

Forest Health Technology Enterprise Team

TECHNOLOGY
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Biological Control

Invasive Plants Established in the United States that are Found in Asia and Their Associated Natural Enemies Volume 2



Invasive Plants Established in the United States that are Found in Asia and Their Associated Natural Enemies

VOLUME 2

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Additional copies of this publication can be ordered from Yun Wu or Richard Reardon, USDA Forest Service, 180 Canfield Street, Morgantown, West Virginia 26505, (304) 285-1594 or (304) 285-1566 or email ywu@fs.fed.us or rreardon@fs.fed.us.

On The Cover: Left to right: *Polygonum perfoliatum* (Mile-a-minute) leaves, flowers and fruits (Denise Binion, USDA Forest Service, FHTET); *Melia azederach* (Chinaberry tree) leaves, flowers and fruits (Ted Bodner, Southern Weed Science Society, <http://www.forestryimages.org>); *Rubus phoenicolasius* (Wineberry) leaves and fruits (Denise Binion, USDA Forest Service, FHTET).



Provinces with plant distributions listed in this book are shown above.

Introduction

Invasive Plants Established in the United States that are Found in Asia and Their Associated Natural Enemies Volume 2 is the second publication in this series containing summaries of information on plants found in Asia that were introduced purposefully or accidentally into the United States. Most of the plants in Volume 2 originated in Asia although there is some confusion for several of the plants which probably originated in Europe; *Gypsophila paniculata*, *Phleum pratense*, *Populus alba*, *Rhamnus cathartica*, and *Viburnum opulus*. *Invasive Plants of Asian Origin Established in the United States and Their Natural Enemies Volume 1* contained 45 species whereas Volume 2 contains 41 species of

plants. All of the information in both volumes was obtained by searching and reviewing the Chinese literature as well as discussions with Chinese scientists. Prior to these volumes, information was scattered, inaccessible and available only in Chinese. The scientific names that appear in the lists of natural enemies were obtained from the Chinese literature and the authors and technical reviewers did not review all of the names, but updated those in obvious error. The book also contains background information on the biology of each plant species, an image to help with identification, a map of its distribution in China, indices of scientific names for each plant species and a bibliography of over 200 references. The references

are cited in the text as bracketed superscript numbers that are indexed in the reference section (pages 164 - 170). Also included are maps of United States distribution for all plant species. This book is intended to serve as a resource for regulatory and plant protection agencies worldwide.

The invasive plant species included in both volumes were selected according to their distribution, economic and ecological importance in the United States based on information from the following sources: *Invasive Plants: Weeds of the Global Garden* (Randall and Marinelli 1996); *Selection of Appropriate Future Target Weeds for Biological Control* (Pemberton 2002); *In:*

Biological Control of Invasive Plants in the Eastern United States (VanDriesche et al 2002), websites (<http://plants.usda.gov>, <http://tncweeds.ucdavis.edu>, <http://www.aphis.usda.gov/ppq/weeds>) and discussions with Dr. Bernd Blossey at Cornell University, Ithaca, NY and Dr. Ted Center at the USDA-ARS Invasive Plant Research Laboratory, Ft. Lauderdale, FL. Knowledge of host range (H.R.) specificity is essential for biological control. Tables containing lists of fungal and arthropod natural enemies are provided for each plant species. The lists of fungal natural enemies were revised based on the Index Fungorum (<http://www.indexfungorum.org/names/names.asp>). Where appropriate, the old names are noted below the table. The host range of natural enemies is based on the organism's feeding preference. Each natural enemy table contains a letter code representing the host range of a given organism. The codes in Volume 2 have been updated from those in Volume 1. The natural enemies found on the target plant are coded as m, o, or p. Natural enemies coded mo, oo, or po are not found on the target plant. The code, using *Ailanthus altissima* as an example, is as follows:

- m = recorded on *Ailanthus altissima*
- mo = recorded on one species of the genus *Ailanthus* other than *Ailanthus altissima*
- o = recorded on more than one species of *Ailanthus* including *Ailanthus altissima*
- oo = recorded on more than one species of *Ailanthus* other than *Ailanthus altissima*
- p = recorded on *Ailanthus* and other genera
- po = recorded on more than one genus including *Ailanthus*, but excluding *Ailanthus altissima*

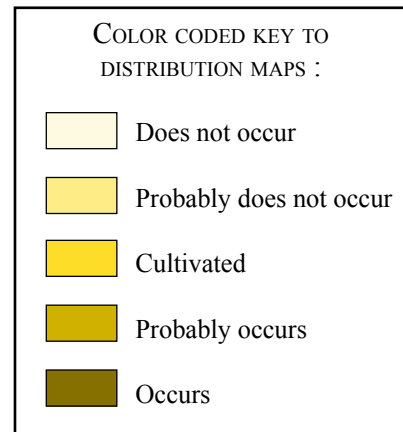
Distribution Maps

The China distribution maps

were created in China, with ESRI ArcView 3.1. using data provided by the National Fundamental Geographic Information system of China (NFGIS). (See sample map and color key at right.) The United States distribution maps indicate whether the plant is present (green) or absent (yellow). Data for the United States distribution maps were obtained by consulting a variety of sources including the Biota of North America (BONAP) (<http://www.bonap.org>); the USDA Plants Database (<http://plants.usda.gov>); the Flora of North America (<http://huh.hua.harvard.edu/FNA>); and the National Park Service (<http://nps.gov>).

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- Randall, J.M.; Marinelli, J. 1996. Invasive plants: weeds of the global garden. Handbook 149. Brooklyn, NY, Brooklyn Botanic Garden, 111p.
- VanDriesche, R.; Blossey, B.; Hoddle, M.; Lyon, S.; Reardon, R. 2002. *Biological Control of Invasive Plants in the Eastern United States*. U.S. Department of Agriculture Forest Health Technology Enterprise Team, FHTET-2002-04, Morgantown, WV. 413p.



Arundo donax

Giant reed

Introduction

The genus *Arundo* contains 5 species occurring in tropical and subtropical regions. Two species are recorded from China^[122].

Species of *Arundo* in China

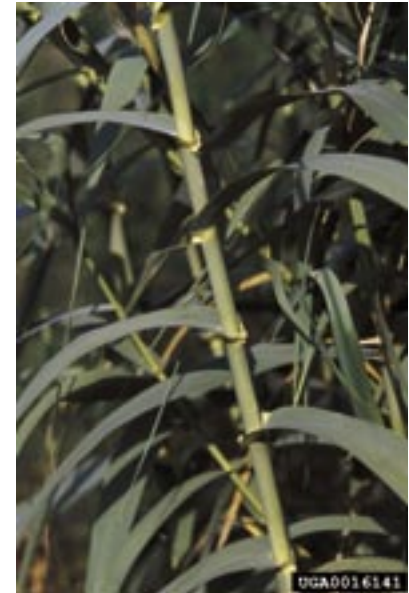
Scientific Name
<i>Arundo donax</i> L.
<i>A. formosana</i> Hack

Taxonomy

- Order:** Graminales
- Suborder:** Gramineae
- Family:** Gramineae (Poaceae)
- Subfamily:** Arundioideae
- Tribe:** Arundineae
- Subtribe:** Arundinae Bews
- Genus:** *Arundo* L.
- Species:** *Arundo donax* L.

Description

Arundo donax is an erect, perennial grass that can grow to a height of 3-6 m. The culms reach a diameter of 1-4 cm, are hollow, with walls 2 to 7 mm thick and divided by partitions at the nodes. The nodes vary in length from 12-30 cm. The leaf sheath is glabrous and longer than the internode. Leaves are conspicuously 2-ranked, 30-50 cm long and 5-8 cm broad at the base and tapering to a fine point. Leaf bases are cordate and persistent. The large plume-like panicles are erect, 30-60 cm long. The spikelet, composed of



2-4 florets, is 10-12 mm in length. Glumes are lanceolate, nearly identical in size, and 3-5 veined, the lower lemma is 8-10 mm long, and about 4-5 mm for the upper. The flowers and fruits appear from September to December^[58, 84, 87, 122].

Habitat

A. donax prefers sandy soil along riverbanks and roadsides^[122].

Distribution

A. donax occurs in Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangsu, Jiangxi, Sichuan, Yunnan, and Zhejiang provinces^[58, 122] and it is cultivated in Henan, Hubei and Shandong provinces^[9, 30, 53].

Economic Importance

The culm of *A. donax* is sometimes used for making reeds for musical wind instruments. Because of its

high fibrin content, *A. donax* is used for paper making and artificial silk. Historically the entire plant was used as building material for rural cottages. It is also used for animal forage^[58, 122].

Related Species

A. donax var. *coleotricha* Hack, native to Taiwan, can be distinguished from *A. donax* by the densely hairy leaf sheath. *A. donax* var. *versicolor* Stokes, has graceful stripes on the leaves. The much shorter *A. formosana*, with a height of 60-120 cm, is also reported from Taiwan^[58, 77, 122].

Natural Enemies of *Arundo*

Five fungi and one arthropod have been recorded in association with plants of the genus *Arundo*.

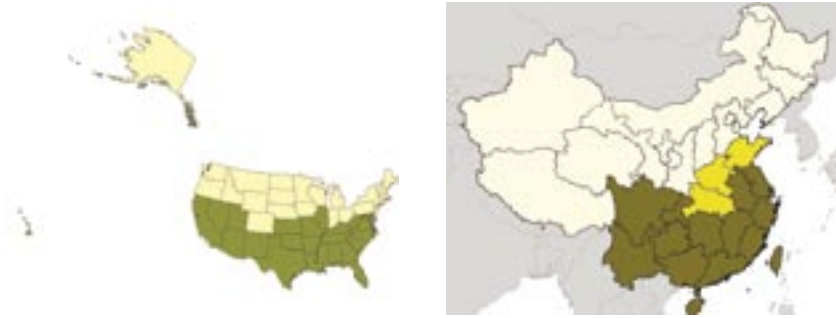
Fungi

Phylum	Family	Species	H. R.	Ref.
Ascomycota	Meliolaceae	<i>Meliola arundinis</i> Pat.	p	[73]
			po	[26]
	Phyllachoraceae	<i>Phyllachora arundinis</i> Sawada	mo	[26]
Basidiomycota	Pucciniaceae	<i>Puccinia arundinis-donacis</i> T. Hirats.	m	[170]
Anamorphic <i>Splanchnonema</i>		<i>Helminthosporium arundinis</i> Sawada	mo	[26]
Anamorphic Uredinales		<i>Uredo arundinis-donacis</i> F.L. Tai	m	[26]

Arthropods

Order	Family	Species	H. R.	Ref.
Lepidoptera	Noctuidae	<i>Simyra albovenosa</i> (Goeze)	p	[15]

Recorded as *Arsilonche albovenosa* (Goeze)



Carex kobomugi
Japanese sedge, Asiatic
sand sedge



Introduction

The genus *Carex* contains more than 2000 species worldwide. In China, approximately 500 species have a nationwide distribution^[114].

Taxonomy

- Order:** Cyperales
- Family:** Cyperaceae
- Subfamily:** Caricoideae Pax
- Tribe:** Cariceale Nees
- Genus:** *Carex* L.
- Subgenus:** *Carex*
- Section:** Macrocephalae
- Kükenth**
- Species:** *Carex kobomugi* Ohwi

Description

C. kobomugi is a perennial rhizomatous sedge. The culm is obtuse triangular, smooth, 10-20 cm in height and 3-4 mm in width, and covered with aged

leaf sheath in the base. Leaves are leathery, toothed and yellow-green in color, often longer than the culms. Inflorescence is dioecious, usually spike. Male flower clusters are oblong in shape, 4-5 cm long and 1.2-1.3 cm wide, with lanceolate scales, while female flower clusters are ovate or oblong, 1.2-1.6 cm long and 4-5



Species of *Carex* in China

Scientific Name	Scientific Name
<i>C. adrieni</i> E. G. Camus	<i>C. maculata</i> Boott
<i>C. aequialta</i> Kükenth.	<i>C. magnoutriculata</i> Tang et Wang ex L. K. Dai
<i>C. agglomerata</i> C. B. Clarke	<i>C. makinoensis</i> Franch.
<i>C. alba</i> Scop.	<i>C. makuensis</i> P. C. Li
<i>C. alliformis</i> C. B. Clarke	<i>C. manca</i> Boott
<i>C. alopecuroides</i> D. Don	<i>C. mancaformis</i> C. B. Clarke ex Franch.
<i>C. alta</i> Boott	<i>C. maorshanica</i> Y. L. Chou
<i>C. altaica</i> Gorodk.	<i>C. maquensis</i> Y. C. Yang
<i>C. amgunensis</i> Fr. Schmidt	<i>C. maubertiana</i> Boott
<i>C. angarae</i> Steud.	<i>C. maximowiczii</i> Miq.
<i>C. angustinowiczii</i> Meinsh. ex Korsh.	<i>C. meihshienica</i> K. T. Fu
<i>C. angustior</i> Mack.	<i>C. melanantha</i> C. A. Mey.
<i>C. angustiutricula</i> Wang et Tang ex L. K. Dai	<i>C. melanocephala</i> Turcz.
<i>C. anningensis</i> Wang et Tang ex P. C. Li	<i>C. melanostachya</i> M. Von Bieb. ex Willd.
<i>C. aperta</i> Boott	<i>C. melinacra</i> Franch.
<i>C. aphanolepis</i> Franch. et Savat.	<i>C. metallica</i> Levl. et Vant.
<i>C. appendiculata</i> (Trautv.) Kükenth.	<i>C. meyeriana</i> Kunth
<i>C. arcatica</i> Meinsh.	<i>C. micrantha</i> Kükenth.
<i>C. arguensis</i> Turcz. ex Trev.	<i>C. microglochyn</i> Wahl.

Scientific Name	Scientific Name
<i>C. argyi</i> Lével. et Vant.	<i>C. middendorffii</i> Fr. Schmidt.
<i>C. aridula</i> V. Krecz.	<i>C. minxianensis</i> S. Y. Liang
<i>C. arisanensis</i> Hayata	<i>C. mitrata</i> Franch.
<i>C. aristatisquamata</i> Tang et Wang ex L. K. Dai	<i>C. miyabei</i> Franch.
<i>C. aristulifera</i> P. C. Li	<i>C. mollicula</i> Boott
<i>C. arnellii</i> Christ ex Scheutz	<i>C. mollissima</i> Christ.
<i>C. ascocetra</i> C. B. Clarke	<i>C. montis-everestii</i> Kükenth.
<i>C. asperifructus</i> Kükenth.	<i>C. montis-wutaii</i> T. Koyama
<i>C. atrata</i> L.	<i>C. moorcroftii</i> Falc. ex Boott
<i>C. atrofusca</i> Schkuhr.	<i>C. morii</i> Hayata
<i>C. atrofuscoides</i> K. T. Ku	<i>C. mosoynensis</i> Franch.
<i>C. austro-occidentalis</i> Wang et Tang	<i>C. motuoensis</i> Y. C. Yang
<i>C. austrosinensis</i> Tang et Wang ex S. Y. Liang	<i>C. moupinensis</i> Franch.
<i>C. autumnalis</i> Ohwi	<i>C. mucronatiformis</i> Tang et Wang
<i>C. baccans</i> Nees	<i>C. muliensis</i> Hand.-Mazz.
<i>C. baimaensis</i> S. W. Su	<i>C. munda</i> Boott
<i>C. baiposhanensis</i> P. C. Li	<i>C. myosurus</i> Nees
<i>C. baohuashanica</i> Tang et Wang ex L. X. Dai	<i>C. nachiana</i> Ohwi
<i>C. bilateralis</i> Hayata	<i>C. nakaoana</i> T. Koyama
<i>C. bodinieri</i> Franch.	<i>C. nanchuanensis</i> Chü ex S. Y. Liang
<i>C. bohémica</i> Schreb.	<i>C. nemostachys</i> Steud.
<i>C. bostrychostigma</i> Maxim.	<i>C. neodigyna</i> P. C. Li
<i>C. brachyathera</i> Ohwi	<i>C. neopolycephala</i> Tang et Wang ex L. K. Dai
<i>C. breviaristata</i> K. T. Fu	<i>C. nervata</i> Franch. et Savat.
<i>C. breviculmis</i> R. Br.	<i>C. neurocarpa</i> Maxim.
<i>C. brevicuspis</i> C. B. Clarke	<i>C. nitidiutriculata</i> L. K. Dai
<i>C. breviscapa</i> C. B. Clarke	<i>C. nivalis</i> Boott
<i>C. brownii</i> Tuckerm.	<i>C. nubigena</i> D. Don
<i>C. brunnea</i> Thunb.	<i>C. nugata</i> . Ohwi
<i>C. caespititia</i> Nees	<i>C. obovatosquamata</i> Wang et Y. L. Chang ex P. C. Li
<i>C. caespitosa</i> L.	<i>C. obscura</i> Nees
<i>C. calcicola</i> Tang et Wang	<i>C. obscuriceps</i> Kükenth.
<i>C. callitrichos</i> V. Krecz.	<i>C. obtusata</i> Liljebl.
<i>C. canaliculata</i> P. C. Li	<i>C. oedorrhapha</i> Nelmes
<i>C. capillacea</i> Boott	<i>C. oligostachya</i> Nees
<i>C. capillaris</i> L.	<i>C. olivacea</i> Boott
<i>C. capilliformis</i> Franch.	<i>C. omeiensis</i> Tang et Wang
<i>C. capricornis</i> Meinsh. ex Maxim.	<i>C. omiana</i> Franch. et Savat.
<i>C. cardiolepis</i> Nees	<i>C. onoei</i> Franch. et Savat.
<i>C. caucasica</i> Stev.	<i>C. orbicularinucis</i> L. K. Dai
<i>C. caudispicata</i> Wang et Tang ex P. C. Li	<i>C. orbicularis</i> Boott
<i>C. cheniana</i> Tang et Wang ex S. Y. Liang	<i>C. orthostachys</i> C. A. Mey.
<i>C. chinensis</i> Retz.	<i>C. otaruensis</i> Franch.
<i>C. chinganensis</i> Litw.	<i>C. otruba</i> Podp.
<i>C. chiwuana</i> Wang et Tang ex P. C. Li	<i>C. ovatispiculata</i> Y. L. Chang ex S. Y. Liang
<i>C. chlorocephalula</i> Wang et Tang ex P. C. Li	<i>C. oxyphylla</i> Franch.

Scientific Name	Scientific Name
<i>C. chlorostachys</i> Stev.	<i>C. pachyneura</i> Kitag.
<i>C. chrysolepis</i> Franch. & Savat.	<i>C. pallida</i> C. A. Mey.
<i>C. chuiana</i> Wang et Tang ex P. C. Li	<i>C. pamirensis</i> C. B. Clarke ex B. Fedtsch.
<i>C. chuii</i> Nelmes	<i>C. paracuraica</i> Wang et Y. L. Chang
<i>C. chungii</i> C. P. Wang	<i>C. parva</i> Nees
<i>C. cinerascens</i> Kükenth.	<i>C. paxii</i> Kükenth.
<i>C. commixta</i> Steud.	<i>C. pediformis</i> C. A. Mey.
<i>C. composita</i> Boott	<i>C. peiktusani</i> Kom.
<i>C. confertiflora</i> Boott	<i>C. peliosanthifolia</i> Wang et Tang ex P. C. Li
<i>C. continua</i> C. B. Clarke	<i>C. perakensis</i> C. B. Clarke
<i>C. coriophora</i> Fisch. et C. A. Mey. ex Kunth	<i>C. pergracilis</i> Nelmes
<i>C. courtallensis</i> Nees ex Boott	<i>C. phacota</i> Spreng.
<i>C. cranaocarpa</i> Nelmes	<i>C. phyllocephala</i> T. Koyama
<i>C. craspedotricha</i> Nelmes	<i>C. physodes</i> M.-Bieb.
<i>C. crebra</i> V. Krecz.	<i>C. pilosa</i> Scop.
<i>C. cremostachys</i> Franch.	<i>C. pisiformis</i> Boott
<i>C. cruciata</i> Wahlenb.	<i>C. planiculmis</i> Kom.
<i>C. cruenta</i> Nees	<i>C. planiscapa</i> Chun et How
<i>C. cryptocarpa</i> C. A. Mey.	<i>C. platysperma</i> Y. L. Chang et Y. L. Yang
<i>C. cryptostachys</i> Brongn	<i>C. poculisquama</i> Kükenth.
<i>C. curaica</i> Kunth	<i>C. polymascula</i> P. C. Li
<i>C. curta</i> Good.	<i>C. polyschoenoides</i> K. T. Fu
<i>C. cylindriostachya</i> Franch.	<i>C. praeclara</i> Nelmes
<i>C. dahurica</i> Kükenth.	<i>C. praelonga</i> C. B. Clarke
<i>C. dailingensis</i> Y. L. Chou	<i>C. prolongata</i> Kükenth.
<i>C. davidii</i> Franch.	<i>C. pruinosa</i> Boott
<i>C. deciduisquama</i> Wang et Tang ex P. C. Li	<i>C. przewalski</i> Egorova
<i>C. delavayi</i> Franch.	<i>C. pseudo-curaica</i> Fr. Schmidt
<i>C. densefimbriata</i> Wang et Tang ex S. Y. Liang	<i>C. pseudo-cyperus</i> L.
<i>C. densicaespitosa</i> L. K. Dai	<i>C. pseudo-dispalata</i> K. T. Fu
<i>C. deqinensis</i> L. K. Dai	<i>C. pseudofoetida</i> Kükenth.
<i>C. diandra</i> Schrank	<i>C. pseudohumilis</i> Wang et Y. L. Chang ex P. C. Li
<i>C. dichroa</i> Freyn	<i>C. pseudo-laticeps</i> Tang et Wang ex S. Y. Liang
<i>C. dickinsii</i> Franch. et Savat.	<i>C. pseudo-ligulata</i> L. K. Dai
<i>C. dielsiana</i> Kükenth.	<i>C. pseudo-longerostrata</i> Y. L. Chang et Y. L. Yang
<i>C. dimorpholepis</i> Steud.	<i>C. pseudo-phyllocephala</i> L. K. Dai
<i>C. diplodon</i> Nelmes	<i>C. pseudo-supina</i> Y. C. Tang ex L. K. Dai
<i>C. dispalata</i> Boott ex A. Gray	<i>C. psychrophila</i> Nees
<i>C. disperma</i> Dew	<i>C. pterocaulos</i> Nelmes
<i>C. doisutepensis</i> T. Koyama	<i>C. pumila</i> Thunb.
<i>C. dolichostachya</i> Hayata	<i>C. purpureo-squamata</i> L. K. Dai
<i>C. doniana</i> Spreng.	<i>C. purpureotincta</i> Ohwi
<i>C. drepanorhyncha</i> Franch.	<i>C. purpureovagina</i> Wang et Y. L. Chang
<i>C. drymophila</i> Turcz	<i>C. putuoensis</i> S. Y. Liang
<i>C. duriuscula</i> C. A. Mey.	<i>C. pycnostachya</i> Kar. et Kir.
<i>C. duvaliana</i> Franch. et Savat.	<i>C. qingdaoensis</i> F. Z. Li et S. J. Fan

Scientific Name	Scientific Name
<i>C. earistata</i> Wang et Y. L. Chang ex S. Y. Liang	<i>C. qinghaiensis</i> Y. C. Yang
<i>C. echinochloaeformis</i> Y. L. Chang et Y. L. Yang	<i>C. qingyangensis</i> S. W. Su et S. M. Xu
<i>C. egena</i> Lévl. et Vant.	<i>C. qiynensis</i> S. W. Su et S. M. Xu
<i>C. eleusinoides</i> Turcz. ex Kunth	<i>C. quadriflora</i> (Kükenth.) Ohwi
<i>C. emineus</i> Nees	<i>C. raddei</i> Kükenth.
<i>C. enervis</i> C. A. Mey.	<i>C. radciflora</i> Dunn
<i>C. ensifolia</i> Turcz.	<i>C. radicina</i> C. P. Wang
<i>C. ereica</i> Tang et Wang ex L. K. Dai	<i>C. rafflesiana</i> Boott
<i>C. eremopyroides</i> V. Krecz.	<i>C. rara</i> Boott
<i>C. eriophylla</i> (Kükenth.) Komarov.	<i>C. recurvisaccus</i> T. Koyama
<i>C. erythrobasis</i> Lévl. et Vant.	<i>C. remotiuscula</i> Wahlenb.
<i>C. fargesii</i> Franch.	<i>C. reptabunda</i> (Trautv.) V. Krecz.
<i>C. fastigiata</i> Franch.	<i>C. retrofracta</i> Kükenth.
<i>C. fenghuangshanica</i> Wang et Tang ex P. C. Li	<i>C. rhizopoda</i> Maxim.
<i>C. fidia</i> Nees	<i>C. rhynchophora</i> Franch.
<i>C. filamentosa</i> K. T. Fu	<i>C. rhynchophysa</i> C. A. Mey.
<i>C. filicina</i> Nees	<i>C. ridongensis</i> P. C. Li
<i>C. filipedunculata</i> S. W. Su	<i>C. riparia</i> Curt.
<i>C. filipes</i> Franch. et Savat.	<i>C. rochebruni</i> Franch. et Savat.
<i>C. finitima</i> Boott	<i>C. rostrata</i> Stokes
<i>C. fluviatilis</i> Boott	<i>C. rubro-brunnea</i> C. B. Clarke
<i>C. foraminata</i> C. B. Clarke	<i>C. rugulosa</i> Kükenth.
<i>C. foraminatiformis</i> Y. C. Tang et S. Y. Liang	<i>C. sadoensis</i> Franch.
<i>C. forficula</i> Franch. et Sav.	<i>C. sagaensis</i> Y. C. Yang
<i>C. forrestii</i> Kükenth.	<i>C. satakeana</i> T. Koyama
<i>C. fulvo-rubescens</i> Hayata	<i>C. satsumensis</i> Franch. et Sav.
<i>C. funingensis</i> Tang et Wang ex S. Y. Liang	<i>C. saxicola</i> Tang et Wang
<i>C. gaoligongshanensis</i> P. C. Li	<i>C. scabrifolia</i> Steud.
<i>C. gentilis</i> Franch.	<i>C. scabrirostris</i> Kükenth.
<i>C. gibba</i> Wahlenb.	<i>C. scaposa</i> C. B. Clarke
<i>C. girdiana</i> Kükenth.	<i>C. schmidtii</i> Meinsh.
<i>C. glabrescens</i> (Kükenth.) Ohwi	<i>C. schneideri</i> Nelmes
<i>C. glaucaeformis</i> Meinsh.	<i>C. sclerocarpa</i> Franch.
<i>C. globistylosa</i> P. C. Li	<i>C. scolopendriformis</i> Wang et Tang ex P. C. Li
<i>C. globularis</i> L.	<i>C. sedakovoii</i> C. A. Mey.
<i>C. glossostigma</i> Han.-Mazz.	<i>C. sendaica</i> Franch.
<i>C. gmelinii</i> Hook. et Arn.	<i>C. serreana</i> Hand.-Mazz.
<i>C. gonggaensis</i> P. C. Li	<i>C. setigera</i> D. Don
<i>C. gongshanensis</i> Tang et Wang ex Y. C. Yang	<i>C. setosa</i> Boott
<i>C. grallatoria</i> Maxim.	<i>C. shaanxiensis</i> Wang et Tang ex P. C. Li
<i>C. graminiculmis</i> T. Koyama	<i>C. shandanica</i> Y. C. Yang
<i>C. grandiligulata</i> Kükenth.	<i>C. shangchengensis</i> S. Y. Liang
<i>C. gynocrates</i> Wormskj. ex Drejer	<i>C. shanghaiensis</i> S. X. Qian et Y. Q. Liu
<i>C. haematostoma</i> Nees	<i>C. shanghangensis</i> S. Y. Liang
<i>C. hancockiana</i> Maxim.	<i>C. shuangbainensis</i> L. K. Dai
<i>C. handelii</i> Kükenth.	<i>C. shuchengensis</i> S. W. Su et Q. Zhang

Scientific Name	Scientific Name
<i>C. harealihinganica</i> Y. L. Chang	<i>C. sichouensis</i> P. C. Li
<i>C. harlandii</i> Boott	<i>C. siderosticta</i> Hance
<i>C. harrismithii</i> Kükenth.	<i>C. simulans</i> C. B. Clarke
<i>C. hastata</i> Kükenth	<i>C. sino-aristata</i> Tang et Wang ex L. K. Dai
<i>C. hattoriana</i> Nakai	<i>C. sino-dissitiflora</i> Tang et Wang ex L. K. Dai
<i>C. hebecarpa</i> C. A. Mey.	<i>C. siroumensis</i> Koidz.
<i>C. henryi</i> C. B. Clarke ex Franch.	<i>C. sociata</i> Boott
<i>C. heshuonensis</i> S. Y. Liang	<i>C. songarica</i> Kar. et Kir.
<i>C. heterolepis</i> Bunge	<i>C. sotoi</i> Ohwi
<i>C. heterostachya</i> Bge.	<i>C. spachiana</i> Boott
<i>C. heudesii</i> Lévl. et Vant.	<i>C. sparsiflora</i> (Wahlenb.) Steud.
<i>C. hirtella</i> Drejer	<i>C. speciosa</i> Kunth.
<i>C. hirtelloides</i> (Kükenth.) Wang et Tang ex P. C. Li	<i>C. stenocarpa</i> Turcz. ex V. Krecz.
<i>C. hirticaulis</i> P. C. Li	<i>C. stipata</i> Muhl. ex Willd.
<i>C. hirtiutriculata</i> L. K. Dai	<i>C. stipitinux</i> C. B. Clarke
<i>C. hongyuanensis</i> Y. C. Tang et S. Y. Liang	<i>C. stipitiutriculata</i> P. C. Li
<i>C. huashanica</i> Tang et Wang ex L. K. Dai	<i>C. stramentitia</i> Boott
<i>C. humida</i> Y. L. Chang et Y. L. Yang	<i>C. subcernua</i> Ohwi
<i>C. humilis</i> Leyss.	<i>C. subbracteata</i> (Kükenth.) Ohwi
<i>C. huolushanensis</i> P. C. Li	<i>C. subfilicinoides</i> Kükenth.
<i>C. hypochlora</i> Freyn	<i>C. submollicula</i> Tang et Wang ex L. K. Dai
<i>C. idzuroei</i> Franch. et Savat.	<i>C. subperakensis</i> L. K. Ling et Y. Z. Huang
<i>C. inanis</i> Kunth	<i>C. subpumila</i> Tang et Wang ex L. X. Dai
<i>C. indica</i> L.	<i>C. subtransversa</i> C. B. Clarke
<i>C. indicaeformis</i> Wang et Tang ex P. C. Li	<i>C. subtumida</i> (Kükenth.) Ohwi
<i>C. infossa</i> C. P. Wang	<i>C. sutchuensis</i> Franch.
<i>C. infuscata</i> Nees	<i>C. taihuensis</i> S. W. Su et S. M. Xu
<i>C. insignis</i> Boott.	<i>C. taipashanica</i> K. T. Fu
<i>C. ischnostachya</i> Steud.	<i>C. taldycola</i> Meinsh.
<i>C. ivanoviae</i> Egorova.	<i>C. tangiana</i> Ohwi
<i>C. jaluensis</i> Kom.	<i>C. tangii</i> Kükenth.
<i>C. japonica</i> Thunb.	<i>C. tangulashanensis</i> Y. C. Yang
<i>C. jiaodongensis</i> Y. M. Zhang et X. D. Chen	<i>C. tapintzensis</i> Franch.
<i>C. jinfoshanensis</i> Tang et Wang ex S. Y. Ling	<i>C. tarumensis</i> Franch.
<i>C. jiuxianshanensis</i> L. K. Dai et Y. Z. Huang	<i>C. tatsiensis</i> (Franch.) Kükenth.
<i>C. jizhuangensis</i> S. Y. Liang	<i>C. tatsutakensis</i> Hayata
<i>C. kansuensis</i> Nelmes	<i>C. teinogyna</i> Boott
<i>C. kaoi</i> Tang et Wang ex S. Y. Liang	<i>C. tenebrosa</i> Boott
<i>C. karlongensis</i> Kükenth.	<i>C. tenuiflora</i> Wahlenb.
<i>C. karoi</i> (Freyn) Freyn	<i>C. tenuiformis</i> Lévl. et Vant.
<i>C. kiangsuensis</i> Kükenth.	<i>C. tenuipaniculata</i> P. C. Li
<i>C. kirganica</i> Kom.	<i>C. tenuispicula</i> T. Tang ex S. Y. Liang
<i>C. kirinensis</i> Wang et Y. L. Chang	<i>C. teres</i> Boott
<i>C. kobomugi</i> Ohwi	<i>C. thibetica</i> Franch.
<i>C. korshinskyi</i> Kom.	<i>C. thompsonii</i> Franch.
<i>C. kuchunensis</i> Tang et Wang ex S. Y. Liang.	<i>C. thomsonii</i> Boott

Scientific Name	Scientific Name
<i>C. kucyniakii</i> Raymond	<i>C. thunbergii</i> Steud.
<i>C. kwangsiensis</i> Wang et Tang ex P. C. Li	<i>C. transversa</i> Boott
<i>C. kwangtoushanica</i> K. T. Fu	<i>C. tricephala</i> Böcklr.
<i>C. lachenalii</i> Schkuhr	<i>C. tristachya</i> Thunb.
<i>C. laeta</i> Boott	<i>C. truncatigluma</i> C. B. Clarke
<i>C. laevissima</i> Nakai	<i>C. tsaiana</i> Wang et Tang ex P. C. Li
<i>C. lancangensis</i> S. Y. Liang	<i>C. tsiangii</i> Wang et Tang
<i>C. lanceolata</i> Boott	<i>C. tsoi</i> Merr. et Chun
<i>C. lancifolia</i> C. B. Clarke	<i>C. tuminensis</i> Kom.
<i>C. lancisquamata</i> L. K. Dai	<i>C. tungfangensis</i> L. K. Dai et S. M. Huang
<i>C. laricetorum</i> Y. L. Chou	<i>C. turkestanica</i> Rgl.
<i>C. lasiocarpa</i> Ehrh.	<i>C. uda</i> Maxim.
<i>C. laticeps</i> C. B. Clarke ex Franch.	<i>C. ulobasis</i> V. Krecz.
<i>C. latisquamea</i> Kom.	<i>C. unisexualis</i> C. B. Clarke
<i>C. laxa</i> Wahlenb.	<i>C. urelytra</i> Ohwi
<i>C. ledebouriana</i> C. A. Mey. et Trev.	<i>C. ussuriensis</i> Kom.
<i>C. lehmanii</i> Drejer	<i>C. vanheurckii</i> Müell. Arg.
<i>C. leiorhyncha</i> C. A. Mey.	<i>C. vesicaria</i> L.
<i>C. lienchengensis</i> S. Y. Liang et Y. Z. Huang	<i>C. vesicata</i> Meinsh.
<i>C. ligata</i> Boott	<i>C. viridimarginata</i> Kükenth.
<i>C. ligulata</i> Nees	<i>C. vulpina</i> L.
<i>C. limosa</i> L.	<i>C. wawuensis</i> Chü
<i>C. limprichtiana</i> Kükenth.	<i>C. wenshanensis</i> L. K. Dai
<i>C. lingii</i> Wang et Tang	<i>C. wui</i> Chii ex L. K. Dai
<i>C. liouana</i> Wang et Tang	<i>C. wushanensis</i> S. Y. Liang
<i>C. liqingii</i> Tang et Wang ex S. Y. Liang	<i>C. wutuensis</i> K. T. Fu
<i>C. lithophila</i> Turcz.	<i>C. wuyishanensis</i> Y. C. Tang ex S. Y. Liang
<i>C. litorhyncha</i> Franch.	<i>C. xiphium</i> Kom.
<i>C. liui</i> T. Koyama & Chuang	<i>C. yajiangensis</i> Tang et Wang
<i>C. loliacea</i> L.	<i>C. yamatsutana</i> Ohwi
<i>C. longerostrata</i> C. A. Mey.	<i>C. yangshuoensis</i> Tang et Wang ex S. Y. Liang
<i>C. longipes</i> D. Don	<i>C. ypsilandraefolia</i> Wang et Tang
<i>C. longispiculata</i> Y. C. Yang	<i>C. yuexiensis</i> S. W. Su et S. M. Xu
<i>C. longpanlaensis</i> S. Y. Liang	<i>C. yulungshanensis</i> P. C. Li
<i>C. longshengensis</i> Y. C. Tang et S. Y. Liang	<i>C. yunlingensis</i> P. C. Li
<i>C. longxishanensis</i> S. Y. Liang	<i>C. yunnanensis</i> Franch.
<i>C. luctuosa</i> Franch.	<i>C. zekogensis</i> Y. C. Yang
<i>C. lushanensis</i> Kükenth.	<i>C. zhenkangensis</i> Wang et Tang
<i>C. maackii</i> Maxim.	<i>C. zhonghaiensis</i> S. Y. Liang
<i>C. macrandrolepis</i> Lévl. et Vant.	<i>C. zizaniaefolia</i> Raymond
<i>C. macrosandra</i> (Franch.) V. Krecz.	<i>C. zunyiensis</i> Tang et Wang

mm wide, with ovate scales that are leathery and veined. Fruits are olive nutlets, which are oblong or oblong-obovate with length of 5-5.5 mm, and enclosed in a papery sac^[114].

Habitat

C. kobomugi occurs along riverbanks and sandy lakeshores^[114].

Distribution

Carex kobomugi occurs in Heibe, Heilongjiang, Jiangsu, Liaoning, Shandong, Taiwan, and Zhejiang provinces^[114].

Economic Importance

The stem and leaf fibers can be used for papermaking. The starchy fruits

are edible^[114].

Natural Enemies of Carex

Approximately 71 species of fungi have been found in association with members of the genus *Carex*, but there are none identified from *C. kobomugi*. Only seven arthropods are recorded.

Fungi

Phylum	Family	Species	H. R.	Ref.
Ascomycota	Mycosphaerellaceae	Mycosphaerella tassiana (De Not.) Johanson	po	[26]
Basidiomycota	Anthracoideaceae	Anthracoidea angulata (Syd.) Boidol & Poelt	oo	[64]
		Anthracoidea butleri (H. & P. Sydow) H. & P. Sydow	oo	[64]
		Anthracoidea caricis (Pers.) Bref.	oo	[64]
			oo	[26]I
		Anthracoidea caryophylleae Kukkonen	oo	[64]
		Anthracoidea eleocharidis Kukkonen	oo	[64]
		Anthracoidea intercedens Nannf.	oo	[64]
		Anthracoidea microspora L. Guo	oo	[64]
		Anthracoidea misandrae Kukkonen	oo	[64]
		Anthracoidea nepalensis Kakish. & Y. Ono	oo	[64]
		Anthracoidea paniceae Kukkonen	oo	[64]
		Anthracoidea siderostictae Kukkonen	oo	[64]
		Anthracoidea subinclusa (Körn.) Bref.	oo	[64]
	oo		[26]II	
	Anthracoidea vankyi Nannf.	oo	[64]	
	Cintractiaceae	Cintractia arctica Lagerh.	oo	[26]
		Tolyposporium aterrimum (Tul. & C. Tul.) Dietel	oo	[64]
	Farysiaceae	Farysia butleri Syd	po	[26]
		Farysia merrillii (Henn.) Syd. & P. Syd.	po	[26]
Farysia orientalis L. Ling		mo	[26]	
Farysia thuenenii (A.A. Fisch. Waldh.) Nannf.		oo	[26]III	

Phylum	Family	Species	H. R.	Ref.
	Glomosporiaceae	Thecaphora aterrима Tul. & C. Tul.	oo	[26]
	Pucciniaceae	Puccinia angustata Peck	oo	[26]
		Puccinia aomoriensis Syd. & P. Syd.	po	[170]
			po	[26]
		Puccinia atrofusca (Dudley & C.H. Thomps.) Holw.	po	[170]
		Puccinia biporosa J.Y. Zhuang	mo	[170]
		Puccinia breviculmis Dietel	mo	[26]
			oo	[170]
		Puccinia caricicola Fuckelel	mo	[170]
		Puccinia caricina DC.	po	[26]
		Puccinia caricis Rebent.	po	[170]
		Puccinia caricis-brunneae Dietel	oo	[26]
			mo	[170]
		Puccinia caricis-filicinae Barclay	mo	[26]
			oo	[170]
		Puccinia caricis-gibbae Dietel	oo	[26]
			oo	[170]
		Puccinia caricis-hancockianae J.Y. Zhuang & S.X. Wei	mo	[170]
		Puccinia caricis-japonicae Dietel	oo	[170]
		Puccinia caricis-lanceolatae Morim.	mo	[170]
		Puccinia caricis-lingii J.Y. Zhuang	mo	[170]
		Puccinia caricis-molliculae Syd. & P. Syd.	oo	[170]
			mo	[26]
		Puccinia caricis-nubigenae Padwick & A. Khan	oo	[170]
		Puccinia caricis-pilosae Miura	oo	[170]
		Puccinia caricis-pseudololiaceae Homma	oo	[170]
		Puccinia caricis-rhizopodae Miura	oo	[170]

Phylum	Family	Species	H. R.	Ref.
		<i>Puccinia caricis-siderostictae</i> Dietel	mo	[26]
			mo	[170]
		<i>Puccinia caricis-thunbergii</i> Homma	oo	[170]
		<i>Puccinia congesta</i> Berk. & Broome	oo	[26]
			oo	[170]
		<i>Puccinia dioicae</i> Magnus	po	[170]
			po	[26]
		<i>Puccinia dioicae</i> var. <i>extensicola</i> (Plowr.) D.M. Hend.	po	[26]
		<i>Puccinia duplex</i> Jørst.	mo	[170]
			mo	[26]
		<i>Puccinia hainanensis</i> J.Y. Zhuang & S.X. Wei	mo	[170]
		<i>Puccinia humilicola</i> Hasler	oo	[170]
		<i>Puccinia hyalina</i> Dietel	oo	[26]
			oo	[170]
		<i>Puccinia jaceae-leporinae</i> Tranzschel	oo	[170]
		<i>Puccinia karelica</i> Tranzschel	mo	[170]
		<i>Puccinia leucocephala</i> J.Y. Zhuang & S.X. Wei	mo	[170]
		<i>Puccinia lineariformis</i> Syd. & P. Syd.	oo	[170]
			oo	[26]
		<i>Puccinia lyngbyei</i> Miura	oo	[170]
		<i>Puccinia mandshurica</i> Miura	mo	[170]
			mo	[26]
		<i>Puccinia microsora</i> Körn.	oo	[170]
		<i>Puccinia miyakei</i> Syd.	mo	[170]
			mo	[26]
		<i>Puccinia moiwensis</i> Miura	oo	[170]
		<i>Puccinia opizii</i> Bubák	oo	[170]

Phylum	Family	Species	H. R.	Ref.
		<i>Puccinia saepta</i> Jørst.	mo	[26]
			mo	[170]
		<i>Puccinia subhyalina</i> Tranzschel	oo	[26]
			oo	[170]
		<i>Puccinia tahensis</i> Tranzschel	mo	[170]
		<i>Puccinia yamesuga</i> Homma	oo	[170]
		<i>Puccinia yokogurae</i> Henn.	oo	[170]
			mo	[26]
	<i>Uromyces perigynius</i> Halst.	oo	[26]	
	Urocystaceae	<i>Urocystis fischeri</i> Körn.	oo	[26]
Ustilaginaceae	<i>Orphanomyces arcticus</i> (Rostr.) Savile	oo	[64]	
	<i>Schizonella melanogramma</i> (DC.) J. Schröt.	oo	[64]	
Anamorphic Mycosphaerella		<i>Septoria caricis</i> Pass.	oo	[26]
		<i>Septoria nigrificans</i> Pat.	oo	[26]

Arthropods

Order	Family	Species	H. R.	Ref
Coleoptera	Chrysomelidae	<i>Geinella invenusta</i> (Jacobson)	po	[201]
Homoptera	Callaphididae	<i>Iziphya flabellai</i> (Sanborn)	m	[113]
Lepidoptera	Crambidae	<i>Catagela adjurella</i> Walker	po	[169]
	Hesperiidae	<i>Ochlodes subhyalina</i> Bremer & Grey	po	[178]
	Noctuidae	<i>Eustrotia uncula</i> (Clerck)	oo	[228]
		<i>Plusia festata</i> Graeser	po	[224]
Satyridae	<i>Erebia ligea</i> (L.)	po	[219]	



Gypsophila paniculata

Baby's breath

Introduction

There are approximately 150 members of the genus *Gypsophila* worldwide primarily occurring in temperate Asia and Europe. Seventeen species occur in China, excluding *Gypsophila elegans* Marschall von Bieberstein, a cultivated species that is native to southwestern Asia and southeastern Europe^[136].



Species of *Gypsophila* in China

Scientific Name	Scientific Name
<i>G. altissima</i> L.	<i>G. oldhamiana</i> Miq.
<i>G. capituliflora</i> Rupr.	<i>G. pacifica</i> Kom.
<i>G. cephalotes</i> (Schrenk) Williams	<i>G. paniculata</i> L.
<i>G. cerastioides</i> D. Don	<i>G. patrinii</i> Ser.
<i>G. davurica</i> Turcz. ex Fenzl	<i>G. perfoliata</i> L.
<i>G. desertorum</i> (Bge.) Fenzl	<i>G. sericea</i> (Ser.) Krylov
<i>G. huashanensis</i> Y. W. Tsui et D. Q. Lu	<i>G. spinosa</i> D. Q. Lu
<i>G. licentiana</i> Hand. -Mazz.	<i>G. tschiliensis</i> J. Krause
<i>G. muralis</i> L.*	

* Revised *Flora of China*, and not listed in the *Flora Reipublicae Popularis Sinicae*

Taxonomy

- Order:** Centrospermae
- Suborder:** Caryophyllineae
- Family:** Caryophyllaceae
- Subfamily:** Silenoideae A. Br.
- Tribe:** Diantheae Pax
- Genus:** *Gypsophila* L.
- Section:** Rokejeka (Forssk.) A. Br.
- Species:** *Gypsophila paniculata* L.

Description

G. paniculata is a perennial herbaceous plant about 30-80 cm high with robust roots. The stem, either solitary or sparsely clustered, is erect and multi-branched, glabrous, or glandular hairy in the lower part. Leaves are lanceolate, or linear, 2-5 cm long and 2.5-7 mm wide with an acuminate

apex and a conspicuous midrib. The compound cymes bear numerous small flowers on glabrous, slender pedicels which are about 2-6 mm long. The bracts are triangular with an abruptly acute apex. The calyx is broadly campanulate, 1.5-2 mm long, purple veined, ovate lobed, with a scarios margin. Petals are white or pink, spatulate, about 3 mm long and 1 mm wide, with a truncate or obtuse apex. The filaments are flat, linear, and equal to the petal in length, with globose anthers. The ovoid ovary is 1 mm in diameter with slender styles. The flowers appear from June through August, followed in August through September by globose capsules that are longer than the persistent calyx, and contain reddish brown, obtusely

tuberculate seeds about 1 mm in diameter^[135, 136].

Habitat and Distribution

G. paniculata occurs in grasslands, on rocky slopes, fixed dunes, in floodplains, and crop fields at elevations of 400-1500 m. It is reported to occur in the Altaic mountain areas of northern Xinjiang and Taxkorgan of western Xinjiang^[20, 135, 136]. Cultivation has been reported in Anhui, Beijing, Hebei, Heilongjiang, and Shanghai provinces^[17, 35, 67, 154, 221].

Economic Importance

The root and stem of *G. paniculata* are medically useful. *G. paniculata* is also cultivated as an ornamental^[136].

Related Species

G. perfoliata L., the other species in the Section Rokejeka, differs from *G. paniculata* by its obovate oblong or obovate leaf which is covered with yellow, glandular hairs. The calyx is



2-4 mm long, and green veined. The petals are oblong, 5 mm long and 2 mm wide. *G. perfoliata* flowers July through August and fruits in August through September. It occurs in forest grasslands, wet riversides, saline-alkaline soils, and steppe sands at elevations of 500-1000 m in

the Altaic mountain area of northern Xinjiang^[134, 136].

Natural Enemies of *Gypsophila*

Three species of fungi are listed for the genus *Gypsophila*, but none is associated with *G. paniculata*.

Fungi

Phylum	Family	Species	H. R.	Ref.
Basidiomycota	Pucciniaceae	<i>Puccinia behenis</i> G.H. Otth	po	[229]
		<i>Puccinia gypsophilae</i> Liou & Wang	oo	[26]
		<i>Uromyces dianthi</i> (Pers.) Niessl	po	[26]



Lepidium latifolium

Broadleaved pepper weed

Introduction

There are 180 members of the genus *Lepidium* worldwide. Sixteen species are reported from China [218].

Taxonomy

Order: Papaverales

Suborder: Capparineae

Family: Cruciferae
(Brassicaceae)

Tribe: Lepidieae DC.

Genus: *Lepidium* L.

Section: *Lepidium*

Species: *Lepidium latifolium* L.

Description

Lepidium latifolium is an herbaceous perennial about 30-150 cm in length. The erect stems are glabrous or sparsely pubescent, branched in the upper part, and woody at the base. The basal leaves and the leaves in the lower part of the stems are leathery, oblong-lanceolate, or ovate, 3-6 cm long and 3-5 cm wide, abruptly acute or obtuse at the apex, cuneate at the base, and entire or dentate margins. The petiole is about 1-3 cm in length. The sessile upper leaves are lanceolate or oblong-elliptic, 2-5 cm long and 5-15 cm wide. The paniculate raceme has glabrescent sepals, which are ovoid oblong, or nearly orbicular, about 1 mm in height, with a rounded apex. Petals are white, obovate, about 2 mm long, with a rounded apex. The flowers appear from May to July. In July through September, oblong-elliptic fruits appear. Fruits are 1.5-3 mm long, glabrous, nearly glabrous,



Species of *Lepidium* in China

Scientific Name	Scientific Name
<i>L. alashanicum</i> S. L. Yang	<i>L. ferganense</i> Korsh.
<i>L. apetalum</i> Willd.	<i>L. lacerum</i> C. A. Meyer
<i>L. campestre</i> (L.) R. Br.*	<i>L. latifolium</i> L.
<i>L. capitatum</i> Hook. f. et Thoms.	<i>L. obtusum</i> Basin.
<i>L. cartilagineum</i> (J. May.) Thell.	<i>L. perfoliatum</i> L.
<i>L. cordatum</i> Willd. ex Stev.	<i>L. ruderale</i> L.
<i>L. cuneiforme</i> C. Y. Wu	<i>L. sativum</i> L.
<i>L. densiflorum</i> Schrad.	<i>L. virginicum</i> L.

* Recorded as *L. campestre* (L.) R. Br. f. *glabratum* (Lej. et Court.) Thell. in *FRPS*.

or pubescent, and wingless. Seeds are light brown, broadly elliptic, about 1 mm long, and also wingless^[61, 218].

Habitat

L. latifolium occurs in field margins and saline meadows, along roadsides, and on slopes, at elevations of 100-4300 m^[218]. *L. latifolium* can also be found in crop field margins, along roadsides and arid, sandy places at elevations of 600-1200 m in Xinjiang^[21, 218].

Distribution

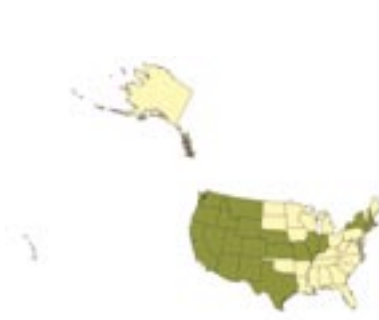
L. latifolium occurs in Gansu, Hebei, Heilongjiang, Henan, Inner Mongolia, Liaoning, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Tibet, and Xinjiang provinces^[218].

Economic Importance

L. latifolium is used medicinally in northwestern China^[218].

Related Species

L. obtusum Basin is distinguished from *L. latifolium* by its obtuse apex,



basally cordate fruits, and raceme inflorescence. It occurs in pastures, field margins, waste places, and deserts at elevations of 400–2800 m in Gansu, Inner Mongolia, Ningxia, Qinghai,

Tibet, and Xinjiang provinces^[61, 218].

Natural Enemies of *Lepidium*

Seven fungi have been recorded as

associated with members of the genus *Lepidium*. Nineteen arthropods are listed in association with members of the genus *Lepidium*.

Fungi

Phylum	Family	Species	H. R.	Ref.
Ascomycota	Erysiphaceae	<i>Erysiphe betae</i> (Vaňha) Weltzien	po	[26]*
		<i>Erysiphe cruciferarum</i> Opiz ex L. Junell	p	[24]
			n/a	[182]
Oomycota	Albuginaceae	<i>Albugo candida</i> (Pers.) Kuntze	po	[202]
		<i>Albugo lepidii</i> A.N.S. Rao	po	[202]
	Peronosporaceae	<i>Peronospora lepidii-virginici</i> Gäum.	mo	[26]
		<i>Peronospora parasitica</i> (Pers.) de Bary	po	[202]
			po	[26]
Anamorphic <i>Guignardia</i>		<i>Phyllosticta lepidii</i> Brunaud	n/a	[182]

* Recorded as *Erysiphe polygoni* DC.

Arthropods

Order	Family	Species	H. R.	Ref.	
Acariformes	Tetranychidae	<i>Tetranychus urticae</i> (Koch)	p	[168]	
Coleoptera	Chrysomelidae	<i>Phyllotreta turcmenica</i> Weise	po	[91]	
		<i>Phyllotreta vittula</i> (Redtenbacher)	po	[91]	
	Curculionidae	<i>Sympiezomias velatus</i> (Chevrolat)	po	[191]	
Hemiptera	Lygaeidae	<i>Nysius ericae</i> (Schilling)	po	[124]	
	Miridae	<i>Adelphocoris lineolatus</i> (Goeze)	p	[217]	
		Pentatomidae	<i>Eurydema maracandicum</i> Oschanin	p	[217] ^I
			<i>Eurydema ventrale</i> Kolenati	p	[208]
			<i>Eurydema wilkinsi</i> Distant	p	[207]
Homoptera	Aphididae	<i>Aphis gossypii</i> Glover	po	[5]	
Lepidoptera	Crambidae	<i>Loxostege sticticalis</i> L.	po	[119]	
			p	[33]	
	Noctuidae	<i>Agrotis crassa</i> (Hübner)	p	[131]	
			p	[130] ^{II}	
			po	[200] ^{III}	
			po	[10]	
			p	[140]	
	Pieridae	<i>Pieris rapae</i> (L.)	po	[198]	
			po	[102]	
	Plutellidae	<i>Plutella xylostella</i> L.	po	[112]	
Thysanoptera	Thripidae	<i>Thrips tabaci</i> Lindemann	po	[149]	
			po	[66]	

^I Recorded as *Eurydema festiva chlorotica* Horváth

^{II} Recorded as *Euxoa conspicua* Hübner

^{III} Recorded as *Scotogramma trifolii* (Rottenberg)

Lygodium species Climbing fern

Introduction

The genus *Lygodium* contains 45 species, most of which occur in tropical and subtropical regions. Ten species are reported to occur in China^[152].



Species of *Lygodium* in China

Scientific Name	Scientific Name
<i>L. conforme</i> C. Chr.	<i>L. microstachyum</i> Desv.
<i>L. digitatum</i> Presl	<i>L. polystachyum</i> Wall.
<i>L. flexuosum</i> (L.) Sw.	<i>L. salicifolium</i> Presl
<i>L. japonicum</i> (Thunb.) Sw.	<i>L. subareolatum</i> Christ
<i>L. microphyllum</i> (Cav.) R. Br*	<i>L. yunnanense</i> Ching

* Listed as *L. scandens* (L.) Sw. in several sources

I. *Lygodium japonicum* Japanese climbing fern

Taxonomy

Order: Eufilicales

Family: Lygodiaceae

Genus: *Lygodium* Sw.

Species: *Lygodium japonicum* (Thunb.) Sw.

Description

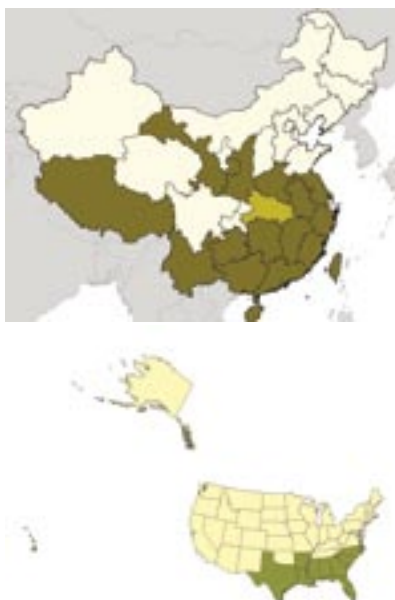
Lygodium japonicum is a climbing fern reaching a height of 1-4 m. The numerous, opposite, compound leaves are 9-11 cm long. The petiole is 1.5 cm long and gray pubescent. The sterile leaves are triangular in overall outline, 10-12 in both length and width. The 2-4 pairs of pinnae (primary leaflets) are alternate on the stem that is about 4-8 mm, pubescent, and with narrow wings. Each pinna is ovoid, 4-8 cm long and 3-6 cm wide. The pinnules (primary leaflets) are 2-3 paired, alternate, nearly sessile, ovoid triangular, and palmately divided into 3 shortly broad lobes.

The terminal lobe is 2-3 cm long and 6-8 mm wide, with an obtuse apex, subcordate base, and irregular crenulate margin. Fertile pinnae are ovoid triangular, about 10-20 cm in both length and width. The pinnae are 4-5 paired, alternate, oblong-lanceolate, 5-10 cm in length and 4-6 cm in width. Each pinna has 3-4 pairs of

ovoid triangular pinnatifid pinnules. Sporangia, borne along the margin in two rows, are glabrous, dark brown, and 2-4 mm in length^[83, 180].

Habitat and Distribution

L. japonicum occurs along roadsides, forests, forest margins or thickets of hillside slopes, crop field margins, at elevations up to 1000m^[83, 180]. It is a common component of the perennial plant population^[204]. *L. japonicum* occurs primarily south of the Yangtze River in the provinces of Anhui, Fujian, Guangdong, Guizhou, Hunan, Guangxi, Jiangsu, northern Shaanxi, Taiwan, Yunnan, and Zhejiang^[56, 117, 152]. North of the Yangtze River, *L. japonicum*



occurs in thickets on the south slopes of the Qinling Mountains at elevations of 560-1100m^[80] and the provinces of Gansu, Henan, and Shaanxi^[80, 152]. This species may also occur in the southern Dabieshan Mountain area in Hubei province^[31].

Economic Importance

L. japonicum is medicinally useful^[83].

Related Species

L. microstachyum Desv., although similar to *L. japonicum* in appearance, has narrower and longer lobes, and occurs in thickets at elevations of 150 m in Fujian, Guangdong, Guangxi, Taiwan, and Yunnan provinces^[152].

II. *Lygodium microphyllum* Old World climbing fern

Taxonomy

Order Eufilicales

Family Lygodiaceae

Genus *Lygodium* Sw.

Species *Lygodium microphyllum* (Cav.) R. Br. [= *Lygodium scandens* (L.) Sw.]

Description

Lygodium microphyllum is a fern that can climb up to a height of 7 m. Numerous papery pinnately compound leaves are borne on a short stem about 2-4 mm long, oppositely on the main stem with internode about 7-9 cm in length. The sterile leaves are imparipinnate (divergent lobed for the terminal leaflet), oblong, 7-8 cm long and 4-7 cm wide, opposite along the lower part of the stem, with petiole about 1-1.2 cm in length. Each sterile frond consists of about 4 pairs of pinnae (leaflets), which



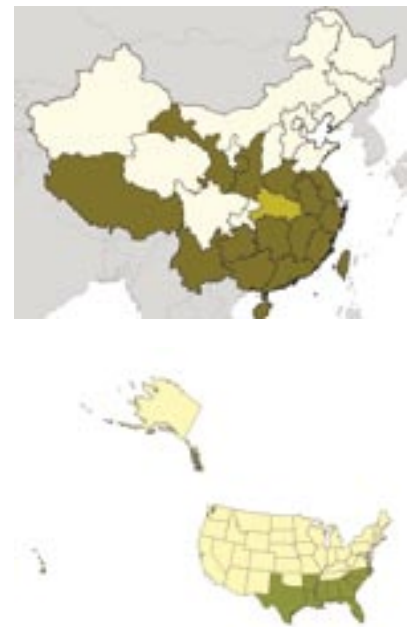
grow alternately 8 mm apart along the rachis. The leaflet is ovoid triangular, about 2 cm long and 1.5 cm wide, with a crenulate margin, truncate or subcordate base, and an obtuse apex. Fertile fronds are oblong, 8-10 cm long and 4-6 cm wide. Each frond has 4-5 pairs of leaflets that are triangular, 1.5-3 cm long and 1.5-2 cm wide, obtuse apically, with noticeable 2-3 branched leaf veins. Brown sporangia about 3-5 mm, occur along the margins of fertile pinnae^[83, 180]

Habitat

L. microphyllum forms thickets, at elevations about 100-152 m. and also occurs along stream banks and roadsides where there is abundant sunshine. It is an indicator of acid soil, growing best at pH 4.5-5.0^[83, 152, 180].

Distribution

L. microphyllum occurs in western Fujian, Guangdong, Guangxi, Hainan, Hunan, Jiangxi, Taiwan, and southeastern Yunnan provinces^[117, 152].



Economic Importance

L. microphyllum is used medicinally in China^[83].

Natural Enemies of *Lygodium*

Two fungi and seven arthropods are associated with the genus *Lygodium*. All can be hosted by *L. japonicum*^[89].

Fungi

Phylum	Family	Species	H. R.	Ref.
Anamorphic <i>Mycosphaerella</i>		<i>Pseudocercospora lygodii</i> Sawada ex Goh & W.H. Hsieh	m	[129]
		<i>Pseudocercospora polypodiacearum</i> D.N. Shukla, A.K. Singh, P. Kumar & Kamal	m	[129]

Arthropods

Order	Family	Species	H. R.	Ref
Acariformes	<i>Eriophyidae</i>	<i>Floracarus perrepae</i> Knihinicki and Boczek	n/a [‡]	[89]
	Tenuipalpidae	<i>Brevipalpis</i> sp.	n/a ^{†‡}	[89]
Coleoptera	<i>Coccinellidae</i>	<i>Epilachna chinensis</i> (Weise)	p [†]	[75]
Homoptera	Margarodidae	<i>Icerya purchasi</i> Maskell	p [†]	[165]
Lepidoptera	Crambidae	<i>Neomusotima conspurcatalis</i> Warren	n/a [‡]	[89]
	Noctuidae	<i>Callopistria</i> sp.	n/a [‡]	[89]
Thysanoptera	Thripidae	<i>Octothrips lygodii</i> Mound	n/a [‡]	[89]

[†] Hosted by *L. japonicum*

[‡] Hosted by *L. microphyllum*

Melia azedarach

Chinaberry tree

Introduction

The genus *Melia* contains three species that occur primarily in tropical and subtropical regions of the Eastern hemisphere. Two species have been recorded from China in provinces south the of Yellow River^[7].

Species of *Melia* in China

Scientific Name
<i>M. azedarach</i> L.
<i>M. toosendan</i> Sieb. et Zucc.

Taxonomy

Order: Rutales

Suborder: Rutineae

Family: Meliaceae

Subfamily: Melioideae Harms

Tribe: Melieae Harms

Genus: *Melia* L.

Species: *Melia azedarach* L.

Description

Melia azedarach is a deciduous tree with spreading branches that can reach up to 10 m in height. The bark is grayish brown and longitudinally fissured. Leaves are odd bipinnate or tripinnate compounds, about 20-40 cm in length. Leaflets are opposite, ovate, elliptic to lanceolate, 3-7 cm long and 2-3 cm wide, shortly acuminate in the apex, cuneate or broadly so at the slightly asymmetrical base, with a crenulate serrate margin. The leaflets are covered with stellate hairs when young, becoming glabrescent with 12-16 pairs of ascending, spreading lateral veins. The panicles are about equal to the leaf in length, glabrous, glabrescent scaly or pubescent. Calyxes are five-lobed. Each lobe is ovate to oblong, with an acute apex. Petals are light purple, obovately spatulate, both surfaces are puberulous, and about 1 cm long. Stamens are monadelphous, purplish, glabrous or nearly so, 7-8



mm long, vertically striped, and 10 bi- or tri-denticulately lobed. Each lobe bears one anther on the inner wall. The ovary is subglobose, glabrous, containing 5-6 locules, with 2 ovules each. The fragrant flowers appear in April through May, the fruits, which are toxic, appear in October through September. They are globose to elliptic drupes 1-2 cm long and 8-15 mm wide, 4-5 locules, each containing a single seed^[7].

Habitat

Melia azedarach occurs in low elevation open fields, roadsides, or sparse forests. Due to its high economic value, *M. azedarach* is cultivated in many areas. *M. azedarach* prefers a moist, fertile soil^[7].

Distribution

M. azedarach has a wide distribution in provinces south of the Yellow River^[7]. It has been reported from Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Yunnan, Zhejiang



provinces and cultivated in Hebei.

Economic Importance

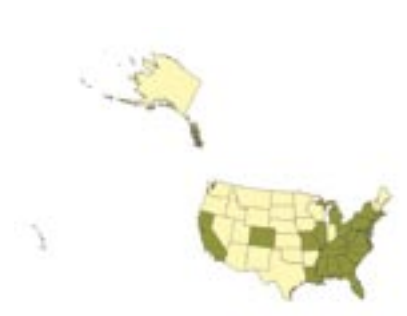
The sapwood of *M. azedarach* is used in building construction and furniture making. The fresh leaves are used as an insect repellent. The roots and fruit are medically useful^[7].

Related Species

The other *Melia* species reported in China is *M. toosendan* Sieb. & Zucc. It has a 6-8 locule ovary, drupes about 3 cm long, and a nearly entire leaf margin. The inflorescence is half the length of the leaf. It prefers moist soil in the fertile mixed forests of Guizhou, Gansu, Hubei, Sichuan, and Yunnan^[7].

Natural Enemies of *Melia*

Eight fungal species have been reported on members of the genus *Melia*, and seven on *M. azedarach*. *Melanconium meliae* Teng and *Cercospora meliae* Ellis & Everh. have only one host record. Fifty six species of arthropods have been



found on members of the genus *Melia*, mainly on *M. azedarach*. Among them, two monophagous leafhoppers *Elbelus melianus* Kuoh and *Erythroneura melia* Kuoh, cause significant damage^[118, 203].

Fungi

Phylum	Family	Species	H. R.	Ref.
Ascomycota	Erysiphaceae	<i>Phyllactinia guttata</i> (Wallr.) Lév.	p	[26]I
Basidiomycota	Hymenochaetaceae	<i>Phellinus torulosus</i> (Pers.) Bourdot & Galzin	p	[26]
	Incertae sedis	<i>Phellinus williamsii</i> (Murrill) Pat.	p	[26]
	Polyporaceae	<i>Coriolus unicolor</i> (Bull.) Pat.	po	[26]
Anamorphic <i>Lewia</i>		<i>Alternaria tenuissima</i> (Kunze) Wiltshire	p	[209]
Anamorphic <i>Melanconis</i>		<i>Melanconium meliae</i> Teng	m	[26]
Anamorphic <i>Mycosphaerella</i>		<i>Cercospora meliae</i> Ellis & Everh.	m	[26]
		<i>Pseudocercospora subsessilis</i> (Syd. & P. Syd.) Deighton	o	[129]
			m	[26]II

^IRecorded as *Phyllactinia corylea* (Pers.) Karst.

^{II}Recorded as *Cercospora subsessilis* H. et P. Syd.

Arthropods

Order	Family	Species	H. R.	Ref	
Acariformes	Eriophyidae	<i>Panonychus citri</i> (McGregor)	p	[75]	
			p	[94]	
	Tetranychidae	<i>Tetranychus</i> sp.	p	[75]	
			<i>Tetranychus urticae</i> (Koch)	p	[94]
Coleoptera	Cerambycidae	<i>Anoplophora chinensis</i> (Förster)	p	[165]	
			p	[94]	
			p	[75]	
		<i>Anoplophora glabripennis</i> (Motschulsky)	p	[94]	
		<i>Anoplophora horsfieldi</i> (Hope)	p	[94]	
		<i>Batocera davidis</i> Deyrolle	p	[94]	
		<i>Batocera lineolata</i> Chevrolat	p	[94]	
		<i>Ceresium sinicum</i> White	p	[94]	
		<i>Embrik-strandia unifasciata</i> (Ritsema)	p	[94]	
		<i>Purpuricenus spectabilis</i> Motschulsky	p	[94]	
	<i>Rhytidodera bowringii</i> White	p	[94]		
	Cetoniidae	<i>Cetonia pilifera</i> Motschulsky	p	[94]	
	Curculionidae	<i>Chlorophanus auripes</i> Faust	p	[94]	
	Eumolpidae	<i>Basilepta sinarum</i> Weise	p	[75]	
	Melolonthidae		<i>Holotrichia diomphalia</i> Bates	p	[94]
			<i>Holotrichia lata</i> Brenske	p	[94]
<i>Holotrichia sinensis</i> Hope			p	[94]	
<i>Polyphylla laticollis</i> Lewis			p	[94]	
Hemiptera	Acanthosomatidae	<i>Elasmucha nipponica</i> (Esaki & Ishihara)	p	[208]	
	Pentatomidae	<i>Chrysocoris grandis</i> (Thunberg)	p	[207]	
			p	[94]	
		<i>Dalpada cinctipes</i> Walker	p	[75]	
		<i>Plautia crossota</i> (Dallas)	p	[75]	
		<i>Rhaphigaster genitalia</i> (Fabricius)	p	[208]	

Order	Family	Species	H. R.	Ref	
Homoptera	Aleyrodidae	<i>Dialeurodes citri</i> (Ashmead)	p	[94]	
	Cicadellidae	<i>Cicadula</i> sp.	m	[94]	
		<i>Elbelus melianus</i> Kuoh	n/a	[203]	
		<i>Erythroneura melia</i> Kuoh	m	[118]	
		<i>Nephotettix cincticeps</i> Uhler	m	[94]	
		<i>Cryptotympana atrata</i> (Fabricius)	p	[94]	
	Cicadidae	<i>Ceroplastes floridensis</i> Comstock	p	[173]	
		<i>Ceroplastes japonicus</i> Green	p	[94]	
	Diaspididae	<i>Lepidosaphes tubulorum</i> Ferris	p	[94]	
		<i>Parlatoria camelliae</i> Comstock	p	[94]	
	Fulgoridae	<i>Lycorma delicatula</i> (White)	p	[220]	
			p	[94]	
	Ricaniiidae	<i>Ricania speculum</i> (Walker)	p	[220]	
			p	[94]	
Hymenoptera	Eurytomidae	<i>Eurytoma plotnikovi</i> Nikolskaya	p	[94]	
Lepidoptera	Geometridae	<i>Ascotis selenaria dianaria</i> Hübner	p	[94]	
		<i>Ophthalmitis albosignaria</i> (Bremer & Grey)	p	[189] ^I	
	Hepialidae	<i>Phassus sinifer sinensis</i> Moore	p	[94]	
	Limacodidae	<i>Monema flavescens</i> Walker	p	[75]	
			p	[94] ^{II}	
			<i>Setora postornata</i> (Hampson)	p	[94]
			<i>Thosea sinensis</i> (Walker)	p	[75]
	Noctuidae	<i>Episparis liturata</i> (Fabricius)	m	[94]	
			<i>Grammodes geometrica</i> (Fabricius)	p	[94] ^{III}
	Sphingidae	<i>Psilogramma increta</i> (Walker)	p	[94]	
			<i>Psilogramma menephron</i> (Cramer)	p	[94]
Tortricidae	<i>Enarmonia koenigana</i> Fabricius	m	[94]		
Parasitiformes	Phytoseiidae	<i>Amblyseius okinawanus</i> Ehara	p	[75]	
		<i>Amblyseius orientalis</i> Ehara	p	[75]	
		<i>Euseius ovalis</i> (Evans)	p	[75]	
Thysanoptera	Phlaeothripidae	<i>Haplothrips chinensis</i> Priesner	p	[75]	
			p	[94]	
	Thripidae	<i>Scirtothrips dorsalis</i> Hood	p	[66]	
		<i>Thrips coloratus</i> Schmutz	p	[75]	
		<i>Thrips flavidulus</i> Bagnall	p	[75]	
<i>Thrips formosanus</i> Priesner	po	[66]			

^IRecorded as *Ophthalmodes albosignaria* (Bremer et Grey)

^{II}Recorded as *Cnidocampa flavescens* (Walker)

^{III}Recorded as *Chalciope geometrica* Fabricius

Miscanthus sinensis

Chinese silver grass

Introduction

The genus *Miscanthus* contains approximately ten species occurring primarily in southeastern Asia and occasionally Africa. Six species have been reported from China^[121].

Taxonomy

Order: Graminales

Suborder: Gramineae

Family: Gramineae (Poaceae)

Subfamily: Panicoideae A. Br.

Tribe: Andropogoneae

Dumort.

Subtribe: Saccharinae Griseb.

Genus: *Miscanthus* Anderss.

Species: *Miscanthus sinensis* Anderss.



10 to 30 cm long with 2 to 6 long stalks. The shiny yellowish spikelet is lanceolate, 4.5 to 5 mm long, and no longer than the white or light yellow filaceous hairs at the base of the glume. The lower glume is acuminate, 3 to



Habitat

M. sinensis occurs in mountainous areas, highlands, and wastelands in the plains at elevations below 1800 m^[121].

Distribution

M. sinensis has been reported from the provinces of Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangsu, Jiangxi, Sichuan, Taiwan, Yunnan, and Zhejiang^[19, 30, 53, 105, 121].

Economic Importance

The fibers of *Miscanthus sinensis* are useful for many purposes including papermaking^[121].

Related Species

Miscanthus jinxianensis L. Liu is morphologically similar to *M. sinensis*. However, *M. jinxianensis* has fewer inflorescences and larger spikelets measuring about 6-7.5 mm in length^[121].

Natural Enemies of *Miscanthus*

Nineteen fungal species and 18 arthropods are reported from the plants of genus *Miscanthus*. Ten fungi are reportedly hosted by *M. sinensis*.

Species of *Miscanthus* in China

Scientific Name	Scientific Name
<i>M. flavidus</i> Honda	<i>M. purpurascens</i> Anderss.
<i>M. floridulus</i> (Lab.) Warb. ex Schum. et Laut.	<i>M. sinensis</i> Anderss.
<i>M. jinxianensis</i> L. Liu	<i>M. transmorrisonensis</i> Hayata

Description

Miscanthus sinensis is a reed-like clumping perennial grass. The culms, about 1-2 m tall, are glabrous, or pilose below the inflorescences. The glabrous leaf sheath is longer than the internode. Ligule is membranous, obtuse, 1-3 mm long, with tiny cilia at the tip. The leaf is linear, pilose or farinose on the underside, 20-50 cm long and 6-10 mm wide with a coarse margin. The erect panicles can reach 15-40 mm in length, glabrous along the rachis but pubescent in the node and axils. The erect branches are triangular, about

4 veined and rough along the lateral vein, whereas the upper glume is single veined and ciliated along both sides of the involute margin. Noticeably shorter than the lower lemma, which is oblong, membranous, about 4 mm in length and ciliated, the upper lemma is 2-lobed. Between the lobes is a single, bent, brown awn 9 to 10 mm long. The pinkish color of the flowers can be attributed to the -purplish brown anthers that are 2.2 to 2.5 mm long. The pistils have purplish brown pinnate stigmas. The fruit is an oblong, dark purple caryopsis^[121].

Fungi

Phylum	Family	Species	H. R.	Ref.
Ascomycota	Chaetothyriaceae	<i>Chaetothrium javanicum</i> (Zimm.) Boedijn	po	[26]
	Clavicipitaceae	<i>Balansia claviceps</i> Speg.	m	[26]*
	Dothioraceae	<i>Metasphaeria miscanthi</i> Sawada	mo	[26]

Phylum	Family	Species	H. R.	Ref.
	Erysiphaceae	<i>Balansia andropogonis</i> Syd. & E.J. Butler	po	[26]
		<i>Claviceps purpurea</i> (Fr.) Tul.	p	[26]
	Meliolaceae	<i>Meliola andropogonis</i> F. Stevens & A. Roldán	mo	[26]
		<i>Meliola boedijniana</i> Hansf.	o	[73]
		<i>Meliola panici</i> Earle	p	[73]
			po	[26]
		<i>Meliola setariae</i> Hansf. & Deighton	po	[73]
	Phyllachoraceae	<i>Phyllachora graminis</i> var. <i>graminis</i> (Pers.) Fuckelel	p	[26]
		<i>Phyllachora miscanthi</i> Syd. & P. Syd.	o	[26]
Basidiomycota	Pucciniaceae	<i>Puccinia erythropus</i> Dietel	p	[170]
		<i>Puccinia melanocephala</i> Syd. & P. Syd.	p	[170]
		<i>Puccinia miscanthi</i> Miura	p	[170]
		<i>Puccinia miscanthicola</i> F.L. Tai & Cheo	mo	[170]
		<i>Ustilago kusanoi</i> Syd. & P. Syd.	p	[72]
	Ustilaginaceae	<i>Sporisorium miscanthi</i> (W.Y. Yen) L. Guo	mo	[72]
Oomycota	Sclerosporaceae	<i>Peronosclerospora miscanthi</i> (T. Miyake) C.G. Shaw	po	[202]
		<i>Sclerospora mischanthi</i> Miyake	po	[26]

* Recorded as *Phaeosaccardinula javanica* (Zimm.) Yamam.

Arthropods

Order	Family	Species	H. R.	Ref
Coleoptera	Eumolpidae	<i>Smaragdina mandzhura</i> (Jacobson)	po	[164]
Homoptera	Hormaphididae	<i>Ceratovacuna lanigera</i> Zehntner	po	[205]
			po	[165]
	Tropiduchidae	<i>Catullia vittata</i> Matsumura	po	[220]
			po	[178]
Lepidoptera	Hesperiidae	<i>Aeromachus inachus</i> Ménériès	m	[178]
		<i>Astictopterus jama chinensis</i> (Leech)	m	[178]
		<i>Borbo cinnara</i> (Wallace)	po	[178]
		<i>Isoetes lamprospilus</i> Felder & Felder	po	[178]
		<i>Ochlodes venata</i> Bremer & Grey	po	[178]
		<i>Parnara ganga</i> Evansman	po	[178]
		<i>Polytremis pellucida</i> (Murray)	po	[178]
		<i>Polytremis zina</i> (Eversman)	po	[178]
	Satyridae	<i>Lethe insana</i> Kollar	oo	[178]
		<i>Melaritis leda</i> (L.)	po	[178]
		<i>Mycalesis francisca</i> (Stoll)	po	[178]
		<i>Mycalesis sangaica</i> Butler	po	[178]
Thysanoptera	Phlaeothripidae	<i>Ophthothrips miscanthicola</i> (Haga)	m	[66]
	Thripidae	<i>Stenchaetothrips cymbopogoni</i> Zhang & Tong	po	[66]
		<i>Thrips flavidulus</i> Bagnall	po	[66]

Murdannia keisak

Wart removing herb

Introduction

Forty members of the genus *Murdannia* occur in tropical and subtropical regions worldwide. In China, 20 species have been recorded, most of which occur south of the Yangtze River [69].



Species of *Murdannia* in China

Scientific Name	Scientific Name
<i>M. bracteata</i> (C. B. Clarke) J. K. Morton ex Hong	<i>M. medica</i> (Lour.) Hong
<i>M. citrina</i> D. Fang	<i>M. nudiflora</i> (L.) Brenan
<i>M. divergens</i> (C. B. Clarke) Brückn.	<i>M. simplex</i> (Vahl) Brenan
<i>M. edulis</i> (Stokes) Faden	<i>M. spectabilis</i> (Kurz) Faden
<i>M. hookeri</i> (C. B. Clark.) Brückn.	<i>M. spirata</i> (L.) Brückn
<i>M. japonica</i> (Thunb.) Faden	<i>M. stenothyrsa</i> (Diels) Hand. -Mazz.
<i>M. kainantensis</i> (Masam.) Hong	<i>M. triquetra</i> (Wall.) Brückn.
<i>M. keisak</i> (Hassk.) Hand. -Mazz.	<i>M. undulata</i> Hong
<i>M. loriformis</i> (Hassk.) Rolla Rao et Kammathy	<i>M. vaginata</i> (L.) Brückn.
<i>M. macrocarpa</i> Hong	<i>M. yunnanensis</i> Hong

Taxonomy

- Order:** Commelinales
- Suborder:** Commelinineae
- Family:** Commelinaceae
- Genus:** *Murdannia* Royle
- Section:** Pauciflorae Brückn
- Species:** *Murdannia keisak* (Hassk.)

Hand.-Mazz.

Description

Murdannia keisak is a glabrous perennial herb that has fibrous, horizontal, elongate rhizomes. The decumbent stems are 40 cm in length. Internodes are 8 cm long, and have densely, white hairs. Leaves are sessile, spreading or slightly folded, linear-lanceolate or linear-elliptic, 2-8 cm

long and 5-8 mm wide, acuminate apex, with a ciliate base extending by a line of hairs on the leaf sheath. A solitary flower appears in the axil or terminally on the peduncle 1-4 cm long. The linear bract is situated in the middle of the peduncle. Sepals are narrowly oblong, 6-10 mm in length. The obovate petals are pink, purplish red, blue-purple, or grayish blue. Filaments are covered with dense, long hairs. Capsules are narrowly ovoid, trigonous, 5-10 mm long and 2-3 mm wide, acute to nearly acuminate at both ends. There are 4 uniseriate, gray, slightly flattened seeds per valve. Flowers appear August through September.[70].

Fungi

Phylum	Family	Species	H. R.	Ref.
Basidiomycota	Pucciniaceae	<i>Puccinia adhikarii</i> Ono	po	[170]

Habitat

M. keisak prefers wet places such as ditch sides, flooded paddy field margins and shaded areas along roadsides^[110, 115, 145].

Distribution

M. keisak distribution includes southern Fujian, northern Jiangxi, eastern Jilin, Liaoning, and northeastern Zhejiang, also Anhui^[38], Guizhou^[110], Heilongjiang^[223], Henan^[30], Hubei^[53], Hunan, Jilin^[223] provinces, and Taiwan^[77].

Economic Importance

M. keisak is a common weed of paddy fields. Occurrence is sparse. The stems and leaves can be used as livestock forage^[7].

Related Species

M. triquetra (Wall.) Brückn., shares similar habitat, appearance and distribution to *M. keisaki*, however, it has a long ellipsoid, trigonous capsule 8-10 mm long and 2-3 mm wide, and acute at both ends^[69, 70].

Natural Enemies of *Murdannia*

At least one fungal species is associated with the genus *Murdannia*.

Phalaris arundinacea

Reed canary grass

Introduction

The genus *Phalaris* contains 10 species that occur in the temperate regions of the Northern hemisphere, primarily in Europe and North America. Only one species and one variety has been recorded in China^[162].

Species of *Phalaris* in China

Phalaris arundinacea L.

Taxonomy

Order: Graminales

Suborder: Gramineae

Family: Gramineae (Poaceae)

Subfamily: Pooideae

Tribe: Phalarideae Kunth

Genus: *Phalaris* L.

Species: *Phalaris arundinacea* L.

Description

Phalaris arundinacea is a rhizomatous perennial grass. The 6-8 noded culm grows solitarily or rarely in a clump about 60-140 cm tall. The glabrous leaf



sheath is shorter than the internode. The ligule is 2-3mm long and membranous. Leaves are flat, slightly coarse when young, 6-30 cm long and 1-1.8 cm wide. Panicle is narrowly dense and 8-15 cm high, with erect branches. The spikelets, are 4-5 mm long and glabrous or slightly hairy. On the glume's keel is a narrow wing. The infertile lemma is broadly lanceolate, 3-4 mm long and pubescent; while the two degenerated fertile lemmae are linear and pubescent. The boat-shaped palea has one keel along which run pilose hairs. The anther is 2-2.5 mm long. The flowers and fruit appear in June through August^[162].

Habitat

P. arundinacea occurs in forests and moist grasslands at elevations of 75-3200 m^[162].

Distribution

P. arundinacea has been reported from Gansu, Hebei, Hunan, Heilongjiang,

Inner Mongolia, Jiangsu, Jiangxi, Jilin, Liaoning, Shaanxi, Shandong, Shanxi, Sichuan and Zhejiang provinces^[23, 30, 53, 77, 126, 142, 162].

Economic Importance

The young plants of *P. arundinacea* are favorite forage of poultry. The culms can be used for papermaking^[162].

Related Species

P. arundinacea var. *picta* L. can be distinguished from *Phalaris arundinacea* var. *arundinacea* by its flat leaf and the white stripe embossed in the white leaf^[162].

Natural Enemies of *Phalaris*

One fungal species has been found on the single member of the genus *Phalaris*.

Fungi

Phylum	Family	Species	H. R.	Ref.
Basidiomycota	Pucciniaceae	<i>Puccinia sessilis</i> W.G. Schneid.	p	[26]

Phleum pratense

Timothy

Introduction

The genus *Phleum* is comprised of approximately fifteen species with distribution in the cold temperate regions of both hemispheres. In China, four species have been reported. Most members of the genus are components of high-quality pastures and hay fields^[125].



Species of *Phleum* in China

Scientific Name
<i>P. alpinum</i> L.
<i>P. paniculatum</i> Huds.
<i>P. phleoides</i> (L.) Karst.
<i>P. pratense</i> L.

Taxonomy

Order: Graminales

Suborder: Gramineae

Family: Gramineae (Poaceae)

Subfamily: Pooideae

Tribe: Agrostideae Dumort.

Genus: *Phleum* L.

Species: *Phleum pratense* L.

Description

Phleum pratense is a perennial grass with densely fibrous roots and short rhizomes. The erect culm, 40-120 cm in height with 5-6 nodes, rises from the bulbous base and the persistent leaf sheath. The glabrous leaf sheath

is shorter than the internode except near the base where it is longer. Ligule is membranous, 2-5 mm long. Leaf blade is flat, coarse on upper and lower surfaces and along the margin, 10-30 cm long and 3-8 mm wide. The panicle is cylindrical, grayish green, 4-15 cm long and 5-6 mm wide. Spikelets are oblong. The glume is membranous, 3 mm long with 3 vertical veins edged with stiff hairs and truncate apex. Awn is 0.5-1 mm long. Slightly longer than the palea, the lemma is membranous, 2 mm long, with 7 veins covered with minute hairs. The anther is 1.5 mm long. The flower and fruits appear summer through autumn^[4].

Habitat

P. pratense occurs in broadleaf forests, forest margins, valley grasslands and prairie in the moist regions of

the Tian Shan range and western Dzungarian mountain area of Xinjiang, at elevations of 1100-2200 m^[23, 125]. Many provinces have introduced the plant. In Shandong province, the species is suspected to have escaped cultivation^[9].

Distribution

P. pratense is native to Zhaosu and Xinjiang provinces. It has been introduced as a forage plant into many other provinces.

Economic Importance

The species is regarded as a high quality forage plant

Natural Enemies of *Phleum*

Two species of fungi and two arthropods are reportedly associated with the genus *Phleum*.

Fungi

Phylum	Family	Species	H. R.	Ref.
Ascomycota	Pleosporaceae	<i>Pyrenophora dictyoides</i> A.R. Paul & Parbery	m	[26]*
Oomycota	Peronosporaceae	<i>Ustilago striiformis</i> (Westend.) Niessl	p	[26]

*Recorded as *Helminthosporium dictyoides* Drechsler

Arthropods

Order	Family	Species	H. R.	Ref
Coleoptera	Crioceridae	<i>Oulema oryzae</i> (Kuwayama)	po	[164]
			p	[164]
Lepidoptera	Tortricidae	<i>Aphelia paleana</i> (Hübner)	po	[133]

Phragmites australis

Common reed

Introduction

The genus *Phragmites* contains 10 species worldwide. Three members of the genus have been reported from China^[123].

Species of *Phragmites* in China

Scientific Name
<i>P. australis</i> (Cav.) Trin. ex Steud.
<i>P. japonica</i> Steud.,
<i>P. karka</i> (Retz.) Trin.

Taxonomy

Order: Graminales

Suborder: Gramineae

Family: Gramineae (Poaceae)

Subfamily: Arundioideae

Tribe: Arundineae

Subtribe: Arundinae Bews

Genus: *Phragmites* Trinius

Species: *Phragmites australis* (Cav.) Trin. ex Steud. [= *Phragmites communis* Trin.]

Description

Phragmites australis is a perennial grass with stoloniferous rhizomes. The erect culm reaches a height of 8 m and a diameter of 1-4 cm. Below each node may be some white powdery substances. The leaf blade is flat, 15-45 cm long and 1-3.5 cm wide with a smooth or coarse margin. The ligule is very short, truncate or appears as a ciliate ring, while the leaf sheath is glabrous or minutely hairy. Panicles are about 10-40 cm long, slightly nodding with slightly spreading branchlets that are 12-16



mm long and mostly bear 4-7 florets, which maybe male for the first one from the base. The glumes are 3-veined, 3-7 mm long for the first glume and 5-11 mm for the second glume. The flowers appear from July to November^[58, 68, 81, 84, 87, 123].

Habitat

P. australis occurs at the edge of rivers, lakes, swamps, moist areas, and wetlands at lower elevations^[58, 84, 123].

Distribution

P. australis has a nationwide distribution in China^[123].

Economic Importance

Young plants of *P. australis* are rich in proteins and saccharides, and are

therefore favored as cattle and horse feed. As it matures, the lignified plant cannot be used as forage. However, the mature culms can be used for construction and paper making^[58, 123].

Related Species

P. karka (Retz.) Trin. has comparatively larger panicles and numerous spreading branches. It occurs in Guangdong, Guangxi, Guizhou, Hainan, Sichuan, Taiwan and Yunnan provinces^[123].

Natural Enemies of *Phragmites*

Twenty four species of fungi and 117 species of arthropods have been recorded as associated with the genus *Phragmites*.



Fungi

Phylum	Family	Species	H. R.	Ref.
Ascomycota	Apiosporaceae	<i>Apiospora montagnei</i> Sacc.	m	[26] ^I
	Dothideaceae	<i>Scirrha rimosa</i> (Alb. & Schwein.) Fuckel	m	[26] ^{II}
	Incertae sedis	<i>Massariothea botulispora</i> (Teng) B. Sutton	m	[26] ^{III}
	Meliolaceae	<i>Meliola arundinis</i> Pat.	p	[73]
			o	[26]
Phyllachoraceae	<i>Phyllachora arundinis</i> Sawada	mo	[26] ^{IV}	
Basidiomycota	Pucciniaceae	<i>Puccinia abei</i> Hirats.	mo	[170]
			mo	[26]
		<i>Puccinia invenusta</i> Syd.	oo	[170]
			mo	[26]
		<i>Puccinia isiacae</i> (Thüm.) G. Winter	mo	[170]
		<i>Puccinia longinqua</i> Cummins	o	[170]
			o	[26]
		<i>Puccinia magnusiana</i> Körn.	o	[170]
			p	[26]
		<i>Puccinia moriokaensis</i> S. Ito	m	[170]
			o	[26]
		<i>Puccinia okatamaensis</i> S. Ito	m	[170]
	o		[26]	
	<i>Puccinia phragmitis</i> (Schumach.) Körn.	p	[170]	
		m	[26]	
	<i>Puccinia sinkiangensis</i> Y.C. Wang	m	[170]	
		m	[26]	
	Ustilaginaceae	<i>Ustilago grandis</i> Fr.	m	[64]
m			[26]	
<i>Ustilago himalensis</i> (Kakish. & Y. Ono) Vánky & Oberw.		mo	[64]	
<i>Ustilago phragmitis</i> L. Ling		m	[64] ^V	
	m	[26]		
Anamorphic Ascomycetes	<i>Brachysporium phragmitis</i> Miyake	m	[26]	
		m	[26] ^{VI}	
Anamorphic Lewia	<i>Alternaria tenuissima</i> (Kunze) Wiltshire	p	[209]	
Anamorphic Mycosphaerella	<i>Cladosporium arundinis</i> (Corda) Sacc.	m	[210]	
	<i>Cladosporium cladosporioides</i> (Fresen.) G.A. de Vries	p	[210]	
Anamorphic Uredinales	<i>Uredo phragmitis-karkae</i>	mo	[26]	
Anamorphic Xylariales	<i>Hadrotrichum phragmiticola</i> Teng	m	[26]	

^IRecorded as *Coniosporium arundinis* (Corda) Sacc.

^{II}Recorded as *Hadrotrichum phragmitis* Fuckel

^{III}Recorded as *Hendersonia botulispora* Teng

^{IV}Recorded as *Phyllachora phragmitis-karkae* Saw

^VRecorded as *Ustilago phragmites* Ling

^{VI}Recorded as *Napicladium arundinaceum* (Corda) Sacc.

Arthropods

Order	Family	Species	H. R.	Ref.	
Acariformes	Eriophyidae	Parategonotus phragmitae Kuang	m	[90]	
	Tetranychidae	Petrobia latens (Müller)	p	[167]	
Coleoptera	Anthribidae	Phloeobius sp.	p	[94]I	
	Cerambycidae	Dorysthenes hydropicus Pascoe	p	[94]	
	Cetoniidae	Protaetia brevitarsis (Lewis)	p	[94]II	
	Chrysomelidae	Psylliodes reitteri Weise	m	[201]	
		Sphaeroderma apicale Baly	p	[201]	
	Crioceridae	Donacia clavipes Fabricius	m	[164]	
		Donacia provosti Fairmaire	p	[75]	
		Donacia vulgaris Zschach	m	[164]	
		Oulema oryzae (Kuwayama)	p	[164]	
				p	[94]
	Curculionidae	Tanymecus circumdatus Wiedemann	p	[94]	
	Hispididae	Dicladispa armigera (Olivier)	p	[94]	
				p	[94]III
		Hispellinus moerens (Baly)	p	[94]	
	Melolonthidae	Holotrichia oblita Feldermann	p	[94]	
		Holotrichia parallela Motschulsky	p	[94]	
		Holotrichia trichophora (Fairmaire)	p	[94]IV	
	Rutelidae	Adoretus sinicus Burmeister	p	[94]	
		Adoretus tenuimaculatus Waterhouse	p	[94]	
		Anomala corpulenta Motschulsky	p	[94]	
		Anomala cupripes Hope	p	[94]	
Anomala heydeni Frivaldszky		p	[94]		
Diptera	Cecidomyiidae	Giraudiella sp.	p	[94]	
Hemiptera	Coreidae	Aeschyntelus chinensis Dallas	p	[94]	
		Cletus punctiger Dallas	p	[94]	
		Leptocorisa varicornis (Fabricius)	p	[94]	
	Lygaeidae	Dimorphopterus spinolae (Signoret)	p	[94]	
	Miridae	Adelphocoris fasiaticollis Reuter	p	[94]	
		Trigonotylus ruficonis Geoffroy	p	[207]	
	Pentatomidae	Metonymia glandulosa (Wolff)	p	[207]	
		Scotinophara lurida (Burmeister)	p	[94]	
		Stollia guttiger (Thunberg)	p	[94]	
	Pyrrhocoridae	Pyrrhocoris tibialis Stål	p	[207]	
Homoptera	Acleridae	Nipponaclerda biwakoensis (Kuwana)	p	[173]	
			p	[94]	
	Aphididae		p	[94]	
		Hyalopterus amygdali Blanchard	p	[205]V	
			p	[165]	
		Macrosiphum avenae Fabricius	p	[94]	

Order	Family	Species	H. R.	Ref.
		Melanaphis sacchari (Zehntner)	p	[94]VI
			p	[113]
		Rhopalosiphum padi (L.)	p	[94]
		Rhopalosiphum rufiabdominalis (Sasaki)	p	[205]
	Cercopidae	Callitettix versicolor Fabricius	p	[94]
	Cicadellidae	Cicadula fasciifrons Stål	p	[94]
		Deltocephalus dorsalis (Motschulsky)	p	[94]VII
		Deltocephalus oryzae Matsumura	p	[94]
		Erythroneura limbata (Matsumura)	p	[94]
		Erythroneura maculifrons (Motschulsky)	p	[94]
		Erythroneura subrufa (Motschulsky)	p	[94]
		Nephotettix cincticeps Uhler	p	[94]
		Nephotettix virescens Distant	p	[94]
		Tettigoniella viridis (L.)	p	[94]VIII
	Cixiidae	Oliarus apicalis (Uhler)	p	[94]
	Delphacidae	Chloriona tateyamana Matsumura	p	[94]
		Dicranotropis nagaragawana Matsumura	p	[94]
		Laodelphax striatellus (Fallén)	p	[94]
		Perkinsiella saccharicida Kirkaldy	p	[94]
		Saccharosydne procerus (Matsumura)	p	[94]
		Sogatella furcifera (Horváth)	p	[94]
		Toya propingua neopropingua (Muir)	p	[94]
		Unkanodes sapporona Matsumura	p	[94]
	Dictyopharidae	Dictyophara sinica Walker	p	[94]
	Eriococcidae	Rhizococcus trispinatus (Wang)	m	[172]IX
			p	[94]X
	Pseudococcidae	Cannococcus ostiolata (Borchsenius)	o	[172]XI
Liucoccus ehrhornioides Borchsenius		p	[172]	
Hymenoptera	Tenthredinidae	Dolerus tritici Chu	p	[94]
Lepidoptera	Arctiidae	Aloa lactinea (Cramer)	p	[94]XII
		Cretonotos tranciens (Walker)	p	[94]XIII
		Spilosoma lubricipedum (L.)	p	[94]XIV
	Cossidae	Phragmataecia castaneae Hübner	p	[178]XV
			p	[94]
			m	[25]
	Crambidae	Calamochrous acutellus Eversmann	m	[169]
			p	[94]
		Chilo hyrax Bleszynski	p	[94]
		Chilo luteellus (Motschulsky)	m	[169]
			p	[94]
			m	[25]
	Chilo phragmitellus Hübner	p	[94]	

Order	Family	Species	H. R.	Ref.
		<i>Chilo suppressalis</i> (Walker)	p	[169]
		<i>Ostrinia nubilalis</i> (Hübner)	p	[169]
		<i>Schoenobius gigantellus</i> Denis & Schiffermüller	m	[169]
	Hesperiidae	<i>Parnara ganga</i> Evansman	p	[178]
		<i>Parnara guttata</i> Bremer & Grey	p	[94]
		<i>Polytremis zina</i> (Eversman)	p	[178]
	Lymantriidae	<i>Cifuna locuples</i> Walker	p	[212]
			p	[94]
			p	[75]
			p	[166]
		<i>Laelia coenosa candioda</i> Leech	p	[94]XVI
	Noctuidae	<i>Agrotis ipsilon</i> (Hüfnagel)	p	[94]XVII
		<i>Aletia pudorina</i> (Denis & Schiffermüller)	p	[25]XVIII
		<i>Archanara neurica</i> (Hübner)	m	[15]
		<i>Archanara phragmiticola</i> Staudinger	p	[94]XIX
		<i>Leucania insecuta</i> Walker	p	[94]
		<i>Leucania loreyi</i> (Duponchel)	p	[94]
		<i>Leucania venalba</i> Moore	p	[94]
		<i>Rhizedra lutosa</i> (Hübner)	m	[15]
		<i>Senta flammea</i> (Curtis)	p	[15]
		<i>Sesamia inferens</i> (Walker)	p	[224]
			p	[94]
			p	[178]
		<i>Sesamia vuteria</i> (Stoll)	p	[224]XX
		<i>Spodoptera depravata</i> Butler	p	[75]XXI
			p	[166]XXII
	<i>Spodoptera litura</i> (Fabricius)	p	[94]	
	Psychidae	<i>Clania minuscula</i> Butler	p	[78]XXIII
	Pyralidae	<i>Proceras venosatum</i> (Walker)	p	[94]XXIV
	Satyridae	<i>Coenonympha oedippus</i> (Fabricius)	p	[219]
	Orthoptera	Acrididae	<i>Acrida cinerea</i> (Thunberg)	p
			p	[94]
Catantopidae		<i>Chondracris rasea</i> De Geer	p	[94]
		<i>Hieroglyphus annulicornis</i> (Shiraki)	p	[94]
		<i>Oxya chinensis</i> (Thunberg)	p	[94]
		<i>Patanga japonica</i> (I. Bolivar)	p	[94]
		<i>Shirakiacris shirakii</i> (I. Bolivar)	p	[94]XXVI
Conocephalidae		<i>Conocephalus gladius</i> Redtenbacher	p	[94]
		<i>Homorocoryphus lineosus</i> Walker	p	[94]
Gryllidae		<i>Teleogryllus mitratus</i> Burmeister	p	[94]XXVII
Oedipodidae		<i>Aiolopus tamulus</i> (Fabricius)	p	[94]
		<i>Gastrimargus marmoratus</i> (Thunberg)	p	[94]

Order	Family	Species	H. R.	Ref.
		Locusta migratoria manilensis (Mayen)	p	[94]
		Oedaleus infernalis Saussure	p	[94]
	Phaneropteridae	Ducetia japonica (Thunberg)	p	[94]
	Pyrgomorphidae	Atractomorpha lata (Motschulsky)	p	[94]
		Atractomorpha sinensis I. Bolivar	p	[94]
Thysanoptera	Phlaeothripidae	Haplothrips aculeatus (Fabricius)	p	[66]
			p	[94]
		Haplothrips tritici (Kurdjumov)	p	[66]
	Thripidae	Frankliniella intonsa (Trybom)	p	[94]
		Scirtothrips dorsalis Hood	p	[66]
		Stenchaetothrips bambusae (Shumsher Singh)	p	[66]
		Stenchaetothrips biformis (Bagnall)	p	[66]
			p	[75]
			p	[94]

ⁱProbably *Phloeobius triarrhenus* Zhang

ⁱⁱRecorded as *Potosia brevitarsis* Lewis

ⁱⁱⁱAlso recorded as *Hispa armigera* Olivier

^{iv}Recorded as *Pledina trichophora* Fairmaire

^vRecorded as *Hyaloptera amygdali* Blanchard

^{vi}Recorded as *Longiunguis sacchari* Zehntner

^{vii}Recorded as *Inazuma dorsalis* Motschulsky

^{viii}Recorded as *Tettigella viridis* Linné

^{ix, x}Recorded as *Eriococcus trispinatus* Wang

^{xi}Recorded as *Kiritshenkella ostiolata* (Borchs)

^{xii}Recorded as *Amsacta lactinea* Cramer

^{xiii}Recorded as *Cretonotus tranciens* Walker

^{xiv}Recorded as *Spilosoma menthastris* Esper

^{xv}Recorded as *Phragmataecia castanea* Hübner

^{xvi}Probably *Laelia coenosa* (Hübner)

^{xvii}Recorded as *Agrotis ypsilon* Rottemberg

^{xviii}Recorded as *Leucania pudorina* Schiffermuller

^{xix}Recorded as *Agrotis phragmiticola* Staudinger

^{xx}Probably *Sesamia uniformis* (Dudgeon)

^{xxi, xxii}Recorded as *Sidemia depravata* (Butler)

^{xxiii}Recorded as *Clania minuscular* Snellen

^{xxiv}Recorded as *Procera venosatum* Walker

^{xxv}Also recorded as *Acrida chinensis* Westwood

^{xxv}Recorded as *Eupreocnemis shirakii* Bolivar

^{xxvii}Recorded as *Gryllus testaceus* Walker

Polygonum perfoliatum

Mile-a-minute

Introduction

The genus *Polygonum* is comprised of 230 species worldwide, primarily in the northern temperate regions of the world. In China, 113 species and 26 varieties have been reported from all provinces of the country^[99].

Taxonomy

Order: Polygonales

Family: Polygonaceae

Subfamily: Polygonideae

Tribe: Polygoneae

Genus: *Polygonum* L.

Section: Echinocaulon Meisn.

Species: *Polygonum perfoliatum* L.

Description

Polygonum perfoliatum is an annual vine that can reach 1-2 m or more in length. The stems are furrowed with short recurved prickles along the ridges. Nearly as long as the petiole, the thin, papery leaves are triangular, about 3-7 cm long and 2-5 cm wide, glabrous on the upper surface with prickles along the mid-rib on the underside. The saucer-shaped ochrea (stipule sheath) is green and connate perfoliate with a diameter of 1.5-3 cm. The flowers, 1-3 cm in length, are borne on racemes that emerge from the leaf axil or at the end of the stem in June through August. Bracts are ovoid, each containing 2-4 flowers with 8 stamens and 3 styles. The perianth consisting of 5 deep lobes, is white or light red in color, becoming blue at fruiting in July to October. Each shiny, black achene is globose, 3-4 mm in diameter, and contained in a persistent perianth^[95, 99].

Habitat

P. perfoliatum occurs in moist areas at elevations of 80 – 2300 m. *P. perfoliatum* can be found along rivers and roadsides in eastern China^{[[128]]};



along valley streams and in thickets in northern China^[17, 67]; mountain thickets, forest margins and stream banks at elevations of 200 – 1300 m in the the Qinling Mountains and Loess Plateau areas of northwestern China^[48, 79]; ditches, stream banks and wasteland in central and southern China^[88, 120, 180]; hillside thickets at 2100m in southern Tibet^[184]; and grassy slopes, forest margins, roadsides and river banks at 500 – 2100 m in Yunnan, southwestern China^[2].

Distribution

P. perfoliatum occurs in the provinces of Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Heilongjiang, Henan, Hubei, Hunan, eastern Inner Mongolia, Jiangsu, Jiangxi, Jilin, Liaoning, southern Shaanxi, Shandong, Sichuan, Taiwan, Chayu of southern Tibet, Yunnan, Zhejiang, and possibly eastern Gansu^[95, 99, 128, 184].

Economic Importance

Polygonum perfoliatum is traditionally regarded as medicinally useful in China, and it is also utilized for suppressing vegetable insect pests^[95, 120]

Related Species

P. thunbergii Sieb. et Zucc. has hastate leaves, occurs in wet valleys and on grassy slopes, at elevations of 90-2400 m. Its distribution includes Gansu, Guizhou, Shaanxi, Sichuan, Yunnan provinces. ^[95].

Natural Enemies of *Polygonum*

Seventy one species of fungi have been reported as associated with various *Polygonum* species, of which 2 are associated with *P. perfoliatum*. The taxonomic status of *Puccinia* spp. on members of the Polygonaceae in China was reviewed in the 1980s^[101]. The 30 reported species are included in the second flora on *Puccinia*^[229]. Sixty-six arthropods have been



reported as associated with members of the genus *Polygonum*. One hundred eleven arthropod species were found during a survey to identify potential biological control agents against *P. perfoliatum*. More than half are Coleopteran species, with one weevil species, *Rhinoncomimus latipes* Korotyaev (Coleoptera: Curculionidae), regarded as the most promising agent. In addition, 3 oligophagous leaf beetles, *Smaragdina nigrifrons* (Coleoptera: Eumolpidae), *Gallerucida*

bifasciata and *Galerucella placida* (Coleoptera: Chrysomelidae), were dominant at most of the surveyed sites as well as *Timandra griseata* (Lepidoptera: Geometridae), a geometrid moth. One bug, *Cletus schmidti* (Hemiptera: Coreidae), and one sawfly, *Allantus nigrocaeruleus* (Hymenoptera: Tenthredinidae), were recommended for further host specificity evaluations^[32].



Species of *Polygonum* in China^[95, 99]

Scientific Name	Scientific Name
<i>P. acerosum</i> Ledeb. ex Meisn.	<i>P. macrophyllum</i> D. Don
<i>P. acetosum</i> Bieb.	<i>P. manshuriense</i> V. Petr. ex Kom.
<i>P. affine</i> D. Don	<i>P. microcephalum</i> D. Don
<i>P. ajanense</i> (Regel et Til.) Grig.	<i>P. milletii</i> (Lévl.) Lévl.
<i>P. alopecuroides</i> Turcz. ex Besser	<i>P. molle</i> D. Don
<i>P. alpinum</i> All.	<i>P. molliiforme</i> Boiss.
<i>P. amphibium</i> L.	<i>P. muricatum</i> Meisn.
<i>P. amplexicaule</i> D. Don	<i>P. nepalense</i> Meisn.
<i>P. angustifolium</i> Pall.	<i>P. nummulariifolium</i> Meisn. ^{IV}
<i>P. arenastrum</i> Boreau	<i>P. ochotense</i> V. Petr. ex Kom.
<i>P. argyrocoleon</i> Steud. ex Kuntze ^I	<i>P. ochreatum</i> L.
<i>P. assamicum</i> Meisn.	<i>P. orientale</i> L.
<i>P. aviculare</i> L.	<i>P. pacificum</i> V. Petr. ex Kom.
<i>P. barbatum</i> L.	<i>P. paleaceum</i> Wall. ex Hook. f.
<i>P. biconvexum</i> Hayata	<i>P. palmatum</i> Dunn
<i>P. bistorta</i> L.	<i>P. paralimicola</i> A. J. Li
<i>P. bungeanum</i> Turcz.	<i>P. paronychioides</i> C. A. Mey. ex Hohen.
<i>P. campanulatum</i> Hook. f.	<i>P. patulum</i> Bieb.
<i>P. capitatum</i> Buch.-Ham. ex D. Don	<i>P. perfoliatum</i> L.
<i>P. cathayanum</i> A. J. Li	<i>P. persicaria</i> L.
<i>P. chinense</i> L.	<i>P. pinetorum</i> Hemsl.
<i>P. cognatum</i> Meisn.	<i>P. platyphyllum</i> Li et Chang
<i>P. coriaceum</i> Sam.	<i>P. plebeium</i> R. Br.
<i>P. coriarium</i> Grig.	<i>P. polycnemoides</i> Jaub. et Spach
<i>P. criopolitanum</i> Hance	<i>P. polystachyum</i> Wall. ex Meisn.
<i>P. cyanandrum</i> Diels	<i>P. popovii</i> Borod.
<i>P. darrisii</i> Lévl.	<i>P. posumbu</i> Buch.-Ham. ex D. Don
<i>P. delicatulum</i> Meisn.	<i>P. praetermissum</i> Hook. f.
<i>P. dichotomum</i> Blume	<i>P. pubescens</i> Blume
<i>P. dissitiflorum</i> Hemsl.	<i>P. pulchrum</i> Blume
<i>P. divaricatum</i> L.	<i>P. purpureonervosum</i> A. J. Li

Scientific Name	Scientific Name
<i>P. ellipticum</i> Willd. ex Spreng.	<i>P. rigidum</i> Skv.
<i>P. emodi</i> Meisn.	<i>P. runcinatum</i> Buch.-Ham. ex D. Don
<i>P. fertile</i> (Maxim.) A. J. Li	<i>P. sagittatum</i> L. ^v
<i>P. filicaule</i> Wall. ex Meisn.	<i>P. schischkinii</i> Ivan. ex Borod.
<i>P. foliosum</i> H. Lindb.	<i>P. senticosum</i> (Meisn.) Franch. et Sav.
<i>P. forrestii</i> Diels	<i>P. sibiricum</i> Laxm.
<i>P. glabrum</i> Willd.	<i>P. sinomontanum</i> Sam.
<i>P. glaciale</i> (Meisn.) Hook. f.	<i>P. songaricum</i> Schrenk
<i>P. griffithii</i> J. D. Hooker ⁱⁱ	<i>P. sparsipilosum</i> A. J. Li
<i>P. hastatosagittatum</i> Mak.	<i>P. strigosum</i> R. Br.
<i>P. honanense</i> Kung	<i>P. strindbergii</i> Schust.
<i>P. hookeri</i> Meisn.	<i>P. subscaposum</i> Diels
<i>P. huananense</i> A. J. Li	<i>P. suffultoides</i> A. J. Li
<i>P. humifusum</i> Merk ex C. Koch	<i>P. suffultum</i> Maxim.
<i>P. humile</i> Meisn.	<i>P. taquetii</i> Lév.
<i>P. hydropiper</i> L.	<i>P. thunbergii</i> Sieb. et Zucc.
<i>P. intramongolicum</i> A. J. Li	<i>P. Tibeticum</i> Hemsl.
<i>P. japonicum</i> Meisn.	<i>P. tinctorium</i> Ait.
<i>P. jucundum</i> Meisn.	<i>P. tortuosum</i> D. Don
<i>P. kawagoeanum</i> Makino ⁱⁱⁱ	<i>P. umbrosum</i> Sam.
<i>P. lapathifolium</i> L.	<i>P. vacciniifolium</i> Wall. ex Meisn. ^{vi}
<i>P. lichiangense</i> W. W. Smith	<i>P. viscoferum</i> Mak.
<i>P. limicola</i> Sam.	<i>P. viscosum</i> Buch.-Ham. ex D. Don
<i>P. limosum</i> Kom.	<i>P. viviparum</i> L.
<i>P. longisetum</i> De Br.	<i>P. wallichii</i> Meisn.
<i>P. maackianum</i> Regel	

ⁱ Recorded as *P. argyrocoleum* Steud. ex Kunze in *FRPS*

ⁱⁱ Recorded as *P. calostachyum* Diels in *FRPS*

ⁱⁱⁱ Recorded as *P. tenellum* Blume in *FRPS*

^{iv} Recorded as *P. nummularifolium* Meisn in *FRPS*

^v Recorded as *P. sieboldii* Meisn. in *FRPS*

^{vi} Recorded as *P. vaccinifolium* Wall. ex Meisn. in *FRPS*

Fungi

Phylum	Family	Species	H. R.	Ref.
Ascomycota	Erysiphaceae	<i>Erysiphe betae</i> (Vaňha) Weltzien	po	[26] ^I
			po	[24] ^I
		<i>Sphaerotheca pannosa</i> (Wallr.) Lév.	mo	[26]
	Sclerotiniaceae	<i>Sclerotinia sclerotiorum</i> (Lib.) de Bary	po	[26]
Basidiomycota	Atheliaceae	<i>Athelia rolfsii</i> (Curzi) C.C. Tu & Kimbr.	po	[26] ^{II}
	Melanopsichiaceae	<i>Melanopsichium nepalense</i> (Liro) Zundel	po	[26] ^{III}
			mo	[64] ^{IV}

Phylum	Family	Species	H. R.	Ref.
		<i>Melanopsichium pennsylvanicum</i> Hirschh.	po	[26]
			oo	[64]
	Microbotryaceae	<i>Liroa emodensis</i> (Berk.) Cif.	mo	[64]
			oo	[26]V
		<i>Microbotryum reticulatum</i> (Liro) R. Bauer & Oberw.	oo	[26]VI
			oo	[64]VII
		<i>Sphacelotheca hydropiperis</i> (Schumach.) de Bary	oo	[26]
			o	[64]
	Pucciniaceae	<i>Puccinia barclayi</i> S. Ahmad	mo	[229]
			oo	[26]
		<i>Puccinia benokiyamensis</i> Hirats. f.	oo	[229]
			oo	[26]
		<i>Puccinia bistortae</i> (F. Strauss) DC.	oo	[229]
			oo	[26]
		<i>Puccinia calumnata</i> Syd. & P. Syd.	mo	[229]
			oo	[26]
		<i>Puccinia congesta</i> Berk. & Broome	oo	[229]
			oo	[26]
		<i>Puccinia fagopyricola</i> Jørst.	po	[26]
		<i>Puccinia hanyuenensis</i> F.L. Tai	mo	[26]
			oo	[229]
		<i>Puccinia iwateyamensis</i> Hirats. f.	mo	[229]
		<i>Puccinia kweichowana</i> Cummins	mo	[26]
			oo	[229]
		<i>Puccinia mammillata</i> J. Schröt.	oo	[26]
			mo	[229]
	<i>Puccinia nitidula</i> Tranzschel	mo	[26]	
		oo	[229]	
	<i>Puccinia omeiensis</i>	mo	[26]	
<i>Puccinia phragmitis</i> (Schumach.) Körn.	po	10		
<i>Puccinia polygoni-alpini</i> Cruchet & Mayor	mo	[229]		
<i>Puccinia polygoni-amphibii</i> Pers.	o	[26]		
	p	[229]		

Phylum	Family	Species	H. R.	Ref.
		<i>Puccinia polygonicola</i> F.L. Tai	oo	[26]
			oo	[229]
		<i>Puccinia polygoni-lapathifolii</i> T. N. Liou & Y. C. Wang	mo	[229]
		<i>Puccinia polygoni-sieboldii</i> (Hirats. & S. Kaneko) B. Li	mo	[229]
		<i>Puccinia polygoni-weyrichii</i> Miyabe	oo	[26]
		<i>Puccinia septentrionalis</i> Juel	mo	[229]
		<i>Puccinia taliensis</i> F.L. Tai	oo	[26]
			oo	[229]
		<i>Puccinia taylorii</i> Balf.-Browne	oo	[229]
		<i>Puccinia thibetana</i> J.Y. Zhuang	mo	[229]
		<i>Puccinia vivipari</i> Jørst.	mo	[26]
			oo	[229]
		<i>Puccinia wulingensis</i> B. Li	mo	[229]
		<i>Puccinia yunnanensis</i> F.L. Tai	po	[26]
		<i>Uromyces polygoni-avicularis</i> (Pers.) P. Karst.	po	[26]
	Ustilaginaceae	<i>Ustilago anhweiana</i> Zundel	oo	[26]
		<i>Ustilago anomala</i> J. Kunze ex G. Winter	oo	[26]
		<i>Ustilago bistortarum</i> (DC.) Körn.	oo	[64]
		<i>Ustilago bosniaca</i> Beck	oo	[64]
		<i>Ustilago cordae</i> Liro	oo	[64]
			oo	[26]
		<i>Ustilago dehiscens</i> L. Ling	mo	[64]
		<i>Ustilago filamenticola</i> L. Ling	mo	[64]
			mo	[26]
		<i>Ustilago koenigiae</i> Rostr.	mo	[26]
			mo	[64]
		<i>Ustilago longiseti</i> Vánky & Oberw.	mo	[64]
		<i>Ustilago ochrearum</i> Berk.	oo	[26]
			oo	[64]
		<i>Ustilago picacea</i> Lagerh. & Liro	mo	[64]
<i>Ustilago piperi</i> G.P. Clinton	mo	[64]		
<i>Ustilago polygoni-alati</i> Thirum. & Pavgi	mo	[64]		
<i>Ustilago pustulata</i> (DC.) G. Winter	mo	[64]		

Phylum	Family	Species	H. R.	Ref.		
		<i>Ustilago sinkiangensis</i> Y.C. Wang	oo	[26]		
		<i>Ustilago tuberculiformis</i> Syd. & P. Syd.	mo	[64]		
			oo	[26]		
Oomycota	Albuginaceae	<i>Albugo polygoni</i> Z.D. Jiang & P.K. Chi	oo	[202]		
	Peronosporaceae	<i>Peronospora sinensis</i> D.Z. Tang	po	[202]		
		<i>Phytophthora polygoni</i> Sawada	oo	[26]		
	oo		[202]			
Anamorphic <i>Guignardia</i>		<i>Phyllosticta polygoni-bungeani</i> Miura	mo	[26]		
		<i>Phyllosticta polygonorum</i> Sacc.	po	[26]		
Anamorphic <i>Lewia</i>		<i>Alternaria alternata</i> (Fr.) Keissl.	po	[26]		
Anamorphic <i>Mycosphaerella</i>	Pythiaceae	<i>Cercospora persicariae</i> W. Yamam.	oo	[26]		
		<i>Cercospora polygonaceae</i> Ellis & Everh.	oo	[26]		
		<i>Cercospora polygonorum</i> Cooke	oo	[26]		
		<i>Cladosporium effusum</i> Berk. & M.A. Curtis	po	[210]		
		<i>Passalora polygoni</i> Y. L. Guo	mo	[65]		
		<i>Pseudocercospora avicularis</i> (G. Winter) A.Z.M. Khan & Shamsi	mo	[129]		
		<i>Pseudocercospora persicariae</i> (W. Yamam.) Deighton	oo	[129]		
		<i>Pseudocercospora polygonicola</i> (A.K. Kar & M. Mandal) Deighton	oo	[129]		
		<i>Pseudocercospora polygonorum</i> (Cooke) Y.L. Guo & X.J. Liu	oo	[129]		
		<i>Septoria polygonicola</i> (Lasch) Sacc.	oo	[26]		
		<i>Septoria polygonorum</i> Desm.	oo	[26]		
			po	[1]		
		Anamorphic Mycosphaerellaceae		<i>Ascochyta polygoni</i> Rabenh.	mo	[26]
		Anamorphic Uredinales		<i>Aecidium polygoni-cuspidati</i> Dietel	oo	[26]

ⁱRecorded as *Erysiphe polygoni* DC.

ⁱⁱRecorded as *Corticium centrifugum* (Lév.) Bres.

ⁱⁱⁱRecorded as *Ustilago nepalensis* Lindr.

^{iv}Recorded as *Ustilago nepalensis* Liro

^vRecorded as *Ustilago emodensis* Berk.

^{vi}Recorded as *Ustilago reticulata* Lindr.

^{vii}Recorded as *Ustilago reticulata* (Zundel) Vánky & Oberwinkler

Arthropods

Order	Family	Species	H. R.	Ref.	
Acariformes	Tetranychidae	<i>Tetranychus truncatus</i> Ehara	po	[167]	
Coleoptera	Chrysomelidae	<i>Chaetocnema bella</i> (Baly)	oo	[165]	
		<i>Chaetocnema concinna</i> (Marsham)	oo	[75]	
		<i>Entomoscelis orientalis</i> Motschulsky	oo	[201]	
		<i>Galeruca barovskyi</i> Jacobson	po	[201]	
		<i>Galerucella grisescens</i> (Joannis)	po	[201]	
		<i>Gallerucida bifasciata</i> Motschulsky	po	[75]	
		<i>Gallerucida singularis</i> (Harold)	po	[201]	
		<i>Gastrophysa atrocyanea</i> (Motschulsky)	oo	[201]	
		<i>Gastrophysa polygona</i> (L.)	po	[201]	
		<i>Geinella invenusta</i> (Jacobson)	mo	[201]	
		<i>Geinella splendida</i> Chen, Jiang & Wang	po	[201]	
		<i>Hespera auricuprea</i> Chen & Wang	po	[165]	
		<i>Hespera brachyelytra</i> Chen & Wang	po	[165]	
		<i>Stenoluperus flavipes</i> Chen	po	[201]	
		<i>Stenoluperus nipponensis</i> (Laboissiere)	po	[165]	
		<i>Stenoluperus nipponensis</i> (Laboissiere)	po	[178]	
		<i>Stenoluperus nipponensis</i> (Laboissiere)	po	[75]	
		<i>Stenoluperus nipponensis</i> (Laboissiere)	po	[165]	
		Crioceridae	<i>Lema lacosa</i> Pic	po	[75]
			<i>Lema paagai</i> Chûjô	po	[164]
	<i>Lilioceris merdigera</i> (L.)		po	[164]	
	<i>Lilioceris merdigera</i> (L.)		po	[75]	
	Curculionidae	<i>Lagenolobus sieversi</i> Faust	oo	[211]	
	Eumolpidae	<i>Basilepta pubiventer</i> T'an	oo	[165]	
		<i>Basilepta ruficollis</i> (Jacoby)	po	[75]	
		<i>Basilepta ruficollis</i> (Jacoby)	po	[164]	
		<i>Chlamisus mosaicus</i> T'an	mo	[165]	
		<i>Cryptocephalus aberrans</i> Jacoby	oo	[164]	
		<i>Nodina pilifrons</i> Chen	oo	[165]	
		<i>Pachnophorus seriatus</i> Lefèvre	po	[164]	
	<i>Smaragdina aurita hammarstraemi</i> (Jacobson)	po	[164]		
	Hemiptera	Coreidae	<i>Cletus punctulatus</i> (Westwood)	po	[207]
<i>Mictis angusta</i> Hsiao			po	[207]	
Lygaeidae		<i>Nysius ericae</i> (Schilling)	po	[207]	
Pentatomidae		<i>Hoplistodera fergussoni</i> Distant	po	[208]	
Plataspidae		<i>Coptosoma parvicta</i> Montandon	m	[208]	

Order	Family	Species	H. R.	Ref.
Homoptera	Aphalaridae	<i>Aphalara fasciata</i> Kuwayama	po	[178]
			mo	[160]
		<i>Aphalara polygonia</i> Foerter	mo	[160]
	Aphididae	<i>Capitophorus javanicus</i> Hille Ris Lambers	p	[205]
		<i>Margituberculatus longituberculatus</i> Zhang	oo	[165]
	Coccidae	<i>Ceroplastes ceriferus</i> (Anderson)	po	[173]
		<i>Ceroplastes floridensis</i> Comstock	po	[173]
Triozidae	<i>Eubactericera drepanoides</i> Li	mo	[160]	
Hymenoptera	Tenthredinidae	<i>Tenthredo mesomelas</i> (L.)	po	[166]
Lepidoptera	Arctiidae	<i>Hyphantria cunea</i> (Drury)	po	[45]
		<i>Lemyra phasma</i> (Leech)	po	[45]
		<i>Rhyparioides metelkana</i> (Lederer)	po	[44]
			po	[45]
		<i>Spilosoma lubricipedum</i> (L.)	po	[45]
			po	[178]I
	Crambidae	<i>Chilo suppressalis</i> (Walker)	po	[169]
		<i>Mecyna gilvata</i> Fabricius	po	[169]
			po	[25]
	<i>Nomophila noctuella</i> Denis & Schiffermüller	po	[169]	
	Geometridae	<i>Calothyranis comptaria</i> Walker	po	[78]
			mo	[189]
		<i>Dysstroma citrata</i> (L.)	po	[195]
	<i>Lythria purpuraria</i> (L.)	po	[195]	
	Lycaenidae	<i>Heliophorus ila matsumurae</i> (Fruhstorfer)	po	[219]
	Lymantriidae	<i>Cifuna locuples</i> Walker	po	[166]
	Noctuidae	<i>Acronicta rumicis</i> (L.)	po	[75]
			po	[178]
			po	[25]
			po	[224]II
		<i>Anaplectoides prasina</i> (Denis & Schiffermüller)	po	[11]
			?	[181]
		<i>Discestra trifolii</i> (Hüfnagel)	po	[15]III
		<i>Grammodes geometrica</i> (Fabricius)	po	[224]IV
		<i>Lacanobia w-latinum</i> (Hüfnagel)	po	[25]V
		<i>Polia thalathina</i> (Rottemburg)	po	[15]
		<i>Simyra nervosa</i> (Denis & Schiffermüller)	?	[25]
<i>Trachea atriplicis</i> (L.)		po	[224]	
		?	[25]	
<i>Xylena formosa</i> (Butler)	p	[224]VI		
Nymphalidae	<i>Speyeria aglaja</i> (L.)	po	[219]	

Order	Family	Species	H. R.	Ref.
Thysanoptera	Phlaeothripidae	<i>Haplothrips aculeatus</i> (Fabricius)	po	[66]
		<i>Haplothrips chinensis</i> Priesner	po	[66]
	Thripidae	<i>Scolothrips takahashii</i> Priesner	po	[66]
		<i>Thrips hawaiiensis</i> (Morgan)	po	[66]

ⁱRecorded as *Spilosoma pura* Leech

ⁱⁱRecorded as *Acronycta rumicis* (L.)

ⁱⁱⁱRecorded as *Scotogramma trifolii* (Rottemberg)

^{iv}Recorded as *Chalciope geometrica* (Fabricius)

^vRecorded as *Polia w-latinum* Hufnagel

^{vi}Recorded as *Xylina formosa* (Butler)

Populus alba

White poplar

Introduction

The genus *Populus* contains approximately 100 species throughout Eurasia and North America. Known for its rapid growth and tolerance for harsh environmental conditions, the genus *Populus* commonly occurs between 30-72° N, at elevations below 3000 m. In China, approximately 71 species including hybrids and cultivated varieties have been reported^[46, 171].

Taxonomy

- Order** Salicales
- Family** Salicaceae
- Genus** *Populus* L.
- Species** *Populus alba* L.

Description

Populus alba is a broad-crowned deciduous tree that can reach 15-30 m in height. The bark is white to grayish white, smooth, becoming coarse in the lower bark. Young shoots are initially white tomentose, coppice shoots are grayish green to russet, and densely tomentose. The shiny, brown buds are ovate, 4-5 mm, acuminate apically, white tomentose and glabrescent. The leaves, measuring 4-8 cm in length and 2-5 cm in width are ovoid-rounded or elliptically ovate with an irregular dentate margin. The petiole is slightly flattened, tomentose, and equal in length to the leaf. The flowers are dioecious, appearing from April to May. Male catkins 3-6 cm long and female catkins are about 5-10 cm in length. The irregularly toothed bract is membranous, broadly elliptic, and has a length of about 3 mm. Stamens are 8-10 with violet anthers. The fruits are narrowly conical capsules, measuring 5 mm long, two-valved and glabrous, appearing in May^[46, 171].



Habitat

P. alba occurs in areas with a continental climate. Although it tolerates poor soil, wind and cold, *P. alba* also grows well in humid areas with fertile, sandy soil. *P. alba* is intolerant of hot, wet conditions where it is more susceptible to insect and disease attack^[171].

Distribution

Populus alba is native to the Irtysh River area of northern Xinjiang province, occurring on the islands and along the river valley, and the Zinjinshan Mountain area of western Shanxi province^[22, 43, 171]. *P. alba* is cultivated in the provinces of Anhui, Gansu, Guangxi, Hebei, Heilongjiang, Henan, Jiangsu, Liaoning, Ningxia, Shaanxi, and Tibet^[34, 35, 62, 88, 171, 221].

Economic Importance

The wood of *P. alba* is straight-grained, fine textured, and light weight, making it useful material for construction, furniture and paper. The ground leaves are used to remedy bed bug infestations. Because of its attractive growth form, *P. alba* is often used in landscaping. In the desert plain area of northwestern China, *P. alba* is cultivated for use as windbreaks^[171].

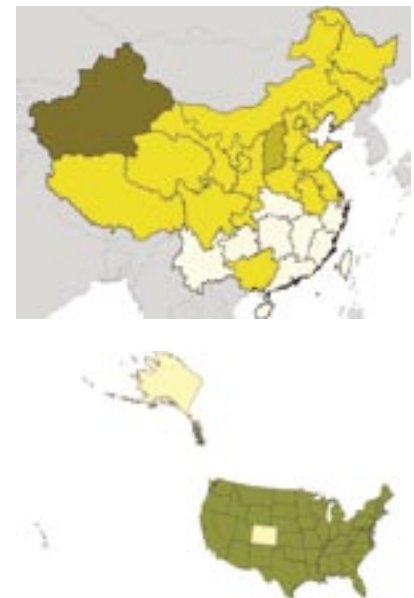
Related Species

Two varieties of *P. alba* are reported in China. *P. alba* var. *pyramidalis* Bunge

has a pyramidal crown, in contrast to the rounded crown of other varieties, *P. alba* var. *bachofenii* (Wierzbicki ex Rochel) Wesmael, differs from *P. alba* in its bark color and leaf shape. The bark of *P. alba* var. *bachofenii* is gray or bluish gray and the leaves of the short branchlets are abaxially subglabrous^[46, 171].

Natural Enemies of *Populus*

Sixty nine fungi and 419 arthropods have been recorded for the plants of the genus *Populus*.



Species of *Populus* in China^[46, 171]

Scientific Name	Scientific Name
<i>P. × beijingensis</i> W. Y. Hsu ¹	<i>P. minhoensis</i> S. F. Yang & H. F. Wu*
<i>P. × berolinensis</i> Dipp.	<i>P. nakaii</i> Skv.
<i>P. × canadensis</i> Moench	<i>P. nigra</i> L.
<i>P. × gansuensis</i> C. Wang & H. L. Yang [†]	<i>P. ningshanica</i> C. Wang et Tung
<i>P. × hopeiensis</i> Hu & Chow in Hu [‡]	<i>P. pamirica</i> Kom.
<i>P. × jrtyschensis</i> Ch. Y. Yang	<i>P. pilosa</i> Rehd.
<i>P. × pseudo-tomentosa</i> C. Wang et Tung	<i>P. pruinosa</i> Schrenk
<i>P. × xiaohei</i> T. S. Hwang et Liang	<i>P. pruinosa</i> Schrenk*
<i>P. × xiaozhuanica</i> W. Y. Hsu et Liang	<i>P. przewalskii</i> Maxim.
<i>P. adenopoda</i> Maxim.	<i>P. pseudoglauca</i> C. Wang et P. Y. Fu
<i>P. afghanica</i> (Ait. et Hemsl.) Schneid.	<i>P. pseudomaximowiczii</i> C. Wang et Tung
<i>P. alachanica</i> Kom.	<i>P. pseudo-simonii</i> Kitag.
<i>P. alba</i> L.	<i>P. purdomii</i> Rehd
<i>P. amurensis</i> Kom.	<i>P. qamdoensis</i> C. Wang et Tung
<i>P. candicans</i> Ait.	<i>P. qionghaoensis</i> T. Hong & P. Luo*
<i>P. canescens</i> (Ait.) Smith.	<i>P. rotundifolia</i> Griff.
<i>P. cathayana</i> Rehd	<i>P. schneideri</i> (Rehder) N. Chao*
<i>P. charbinensis</i> C. Wang et Skv.	<i>P. shanxiensis</i> C. Wang et Tung
<i>P. ciliata</i> Wall.	<i>P. simonii</i> Carr.
<i>P. davidiana</i> Dode	<i>P. suaveolens</i> Fisch.
<i>P. euphratica</i> Oliv.	<i>P. szechuanica</i> Schneid.
<i>P. girinensis</i> Skv.	<i>P. talassica</i> Kom.
<i>P. glauca</i> Haines	<i>P. tomentosa</i> Carr.
<i>P. haoana</i> Cheng et C. Wang	<i>P. tremula</i> L.
<i>P. hsinganica</i> C. Wang et Skv.	<i>P. trinervis</i> C. Wang et Tung
<i>P. iliensis</i> Drob.	<i>P. ussuriensis</i> Kom.
<i>P. intramongolica</i> T. Y. Sun & E. W. Ma*	<i>P. violascens</i> Dode
<i>P. kangdingensis</i> C. Wang et Tung	<i>P. wenxianica</i> Z. C. Feng & J. L. Guo ex G. Zhu*
<i>P. keerqinensis</i> T. Y. Sun	<i>P. wilsonii</i> Schneid.
<i>P. koreana</i> Rehd.	<i>P. wuana</i> C. Wang et Tung
<i>P. lancifolia</i> N. Chao*	<i>P. wulianensis</i> S. B. Liang & X. W. Li*
<i>P. lasiocarpa</i> Oliv.	<i>P. xiangchengensis</i> C. Wang & S. L. Tung
<i>P. laurifolia</i> Ledeb.	<i>P. yatungensis</i> (C. Wang et P. Y. Fu) C. Wang et Tung
<i>P. mainlingensis</i> C. Wang et Tung	<i>P. yuana</i> C. Wang et Tung
<i>P. manshurica</i> Nakai	<i>P. yunnanensis</i> Dode
<i>P. maximowiczii</i> Henry	

¹Result of hybridization

*Not listed in the *FRPS*

[†]Recorded as *P. gansuensis* C. Wang et H. L. Yang in *FRPS*

[‡]Recorded as *P. hopeiensis* Hu et Chow in *FRPS*

Fungi

Phylum	Family	Species	H. R.	Ref
Ascomycota	Botryosphaeriaceae	<i>Macrophoma tumefaciens</i> Shear	oo	[26]
	Capnodiaceae	<i>Capnodium salicinum</i> Mont.	po	[26]
	Dermateaceae	<i>Drepanopeziza populum</i> (Desm.) Höhn.	oo	[26]I
		<i>Gloeosporium populi-albae</i> Desm.	m	[26]
	Diatrypaceae	<i>Cryptosphaeria ligniota</i> (Fr.) Auersw.	oo	[26]II
	Erysiphaceae	<i>Phyllactinia guttata</i> (Wallr.) Lév.	p	[26]III
		<i>Phyllactinia populi</i> (Jacz.) Y.N. Yu	o	[24]
		<i>Pleochaeta populicola</i> X.L. Zhang	mo	[24]
		<i>Uncinula adunca</i> var. <i>adunca</i> (Wallr.) Lév.	po	[24]IV
			po	[26]V
		<i>Uncinula adunca</i> var. <i>mandshurica</i> (Miura) R.Y. Zheng & G.Q. Chen	po	[24]
		<i>Uncinula fragilis</i> R.Y. Zheng & G.Q. Chen	mo	[24]
		<i>Uncinula longispora</i> var. <i>longispora</i>	po	[24]
		<i>Uncinula longispora</i> var. <i>minor</i> R.Y. Zheng & G.Q. Chen	mo	[24]
		<i>Uncinula mandshurica</i> Miura	oo	[26]
		<i>Uncinula pseudocedrelae</i> R.Y. Zheng & G.Q. Chen	mo	[24]
		<i>Uncinula salicis</i> (DC.) Wint. forma <i>populum</i> Rabenh.	mo	[26]
	Mycosphaerellaceae	<i>Mycosphaerella mandshurica</i> Miura	mo	[26]
		<i>Mycosphaerella populi</i> (Auersw.) J. Schröt.	oo	[26]VI
	Phyllachoraceae	<i>Plectosphaera populina</i> (Maubl.) Arx & E. Müll.	oo	[26]VII
		<i>Lambertella fruticicola</i> Dumont	oo	[230]
	Taphrinaceae	<i>Taphrina populina</i> Fr.	oo	[26]
	Valsaceae	<i>Chondroplea populea</i> (Sacc. & Briard) Kleb.	mo	[26]VIII
		<i>Valsa ambiens</i> (Pers.) Fr.	oo	[26]IX
			po	[26]
	Venturiaceae	<i>Napicladium asteroma</i> Allesch.	mo	[26]
<i>Venturia tremulae</i> Aderh.		oo	[26]	
Basidiomycota	Ganodermataceae	<i>Ganoderma applanatum</i> (Pers.) Pat.	po	[26]
	Hericiaceae	<i>Heridium coralloides</i> (Scop.) Pers.	oo	[26]
		<i>Inonotus rheades</i> (Pers.) Bondartsev & Singer	po	[26]
	Hymenochaetaceae	<i>Inonotus radiatus</i> (Sowerby) P. Karst.	po	[26]
		<i>Phellinus igniarius</i> (L.) Quéf.	po	[26]
		<i>Phellinus setulosus</i> (Lloyd) Imazeki	po	[26]
		<i>Phellinus yucatanensis</i> (Murrill) Imazeki	oo	[26]
		<i>Xanthochrous hispidus</i> (Bull.) Pat.	po	[26]
	Melampsoraceae	<i>Melampsora laricis-populina</i> Kleb.	po	[26]
		<i>Melampsora magnusiana</i> G. Wagner	po	[26]
		<i>Melampsora populnea</i> (Pers.) P. Karst.	o	[26]XI
		<i>Melampsora populnea</i> f.sp. <i>laricis</i> Boerema & Verh.	oo	[26]XII
<i>Melampsora pruinosae</i> Tranzschel		oo	[26]	

Phylum	Family	Species	H. R.	Ref
	Platyglloeaceae	<i>Helicobasidium brebissonii</i> (Desm.) Donk	p	[26]
	Pleurotaceae	<i>Pleurotus calyptratus</i> (Lindblad) Sacc.	oo	[26]
		<i>Pleurotus ostreatus</i> (Jacq.) Quél.	po	[26]
	Polyporaceae	<i>Coriolus unicolor</i> (Bull.) Pat.	po	[26]
		<i>Daedaleopsis confragosa</i> (Bolton) J. Schröt.	po	[26]
		<i>Favolus squamosus</i> (Huds.) Ames	po	[26]
		<i>Fomes fomentarius</i> (L.) J.J. Kickx	p	[26]
		<i>Trametes hirsuta</i> (Wulfen) Pilát	po	[26]XIII
		<i>Trametes suaveolens</i> (L.) Fr.	po	[26]
	Strophariaceae	<i>Pholiota adiposa</i> (Fr.) Quél.	po	[26]
		<i>Pholiota populnea</i> (Pers.) Kuyper & Tjall.-Beuk.	oo	[26]XIV
	Tricholomataceae	<i>Tectella calyptrata</i> (Lindbl.) Sing.	mo	[26]
Anamorphic <i>Acantharia</i>	<i>Fusicladium tremulae</i> Fr.	mo	[26]	
Anamorphic Ascomycetes	<i>Myxosporium rimosum</i> Fautrey	mo	[26]	
	<i>Rhabdospora longispora</i> Ferraris	oo	[26]	
Anamorphic <i>Diplocarpon</i>	<i>Marssonina larici</i> Hart.	oo	[26]	
	<i>Marssonina populicola</i> Miura	oo	[26]	
Anamorphic <i>Gibberella</i>	<i>Fusarium ciliatum</i> Sacc.	po	[26]	
	<i>Fusarium sarcochroum</i> (Desm.) Sacc.	mo	[26]	
Anamorphic <i>Guignardia</i>	<i>Phyllosticta populea</i> Sacc.	oo	[26]	
	<i>Phyllosticta populina</i> Sacc.	mo	[26]	
Anamorphic <i>Leptosphaeria</i>	<i>Coniothyrium olivaceum</i> Bonord.	oo	[26]	
	<i>Coniothyrium populicola</i> Miura	oo	[26]	
Anamorphic <i>Lewia</i>	<i>Alternaria dauci</i> f. sp. <i>solani</i>	po	[26]	
Anamorphic <i>Mycosphaerella</i>	<i>Pseudocercospora salicina</i> (Ellis & Everh.) Deighton	po	[129]	
	<i>Septoria populicola</i> Peck	oo	[26]	
Anamorphic Mycosphaerellaceae	<i>Ascochyta populi</i> Delacr.	mo	[26]	
Anamorphic <i>Pseudovalsa</i>	<i>Coryneum populinum</i> Bres.	oo	[26]	
Anamorphic Uredinales	<i>Uredo tholopsora</i> Cummins	oo	[26]	
Anamorphic <i>Venturia</i>	<i>Pollaccia radiosa</i> (Lib.) E. Bald. & Cif.	oo	[26]XV	

^IRecorded as *Marssonina populi* (Lib.) Magn.

^{II}Recorded as *Cryptosphaeria populina* (Pers) Wint

^{III}Recorded as *Phyllactinia corylea* (Pers.) Karst.

^{IV}Recorded as *Uncinula adunca* (Wallr.)

^VRecorded as *Uncinula salicis* (DC.) Wint.

^{VI}Recorded as *Septoria populi* Desm

^{VII}Recorded as *Physalospora populina* Maubl.

^{VIII}Recorded as *Dothichiza populea* Sacc. et Br

^{IX}Recorded as *Valsa populina* Fuckel.

^XRecorded as *Cytospora chrysosperma* (Pers.) Fr.

^{XI}Recorded as *Melampsora rostrupii* Wagn.

^{XII}Recorded as *Melampsora laricis* Hart.

^{XIII}Recorded as *Coriolus hirsutus* (Wulf ex Fr.) Qué!l

^{XIV}Recorded as *Pholiota destruens* (Brond.) Gill.

^{XV}Recorded as *Fusicladium radiosum* (Lib.) Lind

Arthropods

Order	Family	Species	H. R.	Ref.	
Acariformes	Eriophyidae	<i>Tetraspinus populi</i> Kuang & Hong	mo	[94]	
			oo	[90]	
	Tetranychidae	<i>Eotetranychus geniculatus</i> Ehara	po	[167]	
			<i>Eotetranychus populi</i> (Koch)	p	[167]
			<i>Tetranychus urticae</i> (Koch)	po	[94]
<i>Tetranychus viennensis</i> Zacher			po	[94]	
Coleoptera	Attelabidae	<i>Apoderus jekeli</i> Roelofs	po	[94]	
		<i>Byctiscus congener</i> Jekel	po	[94]	
	Buprestidae	<i>Melanophila decastigma</i> Fabricius	mo	[94]	
	Cerambycidae	<i>Acalolepta degener</i> (Bates)	p	[94]	
			<i>Acanthoderes clavipes</i> (Schrank)	po	[86]
			<i>Agapanthia daurica</i> Ganglbauer	po	[150]
			<i>Anoplodera rubra dichroa</i> (Blanchard)	po	[94]
			<i>Anoplophora chinensis</i> (Förster)	po	[94]
				p	[13]
				p	[75]
			<i>Anoplophora glabripennis</i> (Motschulsky)	po	[94]
			<i>Anoplophora nobilis</i> Ganglbauer	po	[86]
			<i>Aphrodisium provosti</i> (Fairmaire)	po	[94]
			<i>Apriona germari</i> (Hope)	po	[94]
			<i>Aromia bungii</i> Faldermann	po	[94]
				p	[178]
			<i>Aromia moschata</i> (L.)	p	[75]
			<i>Aromia moschata orientalis</i> Plavils	p	[13]
			<i>Asias halodendri</i> (Pallas)	po	[178]
			<i>Bacchisa atriarsis</i> (Pic)	po	[94]
			<i>Bandar pascoei</i> (Lansberge)	po	[94]
			<i>Batocera horsfieldi</i> (Hope)	po	[94]
				p	[178]
			<i>Chelidonium provosti</i> (Fairmaire)	p	[150]
			<i>Chelidonium purpureipes</i> Gressitt	po	[94]
			<i>Chlorophorus diadema</i> Motschulsky	po	[94]
			<i>Chlorophorus macaumensis</i> (Chevrolat)	po	[94]
			<i>Chlorophorus sexmaculatus</i> (Motschulsky)	po	[94]
				p	[75]
			<i>Coscinesthes porosa</i> Bates	p	[165]
				p	[75]

Order	Family	Species	H. R.	Ref.
		<i>Dorysthenes hydropicus</i> Pascoe	po	[94]
		<i>Dorysthenes paradoxus</i> (Faldermann)	po	[94]
		<i>Eutetrappa sedecimpunctata</i> (Motschulsky)	po	[94]
		<i>Lamiomimus gottschei</i> Kolbe	po	[94]
		<i>Leptura thoracica</i> Creutzer	p	[13]
			p	[178]
			p	[75]
		<i>Megopsis sinica</i> White	p	[13]
			po	[94]
		<i>Mesosa longipennis</i> Bates	p	[13]
		<i>Neocerambyx mandarinus</i> Gressitt	p	[150]
			po	[94]
		<i>Olenecamptus octopustulatus</i> Motschulsky	po	[94]
		<i>Psacotheta hilaris</i> (Pascoe)	p	[178]
		<i>Pseudaolesthes chrysothrix</i> (Bates)	po	[94]
		<i>Rhopaloscelis unifasciatus</i> Blessig	p	[86]
		<i>Saperda carcharias</i> (L.)	po	[150]
		<i>Saperda perforata</i> (Pallas)	m	[86]
		<i>Saperda populnea</i> (L.)	po	[94]
			po	[150]
		<i>Toxotus meridianus</i> (L.)	p	[86]
		<i>Trichoferus campestris</i> (Faldermann)	po	[94]
		<i>Trichoferus campestris</i> Faldermann	p	[150]
		<i>Trirachys orientalis</i> Hope	po	[94]
		<i>Xylotrechus magnicollis</i> (Fairmaire)	po	[94]
	Cetoniidae	<i>Moseriana rugulosa</i> Ma	p	[143]
		<i>Oxycetonia jucunda</i> (Faldermann)	po	[94]
		<i>Protoetia famelica</i> Janson	p	[165]I
	Chrysomelidae	<i>Agelastica alni orientalis</i> Baly	p	[201]
		<i>Agrosteomela chinensis</i> (Weise)	mo	[94]
		<i>Altica viridicyanea</i> (Baly)	po	[94]
		<i>Arthrotus nigrofasciatus</i> (Jacoby)	po	[94]
		<i>Chrysomela lapponica</i> L.	po	[94]
		<i>Chrysomela populi</i> L.	po	[94]II
			p	[201]
			m	[165]
			p	[75]
		<i>Chrysomela salicivorax</i> (Fairmaire)	po	[94]III
		<i>Chrysomela tremulae</i> Fabricius	o	[165]
			p	[75]
			p	[201]
		<i>Chrysomela vigintipunctata</i> (Scopoli)	po	[94]IV
	<i>Crepidodera pluta</i> (Latreille)	p	[201]	
		po	[94]	

Order	Family	Species	H. R.	Ref.
		<i>Fleutiauxia armata</i> (Baly)	p	[201]
		<i>Galeruca spectabilis</i> (Faldermann)	po	[94]
		<i>Galerucida gloriosa</i> Baly	po	[94]
		<i>Lochmaeata capreae</i> (L.)	p	[201]
		<i>Melasoma vigintipunctata</i> Scopoli	po	[94]V
		<i>Monolepta hieroglyphica</i> (Motschulsky)	po	[94]
		<i>Monolepta pallidula</i> (Baly)	po	[201]
		<i>Monolepta yoasanica</i> Chen	po	[94]
		<i>Phratora aenea</i> Wang	m	[165]
		<i>Phratora costipennis</i> Chen	mo	[201]
		<i>Phratora laticollis</i> (Suffrian)	o	[201]
			oo	[165]
		<i>Phratora moha</i> Daccordi	m	[165]
		<i>Phratora multipunctata</i> (Jacoby)	po	[94]
		<i>Phratora phaedonoides occidentalis</i> Chen	p	[201]
			o	[165]
		<i>Phratora vitellinae</i> (L.)	po	[201]
		<i>Plagiodera versicolora</i> (Laicharting)	po	[94]
	Crioceridae	<i>Pedrillia annulata</i> Baly	po	[164]
	Curculionidae	<i>Chlorophanus auripes</i> Faust	mo	[94]
		<i>Chlorophanus lineolus</i> Motschulsky	mo	[211]
			po	[94]
		<i>Chlorophanus sibiricus</i> Gyllenhal	po	[94]
		<i>Ectatorrhinus adamsi</i> Pascoe	po	[94]
		<i>Lepyrus japonicus</i> Roelofs	po	[94]
			p	[75]
		<i>Lixus amurensis</i> Faust	mo	[94]
		<i>Phyllobius virideaeris</i> Laicharting	p	[211]
		<i>Piazomias validus</i> Motschulsky	p	[6, 211]
	<i>Sympiezomias velatus</i> (Chevrolat)	po	[94]	
	<i>Tanymecus urbanus</i> Gyllenhal	p	[6, 211]	
	Elateridae	<i>Agriotes fuscicollis</i> Miwa	po	[94]
		<i>Pleonomus canaliculatus</i> (Faldermann)	po	[94]
	Eumolpidae	<i>Abiromorphus anceyi</i> Pic	po	[94]
			p	[164]
		<i>Basilepta davidi</i> (Lefèvre)	po	[164]
		<i>Clytra laeviuscula</i> Ratzeburg	po	[94]
		<i>Clytra quadripunctata</i> (L.)	p	[164]
		<i>Cryptocephalus koltzei</i> Weise	mo	[94]
		<i>Labidostomis bipunctata</i> (Mannerheim)	po	[164]
			po	[94]
	<i>Labidostomis chinensis</i> (Lefèvre)	po	[164]	
	<i>Parascela cribrata</i> (Schaufuss)	po	[164]	
			po	[94]

Order	Family	Species	H. R.	Ref.	
		<i>Parnops glasunowi</i> Jacobson	p	[164]	
			po	[94]	
		<i>Smaragdina aurita hammarstraemi</i> (Jacobson)	p	[164]	
		<i>Trichochrysea japana</i> (Motschulsky)	po	[94]	
	Hispidae		<i>Basiprionota bisignata</i> (Boheman)	p	[165]
				po	[94]
				p	[178]
				p	[75]
			<i>Laccoptera quadrimaculata</i> (Thunberg)	po	[94]
	Lucanidae		<i>Lucanus fortunei</i> Saunders	p	[178]
	Megalopodidae		<i>Zeugophora ancora</i> Reitter	oo	[164]
			<i>Zeugophora scutellaris</i> Suffrian	po	[164]
	Melolonthidae		<i>Apogonia chinensis</i> Moser	po	[94]
			<i>Heptophylla picea</i> Motschulsky	po	[94]
			<i>Holotrichia convexopyga</i> Moser	po	[94]
			<i>Holotrichia diomphalia</i> Bates	po	[94]
			<i>Holotrichia lata</i> Brenske	po	[94]
			<i>Holotrichia oblita</i> Feldermann	po	[94]
			<i>Holotrichia parallela</i> Motschulsky	po	[94]
			<i>Holotrichia serobiculata</i> Brenske	mo	[94]
			<i>Holotrichia titanis</i> Reitter	po	[94]
			<i>Holotrichia trichophora</i> (Fairmaire)	po	[94]
			<i>Maladera castanea</i> (Arrow)	po	[94]
			<i>Maladera orientalis</i> Motschulsky	po	[94]
			<i>Maladera ovatula</i> (Fairmaire)	po	[94]
			<i>Polyphylla laticollis</i> Lewis	po	[94]
			Rutelidae		<i>Adoretus sinicus</i> Burmeister
	<i>Adoretus tenuimaculatus</i> Waterhouse	po			[94]
	<i>Anomala corpulenta</i> Motschulsky	po			[94]
	<i>Anomala rufocuprea</i> Motschulsky	po			[94]
	<i>Popillia atrocoerulea</i> Bates	po			[94]
<i>Popillia pustulata</i> Fairmaire	po	[94]			
<i>Popillia quadriguttata</i> (Fabricius)	po	[94]			
<i>Proagopertha lucidula</i> Faldermann	po	[94]			
Scolytidae		<i>Ambrosiodmus rubricollis</i> (Eichhoff)	p	[75]	
			po	[197]	
		<i>Scolytoplatypus raja</i> Blandford	p	[75]	
		<i>Trypophloeus alni</i> Lindemann	oo	[165]	
		<i>Xyleborus adumbratus</i> Blandford	po	[197]	
		<i>Xyleborus emarginatus</i> Eichhoff	po	[197]	
			po	[94]	
		<i>Xyleborus fornicatus</i> Eichhoff	po	[197]	
<i>Xyleborus interjectus</i> Blandford	po	[197]			
<i>Xyleborus lewisi</i> Blandford	po	[197]			

Order	Family	Species	H. R.	Ref.
		<i>Xyleborus saxeseni</i> Ratzeburg	po	[197]
			p	[165]
		<i>Xyleborus semiopacus</i> Eichhoff	po	[197]
Hemiptera	Miridae	<i>Adelphocoris lineolatus</i> (Goeze)	p	[207]
			po	[94]
	Pentatomidae Tingidae	<i>Erthesina fullo</i> (Thunberg)	p	[207]
			po	[94]
		<i>Graphosoma rubrolineata</i> (Westwood)	po	[94]
		<i>Lelia decempunctata</i> Motschulsky	p	[207]
			po	[94]
		<i>Palomena amplifloata</i> Distant	p	[207]
		<i>Pentatoma japonica</i> (Distant)	po	[94]
		<i>Pentatoma metallifera</i> (Motschulsky)	p	[208]
		<i>Pentatoma rufipes</i> (L.)	p	[207]
			po	[94]
		<i>Rhaphigaster nebulosa</i> Poda	p	[207]
		<i>Hegesidemus habrus</i> Drake	po	[94]
		<i>Monostira unicastata</i> (Mulsant & Rey)	p	[207]
<i>Physatocheila costata</i> (Fabricius)	po	[208]		
<i>Stephanitis</i> sp.	po	[94]		
Homoptera	Aphididae	<i>Pterocomma anyangense</i> Zhang	mo	[205]
		<i>Pterocomma bailangense</i> Zhang	mo	[205]
		<i>Pterocomma neimongolense</i> Zhang	oo	[205]VI
		<i>Pterocomma sanpunum</i> Zhang	mo	[205]
		<i>Pterocomma sinipopulifoliae</i> Zhang	oo	[205]
	Aphrophoridae	<i>Aphrophora intermedia</i> Uhler	po	[94]
	Cercopidae	<i>Eoscarta assimilis</i> (Uhler)	p	[178]
	Chaitophoridae	<i>Chaitophorus populeti</i> (Panzer)	p	[165]
		<i>Chaitophorus populialbae</i> (Boyer de Fonscolombe)	o	[205]
		<i>Chaitophorus populihabitanis</i> Zhang	mo	[165]
		<i>Chaitophorus populiyunnanensis</i> Zhang	mo	[165]
		<i>Chaitophorus saliniger</i> Shinji	po	[94]
		<i>Chaitophorus Tibetensis</i> Zhang	oo	[205]
	Cicadellidae	<i>Bothrogonia sinica</i> Yang & Li	po	[94]
		<i>Empoasca biguttula</i> (Ishida)	po	[94]
		<i>Empoasca flavescens</i> (Fabricius)	po	[94]
		<i>Empoasca limbifera</i> Matsumura	mo	[94]
		<i>Idiocerus urakawensis</i> Matsumura	p	[57]
		<i>Tettigoniella viridis</i> (L.)	po	[94]
	Cicadidae	<i>Cryptotympana atrata</i> (Fabricius)	p	[178]
			po	[94]
		<i>Cryptotympana mandarina</i> Distant	po	[94]
			p	[75]

Order	Family	Species	H. R.	Ref.	
		<i>Cryptotympana pustulata</i> (Fabricius)	p	[75]	
		<i>Meimuna opalifera</i> (Walker)	p	[178]	
		<i>Platypleura kaempferi</i> (Fabricius)	po	[94]	
		<i>Suisha coreana</i> (Matsumura)	p	[75]	
	Coccidae	<i>Ceroplastes japonicus</i> Green		po	[165]
				po	[94]
				p	[75]
		<i>Eulecanium douglasi</i> (Sülc)	p	[173]	
		<i>Eulecanium rugulosum</i> (Arch.)	p	[173]	
		<i>Parthenolecanium corni</i> (Bouché)	p	[75]	
	Diaspididae	<i>Parthenolecanium persicae</i> (Fabricius)	po	[94]	
		<i>Dynaspidotus britannicus</i> (Newstead)	po	[165]	
		<i>Lepidosaphes tubulorum</i> Ferris		p	[165]
				po	[94]
		<i>Lepidosaphes ulmi</i> (L.)	po	[94]	
		<i>Pseudaulacaspis pentagona</i> (Targioni-Tozzetti)	po	[94]	
		<i>Quadraspidiotus perniciosus</i> (Comstock)		po	[94]
			p	[75]	
	<i>Quadraspidiotus slavonicus</i> (Green)	po	[94]		
	Fulgoridae	<i>Lycorma delicatula</i> (White)		p	[165]
				po	[94]
	Hormaphididae	<i>Doraphis populi</i> (Maskell)	po	[165]	
	Lachnidae	<i>Longistigma Tibetensis</i> Zhang	p	[165]	
	Membracidae	<i>Gargara genistae</i> (Fabricius)	po	[94]	
	Pemphigidae	<i>Epipemphigus sanpupopuli</i> (Zhang & Zhong)	mo	[205]	
		<i>Kaburagia ensigallis</i> (Tsai & Tang)	mo	[94]	
		<i>Kaburagia ovogallis</i> (Tsai & Tang)	mo	[94]	
		<i>Pemphigus yangcola</i> Zhang	o	[165]	
		<i>Pemphigus borealis</i> Tullgren	oo	[205]	
		<i>Pemphigus chomoensis</i> Zhang	mo	[205]	
		<i>Pemphigus circellatus</i> Zhang & Zhong	mo	[165]	
		<i>Pemphigus immunis</i> Buckton	oo	[205]	
<i>Pemphigus mankamensis</i> Zhang		m	[165]		
<i>Pemphigus matsumurai</i> Monzen			mo	[205]	
			oo	[165]	
<i>Pemphigus protospirae</i> Lichtenstein		po	[205]		
<i>Pemphigus sinobursarius</i> Zhang		mo	[205]		
<i>Pemphigus Tibetensis</i> Zhang			mo	[205]	
			oo	[165]	
<i>Pemphigus yangcola</i> Zhang		mo	[205]		
<i>Pemphigus yunnanensis</i> Zhang			mo	[205]	
		o	[165]		
<i>Thecabius populi</i> (Tao)	m	[75]			
Phloeomyzidae	<i>Phloeomyzus passerinii zhangwuensis</i> Zhang	oo	[205]		
Ricaniidae	<i>Ricania speculum</i> (Walker)	po	[94]		

Order	Family	Species	H. R.	Ref.
Hymenoptera	Siricidae	<i>Tremex apicalis</i> Matsumura	po	[94]
	Tenthredinidae	<i>Rhogogaster viridis</i> (L.)	po	[166]
Isoptera	Rhinotermitidae	<i>Reticulitermes chinensis</i> Snyder	po	[94]
	Termitidae	<i>Macrotermes barneyi</i> Light	po	[94]
Lepidoptera	Aegeriidae	<i>Paranthrene tabaniformis</i> Rottenburg	po	[94]
	Arctiidae	<i>Aloa lactinea</i> (Cramer)	po	[94]
		<i>Hyphantria cunea</i> (Drury)	p	[44]
				[45]
		<i>Lemyra melli</i> (Daniel)	p	[166]
		<i>Spilarctia subcarnea</i> (Walker)	po	[94]
	Callidulidae	<i>Cleis fasciata</i> Butler	mo	[178]
			mo	[75]
	Cossidae	<i>Azygophleps albofasciata</i> Moore	po	[94]
		<i>Cossus cossus</i> L.	po	[94]
			p	[166]
		<i>Holcocerus vicarius</i> Walker	p	[178]
			po	[94]
		<i>Xyleutes leuconotus</i> (Walker)	po	[94]
		<i>Zeuzera pyrina</i> L.	po	[94]
			p	[178]
	Crambidae	<i>Botyodes asialis</i> Guenée	m	[169]
			m	[166]
		<i>Botyodes diniasalis</i> Walker	m	[169]
			po	[94]
			m	[75]
		<i>Botyodes principalis</i> Guenée	po	[94]
			po	[169]
		p	[178]	
	<i>Diaphania perspectalis</i> (Walker)	mo	[75]	
	Drepanidae	<i>Cyclidia substigmatica</i> (Hübner)	po	[94]
		<i>Drepana curvatula</i> (Borkhausen)	po	[75]
	Gelechiidae	<i>Anacampsis populella</i> Clerck	po	[78]
	Geometridae	<i>Abraxas suspecta</i> Warren	p	[94]
			p	[178]
		<i>Alcis repandata</i> L.	po	[94]
p			[78]	
<i>Apocheima cinerarius</i> Erschoff		p	[78]	
<i>Archiearis notha</i> Hübner		p	[78]	
<i>Archiearis notha suifunensis</i> Kardakoff		po	[161]VII	
<i>Arichanna melanaria</i> (L.)		po	[161]	
<i>Biston betularia</i> (L.)	po	[94]		
	p	[78]		

Order	Family	Species	H. R.	Ref.
		<i>Biston comitata</i> Warren	po	[161]
			p	[75]VIII
			po	[94]VIII
		<i>Calospilos suspecta</i> Warren	po	[161]
		<i>Culcula panterinaria</i> (Bremer & Grey)	p	[75]
			p	[178]
			po	[94]
			p	[78]
		<i>Cystidia stratonice</i> (Stoll)	po	[94]
			p	[78]
		<i>Epione vespertaria</i> Fabricius	p	[78]
		<i>Erebomorpha consors</i> Butler	po	[161]
		<i>Gelasma illiturata</i> (Walker)	po	[161]
		<i>Hipparchus papilionaria</i> L.	p	[78]
		<i>Hypomecis punctinalis conferenda</i> (Butler)	p	[178]
		<i>Lomaspilis marginata amurensis</i> (Heydemann)	po	[161]
		<i>Lygris testata achatinellaria</i> Oberthür	po	[161]
		<i>Naxa seriaria</i> Motschulsky	po	[94]
		<i>Ochrognesia difficta</i> (Walker)	po	[161]
			p	[166]
			p	[178]
			p	[75]
			po	[94]
			p	[78]
		<i>Odontopera aurata</i> (Prout)	p	[178]
		<i>Ophthalmitis albosignaria</i> (Bremer & Grey)	p	[75]
			p	[166]
			p	[178]
		<i>Ophthalmodes sinensium</i> Oberthür	p	[178]
		<i>Ourapteryx persica</i> Ménétrière	po	[161]
		<i>Percnia giraffata</i> (Guenée)	p	[178]
		<i>Serraca punctinalis conferenda</i> Butler	po	[94]
		<i>Yala pyricola</i> Chu	p	[78]
		<i>Zamacra excavata</i> Dyar	po	[94]
	Gracillariidae	<i>Lithocolletis ringoniella</i> Matsumura	po	[94]
	Lasiocampidae	<i>Cyclophragma yamadai</i> (Nagano)	po	[94]
		<i>Gastropacha populifolia</i> Esper	po	[94]
		<i>Gastropacha quercifolia</i> (L.)	po	[94]
		<i>Malacosoma dentata</i> Mell	po	[94]
		<i>Malacosoma neustria testacea</i> Motschulsky	po	[94]
			p	[166]
		<i>Odonestis pruni</i> L.	po	[94]
	Limacodidae	<i>Cnidocampa flavescens</i> (Walker)	po	[94]
			p	[78]

Order	Family	Species	H. R.	Ref.	
		<i>Latoia consocia</i> Walker	p	[78]IX	
			po	[94]IX	
		<i>Latoia hilarata</i> (Staudinger)	po	[94]X	
		<i>Latoia lepida</i> (Cramer)	po	[94]XI	
		<i>Latoia pseudorepanda</i> (Hering)	po	[94]XII	
		<i>Latoia repunda</i> (Walker)	po	[94]XIII	
		<i>Monema flavescens</i> Walker	p	[178]	
			p	[75]	
		<i>Narosoideus vulpinus</i> (Wileman)	po	[94]	
		<i>Parasa sinica</i> Moore	po	[94]	
			p	[78]	
		<i>Setora postornata</i> (Hampson)	po	[94]	
		<i>Thosea sinensis</i> (Walker)	po	[94]	
			p	[75]	
			p	[78]	
		Lymantriidae	<i>Arctornis alba</i> (Bremer)	po	[94]
				po	[94]
			<i>Arctornis l-nigrum</i> (Müller)	p	[212]
	p			[75]	
	<i>Cifuna locuples</i> Walker		p	[166]	
			po	[94]	
	<i>Dasychira chekiangensis</i> Collenette		po	[94]	
	<i>Dasychira chinensis</i> Swinhoe		p	[75]	
	<i>Dasychira conjuncta</i> Wileman		po	[94]	
			p	[75]	
	<i>Dasychira fascelina</i> (L.)		po	[212]	
	<i>Dasychira olga</i> (Oberthür)		p	[212]	
	<i>Dasychira pudibunda</i> (L.)		p	[212]	
	<i>Euproctis bipunctapex</i> (Hampson)		p	[212]	
			p	[166]	
			po	[94]	
			p	[178]	
<i>Euproctis chrysorrhoea</i> (L.)	p		[75]		
	p		[212]		
<i>Euproctis karghalica</i> Moore	p		[212]		
	p	[213]			
<i>Laelia coenosa</i> (Hübner)	p	[75]			
	p	[212]			
	po	[94]			
	p	[178]			
<i>Laelia monoscola</i> Collenette	po	[94]			
<i>Lymantria dispar</i> (L.)	po	[212]			
	mo	[166]			
	po	[94]			

Order	Family	Species	H. R.	Ref.
		<i>Lymantria mathura</i> Moore	p	[166]
		<i>Lymantria monacha</i> (L.)	po	[212]
			po	[94]
		<i>Orgyia antiqua</i> (L.)	p	[212]
		<i>Orgyia dubia</i> (Tauscher)	p	[212]
		<i>Orgyia gonostigma</i> (L.)	p	[212]
			po	[94]
			p	[75]
		<i>Porthesia similis</i> (Fueszly)	p	[178]
			po	[94]
			p	[212]
			p	[75]
		<i>Stilpnotia candida</i> Staudinger	p	[212]
			p	[166]
			po	[94]
			p	[75]
		<i>Stilpnotia melanoscela</i> Collenette	po	[94]
			p	[75]
		<i>Stilpnotia salicis</i> (L.)	p	[212]
			po	[94]
		<i>Stilpnotia sartus</i> (Erschoff)	po	[213]
		<i>Teia ericae</i> Germar	p	[212]
			po	[94]
			p	[213]
		<i>Teia gonostigma</i> (L.)	p	[213]
	Noctuidae	<i>Acronicta intermedia</i> Warren	po	[94]
		<i>Acronicta megacephala</i> (Denis & Schiffermüller)	p	[15]
			p	[166]
		<i>Acronicta rumicis</i> (L.)	po	[94]
		<i>Agrotis exclamationis</i> (L.)	po	[94]XIV
		<i>Agrotis ipsilon</i> (Hufnagel)	po	[94]
		<i>Agrotis segetum</i> (Denis & Schiffermüller)	po	[94]
			po	[166]
		<i>Agrotis tokionis</i> Butler	po	[94]
		<i>Amathes triangulum</i> Hufnagel	po	[94]
		<i>Amphipyra perflua</i> (Fabricius)	po	[94]
			p	[75]
			p	[166]
		<i>Amphipyra pyramidea</i> (L.)	po	[94]
		<i>Catocala electa</i> (Vieweg)	po	[224]
			po	[94]
		<i>Catocala elocata</i> (Esper)	p	[15]
	<i>Colobochyla salicalis</i> (Denis & Schiffermüller)	po	[94]	
		p	[228]	

Order	Family	Species	H. R.	Ref.	
		<i>Cymatophoropsis trimaculata</i> (Bremer)	po	[94]	
		<i>Earias pudicana</i> Staudinger	p	[178]XV	
			po	[224]XV	
			po	[94]XV	
		<i>Euxoa oberthuri</i> Leech	po	[94]	
			po	[94]	
		<i>Ipimorpha retusa</i> (L.)	p	[228]	
		<i>Ipimorpha subtusa</i> (Denis & Schiffermüller)	p	[228]	
			p	[166]	
		<i>Melanchra persicariae</i> (L.)	po	[94]	
		<i>Moma alpium</i> (Osbeck)	po	[94]XVI	
		<i>Orthosia gracilis</i> (Denis & Schiffermüller)	p	[15]	
		<i>Orthosia incerta</i> (Hufnagel)	p	[15]	
		<i>Orthosia munda</i> (Denis & Schiffermüller)	p	[15]	
		<i>Scoliopteryx libatrix</i> (L.)	po	[94]	
			po	[224]	
			p	[166]	
		<i>Xestia c-nigrum</i> (L.)	po	[94]XVII	
		<i>Xylena exsoleta</i> (L.)	p	[15]XVIII	
	Notodontidae	<i>Cerura felina</i> Butler	p	[4]XIX	
			<i>Cerura menciana</i> Moore	p	[4]
				p	[166]
				po	[94]
			<i>Clostera albosigma curtuloides</i> (Erschoff)	po	[4]XX
			<i>Clostera anachoreta</i> (Fabricius)	p	[4]
				p	[166]
				po	[94]
			<i>Clostera anastomosis</i> (L.)	po	[94]
				p	[4]
				p	[166]
				p	[75]
			<i>Clostera curtula canescens</i> (Graeser)	p	[4]
			<i>Furcula furcula lanigera</i> (Moore)	p	[166]XXI
			<i>Gangarides dharma</i> Moore	po	[94]
			<i>Gazalina chrysolopha</i> (Kollar)	po	[94]
			<i>Gluphisia crenata</i> (Esper)	m	[4]XXII
			<i>Gonoclostera timoniorum</i> (Bremer)	po	[94]XXIII
			<i>Harpyia langiera</i> (Butler)	p	[4]
				po	[94]
			<i>Harpyia umbrosa</i> (Staudinger)	po	[94]XXIV
			<i>Micromelalopha sieversi</i> (Staudinger)	p	[4]XXV
				po	[94]XXV
		<i>Neocerura wisei</i> (Swinhoe)	p	[4]	
			po	[94]	

Order	Family	Species	H. R.	Ref.
		<i>Notodonta torva</i> (Hübner)	p	[4]XXVI
		<i>Phalera assimilis</i> (Bremer & Grey)	po	[94]
		<i>Phalera bucephala</i> (L.)	po	[94]
		<i>Phalera flavescens</i> (Bremer & Grey)	p	[4]
			po	[94]
		<i>Phalera fuscescens</i> Butler	po	[94]
		<i>Pheosia fusiformis</i> (Matsumura)	m	[4]
		<i>Pterostoma griseum</i> (Bremer)	po	[4]
		<i>Pterostoma sinicum</i> Moore	po	[94]
		<i>Pygaera timon</i> (Hübner)	mo	[4]
	Nymphalidae	<i>Apatura ilia</i> (Denis & Schiffermüller)	po	[94]
		<i>Apatura ilia substituta</i> Butler	mo	[94]
		<i>Apatura iris</i> (L.)	po	[94]
		<i>Apatura metis</i> Freyer	po	[94]
		<i>Chalinga elwesi</i> (Oberthür)	po	[219]
			po	[219]
		<i>Limenitis populi</i> (L.)	po	[94]
		<i>Litinga cottini</i> (Oberthür)	po	[219]
		<i>Nymphalis antiopa</i> (L.)	po	[219]
		<i>Sumalia daraxa</i> (Doubleday)	po	[219]
	<i>Vanessa indica</i> L.	po	[94]	
	Pieridae	<i>Aporia crataegi</i> (L.)	po	[94]
	Psychidae	<i>Chalioides kondonis</i> Matsumura	po	[94]
		<i>Clania minuscula</i> Butler	po	[94]XXVII
		<i>Clania variegata</i> Snellen	po	[94]XXVIII
	Pyralidae	<i>Nephopteryx semirubella</i> Scopoli	po	[94]
	Saturniidae	<i>Actias dubernardi</i> Oberthür	po	[94]
		<i>Actias heterogyna</i> Mell	po	[94]
		<i>Actias selene ningpoana</i> Felder	po	[94]
		<i>Dictyoploca japonica</i> Moore	po	[94]
		<i>Dictyoploca japonica</i> Moore	p	[75]
		<i>Neoris haraldi</i> Schawerda	po	[94]
		<i>Rhodinia davidi</i> Oberthür	po	[94]
	Sphingidae	<i>Amorpha amurensis</i> (Staudinger)	po	[94]
			po	[225]
			po	[227]
		<i>Apocalypsis velox</i> Butler	p	[225]
			po	[227]
			p	[75]
		<i>Callambulyx tatarinovi</i> (Bremer & Grey)	po	[94]
<i>Mimas tiliae christophi</i> (Staudinger)		p	[225]	
		p	[227]	
		po	[94]	
<i>Phyllosphingia dissimilis sinensis</i> Jordan	po	[94]		

Order	Family	Species	H. R.	Ref.	
		<i>Smerithus planus</i> Walker	po	[94]	
		<i>Smerithus caecus</i> Ménétériès	p	[225]	
			p	[227]	
		<i>Smerithus kindermanni</i> Lederer	p	[225]	
			p	[227]	
		<i>Smerithus planus alticola</i> Clark	p	[225]	
		p	[227]		
			<i>Smerithus planus</i> Walker	p	[225]
				p	[227]
	Tortricidae		<i>Acleris alnivora</i> Oku	???	[133]
			<i>Acleris emargana</i> (Fabricius)	p	[133]
				po	[78]
			<i>Acleris issikii</i> Oku	p	[133]
				po	[78]
			<i>Acleris submaccana</i> (Filipjev)	p	[133]
			<i>Adoxophyes orana</i> Fischer von Röslerstamm	p	[75]
				p	[133]
			<i>Ancylis unculana</i> (Haworth)	p	[78]
			<i>Apotomis inundana</i> (Denis & Schiffermüller)	p	[133]
			<i>Archips crataegana</i> (Hübner)	p	[133]
			<i>Archips xylosteana</i> (L.)	p	[133]
			<i>Capua favillaceana</i> (Hübner)	p	[133]
			<i>Cerace stipatana</i> Walker	po	[94]
			<i>Choristoneura diversana</i> (Hübner)	p	[133]
			<i>Cryptophlebia ombrodelta</i> (Lower)	po	[94]
			<i>Epinotia nisella</i> (Clerck)	p	[133]
			<i>Epinotia ramella</i> (L.)	p	[133]
				p	[166]
			<i>Gibberifera simplana</i> (Fischer von Röslerstamm)	m	[78]
			<i>Gypsonoma minutana</i> (Hübner)	p	[133]
			<i>Hedya salicella</i> (L.)	p	[133]
			<i>Pandemis corylana</i> (Fabricius)	po	[94]
		<i>Pandemis heparana</i> (Denis & Schiffermüller)	po	[133]	
		po	[94]		
	<i>Ptycholoma lecheana</i> (L.)	p	[133]		
		p	[75]		
	<i>Saliciphaga achris</i> (Butler)	p	[133]		
	<i>Sciaphila branderiana</i> (L.)	po	[133]		
	Yponomeutidae	<i>Yponomeuta padella</i> (L.)	mo	[94]	
	Zygaenidae	<i>Pidorus glaucopis atratus</i> Butler	po	[94]	
Orthoptera	Oedipodidae	<i>Locusta migratoria manilensis</i> (Meyen)	po	[94]	
	Phaneropteridae	<i>Holochlora japonica</i> Bremer von Wattenwyi	po	[94]	
	Pyrgomorphidae	<i>Atractomorpha lata</i> (Motschulsky)	po	[94]	
Thysanoptera	Phlaeothripidae	<i>Acanthothrips nodicornis</i> (Reuter)	p	[66]	

Order	Family	Species	H. R.	Ref.
	Thripidae	<i>Anaphothrips populi</i> Zhang & Tong	mo	[155]
		<i>Neohydatothrips populi</i> Han	m	[66]
		<i>Scolothrips dilongicornis</i> Han & Zhang	p	[66]
		<i>Scolothrips takahashii</i> Priesner	po	[66]
			p	[75]

^IRecorded as *Potosia famelica* Janson

^{II}Recorded as *Chrysolampra populi* L.

^{III}Recorded as *Chrysolampra saliciwrax* Fairmaire

^{IV}Recorded as *Chrysolampra vigintipunctata* (Scopoli)

^V Possible synonym of *Chrysolampra vigintipunctata* (Scopoli)

^{VI}Recorded as *Pterocomma neimogolense* Zhang

^{VII}Recorded as *Brephos notha suifunensis* Kardarkoff

^{VIII}Recorded as *Biston regalis comitata* (Warren)

^{IX}Recorded as *Parasa consocia* Walker

^XRecorded as *Parasa hilarata* (Staudinger)

^{XI}Recorded as *Parasa lepida* (Cramer)

^{XII}Recorded as *Parasa pseudorepanda* Hering

^{XIII}Recorded as *Parasa repunda* Hampson

^{XIV}Recorded as *Euxoa exclamationis* L.

^{XV}Recorded as *Earias pudicana pupillana* Staudinger

^{XVI}Recorded as *Trichosea champa* Moore

^{XVII}Recorded as *Agrotis c-nigrum* L.

^{XVIII}Recorded as *Xylena exoleta* (L.)

^{XIX}Recorded as *Cerura vinula felina* (Butler)

^{XX}Recorded as *Clostera curtuloides* Erschoff

^{XXI}Recorded as *Furcula lanigera* (Butler)

^{XXII}Recorded as *Gluphisia japonica* (Wileman)

^{XXIII}Recorded as *Gonoclostera timonides* (Bremer)

^{XXIV}Recorded as *Hybocampa umbrosa* (Staudinger)

^{XXV}Recorded as *Micromelalopha troglodyta* (Graeser)

^{XXVI}Recorded as *Notodonta tritophus uniformis* Oberthür

^{XXVII}Recorded as *Cryptothelea minuscula* Butler

^{XXVIII}Recorded as *Cryptothelea variegata* Snellen

Potamogeton crispus

Curly pondweed

Introduction

There are approximately 90 species of the genus *Potamogeton* worldwide. Twenty six species have been reported in China with a nationwide distribution^[3, 4].

Taxonomy

- Order: Helobiae
- Suborder: Potamogetonineae
- Family: Potamogetonaceae
- Genus: *Potamogeton* L.
- Subgenus: Potamogeton
- Species: *Potamogeton crispus* L.

Description

Potamogeton crispus is a submerged freshwater perennial. It has a terete to slightly flattened rhizome. The stems are sparingly branched, also terete to slightly flattened and angular, and creeping at the base. The stiff axillary turions are 1-3 cm long and 8-15mm wide. Leaves are sessile, broadly linear to narrowly oblong, 3-8 cm long and 3-10 mm wide, mostly undulate or crispate, with serrulate margins, and obtuse or rounded apices. Stipules are 5-10 mm long, convolute to shortly connate, membranous and evanescent. Inflorescences are cylindrical spikes composed of 2-4 whorls of opposite



Species of *Potamogeton* in China^[3]

Scientific Name	Scientific Name
<i>P. acutifolius</i> Link	<i>P. manchriensis</i> (A. Benn) A. Benn.*
<i>P. alpinus</i> Balb. ^I	<i>P. natans</i> L.
<i>P. amblyophyllus</i> C. A. Meyer	<i>P. nodosus</i> Poir.
<i>P. compressus</i> L.*	<i>P. obtusifolius</i> Mert. & Koch
<i>P. crispus</i> L.	<i>P. octandrus</i> Poir. ^{III}
<i>P. cristatus</i> Rgl. & Maack	<i>P. oxyphyllus</i> Miq.
<i>P. distinctus</i> A. Benn. ^{II}	<i>P. pamiricus</i> Baag.
<i>P. filiformis</i> Pers.	<i>P. pectinatus</i> L. ^{IV}
<i>P. gramineus</i> L.	<i>P. perfoliatus</i> L.
<i>P. intortifolius</i> J. B. He et al.	<i>P. polygonifolius</i> Pour.
<i>P. lucens</i> L.	<i>P. praelongus</i> Wulf.
<i>P. maackianus</i> A. Benn.	<i>P. pusillus</i> L.
<i>P. malaianus</i> Miq.	<i>P. recurvatus</i> Hagstrom

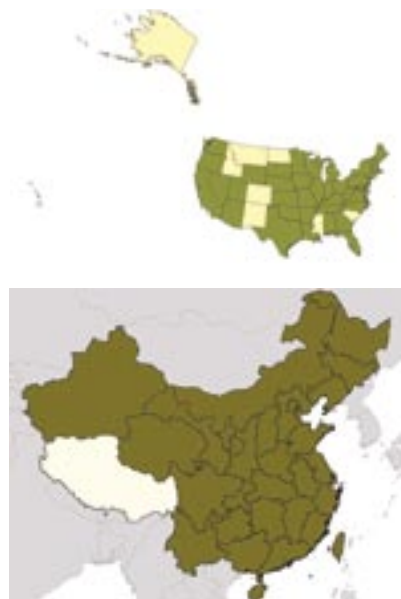
^Irecorded as *P. heterophyllus* Schreb. in *FRPS*

^{II}recorded as *P. fontigenus* Y. H. Guo et al. in *FRPS*

^{III}recorded as *P. hubeiensis* W. X. Wang in *FRPS*

^{IV}recorded as *P. leptanthus* Y. D. Chen and *P. nanus* Y. D. Chen in *FRPS*

*listed in the revised *FOC*



flowers borne on peduncles up to 5 cm in length. Carpels are 4-merous, shortly connate at the base. Fruits are ovate, 3.5-4 mm long; with a significant dorsal keels that are sparsely dentate on the lower ridge. The beak is slender, nearly equal to or longer than the body of carpel. Flowers and fruits appear from April through July^[4].

Habitat

P. crispus occurs in lakes, streams, ponds, reservoirs, paddy fields less than 2 m in depth^[4, 7]. It also occurs in

freshwater marshes at elevations of 2300 m in Qinghai, northwestern China^[6], and 570-2300 m in Yunnan^[7].

Distribution

P. crispus reportedly occurs nationwide in China with the exception of Tibet.

Economic Importance

P. crispus is regarded as green manure, and as a forage plant for fish and livestock^[1, 3], as well as a common aquatic weed. It is also host to some aquatic insect pests^[5]. Like many aquatic plants, *P. crispus* serves as a spawning habitat

for fish and shrimp in the early spring when flowering occurs^[7].

Related Species

P. malaianus Miq., similar to *P. crispus* in appearance, is petiolate, with an undulate or distinctly serrulate margin, 7 or more veined. *P. malaianus* occurs

in still or slowly running water and paddy fields. It is also a nationally distributed aquatic weed^[2, 4].

Natural Enemies of *Potamogeton*

One arthropod species has been recorded as associated with plants of genus

Potamogeton. One aquatic beetle, *Donacia provosti* Fairmaire (Coleoptera: Crioceridae), is mentioned in association with *Potamogeton*^[5].

Arthropods

Order	Family	Species	H. R.	Ref
Homoptera	Aphididae	<i>Rhopalosiphum nymphaeae</i> (L.)	po	[8]

***Pueraria montana* var.
lobata (*Pueraria lobata*)**

Kudzu

Introduction

The genus *Pueraria* contains approximately 35 species, occurring in East and Southeast Asia. Eight species have been reported in China with distribution extending from northwestern and central southern into southeastern China^[176, 177].

Taxonomy

- Order:** Rosales
- Suborder:** Leguminosae
- Family:** Leguminosae (Fabaceae)
- Subfamily:** Papilionoideae Giseke
- Tribe:** Phasoleae DC.
- Subtribe:** Glycininae Benth.
- Genus:** *Pueraria* DC.
- Species:** *Pueraria montana* var. *lobata* (Willd.) Sanjappa & Pradeep

Description

Pueraria montana var. *lobata* is a hirsute woody vine that can grow to a height of 8 meters in China. It has a xyloid stem base, and starchy root tubers. The leaves are 3-leaflets, pinnately compound, with ovoid-oblong, vertically veined stipules. Each leaflet is 3-lobed, or occasionally entire with linear-lanceolate stipules equal to or longer than the petiolule. The terminal leaflet, 7-15 cm long and 5-12, wide is broadly to obliquely ovate. The lateral leaflets are slightly smaller, obliquely ovate, with light yellow appressed pilose hairs on the upper surface and more densely so on the underside. Racemes, about 15-30 cm in length, bear flowers mainly in the upper half of the inflorescence. The caducous bracts are linear-lanceolate to linear, and longer than the bractlets, which are ovate, less than 2 mm in length. Florets occur in cluster of three at the rachis node. Calyces are campanulate, lanceolate-lobed, 8-10 mm long, and covered with yellowish brown hairs.



Species of *Pueraria* in China†

Scientific Name	Scientific Name
<i>P. alopecuroides</i> Craib	<i>P. peduncularis</i> (Grah. ex Benth.) Benth.
<i>P. calycina</i> Franch.	<i>P. phaseoloides</i> (Roxb.) Benth.
<i>P. edulis</i> Pampan.	<i>P. stricta</i> Kurz
<i>P. lobata</i> (Willd.) Ohwi‡	<i>P. wallichii</i> DC.

† Nine species are listed in the revised *FOC*.

‡ *P. lobata* (Willd.) Ohwi is commonly accepted as *Pueraria montana* var. *lobata* (Willd.) Sanjappa & Pradeep

Corollas are purple, 10-12 mm long, with a 2-lobed, obovate flag at the base. Flowers appear from September through October, consequently followed in November to December by brownish hirsute, flat, oblong pods 5-9 cm long and 8-11 cm wide^[176].

Habitat

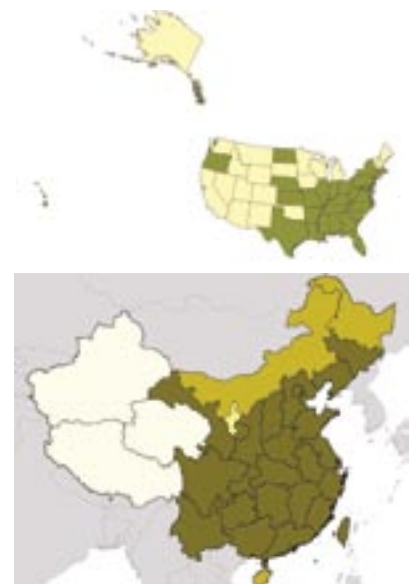
In general, *P. Montana* var. *lobata* occurs in dense or sparse forests in mountainous areas^[176]. Additional habitats include warm, moist hillsides, roadsides, and streamsides at elevations of 700-1500 m in the Qinling Mountains, northwestern China; and broadleaf forests, forest edges, thickets, and undisturbed mountains in northeastern China^[52, 82].

Distribution

The distribution of *P. montana* var. *lobata* has been reported from most of the provinces in China except Qinghai, Tibet, Xinjiang^[176], and possibly Ningxia^[141].

Economic Importance

The root of *P. montana* var. *lobata* is medically useful in China. The plant is a fiber source for weaving and papermaking^[176]. *P. montana* is also planted for soil conservation in some areas in China^[82, 88].



Related Speceis

Pueraria montana var. *montana* (Lour.) Merr, accepted as *Pueraria lobata* var. *montana* (Lour.) van der Maesen in *FRPS*, flowers from July through September and fruits from October through December. It occurs in thickets and sparsely forested mountainous areas, in the provinces of Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangxi, Sichuan, Taiwan, Yunnan, and Zhejiang^[176]. *Pueraria*

lobata var. *thomsonii* (Benth.) van der Maesen, also known as *Pueraria lobata* var. *thomsonii* Benth, may be listed as a separate species in the revised *Flora of China*(FOC). It occurs in thickets and sparse forests, flowering in September and fruiting in November in the provinces of Guangdong, Guangxi, Hainan, Jiangxi, Sichuan, Yunnan, and Zhejiang^[177].

Natural Enemies of Pueraria

Twelve species of fungi have been reported from members of the genus *Pueraria* in China. Three Anamorphic *Mycosphaerella* species, *Cercospora pueraricola* W. Yamam., *Mycovellosiella puerariae* D.E. Shaw & Deighton, *Pseudocercospora puerariae* (Syd. & P. Syd.) Deighton, have been recorded only from *Pueraria montana* var. *lobata*. Forty-eight arthropod species have been found.

Fungi

Phylum	Family	Species	H. R.	Ref.
Ascomycota	Erysiphaceae	<i>Erysiphe puerariae</i> R.Y. Zheng & G.Q. Chen	po	[24]
		<i>Pleochaeta polychaeta</i> (Berk. & M.A. Curtis) Kimbr. & Korf	po	[26]
	Meliolaceae	<i>Meliola banosensis</i> Syd.	o	[72]
			p	[26]
Mycosphaerellaceae	<i>Mycosphaerella puerariae</i>	o	[26]	
Basidiomycota	Ceratobasidiaceae	<i>Thanatephorus cucumeris</i> (A.B. Frank) Donk	p	[26]
	Phakopsoraceae	<i>Phakopsora pachyrhizi</i> Syd. & P. Syd.	p	[26]
Chytridiomycota	Synchytriaceae	<i>Synchytrium minutum</i> (Pat.) Gäum.	oo	[26]
Anamorphic <i>Mycosphaerella</i>		<i>Cercospora pueraricola</i> W. Yamam.	m	[26]
		<i>Mycovellosiella puerariae</i> D.E. Shaw & Deighton	m	[65]
		<i>Pseudocercospora puerariae</i> (Syd. & P. Syd.) Deighton	m	[129]
		<i>Pseudocercospora puerariicola</i> (W. Yamam.) Deighton	o	[129]
Anamorphic <i>Pleochaeta</i>		<i>Streptopodium</i> spp.	po	[24]

Arthropods

Order	Family	Species	H. R.	Ref.
Coleoptera	Chrysomelidae	<i>Brachyphora nigrovittata</i> Jacoby	po	[201]
		<i>Gonioctena flexuosa</i> (Baly)	p	[165]
		<i>Gonioctena tredecimmaculata</i> (Jacoby)	p	[201]
		<i>Gonioctena tredecimmaculata</i> (Jacoby)	oo	[178]
	Crioceridae	<i>Sagra femorata purpurea</i> Lichtenstein	oo	[75]
			po	[164]
Curculionidae	<i>Alcidodes trifidus</i> (Pascoe)	p	[75]	
Hemiptera	Coreidae	<i>Fracastorius cornutus</i> Distant	m	[208]
		<i>Homoeocerus dilatatus</i> Horváth	p	[207]
		<i>Homoeocerus marginellus</i> Herrich-Schäffer	p	[207]
		<i>Homoeocerus unipunctatus</i> (Thunberg)	p	[207]
	Lygaeidae	<i>Chauliops fallax</i> Scott	p	[207]
		<i>Malcus elongatus</i> Stys	m	[208]
		<i>Malcus inconspicuus</i> Stål	p	[207]
<i>Tropidothorax cruciger</i> (Motschulsky)	p	[208]		

Order	Family	Species	H. R.	Ref.
	Pentatomidae	<i>Cantheconidea humeralis</i> (Distant)	p	[208]
		<i>Cyclopelta obscura</i> (Lepelletier & Serville)	p	[207]
		<i>Cyclopelta parva</i> Distant	p	[207]
		<i>Diplorhinus furcatus</i> (Westwood)	p	[208]
		<i>Megarrhamphus truncatus</i> (Westwood)	p	[207]
		<i>Stollia guttiger</i> (Thunberg)	p	[207]
	Plataspidae	<i>Aponsila montana</i> (Distant)	m	[208]
		<i>Brachyplatys punctipes</i> Montandon	m	[208]
		<i>Coptosoma intermedia</i> Yang	p	[208]
			p	[75]
		<i>Coptosoma notabilis</i> Montandon	p	[207]
			p	[75]
		<i>Megacopta cribraria</i> (Fabricius)	p	[207]
		<i>Megacopta distanti</i> (Montandon)	p	[208]
		<i>Megacopta horvathi</i> (Montandon)	p	[75]
	<i>Paracopta duodecimpunctatum</i> (Germar)	p	[207]	
	<i>Paracopta rufiscuta</i> Hsiao et Jen	p	[208]	
	Lepidoptera	Crambidae	<i>Lamprosema diemenalis</i> (Guenée)	p
<i>Maruca testulalis</i> Geyer			p	[169]
		p	[166]	
Drepanidae		<i>Callidrepana argenteola</i> (Moore)	p	[178]I
Lycaenidae		<i>Catochrysops panormus</i> (Felder)	po	[219]
		<i>Celastrina albocerulea</i> Moore	p	[178]
		<i>Celastrina argiola</i> (L.)	p	[219]
		<i>Celastrina argiolus</i> (L.)	p	[178]
		<i>Curetis acuta</i> Moore	p	[219]
		<i>Jamides bochus formosanus</i> (Fruhstorfer)	p	[219]
		<i>Lampides boeticus</i> (L.)	p	[219]
Noctuidae		<i>Mocis ancilla</i> (Warren)	oo	[75]
Notodontidae		<i>Phalera cossioides</i> Walker	oo	[4]II
Nymphalidae		<i>Neptis hylas luculenta</i> Fruhstorfer	p	[219]
		<i>Neptis nata adipala</i> Moore	p	[178]
		<i>Neptis nata lutatia</i> Fruhstorfer	p	[219]
		<i>Neptis soma</i> Moore	p	[219]
Sphingidae		<i>Acosmeryx miskini</i> (Murray)	p	[225]
			p	[227]
			p	[166]
		<i>Acosmeryx naga</i> (Moore)	p	[225]
			p	[75]
			p	[178]
		<i>Clanis bilineata</i> (Walker)	po	[225]
			po	[178]
		<i>Clanis bilibeata tsingtauica</i> Mell	po	[75]
			po	[225]

^IProbably the synonym of *Callidrepana patrana* (Moore)

^{II}Recorded as *Phalera procera* (Felder)

Quercus acutissima

Sawtooth oak

Introduction

The genus *Quercus* contains approximately 300 species worldwide with distribution in Asia, Africa, Europe and North America. Thirty-five species are recorded in the revised *Flora of China*. Members of the genus *Quercus* grow in almost every province of the country due to their high economic value^[74].

Taxonomy

Order Fagales

Family Fagaceae

Genus *Quercus* L.

Species *Quercus acutissima* Carruth

Description

Quercus acutissima is a deciduous tree that can reach a height of 30 m and a diameter of one meter. The bark is dark grayish brown with deep longitudinal fissures. Young shoots are grayish yellow with grayish yellow pubescence becoming glabrescent, and light yellow lenticels. Winter buds are conical and pubescent. The leaves, 8-19 cm long and 2-6 cm wide, may



Species of *Quercus* in China^{*[74, 194]}

Scientific Name	Scientific Name
<i>Q. acrodonta</i> Seem.	<i>Q. marlipoensis</i> Hu et Cheng
<i>Q. acutissima</i> Carruth.	<i>Q. mongolica</i> Fisch. ex Ledeb ^{IV}
<i>Q. aliena</i> Bl.	<i>Q. monimotricha</i> Hand-Mazz.
<i>Q. aquifolioides</i> Rehd. et Wils.	<i>Q. oxyphylla</i> (Wils.) Hand.-Mazz.
<i>Q. baronii</i> Skan	<i>Q. palustris</i> Muench.
<i>Q. bawanglingensis</i> Huang, Li et Xing	<i>Q. phillyraeoides</i> A. Gray
<i>Q. chenii</i> Nakal	<i>Q. rehderiana</i> Hand.-Mazz. ^V
<i>Q. cocciferoides</i> Hand.-Mazz.	<i>Q. robur</i> L.
<i>Q. dentata</i> Thunb.	<i>Q. semecarpifolia</i> Smith
<i>Q. dolicholepis</i> A. Camus	<i>Q. senescens</i> Hand.-Mazz.
<i>Q. engleriana</i> Seem. ^I	<i>Q. serrata</i> Thunb
<i>Q. fabri</i> Hance	<i>Q. setulosa</i> Hick. et A. Camus
<i>Q. franchetii</i> Skan	<i>Q. spinosa</i> David. ex Franch. ^{VI}
<i>Q. griffithii</i> Hook. F. et Thoms. ex Miq.	<i>Q. tarokoensis</i> Hayata
<i>Q. guajavifolia</i> Lévl. ^{II}	<i>Q. utilis</i> Hu et Cheng
<i>Q. kingiana</i> Craib	<i>Q. variabilis</i> Bl.
<i>Q. lanata</i> Smith ^{III}	<i>Q. yunnanensis</i> Franch. ^{VII}
<i>Q. lodicosa</i> E. F. Warb.	

*51 species, 14 varieties and 1 form in *FRPS*. Some species excluded from *FOC* are hybrids, or synonyms, listed below^[32].

^Irecorded as *Q. kongshanensis* Y. C. Hsu et H. W. Jen and *Q. lanceolata* S. Z. Qu et W. H. Zhang in *FRPS*

^{II} recorded as *Q. pannosa* Hand.-Mazz. in *FRPS*

^{III} recorded as *Q. tungmaiensis* Y. T. Chang. in *FRPS*

^{IV} recorded as *Q. wutaishanica* Mayr. in *FRPS*

^V recorded as *Q. longispica* (Hand.-Mazz.) A. Camus. in *FRPS*

^{VI} recorded as *Q. gilliana* Rehd. et Wils. in *FRPS*

^{VII} recorded as *Q. malacotricha* A. Camus in *FRPS*

have varied morphology, but oblong elliptic is the most commonly observed shape. The leaf apex is acuminate, base rounded to broadly cuneate, margin serrate. Young upper and lower leaf surfaces are pubescent becoming sparsely pubescent along the lower leaf veins. The glabrate petiole is about 1-3 cm in length. From March to April, catkins form in the leaf axils. The cupules are 1.5 cm in length and 2-4 cm in diameter. Bractlets are subulate to ligulate, revolute with a grayish white tomentum. In September to October of the following year, *Quercus acutissima* produces ovoid to ellipsoid acorns that are 1.5-2 cm long and 1.7-2.2 cm wide [194].

Habitat

Q. acutissima occurs on sunny slopes, in pure forests or mixed forests at elevations of 60-2200 m. in the provinces of Liaoning, Hebei, Shandong, as well as southwestern China [194].

Distribution

Q. acutissima is reported to occur in Anhui, Fujian, Guangdong, Guangxi,

Guizhou, Hainan, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Liaoning, Shaanxi, Shandong, Shanxi, Sichuan, Yunnan, Zhejiang, and probably Gangsu, and southeastern Xizang provinces [74, 79].

Q. acutissima is cultivated in Taiwan [76].

Economic Importance

Q. acutissima has a ring-porous wood used for making cross ties, timbers, and furniture. The leaves can be used as a food source for a silkworm that produces a type of coarse silk. It is also used as forage and as a starch source for industrial use. The acorns and bark can be used in the tanning process [194].

Related Species

Two varieties have been reported. *Q. acutissima* var. *septentrionalis* Liou, which occurs in Hebei and Shandong, has glabrous or sparsely pubescent young shoots, whereas *Q. acutissima* var. *depressinucata* H. W. Jen et R.Q.Gao, with flattened round acorns, occurs on slopes or in valleys at elevations of 150-300



m in Shandong province [74].

Natural Enemies of Quercus

Eighty-six species of fungi and 606 arthropods have been found in association with members of the genus *Quercus*. Most of the arthropods are regarded as pest species in China.

Fungi

Phylum	Family	Species	H. R.	Ref
Ascomycota	Asterinaceae	<i>Prillieuxina sinensis</i> Petr.	mo	[26]
	Botryosphaeriaceae	<i>Macrophoma fusispora</i> Bubák	oo	[26]
		<i>Macrophoma suberis</i> var. <i>nigromaculata</i> Keissl.	mo	[26]
	Capnodiaceae	<i>Caldariomyces fumago</i> Woron.	po	[26]I
		<i>Hypocapnodium setosum</i> (Zimm.) Speg.	po	[26]
		<i>Neocapnodium tanakae</i>	po	[26]
		<i>Scorias communis</i> W. Yamam.	po	[26]
		<i>Triposporiopsis spinigera</i> (Höhn.) W. Yamam.	po	[26]
	Chaetothyriaceae	<i>Chaetothyrium javanicum</i> (Zimm.) Boedijn	po	[26]II
	Coccoideaceae	<i>Coccodiscus quercicola</i> Henn.	oo	[26]
	Dermateaceae	<i>Gloeosporium quercuum</i> Miura	mo	[26]
	Erysiphaceae	<i>Cystotheca lanestris</i> (Harkn.) Sacc.	p	[24]
		<i>Cystotheca wrightii</i> Berk. & M.A. Curtis	oo	[24]
		<i>Erysiphe betae</i> (Vaňha) Weltzien	po	[26]III
		<i>Erysiphe gracilis</i> R. Y. Zheng & G.Q. Chen	oo	[24]
<i>Erysiphe sikkimensis</i> Chona, J.N. Kapoor & H.S. Gill		po	[24]	

Phylum	Family	Species	H. R.	Ref
		<i>Microsphaera alphitoides</i> Griffon & Maubl.	o	[24]
			p	[26]
		<i>Microsphaera hypophylla</i> Nevod.	o	[24]
		<i>Phyllactinia roboris</i> (Gachet) S. Blumer	po	[26]
			po	[24]
		<i>Sphaerotheca lanestrus</i> Harkn.	p	[26]
		<i>Sphaerotheca wrightii</i> (Berk. & M.A. Curtis) Höhn.	mo	[26]
		<i>Typhulochaeta japonica</i> S. Ito & Hara	oo	[24]
			po	[26]
		<i>Uncinula septata</i> E.S. Salmon	oo	[24]
		oo	[26]	
	Meliolaceae	<i>Asteridiella cyclobalanopsidicola</i> (W. Yamam.) Hansf.	po	[72]IV
		<i>Asteridiella quercina</i> (Hansf.) Hansf.	po	[72]V
		<i>Irenina quercina</i> Hansf.	mo	[26]
		<i>Meliola cyclobalanopsina</i> var. <i>cyclobalanopsina</i>	po	[72]
		<i>Meliola cyclobalanopsina</i> W. Yamam.	po	[26]
		<i>Meliola shiiae</i> W. Yamam.	p	[72]
		<i>Meliola taiyuensis</i> W. Yamam.	p	[72]
			oo	[26]
	<i>Meliola taiwaniana</i> W. Yamam.	p	[72]	
	Phyllachoraceae	<i>Trabutia sinensis</i> Arx & E. Müll.	mo	[26]
	Rhytismataceae	<i>Coccomyces dentatus</i> (J.C. Schmidt & Kunze) Sacc.	mo	[26]VI
	Rutstroemiaceae	<i>Lambertella guizhouensis</i> W.Y. Zhuang & Korf	oo	[230]
		<i>Rutstroemia sydowiana</i> (Rehm) W.L. White	oo	[230]
	Sclerotiniaceae	<i>Ciboria batschiana</i> (Zopf) N.F. Buchw.	mo	[26]VII
		<i>Ciboria bolaris</i> (Batsch) Fuckelel	oo	[230]
	Taphrinaceae	<i>Taphrina caerulescens</i> (Desm. & Mont.) Tul.	mo	[26]
Valsaceae	<i>Cryptoderis quercina</i> Teng	oo	[26]	
	<i>Cytospora microspora</i> (Corda) Rabenh.	oo	[26]	
	<i>Linospora conflicta</i> (Cooke) Sacc.	oo	[26]	
Venturiaceae	<i>Acantharia sinensis</i> (Petr.) Arx	mo	[26]	
Basidiomycota	Cronartiaceae	<i>Cronartium quercuum</i> (Berk.) Miyabe ex Shirai	p	[26]
	Fomitopsidaceae	<i>Fomitopsis castanea</i> Imazeki	oo	[26]VIII
		<i>Fomitopsis pinicola</i> (Sw.) P. Karst.	po	[26]
	Ganodermataceae	<i>Ganoderma applanatum</i> (Pers.) Pat.	po	[26]
	Hapalopilaceae	<i>Aurantiporus fissilis</i> (Berk. & M.A. Curtis) H. Jahn	po	[26]IX
		<i>Spongipellis litschaueri</i> Lohwag	po	[26]
	Hericiaceae	<i>Heridium caput-medusae</i> (Bull.) Pers.	mo	[26]
		<i>Heridium cirrhatum</i> (Pers.) Nikol.	oo	[26]X
		<i>Heridium erinaceus</i> (Bull.) Pers.	po	[26]
		<i>Inonotus rheades</i> (Pers.) Bondartsev & Singer	po	[26]
Hymenochaetaceae	<i>Inonotus dryadeus</i> (Pers.) Murrill	po	[26]	

Phylum	Family	Species	H. R.	Ref
		<i>Inonotus gilvoides</i> (Lloyd) Teng	oo	[26]
		<i>Inonotus krawtzevii</i> (Pilát) Pilát	mo	[26]
		<i>Inonotus radiatus</i> var. <i>licentii</i> Pilát	po	[26]
		<i>Phellinus igniarius</i> (L.) Quél.	po	[26]
		<i>Phellinus pectinatus</i> (Klotzsch) Quél.	oo	[26]XI
		<i>Phellinus robustus</i> (P. Karst.) Bourdot & Galzin	po	[26]
		<i>Phellinus setulosus</i> (Lloyd) Imazeki	po	[26]
		<i>Phellinus torulosus</i> (Pers.) Bourdot & Galzin	po	[26]
		<i>Xanthochrous hispidus</i> (Bull.) Pat.	po	[26]
	Marasmiaceae	<i>Armillaria mellea</i> (Vahl) P. Kumm.	po	[26]XII
	Microstromataceae	<i>Microstroma album</i> var. <i>japonicum</i> Henn.	oo	[26]
	Polyporaceae	<i>Coriolus unicolor</i> (Bull.) Pat.	po	[26]
		<i>Daedaleopsis confragosa</i> (Bolton) J. Schröt.	po	[26]
		<i>Fomes fomentarius</i> (L.) J.J. Kickx	po	[26]
		<i>Laetiporus sulphureus</i> (Bull.) Murrill	po	[26]
		<i>Poria lacerata</i> Murrill	oo	[26]
		<i>Poria lurida</i> Bres.	po	[26]
		<i>Trametes hirsuta</i> (Wulfen) Pilát	po	[26]
		<i>Trametes quercina</i> Lloyd	oo	[26]
		<i>Trametes versicolor</i> (L.) Lloyd	po	[26]XIII
	Schizoporaceae	<i>Schizopora paradoxa</i> (Schrad.) Donk	oo	[26]XIV
	Stereaceae	<i>Xylobolus frustulatus</i> (Pers.) Boidin	oo	[26]XV
		<i>Xylobolus subpileatus</i> (Berk. & M.A. Curtis) Boidin	oo	[26]
Tremellaceae	<i>Tremella indurata</i> Berk. & Broome	mo	[26]	
Anamorphic <i>Apiognomonia</i>	<i>Discula quercina</i> (Westend.) Arx	oo	[26]XVI	
Anamorphic Ascomycetes	<i>Hadronema orbiculare</i> Syd. & P. Syd.	mo	[26]	
	<i>Monochaetia kansensis</i> (Ellis & Barthol.) Sacc.	mo	[26]	
Anamorphic <i>Diplocarpon</i>	<i>Marssonina martinii</i> (Sacc. & Ellis) Magnus	oo	[26]XVII	
Anamorphic <i>Guignardia</i>	<i>Phyllosticta hranicensis</i> Petr.	m	[26]	
	<i>Phyllosticta quercus</i> Sacc. & Speg.	mo	[26]	
Anamorphic <i>Leptosphaeria</i>	<i>Coniothyrium quercinum</i> (Bonord.) Sacc.	mo	[26]	
Anamorphic Mycosphaerellaceae	<i>Ascochyta quercus</i> Sacc. & Speg.	mo	[26]	

^IRecorded as *Fumago vagans* Pers

^{II}Recorded as *Phaeosaccardinula javanica* (Zimm.) Yamam

^{III}Recorded as *Erysiphe polygoni* DC.

^{IV}Recorded as *Asteridiella cyclobalanopsicola* (Yam.) Hansf.

^VRecorded as *Asteridiella quercina* (Hansf.) Hansf.

^{VI}Recorded as *Leptothyrium quercinum* (Lasch) Sacc.

^{VII}Recorded as *Stromatinia pseudotuberosa* Rehm

^{VIII}Recorded as *Fomitopsis castaneus* Imaz.

^{IX}Recorded as *Tyromyces fissilis* (Berk. et Curt.) Donk

^XRecorded as *Steccherinum cirrhatum* (Pers. ex Fr.) Teng

^{XI}Recorded as *Pyropolyporus pectinatus* (Kl.) Murr.

^{XII}Recorded as *Armillariella mellea* (Vahl ex Fr.) Karst.

^{xiii}Recorded as *Coriolus versicolor* (L. ex Fr.) Quél

^{xiv}Recorded as *Poria versipora* (Pers.) Rom

^{xv}Recorded as *Stereum frustulosum* (Pers) Fr

^{xvi}Recorded as *Gloeosporium quercinum* West.

^{xvii}Recorded as *Marssonina martinii* (Sacc. et Ell.)

Arthropods

Order	Family	Species	H. R.	Ref.	
Acariformes	Tetranychidae	<i>Brevipalpus obovatus</i> Donnadieu	po	[94]	
		<i>Eutetranychus orientalis</i> (Klein)	p	[167]	
		<i>Oligonychus ununguis</i> (Jacobi)	p	[167]	
		<i>Tetranychus neocaledonicus</i> André	p	[167]	
		<i>Tetranychus viennensis</i> Zacher	po	[94]	
Coleoptera	Attelabidae	<i>Paroplapoderus melanostictus</i> Fairmaire	p	[75]	
		<i>Paroplapoderus semiannulatus</i> Jekel	p po	[75] [94]	
	Buprestidae	<i>Agrilus cyaneoniger</i> Saunders	po	[94]	
	Cerambycidae		<i>Acanthocinus griseus</i> (Fabricius)	po po	[86] [178]
			<i>Anoplodera rubra dichroa</i> (Blanchard)	po p	[94] [178]
			<i>Anoplophora beryllina</i> (Hope)	oo o po oo	[150] [165] [94] [178]
			<i>Anoplophora chinensis</i> (Förster)	po	[94]
			<i>Anoplophora imitatrix</i> (White)	po	[94]
			<i>Anoplophora leechi</i> (Gahan)	po	[94]
			<i>Aphrodisium sinicum</i> (White)	oo po	[150] [94]
			<i>Apriona germari</i> (Hope)	po	[13]
			<i>Aromia bungii</i> Faldermann	po	[94]
			<i>Asias halodendri</i> (Pallas)	po	[94]
			<i>Bandar pascoei</i> (Lansberge)	po	[94]
			<i>Batocera davidis</i> Deyrolle	po	[94]
			<i>Batocera horsfieldi</i> (Hope)	p po	[13] [94]
			<i>Batocera lineolata</i> Chevrolat	p po p	[165] [94] [75]
			<i>Callipogon relictus</i> (Semenov)	po	[13]
			<i>Chloridolum japonicum</i> (Harold)	m	[86]
			<i>Chloridolum lameeri</i> (Pic)	po	[94]
			<i>Chlorophorus eleodes</i> (Fairmaire)	po	[94]
			<i>Chlorophorus miwai</i> Gressitt	po	[94]
			<i>Chlorophorus moupinensis</i> (Fairmaire)	po	[94]
			<i>Chlorophorus separatus</i> Gressitt	mo po	[150] [94]
			<i>Chlorophorus sexmaculatus</i> (Motschulsky)	po p	[94] [75]
			<i>Dere thoracica</i> White	p po	[13] [94]
			<i>Dorysthenes hügelii</i> Redtenbacher	po	[86]
			<i>Embrik-strandia unifasciata</i> (Ritsema)	po	[94]
			<i>Eurypoda antennata</i> Saunders	p po	[150] [94]

Order	Family	Species	H. R.	Ref.
		<i>Gracilia minuta</i> Fabricius	po	[13]
			po	[13]
		<i>Lamiomimus gottschei</i> Kolbe	po	[94]
			p	[75]
		<i>Leptura aethiops</i> Poda	po	[13]
		<i>Linda apicalis</i> Pic	oo	[165]
			po	[13]
		<i>Macrotoma fisheri</i> Waterhouse	po	[94]
			po	[178]
			p	[13]
		<i>Mallambyx raddei</i> (Blessig)	p	[94]
		<i>Megopsis sinica</i> White	po	[13]
		<i>Mesosa longipennis</i> Bates	po	[13]
			oo	[13]
		<i>Moechotypa diphysis</i> (Pascoe)	po	[94]
			po	[150]
		<i>Monochamus guerryi</i> Pic	o	[165]
			po	[94]
		<i>Monochamus sparsutus</i> Fairmaire	mo	[94]
		<i>Morimospasma paradoxum</i> Ganglbauer	po	[86]
		<i>Olenecamptus octopustulatus</i> Motschulsky	po	[94]
		<i>Oupyrrhidium cinnabarinum</i> (Blessig)	oo	[150]
		<i>Perissus laetus</i> Lameere	p	[86]
			po	[94]
		<i>Plagionotus pulcher</i> Blessig	po	[13]
		<i>Polyzonus fasciatus</i> (Fabricius)	po	[94]
		<i>Pseudaolesthes chrysothrix</i> (Bates)	po	[13]
		<i>Purpuricenus petasifer</i> Fairmaire	po	[94]
			po	[150]
		<i>Purpuricenus sideriger</i> Fairmaire	mo	[94]
		<i>Rhaphuma horsfieldi</i> (White)	p	[165]
			p	[207]
		<i>Rosalia lameerei</i> Brongniart	p	[165]
			po	[13]
		<i>Stenygrinum quadrinotatum</i> Bates	oo	[165]
			po	[94]
		<i>Strangalia attenuata</i> (L.)	p	[86]
		<i>Strangalia basiplicata</i> (Fairmaire)	m	[75]
		<i>Stromatium longicorne</i> (Newman)	p	[13]
		<i>Thermistis croceocincta</i> (Saunders)	po	[94]
		<i>Toxotus meridianus</i> (L.)	p	[86]
		<i>Trichoferus guerryi</i> (Pic)	mo	[86]
			oo	[150]
		<i>Xylotrechus magnicollis</i> (Fairmaire)	po	[94]
			p	[13]
		<i>Xylotrechus rusticus</i> (L.)	p	[13]
		<i>Xystrocera globosa</i> (Olivier)	po	[94]
	Cetoniidae	<i>Agestrata orichalca</i> (L.)	po	[143]
		<i>Anomalocera olivacea</i> (Janson)	po	[143]
		<i>Anomalocera parryi</i> Westwood	po	[143]
		<i>Anthracophora rusticola</i> Burmeister	p	[143]
		<i>Campsiura insignis</i> (Gestro)	po	[143]
		<i>Campsiura javanica</i> (Gory & Percheron)	po	[143]
		<i>Campsiura mirabilis</i> (Faldermann)	po	[75]
			po	[143]
		<i>Campsiura ochreipennis</i> (Fairmaire)	po	[165]
			po	[143]
		<i>Campsiura superba</i> (Van de Poll)	po	[143]

Order	Family	Species	H. R.	Ref.
		<i>Campsiura xanthorrhina</i> Hope	po	[143]
		<i>Cetonia rutilans</i> (Janson)	po	[143]
		<i>Clinteria ducalis</i> White	p	[143]
		<i>Clinterocera mandarina</i> (Westwood)	oo	[165]l
		<i>Coelodera penicillata</i> Hope	p	[143]
		<i>Coenochilus nitidus</i> Arrow	po	[143]
		<i>Cosmiomorpha modesta</i> Saunders	p	[94]
			po	[75]
		<i>Cosmiomorpha setulosa</i> Westwood	oo	[143]
			po	[165]
			po	[94]
			po	[75]
		<i>Cosmiomorpha similis</i> Fairmaire	po	[143]
		<i>Cymophorus pulchellus</i> Arrow	po	[143]
		<i>Dicranobia potanini</i> (Kraatz)	oo	[165]
		<i>Dicranocephalus adamsi</i> (Pascoe)	po	[143]
			po	[165]
			mo	[94]
		<i>Dicranocephalus bowringi</i> Pascoe	po	[94]
		<i>Dicranocephalus dabryi</i> Auzoux	po	[143]
			p	[165]
		<i>Dicranocephalus wallichi bowringi</i> Pascoe	po	[143]
		<i>Dicranocephalus wallichi</i> Hope	po	[143]
		<i>Euchloropus laetus</i> Fabricius	po	[143]
		<i>Euselates ornata</i> (Saunders)	po	[143]
		<i>Euselates pulchella</i> (Gestro)	p	[143]
		<i>Euselates quadrilineata</i> (Hope)	p	[143]
			po	[75]
		<i>Euselates schönfeldti</i> Kraatz	po	[143]
		<i>Euselates tonkinensis</i> Moser	po	[143]
		<i>Glycyphana fulvistemma</i> Motschulsky	po	[143]
			po	[165]
			po	[94]
		<i>Glycyphana horsfieldi</i> (Hope)	p	[143]
			p	[165]
			po	[75]
		<i>Glycyphana nepalensis</i> Kraatz	po	[143]
			po	[165]
		<i>Goliathopsis velutinus</i> Pouillaude	po	[143]
		<i>Heterorrhina punctatissima</i> Westwood	po	[143]
		<i>Iumnos ruckeri</i> Saunders	p	[143]
		<i>Ixorida mouhoti</i> (Wallace)	po	[143]
		<i>Meroloba suturalis</i> (Snellen)	po	[143]
		<i>Moseriana brevopilosa</i> Ma	po	[143]
		<i>Moseriana longipilosa</i> Ma	po	[143]
		<i>Moseriana rugulosa</i> Ma	po	[143]
		<i>Mycteristes microphyllus</i> Wood-Mason	po	[143]
			oo	[165]
		<i>Neophaedimus auzouxi</i> Lucas	oo	[143]
		<i>Neophaedimus castanus</i> Ma	po	[143]
		<i>Oxycetonia bealiae</i> (Gory & Percheron)	po	[143]
			po	[165]
			po	[178]
			po	[75]

Order	Family	Species	H. R.	Ref.
			po	[143]
		<i>Oxycetonia jucunda</i> (Faldermann)	po	[165]
			po	[94]
			po	[75]
		<i>Parapilinurgus variegatus</i> Arrow	po	[143]
		<i>Poecilophilides rusticola</i> (Burmeister)	po	[94]
		<i>Protaetia aerata</i> (Erichson)	p	[143]
		<i>Protaetia andamanarum</i> Janson	po	[143]
			po	[143]
		<i>Protaetia brevitarsis</i> (Lewis)	po	[94]
			po	[94]
			po	[143]
		<i>Protaetia famelica</i> Janson	po	[165]II
			po	[143]
		<i>Protaetia fusca</i> (Herbst)	po	[143]
		<i>Protaetia lugubris orientalis</i> Medvedev	po	[165]III
			po	[143]
		<i>Protaetia nitididorsis</i> (Fairmaire)	po	[165]IV
			po	[75]
		<i>Pseudodicerus nigrocyaneus</i> (Bourgoin)	po	[143]
			po	[143]
		<i>Rhomborrhina fortunei</i> (Saunders)	p	[178]
			po	[75]
		<i>Rhomborrhina fulvopilosa</i> (Moser)	po	[75]
			po	[143]
		<i>Rhomborrhina fuscipes</i> Fairmaire	oo	[165]
			oo	[165]
		<i>Rhomborrhina japonica</i> (Hope)	po	[94]
			po	[75]
		<i>Rhomborrhina nigra</i> Saunders	po	[143]
		<i>Rhomborrhina olivacea</i> (Janson)	po	[75]
		<i>Rhomborrhina parryi</i> Westwood	oo	[165]
		<i>Rhomborrhina unicolor</i> Motschulsky	po	[143]
			oo	[143]
		<i>Rhomborrhina yunnana</i> Moser	po	[165]
		<i>Taeniodera coomani</i> (Bourgoin)	po	[143]
			po	[143]
		<i>Taeniodera flavofasciata</i> (Moser)	po	[75]
			po	[143]
		<i>Taeniodera garnieri</i> (Bourgoin)	po	[143]
		<i>Taeniodera idolica</i> Janson	po	[143]
		<i>Taeniodera malabariensis</i> (Gory & Percheron)	po	[75]
		<i>Thaumastopeus nigritus</i> (Fröhlich)	p	[143]
		<i>Torynorrhina fulvopilosa</i> (Moser)	oo	[143]
		<i>Torynorrhina hyacinthina</i> (Hope)	po	[143]
		<i>Trigonophorus nepalensis</i> Hope	po	[143]
		<i>Trigonophorus rothschildi</i> Fairmaire	po	[143]
		<i>Trigonophorus rothschildi varians</i> (Bourgoin)	po	[75]
	Chrysomelidae	<i>Cneorane cariosipennis</i> Fairmaire	mo	[94]
		<i>Exosoma flaviventris</i> (Motschulsky)	mo	[94]
		<i>Meristoides grandipennis</i> (Fairmaire)	mo	[94]
		<i>Mimastra limbata</i> Baly	po	[94]
		<i>Oides tarsatus</i> (Baly)	po	[94]
		<i>Pseudespera sericea</i> Chen, Wang & Jiang	oo	[165]
		<i>Pseudodera xanthospila</i> Baly	mo	[94]
	Crioceridae	<i>Sagra fulgida janthina</i> Chen	po	[94]
	Curculionidae	<i>Alcidodes waltoni</i> (Boheman)	po	[94]
		<i>Chlorophanus grandis</i> Roelofs	mo	[94]

Order	Family	Species	H. R.	Ref.
		<i>Cryptoderma fortunei</i> Waterhouse	po	[94]
		<i>Curculio arakawai</i> Matsumura & Kono	po	[94]
		<i>Curculio davidi</i> Fairmaire	po	[94]
		<i>Curculio distinguishedus</i> Roelofs	po	[94]
		<i>Ectatorrhinus adamsi</i> Pascoe	po	[94]
		<i>Episomus chinensis</i> Faust	p	[178]
		<i>Eumyllocerus sectator</i> (Reitter)	po	[211]
		<i>Macrocorynus fortis</i> (Reitter)	m	[6, 211]
		<i>Macrocorynus psittacinus</i> Redtenbacher	po	[6, 211]
			po	[94]
		<i>Myllocerinus ochrolineatus</i> Voss	po	[94]
		<i>Neomyllocerus hedini</i> (Marshall)	p	[6, 211]
			po	[94]
			p	[75]
		<i>Styanax apicatus</i> Heller	po	[94]
	Eumolpidae	<i>Basilepta sinarum</i> Weise	po	[164]
			p	[164]
			p	[165]
			po	[94]
		<i>Cleoporus variabilis</i> (Baly)	p	[75]
			mo	[94]
			mo	[164]
			p	[164]
		<i>Cryptocephalus bipunctatus cautus</i> Weise	mo	[164]
		<i>Cryptocephalus cunctatus</i> Clavareau	p	[164]
		<i>Cryptocephalus luteosignatus</i> Pic	po	[164]
		<i>Cryptocephalus pustulipes</i> Ménétriès	p	[164]
		<i>Cryptocephalus regalis</i> Gebler	po	[94]
		<i>Cryptocephalus tetradecaspilotus</i> Baly	po	[94]
		<i>Demotina albomaculata</i> Tan	m	[165]
		<i>Demotina bicoloriceps</i> Tan	oo	[165]
		<i>Demotina fasciculata</i> Baly	p	[164]
	<i>Trichochrysea japana</i> (Motschulsky)	po	[94]	
	<i>Xanthonia collaris</i> Chen	po	[165]	
	Hispididae	<i>Dactylispa angulosa</i> (Solsky)	po	[94]
			po	[75]
		<i>Dactylispa excisa</i> (Kraatz)	po	[94]
		<i>Dactylispa subquadrata</i> (Baly)	po	[94]
	Lucanidae	<i>Dorcus antaeus</i> Hope	oo	[165]
		<i>Dorcus nepalensis</i> Hope	mo	[94]
		<i>Dorcus reichei</i> Hope	po	[165]
		<i>Dorcus tityus</i> (Hope)	po	[165]
		<i>Lucanus parryi</i> Boileau	po	[165]
<i>Neolucanus championi</i> Parry		p	[75]	
<i>Neolucanus sinicus</i> Saunders		p	[75]	
<i>Odontolabis cuvera</i> Hope		p	[178]	
		p	[75]	
<i>Odontolabis siva</i> (Hope & Westwood)		p	[178]	
		po	[75]	
<i>Prosopocoilus astacoides</i> Hope		p	[165]	
<i>Prosopocoilus blanchardi</i> Parry		p	[94]	
	p	[75]		
<i>Serrognathus titanus</i> Boisduval	p	[75]		
Melolonthidae	<i>Autoserica japonica</i> Motschulsky	po	[94]	
	<i>Holotrichia diomphalia</i> Bates	po	[94]	
	<i>Holotrichia trichophora</i> (Fairmaire)	po	[94]	
Rutelidae	<i>Adoretosoma elegans</i> Blanchard	po	[94]	
	<i>Adoretus tenuimaculatus</i> Waterhouse	po	[94]	

Order	Family	Species	H. R.	Ref.	
		<i>Anomala corpulenta</i> Motschulsky	po	[94]	
		<i>Anomala mongolica</i> Faldermann	mo	[94]	
		<i>Anomala rufithorax</i> Ohans	mo	[94]	
		<i>Callistethus plagiicollis</i> Fairmaire	mo	[94]	
		<i>Ectinohoplia rufipes</i> Motschulsky	po	[94]	
		<i>Mimela splendens</i> (Gyllenhal)	po	[94]	
		<i>Popillia pustulata</i> Fairmaire	po	[94]	
		<i>Popillia quadriguttata</i> (Fabricius)	po	[94]	
	Scolytidae		<i>Acanthotomicus spinosus</i> Blandford	m	[165]
			<i>Ambrosiodmus rubricollis</i> (Eichhoff)	p	[75]
			<i>Cnestus maculatus</i> Browne	p	[75]
			<i>Coptodryas perparvus</i> (Sampson)	p	[75]
			<i>Euwallacea interjectus</i> (Blandford)	p	[75]
			<i>Hadrodemius armorphus</i> (Eggers)	p	[75]
			<i>Indocryphalus intermedius</i> (Sampson)	oo	[165]
			<i>Scolytoplatypus raja</i> Blandford	p	[75]
			<i>Scolytus querci</i> Yin & Huang	oo	[197]
				oo	[165]
			<i>Sphaerotrypes imitans</i> Eggers	m	[197]
				o	[165]
			<i>Sphaerotrypes yunnanensis</i> Tsai & Yin	oo	[197]
			<i>Terminalinus cristatus</i> (Schedl)	p	[75]
			<i>Trypodendron lineatum</i> Olivier	po	[94]
			<i>Xyleborus amorphus</i> Eggers	po	[197]
			<i>Xyleborus apicalis</i> Blandford	po	[197]
			<i>Xyleborus armipennis</i> Schedl	po	[197]
			<i>Xyleborus brevis</i> Eichhoff	po	[197]
			<i>Xyleborus dispar</i> Fabricius	po	[197]
			<i>Xyleborus emarginatus</i> Eichhoff	po	[197]
				po	[94]
				p	[75]
			<i>Xyleborus germanus</i> (Blandford)	po	[197]
				p	[75]
			<i>Xyleborus lewisi</i> Blandford	po	[197]
			<i>Xyleborus mancus formosanus</i> Eggers	po	[197]
			<i>Xyleborus saxeseni</i> Ratzeburg	po	[197]
			<i>Xyleborus seriatus</i> Blandford	po	[197]
	Trichiidae		<i>Paratrichius duplicatus</i> Lewis	p	[143]
			<i>Paratrichius pauliani</i> Tesar	oo	[165]
			<i>Paratrichius septemdecimguttatus</i> (Snellen)	po	[165]
				p	[143]
			<i>Trichius bifasciatus</i> Moser	po	[75]
	<i>Trichius dubernardi</i> Pouillaude	po	[143]		
		po	[165]		
	Valgidae		<i>Dasyvalgus laliganti</i> (Fairmaire)	po	[143]
			<i>Dasyvalgus sellatus</i> (Kraatz)	po	[143]
			<i>Oreoderus crassipes</i> Arrow	po	[143]
<i>Oreoderus momeitensis</i> Arrow			po	[143]	
<i>Oreoderus quadricarinatus</i> Arrow			po	[143]	
Hemiptera	Acanthosomatidae	<i>Acanthosoma forficula</i> Jakovlev	p	[94]	
		<i>Anaxandra levicornis</i> Dallas	po	[94]	
		<i>Elasmucha ferrugata</i> (Fabricius)	p	[155]	
		<i>Sastragala esakii</i> Hasegawa	p	[208]	
			po	[94]	
	<i>Sastragala parmata</i> Distant	p	[208]		
Coreidae	<i>Cletus rusticus</i> Stål	p	[75]		

Order	Family	Species	H. R.	Ref.
		<i>Dalader planiventris</i> (Hsiao)	po	[208]
		<i>Mictis fuscipes</i> Hsiao	mo	[94]
		<i>Mictis tenebrosa</i> (Fabricius)	po	[207]
		<i>Notopteryx soror</i> Hsiao	po	[208]
		<i>Ochrochira ferruginea</i> Hsiao	p	[208]
		<i>Petillopsis calcar</i> Dallas	p	[208]
		<i>Pterygomia humeralis</i> Hsiao	p	[208]
			mo	[94]
	<i>Trematocoris insignis</i> (Hsiao)	p	[208]	
	Pentatomidae	<i>Aspongopus chinensis</i> Dallas	po	[94]
		<i>Axiagastus rosmaus</i> Dallas	m	[207]
		<i>Dalpada cinctipes</i> Walker	po	[75]
		<i>Eurostus grossipe</i> Dallas	po	[75]
		<i>Eurostus ochraceus</i> Montandon	p	[208]
		<i>Eurostus validus</i> Dallas	p	[207]
			po	[94]
			p	[75]
		<i>Eusthenes cupreus</i> (Westwood)	po	[75]
		<i>Graphosoma rubrolineata</i> (Westwood)	p	[207]
			po	[94]
		<i>Halyomorpha halys</i> (Stål)	po	[75]
		<i>Homalogonia obtusa</i> (Walker)	p	[208]
			po	[94]
			p	[75]
		<i>Mattiphus splendidus</i> Distant	p	[208]
		<i>Megarrhamphus truncatus</i> (Westwood)	p	[207]
			m	[94]
		<i>Menida formosa</i> (Westwood)	po	[208]
		<i>Palomena angulosa</i> Motschulsky	p	[207]
		<i>Paterculus elatus</i> (Yang)	p	[75]
		<i>Pentatoma japonica</i> (Distant)	po	[207]
		<i>Pentatoma rufipes</i> (L.)	po	[207]
			po	[94]
		<i>Poecilocoris dissimilis</i> Martin	p	[207]
		<i>Poecilocoris lewisi</i> (Distant)	po	[94]
			po	[75]
		<i>Poecilocoris sanszesignatus</i> Yang	po	[207]
		<i>Poecilocoris splendidulus</i> Esaki	po	[207]
		<i>Prionaca hubeiensis</i> Zhang & Lin	mo	[94]
		<i>Tessaratomya papillosa</i> (Drury)	po	[94]
		<i>Udonga spinidens</i> Distant	p	[207]
	p		[94]	
	Plataspidae	<i>Coptosoma lasciva</i> Bergroth	p	[208]
		<i>Coptosoma variegata</i> Herich-Schaeffer	po	[207]
			po	[75]
	<i>Megacopta hui</i> (Yang)	m	[208]	
	Tingidae	<i>Corythucha arcuata</i> (Sty)	po	[94]
<i>Uhlerites debilis</i> (Uhler)		p	[208]	
Urostylidae	<i>Urochela distincta</i> Distant	po	[94]	
	<i>Urochela yangi</i> Maa	mo	[94]	
	<i>Urostylis lateralis</i> Walker	mo	[208]	
Homoptera	Aetalionidae	<i>Darthula hardwicki</i> (Gray)	oo	[165]
	Aphididae	<i>Myzocallis kuricola</i> Motschulsky	po	[94]
	Asterolecaniidae	<i>Asterodiaspis japonica</i> (Cockerell)	po	[173]
	Callaphididae	<i>Diphylaphis quercus</i> (Takahashi)	m	[75]
		<i>Tuberculatus capitatus</i> (Essig & Kuwana)	o	[205]

Order	Family	Species	H. R.	Ref.
		<i>Tuberculatus fulviabdominalis</i> (Shinji)	oo	[205]
		<i>Tuberculatus japonicus radisectuae</i> G. X. Zhang & W. Y. Zhang	m	[75]
		<i>Tuberculatus stigmatus</i> (Matsumura)	oo	[205]
	Cicadellidae	<i>Drabescus nigrifemoratus</i> (Matsumura)	po	[57]
		<i>Eurhadina alba</i> Dworakowska	m	[155]
		<i>Ledra auditura</i> Walker	p	[57]
		<i>Petalocephala discolor</i> Uhler	p	[57]
		<i>Tettigoniella albomarginata</i> (Signoret)	p	[57]
		Cicadidae Coccidae	<i>Cryptotympana atrata</i> (Fabricius)	p
	<i>Eulecanium ciliatum</i> (Douglas)		po	[173]
	<i>Parasaissetia nigra</i> (Nietner)		po	[173]
	<i>Saissetia oleae</i> (Bernard)		p	[173]
	Diaspididae	<i>Fiorinia fioriniae</i> (Targioni-Tozzetti)	po	[94]
		<i>Fiorinia vaccinia</i> Kuwana	po	[94]
		<i>Lepidosaphes beckii</i> (Newman)	po	[94]
		<i>Lepidosaphes corni</i> (Takahashi)	po	[94]
		<i>Lepidosaphes tubulorum</i> Ferris	po	[165]
		<i>Pseudaonidia duplex</i> (Cockerell)	po	[94]
	Fulgoridae	<i>Lycorma delicatula</i> (White)	p	[220]
			p	[165]
	Greenideidae	<i>Eutrichosiphum izas</i> Zhang	po	[165]
		<i>Eutrichosiphum pasaniae</i> (Okajima)	p	[178]
		<i>Eutrichosiphum tattakanum</i> (Takahashi)	p	[165]
		<i>Greenidea hangnigra</i> Zhang	m	[205]V
			m	[113]V
			o	[165]
	Lachnidae	<i>Holotrichosiphon dubius yulongshanense</i> Zhang	m	[165]
		<i>Holotrichosiphon russallee lijiangense</i> Zhang	m	[165]
		<i>Lachnus roboris</i> (L.)	mo	[205]
			mo	[205]
		<i>Lachnus siniquercus</i> Zhang	p	[205]
			po	[94]
	p		[178]	
	p	[75]		
Lecanodiaspididae	<i>Crescoccus candidus</i> Wang	po	[173]	
	<i>Lecanodiaspis circularis</i> (Borchsenius)	oo	[173]	
	<i>Pseudopulvinaria sikkimensis</i> Atkinson	po	[173]	
	<i>Psoraleococcus costatus</i> Borchsenius	po	[173]	
Margarodidae	<i>Drosicha corpulenta</i> (Kuwana)	po	[94]	
Membracidae	<i>Jingkara hyalipunctata</i> Chou	oo	[165]	
		po	[94]	
		p	[75]	
	<i>Tricentrus aleuritis</i> Chou	oo	[165]	
	p	[75]		
Pseudococcidae	<i>Drymococcus rhizophilus</i> Borchsenius	oo	[172]	
	<i>Physeriococcus cellulosus</i> Borchsenius	po	[172]	
Thelaxidae	<i>Cervaphis quercus</i> Takahashi	o	[205]	
		oo	[94]	
	<i>Kurisakia querciphila</i> Takahashi	o	[205]	
Hymenoptera	Cynipidae	<i>Diplolep agana</i> Hart	mo	[94]VI
		<i>Dryocosmus kuriphilus</i> Yasumatsu	po	[94]
Isoptera	Rhinotermitidae	<i>Reticulitermes chinensis</i> Snyder	po	[94]
Lepidoptera	Aegeriidae	<i>Conopia quercus</i> Matsumura	mo	[94]
	Amathusiidae	<i>Stichophthalma howqua</i> (Westwood)	po	[94]

Order	Family	Species	H. R.	Ref.	
	Arctiidae	<i>Camptoloma interiorata</i> (Walker)	p	[44]	
				[45]	
			po	[94]	
			p	[75]	
			<i>Cyana phaedra</i> (Leech)	po	[94]
			<i>Hyphantria cunea</i> (Drury)		[45]
			<i>Rhyparioides amurensis</i> (Bremer)	p	[44]
					[45]
		p		[166]	
		po		[94]	
	Bombycidae	<i>Oberthueria falcigera</i> Butler	po	[226]	
			p	[166]	
		<i>Oberthürria caeca</i> Oberthür	p	[75]	
		<i>Theophila mandarina</i> Moore	po	[226]	
	Brahmaeidae	<i>Brahmaea certhia</i> Fabricius	po	[94]	
		<i>Brahmaea hearseyi</i> (White)	p	[75]	
	Cossidae	<i>Holcocerus vicarius</i> Walker	po	[94]	
			p	[178]	
		<i>Xyleutes leuconotus</i> (Walker)	po	[94]	
	Crambidae	<i>Zeuzera leuconotum</i> Butler	po	[94]VII	
		<i>Diaphania angustalis</i> (Snellen)	mo	[94]	
		<i>Sylepta balteata</i> (Fabricius)	p	[169]	
	Drepanidae	<i>Agnidra scabiosa fixseni</i> (Bryk)	po	[94]VIII	
		<i>Drepana dispilata</i> Warren	mo	[94]	
		<i>Nordstromia japonica</i> (Moore)	po	[94]	
			p	[178]	
		<i>Palaedrepana harpagula</i> (Esper)	po	[94]	
			p	[178]	
			p	[78]	
		<i>Pseudalbara parvula</i> (Leech)	po	[94]	
	p		[178]		
	p		[75]		
	Gelechiidae	<i>Chelaria gibbosella</i> Zeller	po	[78]	
	Geometridae	<i>Acasis viretata</i> (Hübner)	po	[195]	
		<i>Asthena nymphaeata</i> (Staudinger)	oo	[195]	
		<i>Biston betularia</i> (L.)	po	[94]	
		<i>Boarmia displiscens</i> Butler	po	[94]	
			p	[178]	
		<i>Buzura suppressaria</i> (Guenée)	po	[94]	
			p	[178]	
			p	[75]	
		<i>Colotois pennaria ussuriensis</i> O. Bang-Haas	p	[78]	
		<i>Comibaena delicator</i> Warren	mo	[94]	
			p	[178]	
			m	[78]	
		<i>Comibaena pictipennis</i> Butler	m	[94]	
		<i>Conchia mundataria</i> Cramer	po	[161]	
<i>Culcula panterinaria</i> (Bremer & Grey)		po	[94]		
<i>Deileptenia ribeata</i> Clerck		po	[94]		
		p	[178]		
		p	[78]		
<i>Electrophaes corylata</i> (Thunberg)		po	[195]		
<i>Erannis dira</i> Butler	p	[78]			
<i>Esakiopteryx volitans</i> (Butler)	po	[195]			

Order	Family	Species	H. R.	Ref.	
		<i>Garaeus parva distans</i> Warren	po	[161]	
			po	[94]	
		<i>Gelasma glaucaria</i> (Walker)	oo	[161]	
		<i>Hemistola tenuilinea</i> (Alphéraky)	oo	[161]	
		<i>Hemithea aestivaria</i> Hübner	po	[161]	
			p	[78]	
		<i>Hipparchus valida</i> Felder	po	[161]	
			mo	[94]	
			p	[78]	
		<i>Hypomecis punctinalis conferenda</i> (Butler)	p	[178]	
			p	[75]	
		<i>Idiotephria debilitata</i> (Leech)	oo	[195]	
		<i>Inurois fletcheri</i> Inoue	po	[78]	
		<i>Jodis lactearia</i> (L.)	p	[178]	
			p	[78]	
		<i>Larerannis filipjevi</i> Wehrli	mo	[78]	
		<i>Mixochlora vittata</i> (Moore)	po	[178]	
		<i>Ochrognesia difficta</i> (Walker)	po	[161]	
			p	[178]	
			p	[75]	
		<i>Operophtera brumata</i> (L.)	po	[195]	
		<i>Operophtera fagata</i> (Scharfenberg)	po	[195]	
		<i>Operophtera relegata</i> Prout	po	[195]	
		<i>Ourapteryx aristidaria</i> Oberthür	mo	[94]IX	
		<i>Ourapteryx nivea</i> Butler	po	[94]	
			po	[178]	
			po	[78]	
		<i>Ourapteryx sambucaria</i> L.	po	[94]	
		<i>Photoscotia atrostrigata</i> (Bremer)	po	[94]	
		<i>Phthonosema invenustaria</i> Leech	po	[94]	
		<i>Selenia tetralunaria</i> Hufnagel	po	[161]	
			p	[78]	
		<i>Serraca punctinalis conferenda</i> Butler	p	[78]	
		<i>Tanaorhinus rafflesi rafflesi</i> Moore	p	[178]	
		<i>Tanaorhinus reciprocata confuciarum</i> Walker	mo	[94]	
			p	[78]	
		<i>Trichopteryx hemana</i> (Butler)	p	[195]	
		<i>Trichopteryx terranea</i> (Butler)	oo	[195]	
		<i>Trichopteryx ustata</i> (Christoph)	oo	[195]	
		<i>Xanthabraxas hemionata</i> (Guenée)	p	[178]	
			p	[75]	
		Lasiocampidae	<i>Cyclophragma lineata</i> (Moore)	po	[94]
			<i>Cyclophragma undans</i> (Walker)	po	[94]
			<i>Cyclophragma undans fasciatella</i> Ménétériès	po	[94]
			<i>Cyclophragma xichangensis</i> (Tsai & Liu)	p	[166]
			<i>Cyclophragma yamadai</i> (Nagano)	po	[94]
			<i>Gastropacha populifolia</i> Esper	po	[94]
<i>Lebeda nobilis</i> Walker	po		[94]		
<i>Malacosoma neustria testacea</i> Motschulsky	po		[94]		
<i>Odonestis pruni</i> L.	po		[94]		
<i>Paralebeda plagifera femorata</i> (Ménétériès)	p		[178]		
<i>Paralebeda plagifera</i> Walker	po		[166]		
	p		[178]		
<i>Trabala vishnou</i> Lefebure	po		[94]		
	p		[178]		
Limacodidae	<i>Apoda dentatus</i> Oberthür	p	[78]		

Order	Family	Species	H. R.	Ref.
		<i>Cnidocampa flavescens</i> (Walker)	po	[94]
		<i>Latoia consocia</i> Walker	po	[94]X
		<i>Latoia hilarata</i> (Staudinger)	p	[75]
			p	[78]XI
		<i>Narosa edoensis</i> Kawada	p	[78]
		<i>Narosoideus flavidorsalis</i> (Staudinger)	po	[94]
		<i>Phocoderma velutina</i> Kollar	p	[94]
			p	[75]
			p	[78]
		<i>Setora postornata</i> (Hampson)	po	[94]
	<i>Thosea sinensis</i> (Walker)	po	[94]	
	Lycaenidae	<i>Acytolepis puspa</i> (Horsfield)	po	[219]
		<i>Antigius attilia</i> (Bremer)	oo	[178]
			o	[219]
		<i>Arhopala japonica</i> (Murray)	po	[219]
		<i>Arhopala rama</i> Kollar	p	[178]
		<i>Celastrina argiola</i> (L.)	po	[219]
		<i>Chrysozephyrus kabrua nitakanus</i> (Kano)	mo	[219]
		<i>Chrysozephyrus lingi</i> Okano et Ohkura	mo	[219]
		<i>Chrysozephyrus rarasana</i> (Mutsumura)	oo	[219]
		<i>Euaspa milionia formosana</i> Nomura	mo	[219]
		<i>Favonius orientalis</i> (Murray)	o	[219]
		<i>Japonica lutea</i> (Hewitson)	p	[219]
		<i>Japonica saepestriata</i> (Hewitson)	o	[219]
		<i>Leucantigius atayalicus</i> (Shirôzu & Murayama)	oo	[219]
		<i>Niphanda fusca</i> (Bremer & Grey)	po	[94]
			oo	[178]
		<i>Shirozua jonasi</i> (Janson)	p	[219]
		<i>Strymonidia w-album</i> (Knoch)	po	[94]
		<i>Teratozephyrus arisanus</i> (Wileman)	mo	[219]
		<i>Teratozephyrus hecale</i> (Leech)	mo	[219]
	Lymantriidae	<i>Arctornis alba</i> (Bremer)	po	[212]
			po	[94]
			p	[178]
			p	[75]
		<i>Arctornis gelasphora</i> Collenette	po	[94]
		<i>Arctornis l-nigrum</i> (Müller)	p	[212]
			p	[166]
			po	[94]
			p	[75]
		<i>Arctornis xanthochila</i> Collenette	p	[166]
			p	[178]
		<i>Aroa substrigosa</i> Walker	po	[94]
		<i>Cispia lunata</i> Chao	oo	[213]
		<i>Dasychira acerosa</i> Chao	m	[166]
		<i>Dasychira angulata</i> Hampson	m	[166]
			mo	[94]
m			[75]	
<i>Dasychira aurifera</i> Scriba		mo	[212]	
		m	[178]	
		m	[75]	
<i>Dasychira chinensis</i> Swinhoe	p	[75]		
<i>Dasychira conjuncta</i> Wileman	m	[212]		
	po	[94]		
<i>Dasychira lunulata</i> Butler	p	[212]		
	p	[178]		

Order	Family	Species	H. R.	Ref.
		<i>Dasychira olga</i> (Oberthür)	p	[212]
		<i>Dasychira pseudabietis</i> (Butler)	p	[212]
		<i>Dasychira pudibunda</i> (L.)	p	[212]
		<i>Euproctis bipunctapex</i> (Hampson)	po	[94]
			p	[75]
		<i>Euproctis chrysoorrhoea</i> (L.)	p	[212]
		<i>Euproctis diploxutha</i> Collenette	po	[94]
			p	[75]
		<i>Euproctis flava</i> (Bremer)	p	[212]
			po	[94]
			p	[178]
			p	[75]
		<i>Euproctis plana</i> Walker	m	[212]
			po	[94]
			p	[75]
		<i>Ivela ochropoda</i> (Eversmann)	po	[94]
		<i>Lymantria dispar</i> (L.)	p	[212]
			p	[166]
			po	[94]
			p	[178]
		<i>Lymantria dispar japonica</i> Motschulsky	po	[94]
		<i>Lymantria dissoluta</i> Swinhoe	po	[94]
			p	[178]
		<i>Lymantria marginata</i> Walker	po	[94]
		<i>Lymantria mathura</i> Moore	p	[212]
			p	[166]
			po	[94]
			po	[94]
			p	[178]
		<i>Lymantria monacha</i> (L.)	p	[212]
			po	[94]
		<i>Lymantria viola</i> Swinhoe	p	[166]
		<i>Orgyia antiqua</i> (L.)	p	[212]
		<i>Orgyia dubia</i> (Tauscher)	po	[212]
		<i>Orgyia gonostigma</i> (L.)	p	[212]
			po	[94]
			p	[75]
		<i>Orgyia thyellina</i> Butler	p	[212]
		<i>Pida strigipennis</i> (Moore)	po	[213]
			po	[94]
		<i>Porthesia scintillans</i> (Walker)	po	[94]
			p	[75]
		<i>Porthesia similis</i> (Fueszly)	p	[212]
			po	[94]
			p	[178]
			p	[75]
		<i>Teia ericae</i> Germar	p	[212]
			p	[213]
			po	[94]
		<i>Teia gonostigma</i> (L.)	p	[213]
	Noctuidae	<i>Acrionicta aceris</i> (L.)	po	[15]
		<i>Acrionicta leporina</i> (L.)	po	[15]XII
		<i>Acrionicta tridens</i> (Denis & Schiffermüller)	po	[15]
		<i>Agrotis segetum</i> (Denis & Schiffermüller)	p	[166]

Order	Family	Species	H. R.	Ref.	
		<i>Amphipyra perflua</i> (Fabricius)	po	[224]	
			p	[166]	
			po	[94]	
		<i>Amphipyra pyramidea</i> (L.)	po	[94]	
		<i>Bena bicolorana</i> (L.)	m	[228]	
		<i>Bena prasinana</i> (L.)	po	[94]XIII	
			p	[178]XIII	
		<i>Diphtherocome pallida</i> (Moore)	po	[94]XIV	
		<i>Diphtherocome vivida</i> (Leech)	po	[94]	
		<i>Dysgonia stuposa</i> (Fabricius)	p	[94]XV	
		<i>Ephesia dissimilis</i> (Bremer)	mo	[224]	
			mo	[166]	
			po	[94]XVI	
			mo	[75]	
		<i>Ephesia streckeri</i> (Staudinger)	mo	[224]	
			mo	[75]	
		<i>Grammodes stolidia</i> (Fabricius)	po	[224]XVII	
		<i>Hyblaea puera</i> Cramer	p	[94]	
		<i>Hypersynoides astrigera</i> (Butler)	mo	[94]XVIII	
		<i>Hypersynoides punctosa</i> (Walker)	mo	[94]XIX	
		<i>Hypocala moorei</i> Butler	po	[94]	
		<i>Hypocala subsatura</i> Guenée	p	[166]	
			po	[94]	
			p	[75]	
		<i>Lacanobia contigua</i> (Denis & Schiffermüller)	po	[224]XX	
			p	[166]	
		<i>Moma alpium</i> (Osbeck)	po	[224]XXI	
			p	[166]	
			po	[94]XXII	
			m	[178]	
			p	[75]	
		<i>Mormonia dula</i> (Bremer)	oo	[224]	
		<i>Orthosia incerta</i> (Hufnagel)	p	[15]	
		<i>Orthosia munda</i> (Denis & Schiffermüller)	p	[15]	
		<i>Polia thalathina</i> (Rottenburg)	p	[15]	
		<i>Prodenia litura</i> (Fabricius)	po	[94]	
		<i>Pseudopsis sylpha</i> (Butler)	m	[15]XXIII	
			po	[94]XXIII	
		<i>Synoides picta</i> Butler	po	[228]XXIV	
			po	[166]XXIV	
			mo	[94]XXIV	
		<i>Synoides simplex</i> (Leech)	mo	[94]XXV	
		<i>Xylena exsoleta</i> (L.)	p	[15]XXVI	
		Notodontidae	<i>Cnethodonta grisescens</i> Staudinger	po	[94]
			<i>Ellida viridimixta</i> (Bremer)	mo	[4]XXVII
			<i>Euhampsonia cristata</i> (Butler)	po	[4]XXVIII
				mo	[166]XXIX
po	[94]XXVIII				
po	[75]XXIX				
<i>Euhampsonia niveiceps</i> (Walker)	mo		[94]		
<i>Euhampsonia splendida</i> (Oberthür)	mo		[4]		
	po		[94]		

Order	Family	Species	H. R.	Ref.	
		<i>Fentonia ocypte</i> (Bremer)	p	[4]	
			p	[166]	
			po	[94]	
			p	[178]	
			p	[75]	
		<i>Gazalina apsara</i> (Moore)	oo	[166]	
		<i>Gazalina chrysolopha</i> (Kollar)	po	[94]	
		<i>Harpyia umbrosa</i> (Staudinger)	p	[4]XXX	
			po	[94]XXX	
			p	[75]	
		<i>Hexafrenum leucodera</i> (Staudinger)	p	[75]	
		<i>Mesophalera sigmata</i> (Butler)	o	[4]	
			p	[178]	
			p	[75]	
		<i>Phalera assimilis</i> (Bremer & Grey)	p	[4]	
			oo	[166]	
			po	[94]	
		<i>Phalera bucephala</i> (L.)	po	[94]	
		<i>Phalera flavescens</i> (Bremer & Grey)	po	[4]	
			po	[94]	
			po	[75]	
		<i>Phalera fuscescens</i> Butler	po	[94]	
		<i>Phalerodonta bombycina</i> (Oberthür)	p	[4]XXXI	
			mo	[94]XXXII	
		<i>Quadricalcarifera fasciata</i> (Moore)	po	[4]	
			po	[178]	
			oo	[75]	
		<i>Semidonta biloba</i> (Oberthür)	o	[4]	
		<i>Spatialia dives</i> Oberthür	po	[75]	
		<i>Spatialia doerriesi</i> Graeser	mo	[166]	
			mo	[178]	
			po	[75]	
		<i>Spatialia plusiotis</i> (Oberthür)	po	[75]	
		<i>Stauropus persimilis</i> Butler	p	[4]	
		<i>Togepteryx velutina</i> (Oberthür)	po	[94]	
		Nymphalidae	<i>Euthalia nara omeia</i> Leech	po	[178]
			<i>Euthalia nara pacifica</i> Mell	po	[178]
			<i>Euthalia patala</i> (Kollar)	oo	[219]
			<i>Euthalia pratti</i> Leech	m	[178]
			<i>Sephisa chandra</i> (Moore)	oo	[178]
			<i>Sephisa daimio</i> Matsumura	oo	[219]
			<i>Sephisa princeps</i> (Fixsen)	m	[178]
		Papilionidae	<i>Papilio bianor</i> Sonan	po	[94]
		Psychidae	<i>Chalia larminati</i> Heylaerts	p	[166]
			<i>Clania minuscula</i> Butler	po	[94]XXXIII
				po	[94]XXXIV
		Pyrilidae	<i>Clania variegata</i> Snellen	p	[178]
<i>Dichocrocis chlorophanta</i> Butler	po		[94]		
<i>Herculia glaucinalis</i> L.	mo		[94]		
<i>Herculia pelasgalis</i> Walker	mo		[94]		
Saturniidae	<i>Sybrida fasciata</i> Butler	p	[169]		
	<i>Actias dubernardi</i> Oberthür	po	[94]		
		p	[226]		
	<i>Actias heterogyna</i> Mell	po	[94]		
p		[226]			
<i>Actias kongjiaria</i> Chu & Wang	p	[226]			
<i>Actias rhodopneuma</i> Röber	po	[226]			

Order	Family	Species	H. R.	Ref.
		<i>Actias selene ningpoana</i> Felder	po	[94]XXXV
		<i>Actias sinensis</i> Walker	po	[226]
			po	[94]
			p	[178]
			p	[75]
		<i>Aglia tau amurensis</i> Jordan	po	[226]
		<i>Antheraea pernyi</i> Guerin-Méneville	po	[226]
			po	[94]
			p	[178]
		<i>Antheraea pernyi</i> Guérin-Méneville	p	[166]
		<i>Antheraea yamamai</i> Guerin-Méneville	po	[226]
		<i>Attacus atlas</i> (L.)	po	[226]
		<i>Caligula boisduvalii fallax</i> Jordan	po	[226]
		<i>Caligula lindia bonita</i> Jordan	po	[226]
		<i>Caligula zuleika</i> Hope	po	[226]
		<i>Dictyoploca japonica</i> Moore	po	[226]
	<i>Loepa katinka</i> Westwood	p	[75]	
	<i>Rhodinia davidi</i> Oberthür	po	[226]	
	<i>Rhodinia fugax</i> Butler	po	[226]	
	Sphingidae	<i>Enpinanga transtriata</i> Chu & Wang	p	[75]
		<i>Marumba maacki</i> (Bremer)	m	[225]
			p	[227]
		<i>Marumba sperchius</i> Ménétriès	p	[225]
			p	[227]
		<i>Mimas tiliae christophi</i> (Staudinger)	po	[225]
			po	[227]
		<i>Oxyambulyx liturata</i> (Butler)	p	[225]
			p	[227]
			p	[178]
			p	[75]
		<i>Oxyambulyx ochracea</i> (Butler)	po	[94]
	<i>Oxyambulyx schauffelbergi</i> (Bremer & Grey)	p	[225]	
		p	[166]	
		po	[94]	
	Thyrididae	<i>Rhodoneura erecta</i> (Leech)	p	[226]
			p	[155]
		<i>Rhodoneura midfascia</i> Chu & Wang	oo	[226]
		<i>Striglina bispota</i> Chu & Wang	po	[226]
		<i>Striglina cancellata</i> Christoph	m	[166]
		<i>Striglina curvita</i> Chu & Wang	po	[226]
	<i>Striglina scitaria</i> Walker	p	[75]	
	Tortricidae	<i>Acleris delicatana</i> (Christoph)	p	[227]
po			[78]	
<i>Acleris perfundana</i> Kuznetsov		p	[227]	
<i>Aphelia paleana</i> (Hübner)		p	[227]	
<i>Archips crataegana</i> (Hübner)		p	[227]	
<i>Archips ingentana</i> (Christoph)		p	[227]	
<i>Archips xylosteanana</i> (L.)		p	[227]	
<i>Cerace stipatana</i> Walker		po	[94]	
<i>Choristoneura diversana</i> (Hübner)		p	[227]	
<i>Choristoneura longicellana</i> (Walsingham)		p	[227]	
		po	[94]	
<i>Croesia conchyloides</i> (Walsingham)	mo	[94]		
<i>Epinotia tenerana</i> (Denis & Schiffermüller)	p	[227]		

Order	Family	Species	H. R.	Ref.
		<i>Eudemis porphyrana</i> (Hübner)	p	[227]
		<i>Eulia ministrana</i> (L.)	p	[227]
		<i>Hedya inornata</i> (Walsingham)	p	[227]
		<i>Homona magnanima</i> Diakonoff	p	[178]
			p	[75]
			p	[78]
		<i>Laspeyresia splendana</i> (Hübner)	p	[227]
			po	[94]
		<i>Pandemis cinnamomeana</i> (Treitschke)	p	[227]
			p	[166]
			po	[94]
			p	[75]
		<i>Pandemis corylana</i> (Fabricius)	p	[227]
			po	[94]
<i>Pandemis heparana</i> (Denis & Schiffermüller)	p	[227]		
	po	[94]		
<i>Pandemis ribeana</i> (Hübner)	p	[227]		
	po	[94]		
<i>Strophedra nitidana</i> Fabricius	p	[78]		
<i>Syndemis perpulchrana</i> (Kennel)	p	[227]		
Yponomeutidae	<i>Yponomeuta polystigmellus</i> Felder & Felder	po	[94]	
		po	[78]	
Zygaenidae	<i>Illiberis sinensis</i> Walker	po	[94]	
Parasitiformes	Phytoseiidae	<i>Euseius subplebeius</i> (Wu & Li)	po	[75]
Phasmida	Bacillidae	<i>Baculum dolichocercatum</i> Bi & Wang	m	[155]
		<i>Baculum irregulariter-dentatum</i> Brunner von Wattenwyl	p	[155]
	Phasmatidea	<i>Phobaeticus longicornis</i> Bi & Wang	m	[155]
		<i>Phraortes elongatus</i> Thunberg	po	[94]
		<i>Phraortes illepidus</i> (Brunner von Wattenwyl)	p	[155]
<i>Sipylodea truncata</i> Chen & He	m	[155]		
Thysanoptera	Phlaeothripidae	<i>Neoheegeria</i> sp.	m	[155]
	Thripidae	<i>Selenothrips rubrocinctus</i> (Giard)	po	[66]
po			[75]	

- I Recorded as *Clinterocera mandarinus* (Westwood)
- II Recorded as *Potosia famelica* Janson
- III Recorded as *Potosia lugubris orientalis* Medvedev
- IV Recorded as *Potosia nitidorsis* Fairmaire
- V Recorded as *Greenidea hangnigri* Zhang
- VI Possible synonym of *Andricus ostreus* (Hartig)
- VII Recorded as *Zeuzera leuconotus* Butler
- VIII Recorded as *Zanclalbara scabiosa* (Butler) as well as *Agnidra scabiosa fixseni* (Bryk)
- IX Recorded as *Exurapteryx aristidaria* (Oberthür)
- X Recorded as *Parasa consocia* Walker
- XI Recorded as *Parata hilarata* (Staudinger)
- XII Recorded as *Acronicta leporina leporella* Staudinger
- XIII Recorded as *Bena fagana* L.
- XIV Recorded as *Daseochaeta pallida* Moore
- XV Recorded as *Parallelia stuposa* Fabricius
- XVI Recorded as *Catocala dissimilis* Bremer
- XVII Recorded as *Chalciope stolidia* (Fabricius)
- XVIII Recorded as *Sypna astrigera* Butler
- XIX Recorded as *Sypna punctosa* Walker
- XX Recorded as *Polia contigua* (Schiffermüller et Denis)
- XXI Recorded as *Daseochaeta alpium* (Osbeck)
- XXII Recorded as *Daseochaeta alpium* (Osbeck), as well as *Trichosea champa* Moore, and *Moma alpium*

(Osbeck)

^{xxiii}Recorded as *Bena sylpha* (Butler)

^{xxiv}Recorded as *Sypna picta* Butler

^{xxv}Recorded as *Sypna simplex* Leech

^{xxvi}Recorded as *Xylena exoleta* (L.)

^{xxvii}Recorded as *Urodonta viridimixta* (Bremer)

^{xxviii}Recorded as *Lampronadata cristata* (Butler)

^{xxix}Recorded as *Rabtala cristata* (Butler)

^{xxx}Recorded as *Hybocampa umbrosa* (Staudinger)

^{xxxi}Recorded as *Phalera albibasis* (Chiang)

^{xxxii}Recorded as *Naganoea albibasis* (Chiang), as well as *Phalerodonta albibasis* (Chiang)

^{xxxiii}Recorded as *Cryptothelea minuscula* Butler

^{xxxiv}Recorded as *Cryptothelea variegata* Snellen

^{xxxv}Recorded as *Actias selene* Hübner

Reynoutria japonica
Polygonum cuspidatum
Fallopia japonica
 Japanese knotweed

Introduction

The genus *Reynoutria* contains 3 species occurring in eastern Asia. In China, the only reported species occurs in southern Gansu and southern Shaanxi, eastern, southern, southwestern, and central China. The species under this account are also considered as the constituents of the genus *Polygonum* L., or genus *Fallopia* Adanson.

Species of *Reynoutria* in China
Reynoutria japonica Houtt.

Taxonomy

Order: Polygoales

Family: Polygonaceae

Subfamily: Polygonideae

Tribe: Polygoneae

Genus: *Reynoutria* Houtt.

Species: *Reynoutria japonica* Houtt.*

*also commonly known as *Polygonum cuspidatum* Sieb. & Zucc., and *Fallopia japonica* (Houttuyn) Ronse Decraene

Description

Reynoutria japonica is a stout perennial with long-lived, sturdy creeping rhizomes. The hollow, erect stems, reaching, 1-2 m in height, are glabrous, and have conspicuous vertical furrows, swollen nodes and scattered red or purplish red spots. The nearly leathery



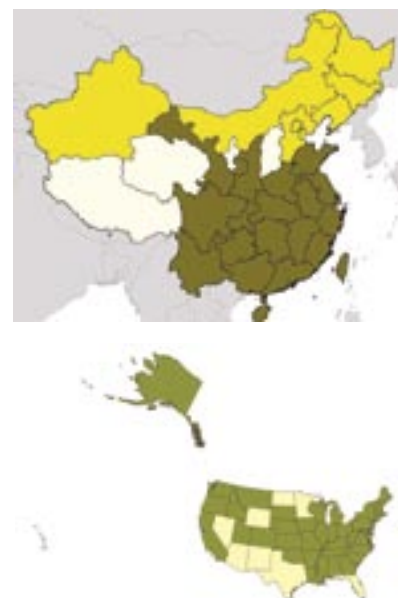
leaves are glabrous, broadly ovate or ovoid elliptic, 5-12 cm long and 4-9 cm wide, with acuminate apex, broadly cuneate, truncate or suborbicular base and entire margins. The brownish ochrea, often caducous, is membranous, glabrous, asymmetrical, 3-5 mm in length, truncate apically, and vertically veined. The unisexual flowers are borne on axillary panicles 3-8 cm long. Bracts are funnel-shaped, about 1.5-2 mm long, and acuminate at the apex, each containing 2 to 4 flowers. The stipule is a membranous sheath, 2-4 mm long. The greenish-white flowers appear in August through September. The shiny blackish brown achenes, contained in a persistent perianth are about 4-5 mm long, are produced in September through October^[96]

Habitat

R. japonica occurs in thickets on mountain slopes, valleys, roadsides, and wetlands in field margins, at elevations of 100-2000 meters^[96, 100].

Distribution

R. japonica is occurs in Anhui, Fujian, northern Gansu, Guangdong, Guangxi, Guizhou, Hainan, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, Sichuan, Taiwan, Yunnan, and Zhejiang provinces. It is cultivated in Hebei, Heilongjiang,



Liaoning, Jilin, Inner Mongolia, and Xinjiang provinces^[17, 22, 52, 100, 104].

Economic Importance

The rhizomes of *Reynoutria japonica* are medicinally useful^[96].

Natural Enemies of *Reynoutria*

Two fungi have been found on *R. japonica*. Five arthropods are reported to be associated with *R. japonica*.

Fungi

Phylum	Family	Species	H. R.	Ref
Basidiomycota	Pucciniaceae	<i>Puccinia polygoni-amphibii</i> Pers.*	o	[26]
		<i>Puccinia polygoni-amphibii</i> Persoon var. <i>polugoni-sieboldii</i> Hiratsuka f. & S. Kaneko	p	[229]
Anamorphic Uredinales		<i>Aecidium polygoni-cuspidati</i> Dietel	o	[26]

*Probable synonym of *Puccinia polygoni-amphibii* Persoon var. *polugoni-sieboldii* Hiratsuka f. & S. Kaneko

Arthropods

Order	Family	Species	H. R.	Ref.
Lepidoptera	Geometridae	<i>Ectropis excellens</i> Butler	p	[189]
	Lycaenidae	<i>Celastrina argiola</i> (L.)	p	[219]
		<i>Plebejus argus</i> (L.)	p	[219]
	Noctuidae	<i>Polia illoba</i> (Butler)	p	[228]
		<i>Xylena formosa</i> (Butler)	p	[166]

Rhamnus species

Buckthorn

Introduction

The genus *Rhamnus* contains approximately 200 species occurring primarily in temperate to tropical regions of eastern Asia and North America. Fifty eight species and 14 varieties occur nationwide in China. The largest populations occur in southwestern and southern China^[3].

I. *Rhamnus cathartica*

Common buckthorn

Taxonomy

Order: Rhamnales

Family: Rhamnaceae

Genus: *Rhamnus* L.

Subgenus: *Frangula* (Mill.) S. F. Gray

Species: *Rhamnus cathartica* L.

Description

Rhamnus cathartica is a shrub or small tree 5-8 m in height. The branchlets are purplish red or silvery gray, opposite or nearly so along the main stems, with terminal spines. Scales of terminal buds are marginally hairy. Leaves are papery, nearly opposite, alternate, or clustered in the twigs. The leaf blade is elliptic, ovoid elliptic, or ovate, 3-6.5 cm long and 1.5-3 cm wide, with a shortly acuminate, acute or obtuse apex, rounded or broadly cuneate base and densely crenate serrate margin. Both sides of the leaf are glabrous. There are 3-4 pairs of lateral veins, the proximal one of which is stout, and often conspicuously divaricated. The petiole is 1-2.7 cm long, grooved, and



pilose or nearly glabrous. The flowers are unisexual, dioecious, 4-merous and usually grow in clusters of 10 on the twigs or from the leaf axil on the lower part of the long branches. The pedicel is 2-4 mm long. Male flowers have petals, but the stamens are degenerate and small. The ovary of female flowers has 3 loculi, with 1 ovule each. The style is long and 3-lobed. Fruits are black globular drupes, with 3 internal pyrenes with persistent calyx-tubes at the base. The fruit's pedicel is 5-8 mm long. The seeds are shortly grooved dorsally, and sutured adaxially. Flowers appear May through June, and fruits July through September^[3].

Habitat and Distribution

R. cathartica occurs in valleys and hillside thickets at elevations of 1200-1400 m in northern Xinjiang^[3].

Economic Importance

The fruits of *R. cathartica* contain catharine, a laxative substance which used medicinally^[3].

II. *Rhamnus frangula*

Glossy buckthorn

Taxonomy

Order: Rhamnales

Family: Rhamnaceae

Genus: *Rhamnus* L.

Subgenus: *Rhamnus*

Section: *Rhamnus*

Species: *Rhamnus frangula* L.



Description

Rhamnus frangula is a shrubby or small woody tree up to 7 m in height. The branchlets are purplish brown, sparsely pubescent. The leaves are papery, broadly elliptic, oblong, or occasionally obovate, 4-11 cm long and 2.5-6 cm wide, apiculate or round in the apex, broadly cuneate or nearly round at base, with entire margins. The upside of the leaves is dark green, glabrous, while underside is light green, pilose along the midrib, with 6-10 lateral veins. The petiole is about 1-1.9 cm long, and glabrescently pubescent. Growing solitary or in clusters of no less than 2 in the leaf axil, flowers are bisexual, 5-merous, glabrous, with pedicel about

5-10 mm long. Sepals have beak like outgrowth in the apex. Petals are rounded, slightly lobed apically. Floral disc is thin and cup-shaped. Ovary is globose, 2-celled with 1 ovule for each. Fruits are globose drupes that are 6-8 mm in diameter, red at maturity, but turning purplish-black. Fruit pedicels are 7-10 mm long. Flowers appears from April through July, and fruits June through September^[3].

Habitat and Distribution

R. frangula occurs in forest margins, along riverbanks and lakesides, in northern Xinjiang province^[3].

Economic Importance

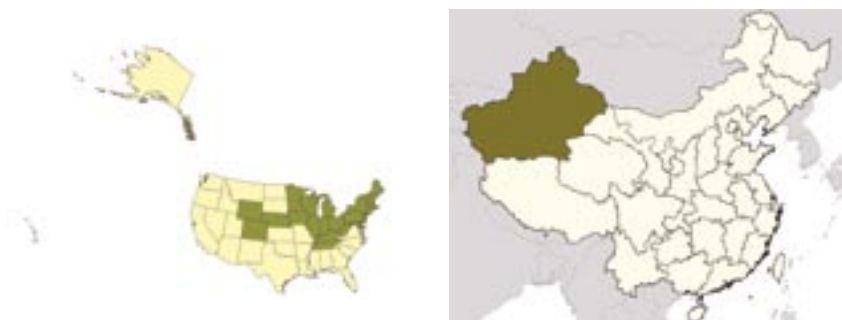
The bark of *R. frangula* is also medically useful. The bark and immature fruit are sources of dye. The wood is used to make gunpowder^[3].

Related Species

In China, *R. davurica* P. S. Pallas is the most commonly known member of the genus *Rhamnus*. It occurs in the forest on slopes, in thickets or in forest margins, and wet areas near ditches at elevations under 1800 m in Hebei, Heilongjiang, Jilin, Liaoning, and Shanxi provinces^[3].

Natural Enemies of *Rhamnus*

Fifteen species of fungi and 20 arthropods



have been recorded for members of the genus *Rhamnus*, but none of them are known to attack *R. cathartica* or *R. frangula*

Species of *Rhamnus* in China

Scientific Names	Scientific Names
<i>R. arguta</i> Maximovicz.	<i>R. leptacantha</i> C. K. Schneider
<i>R. aurea</i> Heppler	<i>R. leptophylla</i> C. K. Schneider
<i>R. bodinieri</i> H. Leveille	<i>R. liukuensis</i> (Wilson) Koidzumi
<i>R. brachypoda</i> C. Y. Wu ex Y. L. Chen	<i>R. longipes</i> Merrill et Chun
<i>R. bungeana</i> J. Vassiew.	<i>R. maximovicziana</i> J. Vassilev.
<i>R. cathartica</i> Linneus	<i>R. minuta</i> Grubav
<i>R. coriophylla</i> Handel-Mazzetti	<i>R. nakaharai</i> (Hayata) Hayata
<i>R. crenata</i> S. A. Siebold et Zuccarinii	<i>R. napalensis</i> (Wall.) Lawson
<i>R. davurica</i> P. S. Pallas	<i>R. nigricans</i> Handel-Mazzetti
<i>R. diamantiaca</i> T. Nakai	<i>R. parvifolia</i> Bung
<i>R. dumetorum</i> C. K. Schneider	<i>R. procumbens</i> Edgeworth
<i>R. erythroxyton</i> Pallas	<i>R. prostrata</i> H. A. Jacques
<i>R. esquirolii</i> H. Leveille	<i>R. rhododendriphylla</i> Y. L. Chen
<i>R. flavescens</i> Y. L. Chen et P. K. Chou	<i>R. rosthornii</i> E. Pritzen

Scientific Names	Scientific Names
<i>R. formossana</i> Matsumura	<i>R. rugulose</i> Hemsley
<i>R. frangula</i> Linneaus	<i>R. sargentiana</i> Schneider
<i>R. fulvo-tincta</i> Metcalf.	<i>R. schneideri</i> H. Leveille. et Vaniot Fedde
<i>R. gilgiana</i> Hepper	<i>R. songorica</i> Gontsch
<i>R. globosa</i> Bunge	<i>R. subapetala</i> E. D. Merrill
<i>R. grandiflora</i> C. Y. Wu ex Y. L. Chen	<i>R. tangutica</i> J. Vassilev
<i>R. hainanensis</i> Merrill et Chun	<i>R. tzetweiensis</i> Y. L. Chen et P. K. ChouBull.
<i>R. hemsleyana</i> C. K. Schneider	<i>R. ussuriensis</i> J. Vassilev.
<i>R. henryi</i> C. K. Schneider	<i>R. utilis</i> J. Decaisrme
<i>R. heterophylla</i> Oliver	<i>R. velutina</i> Anthony
<i>R. hupehensis</i> C. K. Schneider	<i>R. virgata</i> Roxburg.
<i>R. iteinophylla</i> C. K. Schneider	<i>R. wilsonii</i> C. K. Schneider
<i>R. koraiensis</i> C. K. Schneider	<i>R. wumingensis</i> Y. L. Chen et P. K. Chou
<i>R. kwangsiensis</i> Y. L. Chen et P. K. Chou	<i>R. xizangensis</i> Y. L. Chen et P. K. Chou
<i>R. lamprophylla</i> C. K. Schneider	

Fungi

Phylum	Family	Species	H. R.	Ref.
Ascomycota	Erysiphaceae	<i>Erysiphe friesii</i> (Lév.) U. Braun & S. Takam	mo	[4] ^I
			po	[6] ^I
	Meliolaceae	<i>Microsphaera penicillata</i> (Wallr.) Lév.	po	[4] ^{II}
Basidiomycota	Pucciniaceae	<i>Puccinia coronata</i> Corda	po	[14]
			po	[4]
		<i>Puccinia poae-pratensis</i> Miura	po	[4]
Anamorphic <i>Gibberella</i>		<i>Fusisporium bacilligerum</i> Berk. & Broome	mo	[4] ^{III}
Anamorphic <i>Guignardia</i>		<i>Phyllosticta rhamnicola</i> Desm.	mo	[4]
Anamorphic Leptosphaeria		<i>Coniothyrium dumei</i> Briosi & Cavara	mo	[4]
		<i>Coniothyrium rhamni</i> Miyake	oo	[4]
Anamorphic <i>Mycosphaerella</i>		<i>Cercospora rhamni</i> Fuckel	mo	[4]
			mo	[5] ^{IV}
		<i>Pseudocercospora bacilligera</i> (Berk. & Broome) Y.L. Guo & X.J. Liu	oo	[11]
		<i>Pseudocercospora rhamnaceicola</i> Goh & W.H. Hsieh	po	[11]
		<i>Septoria frangulae</i> Guépin	mo	[4]
		<i>Septoria rhamni-catharticae</i> Ces.	mo	[1]
Anamorphic Mycosphaerellaceae		<i>Ascochyta rhamni</i> W.B. Cooke & C.G. Shaw	mo	[4]
Anamorphic Uredinales		<i>Aecidium alaterni</i> Maire	oo	[4]

^IRecorded as *Microsphaera friesii* Lév.

^{II}Recorded as *Microsphaera alni* (Wallr.) Salm.

^{III}Recorded as *Cercospora bacilligera* (Berk. & Broome) Wollenw.

^{IV}Regarded as *Passalora rhamni* (Fuckel) U. Braun

Arthropods

Order	Family	Species	H. R.	Ref
Homoptera	Aphididae	<i>Aphis glycines</i> (Matsumura)	po	[17]
		<i>Aphis gossypii</i> Glover	po	[17]
		<i>Aphis rhamni</i> Boyer de Fonscolombe	mo	[10]
		<i>Aphis utilis</i> Zhang	mo	[17]
	Psyllidae	<i>Cacopsylla rhamnae</i> Li & Sun	mo	[12]
	Triozidae	<i>Eubactericera curvata</i> Li & Sun	mo	[9]
Lepidoptera	Geometridae	<i>Acasis viretata</i> (Hübner)	po	[16]
			po	[13] ^I
		<i>Ophthalmodes irrorataria</i> Bremer & Grey	po	[15]
		<i>Philereme transversata</i> Hüfnagel	mo	[16]
			oo	[13]
	Lycaenidae	<i>Megisba malaya sikkima</i> Moore	po	[18]
		<i>Rapala caerulea</i> (Bremer & Grey)	po	[18]
		<i>Satyrium iyonis</i> (Oxta & Kusunoki)	po	[18]
			po	[18]
		<i>Satyrium spini</i> (Denis & Schiffermüller)	oo	[18]
	Lymantriidae	<i>Teia ericae</i> Germar	po	[7] ^{II}
	Noctuidae	<i>Cymatophoropsis trimaculata</i> (Bremer)	mo	[2]
			po	[7]
	Pieridae	<i>Eurema hecabe hobsoni</i> (Butler)	po	[18]
		<i>Gonepteryx amintha</i> Blanchard	mo	[18]
		<i>Gonepteryx amintha formosana</i> Fruhstorfer	po	[18]
			po	[18]
<i>Gonepteryx rhamni</i> (L.)		po	[18]	
Thyrididae	<i>Rhodoneura lobulatus</i> (Moore)	mo	[19]	

^IRecorded as *Ophthalmitis irrorataria* (Bremer & Grey)

^{II}Recorded as *Orgyia ericae* Gremer

Rosa multiflora

Multiflora rose

Introduction

There are 200 members of the genus *Rosa* distributed widely in subtropical to cold temperate regions of Asia, Europe, North Africa and North America. In China, 95 species have been recorded^[60].

Taxonomy

Order: Rosales

Suborder: Rosineae

Family: Rosaceae

Subfamily: Rosoideae Focke

Genus: *Rosa* L.

Subgenus: *Rosa*

Section: *Synthylae* DC.

Series: *Multiflorae* Yü et Ku

Species: *Rosa multiflora* Thunb.

Description

Rosa multiflora is a climbing, perennial shrub. The branchlets are glabrous and cylindrical with short curved prickles. The leaf axil, petiole and pedicel are glabrous or covered with glandular hairs. The leaves are imparipinnate,



alternate, and composed of 3-9 sharp-toothed leaflets, 5-10 cm long including leafstalk. The leaflets are obovate, oblong or ovate, 1.5-5 cm in length and 0.8-2.8 cm in width, acute or obtuse apex, suborbicular or cuneate base, with simple serrate or biserrate margins. A pair of stipules are adnate to the base of the leafstalk. The upper leaf surface is glabrous and the underside is pubescent. Flowers appear from May through June, as clusters in a corymb inflorescence, 1.5-2 cm in diameter. Each has white, broad-obovate petals that are glabrous outside and pubescent inside. The lanceolate calyx has a retuse apex and a cuneate base. Fruits are red, glabrous, subglobular hips, with a diameter of 6-8 mm, developing from July to August^[59].

Habitat

R. multiflora habitats include thickets, forest margins, and along road sides and streams in mountainous areas^[9, 88].

Distribution

R. multiflora occurs in northern Anhui, Fujian, Henan, Jiangsu, Shandong, Zhejiang, and possibly Guizhou^[36, 40, 59, 60, 88, 109, 175].

Economic Importance

The flowers of *R. multiflora* contain an essential oil used in the food and cosmetic industries. Flowers, fruits, leaves and roots are medically useful. *R. multiflora* is also cultivated as a hedge plant^[9].



Related Species

Three varieties of *R. multiflora* are commonly cultivated in China:

- 1) *R. multiflora* var. *cathayensis* Rehd. et Wils., with simple pink flowers, occurs on hilly slopes, scrub or on riverbanks at elevations up to 1300 m. It occurs in Anhui, Fujian, Gansu, Guangdong, Hebei, Henan, Hubei, Jiangxi, Shaanxi, Shandong and Zhejiang provinces. It is planted in northern China as a hedge. The roots contain 25% tannin which is useful in tanning.
- 2) *R. multiflora* var. *carnea* Thory, with double pink petals, is planted as an ornamental and as a hedge.
- 3) *R. multiflora* var. *alboplana* Yu et Ku, with double, white petals, is

commonly cultivated in Beijing as an ornamental^[59].

Forty-eight species of fungi and 95 arthropods have been found on the members of the genus *Rosa*.

Natural Enemies of *Rosa*

Species of *Rosa* in China

Scientific Name	Scientific Name
<i>R. ×alba</i> L.†	<i>R. longicuspis</i> Bertol.
<i>R. ×fortuneana</i> Lindley†	<i>R. luciae</i> Fr. & Rochebr.‡
<i>R. acicularis</i> Lindl.	<i>R. lucidissima</i> Lévl.
<i>R. albertii</i> Regel	<i>R. ludingensis</i> T. C. Ku‡
<i>R. anemoniflora</i> Fort. ex Lindl.	<i>R. macrophylla</i> Lindl.
<i>R. baiyushanensis</i> Q. L. Wang‡	<i>R. mairei</i> Lévl.
<i>R. banksiae</i> Ait.	<i>R. maximowicziana</i> Regel.
<i>R. banksiopsis</i> Baker	<i>R. miyiensis</i> T. C. Ku‡
<i>R. beggeriana</i> Schrenk	<i>R. morrisonensis</i> Hayata
<i>R. bella</i> Rehd. et Wils.	<i>R. moyesii</i> Hemsl. et Wils.
<i>R. berberifolia</i> Pall.	<i>R. multibracteata</i> Hemsl. et Wils.
<i>R. bracteata</i> Wendl.	<i>R. multiflora</i> Thunb.
<i>R. brunonii</i> Lindl.	<i>R. murielae</i> Rehd. et Wils.
<i>R. calyptopoda</i> Card.	<i>R. odorata</i> (Andr.) Sweet
<i>R. caudata</i> Baker	<i>R. omeiensis</i> Rolfe
<i>R. centifolia</i> L.†	<i>R. oxyacantha</i> M. Bieb.
<i>R. chengkouensis</i> Yü et Ku	<i>R. persetosa</i> Rolfe
<i>R. chinensis</i> Jacq.	<i>R. pinnatisepala</i> T. C. Ku‡
<i>R. corymbulosa</i> Rolfe	<i>R. platyacantha</i> Schrenk
<i>R. cymosa</i> Tratt.	<i>R. praelucens</i> Byhouwer
<i>R. daishanensis</i> T. C. Ku‡	<i>R. prattii</i> Hernsl.
<i>R. damascena</i> Mill.†	<i>R. pricei</i> Hayata‡
<i>R. davidii</i> Crép.	<i>R. primula</i> Bouleng.
<i>R. davurica</i> Pall.	<i>R. pseudobanksiae</i> Yü et Ku
<i>R. deqenensis</i> T. C. Ku‡	<i>R. roxburghii</i> Tratt.
<i>R. derongensis</i> T. C. Ku‡	<i>R. rubus</i> Lévl. et Vant.
<i>R. duplicata</i> Yü et Ku	<i>R. rugosa</i> Thunb.
<i>R. fargesiana</i> Boulenger‡	<i>R. sambucina</i> Koidzumi var. <i>pubescens</i> Koidzumi‡
<i>R. farreri</i> Stapf ex Cox.	<i>R. saturata</i> Baker
<i>R. fedtschenkoana</i> Regel	<i>R. sericea</i> Lindl.
<i>R. filipes</i> Rehd. et Wils.	<i>R. sertata</i> Rolfe
<i>R. foetida</i> Herrm. var. <i>persiana</i> (Lem.) Rehd.	<i>R. setipoda</i> Hemsl. et Wils.
<i>R. forrestiana</i> Bouleng.	<i>R. shangchengensis</i> T. C. Ku‡
<i>R. gallica</i> L.†	<i>R. sikangensis</i> Yü et Ku
<i>R. giraldii</i> Crép.	<i>R. sinobiflora</i> T. C. Ku‡
<i>R. glomerata</i> Rehd. et Wils.	<i>R. soulieana</i> Crép.
<i>R. graciliflora</i> Rehd. et Wils.	<i>R. spinosissima</i> L.
<i>R. helenae</i> Rehd. et Wils.	<i>R. sweginzowii</i> Koehne
<i>R. henryi</i> Bouleng.	<i>R. taiwanensis</i> Nakai‡
<i>R. hezhangensis</i> T. L. Xu‡	<i>R. taronensis</i> Yü et Ku
<i>R. hugonis</i> Hemsl.	<i>R. Tibetica</i> Yü et Ku

Scientific Name	Scientific Name
<i>R. kokanica</i> Regel ex Juzep.	<i>R. transmorrisonensis</i> Hayata
<i>R. koreana</i> Kom.	<i>R. tsinglingensis</i> Pax. et Hoffm.
<i>R. kunmingensis</i> T. C. Ku‡	<i>R. uniflorella</i> Buzunova*
<i>R. kwangtungensis</i> Yü et Tsai	<i>R. webbiana</i> Wall. ex Royle
<i>R. kweichowensis</i> Yü et Ku	<i>R. weisiensis</i> Yü et Ku
<i>R. laevigata</i> Michk.	<i>R. wichuraiana</i> Crép.†
<i>R. langyashanica</i> D. C. Zhang et J. Z. Shao‡	<i>R. willmottiae</i> Hemel.
<i>R. lasiosepala</i> Metc.	<i>R. xanthina</i> Lindl.
<i>R. laxa</i> Retz.	<i>R. zhongdianensis</i> T. C. Ku‡
<i>R. lichiangensis</i> Yü et Ku	

†Cultivated

‡not listed in *FRPS*^[59]

*Recorded as *R. uniflora* Yü et Ku in *FRPS*^[59]

Fungi

Phylum	Family	Species	H. R.	Ref.	
Ascomycota	Botryosphaeriaceae	<i>Guignardia rosae</i> (Auersw.) Petr.	mo	[26]	
	Capnodiaceae	<i>Caldariomyces fumago</i> Woron.	p	[26]I	
	Dermateaceae	<i>Diplocarpon rosae</i> F.A. Wolf	mo	[26]II	
	Elsinoaceae	<i>Elsinoë rosarum</i> Jenkins & Bitanc.	oo	[26]III	
	Erysiphaceae		<i>Medusosphaera rosae</i> Golovin & Gamalitzk.	oo	[24]
			<i>Sphaerotheca fuliginea</i> (Schltld.) Pollacci	po	[26]
			<i>Sphaerotheca humuli</i> (DC.) Burrill	po	[26]
			<i>Sphaerotheca pannosa</i> (Wallr.) Lév.	po	[24]
			<i>Sphaerotheca rosae</i> (Jacz.) Z.Y. Zhao	po	[26]IV
			<i>Sphaerotheca rosae</i> (Jacz.) Z.Y. Zhao	oo	[24]
			<i>Uncinula simulans</i> E.S. Salmon	oo	[26]
		<i>Uncinuliella simulans</i> var. <i>rosae-rubi</i> R.Y. Zheng & G.Q. Chen	oo	[24]	
	Incertae sedis	<i>Hendersonia sarmentorum</i> Westend.	mo	[26]	
	Meliolaceae		<i>Appendiculella calostroma</i> (Desm.) Höhn.	po	[72]
			<i>Asteridiella rosae</i> (Hansf.) Hansf.	po	[72]
			<i>Irenina rosae</i> Hansf.	mo	[26]
	Mycosphaerellaceae		<i>Mycosphaerella rosigena</i> (Ellis & Everh.) Lindau ex McMurrin	oo	[26]
<i>Sphaerulina rehmana</i> Jaap			po	[26]V	
			p	[1]VI	
Rhytismataceae	<i>Colpoma rosae</i> (Teng) Teng	oo	[26]		
Valsaceae	<i>Valsa ceratosperma</i> (Tode) Maire	po	[26]VII		
Basidiomycota	Phragmidiaceae	<i>Gerwasia rosae</i> F.L. Tai	o	[26]	
		<i>Kuehneola japonica</i> Diet.	o	[26]	
		<i>Phragmidium handelii</i> Petr.	mo	[26]	
		<i>Phragmidium hashiokai</i> Hirats. f.	mo	[26]	
		<i>Phragmidium montivagum</i> Arthur	oo	[26]	
		<i>Phragmidium mucronatum</i> (Pers.) Schltld.	o	[26]	
		<i>Phragmidium rosae-davuricae</i> Miura	oo	[26]	

Phylum	Family	Species	H. R.	Ref.
		<i>Phragmidium rosae-multiflorae</i> Dietel	o	[26]
		<i>Phragmidium rosae-rugosae</i> Kasai	oo	[26]
		<i>Phragmidium tuberculatum</i> Jul. Müll.	oo	[26]
		<i>Teloconia kamtschatkae</i> (H.W. Anderson) Hirats. f.	oo	[26]
Anamorphic Ascomycetes		<i>Monochaetia concentrica</i> (Berk. & Broome) Sacc. & D. Sacc.	mo	[26]
		<i>Monochaetia seiridioides</i> (Sacc.) Sacc. & D. Sacc.	oo	[26]
		<i>Myxosporium rosae</i> Fuckelel	oo	[26]
Anamorphic <i>Botryotinia</i>		<i>Botrytis cinerea</i> Pers.	po	[26]
Anamorphic <i>Lewia</i>		<i>Alternaria alternata</i> (Fr.) Keissl.	po	[209]
		<i>Alternaria rosicola</i> (V.G. Rao) T.Y. Zhang & Y.L. Guo	mo	[209]
		<i>Alternaria tamijiana</i> Rajd.	mo	[209]
		<i>Alternaria tenuissima</i> (Kunze) Wiltshire	po	[209]
Anamorphic <i>Mycosphaerella</i>		<i>Cercospora puderii</i> B.H. Davis	o	[26]
		<i>Cercospora rosae</i> (Fuckelel) Höhn.	o	[26]
		<i>Cercospora rosicola</i> Pass.	o	[26]
			oo	[65]VIII
		<i>Cladosporium cladosporioides</i> (Fresen.) G.A. de Vries	po	[210]
		<i>Cladosporium oxysporum</i> Berk. & M.A. Curtis	po	[210]
		<i>Cladosporium tenuissimum</i> Cooke	po	[210]
<i>Pseudocercospora puderi</i> B.H. Davis ex Deighton	oo	[129]		
Anamorphic Mycosphaerellaceae		<i>Ascochyta rosicola</i> Sacc.	mo	[1]
Anamorphic <i>Pseudovalsa</i>		<i>Coryneum rosicola</i> Miura	oo	[26]
Anamorphic Uredinales		<i>Caecoma warburgianum</i> Henn.	oo	[26]IX

^IRecorded as *Fumago vagans* Pers

^{II}Recorded as *Actinonema rosae* (Lib.) Fr.

^{III}Recorded as *Phyllosticta rosarum* Pass.

^{IV}Recorded as *Oidium leucoconium* Desm.

^VRecorded as *Septoria rosae* Desm.

^{VI}Recorded as *Septoria rosae* (Libert) Desm.

^{VII}Recorded as *Valsa coronata* (Hoffm.) Fr.

^{VIII}Recorded as *Passalora rosicola* (Pass.) U. Braun

^{IX}Possibly the synonym of *Caecoma warburgiana* Henn.

Arthropods

Order	Family	Species	H. R.	Ref.
Acariformes	Eriophyidae	<i>Panonychus citri</i> (McGregor)	p	[166]
		<i>Phyllocoptes rosarum</i> (Liro)	mo	[90]
	Tetranychidae	<i>Eotetranychus kankitus</i> Ehara	p	[166]
			p	[166]
		<i>Eotetranychus smithi</i> Pritchard & Baker	po	[167]
		<i>Oligonychus biharensis</i> (Hirst)	po	[167]
		<i>Panonychus ulmi</i> (Koch)	po	[167]

Order	Family	Species	H. R.	Ref.
Coleoptera	Attelabidae	<i>Apoderus praecellens</i> Sharp	mo	[75]
	Cerambycidae	<i>Molorchus liui</i> Gressitt	mo	[86]
	Chrysomelidae	<i>Luperomorpha Xanthodera</i> Fairmaire	p	[201]
		<i>Nonarthra postfasciata</i> (Fairmaire)	m	[165]
		<i>Nonarthra variabilis</i> Baly	m	[165]
		<i>Tuomueria tibialis</i> Chen et Jiang	oo	[201]
	Crioceridae	<i>Lilioceris egena</i> (Weise)	po	[75]
		<i>Temnaspis pulchra</i> Baly	oo	[164]
	Eumolpidae	<i>Cleoporus variabilis</i> (Baly)	po	[165]
			po	[164]
Hemiptera	Acanthosomatidae	<i>Platacantha forfex</i> (Dallas)	po	[208]
		<i>Sastragala edessoides</i> Distant	po	[208]
Homoptera	Aphididae	<i>Acyrtosiphon dirhodum</i> (Walker)	po	[165]
		<i>Longicaudus trirhodus</i> (Walker)	po	[113]
			po	[205]
		<i>Macrosiphum rosae</i> L.	oo	[178]
		<i>Macrosiphum rosivorum</i> Zhang	oo	[205]
			oo	[75]
		<i>Matsumuraja formosana</i> Takahashi	oo	[75]
		<i>Myzaphis rosarum</i> (Kaltenbach)	oo	[165]
	<i>Rhodobium porosum</i> (Sanderson)	po	[113]	
	Asterolecaniidae	<i>Russellaspis pustulans</i> (Cockerell)	po	[173]
	Cerococcidae	<i>Asterococcus yunnanensis</i> Borchsenius	po	[173]
	Cicadellidae	<i>Aguriahana triangularis</i> (Matsumura)	po	[178]
		<i>Erythroneura sudra</i> (Distant)	po	[57]
		<i>Eutettix disciguttus</i> (Walker)	po	[57]
		<i>Tettigoniella albomarginata</i> (Signoret)	po	[57]
		<i>Typhlocyba rosae</i> (Linnaeus)	po	[57]
	Coccidae	<i>Ceroplastes rubens</i> Maskell	po	[75]
		<i>Coccus hesperidum</i> (L.)	po	[75]
			po	[173]
		<i>Metaceronema japonica</i> (Maskell)	po	[75]
		<i>Pulvinaria vitis</i> (L.)	po	[173]
	<i>Saissetia oleae</i> (Bernard)	po	[173]	
	Diaspididae	<i>Aonidiella citrina</i> (Coquillett)	po	[165]
			po	[75]
		<i>Chrysomphalus aonidum</i> (L.)	po	[75]
		<i>Pseudaonidia duplex</i> (Cockerell)	po	[165]
	po		[75]	
	Margarodidae	<i>Icerya purchasi</i> Maskell	po	[165]
			po	[165]
	Pseudococcidae	<i>Phenacoccus prunicola</i> . Borchsenius	mo	[172]

Order	Family	Species	H. R.	Ref.
	Ricaniidae	<i>Ricania speculum</i> (Walker)	po	[220]
Hymenoptera	Argidae	<i>Arge pagana</i> (Panzer)	mo	[75]
Lepidoptera	Geometridae	<i>Cidaria fulvata</i> (Forster)	mo	[195]
			o	[25]
		<i>Hypomecis punctinalis conferenda</i> (Butler)	po	[178]
			po	[75]
			po	[78]
		<i>Ourapteryx sambucaria</i> L.	po	[161]
		<i>Plemyria rubiginata</i> (Denis et Schiffermüller)	po	[195]
		<i>Sauris hirudinata</i> (Guenée)	po	[195]
	<i>Xanthorhoe saturata</i> (Guenée)	po	[195]	
	Limacodidae	<i>Scopelodes venosa kwangtungensis</i> Hering	po	[75]
			po	[78]
	Lycaenidae	<i>Acytolepis puspa</i> (Horsfield)	p	[219]
		<i>Rapala caerulea</i> (Bremer et Grey)	p	[178]
			p	[219]
	<i>Rapala nissa</i> (Kollar)	po	[219]	
	Lymantriidae	<i>Dasychira horsfieldi</i> Saunders	po	[213]
			po	[212]
		<i>Dasychira pudibunda</i> (L.)	po	[212]
		<i>Euproctis chrysorrhoea</i> (L.)	po	[212]
			po	[75]
		<i>Euproctis diploxutha</i> Collenette	po	[75]
			po	[75]
		<i>Euproctis flava</i> (Bremer)	po	[178]
			po	[212]
			po	[166]
		<i>Euproctis fraterna</i> (Moore)	po	[178]
			po	[75]
			po	[75]
		<i>Euproctis niphonis</i> (Butler)	po	[75]
		<i>Porthesia similis</i> (Fueszly)	po	[178]
	po		[212]	
	po		[75]	
	<i>Teia ericae</i> Germar	po	[212]I	
		po	[213]	
		po	[212]	
	<i>Teia gonostigma</i> (L.)	po	[213]	
		po	[213]	
		po	[75]	
	Noctuidae	<i>Acronicta psi</i> (L.)	po	[25]
		<i>Dysgonia arctotaenia</i> (Guenée)	mo	[166]II
			mo	[224]III
mo			[75]II	
Notodontidae	<i>Stauropus alternus</i> Walker	po	[4]	

Order	Family	Species	H. R.	Ref.
	Psychidae	<i>Clania minuscula</i> Butler	po	[78]
		<i>Clania variegata</i> Snellen	po	[166]III
		<i>Dappula tertia</i> Templeton	po	[75]
	Saturniidae	<i>Eriogyna pyretorum</i> (Westwood)	p	[226]
		<i>Eudia pavonia</i> L.	po	[226]
	Tortricidae	<i>Acleris cristana</i> (Denis & Schiffermüller)	po	[133]
			po	[78]
		<i>Adoxophyes cyrtosema</i> Meyrick	po	[78]
		<i>Adoxophyes orana</i> Fischer von Röslerstamm	po	[133]
			po	[75]
		<i>Ancyliis comptana</i> (Frölich)	po	[133]
		<i>Celyphoides cespitana</i> (Hübner)	p	[133]IV
		<i>Choristoneura luticostana</i> (Christoph)	po	[133]
		<i>Clepsis rurinana</i> (L.)	po	[133]V
			po	[75]
		<i>Epiblema (Notocelia) tetragonana</i> (Stephens)	po	[133]
		<i>Epiblema rosaecolana</i> (Doubleday)	oo	[133]
		<i>Eulia ministrana</i> (L.)	po	[133]
		<i>Hedya ochroleucana</i> (Frölich)	oo	[133]
		<i>Homona magnanima</i> Diakonoff	po	[75]
po	[78]			
Thysanoptera	Aeolothripidae	<i>Aeolothrips fasciatus</i> (L.)	po	[66]
	Phlaeothripidae	<i>Haplothrips chinensis</i> Priesner	po	[66]
			po	[75]
		<i>Haplothrips subtilissimus</i> Haliday	po	[66]
	Thripidae	<i>Ernothrips lobatus</i> (Bhatti)	po	[66]
		<i>Frankliniella intonsa</i> (Trybom)	po	[66]
		<i>Megalurothrips distalis</i> (Karny)	po	[66]
		<i>Thrips flavidulus</i> Bagnall	po	[66]
			po	[75]
		<i>Thrips flavus</i> Schrank	po	[66]
			po	[75]
		<i>Thrips hawaiiensis</i> (Morgan)	po	[66]
		<i>Thrips palmi</i> Karny	po	[75]
	<i>Thrips tabaci</i> Lindemann	po	[66]	
	<i>Thrips vulgatissimus</i> Haliday	p	[165]	
p		[66]		

^IRecorded as *Orgyia ericae* Germar

^{II}Recorded as *Parallelia arctotaenia* (Guenée)

^{III}Recorded as *Eumeta variegata* Snellen

^{IV}Recorded as *Celyphoides cespitanus* (Hübner)

^VRecorded as *Clepsis (Siclobola) semialbana* (Guenée)

Rottboellia exaltata

Itchgrass, Raoulgrass

Introduction

The genus *Rottboellia* contains four species widespread in tropical and subtropical regions of the Old World and introduced to tropical regions of the New World. Two species occur in China^[159].

Species of *Rottboellia* in China

Scientific Name
<i>R. exaltata</i> L. f.
<i>R. laevispica</i> Keng

Taxonomy

Order: Graminales

Suborder: Gramineae

Family: Gramineae (Poaceae)

Subfamily: Panicoideae A. Br.

Tribe: Andropogoneae

Dumort.

Subtribe: Rottboelliinae Presl

Genus: *Rottboellia* L. f.

Species: *Rottboellia exaltata* L. f.

Description

Rottboellia exaltata is a robust annual grass with numerous fibrous roots. Sometimes aerial prop roots are also present. Usually erect, appearing in dwarf clusters, the glabrous culm grows up to 2 m in height and 8 mm in diameter. The leaf has a hirsute or glabrescent sheath and a ciliated ligule that is about 2 mm long. The leaf blade is linear, 50 cm long and 2 cm wide, glabrous or hispidulous adaxially, with a prominent midrib. The raceme is



upright, acuminate apically, and can reach a height of 15 cm and diameter of 3-4 mm. The internodes of the inflorescence, are 5 mm long, protrude outward and may be broken off at the node. In the axil are sessile spikelets, with a relatively thin, scaphoid upper glume and a thick, ovate, multi-veined lower glume, with an obtuse, bicuspid or tricuspid apex. The first flower from the bottom is male. Its anther is shorter and darker than that of the second flower from the bottom. The second flower is bisexual with yellow anthers about 2 mm long and purple stigma. The stalked spikelet is green, ovoid-oblong with two male florets that are sometimes degenerated. The flowers and fruits appear in autumn^[159].

Habitat

R. exaltata occurs in crop fields and along roadsides^[159].

Distribution

R. exaltata occurs in the provinces of Fujian, Guangdong, Guangxi, Guizhou, Hainan, Sichuan, Taiwan, Yunnan, Zhejiang^[8, 115, 159], and possibly Hunan



and Jiangxi^[92, 151].

Economic Importance

R. exaltata is a troublesome weed that thrives in crop fields. It consumes large amounts of water and soil nutrients due to its large size^[108, 159].

Related Species

R. laevispica Keng, occurs in shady areas of forests and hilly slopes. It can be distinguished from *R. exaltata* by its lanceolate, abaxially sessile, smooth spikelets^[159].

Natural Enemies of *Rottboellia*

Two species of fungi have been found on members of genus *Rottboellia*. There are no records of arthropods associated with *R. exaltata*.

Fungi

Phylum	Family	Species	H. R.	Ref.
Basidiomycota	Pucciniaceae	<i>Puccinia microspora</i> Dietel	p	[170]
	Ustilaginaceae	<i>Sporisorium ophiuri</i> (Henn.) Vánky	m p	[64] [26]*

*Recorded as *Sphacelotheca ophiuri* (P. Henn.) Ling

Rubus Species

Raspberry

Introduction

The genus *Rubus* contains about 700 species worldwide, primarily in the temperate regions of the Northern hemisphere. Approximately 208 species have been recorded from China^[138].

I. Rubus ellipticus var. *obcordatus*

Yellow Himalayan raspberry

Taxonomy

Order: Rosales

Suborder: Rosineae

Family: Rosaceae

Subfamily: Rosoideae Focke

Genus: *Rubus* L.

Section: *Idaeobatus* Focke.

Subsection: *Stimulantes* Yü et Lu

Species: *Rubus ellipticus* Smith

Subspecies: *Rubus ellipticus* Smith var. *obcordatus* (Franch.) Focke

Description

Rubus ellipticus var. *obcordatus* is a deciduous shrub approximately 1-2 m tall. The branchlets are stout, purplish brown, pubescent, intermixed with prickles and brownish bristles. The leaves are trifoliate. The leaflets are obcordate or obovate, 2-5.5 cm long and 1.5-5 cm wide (terminal leaflet is



larger in size), truncate, or subrounded in the apex that is usually lobed, and broadly cuneate at the base, with a serrulate margin. The underside of the leaflet is densely tomentose, dark greenish, with prominent veins. Petiolule and petiole (leaf rachis) are also tomentose, scattered with prickles and bristles. The inflorescence is a dense cyme. The pedicel is short and hairy. Flowers are white or pink, 1-1.5 cm in diameter. The sepals are ovate and densely tomentose on the outer surface. Fruits are yellow globose aggregate fruits 7-9 mm in diameter^[85].

Habitat

R. ellipticus var. *obcordatus* occurs on hillside slopes, roadsides or in thickets, valleys, sparse forests, and broad-leaf forests at elevations of 300-2000 m, 700-1800 m in Guizhou, and 1800-2100 m in southeastern Tibet^[109, 137, 185].

Distribution

R. ellipticus var. *obcordatus* is distributed in Guangxi, Guizhou, Sichuan, Tibet, and Yunnan provinces^[138].



Economic Importance

The twigs and leaves are used medicinally^[137]. The fruits are edible.

II. Rubus nivens

Hill raspberry

Taxonomy

Order: Rosales

Suborder: Rosineae

Family: Rosaceae

Subfamily: Rosoideae Focke

Genus: *Rubus* L.

Section: *Idaeobatus* Focke.

Subsection: *Idaeanthi* (Focke) Yü et Lu



Species: *Rubus niveus* Thunb.

Description

R. niveus is a shrub 1-2.5 m in height. Branches are purplish red, and farinose, with sparse prickles. Branchlets are purplish or green, and glabrescently tomentose. The leaf typically consists of 7-9 (occasionally 5 or 11) leaflets that are glabrous or pubescent along the leaf vein on the upper surface, and grayish tomentose on the underside, elliptic, ovoid so, or rhombic-elliptic, 2.5-6(8) cm long and 1-3(4) cm wide, acute or obtuse apically, cuneate or rounded basally, with an irregular acutely serrate or rarely obtuse margin. The petiole is about 1.5-4 cm in length. Terminal



leaflets are ovate or elliptic, slightly longer than lateral ones, acuminate apically and 3-lobed marginally with a petiole about 0.5-1.5 cm in length. Lateral leaflets are nearly sessile, tomentose with scattered prickles. Stipule is linear lanceolate, and pubescent. The inflorescence is a terminal or axillary corymb or panicle. Pedicels are 0.5-1 cm long and tomentose. Flowers are 1 cm in diameter. Bracts are lanceolate or linear, and pubescent. Calyxes are densely tomentose outside, or mixed with soft hairs, and have triangular ovate or triangular lanceolate sepals that are acute or tapering in the apex and erect when flowering and fruiting. Shorter than the sepals, the petals are red, nearly orbicular, and bear short claws at the base. Fruits are semiglobose, 8-12 mm in diameter, dark red becoming black, densely white tomentose. Pyrenes are slightly rugose. Flowers appear from May through July, and fruit from August through September^[137].

Habitat

R. niveus occurs in thickets along hillside slopes, in sparse forests, valleys, flood land, and along streamsides at elevations of 500-2800 m^[138], 500-2100 m in Guizhou, 1900-2800 m in Tibet, and 700-2600 m in Tsingling Mountains^[79, 109, 185].

Distribution

R. niveus is reported to occur in Gansu,

Guangxi, Guizhou, Henan, Shaanxi, Sichuan, Taiwan, Tibet, and Yunnan provinces^[28, 138].

Economic Importance

Fruits are edible and useful in wine-making. The roots contain an extract used in tanning^[137].

III. *Rubus phoenicolasius* Wine raspberry

Taxonomy

Order: Rosales

Suborder: Rosineae

Family: Rosaceae

Subfamily: Rosoideae Focke

Genus: *Rubus* L.

Section: *Idaeobatus* Focke.

Subsection: *Stimulantes* Yü et Lu

Species: *Rubus phoenicolasius* Maxim.

Description

Rubus phoenicolasius is a shrub approximately 1-3 m high covered with densely reddish brown glandular hairs and sparse prickles. The branches are erect initially, but will root where they come in contact with soil. The leaves are composed of 3 (rarely 5) ovate, broadly ovate, rhombic, or occasionally elliptic leaflets, 4-8 cm long and 2-5 cm wide, with an acute to acuminate apex, rounded or subcordate base, and irregularly serrate,

usually incised leaf margin. Petiole is 3-6 cm long. The terminal leaflets are slightly lobed, and petiolule 2-3 cm long, whereas the lateral leaflet is subsessile. Stipule is linear, pubescent and glandular hairy. The inflorescence is a terminal or axillary raceme. The flowers are few in number, 6-10 mm in diameter, with a long pedicel about 5-15 mm long and lanceolate bracts. The sepals are lanceolate, caudate in the apex, and about 1-1.5 cm in length. Petals are erect, purplish red, obovate spatulate, or nearly orbicular, with claws and soft hairs near the base. Fruits are red, glabrous, semiglobose, aggregate drupelets, 1 cm in diameter. Pyrenes have rugose wrinkles and pits. Flowers appear in May through June, and fruit July through August^[137].



Habitat

R. phoenicolasius occurs along roadsides, in valleys, and forests, at low to medium elevations^[138]. *R. phoenicolasius* may occur as an understory plant at elevations of 700-2000 m in the Tsingling mountain area^[79], 3300m in Qinghai^[127], and 1400 m in Shanxi; thickets along hillsides and moist valleys in Henan^[28]; thickets at forest edges in the Helanshan mountain area of Ningxia^[141], and at elevations of about 600 m in northwestern Hubei^[55].

Distribution

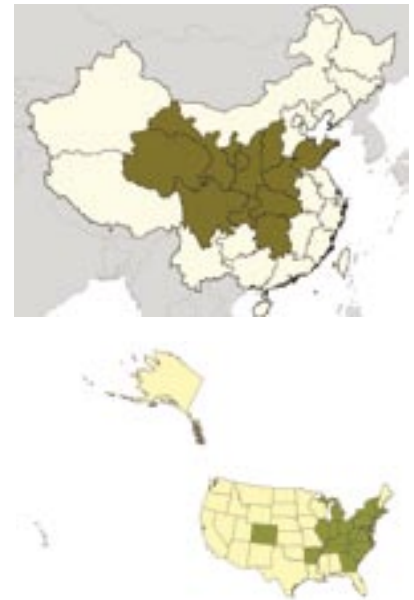
R. phoenicolasius occurs in Gansu, Henan, Hubei, Hunan, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, and Sichuan provinces^[138, 141, 151].

Economic Importance

The stems and leaves are used medicinally and the fruits are edible. The stems can be used in making tanning extracts^[137].

Natural Enemies of *Rubus*

In China, 42 fungi and 43 arthropods have been recorded as associated with members of the genus *Rubus*. Two fungi, *Hamasporea sinica* F.L. Tai & C.C. Cheo and *Phragmidium nambuanum* Dietel, are recorded as associates of *R. phoenicolasius*. *Hamasporea rubi-sieboldii* (Kawagoe) Dietel, is associated with *R. ellipticus* var. *obcordatus*, which is also host to two arthropod species, *Photoscotia miniosata* (Walker) and *Chlamysus setosus* (Bowditch).



Species of *Rubus* in China

Scientific Name	Scientific Name
<i>R. acuminatus</i> Smith	<i>R. lobatus</i> T. T. Yu et L. T. Lu
<i>R. adenophorus</i> Rolfe	<i>R. lobophyllus</i> Y. K. Shih ex F. P. Metcalf,
<i>R. alceifolius</i> Poirét	<i>R. lohfauiensis</i> F. P. Metcalf
<i>R. alexeterius</i> Focke	<i>R. lucens</i> Focke
<i>R. alnifoliolatus</i> H. Léveillé	<i>R. luchunensis</i> T. T. Yu et L. T. Lu
<i>R. amabilis</i> Focke	<i>R. lutescens</i> Franchet
<i>R. amphidasys</i> Focke	<i>R. macilentus</i> Cambessèdes
<i>R. angustibracteatus</i> T. T. Yu et L. T. Lu	<i>R. malifolius</i> Focke
<i>R. arachnoideus</i> Y. C. Liu et F. Y. Lu	<i>R. malipoensis</i> T. T. Yu et L. T. Lu
<i>R. arcticus</i> L.	<i>R. mallotifolius</i> C. Y. Wu ex T. T. Yu et L. T. Lu
<i>R. assamensis</i> Focke	<i>R. menglaensis</i> T. T. Yu et L. T. Lu

Scientific Name	Scientific Name
<i>R. aurantiacus</i> Focke	<i>R. mesogaeus</i> Focke
<i>R. austrotibetanus</i> T. T. Yu et L. T. Lu	<i>R. metoensis</i> T. T. Yu et L. T. Lu
<i>R. bambusarum</i> Focke	<i>R. multisetosus</i> T. T. Yu et L. T. Lu
<i>R. biflorus</i> Buchanan-Hamilton ex Smith	<i>R. nagasawanus</i> Koidzumi
<i>R. bonatianus</i> Focke	<i>R. neoviburnifolius</i> L. T. Lu et Boufford
<i>R. brevipetiolatus</i> T. T. Yu et L. T. Lu	<i>R. niveus</i> Thunberg
<i>R. buergeri</i> Miquel	<i>R. nyalamensis</i> T. T. Yu et L. T. Lu
<i>R. caesius</i> L.	<i>R. oblongus</i> T. T. Yu et L. T. Lu
<i>R. calycacanthus</i> H. Léveillé	<i>R. ourosepalus</i> Cardot
<i>R. calycinus</i> Wallich ex D. Don	<i>R. pacificus</i> Hance
<i>R. caudifolius</i> Wuzhi	<i>R. panduratus</i> Handel-Mazzetti
<i>R. chamaemorus</i> L.	<i>R. paniculatus</i> Smith
<i>R. chiliadenus</i> Focke	<i>R. pararosifolius</i> F. P. Metcalf
<i>R. chingii</i> H. H. Hu	<i>R. parkeri</i> Hance
<i>R. chroosepalus</i> Focke	<i>R. parviaraliifolius</i> Hayata
<i>R. chrysobotrys</i> Handel-Mazzetti	<i>R. parvifolius</i> L.
<i>R. cinclidodictyus</i> Cardot	<i>R. paucidentatus</i> T. T. Yu et L. T. Lu
<i>R. clivicola</i> E. Walker	<i>R. pectinarioides</i> H. Hara
<i>R. cochinchinensis</i> Trattinnick	<i>R. pectinarius</i> Focke
<i>R. cockburnianus</i> Hemsley	<i>R. pectinellus</i> Maximowicz
<i>R. columellaris</i> Tutchet	<i>R. pedunculatus</i> D. Don
<i>R. corchorifolius</i> L.	<i>R. peltatus</i> Maximowicz
<i>R. coreanus</i> Miquel	<i>R. penduliflorus</i> C. Y. Wu ex T. T. Yu et L. T. Lu
<i>R. crassifolius</i> T. T. Yu et L. T. Lu	<i>R. pentagonus</i> Wallich ex Focke
<i>R. crataegifolius</i> Bunge	<i>R. phoenicolasius</i> Maximowicz
<i>R. croceacanthus</i> H. Léveillé	<i>R. pileatus</i> Focke
<i>R. delavayi</i> Franchet	<i>R. piluliferus</i> Focke
<i>R. dolichophyllus</i> Handel-Mazzetti	<i>R. pinnatisepalus</i> Hemsley
<i>R. doyonensis</i> Handel-Mazzetti	<i>R. pirifolius</i> Smith
<i>R. dunnii</i> F. P. Metcalf	<i>R. platysepalus</i> Handel-Mazzetti
<i>R. ellipticus</i> Smith	<i>R. playfairianus</i> Hemsley ex Focke
<i>R. erythrocarpus</i> T. T. Yu et L. T. Lu	<i>R. pluribracteatus</i> L. T. Lu et Boufford
<i>R. eucalyptus</i> Focke	<i>R. poliophyllus</i> Kuntze
<i>R. eustephanos</i> Focke	<i>R. polyodontus</i> Handel-Mazzetti
<i>R. faberi</i> Focke,	<i>R. potentilloides</i> W. E. Evans
<i>R. fanjingshanensis</i> L. T. Lu ex Boufford et al.	<i>R. preptanthus</i> Focke
<i>R. feddei</i> H. Léveillé et Vaniot	<i>R. pseudopileatus</i> Cardot
<i>R. flagelliflorus</i> Focke	<i>R. ptilocarpus</i> T. T. Yu et L. T. Lu
<i>R. flosculosus</i> Focke	<i>R. pungens</i> Cambessèdes
<i>R. fockeanus</i> Kurz	<i>R. quinquefoliolatus</i> T. T. Yu et L. T. Lu
<i>R. foliaceistipulatus</i> T. T. Yu et L. T. Lu	<i>R. raopingensis</i> T. T. Yu et L. T. Lu
<i>R. formosensis</i> Kuntze	<i>R. reflexus</i> Ker Gawler
<i>R. forrestianus</i> Handel-Mazzetti	<i>R. refractus</i> H. Léveillé
<i>R. fragarioides</i> Bertoloni	<i>R. reticulatus</i> Wallich ex J. D. Hooker

Scientific Name	Scientific Name
<i>R. fraxinifolius</i> Hayata	<i>R. rolfei</i> S. Vidal
<i>R. fraxinifolius</i> Poirlet	<i>R. rosifolius</i> Smith
<i>R. fujianensis</i> T. T. Yu et L. T. Lu	<i>R. rubrisetulosus</i> Cardot
<i>R. fuscifolius</i> T. T. Yu et L. T. Lu	<i>R. rufus</i> Focke
<i>R. fusciorubens</i> Focke	<i>R. sachalinensis</i> H. Léveillé
<i>R. glabricarpus</i> W. C. Cheng	<i>R. salwinensis</i> Handel-Mazzetti
<i>R. glandulosocalycinus</i> Hayata	<i>R. saxatilis</i> L.
<i>R. glandulosocarpus</i> M. X. Nie	<i>R. setchuenensis</i> Bureau et Franchet
<i>R. gongshanensis</i> T. T. Yu et L. T. Lu	<i>R. shihae</i> F. P. Metcalf
<i>R. grandipaniculatus</i> T. T. Yu et L. T. Lu	<i>R. sikkimensis</i> J. D. Hooker
<i>R. grayanus</i> Maximowicz	<i>R. simplex</i> Focke
<i>R. gressittii</i> F. P. Metcalf	<i>R. spananthus</i> Z. M. Wu et Z. L. Cheng
<i>R. gyamdaensis</i> L. T. Lu et Boufford	<i>R. spinulosoides</i> F. P. Metcalf
<i>R. hanceanus</i> Kuntze	<i>R. stans</i> Focke
<i>R. hastifolius</i> H. Léveillé et Vaniot	<i>R. stimulans</i> Focke
<i>R. hemithyrus</i> Handel-Mazzetti	<i>R. stipulosus</i> T. T. Yu et L. T. Lu
<i>R. henryi</i> Hemsley et Kuntze	<i>R. subcoreanus</i> T. T. Yu et L. T. Lu
<i>R. hirsutus</i> Thunberg,	<i>R. subinopertus</i> T. T. Yu et L. T. Lu
<i>R. howii</i> Merrill et Chun	<i>R. subornatus</i> Focke
<i>R. huangpingensis</i> T. T. Yu et L. T. Lu	<i>R. subTibetanus</i> Handel-Mazzetti
<i>R. humulifolius</i> C. A. Meyer	<i>R. sumatranus</i> Miquel
<i>R. hunanensis</i> Handel-Mazzetti	<i>R. swinhoei</i> Hance
<i>R. hypopitys</i> Focke	<i>R. taitoensis</i> Hayata
<i>R. ichangensis</i> Hemsley et Kuntze	<i>R. taiwanicola</i> Koidzumi et Ohwi
<i>R. idaeopsis</i> Focke	<i>R. taronensis</i> C. Y. Wu ex T. T. Yu et L. T. Lu
<i>R. idaeus</i> L.	<i>R. tephrodes</i> Hance
<i>R. impressinervus</i> F. P. Metcalf	<i>R. tibetanus</i> Franchet
<i>R. innominatus</i> S. Moore	<i>R. tinifolius</i> C. Y. Wu ex T. T. Yu et L. T. Lu
<i>R. inopertus</i> (Focke) Focke	<i>R. treutleri</i> J. D. Hooker
<i>R. irenaeus</i> Focke	<i>R. trianthus</i> Focke
<i>R. irritans</i> Focke	<i>R. tricolor</i> Focke
<i>R. jambosoides</i> Hance	<i>R. trijugus</i> Focke
<i>R. jianensis</i> L. T. Lu et Boufford	<i>R. tsangii</i> Merrill
<i>R. jinfoshanensis</i> T. T. Yu et L. T. Lu	<i>R. tsangorum</i> Handel-Mazzetti
<i>R. kawakamii</i> Hayata	<i>R. wallichianus</i> Wight et Arnott
<i>R. komarovii</i> Nakai	<i>R. wangii</i> F. P. Metcalf
<i>R. kulinganus</i> L. H. Bailey	<i>R. wardii</i> Merrill
<i>R. kwangsiensis</i> H. L. Li	<i>R. wawushanensis</i> T. T. Yu et L. T. Lu
<i>R. lambertianus</i> Seringe	<i>R. wilsonii</i> Duthie
<i>R. lanyuensis</i> Chang	<i>R. wushanensis</i> T. T. Yu et L. T. Lu
<i>R. lasiostylus</i> Focke	<i>R. wuzhianus</i> L. T. Lu et Boufford
<i>R. lasiotrichos</i> Focke	<i>R. xanthocarpus</i> Bureau et Franchet
<i>R. latoauriculatus</i> F. P. Metcalf	<i>R. xanthoneurus</i> Focke
<i>R. laxus</i> Focke	<i>R. xichouensis</i> T. T. Yu et L. T. Lu

Scientific Name	Scientific Name
<i>R. leucanthus</i> Hance,	<i>R. yanyunii</i> Y. T. Chang et L. Y. Chen
<i>R. lichuanensis</i> T. T. Yu et L. T. Lu	<i>R. yiwuanus</i> W. P. Fang
<i>R. lineatus</i> Reinwardt	<i>R. yuliensis</i> Y. C. Liu et F. Y. Lu
<i>R. lishuiensis</i> T. T. Yu et L. T. Lu	<i>R. yunanicus</i> Kuntze
<i>R. liui</i> Yuen P. Yang et S. Y. Lu	<i>R. zhaogoshanensis</i> T. T. Yu et L. T. Lu

Fungi

Phylum	Family	Species	H. R.	Ref.	
Ascomycota	Amphisphaeriaceae	<i>Coryneopsis rubi</i> (Westend.) Grove	oo	[1]	
	Meliolaceae	<i>Appendiculella calostroma</i> (Desm.) Höhn.	po	[72]	
		<i>Meliola formosensis</i> W. Yamam.	oo	[26]	
		<i>Meliola rubiella</i> Hansf.	oo	[73]	
	Mycosphaerellaceae	<i>Mycosphaerella confusa</i> F.A. Wolf	po	[129]	
		<i>Mycosphaerella fragariae</i> (Tul.) Lindau	mo	[26]	
		<i>Mycosphaerella rubi</i> Roark	oo	[26]	
	Patellariaceae	<i>Rhytidhysterium prosopidis</i> Peck	mo	[26]	
	Basidiomycota	Incertae sedis	<i>Phragmotelium formosanum</i> (Hirats.) Thirum.	oo	[26]
			<i>Phragmotelium okianum</i> (Hara) Thirum.	oo	[26]
<i>Phragmotelium rubi-fraxinifolii</i> (Syd. & P. Syd.) Thirum			oo	[26]	
Phragmidiaceae		<i>Arthuriomyces peckianus</i> (Howe) Cummins & Y. Hirats.	mo	[26]	
		<i>Gerwasia rubi</i> Racib.	oo	[26]	
		<i>Hamasporea acutissima</i> P. Syd. & Syd	oo	[26]	
		<i>Hamasporea hashiokai</i> Hirats. f.	oo	[26]	
		<i>Hamasporea rubi-sieboldii</i> (Kawagoe) Dietel	o*	[26]	
		<i>Hamasporea sinica</i> F.L. Tai & C.C. Cheo	o†	[26]	
		<i>Hamasporea tairai</i> Hirats.	mo	[26]	
		<i>Hamasporea taiwaniana</i> Hirats. f. & Hashioka	mo	[26]	
		<i>Phragmidium arisanense</i> Hirats. & Hashioka	mo	[26]	
		<i>Phragmidium griseum</i> Dietel	oo	[26]	
		<i>Phragmidium nambuanum</i> Dietel	o†	[26]	
		<i>Phragmidium pauciloculare</i> (Dietel) Syd. & P. Syd.	oo	[26]	
		<i>Phragmidium rubi-thunbergii</i> Kusano	oo	[26]	
		<i>Phragmidium shensianum</i> F.L. Tai & C.C. Cheo	oo	[26]	
		<i>Phragmidium sikangense</i> Petr.	oo	[26]	
		<i>Phragmidium sinicum</i> F.L. Tai & C.C. Cheo	mo	[26]	
		<i>Phragmidium violaceum</i> (Schultz) G. Winter	mo	[26]	
<i>Phragmidium yamadanum</i> Hirats.	oo	[26]			
Oomycota	Pythiaceae	<i>Phytophthora citricola</i> Sawada	po	[202]	
Anamorphic Ascomycetes		<i>Acrothecium rubi</i> Sawada	mo	[26]	

Phylum	Family	Species	H. R.	Ref.
Anamorphic	<i>Botryotinia</i>	<i>Botrytis cinerea</i> Pers.	po	[26]
Anamorphic	<i>Didymella</i>	<i>Hendersonia vulgaris</i> Desm.	mo	[26]
Anamorphic	<i>Diplocarpon</i>	<i>Gloeosporium venetum</i> Speg.	mo	[26]
Anamorphic	<i>Discostroma</i>	<i>Coryneopsis rubi</i> (Westend.) Grove	oo	[26]
Anamorphic	Hypochytrales	<i>Verticillium albo-atrum</i> Reinke & Berthold	po	[26]
Anamorphic	<i>Hypocrella</i>	<i>Aschersonia tamurai</i> Henn.	mo	[26]
Anamorphic	<i>Mycosphaerella</i>	<i>Pseudocercospora heteromalla</i> (Syd.) Deighton	mo	[129]
		<i>Pseudocercospora rubicola</i> (Thüm.) X.J. Liu & Y.L. Guo	mo	[129]
		<i>Septoria brevispora</i> Ellis & Davis	oo	[26]
		<i>Septoria rubi</i> var. <i>brevispora</i> Sacc.	mo	[26]
Anamorphic	Uredinales	<i>Caecoma cheoanum</i> Cummins	oo	[26]

[†]Hosted by *Rubus phoenicolasius*

[‡]Hosted by *Rubus ellipticus* var. *obcordatus*

[§]Recorded as *Septoria rubi* Westendorp

^{||}Recorded as *Pseudocercospora rubi* (Sacc.) Deighton

^{|||}Recorded as *Phragmidium formosanum* Hirats.

^{IV}Recorded as *Phragmidium okianum* Hara

^VRecorded as *Phragmidium rubi-fraxinifolii* Syd. & P. Syd.

^{VI}Recorded as *Gymnoconia peckiana* (Howe) Trotter

^{VII}Recorded as *Hamaspora hashiokae* Hirats

^{VIII}Recorded as *Hamaspora benguetensis* Syd.

Arthropods

Order	Family	Species	H. R.	Ref
Coleoptera	Buprestidae	<i>Coraebus quadriundulatus</i> Motschulsky	mo	[94]
	Chrysomelidae	<i>Aphthona howenchuni</i> (Chen)	oo	[201]
		<i>Batophila impressa</i> Wang	oo	[201]
		<i>Chaetocnema simplicifrons</i> (Baly)	oo	[201]
		<i>Phaedon fulvescens</i> Weise	oo	[201]
	Curculionidae	<i>Enaptorrhinus convexiusculus</i> Heller	po	[211]
	Eumolpidae	<i>Basilepta leechi</i> (Jacoby)	po	[164]
		<i>Basilepta ruficollis</i> (Jacoby)	po	[164]
		<i>Chlamisus indicus</i> Jacoby	oo	[164]
		<i>Chlamisus latiusculus</i> Chûjô	mo	[164]
		<i>Chlamisus ruficeps</i> (Chen)	po	[164]
		<i>Chlamisus semirufus</i> (Chen)	po	[164]
		<i>Chlamisus setosus</i> (Bowditch)	m [†]	[164]
Hispididae	<i>Alledoya vespertina</i> (Boheman)	po	[94]	
Hemiptera	Coreidae	<i>Derepteryx fuliginosa</i> (Uhler)	po	[207]
		<i>Derepteryx lunata</i> (Distant)	po	[207]
	Pentatomidae	<i>Amyntor obscurus</i> (Dallas)	po	[207]
Homoptera	Aphididae	<i>Acyrtosiphon rubiformosanum</i> (Takahashi)	po	[205]

Order	Family	Species	H. R.	Ref
Lepidoptera	Geometridae	<i>Dysstroma cinereata</i> (Moore)	mo	[195]
		<i>Dysstroma citrata</i> (L.)	po	[195]
		<i>Mesoleuca albicillata</i> (L.)	po	[161]
			po	[195]
			mo	[189]
			<i>Photoscotia miniosata</i> (Walker)	m [†]
		<i>Plagidis dolabraria</i> (L.)	oo	[161]
	Hesperiidae	<i>Abraximorpha davidii</i> (Mabille)	mo	[219]
	Lycaenidae	<i>Sinthusia chandrana</i> (Moore)	mo	[219]
	Noctuidae	<i>Acrionicta rumicis</i> (L.)	po	[224] ^I
			po	[181]
		<i>Anaplectoides prasina</i> (Denis & Schiffermüller)		[181]
		<i>Anomis mesogona</i> (Walker)	oo	[224]
		<i>Grammodes geometrica</i> (Fabricius)	po	[224] ^{II}
			po	[11] ^{III}
		<i>Grammodes stolidata</i> (Fabricius)	po	[224] ^{IV}
		<i>Sypnoides picta</i> Butler	po	[228] ^V
	Nymphalidae	<i>Argynnis paphia</i> (L.)	po	[219]
		<i>Brenthis daphne</i> (Denis & Schiffermüller)	po	[219]
		<i>Brenthis ino</i> (Rottemburg)	po	[219]
	Saturniidae	<i>Loepa damaritis</i> Jordan	po	[226]
	Tortricidae	<i>Adoxophyes orana</i> Fischer von Röslerstamm	po	[133]
		<i>Ancylis comptana</i> (Frölich)	po	[133]
		<i>Archips xylosteana</i> (L.)	po	[133]
		<i>Epiblema tetragonana</i> (Stephens)	po	[133]
		<i>Epinotia ustulana</i> Hübner	oo	[133]
		<i>Olethreutes lacunana</i> (Denis & Schiffermüller)	po	[133] ^{VI}
		<i>Orthotaenia undulana</i> (Denis & Schiffermüller)	po	[133]
	<i>Syndemis perpulchrana</i> (Kennel)	po	[133]	

[†] Hosted by *Rubus ellipticus* var. *obcordatus*

^I Recorded as *Acrionicta rumicis* (L.)

^{II} Recorded as *Chalciope geometrica* Fabricius

^{III} Recorded as *Grammodes geometrica* (Fabricius)

^{IV} Recorded as *Chalciope stolidata* (Fabricius)

^V Recorded as *Sypna picta* Butler

^{VI} Recorded as *Argyroplote lacunana* (Denis et Schiffermüller)

Rumex species

dock, sorrel

Introduction

The genus *Rumex* contains approximately 200 species worldwide, occurring primarily in the north temperate regions. In China 27 species occur nationwide [98].

I. *Rumex acetosella*

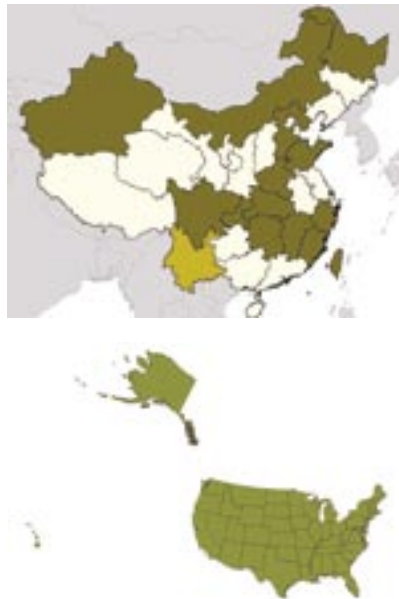
Sheep sorrel

Taxonomy

- Order:** Polygonales
- Family:** Polygonaceae
- Subfamily:** Rumicoideae Damm.
- Tribe:** Rumiceae Damm.
- Genus:** *Rumex* L.
- Subgenus:** acetosella (Meisn.) Rech. f.
- Species:** *Rumex acetosella* L.

Description

Rumex acetosella is a perennial herb with a creeping xyloid rhizome from which numerous stems are spread. The plant can reach 35 cm in height. The stems are slender and furrowed, usually branching in the upper half of the stem. The leaves are narrow-lanceolate or linear hastate, the petiole is 2-5 cm long. The middle lobe of the



Species of *Rumex* in China*

Scientific Name	Scientific Name
<i>R. acetosa</i> L.	<i>R. marschallianus</i> Reichb.
<i>R. acetosella</i> L.	<i>R. microcarpus</i> Campd.
<i>R. amurensis</i> Fr. Schm. ex Maxim.	<i>R. nepalensis</i> Spreng.
<i>R. angulatus</i> Rech. f.	<i>R. obtusifolius</i> L.
<i>R. aquaticus</i> L.	<i>R. patientia</i> L.
<i>R. chalepensis</i> Mill.	<i>R. popovii</i> Pachom.
<i>R. confertus</i> Willdenow†	<i>R. pseudonatronatus</i> (Borb.) Borb. ex Murb.
<i>R. crispus</i> L.	<i>R. similans</i> K. H. Rechinger†
<i>R. dentatus</i> L.	<i>R. stenophyllus</i> Ledeb.
<i>R. gmelinii</i> Turcz. ex Ledeb.	<i>R. thyrsiflorus</i> Fingerh
<i>R. hastatus</i> D. Don	<i>R. tianschanicus</i> Los.‡
<i>R. japonicus</i> Houtt.	<i>R. trisetifer</i> Stokes
<i>R. longifolius</i> DC.	<i>R. yungningensis</i> Sam.
<i>R. maritimus</i> L.	

†Not listed in *FRPS*

‡Recorded as *R. tianschanicus* Los. in *FRPS*

**R. ucranicus* Fisch. ex Spreng. is not listed in the revised *FOC*

leaves is lanceolate or linear lanceolate, 2 - 4 cm long and 3 to 6 mm wide, with acute apex. The upper leaves are relatively slender, with a short petiole or sessile. The ochrea or stipule sheath is membranous, white to silver. From June to July, dioecious unisexual flowers occur in clusters of 2-7 in a terminal panicle. Male flowers, with 6 stamens, have elliptic inner sepals that are 1.5-1.8 mm long and larger than the lanceolate outer ones. The inner sepals of female flowers are veined,

ovate and about 1.5-1.8 mm long, with acute apices and rounded bases, while the outer ones are lanceolate and about 1 mm long. The achenes are produced in July through August. The shiny, yellowish brown fruits are broadly ovate, 3-winged, and about 1-1.5 mm long^[97, 98].

Habitat

R. acetosella occurs on grassy slopes, forest margins, moist valleys, meadow prairies, gravel land of the steppes and

roadsides at elevations of 400-3200 m^[97, 108].

Distribution

R. acetosella occurs in Fujian, Hebei, Heilongjiang, Henan, Hubei, Hunan, Inner Mongolia, Jiangxi, Shandong, Sichuan, Taiwan and Xinjiang, Zhejiang, and probably Yunnan provinces^[97, 98].

Economic Importance

R. acetosella is used for goat and sheep feed in the summer and fall^[108].

Related Species

R. acetosa L. is the most common species of *Rumex* in China. It occurs nationwide along hillsides, ditches, roads and forest margins at elevations of 400-4100m. It is used in Chinese medicine and the young stems and leaves are edible and also used as animal forage in some areas. *R. acetosa* is distinguished from *R. acetosella* by its sagittate basal leaves and the absence of a rhizome^[97, 98].

II. *Rumex crispus* Curly Dock, Yellow Dock

Taxonomy

Order: Polygonales

Family: Polygonaceae

Subfamily: Rumicoideae Damm.

Tribe: Rumiceae Damm.

Genus: *Rumex* L.

Subgenus: *Rumex*

Species: *Rumex crispus* L.

Description

R. crispus is a perennial herb with a stout yellowish-brown root. The grooved stem is 50 to 120 cm tall, and unbranched or branched at the upper part. The basal leaves are lanceolate or narrowly so, 10-25 cm long and 2-5 cm wide with a crisped, wavy margin, acute apex and cuneate base. The cauline leaves are comparatively



smaller, and narrowly lanceolate. The ochra or stipule sheath is membranous, and fragile. The inflorescence is a narrow panicle. The bisexual flower is light green, with a slender, jointed pedicel. There are 6 elliptic sepals each about 1 mm long. The inner sepals are broadly ovate, 4-5 mm long, slightly obtuse apically with a nearly truncate base, with a noticeable net of veins, and tubercles, which are ovate and 1.5-2 mm long. Flowers appear from May to June. Appearing at the end of July, the fruit is a dark brown, shiny, trigonous ovate achene^[97, 98].

Habitat

R. crispus occurs along riversides, wetland areas, and roadsides, at elevations of 30-2500 m^[97, 98, 108].

Distribution

R. crispus occurs in Gansu, Guizhou, Heilongjiang, Hebei, Henan, Hubei, Hunan, Jilin, Liaoning, Inner Mongolia, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xinjiang, Yunnan, and probably Hainan and Zhejiang provinces^[98]

Related Speceis

R. crispus var. *unicallosus* Petermann also occurs in China^[97].



Economic Importance

R. crispus causes damage to wheat, vegetables, and young trees when, it occurs in orchards and in crop fields^[39, 108]. However, it is also industrially and medicinally useful^[120].

Natural Enemies of *Rumex*

Twenty-two species of fungi have been found on members of the genus *Rumex* in China, with two from *R. acetosella* and five from *R. crispus*. Fifty-one arthropod species are recorded as associates of *Rumex*. One species, associated primarily with *R. acetosa* exhibits a narrow host range specificity for members of *Rumex* and *Polygonum* making it a potential biological control candidate, however *R. crispus* is the preferred feeding choice in northeastern China^[107, 148].

Fungi

Phylum	Family	Species	H. R.	Ref
Ascomycota	Erysiphaceae	<i>Erysiphe betae</i> (Vaňha) Weltzien	p [‡]	[26]I
			p [‡]	[24]I
	Sclerotiniaceae	<i>Sclerotinia sclerotiorum</i> (Lib.) de Bary	po	[26]
	Venturiaceae	<i>Venturia rumicis</i> (Desm.) G. Winter	mo	[26]II
Basidiomycota	Pucciniaceae	<i>Puccinia acetosae</i> (Schumach.) Körn.	oo	[26]
			oo	[229]
		<i>Puccinia hultenii</i> Tranzschel & Jørst.	oo	[229]
		<i>Puccinia namjagbarwana</i> B. Li & J.Y. Zhuang	mo	[229]
		<i>Puccinia nepalensis</i> Barclay & Dietel	mo	[229]
		<i>Puccinia ornata</i> Arthur & Holw.	oo	[229]
		<i>Puccinia otaniana</i> Hirats. f.	o [‡]	[229]
		<i>Puccinia phragmitis</i> (Schumach.) Körn.	po	[170]
		<i>Puccinia punctiformis</i> Dietel & Holw.	o [‡]	[26]
		<i>Uromyces polygoni-avicularis</i> (Pers.) P. Karst.	po	[26]
	<i>Uromyces rumicis</i> (Schumach.) G. Winter	oo	[26]III	
	Ustilaginaceae	<i>Ustilago hsuii</i> Y.C. Wang	oo	[26]
		<i>Ustilago kuehneana</i> R. Wolff	oo	[64]
		<i>Ustilago rumicis</i> (Berk.) G.P. Clinton	oo	[26]
<i>Ustilago warmingii</i> Rostr.		mo	[26]	
		mo	[64]	
Oomycota	Peronosporaceae	<i>Peronospora rumicis</i> Corda	p [†]	[202]
	Pythiaceae	<i>Pythium helicandrum</i> Drechsler	m [†]	[202]
Anamorphic <i>Guignardia</i>		<i>Phyllosticta rumicicola</i> Miura	o [‡]	[26]
Anamorphic <i>Mycosphaerella</i>		<i>Ramularia decipiens</i> Ellis & Everh.	oo	[26]
			oo	[26]
		<i>Ramularia rumicis-crispi</i> Sawada	o [‡]	[26]

^IRecorded as *Erysiphe polygoni* DC

^{II}Recorded as *Mycosphaerella rumicis* (Desm.) Cooke

^{III}Recorded as *Uromyces rumicis* (Schum.) Wint.

[†]Species found on *Rumex acetosella*

[‡]Species found on *Rumex crispus*

Arthropods

Order	Family	Species	H. R.	Ref.
Coleoptera	Chrysomelidae	<i>Gallerucella griseascens</i> (Joannis)	po	[201]
		<i>Gallerucida bifasciata</i> Motschulsky	po	[201]
		<i>Gastrophysa atrocyanea</i> (Motschulsky)	po	[165]
		<i>Hespera brachyelytra</i> Chen & Wang	po	[165]
			po	[201]
Hemiptera	Lygaeidae	<i>Lygaeus vicarius</i> Winkler & Kerzhner	po	[208]
	Pentatomidae	<i>Hoplistodera fergussoni</i> Distant	po	[208]
		<i>Sepontia aenea</i> Distant	mo	[208]
Homoptera	Aphididae	<i>Aphis rumicis</i> L.	m	[205]
			m	[113]

Order	Family	Species	H. R.	Ref.
Lepidoptera	Arctiidae	<i>Phragmatobia fuliginosa</i> (L.)	po	[45]
			po	[44]
			po	[25]
		<i>Spilosoma urticae</i> (Esper)	po	[44]
			po	[45]
			po	[25]
	Crambidae	<i>Loxostege verticalis</i> L.	po	[169]
		<i>Mesographe forficalis</i> L.	po	[169]
		<i>Pyrausta memnialis</i> Walker	mo	[169]
	Geometridae	<i>Calothysanis amata</i> (L.)	oo	[25]I
		<i>Dysstroma citrata</i> (L.)	po	[195]
		<i>Lythria purpuraria</i> (L.)	po	[195]
		<i>Lythria</i> sp.	po	[25]
		<i>Orthonama obstipata</i> (Fabricius)	mo	[195]
			mo	[161]II
	<i>Xanthorhoe quadrifasciata</i> (Clerck)	po	[195]	
	Lycaenidae	<i>Heliophorus ila matsumurae</i> (Fruhstorfer)	po	[219]
		<i>Lycaena phlaeas</i> (L.)	o2	[219]III
			o	[219]III
	Noctuidae	<i>Agrotis clavis</i> (Hüfnagel)	po	[181]IV
			po	[166]IV
		<i>Agrotis exclamationis</i> (L.)	po	[166]
		<i>Aletia l-album</i> (L.)	po	[25]V
		<i>Anaplectoides prasina</i> (Denis & Schiffermüller)	po	[11]
			po	[181]
		<i>Apamea characteria</i> (Denis & Schiffermüller)	po	[15]VI
		<i>Apamea crenata</i> (Hüfnagel)	po	[166]VII
		<i>Atrachea nitens</i> (Butler)	m	[11]
		<i>Cerastis rubricosa</i> (Denis & Schiffermüller)	po	[15]
		<i>Diarsia brunnea</i> (Denis & Schiffermüller)	po	[15]
			po	[166]
		<i>Diarsia canescens</i> (Butler)	po	[166]
		<i>Graphiphora augur</i> (Fabricius)	po	[15]
		<i>Hadena reticulata</i> (Villers)	po	[228]VIII
		<i>Heliophobus reticulata</i> (Goeze)	po	[75]
			po	[166]
			po	[25]
		<i>Hoplodrina alsines</i> (Brahm)	po	[15]IX
			po	[166]IX
	<i>Hoplodrina blanda</i> (Denis & Schiffermüller)	po	[15]X	
	<i>Lacanobia contigua</i> (Denis & Schiffermüller)	po	[25]	
	<i>Lacanobia suasa</i> (Denis & Schiffermüller)	po	[25]XI	
po		[15]XI		
<i>Leucania comma</i> (L.)	po	[15]		

Order	Family	Species	H. R.	Ref.
		<i>Naenia contaminata</i> (Walker)	po	[224]
			po	[11]
		<i>Noctua pronuba</i> (L.)	po	[15]
		<i>Polia illoba</i> (Butler)	p	[228]
		<i>Simyra nervosa</i> (Schifferrmüller)	po	[15]
		<i>Trachea atriplicis</i> (L.)	po	[224]
		<i>Valeria viridimacula</i> (Graeser)	oo	[228]XII
		<i>Xestia c-nigrum</i> (L.)	po	[166]XIII
			po	[11]XIV
		<i>Xestia triangulum</i> (Hüfnagel)	po	[181]XIV
			po	[178]XIV
			po	[224]XIV
			<i>Xestia umbrosa</i> (Hübner)	po
		<i>Xylena formosa</i> (Butler)	po	[224]XVI
	Sphingidae	<i>Celerio lineata livornica</i> (Esper)	po	[225]
p			[227]	
<i>Hippotion celerio</i> (L.)		po	[225]	
		po	[227]	

^IRecorded as *Timandra amata* L.

^{II}Recorded as *Nyctosea obstipata* (Fabricius)

^{III}Regarded as another family (Internet)

^{IV}Recorded as *Agrotis corticea* (Schifferrmüller)

^VRecorded as *Leucania l-album* L.

^{VI}Recorded as *Apamea hepatica* (L.)

^{VII}Recorded as *Apamea rurea* Fabricius

^{VIII}Probably *Heliophobus reticulata* (Goeze)

^{IX}Recorded as *Athetis alsines* (Brahm)

^XRecorded as *Athetis blanda* (Schifferrmüller)

^{XI}Recorded as *Polia suasa* (Schifferrmüller)

^{XII}Recorded as *Valeriodes viridimacula* (Graeser)

^{XIII}Recorded as *Amathes c-nigrum* L.

^{XIV}Recorded as *Agrotis triangulum* (Hüfnagel)

^{XV}Recorded as *Amathes sexstrigata* (Haworth)

^{XVI}Recorded as *Xylina formosa* (Bütler)

Sapium sebiferum *Triadica sebifera*

Chinese tallow tree

Introduction

The genus *Sapium* consists of approximately 120 species worldwide. Members of the genus occur primarily in tropical regions, especially in South America. Nine species occur in the low hills of southeastern and southwestern China^[16].

Taxonomy

Order: Geraniales

Suborder: Euphorbiineae

Family: Euphorbiaceae

Subfamily: Euphorbioideae

Tribe: Hippomaneae Reichb.

Genus: *Sapium* P. Br.

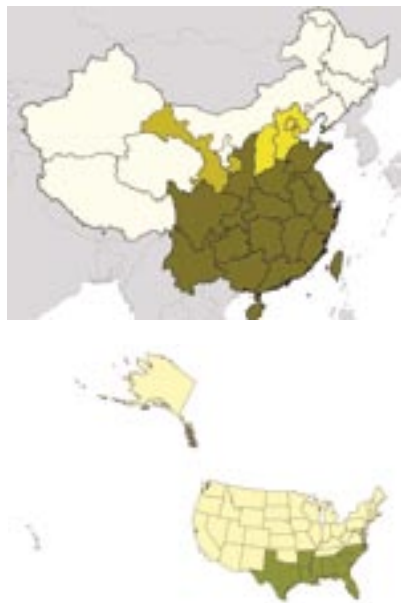
Section: *Triadica* (Lour.) Muell.

Arg

Species: *Sapium sebiferum* (L.) Roxb.
(=*Triadica sebifera* (L.) Small)

Description

Sapium sebiferum is a deciduous tree that can reach 15 m in height. Most parts of the plant are glabrous. The bark is gray to whitish-gray with vertical cracks. The alternate leaves are broad rhombic to ovate 3-8 cm long and 3-8 cm wide, entire margin, and a cordate-acuminate apex and a rounded base.



Species of *Sapium* in China

Scientific Name	Scientific Name
<i>S. sebiferum</i> (L.) Roxb.	<i>S. insigne</i> (Royle) Benth. ex Hook. f.
<i>S. atrobadiomaculatum</i> Metcalf	<i>S. japonicum</i> (Sieb. et Zucc.) Pax et Hoffm.(Sieb.)
<i>S. baccatum</i> Roxb.	
<i>S. chihsinianum</i> S. K. Lee	<i>S. pleiocarpum</i> Y. C. Tseng
<i>S. discolor</i> (Champ. ex Benth.) Muell. Arg.	<i>S. rotundifolium</i> Hemsl.

The petiole is slender, 2.5-6 cm long, bearing 2 glands in the terminal. The stem contains a milky, poisonous sap. Flowers are monoecious, without petals or flower discs, arranged as terminal spikes. The slender male flowers have a 3-lobed cuplike calyx and 2 stamens with separated filaments. One to four female flowers appear at the base of

the inflorescence. The female flower is borne on the pedicel, which is 2-4 mm long with 2 kidney-shaped glands in the base. The flowers appear from April through August. Fruits are pear-shaped globular capsules 1-1.5 cm in diameter. Each fruit contains 3 black seeds that are flat globular and covered with a waxy, white arils at maturity^[16].

Habitat

S. sebiferum occurs in open areas, edges of crop fields, sparse forests, and near bodies of water at elevations below 1200 m. It is also planted as an ornamental along roadsides^[16, 82, 88].

Distribution

S. sebiferum occurs in Anhui, Fujian,, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, Sichuan, Taiwan, Yunnan, Zhejiang, and possibly Gansu, most of which are provinces south of the Yellow River.^[17, 86] It is also cultivated in Hebei and Shanxi^[19, 48].



Economic Importance

The rigidity and fine texture of the light colored wood makes *S. sebiferum* suitable for construction and furniture making. The outer root covering has medicinal value. The leaves are a source for a black dye. The wax-coated seeds are a source of candle wax, and fatty acids for soap making. The leaves

are a food source for the larvae of the atlas moth, *Attacus atlas* (Lepidoptera: Saturniidae)^[16, 82]. In addition, *S. sebiferum* is a nectariferous plant^[88, 179]

Natural Enemies of *Sapium*

Three species of fungi have been found on *S. sebiferum*. *Stigmata sapii* is reported to cause abnormal leaf drop

of *S. sebiferum*^[26, 147].

One hundred fifteen species of arthropods have been reported to damage members of the genus *Sapium*. Most of them are foliage feeders. A detailed review on the arthropod species associated with *Sapium* can be found in *Cultivation of Chinese Tallow Tree*^[163, 190, 193].

Fungi

Phylum	Family	Species	H. R.	ref
Ascomycota	Erysiphaceae	<i>Phyllactinia guttata</i> (Wallr.) Lév.	p	[26] ^I
		<i>Phyllactinia sapii</i> Sawada	m	[24]
	Meliolaceae	<i>Meliola sapiicola</i> Y.X. Hu & B. Song	mo	[158]
Anamorphic Mycosphaerella		<i>Cercospora stillingiae</i> Ellis & Everh.	oo	[26]
		<i>Pseudocercospora sapii-sebiferi</i> Sawada ex Goh & W.H. Hsieh	m	[129]
Anamorphic Otthia		<i>Stigmata sapii</i> (J. Miyake) M.B. Ellis	m	[26] ^{II}

^I Recorded as *Phyllactinia corylea* (Pers.) Karst.

^{II} Recorded as *Cercospora micromera* Syd. and *Helminthosporium sapii* Miyake

Arthropods

Order	Family	Species	H. R.	Ref.
Acariformes	Eriophyidae	<i>Phyllocoptruta sapii</i> Kuang & Zhuo	m	[90]
Coleoptera	Attelabidae	<i>Apoderus bicallosocollis</i> Voss	m	[75]
		<i>Apoderus nigroapicatus</i> Jekel	p	[75]
		Cerambycidae	<i>Aeolesthes holosericea</i> (Fabricius)	po
	<i>Aeolesthes induta</i> (Newman)		p	[13]
	<i>Anoplophora chinensis</i> (Förster)		p	[193]
			p	[190]
	<i>Apriona germari</i> (Hope)		p	[193]
	<i>Batocera horsfieldi</i> (Hope)		p	[13]
			p	[94]
			†	[163]
			p	[193]
			p	[190]
			p	[75]
	<i>Batocera lineolata</i> Chevrolat		p	[94]
			p	[165]
			p	[94]
	<i>Erythrus championi</i> White	p	[94]	
	<i>Philus antennatus</i> (Gyllenhal)	p	[178]	
	<i>Rhaphipodus gahani</i> Lameere	m	[86]	
	Cetoniidae	<i>Cetonia pilifera</i> (Motschulsky)	p	[94]
<i>Poecilophilides rusticola</i> (Burmeister)		p	[94]	
Chrysomelidae	<i>Aphthonomorpha collaris</i> (Baly)	m	[75]	
		m	[94]	
		m	[201]	
	<i>Morphosphaera japonica</i> Hornstedt	m	[94]	

Order	Family	Species	H. R.	Ref.
	Curculionidae	<i>Alcidodes erro</i> (Pascoe)	p	[6]
			m	[94]
			p	[178]
		<i>Chlorophanus auripes</i> Faust	p	[94]
		<i>Eucryptorrhynchus chinensis</i> (Olivier)	p	[94]
	Eumolpidae	<i>Hypomeces squamosus</i> Fabricius	p	[193]
		<i>Colasposoma dauricum auripenne</i> (Motschulsky)	p	[94]
	Melolonthidae	<i>Cryptocephalus fortunatus</i> Baly	p	[94]
		<i>Apogonia cribricollis</i> Burmeister	p	[94]
		<i>Holotrichia plumbea</i> Hope	†	[193]
		<i>Holotrichia trichophora</i> (Fairmaire)	p	[94]
	Rutelidae	<i>Maladera orientalis</i> Mots	p	[193]
		<i>Adoretus sinicus</i> Burmeister	†	[193]
			p	[190]
		<i>Adoretus tenuimaculatus</i> Waterhouse	p	[94]
			p	[190]
		<i>Anomala antiqua</i> (Gyllenhal)	†	[193]
	Hemiptera	<i>Anomala corpulenta</i> Motschulsky	†	[193]
		<i>Anomala cuprea</i> Hope	p	[94]
		<i>Popillia quadriguttata</i> (Fabricius)	†	[193]
		Acanthosomatidae	<i>Elasmucha nipponica</i> (Esaki & Ishihara)	p
Coreidae		<i>Physomerus grossipes</i> (Fabricius)	p	[208]
Pentatomidae	<i>Eurostus validus</i> Dallas	p	[207]	
	<i>Rhaphigaster genitalia</i> Yang	p	[208]	
Urostylidae	<i>Urochela distincta</i> Distant	p	[94]	
		p	[207]	
Homoptera	Aphididae	<i>Aphis</i> sp.	†	[163]
			p	[75]
			m	[94]
		<i>Toxoptera odinae</i> (van der Goot)	p	[165]
			p	[178]
	Cicadellidae		p	[205]
		<i>Erythroneura subrufa</i> (Motschulsky)	p	[193]
		<i>Nephotettix bipunctatus cincticeps</i> (Uhler)	p	[193]
	Cicadidae	<i>Tettigoniella viridis</i> (Linné)	p	[193]
		<i>Gaeana muculata consors</i> Distant	m	[75]
	Coccidae	<i>Ceroplastes japonicus</i> Green	p	[94]
		<i>Parasaissetia nigra</i> (Nietner)	p	[173]
		<i>Saissetia formicarii</i> (Green)	p	[173]
	Diaspididae	<i>Aulacaspis rosarum</i> Borchsennius	p	[190]
		<i>Fiorinia fiorinae</i> (Targioni-Tozzetti)	p	[94]
		<i>Lepidosaphes tubulorum</i> Ferris	p	[94]
		<i>Pseudaulacaspis pentagona</i> (Targioni-Tozzetti)	p	[178]
Flatidae	<i>Geisha distinctissima</i> (Walker)	p	[94]	

Order	Family	Species	H. R.	Ref.
	Fulgoridae	<i>Fulgora candelaria</i> (L.)	p	[220]
		<i>Fulgora watanabei</i> Matsumura	m	[220]
	Margarodidae	<i>Icerya purchasi</i> Maskell	p	[193]
	Membracidae	<i>Hypsauchertia chinensis</i> Chou	p	[190]
		<i>Tricentrus aleuritis</i> Chou	p	[178]
Ricaniidae	<i>Ricania speculum</i> (Walker)	p	[94]	
Isoptera	Termitidae	<i>Odontotermes formosanus</i> (Shiraki)	p	[193]
Lepidoptera	Arctiidae	<i>Aloa lactinea</i> (Cramer)	p	[94]I
		<i>Camptoloma interiorata</i> (Walker)	p	[44]
			p	[190]
			p	[75]
			p	[94]
	p	[193]		
	Brahmaeidae	<i>Brahmaea hearseyi</i> (White)	p	[75]
	Cossidae	<i>Arbela dea</i> Swinhoe	p	[94]
		<i>Zeuzera coffeae</i> Nietner	p	[94]
			p	[193]
	p	[190]		
	Eupterotidae	<i>Eupterote chinensis</i> Leech	p	[94]
		<i>Eupterote sapivora</i> Yang & Yang	p	[190]
			p	[196]
	Geometridae	<i>Biston marginata</i> Matsumura	p	[94]
		<i>Buzura suppressaria</i> Guenee	p	[190]
			p	[190]
			p	[178]
			p	[94]
	‡	[193]		
	<i>Comibaena procumbaria</i> (Pryer)	p	[178]	
	Hepialidae	<i>Phassus sinifer sinensis</i> Moore	p	[193]
	Lasiocampidae	<i>Trabala vishnou</i> Lefebure	p	[193]
	Limacodidae	<i>Latoia hilarata</i> (Staudinger)	p	[190]
		<i>Monema flavescens</i> Walker	p	[94]II
			‡	[193]II
			p	[190]II
			p	[75]
		<i>Parasa consocia</i> Walker	p	[94]
		†	[163]	
		‡	[193]	
		<i>Parasa hilarata</i> (Staudinger)	p	[94]
<i>Parasa pseudorepanda</i> Hering		p	[94]	
<i>Parasa sinica</i> Moore	p	[94]		
<i>Phocoderma velutina</i> Kollar	p	[94]		

Order	Family	Species	H. R.	Ref.		
		<i>Setora postornata</i> (Hampson)	p	[94]		
			†	[163]		
			‡	[193]		
			p	[190]		
		<i>Thosea sinensis</i> (Walker)	p	[75]		
			p	[94]		
			p	[178]		
			‡	[193]		
	Lymantriidae	<i>Artaxa flava</i> (Bremer)	p	[94]III		
			<i>Euproctis bipunctapex</i> (Hampson)	p	[212]	
				p	[75]	
				p	[94]	
				†	[163]	
				p	[166]	
				p	[178]	
				p	[193]	
				p	[190]	
			<i>Euproctis pseudoconspersa</i> Strand	p	[212]	
				p	[94]	
				p	[178]	
				p	[193]	
			<i>Euproctis similis xanthocampa</i> Dyar.	p	[190]	
				p	[193]IV	
			<i>Lymantria xyliana</i> Swinhoe	p	[193]	
				<i>Porthesia atereta</i> Collenette	p	[94]
					p	[166]
					p	[178]
	<i>Porthesia scintillans</i> (Walker)	p		[75]		
		<i>Agrotis ipsilon</i> (Hufnagel)		†	[163]V	
			<i>Dysgonia stuposa</i> Fabricius	p	[94]VI	
	<i>Grammodes geometrica</i> (Fabricius)			p	[94]VII	
		Noctuidae		m	[224]VIII	
	m			[75]VIII		
	<i>Iscadia inexacta</i> (Walker)			m	[94]VIII	
				m	[178]VIII	
				m	[190]VIII	
				Oecophoridae	<i>Odites xenophaea</i> (Meyrick)	p
	Papilionidae	<i>Papilio polytes</i> L.	p			[94]
			Psychidae		<i>Acanthopsyche subferalbata</i> Hampson	‡
	p	[94]				
	<i>Chalioides kondonis</i> Kondo	†			[163]	
		‡			[193]	
<i>Clania minuscula</i> Butler		p			[94]IX	
	p	[94]IX				
	†	[163]IX				

Order	Family	Species	H. R.	Ref.
		<i>Clania variegata</i> Snellen	p	[94]X
			†	[163]X
			‡	[193]X
		<i>Dappula tertia</i> Templeton	p	[190]
		<i>Mahasena colona</i> Sonan	p	[94]
	p		[190]	
	Saturniidae	<i>Actias artemis artemis</i> (Bremer & Gray)	p	[226]
			p	[75]
		<i>Actias heterogyna</i> Mell	p	[226]
		<i>Actias selene ningpoana</i> Felder	p	[75]
			p	[94]
			†	[163]
			p	[166]
			p	[193]
			p	[226]
			p	[190]
		<i>Antheraea frithii javanensis</i> Bouvier	p	[226]
			p	[178]
		<i>Attacus atlas</i> (L.)	p	[75]
			p	[226]
		<i>Caligula anna</i> Moore	p	[226]
		<i>Eriogyna pyretorum</i> (Westwood)	p	[190]
		<i>Eriogyna pyretorum lucifera</i> Jordan	p	[226]
		<i>Samia cynthia</i> (Drury)	p	[75]XI
			p	[94]XI
			†	[163]XI
	p		[166]XI	
	p		[193]XI	
	p		[190]XII	
	p		[178]XII	
	p		[226]	
<i>Samia cynthia canningi</i> (Hutton)	p	[226]		
<i>Samia cynthia ricina</i> (Donovan)	p	[178]XIII		
	p	[226]		
Tortricidae	<i>Archips piceana</i> (L.)	p	[193]	
	<i>Gatesclarkeana idia</i> Diakonoff	m	[190]	
Zygaenidae	<i>Soritia pulchella sexpunctata</i> Walker	p	[94]	
Orthoptera	Pyrgomorphidae	<i>Atractomorpha sinensis</i> I. Bolivar	p	[94]
Phasmida	Phasmatidae	<i>Baculum saussure</i> (Saussure)	p	[190]
Thysanoptera	Thripidae	<i>Selenothrips rubrocinctus</i> (Giard)	p	[66]
			p	[75]

†pest list appendix of Chinese literature

‡Not described in the literature

^IRecorded as *Amsacta lactinea* (Cramer)

^{II}Recorded as *Cnidocampa flavescens* (Walker)

^{III}Possible synonym of *Euproctis flava* (Bremer). According to the Chinese name it may be *Euproctis chrysorrhoea* (L.)

^{IV}Possibly *Euproctis similis* (Fuessly)

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- ^vRecorded as *Agrotis ypsilon* (Rottemberg)
^{vi}Recorded as *Parallelia stuposus* Fabricius
^{vii}Recorded as *Chalciope geometrica* Fabricius
^{viii}Recorded as *Gadirtha inexacta* Walker
^{ix}Recorded as *Cryptothelea minuscula* Butler
^xRecorded as *Cryptothelea variegata* Snellen
^{xi}Recorded as *Philosamia cynthia* Walker & Felder
^{xii}Recorded as *Philosamia cynthia walkeri* Felder & Felder
^{xiii}Recorded as *Philosamia cynthia ricina* Donovan

Setaria faberii

Giant foxtail

Introduction

The genus *Setaria* consists of approximately 130 species, occurring in tropical and temperate regions. Although some *Setaria* species thrive in Africa, additional species extend into the Arctic Circle. In China, 15 species, 3 subspecies, and 5 varieties have been recorded. Most members of the genus *Setaria* are of economically important^[156].

Taxonomy

- Order:** Graminales
- Suborder:** Gramineae
- Family:** Gramineae (Poaceae)
- Subfamily:** panicoideae A. Br.
- Tribe:** Paniceae R. Br.
- Subtribe:** Setariinae Dum.
- Genus:** *Setaria* Beauv.
- Section:** *Setaria*
- Species:** *Setaria faberii* Herrm.

Description

Setaria faberii is an annual grass with prop roots. The glabrous culm is rigid and erect, 50 to 120 cm in height and 6 mm in diameter. The sheath is loose with a ciliated margin, but glabrous and membranous at the base of the culm. The ligules are densely ciliate, 1-2 mm long.



Species of *Setaria* in China

Scientific Name	Scientific Name
<i>S. arenaria</i> Kitag.	<i>S. italica</i> (L.) Beauv.
<i>S. chondrachne</i> (Steud.) Honda	<i>S. pallidifusca</i> (Schumach.) Stapf et Hubb.†
<i>S. faberi</i> Herrm.	<i>S. palmifolia</i> (Koen.) Stapf
<i>S. forbesiana</i> (Nees) Hook. f.	<i>S. plicata</i> (Lam.) T. Cooke
<i>S. geniculata</i> (Lam.) Beauv.†	<i>S. verticillata</i> (L.) Beauv.
<i>S. glauca</i> (L.) Beauv.‡	<i>S. viridis</i> (L.) Beauv.
<i>S. guizhouensis</i> S. L. Chen et G. Y. Sheng	<i>S. yunnanensis</i> Keng et K. D. Yu ex Keng f. et Y. K. Ma
<i>S. intermedia</i> Roem. et Schult.	

†Listed as *S. parviflora* (Poir.) Kerguelen revised FOC^[188]

‡Listed as *S. palmifolia* (J. König) Stapf revised FOC^[188]

Leaves are linear lanceolate, 10-40 cm long and 5-20 mm wide, apex acuminate and base obtuse or attenuate, margin



serrate, glabrous or sparsely vesiculose on the upper surface, but rarely so on the under side. The inflorescences is dense a cylindrical panicle, 5 to 24 cm long, drooping, with densely pubescent rachis. The spikelets are elliptical, 3 mm long bearing 1-3 coarse, green to light purplish brown bristles 5-15 mm in length. The lower glume is broadly ovate and 3-veined with a tapering tip approximately 1/3-1/2 of the length of the spikelet. The upper glume is nearly 3/4 the length of the spikelet, tapering at the apex. The upper lemma is rugose. The lower lemma is membranous and lanceolate. The fruits appear from July to October^[156].

Habitat

S. faberii occurs on hill slopes, roadsides,

and in crop fields, orchards and wastelands^[156].

Distribution

Setaria faberi is reported to occur in Anhui, Guizhou, Guangxi, Heilongjiang, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Taiwan and Zhejiang^[156].

Economic Importance

The young leaves, culms and grains of some species are used for forage. It is sometimes planted for conservation of

soil and water and sand stabilization for embankment protection^[156].

Related Species

S. viridis (L.) Beauv. is often confused with *S. faberi*, but the latter has broader acute spikelets and a shorter upper glume clearly exposing the tip of the upper lemma while the upper glume of *S. viridis* almost completely covers the upper lemma and the spikelets are usually obtuse^[188]. *S. viridis* is a common weed occurring in crop fields,

wastelands and roadsides nationwide below 4000 m elevation^[156].

Natural Enemies of *Setaria*

Sixty three species of fungi have been recorded from members of the genus *Setaria* in China, but few are reported from *Setaria faberi*. Approximately 73 arthropods attack members of the genus *Setaria*, but few arthropod species attack *S. faberi*.

Fungi

Phylum	Family	Species	H. R.	Ref.	
Ascomycota	Glomerellaceae	<i>Glomerella graminicola</i> D.J. Politis	po	[26]I	
	Incertae sedis	<i>Khuskia oryzae</i> H.J. Huds.	po	[26]II	
		<i>Monographella nivalis</i> var. <i>nivalis</i>	po	[26]	
	Leptosphaeriaceae	<i>Leptosphaeria sacchari</i> Breda de Haan	po	[26]III	
	Magnaporthaceae	<i>Gaeumannomyces graminis</i> var. <i>graminis</i> (Sacc.) Arx & D.L. Olivier	po	[26]IV	
		<i>Magnaporthe grisea</i> (T.T. Hebert) M.E. Barr	po po	[26]V [210]V	
	Meliolaceae	<i>Meliola setariae</i> Hansf. & Deighton	po	[73]	
	Nectriaceae	<i>Gibberella acuminata</i> C. Booth	po	[26]VI	
		<i>Gibberella avenacea</i> R.J. Cook	po	[26]VII	
		<i>Gibberella intricans</i> Wollenw.	po	[26]VIII	
		<i>Gibberella moniliformis</i> Wineland	po	[26]IX	
		<i>Gibberella zeae</i> (Schwein.) Petch	po	[26]X	
	Phyllachoraceae	<i>Phyllachora graminis</i> var. <i>graminis</i> (Pers.) Fuckelel	po mo	[26]XI [26]XII	
		<i>Phyllachora setariicola</i> Speg.	po	[26]XIII	
			mo	[26]XIV	
	Pleosporaceae	<i>Cochliobolus miyabeanus</i> (S. Ito & Kurib.) Drechsler ex Dastur	oo	[26]	
		<i>Cochliobolus sativus</i> (S. Ito & Kurib.) Drechsler ex Dastur	po	[26]	
		<i>Cochliobolus setariae</i> (S. Ito & Kurib.) Drechsler ex Dastur	oo	[26]	
	Basidiomycota	Atheliaceae	<i>Athelia rolfsii</i> (Curzi) C.C. Tu & Kimbr.	po oo	[26]XV [26]XVI
				po	[26]XVII
Ceratobasidiaceae		<i>Thanatephorus cucumeris</i> (A.B. Frank) Donk	po	[26]XVII	
Pucciniaceae		<i>Puccinia graminis</i> Pers.	po	[26]	
		<i>Puccinia panici-montani</i> Fujik. ex Ramachar & Cummins	mo oo	[26] [170]	
		<i>Puccinia setariae-forbesianae</i> Tai	mo mo	[170] [26]	
		<i>Puccinia setariae-viridis</i> Dietel	mo	[26]	

Phylum	Family	Species	H. R.	Ref.	
		<i>Uromyces setariae-italicae</i> Yoshino	po	[26]XVIII	
			oo	[26]	
	Tilletiaceae	<i>Tilletia setariae</i> L. Ling	oo	[26]	
	Ustilaginaceae	<i>Macalpinomyces tanakae</i> (S. Ito) Vánky	oo	[64]XIX	
			<i>Ustilago crameri</i> Körn.	po	[26]
				o	[64]
			<i>Ustilago neglecta</i> Niessl	o	[64]
oo	[26]				
	<i>Ustilago syntherismae</i> (Schwein.) Peck	po	[26]		
		oo	[26]		
Oomycota	Pythiaceae	<i>Pythium aristosporum</i> Vanterp.	oo	[202]	
		<i>Pythium arrhenomanes</i> Drechsler	po	[202]	
		<i>Pythium monospermum</i> Pringsh.	po	[202]	
		<i>Pythium tardicrescens</i> Vanterp.	po	[202]	
	Sclerosporaceae	<i>Sclerospora graminicola</i> (Sacc.) J. Schröt.	oo	[26]	
			po	[202]	
Anamorphic Ascomycetes		<i>Ustilaginoidea setariae</i> Bref.	mo	[26]	
		<i>Ustilaginoidea virens</i> (Cooke) Takah.	p	[26]	
Anamorphic <i>Balansia</i>		<i>Ephelis japonica</i> Henn.	po	[26]	
Anamorphic <i>Gibberella</i>		<i>Fusarium compactum</i> (Wollenw.) W.L. Gordon	mo	[26]XX	
		<i>Fusarium concolor</i> Reinking	po	[26]	
		<i>Fusarium culmorum</i> (W.G. Sm.) Sacc.	po	[26]	
		<i>Fusarium diversisporum</i> Sherb.	po	[26]	
		<i>Fusarium heterosporum</i> Nees	po	[26]	
		<i>Fusarium nivale</i> (Fr.) Ces. var. <i>satariae</i> You et Lou	mo	[26]	
		<i>Fusarium orthoceras</i> var. <i>longius</i> (Sherb.) Wollenw.	po	[26]	
		<i>Fusarium poae</i> (Peck) Wollenw.	po	[26]	
		<i>Fusarium scirpi</i> var. <i>caudatum</i> (Wollenw.) Wollenw.	mo	[26]	
<i>Fusarium sporotrichioides</i> Sherb.	mo	[26]			
Anamorphic <i>Guignardia</i>		<i>Phyllosticta setariae</i> Ferraris	oo	[26]	
Anamorphic <i>Lewia</i>		<i>Alternaria alternata</i> (Fr.) Keissl.	po	[26]	
			po	[209]	
		<i>Alternaria setariae</i> T.Y. Zhang	mo	[209]	
Anamorphic <i>Magnaporthe</i>		<i>Pyricularia setariae</i> Y. Nisik.	po	[26]XXII	
			oo	[210]	
Anamorphic <i>Mycosphaerella</i>		<i>Cercospora fusimaculans</i> G.F. Atk	po	[65]XXI	
		<i>Cercospora fusimaculans</i> G.F. Atk.	po	[26]	
		<i>Cercospora setariae</i> G.F. Atk.	mo	[26]	
		<i>Cladosporium cladosporioides</i> (Fresen.) G.A. de Vries	po	[210]	
		<i>Cladosporium herbarum</i> (Pers.) Link	po	[210]	
		<i>Cladosporium herbarum</i> var. <i>lablab</i> Sacc.	mo	[26]	
Anamorphic Mycosphaerellaceae		<i>Ascochyta graminicola</i> Sacc.	po	[26]	
			po	[1]	
		<i>Ascochyta sorghi</i> Sacc.	po	[26]XXIII	
Anamorphic <i>Splanchnonema</i>		<i>Helminthosporium yamadae</i> Y. Nisik.	po	[26]	

Phylum	Family	Species	H. R.	Ref.
Anamorphic	<i>Tapesia</i>	<i>Ramulispora sorghicola</i> E. Harris	po	[26]
Anamorphic Uredinales		<i>Uredo panici-plicati</i> Sawada	oo	[26]
		<i>Uredo setariae-excurrentis</i> Y.C. Wang	mo	[26]

^IRecorded as *Colletotrichum graminicolum* (Ces.) Wils.

^{II}Recorded as *Nigrospora oryzae* (Berk. et Br.) Petch

^{III}Recorded as *Phyllosticta sorghina* Sacc.

^{IV}Recorded as *Gaeumannomyces graminis* (Sacc.) Arx et Olivier

^VRecorded as *Pyricularia grisea* (Cooke) Sacc.

^{VI}Recorded as *Fusarium scirpi* Lamb. et Fautr.

^{VII}Recorded as *Fusarium avenaceum* (Fr.) Sacc.

^{VIII}Recorded as *Fusarium equiseti* (Corda) Sacc.

^{IX}Recorded as *Fusarium moniliforme* Sheld.

^XRecorded as *Fusarium graminearum* Schw.

^{XI}Recorded as *Phyllachora graminis* (Pers.) Fuckel

^{XII}Recorded as *Phyllachora evanssi* Syd.

^{XIII}Recorded as *Phyllachora pazschkeana* Sdy.

^{XIV}Recorded as *Phyllachora vanderystii* Theiss. et Syd.

^{XV}Recorded as *Corticium centrifugum* (Lév.) Bres.

^{XVI}Recorded as *Sclerotium rolfsii* Sacc

^{XVII}Recorded as *Corticium sasakii* (Shirai) Matsum.

^{XVIII}Recorded as *Uromyces leptodermus* Syd.

^{XIX}Recorded as *Ustilago tanakae* S. Ito

^{XX}Recorded as *Fusarium scirpi* Lamb. et Fautr. var. *compactum* Wollenw

^{XXI}Recorded as *Piricularia setariae* Nishik.

^{XXII}Recorded as *Phaeoramularia fusimaculans* (Atk.) X. J. Liu & Y. L. Guo

^{XXIII}Recorded as *Mycosphaerella ceres* Sacc.

Arthropods

Order	Family	Species	H. R.	Ref.
Coleoptera	Chrysomelidae	<i>Apophyllia flavovirens</i> (Fairmaire)	po	[201]
			po	[75]
		<i>Chaetocnema basalis</i> (Baly)	po	[75]
			po	[201]
		<i>Chaetocnema hortensis</i> (Geoffroy)	po	[201]
			po	[75]
		<i>Chaetocnema ingenua</i> (Baly)	po	[201]
		<i>Hespera lomasa</i> Maulik	po	[165]
		<i>Sphaeroderma apicale</i> Baly	po	[201]
	Crioceridae	<i>Oulema atrosuturalis</i> (Pic)	po	[164]
<i>Oulema oryzae</i> (Kuwayama)		po	[164]	
<i>Oulema tristis</i> (Herbst)		po	[164]	
Curculionidae	<i>Stelorrhinoides freyi</i> (Zumpt)	po	[6]	
Hemiptera	Coreidae	<i>Aeschyntelus chinensis</i> Dallas	po	[207]
		<i>Aeschyntelus notatus</i> Hsiao	po	[207]
		<i>Cletus tenuis</i> Kiritschenko	p	[207]
		<i>Leptocoris chinensis</i> Dallas	po	[207]

Order	Family	Species	H. R.	Ref.
		<i>Leptocorisa lepida</i> Breddin	m	[208]
		<i>Leptocorisa varicornis</i> (Fabricius)	po	[207]
		<i>Liorhyssus hyalinus</i> (Fabricius)	po	[207]
		<i>Riptortus linearis</i> (Fabricius)	po	[207]
		<i>Riptortus pedestris</i> (Fabricius)	po	[207]
	Cydnidae	<i>Adrisa magna</i> Uhler	po	[207]
		<i>Stibaropus formosanus</i> Takado & Yamagihara	po	[207]
	Lygaeidae	<i>Cavelerius saccharivorus</i> (Okajima)	po	[207]
		<i>Nysius ericae</i> (Schilling)	po	[207]
		<i>Pachygrontha antennata</i> (Uhler)	po	[207]
	Miridae	<i>Trigonotylus ruficonis</i> Geoffroy	p	[207]
	Pentatomidae	<i>Dolycoris baccarum</i> (L.)	po	[207]
		<i>Euryaspis flavescens</i> Distant	po	[207]
		<i>Eysarcoris parvus</i> Uhler	po	[208]
		<i>Megarrhamphus hastatus</i> (Fabricius)	po	[207]
		<i>Nezara viridula</i> (L.)	po	[207]
		<i>Piezodorus rubrofasciatus</i> (Fabricius)	po	[207]
		<i>Rubiconia intermedia</i> (Wolff)	po	[207]
		<i>Scotinophara lurida</i> (Burmeister)	po	[207]
		<i>Stollia guttiger</i> (Thunberg)	po	[75]†
<i>Stollia ventralis</i> (Westwood)		po	[207]	
Homoptera	Aphididae	<i>Rhopalosiphum maidis</i> (Fitch)	p	[205]
		<i>Schizaphis graminum</i> (Rondani)	po	[178]
		<i>Schizaphis graminum</i> (Rondani)	p	[205]
	Cicadellidae	<i>Tettigoniella viridis</i> (L.)	po	[57]
	Cixiidae	<i>Oliarus apicalis</i> (Uhler)	po	[220]
	Derbidae	<i>Diostrombus politus</i> Uhler	po	[220]
Meenopliidae	<i>Nisia atrovonosa</i> (Lethierry)	po	[220]	
Lepidoptera	Crambidae	<i>Chilo auricilius</i> Dudgeon	po	[169]
		<i>Chilo suppressalis</i> (Walker)	po	[178]
		<i>Chilo suppressalis</i> (Walker)	po	[169]
		<i>Dichocrocis chlorophanta</i> Butler	po	[169]
		<i>Marasmia trapezalis</i> Guenée	po	[169]
		<i>Marasmia venialialis</i> Walker	po	[178]
		<i>Ostrinia nubilalis</i> (Hübner)	p	[169]
	Geometridae	<i>Culcula panterinaria</i> (Bremer & Grey)	po	[78]
	Hesperiidae	<i>Borbo cinnara</i> (Wallace)	po	[219]
		<i>Borbo cinnara</i> (Wallace)	po	[178]
		<i>Polytremis zina</i> (Eversman)	po	[178]
<i>Telicota ohara formosana</i> Fruhstorfer		po	[219]	
Noctuidae	<i>Agrotis trifurca</i> Eversmann	po	[166]	

Order	Family	Species	H. R.	Ref.	
		<i>Euxoa oberthuri</i> Leech	po	[166]	
		<i>Leucania venalba</i> Moore	po	[178]	
		<i>Pseudaletia separata</i> (Walker)	po	[178]II	
		<i>Sesamia inferens</i> (Walker)	po	[178]	
		<i>Spodoptera depravata</i> Butler	po	[166]III	
		<i>Xestia triangulum</i> (Hüfnagel)	po	[224]IV	
	Notodontidae	<i>Phalera flavescens</i> (Bremer & Grey)	po	[4]	
	Pyralidae	<i>Mampava bipunctella</i> Ragonot	po	[169]	
		<i>Proceras venosatum</i> (Walker)	po	[169]V	
	Saturniidae	<i>Attacus atlas</i> (L.)	p	[226]	
			po	[75]	
	Satyridae	<i>Melanitis phedima</i> Cramer	po	[219]	
		<i>Melanitis phedima polishana</i> Fruhstorfer	po	[219]	
		<i>Mycalesis francisca formosana</i> Fruhstorfer	po	[219]	
		<i>Mycalesis sangaica mara</i> Fruhstorfer	po	[219]	
		<i>Ypthima esakii</i> Shirôzu	po	[219]	
		<i>Ypthima formosana</i> Fruhstorfer	po	[219]	
			<i>Ypthima multistriata</i> Butler	po	[219]
	Thysanoptera	Phlaeothripidae	<i>Haplothrips aculeatus</i> (Fabricius)	po	[66]
				po	[75]
		Thripidae	<i>Anaphothrips sudanensis</i> Trybom	po	[75]
po				[75]	
po				[165]	
po				[165]	
		<i>Phibalothrips peringueyi</i> (Faure)	po	[165]	

^IRecorded as *Eysarcoris guttiger* Thunberg

^{II}Recorded as *Leucania separata* Walker

^{III}Recorded as *Sidemia depravata* Butler

^{IV}Recorded as *Agrotis triangulum* (Hüfnagel)

^VRecorded as *Proceras venosatum* (Walker)

Spiraea japonica

Japanese spiraea

Introduction

The genus *Spiraea* is comprised of approximately 100 species occurring in the mountainous areas of temperate and subtropical regions of the Northern hemisphere. At least 70 species have been recorded in China^[139].

Taxonomy

- Order:** Rosales
- Suborder:** Rosineae
- Family:** Rosaceae
- Subfamily:** Spiraeoideae
- Genus:** *Spiraea* L.
- Section:** Calospira K. Koch
- Series:** Japonicae Yü
- Species:** *Spiraea japonica* L. f.

Description

Spiraea japonica is an upright shrub that can grow to 1.5 m in height. The slender branchlets are subcylindrical, glabrous and pubescent when young, giving a spreading appearance. Leaf blade, incised bidentate or dentate margined, is ovate to ovoid elliptic, 2-8 cm long and 1 to 3 cm broad, with an abrupt to shortly acuminate apex and a cuneate base. The upper surface is dark green, glabrous or puberulous along the veins, the underside is lighter in color or glaucous and pubescent along the veins. The petiole, about 1-3 mm long, is also pubescent. In June through July, pubescent flowers, about 4-7 mm in diameter, bloom densely in the erect, compound corymb arising from the apex of the annual shoot. Bracts are



lanceolate to linear lanceolate and puberulous on the underside. Calyx is campanulate, pubescent inside and sparsely so outside. The pubescent sepals are triangular with an abrupt apex. The petals, much shorter than stamens and pink in color, are ovate to orbicular, and obtuse apically, with a length of 2.5-3.5 mm and a width of 2-3 mm. ^[139, 199].

Habitat and Distribution

Native to Japan and Korea, *S. japonicaca* is cultivated nationwide throughout China as an ornamental ^[139].

Related Species

S. japonica is highly variable. There are eight varieties reported in China^[139, 199].

- 1) *S. japonica* L. f. var. *acuta* Yü occurs in mixed forests and grassy slopes in western Yunnan province at elevations of 2500-2700 m.
- 2) *S. japonica* L. f. var. *acuminata* Franch. occurs in sparsely or densely mixed forests, ravines, riversides and grassy slopes at elevations of 950-4000 m, in Anhui, Gansu, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangxi, Shaanxi, Yunnan and Zhejiang provinces.

3) *S. japonica* L. f. var. *incisa* Yü occurs in prairie thickets at elevations of 3200-4000 m, in Sichuan and Yunnan provinces.

4) *S. japonica* L. f. var. *ovalifolia* Franch. occurs on rocky slopes, forest edges or ravines at elevations of 2500-3800 m, in Sichuan and Yunnan provinces.

5) *S. japonica* L. f. var. *fortunei* (Planchon) Rehd. occurs hilly slopes, croplands, or mixed forests at elevations of 700-3000 m, in Anhui, Guizhou, Hubei, Jiangsu, Jiangxi, Shaanxi, Shandong, Sichuan, Yunnan, and Zhejiang provinces.

6) *S. japonica* L. f. var. *glabra* (Regel) Koidz. occurs on rocky land, forests, or forest edges at elevations of 1600-1900m, in Anhui, Sichuan, Yunnan and Zhejiang provinces.

7) *S. japonica* var. *pinnatifida* T. T. Yu & L. T. Lu occurs on slopes in mixed forests; at elevations of about 2900 m in Xizang province.

Natural Enemies of *Spiraea*

Seven fungal species and twenty-seven arthropods have been recorded from members of the genus *Spiraea*. Few natural enemies are recorded for *S. japonica*.



Species of *Spiraea* in China

Scientific Name	Scientific Name
<i>S. alpina</i> Pall.	<i>S. miyabei</i> Koidz.
<i>S. anomala</i> Bata.*	<i>S. mollifolia</i> Rehd.
<i>S. aquilegifolia</i> Pallas	<i>S. mongolica</i> Maxim.
<i>S. arcuata</i> Hook.	<i>S. morrisonicola</i> Hayata
<i>S. bella</i> Sims	<i>S. muliensis</i> T. T. Yu & L. T. Lu*
<i>S. blumei</i>	<i>S. myrtilloides</i> Rehd.
<i>S. calcicola</i> W. W. Smith	<i>S. ningshiaensis</i> T. T. Yu & L. T. Lu*
<i>S. canescens</i> D. Don	<i>S. nishimurae</i> Kitag.
<i>S. cantoniensis</i> Lour.	<i>S. ovalis</i> Rehd.
<i>S. cavaleriei</i> H. Lév.*	<i>S. papillosa</i> Rehd.
<i>S. chamaedryfolia</i> L.	<i>S. prostrata</i> Maxim.
<i>S. chinensis</i> Maxim.	<i>S. prunifolia</i> Sieb. & Zucc.
<i>S. compsophylla</i> Hand.-Mazz.	<i>S. pubescens</i> Turcz.
<i>S. dahurica</i> Maxim.	<i>S. purpurea</i> Hand.-Mazz.
<i>S. daochengensis</i> L. T. Lu*	<i>S. rosthornii</i> Pritz.
<i>S. dasyantha</i> Bge.	<i>S. salicifolia</i> L.
<i>S. elegans</i> Pojark.	<i>S. sargentiana</i> Rehd.
<i>S. flexuosa</i> Fisch. ex Cambess.	<i>S. schneideriana</i> Rehd.
<i>S. formosana</i> Hayata	<i>S. schochiana</i> Rehd.
<i>S. fritschiana</i> Schneid.	<i>S. sericea</i> Turcz.
<i>S. hailarensis</i> Liou	<i>S. siccanea</i> (W. W. Smith) Rehd.
<i>S. hayatana</i> H. L. Li*	<i>S. sublobata</i> Hand.-Mazz.
<i>S. henryi</i> Hemsl.	<i>S. tarokoensis</i> Hayata
<i>S. hingshanensis</i> T. T. Yu & L. T. Lu*	<i>S. teniana</i>
<i>S. hirsuta</i> (Hemsl.) Schneid.	<i>S. teretiuscula</i> C. K. Schneider*
<i>S. hypericifolia</i> L.	<i>S. thunbergii</i> Sieb. ex Blume
<i>S. japonica</i> L. f.	<i>S. trichocarpa</i> Nakai
<i>S. kwangsiensis</i> Yü	<i>S. trilobata</i> L.
<i>S. kweichowensis</i> T. T. Yu & L. T. Lu*	<i>S. uratensis</i> Franch.
<i>S. laeta</i> Rehd.	<i>S. vanhouttei</i> (Briot) Zabel
<i>S. lichiangensis</i> W. W. Smith	<i>S. veitchii</i> Hemsl.
<i>S. lobulata</i> T. T. Yu & L. T. Lu*	<i>S. velutina</i> Franch.
<i>S. longigemmis</i> Maxim.	<i>S. wilsonii</i> Duthie
<i>S. martinii</i> Lév.	<i>S. Tibetensis</i> L. T. Lu*
<i>S. media</i> Schmidt	<i>S. yunnanensis</i> Franch.

* Not listed in FRPS^[199]

Fungi

Phylum	Family	Species	H. R.	Ref
Ascomycota	Erysiphaceae	<i>Podosphaera clandestina</i> var. <i>clandestina</i> (Wallr.) Lév.	oo	[24]
			o	[24]I
			po	[26]II
Anamorphic <i>Botryosphaeria</i>		<i>Diplodia spiraeae</i> Thüm.	mo	[26]

Phylum	Family	Species	H. R.	Ref
Anamorphic	<i>Leptosphaeria</i>	<i>Coniothyrium spiraeae</i> Miyake	mo	[26]
Anamorphic	<i>Mycosphaerella</i>	<i>Cercospora spiraeae</i> Thüm.	m	[26]
		<i>Cladosporium herbarum</i> (Pers.) Link	po	[210]
		<i>Cladosporium nodulosum</i> Corda	mo	[26]
			mo	[210]
		<i>Pseudocercospora spiraeicola</i> (A.S. Mull. & Chupp) X.J. Liu & Y.L. Guo	po	[129]

¹Recorded as *Podosphaera minor* Hacke

²Recorded as *Podosphora oxyacanthae* (DC.) de Bary

Arthropods

Order	Family	Species	H. R.	Ref.	
Acariformes	Eriophyidae	<i>Eptrimerus spiraeae</i> Kuang	mo	[90]	
Coleoptera	Cerambycidae	<i>Xylotrechus robusticollis</i> (Pic)	po	[150]	
	Chrysomelidae	<i>Stenoluperus flavipes</i> Chen	po	[165]	
Hemiptera	Acanthosomatidae	<i>Elasmucha dorsalis</i> (Jakovlev)	po	[208]	
	Pentatomidae	<i>Sepontia variolosa</i> (Walker)	mo	[207]	
po			[75]		
Homoptera	Aphididae	<i>Aphis citricola</i> van der Goot	p	[205]	
	Psyllidae	<i>Cyamophila</i> sp.	po	[165]	
			m	[160]	
Lepidoptera	Gelechiidae	<i>Compsolechia metagramma</i> Meyrick	mo	[78]	
	Hesperiidae	<i>Pyrgus darwazicus</i> Kauffmann	mo	[25]	
	Lycaenidae	<i>Acytolepis puspa myla</i> (Fruhstorfer)	po	[219]	
	Noctuidae	<i>Orthosia gracilis</i> (Denis & Schiffermüller)	po	[15]	
	Nymphalidae		<i>Brenthis ino</i> (Rottemburg)	po	[219]
			<i>Limenitis sydyi</i> Lederer	oo	[178]
			<i>Neptis pryeri</i> Butler	oo	[178]
			<i>Neptis pryeri jucundita</i> Fruhstorfer	oo	[219]
	Saturniidae	<i>Neoris haraldi</i> Schawerda	po	[226]	
	Tortricidae		<i>Acleris latifasciana</i> (Haworth)	po	[133]
				po	[78]
			<i>Acleris shepherdana</i> (Stephens)	po	[133]
			<i>Clepsis pallidana</i> (Fabricius)	po	[133]
			<i>Epinotia contrariana</i> (Christoph)	po	[133]
			<i>Olethreutes siderana</i> (Treitschke)	po	[133]
<i>Pandemis dumetana</i> Treitschke			po	[78]	
			po	[166]	
	<i>Pandemis heparana</i> (Denis & Schiffermüller)	po	[133]		

Order	Family	Species	H. R.	Ref.
Thysanoptera	Aeolothripidae	<i>Aeolothrips melaleucus</i> (Haliday)	po	[66]
	Phlaeothripidae	<i>Haplothrips chinensis</i> Priesner	po	[75]
			po	[165]
	Thripidae	<i>Frankliniella intonsa</i> (Trybom)	po	[66]
<i>Thrips flavidulus</i> Bagnall		po	[66]	

*Recorded as *Clepsis (Siclobola) strigana* (Hübner)

Stellaria media

Common chickweed

Introduction

The genus *Stellaria* contains approximately 190 species, occurring primarily in the temperate regions. Sixty-four species have been reported in China^[12].

Taxonomy

- Order:** Centrospermae
- Suborder:** Caryophyllineae
- Family:** Caryophyllaceae
- Subfamily:** Alsinoideae Vierh.
- Tribe:** Alsineae Pax
- Subtribe:** Stellarinae Aschers. et Graebn.
- Genus:** *Stellaria* L.
- Section:** *Stellaria*
- Subsection:** *Stellaria*
- Series:** *Petiolares* Fenal
- Species:** *Stellaria media* (L.) Cyr.

Description

Stellaria media is an annual or biennial herb that can reach 10-30 cm in height. The stem is light purplish red with one or two rows of hairs on the surface, and procumbent or erect branches at the base. Leaves are broad ovate or ovate, margin entire, 1.5-2.5 cm long and 1-1.5 cm wide, with acuminate or abrupt



apex and attenuate or subcordate base, lower leaf is petioled. The inflorescence is a terminal cyme. The sepals are, ovate lanceolate, about 4 mm in length, slightly obtuse or suborbicular apically and covered with short glandular hairs outside. Shorter than sepals, each petal is white, oblong, nearly bisected. Shorter than petals, stamens are 3-5 with 3 linear styles. Slightly longer than the persistent calyx, capsules are ovate, 6-lobed apically. The flowers bloom from June to July and followed by fruits in July through August. The plentiful seeds are reddish brown, ovate to suborbicular, nearly compressed, 1-1.2 mm in diameter^[12, 187].

Habitat

Stellaria media most often occurs in moist croplands, along roadsides, or in grasslands near streams^[39].

Distribution

Stellaria media occurs in Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Inner Mongolia, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Xizang, Yunnan, and Zhejiang provinces^[12, 187].

Economic Importance

Although the stems, leaves and seeds of *S. media* are reported to be medically useful and edible, *S. media* is a bothersome weed during the early through middle

stage of crop growth of wheat, rape and some vegetables. It is also poisonous to poultry^[39, 108, 187].

Related Species

S. media var. *micrantha* (Hayata) T. S. Liu & S. S. Ying, native to Taiwan, is a perennial herb. Its petals are nearly equal to sepals, which are 2-2.5 mm long, whereas *S. media* var. *media* has longer sepals and shorter petals^[12]. *S. media* and five additional members of the genus *Stellaria* are regarded as unwelcome plants in China. They are *S. alsine* Grimm, *S. pallida* (Dumortier) Crépin, *S. dichotoma* L., *S. discolor* Turcz., and *S. neglecta* Weihe ex Bluff et Fingerh^[108].

Natural Enemies of Stellaria

Eleven fungi and eighteen arthropods have been found on the members of the genus *Stellaria*. Four fungal species are reported to infect *S. media*. One out of seven insects that attack *S. media*, *Hypera basalis* (Voss) is considered to be a potential biological control agent^[116].

Species of *Stellaria* in China^[12, 187]

Scientific Name	Scientific Name
<i>S. alaschanica</i> Y. Z. Zhao	<i>S. media</i> (L.) Cyr.
<i>S. alsine</i> Grimm ^I	<i>S. monosperma</i> Buch.-Ham. ex D. Don
<i>S. amblyosepala</i> Schrenk	<i>S. neglecta</i> Weihe ex Bluff et Fingerh.
<i>S. arenarioides</i> Shi L. Chen et al. ^{II}	<i>S. nemorum</i> L.
<i>S. arisanensis</i> (Hayata) Hayata	<i>S. nepalensis</i> Majumdar et Vartak
<i>S. bistyla</i> Y. Z. Zhao [†]	<i>S. nipponica</i> Ohwi
<i>S. brachypetala</i> Bge.	<i>S. omeiensis</i> C. Y. Wu et Y. W. Tsui ex P. Ke
<i>S. bungeana</i> Fenzl	<i>S. ovatifolia</i> (Mizushima) Mizushima
<i>S. cherleriae</i> (Fisch. ex Ser.) Williams	<i>S. oxycoccoides</i> Kom.
<i>S. chinensis</i> Regel	<i>S. pallida</i> (Dumortier) Crépin ^{III}
<i>S. congestiflora</i> Hara	<i>S. palustris</i> Ehrh. ex Retz.
<i>S. crassifolia</i> Ehrh.	<i>S. parvumbellata</i> Y. Z. Zhao
<i>S. decumbens</i> Edgew.	<i>S. patens</i> D. Don
<i>S. delavayi</i> Franch.	<i>S. petiolaris</i> Hand.-Mazz.
<i>S. depressa</i> E. Schmid	<i>S. petraea</i> Bge.
<i>S. dianthifolia</i> Williams	<i>S. pilosoides</i> Shi L. Chen et al. ^{IV}
<i>S. dichotoma</i> L.	<i>S. pusilla</i> E. Schmid
<i>S. discolor</i> Turcz.	<i>S. radians</i> L.
<i>S. ebracteata</i> Kom.	<i>S. reticulivena</i> Hayata
<i>S. filicaulis</i> Makino	<i>S. salicifolia</i> Y. W. Tsui ex P. Ke
<i>S. graminea</i> L.	<i>S. soongorica</i> Roshev.
<i>S. gyantseensis</i> Williams	<i>S. souliei</i> Williams
<i>S. gyirongensis</i> L. H. Zhou	<i>S. strongylosepala</i> Handel-Mazzetti [†]
<i>S. henryi</i> Williams	<i>S. subumbellata</i> Edgew.
<i>S. imbricata</i> Bge.	<i>S. Tibetica</i> Kurz
<i>S. infracta</i> Maxim.	<i>S. uda</i> Williams
<i>S. irrigua</i> Bge.	<i>S. umbellata</i> Turcz.
<i>S. lanata</i> Hook. f. ex Edgew. et Hook. f.	<i>S. vestita</i> Kurz
<i>S. lanipes</i> C. Y. Wu et H. Chuang	<i>S. winkleri</i> (Briq.) Schischk.
<i>S. longifolia</i> Muehl. ex Willd.	<i>S. wushanensis</i> Williams
<i>S. mainlingensis</i> L. H. Zhou	<i>S. yunnanensis</i> Franch.
<i>S. martjanovii</i> Krylov	<i>S. zangnanensis</i> L. H. Zhou

† Not listed in *FRPS*

^I Recorded as *S. uliginosa* Murr. in *FRPS*

^{II} Recorded as *S. arenaria* Maxim. in *FRPS*

^{III} Recorded as *S. apetala* Ucria ex Roem. in *FRPS*

^{IV} Recorded as *S. pilosa* Franch. in *FRPS*

Fungi

Phylum	Family	Species	H. R.	Ref.
Ascomycota	Sclerotiniaceae	<i>Sclerotinia sclerotiorum</i> (Lib.) de Bary	p	[26]
Basidiomycota	Pucciniaceae	<i>Puccinia arenariae</i> (Schumach.) J. Schröt.	po	[26]
		<i>Puccinia stellariicola</i> Cummins	p	[229]
		<i>Uromyces inaequalis</i> Lasch ex Rabenh.	oo	[26]
			po	[26]

Phylum	Family	Species	H. R.	Ref.
		<i>Uromyces leptaleus</i> Syd.	oo	[26]
Oomycota	Peronosporaceae	<i>Peronospora alsinearum</i> Casp.	m	[26]
			o	[202]
		<i>Peronospora media</i> Gäum.	m	[26]
		<i>Peronospora parva</i> Gäum.	oo	[202]
		<i>Peronospora stellariae-radiantis</i> Sawada	oo	[202]
		<i>Peronospora stellariae-uliginosae</i> Sawada	mo	[26]
oo	[202]			
Anamorphic <i>Mycosphaerella</i>		<i>Septoria paraphysoides</i> Spag.	oo	[26]

Arthropods

Order	Family	Species	H. R.	Ref.	
Acariformes	Tetranychidae	<i>Tetranychus cinnabarinus</i> (Boisduval)	po	[167]	
Coleoptera	Curculionidae	<i>Hypera basalis</i> (Voss)	m	[116]	
Hymenoptera	Tenthredinidae	<i>Rhogogaster viridis</i> (L.)	po	[166]	
Lepidoptera	Geometridae	<i>Euphyia cineraria</i> (Butler)	m	[195]	
			m	[189]	
		<i>Euphyia unangulata</i> (Haworth)	m	[195]	
		<i>Euphyia unangulata gracilaria</i> (Bang-Haas)	m	[189]	
			<i>Sterrhia rufaria</i> Hübner	m	[25]
	Noctuidae		<i>Agrotis exclamationis</i> (L.)	po	[166]
			<i>Amathes triangulum</i> Hüfnagel	po	[166]
			<i>Apamea characteria</i> (Denis & Schiffermüller)	po	[15]I
				po	[228]II
			<i>Axylia putris</i> (L.)	po	[178]
				po	[11]
				po	[181]II
			<i>Euxoa tritici</i> (L.)	p	[25]
			<i>Hoplodrina alsines</i> (Brahm)	po	[15]III
				po	[166]III
			<i>Hoplodrina blanda</i> (Denis & Schiffermüller)	po	[15]IV
			<i>Lacanobia w-latinum</i> (Hüfnagel)	po	[25]V
			<i>Polia illoba</i> (Butler)	p	[228]
			<i>Xestia c-nigrum</i> (L.)	p	[166]VI
			<i>Xestia triangulum</i> (Hüfnagel)	po	[178]VII
po				[224]VII	
po	[11]VII				
	po	[181]VII			

^IRecorded as *Apamea hepatica* (L.)

^{II}Recorded as *Agrotis putris* (L.)

^{III}Recorded as *Athetis alsines* (Brahm)

^{IV}Recorded as *Athetis blanda* (Schiffermüller)

^VRecorded as *Recorded as Polia w-latinum* Hüfnagel

^{VI}Recorded as *Amathes c-nigrum* L.

^{VII}Recorded as *Agrotis triangulum* (Hüfnagel)

Tamarix species

Salt Cedar, Tamarisk

Introduction

The genus *Tamarix* contains approximately 90 species worldwide, primarily in Asia and North Africa, as well as the arid and semi-arid areas of Europe. Distribution ranges from 10°W to 145°E, and 50° through 20°N in the Northern hemisphere, and 55° through 12°S in the Southern hemisphere. Members of the genus are tolerant to dry, saline, hot conditions, with a preference for sand and water^[206].

I. *Tamarix chinensis*

Five stamen Tamarisk, Salt Cedar

Taxonomy

Order: Violales

Suborder: Tamaricineae

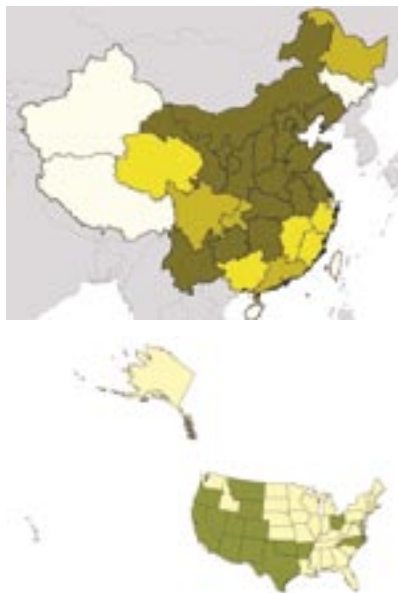
Family: Tamaricaceae

Genus: *Tamarix* L.

Species: *Tamarix chinensis* Lour.

Description

Tamarix chinensis is a deciduous shrub or small tree 3-6 m tall. The branches are purplish red, dark red or light brown; and thin, slender and weeping when



Species of *Tamarix* in China^[206]

Scientific Name	Scientific Name
<i>T. tenuissima</i> Nakai	<i>T. hohenackeri</i> Bunge
<i>T. androssowii</i> Litw.	<i>T. jintaenia</i> P. Y. Zhang et M. T. Liu
<i>T. aphylla</i> (L.) Karst.	<i>T. karelinii</i> Bunge
<i>T. arceuthoides</i> Bunge	<i>T. laxa</i> Willd.
<i>T. austromongolica</i> Nakai	<i>T. leptostachys</i> Bunge
<i>T. chinensis</i> Lour.	<i>T. mongolica</i> Niedenzu
<i>T. elongata</i> Ledeb.	<i>T. ramosissima</i> Ledeb.
<i>T. gansuensis</i> H. Z. Zhang	<i>T. sachuensis</i> P. Y. Zhang et M. T. Liu
<i>T. gracilis</i> Willd.	<i>T. taklamakanensis</i> M. T. Liu
<i>T. hispida</i> Willd.	<i>T. tarimensis</i> P. Y. Zhang et M. T. Liu

young. The leaves are subulate or ovate lanceolate, 1-3 mm long, and scale-like on the underside. The inflorescence is a panicle at the end of the shoot. Flower stalks are slender. Bracts are oblong, or linear chisel shaped, and inflated at the base. The sepals are 5-numbered, narrowly ovate, and shorter than purplish petals, which are also 5-numbered, and persistent when fruited. The floral disc is purplish, and has 5 or 10 lobes, between which stamens occur in 5s and are longer than the petals. The ovary is cylindrical with 3 rod-shaped styles. The fruit is a capsule about 3.5 mm in length. The flowers appear in April followed by fruits in late summer through October^[206].

Habitat

T. chinensis occurs in alluvial plains, seashores, flood plains, and other moist and saline areas^[206]. Additional habitats include streamsides and roadsides at elevations of 1910-2500 m in Yunnan province, southwestern China^[14], valleys, and hillside slopes at elevations of 900 m in Shanxi province, northern China^[47], at 500 m in the Shenlongjia Mountain area, and Hubei province of central China^[54].

Distribution

T. chinensis is native to Anhui, Hebei, Henan, Jiangsu, Liaoning, and Shandong provinces. It is planted in areas of eastern and southwestern China^[206] extending to Guangdong, Guangxi and Yunnan^[85]. Recently published provincial floras indicate that *T. chinensis* may also occur in Gansu, Hubei^[54], Hunan^[151], Inner Mongolia^[144], Ningxia^[142], Shanxi^[47], Yunnan^[14], cultivated in Fujian^[41], Guangxi^[63], Jiangxi^[42], Qinghai^[127], Shaanxi^[82], Zhejiang^[153], and probably Guangdong^[85], Heilongjiang^[157], and Sichuan^[85].

Economic Importance

T. chinensis, is cultivated for soil stabilization and as an ornamental. The young shoots, leaves, and flowers are used medicinally^[14].

II. *Tamarix ramosissima*

Taxonomy

Order Violales

Suborder Tamaricineae

Family Tamaricaceae

Genus *Tamarix* L.

Species *Tamarix ramosissima* Ledeb.

Description

Tamarix ramosissima is a shrub or small tree 1-3 m tall. The stems and older bark are dark gray. The annual lignified vegetable shoots are erect, slender, multi-stemmed, light red or orange yellow color, which fades on the biennial shoot. Leaves on the lignified shoot are lanceolate, and half perfoliate, while the leaves of the green vegetative shoots are subovate, or triangular-cordate, 2-5 mm long, acuminate at the apex, and nearly perfoliate. The raceme inflorescence, 3-3.5 cm long and 3-5 mm wide, appears at the apex of the annual shoot in a panicle arrangement 0.2-1 cm in length. The bract is lanceolate, 1.5-2 mm long, and equal to or longer than the calyx, petals are pink to purple, obovate to broadly so, and persistent when in fruit. The sepals are broadly elliptic, or ovate, 0.5-1 mm long. Flowers are 5-numbered. The floral disc is five-lobed, equal to or 2.5 times the length of the corolla. The fruit is a conical capsule, 3-4 times longer than calyx. The flowers and fruits appear from May through September^[47].



Xinjiang,^[9, 47, 206] and probably Beijing and western Tibet^[18, 67, 186, 206].

was already imported and released in the western United States^[27].

Economic Importance

T. ramosissima is cultivated in arid areas for soil stabilization and reforestation. It is sometimes planted as an ornamental and as sheep and cattle forage. However, it is regarded as a weed when it appears in crop fields and irrigation areas^[206].



Natural Enemies of *Tamarix*

At least two fungal species and eight arthropods have been recorded as associated with *Tamarix*. *Alternaria tamaricis* T. Y. Zhang, *Liocleonus clathratus* (Olivier), *Cryptocephalus astracanicus* Suffrian, and *Stylosomus tamaricis* Herrich-Schäffer are recorded hosted by *T. Chinensis*. Meng et al reported 105 species in 29 families of 7 orders resulted from the surveys on *Tamarix* species in Xinjiang^[146]. *Diorhabda elongata deserticola* Chen, a leaf beetle specific to *tamarix* spp,



Habitat

T. ramosissima occurs on hillside slopes, along stream banks and stream beds at elevations of 770-1470 m in Shanxi^[47], 2700-2950 m in Qinghai^[127], salt marshes, floodplains, sandy areas in Shandong^[9], wetland and swamp interface in Ningxia^[142], dry riverbeds in Inner Mongolia^[144].

Distribution

T. ramosissima occurs in the provinces of Gansu, Inner Mongolia, Ningxia, northern Shandong, Shanxi, Qinghai,

Fungi

Phylum	Family	Species	H. R.	Ref.
Basidiomycota	Incertae sedis	<i>Inonotus rheades</i> (Pers.) Bondartsev & Singer	po	[26]
Anamorphic <i>Lewia</i>		<i>Alternaria tamaricis</i> T. Y. Zhang	m	[209]

Arthropods

Order	Family	Species	H. R.	Ref
Coleoptera	Chrysomelidae	<i>Diorhabda elongata deserticola</i> Chen	oo	[173]†
	Curculionidae	<i>Liocleonus clathratus</i> (Olivier)	m	[6]
	Eumolpidae	<i>Cryptocephalus astracanicus</i> Suffrian	m	[164]
		<i>Stylosomus tamaricis</i> Herrich-Schäffer	m	[164]
Hemiptera	Pentatomidae	<i>Desertomenida quadrimaculata</i> (Horvath)	oo	[208]
Homoptera	Coccidae	<i>Ceroplastes rubens</i> Maskell	po	[173]
Lepidoptera	Lymantriidae	<i>Teia ericae</i> Germar	po	[212]‡
			po	[213]
	Pyralidae	<i>Cryptoblabes gnidiella</i> (Millière)	po	[169]

†Recorded as *Diorhabda deserticola* Chen

‡Recorded as *Orgyia ericae* Gremer

Taxus cuspidata

Japanese yew

Introduction

The genus *Taxus* contains 9 species occurring primarily in the Northern hemisphere. Three of these species occur in China^[50].

Taxonomy

Order: Taxales

Family: Taxaceae

Tribe: Taxeae Milchior et Werd.

Genus: *Taxus* L.

Species: *Taxus cuspidata* Sieb. et Zucc.

Description

Taxus cuspidata is tree approximately 20 m in height and 1 m in diameter. The bark is reddish brown with shallow cracks on the surface. Branches are dense, in a spreading or ascending growth form. Bud scales persist in the branchlets. Annual branchlets are green, turning reddish brown in the fall. The biennial and triennial branchlets are reddish brown or yellowish brown. The scales of the yellowish brown winter buds are acuminate in the apex and longitudinally ridged on the back. Leaves grow irregularly in two rows about 45 degrees to each other along the stems. The leaves are linear, straight or slightly falcate, 1-2.5 (occasionally 4) cm long and 2.5-3 mm wide, with a narrow base, mucronate apex and short petiole. The upper surface of the leaf is dark green, and shiny, while the underside has two rows of grayish green becoming yellowish brown stomata, which are two-third the width of the leaf. Each male cone has 9-14 microsporophylls (stamens), with 5-8 anthers each. Seeds are purplish red, shiny, ovoid, about 6 mm long, with 3-4 obtuse ridges near the top. Flowers appear from May to June, and seeds ripen in September

Fungi

Phylum	Family	Species	H. R.	Ref.
Anamorphic Botryosphaeria		<i>Macrophoma taxi</i> (Berk.) Berl. & Voglino	m	[26]



Species of *Taxus* in China

Scientific Name	Scientific Name
<i>T. cuspidata</i> Sieb. et Zucc.	<i>T. wallichiana</i> Zucc.‡
<i>T. fauna</i> Nan Li et R. R. Mill†	

† Recorded in *FRPS* as *T. wallichiana* Zucc.

‡ *Taxus wallichiana* var. *chinensis* (Pilger) Florin is recorded in *FRPS* as *T. chinensis* (Pilger) Rehd.; *T. wallichiana* var. *wallichiana* is recorded in *FRPS* as *T. yunnanensis* Cheng et L. K. Fu.

through October^[215].

Habitat

T. cuspidata occurs on acidic soils in cold, humid habitats, at elevations of 500–1000 m^[50, 215].

Distribution

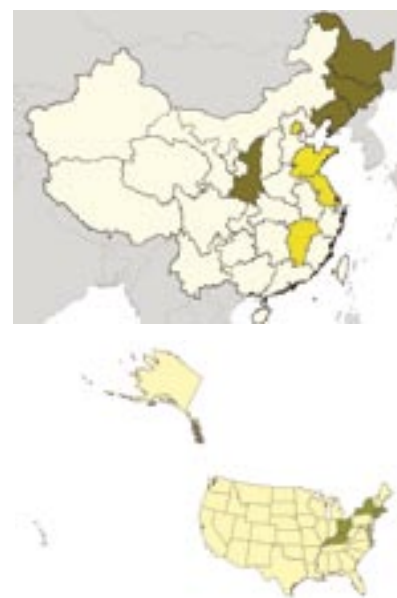
T. cuspidata occurs in Heilongjiang, eastern Jilin, Liaoning, and Shaanx provinces^[50]. It is also reportedly cultivated in Beijing, and Jiangsu, Jiangxi, Shandong, and Shanghai provinces^[67, 215].

Economic Importance

The wood of *T. cuspidata* is used in construction and furniture making. It is also the source of a red dye. The seed is used as an oil source and other parts of the plant contain chemical compounds used in medicine^[215].

Natural Enemies of *Taxus*

Only one species of fungi has been recorded from *T. cuspidata*^[215].



Tribulus terrestris

Puncture vine

Introduction

The genus *Tribulus* contains 20 species worldwide, primarily occurring in tropical and subtropical regions. In China, only 2 species have been recorded^[132].

Species of *Tribulus* in China

Scientific Name
<i>T. terrestris</i> L.*
<i>T. cistoides</i> L.

*Recorded as *T. terrester* L. in *FRPS*

Taxonomy

Order: Geraniales

Suborder: Geraniineae

Family: Zygophyllaceae

Genus: *Tribulus* L.

Species: *Tribulus terrestris* L.
(=*Tribulus terrester* L.)

Description

Tribulus terrestris is an herbaceous annual, with glabrous, villous or hirsute, procumbent stems that are 20-60 cm in length. Leaves are parapinnately compound 1.5-5 cm long with 3-8 pairs of opposite leaflets for each. Each leaf is oblong or asymmetrical, 5-10 mm long and 2-5 mm wide, acute or obtuse apically, slightly asymmetrical basally, and an entire margin. Axillary yellow flowers have a pedicel shorter than the leaf. Both petals and persistent calyxes are 5-numbered. Ten stamens occur at the base of the floral disc which also bears scale-like glands. The ovary has 5 ridges, and a 5-lobed stigma, with 3-4 ovules in each loculus. Flowers appear from May through August,



and fruit July through September. Fruits are stiff, glabrous or hairy, 4-6 mm long, with 2 spines in the middle of fruit margin. The fruits is a 5 part mericarp^[132].

Habitat

Tribulus terrestris occurs in sandy areas, waste land, hillside slopes, as well as residential areas^[132].

Distribution

Tribulus terrestris has a nationwide distribution in China^[132].

Economic Importance

Tribulus terrestris can be used as forage while green. Fruits are medically useful. It is a common pest plant in the pasture^[132] and causes damage to cotton, pulse, root and tuber crops and other crops and vegetables^[39].

Related Species

Tribulus cistoides has a pedicel nearly equal to the leaf in length and a larger flower with a diameter of about 3 cm, whereas *T. terrestris* is 1 cm in diameter. *T. cistoides* occurs along coastal beaches

and sparse forests in Hainan, and the hot, dry valleys in Yunnan^[132].

Natural Enemies of *Tribulus*

One species of fungi and one arthropod have been found to be associated with *Tribulus terrestris*.



Fungi

Phylum	Family	Species	H. R.	Ref.
Oomycota	Peronosporaceae	<i>Peronospora tribulina</i> Pass.	m	[202]

Arthropods

Order	Family	Species	H. R.	Ref.
Acariformes	Tetranychidae	<i>Tetranychus truncatus</i> Ehara	p	[106]

Ulmus pumila

Siberian elm

Introduction

The genus *Ulmus* contains approximately 30 species in North America, Asia and Europe. More than 20 of these species occur nationwide in China, although most species occur north of the Yangtze River. Because of their high economic value, many *Ulmus* species are cultivated outside of their native range^[49, 51]

Taxonomy

Order: Urticales

Family: Ulmaceae

Genus: *Ulmus* L.

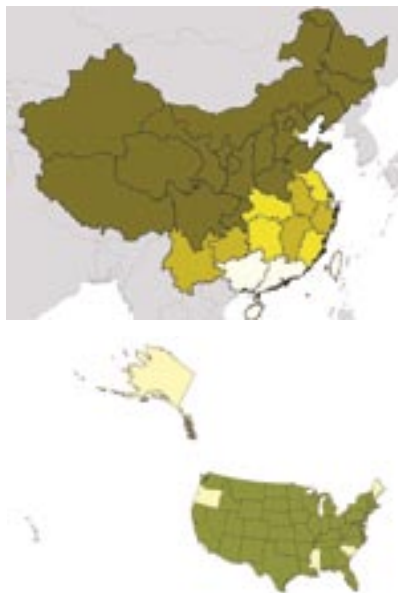
Section: *Ulmus*

Series: Glabrae Moss.

Species: *Ulmus pumila* L.

Description

Ulmus pumila is a deciduous tree that can reach 25 m in height and 1 m in diameter. In arid areas *U. pumila* grows as a shrub. The shoots have smooth bark, which is grayish brown or light grayish, but will become coarse, dark grayish and spilt irregularly with age. The twigs are light yellowish gray, light grayish brown or light gray, glabrous or pubescent, with scattered lenticels. Winter buds are ovoid to globose. The



surface scales are glabrous, whereas those inside the buds are white and ciliated along the margins. The leaves are elliptically ovate to elliptically lanceolate, or ovoid lanceolate, 2-8 cm long and 1.2-3.5 cm wide, with an acuminate apex and asymmetrical base with dentate or bidentate margins. The upper leaf surface is glabrous, while the lower side is glabrescent with hairy vein axils. Emerging earlier than the leaves, fascicled cymes appear in the leaf axil of the second year branchlets. Fruits are suborbicular samaras about 1.2-2 cm long, glabrous except for the stigmatic surface which is pubescent. The persistent perianth is glabrous and 4-lobed with a ciliated margin. In general, the flowers and fruits appear from March to June, somewhat later in northeastern China^[49].

Habitat

U. pumila occurs on hillside slopes, in valleys, plains, and dunes at elevations of 1000 to 2500 m^[49, 51].

Distribution

U. pumila occurs primarily in north, northwest, northeast China, and some southwestern provinces^[49] In fact, the appearance of the tree in areas south of the Yangtze River is due to cultivation.^[83] *U. pumila* occurs in Gansu, Hebei, Henan, Heilongjiang, Jilin, Liaoning, Inner Mongolia, Ningxia, eastern Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, and Xizang provinces^[51]. According to provincial

floras and other publications, *U. pumila* may occur, in Guizhou and Yunnan provinces. It may occur in Guizhou and Yunnan, two southwestern provinces according to provincial floras and other publications^[111, 183]. *U. pumila* is commonly cultivated in the provinces situated at the lower reach of the Yangtze River and it is easily found in the countryside of the northern Anhui and Huabei plains^[49].

Economic Importance

U. pumila yields high quality wood. It is often used in reforestation. The bark can be used as a fiber source instead of hemp. The finely ground bark can be used to produce a type of vinegar. The leaves can be used as forage. The samaras are edible and are also used in the pharmaceutical and chemical industries^[49, 51].

Natural Enemies of *Ulmus*

Twenty nine species of fungi and 284 arthropods are reported to be associated with members of the genus *Ulmus*. Chinese elm, the common name for *U. pumila*, generally refers to various species of *Ulmus*, therefore natural enemies coded “m” may attack other *Ulmus* species as well as *U. pumila*.

Species of *Ulmus* in China

Scientific Name	Scientific Name
<i>U. americana</i> L.†	<i>U. laciniata</i> (Trautv.) Mayr
<i>U. androssowii</i> Litw. var. <i>subhirsuta</i> (Schneid.) P. H. Huang, F. Y. Gao et. L H Zhuo	<i>U. laevis</i> Pall.†
<i>U. bergmanniana</i> Schneid.	<i>U. lamellosa</i> T. Wang et S. L. Chang ex L. K. Fu
<i>U. castaneifolia</i> Hemsl.	<i>U. lanceifolia</i> Roxb. ex Wallich‡
<i>U. changii</i> Cheng	<i>U. macrocarpa</i> Hance
<i>U. chenmoui</i> Cheng	<i>U. microcarpa</i> L. K. Fu
<i>U. davidiana</i> Planch.	<i>U. parvifolia</i> Jacq.
<i>U. densa</i> Litw.†	<i>U. prunifolia</i> Cheng et L. K. Fu
<i>U. elongata</i> L. K. Fu et C. S. Ding	<i>U. pseudopropinqua</i> Wang et Li
<i>U. gaussonii</i> Cheng	<i>U. pumila</i> L.
<i>U. glaucescens</i> Franch.	<i>U. szechuanica</i> Fang
<i>U. harbinensis</i> S. Q. Nie et K. Q. Huang	<i>U. uyematsui</i> Hayata

†Non-native species grown as cultivated plants in China.^[51]

‡Recorded as *U. lanceaefolia* Roxb. in *FRPS*, also the current name of *U. tonkinensis* Gagnep.^[49, 51]

Fungi

Phylum	Family	Species	H. R.	Ref.
Ascomycota	Erysiphaceae	<i>Phyllactinia pteroceltidis</i> Y.N. Yu & S.J. Han	p	[24]
		<i>Podosphaera clandestina</i> var. <i>clandestina</i> (Wallr.) Lév.	o	[24]I
		<i>Uncinula clandestina</i> var. <i>clandestina</i>	p	[26]I
		<i>Uncinula clandestina</i> var. <i>ulmi-foliaceae</i> Biv.	o	[24]
		<i>Uncinula kenjiana</i> Homma	oo	[24]
	Mycosphaerellaceae	<i>Mycosphaerella ulmi</i> Kleb.	oo	[26]
	Nectriaceae	<i>Nectria cinnabarina</i> (Tode) Fr.	o	[26]II
	Rhytismataceae	<i>Melasmia ulmicola</i> Berk. & M.A. Curtis	p	[26]III
	Valsaceae	<i>Gnomonia oharana</i> Y. Nisik. & H. Matsumoto	o	[26]
		<i>Gnomonia ulmea</i> (Schwein.) Thüm.	o	[26]
		<i>Rehmiella ulmicola</i> Miyake	mo	[26]
		<i>Stegophora aemula</i> Syd.	mo	[26]
	Venturiaceae	<i>Platychora ulmi</i> (Schleich.) Petr.	mo	[26]IV
	Basidiomycota	Hymenochaetaceae	<i>Xanthochrous hispidus</i> (Bull.) Pat.	po
Polyporaceae		<i>Coriolus unicolor</i> (Bull.) Pat.	po	[26]
		<i>Favolus squamosus</i> (Huds.) Ames	o	[26]
		<i>Fomes fomentarius</i> (L.) J.J. Kickx	p	[26]
		<i>Trametes hirsuta</i> (Wulfen) Pilát	po	[26]V
		<i>Tyromyces galactinus</i> (Berk.) Bondartsev	po	[26]
Sistotremataceae		<i>Fibuloporia donkii</i> Domański	po	[26]VI
Tricholomataceae		<i>Lyophyllum ulmarium</i> (Bull.) Kühner	oo	[26]VII
Typhulaceae	<i>Apiosporium salicinum</i> (Pers.) Kunze	p	[26]	
Anamorphic Guignardia	<i>Phyllosticta bellunensis</i> Martelli	po	[26]	
Anamorphic Guignardia	<i>Phyllosticta ulmicola</i> Sacc.	o	[26]	
Anamorphic Lepteutypa	<i>Seiridium intermedium</i> (Sacc.) B. Sutton	mo	[26]VIII	
Anamorphic Mycosphaerella	<i>Pseudocercospora sphaeriiformis</i> (Cooke) Y.L. Guo & X.J. Liu	m	[26]IX	
			oo	[129]
Anamorphic Mycosphaerella	<i>Septoria yokokawai</i> Hara	mo	[26]	
Anamorphic Mycosphaerellaceae	<i>Ascochyta ulmi</i>	m	[26]	

Phylum	Family	Species	H. R.	Ref.
Anamorphic Pyrenopeziza		<i>Cylindrosporium ulmi</i> (Fr.) Vassiljevsky	m	[26]

^IRecorded as *Uncinula clandestina* (Biv. -Bern.) Schrot

^{II}Recorded as *Septoria ulmi* Hara

^{III}Recorded as *Tubercularia vulgaris* Tode

^{IV}Recorded as *Systemma ulmi* (Duv. ex Fr.) Theiss. et Syd.

^VRecorded as *Coriolus hirsutus* (Wulf ex Fr.) Quéf

^{VI}Recorded as *Poria mucida* (Pers.) Fr.

^{VII}Recorded as *Pleurotus ulmarius* (Bull. ex Fr.) Quéf

^{VIII}Recorded as *Coryneum intermedium* Sacc

^{IX}Recorded as *Cerospora sphaeriiformis* Cooke

Arthropods

Order	Family	Species	H. R.	Ref.
Acariformes	Eriophyidae	<i>Aceria nanjingensis</i> Kuang	oo	[90]
		<i>Panonychus citri</i> (Mc Gregor)	p	[94]
		<i>Panonychus ulmi</i> (Koch)	p	[94]
	Rhyncaphytoptidae	<i>Diptacus pseudocerasis</i> Kuang & Hong	oo	[90]
		<i>Rhinophytoptus xiamenensis</i> Kuang	oo	[90]
		<i>Rhyncaphytoptus ulmi chongqingensis</i> Kuang & Hong	mo	[90]
		<i>Rhyncaphytoptus ulmivagrans</i> (Keifer)	o	[90]
	Tarsonemidae	<i>Polyphagotarsonemus latus</i> (Bank)	p	[94]
	Tetranychidae	<i>Eotetranychus</i> sp.	p	[75]
		<i>Eurytetranychus ulmi</i> Wang	o	[167]
Coleoptera	Attelabidae	<i>Apoderus jekeli</i> Roelofs	p	[94]
		<i>Byctiscus congener</i> Jekel	p	[94]
		<i>Phymatapoderus latipennis</i> (Jekel)	p	[75]
	Cerambycidae	<i>Amarysius altajensis</i> (Laxmann)	po	[13]
		<i>Anoplophora chinensis</i> (Förster)	p	[94]
			p	[178]
			p	[13]
			p	[165]
			p	[75]
			p	[13]
		<i>Anoplophora glabripennis</i> (Motschulsky)	p	[178]
			p	[94]
			m	[75]
			p	[94]
			p	[86]
		<i>Anoplophora horsfieldi</i> (Hope)	m	[75]
			p	[94]
		<i>Anoplophora nobilis</i> Ganglbauer	p	[86]
		<i>Aphrodisium provosti</i> (Fairmaire)	p	[94]
		<i>Apriona germari</i> (Hope)	p	[94]
p	[13]			
p	[165]			
p	[178]			
po	[13]			
<i>Asias halodendri</i> (Pallas)	p	[94]		

Order	Family	Species	H. R.	Ref.
		<i>Batocera horsfieldi</i> (Hope)	p	[94]
			p	[13]
			p	[178]
		<i>Batocera lineolata</i> Chevrolat	p	[75]
			p	[94]
			p	[165]
		<i>Callipogon relictus</i> (Semenov)	p	[13]
		<i>Chelidonium provosti</i> (Fairmaire)	p	[150]
		<i>Chelidonium purpureipes</i> Gressitt	p	[94]
		<i>Clytobius davidis</i> (Fairmaire)	p	[150]
		<i>Dorysthenes hydropicus</i> Pascoe	p	[94]
		<i>Dorysthenes paradoxus</i> Faldermann	p	[94]
		<i>Glenea relictus</i> Pascoe	o	[94]
			mo	[13]
		<i>Megopis sinica</i> White	p	[13]
			p	[94]
		<i>Mesosa longipennis</i> Bates	po	[13]
		<i>Mesosa myops</i> (Dalman)	po	[13]
		<i>Olenecamptus clarus</i> Pascoe	p	[94]
		<i>Oplatocera oberthuri</i> Gahan	m	[86]
			m	[75]
		<i>Philus antennatus</i> (Gyllenhal)	p	[94]
			p	[178]
		<i>Plagionotus pulcher</i> Blessig	p	[13]
		<i>Pogonocherus dimidiatus</i> Blessig	po	[13]
		<i>Prionus heros</i> (Semenov-Tian-Shanskij)	m	[86]
		<i>Prionus insularis</i> Motschulsky	p	[94]
			p	[13]
		<i>Pterolophia rigida</i> (Bates)	p	[13]
		<i>Trichoferus campestris</i> (Faldermann)	p	[94]
		<i>Xylotrechus cuneipennis</i> (Kraatz)	po	[13]
			p	[94]
		<i>Xylotrechus grayii</i> (White)	p	[94]
			p	[13]
		<i>Xylotrechus rusticus</i> (L.)	po	[13]
		Cetoniidae	<i>Anthracophora rusticola</i> Burmeister	p
<i>Oxycetonia jucunda</i> Faldermann	p		[94]	
<i>Poecilophilides rusticola</i> (Burmeister)	p		[94]	
<i>Protaetia aerata</i> (Erichson)	p		[143]	
<i>Protaetia brevitarsis</i> (Lewis)	p		[94]I	
	po		[143]	
<i>Protaetia famelica</i> Janson	p	[165]II		

Order	Family	Species	H. R.	Ref.
		<i>Protaetia lugubris orientalis</i> (Medvedev)	p	[165]
		<i>Protaetia nitididorsis</i> (Fairmaire)	p	[143]
			p	[75]
		<i>Torynorrhina fulvopilosa</i> (Moser)	p	[75]III
	Chrysomelidae	<i>Ambrostoma fortunei</i> (Baly)	m	[201]
			m	[75]
		<i>Ambrostoma leigongshana</i> Wang	m	[201]
			m	[75]
		<i>Ambrostoma quadriimpressum</i> (Motschulsky)	m	[201]
			po	[94]
		<i>Dercetina flavocincta</i> (Hope)	m	[178]
		<i>Gastrolina peltoidea</i> (Gebler)	p	[94]
		<i>Mimastra cyanura</i> (Hope)	p	[201]
			oo	[165]
		<i>Mimastra limbata</i> Baly	p	[94]
			po	[201]
		<i>Mimastra limbata</i> Baly	p	[94]
			p	[94]
		<i>Monolepta yoasanica</i> Chen	p	[94]
	<i>Pallasiola absinthii</i> (Pallas)	p	[201]	
	<i>Pyrrhalta aenescens</i> (Fairmaire)	m	[201]	
		m	[94]	
	<i>Pyrrhalta maculicollis</i> (Motschulsky)	m	[94]	
		m	[201]	
		m	[75]	
	Curculionidae	<i>Chlorophanus lineolus</i> Motschulsky	p	[94]
		<i>Chlorophanus sibiricus</i> Gyllenhal	p	[94]
		<i>Eugnathus distinctus</i> Roelofs	m	[94]
		<i>Piazomias globulicollis</i> Faldermann	p	[211]
		<i>Piazomias validus</i> Motschulsky	p	[211]
		<i>Tanymecus urbanus</i> Gyllenhal	p	[211]
	Eumolpidae	<i>Abirus fortunei</i> (Baly)	p	[164]
			p	[94]
p			[75]	
<i>Basilepta leechi</i> (Jacoby)		p	[94]	
<i>Clytra laeviuscula</i> Ratzeburg		p	[164]	
		p	[165]	
		p	[94]	
<i>Cryptocephalus lemniscatus</i> Suffrian		m	[164]	
<i>Cryptocephalus mannerheimi</i> Gebler		p	[164]	
<i>Cryptocephalus ochroloma</i> Gebler		p	[164]	
<i>Cryptocephalus pilosellus</i> Suffrian	p	[164]		
<i>Cryptocephalus regalis</i> Gebler	p	[94]		

Order	Family	Species	H. R.	Ref.
		<i>Cryptocephalus stchukini</i> Faldermann	m	[164]
		<i>Labidostomis bipunctata</i> (Mannerheim)	p	[164]
			p	[94]
		<i>Smaragdina mandzhura</i> (Jacobson)	p	[164]
	<i>Smaragdina semiaurantiaca</i> (Fairmaire)	p	[164]	
		m	[94]	
	Lucanidae	<i>Aegus parallelus</i> Hope & Westwood	p	[94]
		<i>Lucanus fortunei</i> Saunders	p	[178]
		<i>Proagopertha lucidula</i> Faldermann	p	[94]
		<i>Prosopocoilus blanchardi</i> Parry	p	[94]
	p		[75]	
	Melolonthidae	<i>Apogonia chinensis</i> Moser	p	[94]
		<i>Heptophylla picea</i> Motschulsky	p	[94]
		<i>Holotrichia convexopyga</i> Moser	p	[94]
		<i>Holotrichia diomphalia</i> Moser	p	[94]
		<i>Holotrichia lata</i> Brenske	p	[94]
		<i>Holotrichia morosa</i> Waterhouse	p	[94]
		<i>Holotrichia parallela</i> Motschulsky	p	[94]
		<i>Holotrichia trichophora</i> (Fairmaire)	p	[94]
		<i>Maladera castanea</i> (Arrow)	p	[94]
	<i>Maladera orientalis</i> (Motschulsky)	p	[94]	
	Nitidulidae	<i>Librodor japonicus</i> (Motschulsky)	m	[94]
	Rhynchophoridae	<i>Hyposipalus gigas</i> Fabricius	p	[94]
	Rutelidae	<i>Anomala corpulenta</i> Motschulsky	p	[94]
		<i>Popillia atrocoerulea</i> Bates	p	[94]
		<i>Popillia quadriguttata</i> (Fabricius)	p	[94]
	Scolytidae	<i>Scolytus aratus</i> Blandford	po	[197]
		<i>Scolytus butovitschi</i> Stark	m	[197]
		<i>Scolytus confusus</i> Eggers	m	[197]
		<i>Scolytus esuriens</i> Blandford	oo	[197]
		<i>Scolytus jacobsoni</i> Spessivtseff	mo	[197]
		<i>Scolytus parviclaviger</i> Yin & Huang	mo	[197]
		<i>Scolytus schevyrewi</i> Semenov	p	[197]
<i>Scolytus semenovi</i> Spessivtseff		o	[197]	
<i>Scolytus seulensis</i> Murayama		p	[165]	
<i>Scolytus shikisani</i> Niisima		m	[197]	
<i>Scolytus squamosus</i> Yin & Huang		mo	[197]	
<i>Sphaerotrypes ulmi</i> Tsai & Yin		m	[197]	
<i>Trypodendron signatum</i> Fabricius		po	[165]	
<i>Xyleborus emarginatus</i> Eichhoff	p	[94]		
<i>Xyleterus proximus</i> Niisima	po	[197]		
Trichiidae	<i>Trichius fasciatus</i> (L.)	p	[143]	

Order	Family	Species	H. R.	Ref.
Hemiptera	Acanthosomatidae	<i>Dichobothrium nubilum</i> (Dallas)	p	[207]
			m	[94]
		<i>Elasmostethus humeralis</i> Jakovlev	p	[207]
		<i>Elasmucha ferrugata</i> (Fabricius)	po	[94]
	Lygaeidae	<i>Lygaeus equestris</i> (L.)	p	[207]
			m	[94]
		<i>Lygaeus quadratomaculatus</i> (L.)	m	[94]
	Pentatomidae	<i>Erthesina fullo</i> (Thunberg)	p	[94]
		<i>Graphosoma rubrolineata</i> (Westwood)	p	[94]
			p	[207]
		<i>Halyomorpha halys</i> (Stål)	p	[94]
		<i>Lelia decempunctata</i> Motschulsky	p	[94]
			p	[207]
		<i>Menida scotti</i> Puton	p	[94]
			p	[75]
		<i>Menida violacea</i> Motschulsky	p	[94]
			p	[75]
			p	[207]
			<i>Pentatoma japonica</i> (Distant)	p
			p	[207]
			p	[94]
		<i>Pentatoma rufipes</i> (L.)	p	[207]
			p	[94]
Tingidae	<i>Physatocheila dumetorum</i> (Herrich-Schaeffer)	m	[208]	
	<i>Stephanitis nashi</i> Esaki & Takeya	m	[94]	
	<i>Stephanitis pyriodes</i> (Scott)	p	[94]	
Urostylidae	<i>Urochela distincta</i> Distant	p	[94]	
	<i>Urochela quadrinotata</i> Reuter	p	[207]	
Homoptera	Aphrophoridae	<i>Aphrophora intermedia</i> Uhler	p	[165]
			p	[94]IV
		<i>Trigophora obliqua</i> (Uhler)	p	[165]
	Callaphididae	<i>Chromocallis nirecola</i> (Shinji)	m	[205]
		<i>Chromocallis pumili</i> Zhang	m	[205]
		<i>Chromocallis similinirecola</i> Zhang	m	[205]
		<i>Sinochaitophorus maoi</i> Takahashi	m	[205]
		<i>Tinocallis saltans</i> (Nevsky)	m	[205]
			oo	[75]
	Cicadellidae	<i>Bythoscopus dorsalis</i> (Matsumura)	p	[57]
		<i>Empoasca biguttula</i> (Ishida)	p	[94]
<i>Oniella leucocephala</i> Matsumura		p	[57]	
<i>Tettigoniella viridis</i> (Linné)		p	[94]V	

Order	Family	Species	H. R.	Ref.
	Cicadidae	<i>Cryptotympana atrata</i> (Fabricius)	p	[178]
			p	[94]
		<i>Cryptotympana mandarina</i> Distant	p	[94]
			p	[75]
		<i>Cryptotympana pustulata</i> (Fabricius)	p	[75]
		<i>Suisha coreana</i> (Matsumura)	p	[75]
	Coccidae	<i>Ceroplastes japonicus</i> Green	p	[94]
		<i>Eulecanium kostylevi</i> Borchs.	m	[173]
		<i>Eulecanium kuwanai</i> Kanda	p	[173]
		<i>Eulecanium rugulosum</i> (Arch.)	p	[173]
		<i>Parthenolecanium corni</i> (Bouché)	p	[94]
		<i>Pulvinaria vitis</i> (L.)	p	[173]
	Diaspididae	<i>Fiorinia fiorinae</i> (Targioni-Tozzetti)	p	[94]
		<i>Pseudaulacaspis pentagona</i> (Targioni-Tozzetti)	p	[178]
			p	[75]
	Euscelidae	<i>Phlogotettix cyclops</i> (Mulsant et Rey)	p	[178]
	Fulgoridae	<i>Lycorma delicatula</i> (White)	p	[220]
			p	[165]
			p	[94]
	Membracidae	<i>Gargara genistae</i> (Fabricius)	p	[94]
Pemphigidae	<i>Eriosoma dilanuginosum</i> Zhang	m	[205]	
	<i>Tetraneura akinire</i> Sasaki	p	[205]	
		m	[94]	
	<i>Tetraneura ulmi</i> (L.)	m	[94]	
Pseudococcidae	<i>Eriococcus ulmi</i> Tang	m	[172]	
Psyllidae	<i>Cacopsylla peregrina</i> (Förster)	mo	[160]	
Hymenoptera	Argidae	<i>Arge captiva</i> (Smith)	oo	[75]
Lepidoptera	Arctiidae	<i>Cyana phaedra</i> (Leech)	p	[94]VI
		<i>Hyphantria cunea</i> Drury	p	[45]
		<i>Lemyra melli</i> Daniel	po	[45]
			p	[166]VII
			p	[44]
		<i>Rhyparioides amurensis</i> (Bremer)	p	[166]
			p	[94]
	p		[45]	
		<i>Spilarctia subcarnea</i> (Walker)	p	[94]
	Cossidae	<i>Cossus cossus</i> L.	p	[94]
			p	[166]
		<i>Xyleutes leuconotus</i> (Walker)	p	[94]
		<i>Zeuzera pyrina</i> L.	p	[166]
			p	[94]
			p	[178]

Order	Family	Species	H. R.	Ref.	
	Crambidae	<i>Cotachena histricalis</i> (Walker)	p	[94]	
	Ctenuchidae	<i>Amata pascus</i> (Leech)	p	[166]	
	Epicopeiidae	<i>Epicopeia mencia</i> Moore	m	[94]	
			m	[75]	
			m	[78]	
	Geometridae		<i>Abraxas flavisinuata</i> Warren	p	[94]
				p	[178]
			<i>Abraxas suspecta</i> Warren	p	[75]
				p	[94]VIII
			<i>Abraxas sylvata</i> (Scopoli)	p	[178]
			<i>Apocheima cinerarius</i> Erschoff	p	[78]
			<i>Ascotis selenaria</i> (Denis & Schiffermüller)	p	[75]
				po	[161]
			<i>Ascotis selenaria dianaria</i> Hübner	p	[94]
			<i>Biston betularia</i> L.	p	[94]
				p	[78]
				p	[75]
				p	[178]
			<i>Culcula panterinaria</i> (Bremer & Grey)	p	[94]
				p	[78]
			<i>Heterophleps confusa</i> (Wileman)	po	[195]
		po	[161]		
	<i>Odezia atrata</i> (L.)	p	[78]		
	<i>Ophthalmodes giraffata</i> (Guenee)	p	[178]		
	<i>Semiothisa hebesata</i> (Walker)	p	[178]		
	<i>Yala pyricola</i> Chu	p	[78]		
	Lasiocampidae		<i>Gastropacha quercifolia</i> (L.)	p	[94]
			<i>Malacosoma dentata</i> Mell	p	[94]
			<i>Malacosoma neustria testacea</i> Motschulsky	p	[166]
				p	[94]
	Limacodidae			p	[94]IX
				p	[78]IX
<i>Monema flavescens</i> Walker			p	[178]	
			p	[75]	
<i>Parasa consocia</i> Walker			p	[78]	
			p	[94]	
	<i>Parasa hilarata</i> (Staudinger)	p	[94]		
	<i>Parasa sinica</i> Moore	p	[94]		
		p	[78]		
Lycaenidae	<i>Strymonidia w-album</i> (Knoch)	p	[94]		
Lymantriidae		<i>Arctornis alba</i> (Bremer)	p	[94]	
		<i>Arctornis gelasphora</i> Collenette	p	[94]	

Order	Family	Species	H. R.	Ref.		
		<i>Arctornis l-nigrum</i> (Müller)	p	[94]		
			p	[212]		
			p	[75]		
		<i>Aroa substrigosa</i> Walker	p	[94]		
			p	[212]		
		<i>Cifuna locuples</i> Walker	p	[166]		
			p	[94]		
			p	[178]		
			p	[75]		
			p	[94]		
		<i>Dasychira chekiangensis</i> Collenette	p	[94]		
		<i>Dasychira horsfieldi</i> Saunders	p	[213]		
		<i>Euproctis chrysorrhoea</i> (L.)	p	[212]		
		<i>Ivela ochropoda</i> (Eversmann)	p	[94]X		
			m	[212]		
		<i>Laelia coenosa</i> (Hübner)	p	[75]		
			p	[212]		
			p	[94]		
			p	[178]		
		<i>Laelia monoscola</i> Collenette	p	[94]		
		<i>Lymantria dispar</i> (L.)	p	[212]		
			p	[166]		
			p	[94]		
		<i>Lymantria dispar japonica</i> Motschulsky	p	[94]		
		<i>Lymantria monacha</i> (L.)	po	[212]		
			p	[94]		
		<i>Porthesia similis</i> (Fueslly)	p	[94]		
		<i>Stilpnotia melanoscela</i> Collenette	p	[94]		
			p	[75]		
		<i>Teia gonostigma</i> (L.)	p	[213]		
		Noctuidae		<i>Acronicta auricoma</i> (Denis & Schiffermüller)	po	[15]
				<i>Acronicta hercules</i> (Felder & Rogenhofer)	m	[166]
					m	[75]
					m	[228]XI
				<i>Acronicta intermedia</i> Warren	p	[94]XII
				<i>Amphipyra perflua</i> (Fabricius)	p	[94]
po	[224]					
<i>Amphipyra pyramidea</i> (L.)	po			[224]		
	p			[94]		
<i>Calymnia affinis</i> (L.)	oo			[15]		
<i>Catocala fraxini</i> (L.)	po	[224]				
<i>Herminia tarsicrinalis</i> (Knoch)	m	[94]XIII				
<i>Orthosia incerta</i> (Hufnagel)	p	[15]				

Order	Family	Species	H. R.	Ref.
		<i>Orthosia munda</i> (Denis & Schiffermüller)	p	[15]
		<i>Pangrapta vasava</i> Butler	m	[224]
		<i>Polia nebulosa</i> (Hufnagel)	p	[15]
		<i>Trachea atriplicis</i> (L.)	m	[94]
		<i>Zanclognatha griselda</i> (Butler)	p	[94]
	Notodontidae	<i>Cnethodonta grisescens</i> Staudinger	po	[4]
			p	[94]
		<i>Exaereta ulmi</i> (Denis & Schiffermüller)	m	[4]
			m	[94]
		<i>Gangarides dharma</i> Moore	p	[94]
		<i>Hybocampa umbrosa</i> (Staudinger)	p	[94]
		<i>Nericoides davidi</i> (Oberthür)	m	[4]
			m	[94]
		<i>Phalera assimilis</i> (Bremer & Grey)	p	[4]
			p	[94]
		<i>Phalera bucephala</i> (L.)	p	[94]
			p	[4]
		<i>Phalera flavescens</i> (Bremer & Grey)	p	[4]
			p	[94]
			p	[178]
			p	[75]
		<i>Phalera fuscescens</i> Butler	p	[4]
	p		[94]	
	<i>Phalera takasagoensis</i> Matsumura	p	[178]	
		p	[75]	
	<i>Stauropus basalis</i> Moore	m	[94]	
	Nymphalidae	<i>Apatura iris</i> (L.)	p	[94]
		<i>Hestina assimilis</i> (L.)	p	[94]
		<i>Mimathyma ambica</i> Kollar	mo	[219]
		<i>Mimathyma nycteis</i> (Ménétrès)	oo	[219]
		<i>Nymphalis antiopa</i> (L.)	po	[219]
		<i>Polygonia c-album</i> (L.)	p	[178]
			po	[219]
p			[94]	
<i>Polygonia c-album asakurai</i> Nakahara		po	[219]	
<i>Polygonia c-aureum</i> L.		m	[94]	
<i>Vanessa cardui</i> (L.)		m	[94]	
<i>Vanessa indica</i> Herbst	p	[178]		
	p	[94]		
Pieridae	<i>Aporia crataegi</i> (L.)	p	[94]	
Psychidae	<i>Chalioides kondonis</i> Kondo	p	[94]	

Order	Family	Species	H. R.	Ref.	
		<i>Clania minuscula</i> Butler	po	[78]	
			p	[94]XIV	
	Saturniidae		<i>Aglia tau ferenigra</i> Th. Mieg	p	[226]
			<i>Dictyploca japonica</i> Moore	p	[94]
				p	[75]
			<i>Eriogyna pyretorum</i> (Westwood)	p	[94]
				p	[226]
			<i>Neoris haraldi</i> Schawerda	p	[226]
		<i>Syntherata loepoides</i> Butler	p	[226]	
	Sphingidae		<i>Amorpha sinica</i> Rothschild & Jordan	p	[225]
				po	[227]
			<i>Callambulyx orbita</i> Chu & Wang	p	[75]
			<i>Callambulyx tatarinovi</i> (Bremer & Grey)	p	[225]
				po	[227]
				p	[94]
			<i>Mimas tiliae christophi</i> (Staudinger)	p	[225]
				po	[227]
		p	[94]		
		<i>Parum porphyria</i> (Butler)	p	[94]	
		<i>Smerinthus planus</i> Walker	p	[94]	
	Tortricidae		<i>Acleris alnivora</i> Oku	po	[133]
			<i>Acleris cristana</i> (Denis & Schiffermüller)	p	[133]
				po	[78]
			<i>Acleris ulmicola</i> (Meyrick)	p	[133]
			<i>Archips crataegana</i> (Hübner)	p	[133]
			<i>Archips xylosteana</i> (L.)	p	[133]
			<i>Choristoneura diversana</i> (Hübner)	p	[133]
			<i>Epinotia tenerana</i> (Denis & Schiffermüller)	p	[133]
			<i>Pandemis corylana</i> (Fabricius)	p	[94]
			<i>Pandemis heparana</i> (Schiffermüller)	p	[133]
p				[94]	
<i>Pandemis ribeana</i> (Hübner)			p	[133]	
	p	[94]			
<i>Ptycholoma lecheana</i> (L.)	p	[133]			
	p	[75]			
Orthoptera	Oedipodidae	<i>Locusta migratoria manilensis</i> (Meyen)	p	[94]	
Parasitiformes	Phytoseiidae	<i>Amblyseius oguroi</i> Ehara	p	[75]	
		<i>Phytoseius huaxiensis</i> Xin, Liang & Ke	p	[75]	
Thysanoptera	Phlaeothripidae	<i>Rhynchothrips fuscus</i> Steinweden & Moulton	m	[66]	
		<i>Rhynchothrips turkestanicus</i> John	m	[66]	
	Thripidae	<i>Frankliniella intonsa</i> (Trybom)	p	[75]	
		<i>Thrips major</i> Uzel	m	[66]	

Verbascum thapsus

Common mullein

Introduction

The genus *Verbascum* contains approximately 300 species worldwide primarily in the temperate regions of Asia and Europe. Five species and one subspecies are recorded from China, primarily in Xinjiang, northwestern China^[71, 216].

Taxonomy

Order: Tubiflorae

Suborder: Solanieae

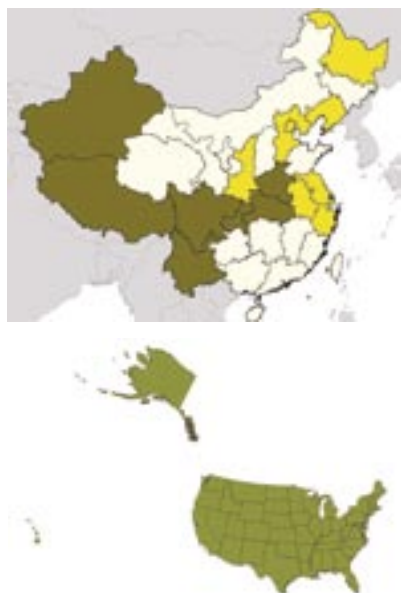
Family: Scrophulariaceae

Genus: *Verbascum* L.

Species: *Verbascum thapsus* L.

Description

Verbascum thapsus is a biennial herbaceous plant up to 1.5 m in height, with densely light grayish yellow stellate hairs. The basal leaves and those in the lower part of the stem are oblanceolate oblong, 15 cm long and 6 cm wide, and narrowly petiole-like at base, with crenate margins. The leaves in the upper part of stem are gradually decreasing in size upward into oblong and ovoid oblong in shape, with base decurrent into narrow wings. The inflorescences are panicles in arrangement of cylindrical shape, 30



Species of *Verbascum* in China

Scientific Name	Scientific Name
<i>V. blattaria</i> L.	<i>V. phoeniceum</i> L.
<i>V. chaixii</i> Vill. subsp. <i>orientale</i> Hayek	<i>V. songoricum</i> Schrenk
<i>V. chinense</i> (L.) Santapau*	<i>V. thapsus</i> L.

*Recorded as *V. coromandelianum* (Vahl) O. Kuntze in *FRPS*

cm in length and 2 cm in diameter, but expanded when in fruit. The dense flowers occur in clusters (at least in the lower part of the florescence) on the very short pedicel. Calyx is 7 mm long, and lanceately lobed. Corolla is yellow and 1-2 cm in diameter. Filaments of posterior 3 out of 5 stamens are pubescent, whereas the 2 anterior ones are glabrous. The anthers are divergent at base of the lobes. Flowers appear in June through August, and followed in July through October by fruits, which are ovate capsules equal to persistent calyx in length^[11].

Habitat

Verbascum thapsus occurs on grassy slopes, and grasslands near rivers banks at elevations of 700-3200 m^[54, 216].

Distribution

Verbascum thapsus occurs in the western provinces of Sichuan, Tibet, Xinjiang, and Yunnan^[71, 216]; the Jigongshan Mountains on the borders of Henan and Hubei^[29, 54], two provinces of central China; and

Jiangsu and Zhejiang provinces of eastern China where it is suspected to have escaped cultivation^[88, 214]. Cultivation of *Verbascum thapsus* is also reported from Anhui, Hebei, Heilongjiang, and Liaoning provinces^[18, 37, 105, 222].

Economic Importance

Verbascum thapsus is cultivated as an ornamental. In addition, the plant contains a volatile essential oil and viscous materials used as a lubricant^[37, 88].

Related Species

Another *Verbascum* species that occurs in Xinjiang is *V. chinense* (L.) Santapau, previously recorded as *V. coromandelianum* (Vahl) O. Kuntze in many floras. It occurs in sandy areas along rivers at elevations of 120-1300 m, in Guangxi, Sichuan, and Yunnan provinces^[216].

Natural Enemies of *Verbascum*

Only one arthropod is listed as an associate of members of the genus *Verbascum*.

Arthropods

Order	Family	Species	H. R.	Ref
Hemiptera	Miridae	<i>Campylomma verbasci</i> (Meyer-Duer)	po	[93]

Viburnum opulus

Guelder rose,
European cranberry

Introduction

The genus *Viburnum* contains approximately 200 species worldwide. Seventy-four species have been recorded in China with nationwide distribution, but mainly in southwestern China^[192].

Taxonomy

Order Dipsacales

Family Caprifoliaceae

Tribe Viburneae (Spach) Fritsch

Genus *Viburnum* L.

Section *Opulus* DC.

Species *Viburnum opulus* L.

Description

Viburnum opulus is a deciduous shrub 1.5-4 m high. Annual twigs are striped, glabrous, with noticeable raised lenticels on the surface; biennial twigs are yellowish or reddish brown, and nearly cylindrical; while perennial twigs and stem are dark grayish, with thin bark that is non-corky and vertically cracked. Winter buds are ovate, stalked, covered by a pair of glabrous concrescent outer scales, and membranous inner scales that grow concrescently into a cylindrical form at the base. The leaf blade is ovate to broadly so, or obovate,



6-12 cm long, commonly 3-lobed with digitately ternate veins. The glabrous leaf has a round, cuneate, or subcordate base. The lobe has an acuminate apex, and an irregular dentate margin. The leaves in the upper stem are narrow, elliptic to oblong-lanceolate, without lobes with sparsely crenate margin, or slightly lobed with nearly entire margins, the lateral one is shorter than the middle one. The petiole is robust, 1-2 cm long, glabrous, with no less than 2 oblong-disc glands and 2 basal stipules. The compound umbel-shaped cyme inflorescence has a diameter of 5-10 cm, with 6-8 primary whorled branches. Sessile, sterile and fertile flowers are borne on the secondary braches. The glabrous calyx of fertile flowers is conical, about 1 mm long, and triangularly lobed. Corollas are white, crenulate lobed, about 1 mm long, and villous inside. Sterile flowers, borne on a long pedicel, are white, 1.3-2.5 cm in diameter, and have broadly obovate, crenate or irregular lobes. Fruits are red, nearly round, 8-10 mm in diameter with grayish, oblate core 7-9 mm in diameter. The flowers occur in May through June; fruits ripen in September through October^[192].

Habitat and Distribution

V. opulus occurs under the spurge in the valley forest at elevation of 1000-1600 m in northwestern Xinjiang, and is cultivated in Beijing^[18, 192].

Economic Importance

V. opulus is grown primarily as an

ornamental^[18].

Related Species

V. opulus var. *calvescens* has thick, corky bark. The twigs, petiole and rachis are glabrous, but hairs cluster in the vein axils on the lower leaf surface and appressed sericeous hairs occur sparsely along the veins. The anthers are purplish red while that of *Viburnum opulus* var. *opulus* are whitish yellow. *V. opulus* var. *calvescens* occurs in sparse forests, on stream banks or in thickets at elevations of 1000-1650 m, in southwestern Anhui, southern Gansu, northern Hebei, Heilongjiang, western Henan, Hubei, Jiangxi, Jilin, Liaoning, southern Shaanxi, Shandong, Shanxi, Sichuan, and northwestern Zhejiang provinces. *V. opulus* var. *calvescens* (Rehd.) Hara forma *puberulum* (Kom.) has a yellow villous petiole, rachis, young shoot and leaf underside. It occurs in mixed forests near rivers or forest margins at elevations of 1200-2200 m^[192].



Natural Enemies of *Viburnum*

Fourteen species of fungi and 14 arthropods are listed for members of

the genus *Viburnum*. One fungus, *Phaeoramularia penicillata* (Ces.) X.J. Liu & Y.L. Guo, and one mite, *Calacarus carinatus* (Green) are *V. opulus* associated.

Species of *Viburnum* in China

Scientific Name	Scientific Name
<i>V. amplifolium</i> Rehd.	<i>V. laterale</i> Rehd.
<i>V. atrocyaneum</i> C. B. Clarke	<i>V. leiocarpum</i> Hsu
<i>V. betulifolium</i> Batal.	<i>V. longipedunculatum</i> (Hsu) Hsu
<i>V. brachybotryum</i> Hemsl.	<i>V. longiradiatum</i> Hsu et S. W. Fan
<i>V. brevipes</i> Rehd.	<i>V. lutescens</i> Blume
<i>V. brevitubum</i> (Hsu) Hsu	<i>V. luzonicum</i> Rolfe
<i>V. buddleifolium</i> C. H. Wright	<i>V. macrocephalum</i> Fort.
<i>V. burejaeticum</i> Regel et Herd.	<i>V. melanocarpum</i> Hsu
<i>V. burmanicum</i> (Rehd.) C. Y. Wu ex Hsu	<i>V. mongolicum</i> (Pall.) Rehd.
<i>V. chingii</i> Hsu	<i>V. mullaha</i> Buch.-Ham. ex D. Don
<i>V. chinshanense</i> Graebn.	<i>V. nervosum</i> D. Don
<i>V. chunii</i> Hsu	<i>V. odoratissimum</i> Ker-Gawl.
<i>V. cinnamomifolium</i> Rehd.	<i>V. oliganthum</i> Batal.
<i>V. congestum</i> Rehd.	<i>V. omeiense</i> Hsu
<i>V. corymbiflorum</i> Hsu et S. C. Hsu	<i>V. opulus</i> L.
<i>V. cotinifolium</i> D. Don	<i>V. parvifolium</i> Hayata
<i>V. cylindricum</i> Buch.-Ham. ex D. Don	<i>V. plicatum</i> Thunb.
<i>V. dalzielii</i> W. W. Smith	<i>V. propinquum</i> Hemsl.
<i>V. davidii</i> Franch.	<i>V. punctatum</i> Buch.-Ham. ex D. Don
<i>V. dilatatum</i> Thunb.	<i>V. pyramidatum</i> Rehd.
<i>V. erosum</i> Thunb.	<i>V. rhytidophyllum</i> Hemsl.
<i>V. erubescens</i> Wall. ex DC.	<i>V. schensianum</i> Maxim.
<i>V. farreri</i> W. T. Stearn	<i>V. sempervirens</i> K. Koch
<i>V. foetidum</i> Wall.	<i>V. setigerum</i> Hance
<i>V. fordiae</i> Hance	<i>V. shweliense</i> W. W. Smith
<i>V. formosanum</i> Hayata	<i>V. squamulosum</i> Hsu
<i>V. glomeratum</i> Maxim.	<i>V. subalpinum</i> Hand.-Mazz.
<i>V. grandiflorum</i> Wall. ex DC.	<i>V. sympodiale</i> Graebn.
<i>V. hainanense</i> Merr. et Chun	<i>V. taitoense</i> Hayata
<i>V. hanceanum</i> Maxim.	<i>V. tengyuehense</i> (W. W. Smith) Hsu
<i>V. hengshanicum</i> Tsiang ex Hsu	<i>V. ternatum</i> Rehd.
<i>V. henryi</i> Hemsl.	<i>V. trabeculosum</i> C. Y. Wu ex Hsu
<i>V. inopinatum</i> Craib	<i>V. triplinerve</i> Hand. -Mazz.
<i>V. integrifolium</i> Hayata	<i>V. urceolatum</i> Sieb. et Zucc.
<i>V. kansuense</i> Batal.	<i>V. utile</i> Hemsl.
<i>V. koreanum</i> Nakai	<i>V. wrightii</i> Miq.
<i>V. lancifolium</i> Hsu	<i>V. yunnanense</i> Rehd.

Fungi

Phylum	Family	Species	H. R.	Ref.
Ascomycota	Asterinaceae	<i>Asterina viburni</i> Pat.	oo	[26]
	Meliolaceae	<i>Irenina viburni</i> (Syd.) F. Stevens	oo	[26]
		<i>Meliola aequatoriensis</i> Petr.	mo	[26]
Basidiomycota	Pucciniaceae	<i>Puccinia linkii</i> Klotzsch	mo	[229]
		<i>Puccinia viburnicola</i> J.Y. Zhuang	oo	[229]
Anamorphic Dothideales		<i>Placosphaeria viburni</i> Henn.	mo	[26]
Anamorphic <i>Leptosphaeria</i>		<i>Phoma exigua</i> var. <i>viburni</i> (Roum. ex Sacc.) Boerema	mo	[1]I
Anamorphic <i>Mycosphaerella</i>	<i>Cercospora penicillata</i> (Ces.) Fresen.		oo	[26]
	<i>Cercospora viburni-cylindrici</i> F.L. Tai		mo	[26]
	<i>Phaeoramularia penicillata</i> (Ces.) X.J. Liu & Y.L. Guo		o	[65]
	<i>Septoria viburni</i> Westend.		mo	[26]
Anamorphic <i>Othia</i>		<i>Stigmia tineae</i> (Sacc.) M.B. Ellis	mo	[26]II
Anamorphic <i>Rhytisma</i>		<i>Melasmia viburni</i> Sawada	mo	[26]
Anamorphic Uredinales		<i>Aecidium viburni</i> Henn. & Shirai	oo	[26]

I Recorded as *Ascochyta viburni* (Roumeguere) Saccardo

II Recorded as *Cercospora tineae* Sacc.

Arthropods

Order	Family	Species	H. R.	Ref
Acariformes	Eriophyidae	<i>Calacarus carinatus</i> (Green)	p	[90]
Coleoptera	Chrysomelidae	<i>Monolepta hieroglyphica</i> (Motschulsky)	po	[165]
		<i>Pyrrhalta humeralis</i> (Chen)	po	[201]
			oo	[165]
	Eumolpidae	<i>Colaspoides femoralis</i> Lefèvre	po	[164]
	Scolytidae	<i>Cnestus maculatus</i> Browne	po	[165]
		<i>Cryphalus viburni</i> Stark	mo	[197]
		<i>Scolytoplatypus darjeelingi</i> Stebbing	po	[165]
Lepidoptera	Drepanidae	<i>Oreta eminens</i> (Bryk)	po	[75]
		<i>Oreta pulchripes</i> Butler	mo	[178]
			po	[75]
		<i>Oreta turpis</i> (Butler)	mo	[178]
	mo	[75]		
	Lycaenidae	<i>Celastrina albocaerulea</i> Moore	po	[178]
	Nymphalidae	<i>Athyma fortuna</i> (Leech)	oo	[178]
Tortricidae	<i>Acleris submaccana</i> (Filipjev)	po	[133]	
Thysanoptera	Phlaeothripidae	<i>Liothrips kuwayainai</i> (Moulton)	po	[66]

Wisteria species

Wisteria

Introduction

The genus *Wisteria* contains approximately ten members occurring in East Asia, North America and Australia. Five species and one form are reported from China^[174].

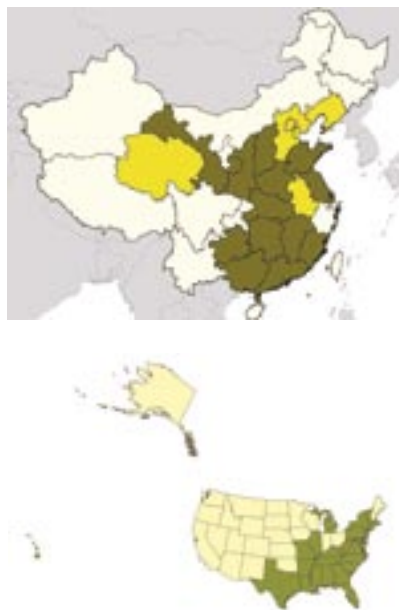
I. *Wisteria sinensis* Chinese wisteria

Taxonomy

Order: Rosales
Suborder: Leguminosae
Family: Leguminosae (Fabaceae)
Subfamily: Papilionoideae
Tribe: Tephrosieae
Genus: *Wisteria* Nutt.
Species: *Wisteria sinensis* (Sims) Sweet.

Description

Wisteria sinensis is a deciduous climbing vine. The stout stem, covered with glabrescent white hairs, twines clockwise. Winter buds are ovate. The imparipinnate leaf is 15-25 cm long, and composed of 3-6 pairs of leaflets, which are ovoid elliptic to ovoid lanceolate, acuminate



Species of *Wisteria* in China

Scientific Name	Scientific Name
<i>W. sinensis</i> (Sims) Sweet	<i>W. venusta</i> Rehd. et Wils.
<i>W. brevidentata</i> Rehd.	<i>W. floribunda</i> (Willd.) DC.
<i>W. villosa</i> Rehd.	

or somewhat caudate apically and obtuse, cuneate or asymmetrical at the base, 5-8 cm in length and 2-4 cm in width decreasing in size along the stem from the base to the apex. The caduceus stipule is linear whereas the stipel is bristle-like and persistent. The inflorescence, a pendulous flower cluster, appears in the terminal bud or axillary bud of the previous year's twigs. The clusters are 15-20 cm in length and 8-10 cm in diameter. The axil is villous. Bracts are lanceolate and caducous. The fragrant flowers are borne on a slender pedicel 2-3 cm long. The calyx is campanulate or cup-shaped, 5-6 mm long and 7-8 mm wide, with two obtuse teeth on the upper side and three ovoid triangular teeth on the lower side. Corollas are sericeous, obtuse and bifid on the upper edge and trifid on the lower edge. Petals are purple. *W. sinensis* blooms from mid April to early May, followed in June to August by persistent, oblanceolate, tomentose pods, 10-15 cm long and 1.5-2 cm wide, containing 1-3 brown, oblate seeds^[174].

Habitat

W. sinensis occurs in valleys, mountain forests, and on slopes at elevations of

500-1800 m^[82, 174].

Distribution

W. sinensis occurs in Guizhou, Guanxi, Henan, Shaanxi, Yunnan provinces and southern Hebei province.^[174]

Economic Importance

W. sinensis is usually planted to climb on a trellis as an ornamental. The seeds contain sparteine which is considered to be medicinally useful. The bark is a fiber source^[82, 88, 174].



Related Species

W. sinensis (Sims) Sweet f. *alba* (Lindl.) Rehd. et Wils. can be distinguished from *W. sinensis* (Sims) Sweet by flower color. The former is white and the latter is purple. *W. sinensis* f. *alba* is native to Hubei province and is widely cultivated throughout the nation^[174].



II. *Wisteria floribunda*

Japanese wisteria

Taxonomy

Order: Rosales

Suborder: Leguminosae

Family: Leguminosae
(Fabaceae)

Subfamily: Papilionoideae

Tribe: Tephrosieae

Genus: *Wisteria* Nutt.

Species: *Wisteria floribunda*
(Willd.) DC.

Description

W. floribunda is a deciduous vine with reddish-brown bark. Unlike, *W. sinensis*, the stem of *W. floribunda* twines counter-clockwise. The slender, brown stem is densely branched and pubescent when

young becoming glabrous as it grows. The pinnately compound leaves are about 20-30 cm long, and composed of 5-9 pairs of leaflets, each of which is papery thin, 4-8 cm long and 1-1.25 cm wide with an acuminate apex and obtuse or somewhat asymmetric base with an appressed pubescence when young, ovoid lanceolate and gradually narrowing downward along the leaf axil. In late April to mid May, racemes, about 30-90 cm in length, appear in the terminal axil, blooming sequentially upwards. Each floret appears on the inflorescence, from base to apex along the densely pubescent rachis, becoming about 1.5-2 cm in length. Calyx is cup-shaped, 4-5 mm long and 5-6 mm wide, and covered with the soft, silky hairs. Corollas are violet to blue violet. The fruits follow in May to July, as oblanceolate, tomentose pods, 12-19 long and 1.5-2 cm wide, containing 3-6 glossy, orbicular, violet purple seeds, about 1-1.4 cm^[174].

Distribution

W. floribunda is native to Japan and introduced to China where it is cultivated nationwide^[174].

Natural Enemies of *Wisteria*

Only two species of fungi have been reported to occur on members of the genus *Wisteria*. Eighteen species of arthropods are associated with *W. sinensis*. Two out of the 18 species may be host specific.



Fungi

Phylum	Family	Index of Fungi	H. R.	Ref.
Anamorphic	<i>Leptosphaeria</i>	<i>Coniothyrium kraunhiae</i> Miyake	m [†]	[26]
Anamorphic	<i>Mycosphaerella</i>	<i>Pseudocercospora wisteriicola</i> (J.M. Yen) J.M. Yen	m	[129]

[†] Can attack *Wisteria sinensis*

Arthropods

Order	Family	Species	H. R.	Ref.
Coleoptera	Curculionidae	<i>Episomus chinensis</i> Faust	p [†]	[178]
Homoptera	Aphididae	<i>Aphis craccivora usuana</i> Zhang	p [†]	[113]
		<i>Aulacophoroides hoffmanni</i> (Takahashi)	m [†]	[205]
	Cicadellidae	<i>Tettigoniella albomarginata</i> (Signoret)	p [†]	[113]
			p [†]	[57]

Order	Family	Species	H. R.	Ref.
Lepidoptera	Gelechiidae	<i>Dichomeris oceanis</i> Meyrick	p [†]	[78]
	Limacodidae	<i>Parasa sinica</i> Moore	p [†]	[78]
	Lycaenidae	<i>Celastrina argiola</i> (L.)	p [‡]	[219]
		<i>Curetis acuta</i> Moore	p [†]	[178]
	Lymantriidae	<i>Cifuna locuples</i> Walker	p [†]	[212]
			p [†]	[75]
			p [†]	[178]
		<i>Euproctis flava</i> (Bremer)	p [†]	[166]
			p [†]	[212]
			p [†]	[75]
	Noctuidae	<i>Catocala patala</i> Felder & Rogenhofer	m [‡]	[224]
		<i>Hypopyra vespertilio</i> (Fabricius)*	m [‡]	[224]
	Notodontidae	<i>Pterostoma sinicum</i> Moore	p [‡]	[4]
			p [‡]	[75]
	Nymphalidae	<i>Neptis soma</i> Moore	p [‡]	[219]
Saturniidae	<i>Loepa damaritis</i> Jordan	p [†]	[226]	
Tortricidae	<i>Homona magnanima</i> Diakonoff	p [†]	[75]	
		p [†]	[78]	
Thysanoptera	Thripidae	<i>Frankliniella intonsa</i> (Trybom)	p [†]	[66]
		<i>Megalurothrips distalis</i> (Karny)	p [†]	[75]
		<i>Megalurothrips distalis</i> (Karny)	p [†]	[66]

*Recorded as *Enmonodia vespertilio* (Fabricius)

† Can attack *Wisteria sinensis*

Glossary

Achene – a small, dry, thin-walled one-seeded fruit that does not split open at maturity

Acuminate – gradually tapering to a point

Acute – having a sharp point

Adnate – fused to a different part

Adventitious – a root arising from an area other than the primary root system

Alternate (leaves) – arranged singly along stem, not paired or whorled

Annual – a plant having a one-year or one season life cycle

Anther – the sac-like, pollen producing part of the stamen

Apex – the tip of an organ

Apiculate – having a short, sharp point

Appressed – lying close and flat against

Arachnoid – hairs resembling the interlaced filaments of a spiderweb

Attenuate – gradually narrowing

Auricle – small ear-like appendage

Awn – a bristle-like appendage

Axil – angle formed by the upper side of a leaf and the stem from which it grows

Axillary – in the axil

Baculiform – rod-shaped

Basal – located at the base

Base – part of attachment of any organ

Berry – a fleshy, indehiscent fruit containing one to many seeds

Biennial – a plant with a two-year life cycle, producing vegetative growth the first year and flowering in the second

Bipinnate – pinnate, with the primary leaflets also pinnate

Bract – modified, scale-like leaves, situated at the base of a flower, fruit or inflorescence

Branchlet – a small branch, a twig

Bud – an underdeveloped leaf, flower or shoot

Bud scale – a scale enclosing or partially enclosing a bud

Bullate – having surface blisters

Caducous – falling off, shedding early

Calyx – collective term for the sepals of a flower

Campanulate – bell-shaped

Canopy – the uppermost layer of a forest, formed by the crowns of trees

Capitate – growing in heads, as flowers in the Compositae

Capsule – a dry, thin-walled fruit containing 2 or more seeds opening along grooved lines at maturity

Caryopsis – a dry, single-seeded indehiscent fruit characteristic of cereal grasses

Catkin – a drooping cluster of reduced, stalkless unisexual flowers without petals

Caudate – having a tail-like appendage

Ciliate – fringed by long hairs

Clavate – club-shaped

Concolorous – having a uniform color

Cordate – heart-shaped

Corolla – collective term for the petals of a flower

Corymb – an indeterminate inflorescence with stalked flowers

Crenate – having small, rounded teeth

Crown – the mass of branches, twigs and leaves forming the top of tree

Crown gall – a tumor-like growth caused by a bacterial disease

Culm – the jointed, flowering stem of grasses

Cuneate – wedge-shaped

Cupuliform – cup-shaped

Cyathium – a type of inflorescence found in the genus *Euphorbia*

Cylindroid – cylinder-shaped

Cyme – a branching inflorescence with a flower at the end of each branch

Deciduous – seasonal shedding of leaves; shedding of certain plant parts after a period of growth

Decumbent – growing along the ground with

stem tips upright

Dehiscent – opening naturally at maturity, as a fruit releasing seeds

Dentate – toothed

Denticles – small teeth

Denticulate – finely toothed

Dichotomus – dividing into two equal branches, forked

Digitate – palmate with narrow leaflets

Dioecious – having male and female flowers on separate plants

Dissected – deeply divided into segments

Distal – distant from the point of attachment

Drupe – a fleshy fruit, containing one or more seeds, each enclosed in a stony endocarp

Emarginate – distinctly notched at the apex

Evergreen – retaining leaves year around

Filament – a fine, thread-like structure

Filiform – thread-like

Flexuous – wavy

Floret – a small flower

Fruit – a mature ovary containing seeds

Furcate – forked

Glabrescent – becoming hairless

Glabrous – hairless

Glandular – having glands (structures secreting

oil or nectar)

Globose – spherical or globe-shaped

Glume – a single bract at the base of a spikelet in the Gramineae

Gram-positive – a basic dye staining technique used to determine the genus of a bacterium; gram positive bacteria retain the dark violet color of the dye stain

Hastate – spearhead-shaped, with basal lobes directed outwards

Herbaceous – composed of soft, non-woody tissue

Hirsute – covered by coarse hairs

Hypanthium – a flower's cup-like base

Imbricate – overlapping scales

Inflorescence – the arrangement of flowers on a plant

Internode – the part of the stem between the nodes

Involucre – a whorl of bracts beneath an inflorescence

Keel – a sharp ridge formed by two fused lower petals

Knot – hard tissue formed where a branch grows from a tree trunk

Labiate – having lips

Lanceolate – lance-shaped, longer than wide with a pointed tip; widest at the middle or below

Lateral – at the side

Leaf sheath – lower part of the leaf stalk

enclosing the stem

Leaflet – single part of a compound leaf

Legume – dry fruit usually opening along two lines as in the Pea family

Lemma – in grasses, the lower of the two bracts that enclose the flower

Lenticel – a pore in the stem allowing gas exchange between the inside and outside of a plant

Ligule – strap-shaped projection at the base of a leaf blade

Lobe – rounded area of an organ

Margin – the outside edge

Membranous – thin, semi-transparent

Mericaip – a one-seeded section of a fruit that breaks free from a schizocarp at maturity

Monoecious – having both male and female flowers on the same plant

Monophagous - feeding on a single food source

Mosaic – a virus disease of plants causing mottling of leaves

Mucronate – ending abruptly in a sharp point

Mycoplasma – (more appropriately micoplasma-like organisms MLO) bacteria-like organisms that cause diseases in plants

Nectariferous – bearing nectar-producing glands

Node – place of leaf or branch attachment on the stem

Nutlet – a small nut; often refers to an achene

or mericarp

Oblanceolate – broadest toward the tip and tapering to the stalk, inversely lanceolate

Oblique – unequal, one side of leaf extending below the opposite side

Obovate – broadest toward the tip and tapering to the stalk, inversely ovate

Obtuse – blunt

Oceania - a large group of islands in the south Pacific including Melanesia and Micronesia and Polynesia (and sometimes Australasia and the Malay Archipelago)

Oligophagous - feeding on a limited range of food sources

Opposite – occurring in pairs at the node, one leaf on each side of the stem

Orbicular – circular

Ovate – egg-shaped, pointed at the top and broader toward the base

Palea – upper two bracts enclosing a grass flower

Palmate – having 3 or more divisions or lobes, the appearance of fingers on an outspread hand

Panicle – a multi-branched inflorescence

Pappus – a bristle, scale or crown on seed-like fruits especially on thistles

Pedicel – the stalk of a single flower

Pedicellate – of a flower, stalked

Peduncle – the main flower stem or stalk holding an inflorescence

Pendent – pendulous, hanging down

Perennial – living for a number of years

Perianth – the calyx and corolla or the outer whorl

Petal – the basic unit of the corolla, usually flat, broad and brightly colored

Petiole – the stalk like part of a leaf that attaches it to the stem

Petioule – the stalk of a leaflet in a compound leaf

Phloem – vascular tissue that conducts sap

Pilose – softly hairy

Pinna(e) – primary leaflet of a compound leaf

Pinnate – having leaflets along the sides of a common central stalk, like a feather

Pinnatifid – pinnately lobed

Pinnatipartite – pinnately divided

Pistil – female organ of the flower consisting of the ovary, style and stigma

Pistillate – having one or more pistils, without functional stamens

Pod – a dry, many seeded fruit that opens at maturity found in members of the Leguminosae

Polyphagous - utilizing a wide variety of food sources

Pome – a fleshy fruit with a papery-walled inner chamber that contains the seeds

Procumbent – lying along the ground

Puberulent – minutely covered in soft hairs

Puberulous – slightly hairy

Pubescent – downy, covered with hairs

Pyrene – the stone of a drupe, seed surrounded by a hard endocarp

Raceme – a long flower cluster with individual flowers on a small stalk attached to a larger, central stalk

Rachilla – in grasses, a secondary axis of an inflorescence

Rachis – the axis of a compound leaf or inflorescence

Reniform – kidney-shaped

Repand – having a slightly sinuate margin

Retuse – slightly notched at the apex

Revolute – rolled downwards at the margin

Rhizome – an underground, horizontal, root-like stem having buds, shoots and adventitious roots

Rootstock – underground stem or rhizome

Sagittate – arrowhead-shaped

Samara – a dry, indehiscent, winged fruit

Scabrid – somewhat rough to the touch because of tiny projections

Scabrous – rough to the touch

Scaphoid – boat-shaped

Schizocarp – a fruit which breaks up at maturity into two or more one-seeded portions (mericarps)

Semi-decumbent – nearly decumbent

Sepal – basic unit of the calyx

Sericeous – silky

Serrate – having a saw-tooth margin

Sessile – stalkless

Shrub – woody, low growing plant with branches

Spathe – bract or pair of bracts, enclosing the flower

Spike – elongated flower cluster, each flower of which is stalkless

Spikelet – a grass inflorescence where one or more flowers are subtended by a pair of glumes

Spinose – spiny

Spinules – small spines

Stamen – the male organ of the flower, made up of a filament topped by an anther

Staminate – a male flower with anthers and without pistils

Stellate – star-shaped

Stigma – tip of the pistil where the pollen lands

Stipule – small appendage, often leaf-like on either side of the petiole

Stolon – a stem growing along or under the ground, a runner

Style – the narrow part of the pistil that connects the ovary to the stigma

Subcordate – nearly heart-shaped, more or less

Suborbicular – nearly circular

Subshrub – a low growing shrub, may have herbaceous stems

Subtropical - regions adjacent to the tropics ranging in latitude from 23.5 to 35 degrees

Sulcate – grooved

Syncarp – a fleshy, multiple fruit with fused carpels

Syconium – a fleshy fruit with multiple seeds in a hollow compartment, as in the genus *Ficus*

Tannin – an acidic, water soluble, bitter tasting substance

Tendrils – slender, coiling, thread-like structure that helps to secure climbing plants

Terminal – at the end or apex

Thyrse – mixed inflorescence with an indeterminate main axis and determinate secondary axes

Tomentose – densely covered with soft hairs

Tomentum – dense covering of hairs

Trifoliate – having three leaflets

Trifurcate – forked, divided into 3 equal branches

Tropical - occurring in the region extending to 23 degrees on either side of the equator

Truncate – appearing to be cut off at either the base or the apex

Tuber – an enlarged, fleshy underground stem serving as a storage organ

Tuberculate – bearing small, wart-like projections

Twining – encircling or coiling around

Umbel – flower cluster with flower stalks growing from the same point

Variety - a rank designating plant groups which vary in flower color or some other way

Ventral – the side facing the axis

Verrucose – covered with small warts, tuberculate

Villous – covered with long, shaggy hairs

Witches' broom – an abnormal growth of dense twigs caused by mites, fungi or viruses

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Appendix

Arundo donax

UGA 0016140 - James H. Miller, USDA Forest Service; <http://www.forestryimages.org>

UGA 0016141 - James H. Miller, USDA Forest Service; <http://www.forestryimages.org>

Carex kobomugii

Les Mehrhoff, IPANE - Invasive Plants of New England, University of Connecticut

Gypsophila paniculata

Klenn Kopp, Missouri Botanical Garden (2 images)

Lepidium latifolium

Joseph Ditomaso, University of California, Davis (2 images)

Lygodium microphyllum

UGA 2308087 - Peggy Grebb, USDA ARS; <http://www.forestryimages.org>

Melia azedarach

UGA 0016025 - Ted Bodner, Southern Weed Science Society; <http://www.forestryimages.org>

Miscanthus sinensis

UGA 0016161 - James H. Miller, USDA Forest Service; <http://www.forestryimages.org>

Murdannia keisak

UGA 2308037 - Mil Pyne, USDA NRCS; <http://www.forestryimages.org>

Phalaris arundinacea

UGA 1196192 - Michael Shephard, USDA Forest Service; <http://www.forestryimages.org>

UGA 1196188 - Michael Shephard, USDA Forest Service; <http://www.forestryimages.org>

Phleum pratense

UGA 1213019 - Dave Powell, USDA Forest Service; <http://www.forestryimages.org>

Phragmites australis

UGA 0002045 - Bernd Blossey, Cornell University; <http://www.forestryimages.org>

Polygonum perfoliatum

Denise Binion, USDA Forest Service (2 images)

Populus alba

UGA 0008421 - Paul Wray, Iowa State University; <http://www.forestryimages.org>

Potamogeton crispus

Robert H. Mohlenbrock, USDA-NRCS PLANTS Database; <http://plants.usda.gov>

Pueraria lobata

UGA 1162002 - David Moorehead, University of Georgia ; <http://www.forestryimages.org>

Quercus acutissima

Denise Binion, USDA Forest Service, FHTET

UGA 1237024 - Chuck Bargeron, University of Georgia; <http://www.forestryimages.org>

Reynoutria cuspidatum (Polygonum cuspidata, Fallopia japonica)

UGA 1196035 - Michael Shephard, USDA Forest Service; <http://www.forestryimages.org>

UGA 2308046 - Les Mehrhoff, University of Connecticut; <http://www.forestryimages.org>

Rhamnus cathartica

UGA 0008307 - Paul Wray, Iowa State University; <http://www.forestryimages.org>

UGA 0008184 - Paul Wray, Iowa State University; <http://www.forestryimages.org>

Rhamnus frangula

UGA 1260057 - Gil Wojciech, Polish Forest Research Institute; <http://www.forestryimages.org>

Rosa multiflora

UGA 0016231 - James H. Miller, USDA Forest Service; <http://www.forestryimages.org>

UGA 2307113 - James H. Miller, USDA Forest Service; <http://www.forestryimages.org>

UGA 1380239 - Chris Evans, University of Georgia; <http://www.forestryimages.org>

Rottboellia exaltata

Larry Allain, USDA-NRCS PLANTS Database; <http://plants.usda.gov>

Rubus ellipticus

Forest and Kim Starr, US Geological Survey(USGS), Makawao, Hawaii

Rubus nivens

Forest and Kim Starr, US Geological Survey(USGS), Makawao, Hawaii

Rubus phoenicolasius

Denise Binion, USDA Forest Service, FHTET

Rumex acetosella

Denise Binion, USDA Forest Service, FHTET

Merel R. Black, University of Wisconsin, Madison, WI

Rumex crispus

Stephen L. Solheim, University of Wisconsin, Madison, WI

Sapium sebiferum (Triadica sebifera)

UGA 2307040 - James H. Miller, USDA Forest Service; <http://www.forestryimages.org>

UGA 0016032 - Ted Bodner, Southern Weed Science Society; <http://www.forestryimages.org>

Setaria faberii

Dan Tenaglia, <http://www.missouriplants.com> (2 images)

Spiraea japonica

Denise Binion, USDA Forest Service, FHTET (2 images)

Stellaria media

UGA 1196235 - Elizabeth Bella, USDA Forest Service; <http://www.forestryimages.org>

Tamarix ramosissima

UGA 1624020 - Steve Dewey, Utah State University; <http://www.forestryimages.org>

Taxus cuspidata

Denise Binion, USDA Forest Service, FHTET

J. S. Peterson, USDA NRCS PLANTS Database; <http://plants.usda.gov> (inset)

Tribulus terrestris

UGA 0022069 - Eric Coombs, Oregon Department of Agriculture; <http://www.forestryimages.org>

Ulmus pumila

UGA 2308005 - Patrick breen, Oregon State University; <http://www.forestryimages.org>

Verbascum thapsus

Denise Binion, USDA Forest Service, FHTET (2 images)

Viburnum opulus

UGA 1261162 - Gil Wojciech, Polish Forestry Research Institute; <http://www.forestryimages.org>

Denise Binion, USDA Forest Service, FHTET (fruits)

Wisteria floribunda

UGA 230041 - J. Scott Peterson, USDA NRCS; <http://www.forestryimages.org>

Denise Binion, USDA Forest Service, FHTET (flowers)

Wisteria chinensis

UGA 1120457 - Ted Bodner, Southern Weed Science Society; <http://www.forestryimages.org>

UGA 2307175 - Ted Bodner, Southern Weed Science Society; <http://www.forestryimages.org>

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