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Invasive Plants of Asian Origin Established in the United States and Their Natural Enemies

Volume 1



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Invasive Plants of Asian Origin Established in the United States and Their Natural Enemies

Volume 1

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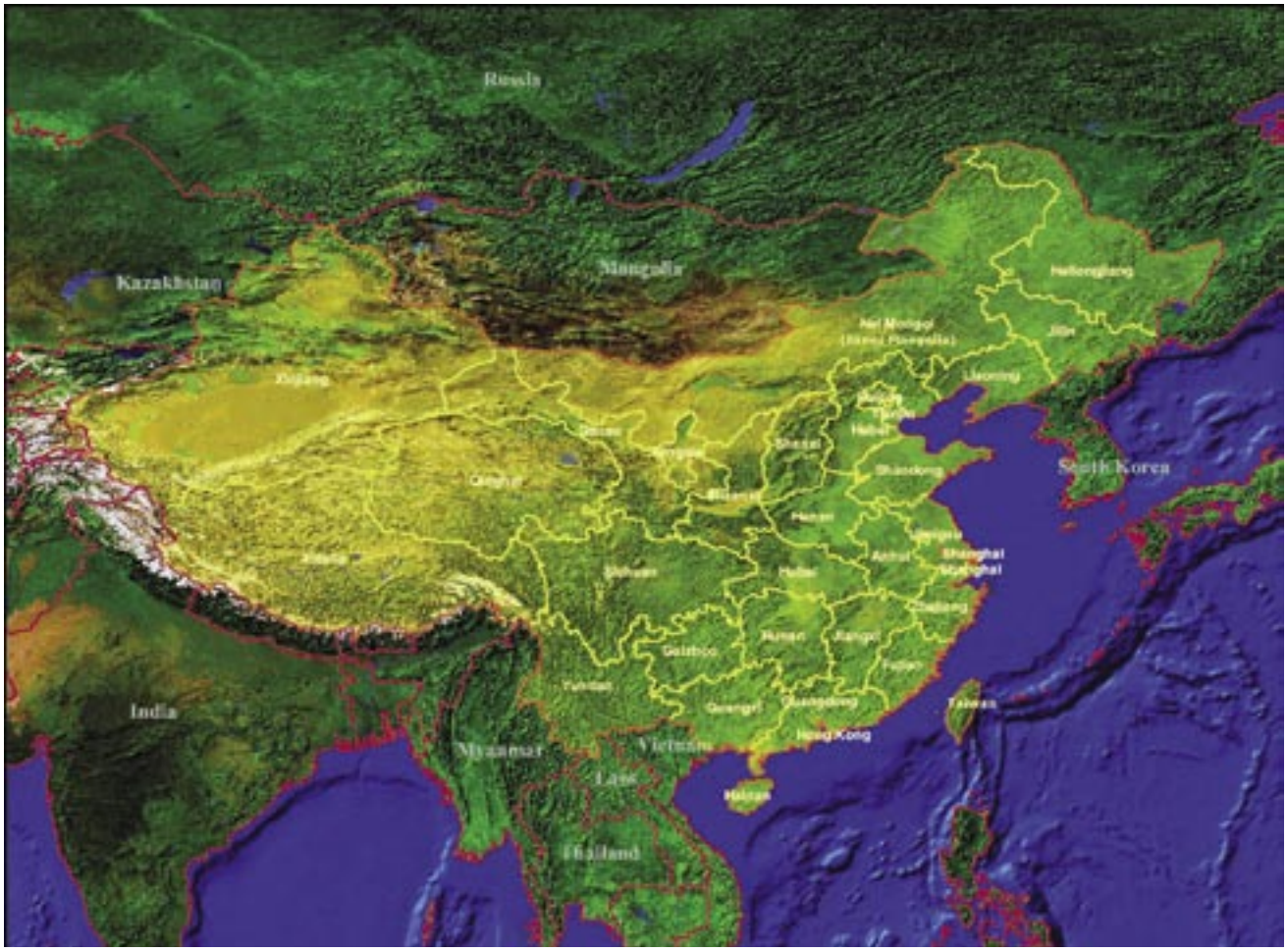
On The Cover: Left to right: *Albizia julibrissin* (Mimosa) leaves and flowers; *Lonicera tatarica* (Tartarian honeysuckle) leaves and flowers; *Paulownia tomentosa* (Princess tree) fruits.



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

Introduction

There are approximately 50,000 non-native invasive species (plants and animals) in the United States. The cost of these invasive species could exceed an estimated $138 billion per year (Pimental et al. 2000). Human population growth, development, and global trade and transportation are some of the major pressures that are exacerbating the growing problem of invasive species. They are unlikely to decrease in the near future since effective market and environmental compromises are difficult and long-term to develop (Radoscevish, Holt and Ghersa, 1997).

There are an estimated 250,000 species of plants in the world including about 1,100 species that are considered to be invasive (Radoscevish, Holt and Ghersa, 1997). The term "invasive" has many definitions but refers to species that establish in a new ecosystem in which they proliferate, spread and persist to cause or likely to cause detrimental impact to the economy, environment or human health. Invasive non-native plants comprise from 8 to 47 percent of the total flora of most states (i.e., well over 100 million acres) in the United States and continue to increase by 8 to 20 percent annually. These percentages are likely to increase dramatically as they were comprised mostly of invasive plants associated with agriculture but more resources are being committed to identification and documentation of invasive plants found in nature and natural ecosystems.

Once an invasive plant becomes established it is not easily suppressed or eliminated, as these species often possess characteristics that favor their population increase. In addition, many invasive plants are free of attack in their invaded range by a complex of specialized arthropod herbivores or plant pathogens that are associated with a particular plant species.

Classical biological control is a widely used tactic for suppression of invasive plant species. This approach requires the acquisition of information on the natural enemies as well as the invasive plant in its native range. These data are often difficult to acquire for plants native to Asian countries where they are typically non invasive and therefore, have not been studied except for medicinal, nutritional or other uses.

The book Invasive Plants of Asian Origin Established in the United

States and Their Natural Enemies Volume 1 contains summaries of existing information on more than 40 species of plants found in Asia that were introduced either purposefully or accidentally into the United States. All of these species have established populations in the United States and many are designated as invasive. It also includes lists of natural enemies in their native range. All of the information in Volume 1 was obtained by searching and reviewing the Chinese literature as well as discussions with Chinese scientists. Prior to this current volume, 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 142 - 147). Also included are maps of US 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 this book (Volume 1) as well as Volume 2 were selected according to their origin, distribution and 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.

Color coded key to distribution maps :

- Does not occur
- Probably does not occur
- Cultivated
- Probably occurs
- Occurs

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 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 above.) The United States distribution maps indicate whether the plant is present (green) or absent (yellow).

Second Edition Changes

New images have been added for *Arthraxon hispidus*. Corrected images of *Artemisia vulgaris* and *Cirsium arvense* have replaced the previous images. The *Ailanthus altissima* U.S. distribution map has been updated. The China distribution maps have been altered to more accurately depict the provinces of China.

References

Pimental, D.; Lach, L.; Zuniga, R.; Morrison, D. 2000. Environmental and economic costs associated with non-indigenous species in the United States. Bioscience 50:53-65.

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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.

Abutilon theophrasti
Velvetleaf, China jute

Abutilon theophrasti buds and flower.

Introduction
The genus *Abutilon* contains approximately 160 species worldwide, primarily in tropical and subtropical areas. In China, ten species and three varieties occur throughout the country. *Abutilon* species are cultivated for medicinal and ornamental purposes as well as a fiber source[44].

Species of *Abutilon* in China

Scientific Name	Scientific Name
A. crispum (Linn.) Medicus	*A. paniculatum* Hand.-Mazz.
A. gebauerianum Hand.-Mazz.	*A. roseum* Hand.-Mazz.
A. guineens (Schumacher)†	*A. sinense* Oliv.
A. hirtum (Lamk.) Sweet	*A. striatum* Dickson.
A. indicum (Linn.) Sweet	***A. theophrasti* Medicus**

† from the revised *Flora of China* (FOC)[170]; others from *Flora Reipublicae Popularis Sinicae* (Flora of People's Republic of China, FRPS)[44]

Taxonomy
Family: Malvaceae
Genus: *Abutilon* Miller

Description
Abutilon theophrasti is an annual subshrub-like herb that can reach a height of 1-2 m. The stem and twigs are covered with fine hairs. The velvety, heart-shaped leaves are alternate, about 5-10 cm long, densely stellate pubescent on both surfaces, with minutely crenate margin, long acuminate apex and cordate base. Petiole is 3-12 cm long with stellate hairs. The stipule is shed early. Blooming from July to August, yellow flowers are produced solitarily in leaf axils. The pedicel is pubescent, 1-3 cm long, with a knot near the apex. The calyx is cup-shaped, densely puberulous, with five ovate lobes about 6 mm long.

Abutilon theophrasti.

Petals are yellow, obovate, and about 1 cm in length. Fruits are semi-globose capsules, about 2 cm in diameter and 1.2 cm in length, with 15-20 scabrous mericarps bearing two long awns at the apex. Seeds are brown, stellately puberulous and reniform[44].

Habitat and Distribution
Abutilon theophrasti occurs throughout mainland China with the exception of Qinghai and Tibet[44]. *Abutilon theophrasti* occurs along roadsides, ditches, hillside slopes, riverbanks, disturbed areas, and crop fields.[44][70][201]

Economic Importance
Abutilon theophrasti has a variety of medicinal uses.[44] It is cultivated as a source of fiber and oil, however, it has escaped from cultivation to become an invasive species of orchards, cotton,

maize, soybean, and vegetable fields, causing serious damage [34][96].

Natural Enemies of *Abutilon*

At least 16 records of fungi have been found on plants of the genus *Abutilon*. Most of them can infect *Abutilon theophrasti* and among them, ten fungal species are only reported on this plant [23]. Six out of eight arthropods are reported to injure *A. theophrasti*, but none is host-specific.

Fungi

Phylum	Family	Species	H. R.	Ref.
Ascomycota	Dothioraceae	*Pleosphaerulina abutilonis* Miura	m	23
	Mycosphaerellaceae	*Mycosphaerella abutilonis* Nakata & Takim.	m	23
		Mycosphaerella abutilontidicola Miura	m	23
Basidiomycota	Ceratobasidiaceae	*Thanatephorus cucumeris* (A.B. Frank) Donk	p	23
	Pucciniaceae	*Puccinia abutili* Berk. & Broome	oo	23
		Puccinia heterospora Berk. & M.A. Curtis	p	23
Oomycota	Peronosporaceae	*Plasmopara skvortzovii* Miura	m	23
			oo	188
Anamorphic Ascomycetes		*Macrophoma abutilonis* Nakata & Takim.	m	23
Anamorphic *Glomerella*		*Colletotrichum pekinensis* Kats.	m	23
Anamorphic *Guignardia*		*Phyllosticta abutilonis* Henn.	m	23
Anamorphic Hypocreales		*Myrothecium roridum* Tode	p	23
Anamorphic *Hypomyces*		*Verticillium albo-atrum* Reinke & Berthold	p	23
Anamorphic *Lewia*		*Alternaria abutilonis* (Speg.) P. Joly [= *Macrosporium abutilonis* Speg.]	o	23†
Anamorphic *Mycosphaerella*		*Cercospora avicennae* Chupp	m	23
Anamorphic Mycosphaerellaceae		*Ascochyta abutilonis* Hollós	m	23
Anamorphic *Nectria*		*Tubercularia abutilonis* Katsura	m	23

†*Macrosporium abutilonis* Speg., and its synonym, *Alternaria abutilonis* (Speg.) P. Joly, are recorded as different accounts. Only one host is recorded for *M. abutilonis* and several host species in one genus for *A. abutilonis*, therefore "o" is the accepted H. R. entry.

Arthropods

Order	Family	Species	H. R.	Ref.
Hemiptera	Coreidae	*Liorhyssus hyalinus* (Fabricius)	p	192
	Pyrrhocoridae	*Dysdercus cingulatus* (Fabricius)	p	192
Homoptera	Pseudococcidae	*Pseudococcus maritimus* Ehrhorn	po	150
Lepidoptera	Noctuidae	*Acontia malvae* Esper	p	205
		Anomis flava (Fabricius)	p	158
			p	205
		Heliothis armigera (Hübner)	p	205
	Nymphalidae	*Hypolimnas missipus* (Linnaeus)	p	203
Thysanoptera	Thripidae	*Tusothrips aureus* (Mouleon)	po	140

Acer ginnala
Amur maple

Leaves of *Acer ginnala*.

Introduction
The genus *Acer* is comprised of approximately 200 species that are widely distributed throughout Asia, North America, and Europe. More than 100 species are recorded in China [43].

Species of *Acer* in China†
(see next page)

Taxonomy
Family: Aceraceae
Genus: *Acer* L.

Description
Well-known for its brilliant red and orange fall color, Amur maple is a deciduous shrub or woody tree that can reach a height of 5 to 6 m. The bark is coarse, slightly split vertically, and grayish, rarely deep gray or grayish brown. The slender twigs are cylindroid and glabrous. The white lenticels are elliptic or nearly rounded. Winter buds are small, light brown, villous edged, and bear eight scales in an imbricate arrangement. Leaves are papery, oblong ovate to elliptic, 6-10 cm long and 4-6 cm wide, basally round, truncate or subcordate, and 3-5 lobed, with the middle lobe being acute or narrowly acute while the lateral pair are relatively obtuse. Each lobe has a dentate margin. The upper leaf surface is dark green and glabrous; the lower surface is light green and nearly glabrous. Appearing in May, the corymb inflorescence is glabrous and approximately 6 cm in length. Bisexual and male flowers are produced on the same plant. The calyx has 5 ovate sepals that are yellowish green and villous margined. The 5 petals are longer than the sepals, white, and oblong to ovate. There are eight stamens, of which the filaments are glabrous and the anthers are yellow. The fruit is a double samara, ripening in October, yellowish green or yellowish brown, noticeably veined, about 8 mm long and 8-10 mm wide [43].

Habitat and distribution
A. ginnala occurs in forests below 800 m in Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Inner Mongolia, Ningxia, Shaanxi, Shanxi [43][115], and Shandong provinces[8].

Economic Importance
The young leaves can be used as a substitute for tea. Medicinally, *A. ginnala* has a variety of uses. The stems and leaves are sources of dye [81].

Related Species
Acer ginnala subsp. *theiferum* (Fang) can be distinguished from the original species by its thinner papery leaves with entire margins and inconspicuous lobes. *A. ginnala* subsp. *theiferum* grows in low-elevation, sparse forests of eastern and central China [43]. Distribution data are recorded for the provinces of Anhui[30], Fujian[36], Guangdong[156], Jiangsu[81], Jiangxi[84], and Zhejiang[127]. The subspecies is also recorded as *A. ginnala* Maxim. in some publications [81].

Flowers of *Acer ginnala*.

Natural Enemies of *Acer*

Thirty-seven fungi and 58 arthropod species have been reported from plants of the genus *Acer*. Most of the fungi and eight arthropods appear to have a narrow host range.

Species of *Acer* in China†

Scientific Name	Scientific Name	Scientific Name
A. acutu Fang	*A. albo-purpurascens* Hayata	*A. amplum* Rehd.
A. anhweiense Fang et Fang f.	*A. barbinerve* Maxim.	*A. bicolor* F. Chun
A. buergerianum Miq.	*A. caesium* Wall. ex Brandis	*A. campbellii* Hook. f. et Thoms. ex Hiern
A. cappadocicum Gled.	*A. catalpifolium* Rehd.	*A. caudatifolium* Hayata
A. caudatum Wall.	*A. ceriferum* Rehd.	*A. changhuaense* (Fang et Fang f.) Fang et P. L. Chiu
A. chienii Hu et Cheng	*A. chingii* Hu	*A. chunii* Fang
A. cinnamomifolium Hayata	*A. confertifolium* Merr. et Metc.	*A. cordatum* Pax
A. coriaceifolium Lévl	*A. crassum* Hu et Cheng	*A. davidii* Franch.
A. decandrum Merr.	*A. discolor* Maxim.	*A. duplicato-serratum* Hayata
A. elegantulum Fang et P. L. Chiu	*A. erianthum* Schwer.	*A. eucalyptoides* Fang et Wu
A. fabri Hance	A. fenzelianum Hand.-Mazz.	*A. firmianioides* Cheng
A. flabellatum Rehd.	*A. forrestii* Diels	*A. franchetii* Pax
A. fulvescens Rehd.	***A. ginnala* Maxim.**	*A. griseum* (Franch.) Pax
A. grosseri Pax	*A. hainanense* Chun et Fang	*A. henryi* Pax
A. heptalobum Diels	*A. hilaense* Hu et Cheng	*A. hookeri* Miq.
A. huianum Fang et Hsieh	*A. hypoleucum* Hayata	*A. japonicum* Thunb.
A. kiangsiense Fang et Fang f.	*A. kiukiangense* Hu et Cheng	*A. komarovii* Pojark.
A. kungshanense Fang et C. Y. Chang	*A. kuomeii* Fang et Fang f.	*A. kwangnanense* Hu et Cheng
A. kweilinense Fang et Fang f.	*A. laevigatum* Wall.	*A. laikuanii* Ling
A. laisuense Fang et W. K. Hu	*A. lanceolatum* Moll.	*A. lanpingense* Fang et Fang f.
A. laxiflorum Pax	*A. leiopodum* (Hand.-Mazz.) Fang et Chow	*A. leipoense* Fang et Soong
A. leptophyllum Fang	*A. linganense* Fang et P. L. Chiu	*A. lingii* Fang
A. litseaefolium Hayata	*A. longicarpum* Hu et Cheng	*A. longipes* Franch. ex Rehd.
A. lucidum Metc.	*A. lungshengense* Fang et L. C. Hu	*A. machilifolium* Hu et Cheng
A. mandshuricum Maxim.	*A. mapienense* Fang	*A. maximowiczii* Pax.
A. megalodum Fang et Su	*A. metccalfii* Rehd.	*A. miaoshanicum* Fang
A. miaotaiense P. C. Tsoong	*A. mono* Maxim.	*A. nayongense* Fang
A. negundo Linn.	*A. nikoense* Mixim.	*A. oblongum* Wall. ex DC.
A. oligocarpum Fang et L. C. Hu	*A. olivaceum* Fang et P. L. Chiu	*A. oliverianum* Pax
A. paihengii Fang	*A. palmatam* Thunb.	*A. pashanicum* Fang et Soong
A. pauciflorum Fang	*A. paxii* Franch.	*A. pectinatum* Wall. ex Nichols.
A. pehpeiense Fang et Su	*A. pentaphyllum* Diels	*A. pilosum* Maxim.
A. poliophyllum Fang et Wu	*A. prolificum* Fang et Fang f.	*A. pseudo-sieboldianum* (Pax) Komarov
A. pubinerve Rehd.	*A. pubipalmatum* Fang	*A. pubipetiolatum* Hu et Cheng
A. reticulatum Champ.	*A. robustum* Pax	*A. rubescens* Hayata
A. Schneiderianum Pax et Hoffm.	*A. semenovii* Regel et Herder.	*A. shangszeense* Fang et Soong
A. shensiense Fang et L. C. Hu	*A. shihweii* Chun et Fang	*A. sichourense* (Fang et Fang f.) Fang
A. sikkimense Miq.	*A. sinense* Pax	*A. sino-oblongum* Metc.
A. sinopurpurasscens Cheng	*A. stachyophyllum* Hiern	*A. stenolobum* Rehd.
A. sterculiaceum Wall.	*A. sunyiense* Fang	*A. sutchuenense* Franch.
A. sycopseoides Chun	*A. taipuense* Fang	*A. taronense* Hand.-Mazz.
A. tegmentosum Maxim.	*A. tenellum* Pax	*A. tetramerum* Pax
A. thomsonii Miq.	*A. tibetense* Fang	*A. tonkinense* H. Lec.
A. triflorum Komarov	*A. truncatum* Bunge	*A. tsinglingense* Fang et Hsieh
A. tutcheri Duthie	*A. ukurunduense* Trautv. et Mey.	*A. wangchii* Fang
A. wardii W. W. Smith	*A. wilsonii* Rehd.	*A. wuyishanicum* Fang et Tan
A. wuyuanense Fang et Wu	*A. yanjuechi* Fang et P. L. Chiu	*A. yaoshanicum* Fang
A. yinkunii Fang	*A. yui* Fang	

† 147 species are recorded in FRPS[43]; 107 are recorded in the revised Flora of China[169]

Fungi

Phylum	Family	Species	H. R.	Ref.
Ascomycota	Erysiphaceae	*Sawadaea bicornis* (Wallr.) Miyabe	oo	22[I]
			oo	23[II]
		Sawadaea bomiensis R.Y. Zheng & G.Q. Chen	oo	22[III]
		Sawadaea negundinis Homma	o	22[IV]
		Sawadaea polyfida (C.T. Wei) R.Y. Zheng & G.Q. Chen	oo	22[V]
			mo	23[VI]
		Sawadaea tulasnei (Fuckel) Homma	oo	22[VII]
		Uncinula aceris var. *tulasnei* (Fuckel) E.S. Salmon	oo	23
		Uncinula circinata Cooke & Peck	oo	22
		Uncinula ljubarskii var. *aduncoides* (R.Y. Zheng & G.Q. Chen) R.Y. Zheng & G.Q. Chen	oo	22
		Uncinula nankinensis F.L. Tai	oo	22
			mo	23
		Uncinula negundinis (Homma) Tai	mo	23
		Uncinula sinensis F.L. Tai & C.T. Wei	po	23
	Meliolaceae	*Meliola aceris* W. Yamam.	mo	23
			oo	62
	Rhytismataceae	*Rhytisma acerinum* (Pers.) Fr.	oo	23[VIII]
		Rhytisma punctatum (Pers.) Fr.	o	23
		Vladracula annuliformis (Syd., P. Syd. & E.J. Butler) P.F. Cannon, Minter & Kamal	mo	23[IX]
Basidiomycota	Boletaceae	*Phellinus igniarius* (L.) Quél.	po	23
	Ganodermataceae	*Ganoderma applanatum* (Pers.) Pat.	po	23
	Hymenochaetaceae	*Inonotus radiatus var. licentii* Pilát	po	23
	Polyporaceae	*Aurantiporus fissilis* (Berk. & M.A. Curtis) H. Jahn	po	23 [X]
		Poria lurida Bres.	po	23
		Trametes versicolor (L.) Lloyd	po	23[XI]
	Pucciniastraceae	*Melampsoridium aceris* Jørst.	mo	23
		Pucciniastrum hikosanense Hirats. f.	mo	23
	Steccherinaceae	*Steccherinum septentrionale* (Fr.) Banker	po	23
Anamorphic Ascomycetes		*Dinemasporium acerinum* Peck	oo	23
		Mycocentrospora acerina (R. Hartig) Deighton	oo	23[XII]
Anamorphic *Didymosphaeria*		*Asteromella platanoidis* (Sacc.) Petr.	mo	23
Anamorphic *Guignardia*		*Phyllosticta arida* Earle	mo	23
		Phyllosticta minima (Berk. & M.A. Curtis) Underw. & Earle	mo	23[XIII]
		Phyllosticta negundicola Sacc.	mo	23
		Phyllosticta negundinis Sacc. & Speg.	mo	23
		Phyllosticta platanoidis Sacc.	mo	23

Anamorphic *Hypomyces*	*Verticillium albo-atrum* Reinke & Berthold	po	23
Anamorphic *Lewia*	*Alternaria negundinicola* (Ellis & Barthol.) P. Joly	oo	23
Anamorphic *Mycosphaerella*	*Pseudocercospora acericola* (Woron.) Y.L. Guo & X.J. Liu	mo	110
	Septoria negundinis Ellis & Everh.	mo	23
Anamorphic *Rhytisma*	*Melasmia punctata* Sacc. & Roum.	oo	23

I Recorded as *Sawadaia bicornis* (Wallr.: Fr.) Homma
II Recorded as *Uncinula aceris* (DC.) Sacc.
III Recorded as *Sawadaia bomiensis* Zheng et Chen
IV Recorded as *Sawadaia negundinis* Homma
V Recorded as *Sawadaia polyfida* (Wei) Zheng et Chen
VI Recorded as *Uncinula polyfida* C.T. Wei
VII Recorded as *Sawadaia tulasnei* (Fuckel) Homma
VIII *Melasmia acerina* Lev., of which *Rhytisma acerinum* (Pers.) Fr. is the current name recorded as a separate entry in reference 23.
IX Recorded as *Schizothyrium annuliforme* Syd. et Butl.
X Recorded as *Tyromyces fissilis* (Berk. et Curt.) Donk
XI Recorded as *Coriolus versicolor* (L. ex Fr.) Quél.
XII Recorded as *Cercospora acerina* Hart.
XIII Recorded as *Phyllosticta minima* (Berk. et Curt.) Ell. et Ev.

Arthropods

Order	Family	Species	H. R.	Ref.
Acariformes	Eriophyidae	*Aculops longispinosus* Kuang et Hong	oo	83
Coleoptera	Cerambycidae	*Gracilia minuta* Fabricius	po	9
		Palimna liturata (Bates)	po	9
	Eumolpidae	*Cryptocephalus mannerheimi* Gebler	p	139
		Xanthonia foveata T'an	oo	140
Hemiptera	Acanthosomatidae	*Elasmostethus humeralis* Jakovlev	p	192
	Pentatomidae	*Amyntor obscurus* (Dallas)	po	192
		Lelia decempunctata Motschulsky	po	192
		Rhaphigaster nebulosa Poda	po	192
Homoptera	Chaitophoridae	*Periphyllus acerihabitans* Zhang	mo	189
		Periphyllus diacerivorus Zhang	mo	189
	Cicadellidae	*Erythroneura apicalis* (Nawa)	po	48
		Typhlocyba tenerrima Herrich-Schäffer	po	48
	Coccidae	*Ceroplastes rubens* Maskell	po	151
		Eulecanium kuwanai Kanda	po	151
	Pseudococcidae	*Eriococcus tokaedae* Kuwana	po	150
	Psyllidae	*Cacopsylla lineaticeps* (Kwon)	m	137
		Cacopsylla sp.	m	137
Lepidoptera	Arctiidae	*Hyphantria cunea* (Drury)	po	41
	Cochylidae	*Eupoecilia ambiguella* Hübner	po	66
	Drepanidae	*Cyclidia substigmaria* (Hübner)	po	65
		Mimozethes argentilinearia (Leech)	oo	66
	Gelechiidae	*Anacampsis populella* Clerck	po	66
	Geometridae	*Apocheima cinerarius* Erschoff	po	66
		Asthena octomacularia Leech	mo	177
		Culcula panterinaria (Bremer et Grey)	po	66
		Eupithecia gigantea Staudinger	po	138
		Hydrelia nisaria (Christoph)	po	177

Lepidoptera		*Operophtera brumata* (Linnaeus)	po	177
		Operophtera relegata Prout	po	177
		Phthonosema invenustaria Leech	po	66
			po	138
		Trichopteryx hemana (Butler)	po	177
	Hepialidae	*Phassus nodus* Chu et Wang	po	65
	Limacodidae	*Cnidocampa flavescens* (Walker)	po	66±
		Latoia hilarata (Staudinger)	po	65
			po	66
		Monema flavescens Walker	po	65
		Norosoideus flavidorsalis (Staudinger)	po	65
			po	66
		Parasa consocia Walker	po	66
		Parasa sinica Moore	po	66
	Lymantriidae	*Arctornis l-nigrum* (Müller)	po	141
	Noctuidae	*Amphipyra pyramidea* (Linnaeus)	po	205
		Catocala fraxini (Linnaeus)	po	205
	Notodontidae	*Dudusa sphingiformis* Moore	po	1
			po	65
		Phalera bucephala (Linnaeus)	po	1
		Shaka atrovittata (Bremer)	oo	141
		Tarsolepis japonica Wileman et South	oo	1
			oo	65
		Togepteryx velutina (Oberthür)	oo	65
	Nymphalidae	*Neptis philyra splendens* Murayama	po	203
	Sphingidae	*Oxyambulyx japonica* Rothschild	oo	206
			po	208
		Oxyambulyx ochracea (Butler)	po	141
			oo	206
			po	208
	Tortricidae	*Archips capsigerana* Kennel	po	66
		Cerace xanthocosma Diakonoff	po	65
			po	66
		Choristoneura diversana (Hübner)	po	66
			po	113
		Pandemis cinnamomeana (Treitschke)	po	65
			po	66
			po	141
		Pandemis ribeana (Hübner)	po	66
			po	113
		Ptycholoma lecheana (Linnaeus)	po	65
			po	113
		Ptycholomoides aeriferanus (Herrich-Schäffer)	po	113
Parasitiformes	Phytoseiidae	*Amblyseius oguroi* Ehara	po	65

† Recorded as *Parata hilarata* (Staudinger)

Agrostis tenuis
Bentgrass

Introduction
Agrostis is a genus that includes about 200 species worldwide. The main distribution is in the cooler areas of temperate zones, especially in the northern hemisphere. At least 32 species and 10 varieties of the genus are reported in China. Most of them are forage favored by livestock such as cattle and horses [180].

Species of *Agrostis* in China

Scientific Name	Scientific Name
A. arisan-montana Ohwi.	*A. micrantha* Steud.
A. canina L.	*A. morrisonensis* Hayata
A. clavata Trin.	*A. myriantha* Hook. f.
A. contracta Y. C. Tong ex Y. C. Yang	*A. perlaxa* Pilger
A. divaricatissima Mez	*A. pubicallis* Keng ex Y. C. Yang
A. eriolepis Keng ex Y. C. Yang	*A. rupestris* All.
A. flaccida Hack.	*A. schneideri* Pilger
A. fukuyamae Ohwi	*A. sibirica* V. Petr.
A. gigantea Roth	*A. sinkiangensis* Y. C. Yang
A. hookeriana Clarke ex Hook. f.	*A. subaristata* Aitch. et Hemsl.
A. hugoniana Rendle	***A. tenuis*** Sibth.
A. inaequiglumis Griseb.	*A. transmorrisonensis* Hayata
A. limprichtii Pilger	*A. trinii* Turcz.
A. matsumurae Hack. ex Honda	*A. turkestanica* Drob.
A. megathyrsa Keng	

The above list of species is recorded in *Flora Reipublicae Popularis Sinicae* published in the late 1980s [180]. Recently, some new taxa, including three species (*A. pilosula* Trin., *A. lushuiensis* B. S. Sun et Y. C. Wang, and *A. kunmingensis* B. S. Sun et Y. C. Wang) and two varieties (*A. pilosula* Trin. var. *wallichiana* [Steud.] Bor. and *A. myriantha* Hook. f. var *yangbiensis* B. S. Sun et Y. V. Wang), were identified [148][147].

Taxonomy
Family: Gramineae (Poaceae)
Genus: *Agrostis* Linn.

Description
Agrostis tenuis is a perennial grass that can reach 20-25 cm in height. Rhizomes are short; slender culms about 1 mm in diameter, with three to four nodes clump at the base, and then become erect. Leaf sheaths are smooth and often taller than the internode. Ligules are dry and membranous, about 1 mm long, with a truncate apex. The thick leaves are flat and narrow, 2-4 cm long and 1-1.5 mm wide, acuminate apically and often rolled in dry conditions. Nearly elliptic in shape, panicles are spreading with two to five branches at each node, ascending. Spikelets are purple-brown, elliptical to lanceolate, 1.5-1.7 cm long and coarse on the surface, with awnless lemma. Flowers appear in August, with golden anthers 0.8-1 mm long[180].

Distribution
Eurasian in origin, *A. tenuis* occurs in Shanxi province [75][180], and probably in Henan, Ningxia[116], Inner Mongolia[121], and Xinjiang provinces[21].

Habitat
In China, bentgrass commonly grows in wetlands, [75] especially in moist grasslands[180] at elevations of 1000 - 1500 m. In some areas of Xinjiang, the grass is found in oases, meadows, and cultivated areas at elevations of 800 - 2300 m [21].

Economic Importance
Bentgrass is grown as a lawn grass in some areas.

Related Species
Agrostis sibirica V. Petr. can be differentiated from *A. tenuis* by its yellowish green spikelets and lanceolate leaves; *A. sibirica* occurs in roadside wetlands at an elevation of 400 m in the provinces of northeastern China [180].

Natural Enemies of Agrostis
Thirteen fungi, and four insect species

are recorded as associated with plants of the genus *Agrostis* in China. Two fungi, *Puccinia agrostidicola* Tai and *Puccinia recondita* Rob. et Desm. f. sp. *agrostidis* D. M. Hend. may have narrow host ranges. All four insect species are polyphagous.

Fungi

Phylum	Family	Species	H. R.	Ref.
Ascomycota	Clavicipitaceae	*Claviceps purpurea* (Fr.) Tul.	po	23
Basidiomycota	Pucciniaceae	*Puccinia agropyricola* Hiratsuka	po	149
		Puccinia agrostidicola F.L. Tai	o	23
			o	149
		Puccinia brachypodii var. *poae-nemoralis* (G.H. Otth) Cummins & H.C. Greene	po	23
			po	149
		Puccinia coronata Corda	po	23
			po	149
		Puccinia coronata var. *himalensis* Barclay	po	149
		Puccinia graminis Pers.	po	149
		Puccinia pygmaea Erikss.	po	149
		Puccinia rangiferina S. Ito	po	23
			po	149
		Puccinia recondita f.sp. *agrostidis* D.M. Hend.	o	23
		Puccinia recondita Dietel & Holw.	po	149
	Ustilaginaceae	*Ustilago striiformis* (Westend.) Niessl	po	54
Oomycota	Pythiaceae	*Pythium mamillatum* Meurs	po	188

Arthropods

Order	Family	Species	H. R.	Ref.
Hemiptera	Piesmatidae	*Piesma quadratum* (Fieber)	po	106
Homoptera	Pseudococcidae	*Saccharicoccus penium* Williams	po	152
		Trionymus thulensis Green	po	152
Lepidoptera	Noctuidae	*Agrotis ipsilon* (Hufnagel)	po	190†

† Recorded as *Agrotis ypsilon* (Rottemberg)

Ailanthus altissima
Tree of heaven

Ailantus altissima leaves and flowers.

Introduction
The genus *Ailanthus* consists of approximately ten species, which have a wide distribution ranging from Asia to north Oceania. Five species and two varieties have been found in southwestern, southeastern, central, and northern China.[64]

Taxonomy:
Family: Simaroubaceae
Genus: *Ailanthus* Desf.

Species of *Ailanthus* in China

Scientific Name	Scientific Name
A. altissima (Mill.) Swingle	*A. triphysa* (Dennst.) Alston
A. fordii Nooteboom	*A. vilmoriniana* Dode
A. giraldii Dode	

Description
Ailanthus altissima is a deciduous woody tree that can reach a height of 20 m. The bark is smooth with vertical streaks. The pithy shoots are initially covered with yellow or yellowish brown hairs, becoming glabrous. The leaves are odd-pinnate, 40-60 cm in length, consisting of 13-27 opposite or nearly opposite leaflets, which are papery, ovate, or lanceolate, 7-13 cm long and 2.5-4 cm wide, acuminate in the apex and suborbicular or cuneate at the base, with one or two glandular tips. The upper side of the leaf is deep green while the underside is grayish green. The inflorescence is a panicle with greenish flowers appearing from April to May. The flowers are about 6 mm long with 5 imbricate sepals and five petals, which are 2-2.5 mm long and hirsute at the base. The staminate flowers have an unpleasant odor; leaves also produce this odor when bruised. The fruit, which appears from August to October, is an oblong samara, 3 - 4.5 cm long and 1-1.2 cm wide, with a single flat seed in the middle of the wings[64].

Colorful fruits of *A. altissima*.

Habitat
A. altissima grows well in limestone-rich soils and often occurs in disturbed areas.

Distribution
A. altissima occurs nationwide in China with the exception of Gansu, Heilongjiang, Hainan, Jilin, Ningxia, Qinghai, Tibet and Xinjiang.[64] The plant is recently reported to be cultivated in Ningxia,[115] Qinghai,[107] and Xinjiang.[175]

Economic Importance
A. altissima is planted in limestone areas for reforestation purposes, but in most cases, the plant is grown as an ornamental. The tree is a source of timber. The leaves serve as forage for *Samia cynthia* (Drurvy), a species of silk-producing caterpillar. The bark and fruit have medicinal uses [64].

Related Species
Two varieties of *A. altissima* are reported in China. *Ailanthus altissima* var. *tanakai* (Hayata) Kanehira et Sasaki has yellowish-gray bark, scythe-like leaflets and a single-seeded reddish-brown fruit. *Ailanthus altissima* var. *sutchuenensis* (Dode) Rehd. et Wils. can be identified by its red branchlets [64].

Natural Enemies of *Ailanthus*
At least 32 arthropods and 13 fungi have been recorded in association with the genus *Ailanthus* in China. Four identified fungal species (*Phyllactinia ailanthi* (Golov. et Bunk.), *Cercospora glandulosa* Ell. et Kell., *Phyllosticta ailanthi* Sacc., and *Pseudocercospora ailanthicola* (Patwardhan) Deighton; at least two new taxa (*Alternaria ailanthi* from Shandong and Shaanxi, and *Aecidium ailanthi* from Shaanxi);

along with one as yet unidentified *Coleosporium sp.* from Henan, are reported only from *A. altissima*. *Cytospora ailanthi* Berk. et Curtis, which can cause a symptom of bark canker on tree of heaven, is reported to occur in Xinjiang[187].One flexuous filamentous virus has been isolated from a tree of heaven exhibiting mosaic. It has been identified as a member of the potyvirus group[181]. Witches' broom, caused by a mycoplasma-like organism, is reported from Anhui [187].Two weevils, *Eucryptorrhynchus brandti* (Harold) and *Eucryptorrhynchus chinensis* (Olivier), and one bug, *Orthopagus lunulifer* Uhler, may have potential for biological control of this plant based on their reported H. R.s and damage to the plant.

Fungi

Phylum	Family	Species	H.R.	Ref.
Ascomycota	Erysiphaceae	*Phyllactinia ailanthi* (Golovin & Bunkina) Y.N. Yu & S.J. Han	m	22
			p	23†
		Uncinula delavayi Pat.	o	22
			o	23
		Uncinula picrasmae Homma	mo	22
Basidiomycota	Coleosporiaceae	*Coleosporium* sp.	m	187
	Incertae sedis	*Aecidium ailanthi* J.Y. Zhuang	m	210
	Schizophyllaceae	*Schizophyllum multifidum* (Batsch) Fr.	oo	23
	Sphaerophragmiaceae	*Nyssopsora cedrelae* (Hori) Tranzschel	p	23
Anamorphic *Guignardia*		*Phyllosticta ailanthi* Sacc.	m	23
Anamorphic *Lewia*		*Alternaria ailanthi* T.Y. Zhang & Y.L. Guo	m	nc
Anamorphic *Mycosphaerella*		*Cercospora glandulosa* Ellis & Kellerm.	m	23
		Pseudocercospora ailanthicola (Patw.) Deighton	m	110
		Pseudocercospora qinlingensis Y.L. Guo	oo	110
Anamorphic *Valsa*		*Cytospora ailanthi* Berk. & M.A. Curtis	m	187

† recorded as *Phyllactinia corylea* (Pers.) P. Karst., and regarded as a synonym of *Phyllactinia ailanthi* (Golovin & Bunkina) Y.N. Yu & S.J. In reference 22, although *Phyllactinia guttata* (Wallr.) Lév. is regarded as the current name of *P. corylea*.

Arthropods

Order	Family	Species	H. R.	Ref.
Acariformes	Tetranychidae	*Tetranychus urticae* (Koch)	p	85
		Tetranychus viennensis Zacher	p	85
Coleoptera	Cerambycidae	*Acalolepta degener* (Bates)	p	85
		Mesosa longipennis Bates	p	9
	Chrysomelidae	*Gastrolina depressa* Baly	p	85
	Curculionidae	*Alcidodes waltoni* (Bohemen)	p	85
		Desmidophorus hebes Fabricius	p	85
		Eucryptorrhynchus brandti (Harold)	m	2
		Eucryptorrhynchus chinensis (Olivier)	m	2
	Eumolpidae	*Basilepta ruficolle* (Jacoby)	p	85
	Scolytidae	*Xyleborus discolor* Blandford	p	182
		Xyleborus lewisi Blandford	p	182
Hemiptera	Pentatomidae	*Erthesina fullo* (Thunberg)	p	85
		Palomena angulosa Motschulsky	p	85
Homoptera	Cicadidae	*Huechys sanguinea* De Geer	p	85
	Coccidae	*Ceroplastes japonicus* Green	p	85
	Diaspididae	*Pinnaspis theae* (Maskell)	p	85
	Dictyopharidae	*Orthopagus lunulifer* Uhler	m	85
	Fulgoridae	*Lycorma delicatula* (White)	p	140
			p	204
	Margarodidae	*Icerya seychellarum* (Westwood)	p	85
Lepidoptera	Geometridae	*Culcula panterinaria* (Bremer et Grey)	p	85
		Percnia giraffata (Guenée)	p	65
			p	158
	Hepialidae	*Phassus excrescens* Butler	p	85
		Phassus miniatus Chu et Wang	p	85
	Noctuidae	*Eligma narcissus* (Cramer)	p	65
			m	85
			p	158
	Pieridae	*Eurema hecabe* (Linnaeus)	p	85
		Talbotia naganuvm (Moore)	p	158
	Pyralidae	*Dichocrocis punctiferalis* (Guenée)	p	85
		Omphisa plagialis Wileman	p	85
	Saturniidae	*Actias selene ningpoana* Felder	p	141
		Samia cynthia (Drurvy)	p	65[I]
			p	141[II]
			p	158[III]
			p	207
		Samia cynthia ricina (Donovan)	p	158[IV]
			p	207

[I, III] Recorded as *Philosamia cynthia walkeri* Felder et Felder; [II] Recorded as *Philosamia cynthia* Walker et Felder, [IV] Recorded as *Philosamia cynthia ricina Donovan*

Akebia quinata
Chocolate vine, five-leaf Akebia

Akebia quinata leaves.

Introduction
Native to eastern Asia, the genus *Akebia* consists of five species, with four species and three subspecies reported in China[168]. Members of this genus are deciduous or semi-deciduous twining vines. The roots, vines, and fruits can be used for medicinal purposes. The sweet fruits can be used in wine-making[4].

Taxonomy:
Family: Lardizabalaceae
Genus: *Akebia* Decne.

Species of *Akebia* in China

Scientific Name	Scientific Name
A. chingshuiensis T. Shimizu	***A. quinata*** (Houtt.) Decne
A. longeracemosa Matsumura	*A. trifoliata* (Thunb.) Koidz

Description
Akebia quinata is a deciduous woody vine with slender, twisting, cylindrical stems bearing small, round lenticels on the grayish brown surface. Bud scales are light reddish-brown with an imbricate arrangement. Leaves are palmate, alternating along the stems or clustered on the branchlets, and divided into five, or sometimes three to four or six to seven papery leaflets that are obovate or obovately elliptic, 2-5 cm long, 1.5-2.5 cm wide, with a round or emarginate apex and a round or broadly cuneate base. Infrequently blooming, the inflorescence is an axillary raceme of fragrant flowers appearing from April to May. The lowest two flowers are male and the rest are female. Appearing from June to August, oblong or elliptic purplish fruits split open when mature, revealing dark, brownish, flat seeds arranged irregularly in rows[4].

Habitat and Distribution
A. quinata grows near forest margins along streams, as scrub on mountain slopes at 300 - 1500 m elevation, in most of the provinces through which the Yellow River flows[4]. It has a native range in Anhui, Fujian, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shandong, Sichuan, Zhejiang, and is recorded as *Akebia quinata* var. *polyphylla* Nakai in Shaanxi, and possibly Gansu provinces [52] [66] [68] [77] [97] [101] [157] [168].

Economic Importance
In China, chocolate vine is one of the most ancient traditional medicines. Stems, roots, and fruits are medically useful. In addition, the edible fruits have a sweet taste. Oil extracted from the seeds is used in soap-making. To date, no ecological impact in China has been reported [66][4].

Related Species
Akebia quinata has five leaflets per leaf, *A. trifoliata* (Thunb.) Koidz has three leaflets per leaf, hence the name "three-leaf akebia". Besides the subspecies trifoliata, two additional subspecies of *A. trifoliata* have been reported in China. They are *A. trifoliata* subsp. *australis* and *A. trifoliata* subsp. *longisepala* H. N. Qin[168].

Thick growth of *Akebia quinata* in a forest understory.

Natural Enemies of *Akebia*

Four species of fungi have been found in association with members of the genus *Akebia*. Three fungi can attack both five-leaf akebia and three-leaf akebia. Three lepidopterans are known to damage five-leaf akebia, *Ophideres fullonica* (Linnaeus), the most common, is also a serious orchard pest.

Fungi

Phylum	Family	Species	H.R.	Ref.
Ascomycota	Erysiphaceae	*Microsphaera akebiae* Sawada	o	22
		Microsphaera penicillata (Wallr.) Lév.	p	23†
	Microthyriaceae	*Muyocopron smilacis* (De Not.) Sacc.	oo	23‡
Basidiomycota	Incertae sedis	*Aecidium akebiae* Henn.	o	23

† Recorded as *Microsphaera alni* (Wallr.) Salm.
‡ Recorded as *Myiocopron smilacis* (de Not.) Sacc.

Arthropods

Order	Family	Species	H. R.	Ref.
Lepidoptera	Geometridae	*Evecliptopera decurrens* (Moore)	o	177
	Noctuidae	*Ophideres fullonica* Linnaeus	m	158
			p	67
			m	205
			m	65
	Tortricidae	*Archips asiaticus* (Walsingham)	p	141

† recorded as *Ophideres fullonia* (Clerck)

Albizia julibrissin
Mimosa, silk tree

Leaves and fruits of *Albizia julibrissin*.

Introduction
The genus *Albizia* (also *Albizzia)* consists of approximately 150 species distributed in Asia, Africa, Australia, and tropical and subtropical America. Most species are deciduous woody trees and shrubs. They are easily identified by their bipinnately compound leaves. Several *Albizia* species are planted as ornamentals or as a source of tannin extracts. Seventeen species of *Albizia* occur in China, primarily in the southwestern, southern, and southeastern provinces [74][155].

Species of *Albizia* in China[155]
Taxonomy:

Scientific Name	Scientific Name
A. attopeuensis (Pierre) Nielsen	*A. kalkora* (Roxb.) Prain
A. bracteata Dunn	*A. lebbeck* (Linn.) Benth.
A. calcarea Y. H. Huang	*A. lucidior* (Steud.) Nielsen
A. chinensis (Osbeck) Merr.	*A. mollis* (Wall.) Boiv.
A. corniculata (Lour.) Druce	*A. odoratissima* (Linn. f.) Benth.
A. crassiramea Lace	*A. procera* (Roxb.) Benth.
A. duclouxii Gagnep.	*A. sherriffii* Baker
A. falcataria (Linn.) Fosberg	*A. simeonis* Harms
A. julibrissin Durazz.	

Family: Leguminoseae (Fabaceae)
Genus: *Albizia* Durazz.

Description
Albizia julibrissin is a woody tree with a spreading crown and ridged twigs. It can grow to 16 m tall at maturity. The stems contain many stiff, appressed hairs. Leaves are fern-like, bipinnately compound with 4-12 pairs of pinnae (sometimes 20 pairs in cultivated specimens), with linear lance-shaped stipules and one gland near the base of the rachis (central petiole). Each pinna consists of 10-30 pairs of linear to oblong leaflets that are 6-12 mm long, 1-4 mm wide, and obliquely acute towards the apex. From June to July, a head inflorescence of attractive pink flowers is produced at the top of the branch. The calyx is 3 mm long and tube-like; the corolla is 8 mm long and tri-lobed. The seeds are contained in elongate, flattened pods that mature from August to October, measuring 9-15 cm long and 1.5-2.5 wide[155].

Habitat
Mimosa trees often grow on hillsides, in valleys, and on plains. Because it is fast-growing and drought-tolerant, *A. julibrissin* is also widely planted along roadways or in gardens for ornamental purposes. It is also grown in sandy areas to prevent erosion [74][111][155].

Distribution
A. julibrissin's native range covers northeastern, southwestern, and southern China [155]. Due to its wide cultivation, *A. julibrissin* can be found in almost every province except Hainan[159], Inner Mongolia[119], Heilongjiang[45], and Jilin provinces[45].

Economic Importance
Because of its graceful flowers and umbrella-like canopy, *Albizia julibrissin* has been widely planted as an ornamental tree for landscaping along roads. Its wood can be used for building and furniture-making. The young leaves are edible. The bark has been utilized as an insect repellent, and

A. julibrissin flowers.

as medicine [74] [155].

Related Species

As a cultivated variety, *A. julibrissin* Durazz f. *rosae* (Carr.) Rehd grows in a relatively small form and produces light pink flowers. *Albizia chinensis* (Osbeck) Merr., with similar economic importance to *A. julibrissin*, is distinguished from mimosa by its semicordate stipules and greenish white flowers. *Albizia chinensis* occurs in the provinces of Fujian, Guangdong, Guangxi, Hunan, Tibet, and Yunnan[155].

Natural Enemies of Albizia

Nine fungal species are recorded from plants of the genus *Albizia*. *Ravenelia japonica* is known to infect *A. julibrissin*. Seventy-five arthropod species belonging to 27 families and 6 orders are associated with *Albizia* spp. Five insects may be host-specific to *A. julibrissin*.

Fungi

Phylum	Family	Species	H.R.	Ref.
Basidiomycota	Ganodermataceae	*Ganoderma tropicum* (Jungh.) Bres.	po	23
	Hymenochaetaceae	*Phellinus torulosus* (Pers.) Bourdot & Galzin	po	23
		Xanthochrous hispidus (Bull.) Pat.	po	23
	Polyporaceae	*Lenzites shichiana* (Teng & L. Ling) Teng	oo	23
	Raveneliaceae	*Ravenelia japonica* Dietel & P. Syd.	o	23
		Ravenelia sessilis Berk.	oo	23
	Sphaerophragmiaceae	*Sphaerophragmium acaciae* (Cooke) Magnus	oo	23
Anamorphic *Glomerella*		*Colletotrichum lebbek* (Syd.) Petr.	mo	23
Anamorphic *Mycosphaerella*		*Pseudocercospora glaucae* (Syd.) Y.L. Guo & X.J. Liu	mo	23†
			oo	110

† Recorded as *Cercospora glauca* Syd.

Arthopods (next page)

Order	Family	Species	H. R.	Ref.
Coleoptera	Bruchidae	*Bruchidius terrenus* (Sharp)	m	139
	Cerambycidae	*Acalolepta permutans* (Pascoe)	po	158
		Cacia cretifera Hope	po	124
		Ceresium leucosticticum White	po	124
		Chlorophorus miwai Gressitt	p	85
		Coptops leucostictica leucostictica White	po	124
			po	124
		Dere thoracica White	p	9
			p	85
		Derolus volvulus (Fabricius)	po	9
		Pterolophia rigida (Bates)	p	9
		Rhaphuma horsfieldi (White)	po	124
		Xystrocera festiva Thomson	po	79
		Xystrocera globosa (Olivier)	p	9
			m	85
	Chrysomelidae	*Paropsides nigrofasciata* (Jacoby)	m	65
			m	85
			mo	185
	Crioceridae	*Sagra fulgida janthina* Chen	p	85
	Eumolpidae	*Trichochrysea imperialis* (Baly)	po	65
			po	139
		Trichochrysea nitidissima (Jacoby)	po	65
			po	139
	Scolytidae	*Trypodendron lineatum* Olivier	p	85
		Xyleborus andrewesi Blandford	mo	182
Hemiptera	Coreidae	*Anoplocnemis phasiana* (Fabricius)	p	85
			p	140
			p	192
		Homoeocerus striicornis Scott	po	85
			p	192
		Homoeocerus walkeri Kirby	oo	192
		Homoeocerus walkerianus Lethierry et Severin	p	65
			p	85
		Sinotagus nasutus Kiritshenko	p	193
	Pentatomidae	*Erthesina fullo* (Thunberg)	p	85
	Plataspidae	*Coptosoma davidi* Montandon	m	193
		Coptosoma intermedia Yang	p	193
		Coptosoma notabilis Montandon	p	65
		Megacopta distanti (Montandon)	p	65
		Paracopta maculata Hsiao et Jen	mo	193
		Paracopta rufiscuta Hsiao et Jen	po	193
Homoptera	Asterolecaniidae	*Russellaspis pustulans* (Cockerell)	po	151
	Coccidae	*Eulecanium* sp.	m	85
		Takahashia wuchangensis Tseng	m	85
	Fulgoridae	*Lycorma delicatula* (White)	p	140
			p	204
	Lecanodiaspididae	*Cosmococcus albizziae* Borchsenius	mo	151
	Margarodidae	*Laccifer lacca* (Kerr)	p	85
	Pseudococcidae	*Paraputo albizzicola* Borchsenius	mo	150
	Psyllidae	*Acizzia albizzicola* Li et Yang	mo	140
		Acizzia jamatonica (Kuwayama)	m	65
			m	137
		Psylla yamatonica Kuwayama	m	85

Order	Family	Species	H. R.	Ref.
Isoptera	Termitidae	*Odontotermes formosanus* (Shiraki)	p	85
Lepidoptera	Geometridae	*Culcula panterinaria* (Bremer et Grey)	p	66
		Semiothisa defixaria Walker	m	85
	Lycaenidae	*Amblopala avidiena avidiena* (Hewitson)	m	158
		Leptotes plinius (Fabricius)	po	203
	Noctuidae	*Dinumma deponens* Walker	po	65
			po	85
			po	158
		Enmonodia feniseca Guenée	po	141
		Hypopyra vespertilio (Fabricius)	po	85*
		Hypospila signipalpis (Walker)	m	65
			m	141
		Selepa celtis Moore	m	85
		Speiredonia martha (Butler)	m	85
			m	209
		Speiredonia retorta Linnaeus	m	85
			m	141
			m	205
		Spirama martha (Butler)	m	65
		Spirama retorta (Linnaeus)	m	65
			m	158
	Nymphalidae	*Charaxes bernardus* (Fabricius)	po	203
		Neptis hylas (Linnaeus)	p	85
		Neptis sappho intermedia (Pallas)	po	85
		Pantoporia hordonia (Stoll)	po	203
		Polyura athamas (Drury)	po	203
		Polyura eudamippus cupidinius (Fruhstorfer)	po	203
		Polyura eudamippus Doubledaly	p	158
		Polyura narcaea (Hewitson)	po	158
		Polyura nepenthes (Grose-Smith)	m	158
	Pieridae	*Eurema hecabe* (Linnaeus)	p	85
			p	158
		Eurema hecabe hobsoni (Butler)	p	203
	Pyralidae	*Longiculcita vinaceella abstractella* Roesler	po	65
	Saturniidae	*Attacus atlas* (Linnaeus)	po	65
			p	207
	Tortricidae	*Cryptophlebia ombrodelta* (Lower)	p	113
		Pandemis corylana (Fabricius)	p	113
Thysanoptera	Phlaeothripidae	*Haplothrips chinensis* Priesner	p	132
		Haplothrips kurdjumovi Karny	p	132
	Thripidae	*Ajothrips* sp.	m	132
		Frankliniella intonsa (Trybom)	p	132
		Thrips flavus Schrank	p	132
		Thrips florum Schmutz	m	132

* Recorded as *Enmonoda vespertilio* Fabricius

Ampelopsis heterophylla var. *brevipedunculata* *(Ampelopsis brevipedunculata)* Porcelain-berry

Brightly colored fruits of *Ampelopsis heterophylla* var. *brevipedunculata.*

Introduction

The genus *Ampelopsis* contains approximately 30 species, most of which are woody vines distributed in Asia and North and Middle America. Seventeen species of the genus occur nationwide in China[89].

Taxonomy:

Family: Vitaceae
Genus: *Ampelopsis* Michaux

Species of *Ampelopsis* in China

Scientific Name	Scientific Name
A. acerifolia W. T. Wang	***A. heterophylla*** (Thunb.) Sieb. et Zucc.
A. aconitifolia Bge.	*A. humulifolia* Bge.
A. acutidentata W. T. Wang	*A. hypoglauca* (Hance) C. L. Li
A. bodinieri (Lévl et Vant.) Rehd.	*A. japonica* (Thunb.) Makino
A. cantoniensis (Hook. et Arn.) Planch.	*A. megalophylla* Diels et Gilg
A. chaffanjoni (Lévl. et Vant.) Rehd.	*A. mollifolia* W. T. Wang
A. delavayana Planch.	*A. rubifolia* (Wall.) Planch.
A. gongshanensis C. L. Li	*A. tomentosa* Planch.
A. grossedentata (Hand.-Mazz.) W. T. Wang	

Description

Ampelopsis heterophylla is a pubescent woody vine. Twigs are cylindrical, pubescent, and grooved. Opposite the two-to-three branched tendrils, leaves are simple, heart-shaped or ovate, often 3 - 5 lobed or dissected, densely serrate, 3.5-14 cm long and 3-11 cm wide, with abruptly acute apex and cordate base. The upper leaf surface is glabrous and shiny; lower leaf surface is pubescent with fine hairs along the veins. Flowers are produced from July to August. Flower buds are ovate and 1-2.5 cm long. Slightly lobed in the edges, the calyx is disc-shaped with slightly lobed edges, and the five petals are ovate and 0.8-1.8 mm long. Fruits containing two to four oblong seeds are bright turquoise, subglobose berries, 0.5-0.8 in diameter, appearing from September to October[89].

Habitat

Porcelain-berry occurs in forests, in valleys, or on hillsides at elevations of 150-600 m[89].

Distribution

A. heterophylla var. *brevipedunculata* occurs in Heilongjiang, Jilin, and Liaoning, China's northeast provinces [89].

Economic Importance

The roots and leaves of *A. heterophylla* var. *brevipedunculata* are used medicinally [89].

Related Species

In addition to *Ampelopsis heterophylla* var. *brevipedunculata,* there are four other varieties recorded in Chinese floras [89]:

1) *A. heterophylla* (Thunb.) Sieb.

et Zucc. var. *heterophylla* occurs at elevations of 200-1800 m in Anhui, Fujian, Guangdong, Guangxi, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, and Zhejiang;
2) *A. heterophylla* (Thunb.) Sieb. et Zucc. var. *vestita* Rehd. occurs in forests, valleys, and shady thickets along slopes, at elevations ranging from 50 to 2000 m in Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hebei, Henan, Jiangxi, Sichuan, Yunnan, and Zhejiang;
3) *A. heterophylla* (Thunb.) Sieb. et Zucc. var. *hancei* Planch. occurs at elevations of 50-60 m in Fujian, Guangdong, Guangxi, Guizhou, Henan, Hunan, Jiangsu, Jiangxi, Shandong, Sichuan, and Yunnan;
4) *A. heterophylla* (Thunb.) Sieb. et Zucc. var. *kulingensis* (Rhed.) C. L. Li has a distribution range similar to *A. heterophylla* (Thunb.) Sieb. et Zucc. var. *vestita* Rehd., but at elevations of 300-1600 m, in Anhui, Fujian, Guangdong, Guizhou, Hunan, Jiangsu, Jiangxi, Sichuan, and Zhejiang.

Natural Enemies of *Ampelopsis*

Nine species of fungi and thirteen species of arthropods have been recorded for *Ampelopsis* species.

Fungi

Phylum	Family	Species	H.R.	Ref.
Ascomycota	Erysiphaceae	*Phyllactinia ampelopsidis* Y.X. Yu & Y.Q. Lai	po	22
		Phyllactinia corylea (Pers.) P. Karst.	po	23
Basidiomycota	Phragmidiaceae	*Hamaspora hashiokai* Hirats. f.	oo	23†
Oomycota	Peronosporaceae	*Plasmopara viticola* (Berk. & M.A. Curtis) Berl. & De Toni	p	23
	Pythiaceae	*Physopella ampelopsidis* (Dietel & P. Syd.) Cummins & Ramachar	p	23
Anamorphic *Mycosphaerella*		*Pseudocercospora brachypus* (Ellis & Everh.) Y.L. Guo & X.J. Liu	po	110
		Pseudocercospora vitis (Lév.) Speg.	po	110
		Septoria ampelina Berk. & M.A. Curtis	p	23
		Septoria ampelopsidis-heterophyllae Miura	mo	23

† Recorded as *Pucciniostele hashiokai* (Hirats. f.) Cumm.

Arthropods

Order	Family	Species	H. R.	Ref.
Acariformes	Tetranychidae	*Eotetranychus smithi* Pritchard et Baker	po	143
Acarina	Phytoseiidae	*Amblyseius ruiliensis* Wu et Li	po	65
		Phytoseius silvaticus Wu et Li	po	65
Coleoptera	Chrysomelidae	*Gallerucida gloriosa* (Baly)	oo	185
	Eumolpidae	*Aoria scutellaris* Pic	mo	65
Homoptera	Cercopidae	*Cosmoscarta dorsimacula* (Walker)	po	65
Lepidoptera	Drepaniidae	*Oreta eminens* (Bryk)	po	65
		Oreta pulchripes Butler	po	65
		Oreta vatama acutula Waston	mo	65
	Geometridae	*Eclipopera umbrosaria* (Motschulsky)	p	177
	Sphingidae	*Sphecodina caudata* (Bremer et Grey)	po	208
	Thyrididae	*Rhodoneura fasciata* (Moore)	mo	207
Thysanoptera	Thripidae	*Thrips flavidulus* Bagnall	po	56

Artemisia vulgaris
Mugwort

Leaves of *Artemisia vulgaris.*

Introduction
The genus *Artemisia* includes more than 300 species, which are distributed primarily in temperate regions and subtropics of Asia, Europe and North America. In China, there are 186 species and 44 varieties belonging to 2 subgenera with a nationwide distribution. Members of the genus *Artemisia* are well-known as aromatic herbs[103].

Species of *Artemisia* in China
(see next page)

Taxonomy
Family: Compositae (Asteraceae)
Genus: *Artemisia* L.

Description
Commonly known as mugwort, *Artemisia vulgaris* is a perennial herb that can reach 60-160 cm high, with many thin lateral roots. The branched, purplish-brown stems are parallel grooved, with ascending twigs covered with short hairs. Leaves are papery, pubescent, dark green on the upper surface, and have various shapes depending on their position on the plant. The leaves near the base are elliptic and oblong, bipinnate (divided two times) deeply even nearly to midrib. The leaves in the middle are elliptic to ovate, 3-10 cm long and 1.5-6 cm wide, pinnate or bipinnate, with four to five lobes that are elliptic lanceolate or linear lanceolate, 3-5 cm long and 1-1.5 cm wide, with more than one tooth on the tip. The leaves near the top are small, also pinnate and lanceolate-lobed, not significantly toothed or even entire. Head inflorescences are oblong, 2.5-3 mm in diameter, borne densely in a spike on the branched twigs as well as spreading panicles on the stems. There are seven to ten purple female flowers, with narrow tube-shaped corollas. Bisexual flowers number 8-20, with tube or goblet shaped corollas, and long densely ciliate hairs at the top of the style. Fruits, appearing from August to October together with flowers, are obovate or ovate achenes[103].

Habitat
Mugwort grows in high-elevation pastures, forest edges, valleys, hillside wasteland, ditches, and roadsides[112][103].

Distribution
In China, mugwort has been reported to occur in Shaanxi and Qinghai at elevations above 2,500 m, as well as in western Gansu and Xinjiang at elevations of 1,500 to 2,100 m[103]. *Artemisia vulgaris* is also reported to occur in Sichuan and the desert of Inner Mongolia[103] [112].

Economic Importance
In addition to the volatile oil psilostachyin, which contributes to its strong aroma, mugwort also contains other medically active ketones and alkaloids. Mugwort is also used as a livestock feed[103].

Related Species
In China, mugwort, the common name of *Artemisia vulgaris* is often confused with *A. argyi,* which is a common inhabitant of wastelands, roadsides, riversides, and hilly slopes, as well as the forests and prairie at low to moderate elevations [103].

Natural Enemies of *Artemisia*
Twenty-two fungi have been recorded

to occur on members of the genus *Artemisia*. Eight species are reported to infect *A. vulgaris*. At least 111 species of insects and mites in 31 families and 7 orders attack members of the genus *Artemisia*.

Species of *Artemisia* in China

Scientific Name	Scientific Name	Scientific Name
A. abaensis Y. R. Ling et S. Y. Zhao	*A. absinthium* Linn.	*A. adamsii* Bess.
A. aksaiensis Y. R. Ling	*A. anethifolia* Web. ex Stechm.	*A. anethoides* Mattf.
A. angustissima Nakai	*A. annua* L.	*A. anomala* S. Moore
A. argyi Lévl. et Van.	*A. argyrophylla* Ledeb.	*A. aschurbajewii* C. Winkl.
A. atrovirens Hand.-Mazz.	*A. aurata* Komar.	*A. austriaca* Jacq.
A. austro-yunnanensis Ling et Y. R. Ling	*A. baimaensis* Y. R. Ling et Z. C. Zhuo	*A. bargusinensis* Spreng.
A. blepharolepis Bge.	*A. brachyloba* Franch.	*A. brachyphylla* Kitam.
A. caespitosa Ledeb.	*A. calophylla* Pamp.	*A. campbellii* Hook. F. et Thoms in C. B. Clarke
A. campestris L.	*A. capillaris* Thunb.	*A. carvifolia* Buch.-Ham. ex Roxb.
A. chienshanica Ling et W. Wang	*A. chingii* Pamp.	*A. comaiensis* Ling et Y. R. Ling
A. conaensis Ling et Y. R. Ling	*A. dalai-lamae* Krasch.	*A. demissa* Krasch.
A. depauperata Krasch.	*A. desertorum* Spreng.	*A. deversa* Diels
A. disjuncta Krasch.	*A. divaricata* (Pamp.) Pamp.	*A. dracunculus* L.
A. dubia Wall. ex Bess.	*A. duthreuil-de-rhinsi* Krasch.	*A. edgeworthii* Balakr.
A. emeiensis Y. R. Ling	*A. eriopoda* Bge.	*A. erlangshanensis* Ling et Y. R. Ling
A. fauriei Nakai	*A. flaccida* Hand.-Mazz.	*A. forrestii* W. W. Smith
A. freyniana (Pamp.) Krasch.	*A. frigida* Willd.	*A. fukudo* Makino
A. fulgens Pamp.	*A. gansuensis* Ling et Y. R. Ling	*A. gilvescens* Miq.
A. giraldii Pamp.	*A. glabella* Kar. et Kir.	*A. globosoides* Ling et Y. R. Ling
A. gmelinii Web. ex Stechm.	*A. gongshanensis* Y. R. Ling et C. J. Humphries	*A. gyangzeensis* Ling et Y. R. Ling
A. gyitangensis Ling et Y. R. Ling	*A. halodendron* Turcz. ex Bess.	*A. hancei* (Pamp.) Ling et Y. R. Ling
A. hedinii Ostenf. et Paulse.	*A. igniaria* Maxim.	*A. imponens* Pamp.
A. incisa Pamp.	*A. indica* Willd.	*A. integrifolia* Linn.
A. japonica Thunb.	*A. jilongensis* Y. R. Ling et C. J. Humphries	*A. kanashiroi* Kitam.
A. kangmarensis Ling et Y. R. Ling	*A. kawakamii* Hayata	*A. keiskeana* Miq.
A. klementze Krasch.	*A. kuschakewiczii* C. Winkl.	*A. lactiflora* Wall. ex DC.
A. lagocephala (Fisch. ex Bess.) DC.	*A. lancea* Van.	*A. latifolia* Ledeb.
A. lavandulaefolia DC.	*A. leucophylla* (Turcz. ex Bess.) C. B. Clarke	*A. littoricola* Kitam.
A. macilenta (Maximl) Krasch.	*A. macrantha* Ledeb.	*A. macrocephala* Jacq. ex Bess.
A. mairei Lévl.	*A. manshurica* (Komar.) Komar.	*A. marschalliana* Spreng.
A. mattfeldii Pamp.	*A. maximowicziana* (F. Schum.) Krasch. ex Poljak.	*A. medioxima* Krasch. ex Poljak.
A. minor Jacq. ex Bess.	*A. mongolica* (Fisch. ex Bess.) Nakai	*A. moorcroftiana* Wall. ex DC.
A. morrisonensis Hayata	*A. myriantha* Wall. ex Bess.	*A. nakai* Pamp.
A. nanschanica Krasch.	*A. niitakayamensis* Hayata	*A. nilagirica* (C. B. Clarke) Pamp.
A. nortonii Pamp.	*A. nujianensis* (Ling et Y. R. Ling) Y. R. Ling	*A. obtusiloba* Ledeb.
A. occidentali-sichuanensis Y. R. Ling et S. Y. Zhao	*A. occidentali-sinensis* Y. R. Ling	*A. oligocarpa* Hayata
A. ordosica Krasch.	*A. orientali-hengduangensis* Ling et Y. R. Ling	*A. orientali-xizangensis* Y. R. Ling et. C. J. Humphries
A. orientali-yunnanensis Y. R. Ling	*A. oxycephala* Kitag.	*A. palustris* L.
A. parviflora Buch.-Ham. ex Roxb	*A. penchuoensis* Y. R. Ling et S. Y. Zhao	*A. persica* Boiss.
A. pewzowi C. Winkl.	*A. phaeolepis* Krasch.	*A. phyllobotrys* (Hand.-Mazz.) Ling et Y. R. Ling
A. polybotryoidea Y. R. Ling	*A. pontica* L.	*A. prattii* (Pamp.) Ling et Y. R. Ling

A. princeps Pamp.	*A. przewalskii Krasch*	*A. pubescens Ledeb.*
A. qinlingensis Ling et Y. R. Ling	*A. robusta (Pamp.) Ling et Y. R. Ling*	*A. rosthornii Pamp.*
A. roxburghiana Bess.	*A. rubripes Nakai*	*A. rupestris L.*
A. rutifolia Steph. ex Spreng.	*A. sacrorum Ledeb.*	*A. saposhnikovii Krasch. ex Poljak.*
A. scoparia Waldst. et Kit.	*A. selengensis Turcz. ex Bess.*	*A. sericea Web. ex Stechm.*
A. shangnanensis Ling et Y. R. Ling	*A. shennongjiaensis Ling et Y. R. Ling*	*A. sichuanensis Ling et Y. R. Ling*
A. sieversiana Ehrhart ex Willd.	*A. simulans Pamp.*	*A. sinensis (Pamp.) Ling et Y. R. Ling*
A. smithii Mattf.	*A. somai Hayata*	*A. songarica Schrenk*
A. speciosa (Pamp.) Ling et Y. R. Ling	*A. sphaerocephala Krasch.*	*A. stolonifera (Maxim.) Komar.*
A. stracheyi Hook. f. et Thoms. ex C. B. Clarke	*A. subulata Nakai*	*A. succulenta Ledeb.*
A. succulentoides Ling et Y. R. Ling	*A. sylvatica Maxim.*	*A. tafelii Mattf.*
A. taibaishahensis Y. R. Ling et C. J. Humphries	*A. tainingensis Hand.-Mazz.*	*A. tanacetifolia L.*
A. tangutica Pamp.	*A. thellungiana Pamp.*	*A. tournefortiana Reichb.*
A. tridactyla Hand.-Mazz.	*A. tsugitakaensis (Kitam.) Ling et Y. R. Ling*	*A. velutina Pamp.*
A. verbenacea (Komar.) Kitag.	*A. verlotorum Lamotte*	*A. vestita Walle ex Bess.*
A. vexans Pamp.	*A. viridisquama Kitam.*	*A. viridissima (Komar.) Pamp.*
A. viscida (Mattf.) Pamp.	*A. viscidissima Ling et Y. R. Ling*	*A. vulgaris L.*
A. waltonii J. R. Drumm. ex Pamp.	*A. wellbyi Hemsl. et Pears. ex Deasy*	*A. wudanica Liou et W. Wang*
A. xanthochloa Krasch.	*A. xerophytica Krasch.*	*A. xigazeensis Ling et Y. R. Ling*
A. yadongensis Ling et Y. R. Ling	*A. younghusbandii J. R. Drumm. ex Pamp.*	*A. youngii Y. R. Ling*
A. yunnanensls J. F. Jeffrey ex Diels	*A. zayuensis Ling et Y. R. Ling*	*A. zhongdianensis Y. R. Ling*

Fungi

Phylum	Family	Species	H. R.	Ref.
Ascomycota	Erysiphaceae	*Erysiphe artemisiae* Grev.	oo	22
		Erysiphe cichoracearum DC.	p	23
		Sphaerotheca fuliginea (Schltdl.) Pollacci	po	23
	Pleosporaceae	*Pleospora tarda* E.G. Simmons	po	23[I]
	Pseudoperisporiaceae	*Nematostoma artemisiae* Syd. & P. Syd.	m	23
Basidiomycota	Atheliaceae	*Athelia rolfsii* (Curzi) C.C. Tu & Kimbr.	po	23[II]
	Phakopsoraceae	*Phakopsora artemisiae* Hirats.	p	23
		Phakopsora compositarum Miyake	p	23
	Pucciniaceae	*Puccinia adjuncta* Mitter	oo	23
		Puccinia asteris Duby	po	23
		Puccinia atrofusca (Dudley & C.H. Thomps.) Holw.	p	23
			po	149
		Puccinia asteris Duby	o	23[III]
		Puccinia extensicola Plowr.	po	23
		Puccinia tanaceti DC.	o	23
		Uromyces oblongisporus Ellis & Everh.	oo	23

Oomycota	Peronosporaceae	*Paraperonospora artemisiae-annuae* (L. Ling & M.C. Tai) Constant.	mo	23[IV]
			mo	188
		Paraperonospora sulfurea (Gäum.) Constant.	oo	188
		Peronospora sulfurea Gäum.	oo	23
			oo	188
Anamorphic *Mycosphaerella*		*Cercospora ferruginea* Fuckel	o	23
		Pseudocercospora artemisiicola Y.L. Guo	mo	110
		Pseudocercospora dracunculi (Sarwar) Y.L. Guo	mo	110
		Septoria artemisiae Pass.	m	23

[I] Recorded as *Stemphylium botryosum* Wallr.
[II] Recorded as *Corticium centrifugum* (Lév.) Bres.
[III] Recorded as *Puccinia cnici-oleracei* Pers
[IV] Recorded as *Peronospora artemisiae-annuae* Ling et M. C. Tai

Arthropods

Order	Family	Species	H. R.	Ref.
Acariformes	Eriophyidae	*Aceria abalis* (Keifer)	oo	83
		Aceria kunminensis Kuang et Hong	mo	83
		Heterotergum artemisiae Hong et Kuang	mo	83
	Tetranychidae	*Brevipalpus obovatus* Donnadieu	po	65
		Bryobia hengduanensis Wang et Cui	po	141
		Tetranychus ludeni Zacher	po	143
		Tetranychus piercei McGregor	mo	65
Coleoptera	Cerambycidae	*Phytoecia rufiventris* Gautier	po	85
	Chrysomelidae	*Chrysolina aeruginosa* (Faldermann)	oo	140
			oo	185
		Chrysolina aurichalcea (Mannerheim)	mo	65
			po	140
			oo	185

		Crosita altaica altaica Gebler	oo	185
		Galeruca nigrolineata Mannerheim	oo	185
		Geinella nila (Maulik)	po	185
		Geinula antennata Chen	po	140
		Geinula coeruleipennis Chen, Jiang et Wang	oo	140
		Geinula similis Chen, Jiang et Wang	oo	140
		Hespera cyanea Maulik	po	140
			po	185
		Monolepta hieroglyphica (Motschulsky)	po	140
		Nonarthra cyaneum Baly	oo	65
			po	185
		Nonarthra nigricolle alticola Jiang	po	140
		Pallasiola absinthii (Pallas)	po	185
		Phaedon alticola Chen	po	140
		Phyllobrotica signata (Mannerheim)	oo	185
	Coccinellidae	*Afidentuta manderst jernae* (Mulsant)	po	65
		Epilachna ocellatae-maculata (Mader)	mo	65
			mo	122
			oo	140
		Epilachna plicata Weise	mo	122
		Epiverta chelonia (Mader)	po	122
			po	140
		Henosepilachna ocellata (Redtenbacher)	mo	122
	Curculionidae	*Lixus acutipennis* Roelofs	po	2
		Xanthochelus faunus (Olivier)	mo	140
	Eumolpidae	*Basilepta fulvipes* (Motschulsky)	po	139
		Cleoporus variabilis (Baly)	po	139
			po	140
		Coptocephala asiatica chûjô	oo	139
		Cryptocephalus koltzei Weise	oo	139
		Pachybrachys scriptidorsum Marseul	po	139
		Smaragdina nigrifrons (Hope)	po	139
			po	140
	Hispidae	*Cassida fuscorufa fuscorufa* Motschulsky	oo	65
		Cassida fuscorufa jacobsoni Spaeth	oo	65
Hemiptera	Coreidae	*Anoplocnemis phasiana* (Fabricius)	po	192
		Corizus tetraspilus Horvath	po	193
		Derepteryx hardwickii White	po	193
	Lygaeidae	*NySius ericae* (Schilling)	po	192
	Pentatomidae	*Dolycoris baccarum* (Linnaeus)	po	192
		Dymantiscus marginatus Hsiao	oo	193
		Eysarcoris montivagus (Distant)	mo	65
		Pentatoma kunmingensis Xiong	po	193
		Poeciiocoris sanszesignatus Yang	po	192
	Plataspidae	*Coptosoma bifaria* Montandon	mo	65
			po	193
		Coptosoma gyirongan Zhang et Lin	oo	193
		Coptosoma zhamua Zhang et Lin	oo	193
	Tingidae	*Tringis crispata* (Herrich-Schaeffer)	mo	193

Homoptera	Aphalaridae	*Craspedolepta lineolata* Loginova	mo	132
		Craspedolepta terminara Longinova	mo	132
		Craspedolepta topicalis Longinova	mo	132
	Aphididae	*Aphis kurosawai* Takahashi	mo	65
			o	100
			o	189
		Capitophorus formosartemisiae Takahashi	o	100
		Coloradoa artemisicola Takahashi	oo	100
			oo	140
			oo	189
		Coloradoa nodulosa Zhang	mo	189
			mo	100
		Coloradoa rufomaculata (Wilson)	oo	100
		Cryptosiphum artemisiae Buchton	mo	65
		Cryptosiphum artemisiae linanense Zhang	p	100
			p	189
		Macrosiphoniella brevisiphora Zhang	mo	140
		Macrosiphoniella formosartemisiae (Takahashi)	oo	100
		Macrosiphoniella grandicauda Tak. et Moritsu	po	140
		Macrosiphoniella hokkaidensis Miyazaki	oo	189
		Macrosiphoniella huaidensis Zhang	oo	189
		Macrosiphoniella kuwayamai Takahashi	mo	100
			mo	189
		Macrosiphoniella pseudoartemisiae Shinji	oo	100
			oo	140
		Macrosiphoniella sanborni (Gillette)	oo	100
			oo	65
			po	85
		Macrosiphoniella similioblonga Zhang	mo	189
		Macrosiphoniella yomogifoliae (Shinji)	oo	65
		Myzus tsengi Tao	mo	140
		Pleotrichophorus glandulosus (Kaltenbach)	mo	65
			mo	189
		Pleotrichophorus pseudoglandulosus (Palmer)	mo	189
	Cercopidae	*Cosmoscarta dorsimacula* (Walker)	po	65
	Cicadellidae	*Mileewa margheritae* Distant	mo	48
	Coccidae	*Ceroplastes ceriferus* (Anderson)	po	151
		Ceroplastes rubens Maskell	po	151
	Membracidae	*Leptobelus gazella* Fairmaire	po	65
			po	140
	Pseudococcidae	*Amonostherium prionodes* Wang	po	150
		Eriococcus terrestris (Matesova)	po	150
		Heliococcus pamirensis Borchsenius	po	150
		Pseudococcus comstocki (Kuwana)	po	150
		Trionymus multivorus (Kiritshenko)	po	150
	Triozidae	*Eubactericera artemicola* Li	oo	132
		Eubactericera artemisisuga Li	oo	132

Lepidoptera	Arctiidae	*Rhyparia purpurata* (Linnaeus)	po	40
			p	41
		Rhyparioides nebulosa Butler	po	40
	Geometridae	*Carige cruciplaga* (Walker)	mo	177
	Lycaenidae	*Plebejus argus* (Linnaeus)	po	203
	Noctuidae	*Cucullia formosa* Rogenhofer	oo	12
		Cucullia fraudatrix Eversmann	mo	209
		Cucullia fuchsiana Eversmann	mo	12
		Cucullia santonici (Hübner)	po	12
			po	141
		Euxoa cursoria (Hufnagel)	po	13
		Euxoa oberthuri Leech	po	141
		Melicleptria scutosa (Schiffermüller)	po	13
			po	65
			po	205
		Phyllophila obliterata (Rambur)	mo	209
		Xylena formosa (Butler)	po	13
			po	141
	Nymphalidae	*Vanessa cardui* (Linnaeus)	po	203
	Pyralidae	*Homoeosoma binaevella* Hübner	po	145
		Loxostege aeruginalis Hübner	mo	145
		Ostrinia nubilalis (Hübner)	po	85
			po	145
	Tortricidae	*Cnephasia chrysantheana* (Duponchel)	oo	113
		Epiblema foenella (Linnaeus)	mo	65
			oo	113
		Eucosma intacta (Walsingham)	mo	113
		Eucosma metzneriana (Treitschke)	oo	113
		Pandemis dumetana Treitshke	po	141
Parasitiformes	Phytoseiidae	*Amblyseius heveae* (Oudemans)	po	65
Thysanoptera	Phlaeothripidae	*Haplothrips aculeatus* (Fabricius)	po	56
	Thripidae	*Thrips tabaci* Lindeman	po	56

Arthraxon hispidus
Jointhead grass

Arthraxon hispidus

Introduction
Approximately 20 species of *Arthraxon* occur in the tropics and subtropics of the eastern hemisphere. Ten species and six varieties have been reported from China [82].

Species of *Arthraxon* in China [4]

Scientific Name	Scientific Name
A. castratus (Gtiff.) Narayan. ex Bor	*A. maopingensis* S. L. Chen et Y. X. Jin
A. guizhouensis S. L. Chen et Y. X. Jin	*A. micans* (Nees) Hochst.
A. hispidus (Thunb.) Makino	*A. microphyllus* (Trin.) Hochst.
A. lanceolatus (Roxb.) Hochst.	*A. multinervus* S.L.Chen et Y. X. Jin
A. lancifolius (Trin.) Hochst.	*A. xinanensis* S. L. Chen et Y. X. Jin

Taxonomy
Family: Gramineae (Poaceae)
Genus: *Arthraxon* Beauv.

Description
Jointhead grass is an annual grass that reaches a height of 30-60 cm with a semi-decumbent growth habit. The slender culm (stem) is glabrous, branched, and has many nodes. Leaf sheath is shorter than internode and covered with wart-like granules. Ligule is membranous, 0.5-1 mm long, and margined by fine hairs. Leaves are ovate-lanceolate, 2-4 cm in length and 0.8-1.5 cm in width, cordate base encircling the stem. Racemes are slender, 1.5-4 cm long, clustered or digitate on the top of culm. The sessile spikelets are ovate-lanceolate, 3-5 mm long, grayish green or somewhat violet, with a basally twisted awn that is 6-9 mm long while the petiolate spikelets are degenerated and pin-like. Fruits are oblong caryopsis. Flowers and fruits appear in September through November [82].

Habitat
Jointhead grass occurs in moist areas of grasslands, hillsides, and along streams, flourishing in warm regions nationwide. It prefers to grow in mountain regions. It is also a common weed plant of orchards, tea fields, and roadsides [82][96][205].

Distribution
Although it is generally thought to occur nationwide[82], *Arthraxon hispidus* is not found in the floras of Hainan[6] Inner Mongolia[121], Qinghai[108], or Tibet[163].

Economic Importance
Jointhead grass is a common pasture plant and it is also medically useful for relieving sore throat [96][205].

Related Species
There are two varieties of *A. hispidus*. *Arthraxon hispidus* (Thunb.) Makino var. *centrasiaticus* (Grisb.) Honda, bearing a hairy two-awned spikelet, occurs in Northeast, Northwest, East, and Central China. *Arthraxon hispidus* var. *cryptatherus* (Hack.) Honda, has insignificant awns half the spikelet in length, and occurs in East, South, Southwest, and Central China [82].

Natural Enemies of *Arthraxon*
Nine species of fungi have been found in association with species of *Arthraxon,* among them, one species (*Bremia graminicola* Naumov) is likely host specific to jointhead grass. Seven other species also have a narrow host range. Eleven insect species are reported to attack *Arthraxon* spp. but all are polyphagous.

Fungi

Phylum	Family	Species	H. R.	Ref.
Ascomycota	Phyllachoraceae	*Phyllachora arthraxonis* Henn.	o	23[†]
Basidiomycota	Ceratobasidiaceae	*Thanatephorus cucumeris* (A.B. Frank) Donk	po	23[‡]
	Pucciniaceae	*Puccinia aestivalis* Dietel	mo	23
			p	149
		Puccinia arthraxonis (Henn.) Syd., P. Syd. & E.J. Butler	o	23
			o	149
		Puccinia arthraxonis-ciliaris Cummins	o	23
			o	149
		Puccinia benguetensis Syd.	o	149
	Ustilaginaceae	*Sporisorium arthraxone* (Patouillard) L. Guo	oo	54
Oomycota	Albuginaceae	*Albugo ipomoeae-panduratae* (Schwein.) Swingle	p	23
	Peronosporaceae	*Bremia graminicola* Naumov	m	23
			o	188

[†] Recorded as *Phyllachora arthraxonis-hispidi* Saw
[‡] Recorded as *Corticium sasakii* (Shirai) Matsum.

Arthropods

Order	Family	Species	H. R.	Ref.
Coleoptera	Chrysomelidae	*Sphaeroderma apicale* Baly	po	185
Lepidoptera	Noctuidae	*Agrotis ipsilon* (Hufnagel)	p	205[I]
		Agrotis tokionis Butler	p	205
		Anomis flava (Fabricius)	p	205
		Euxoa segetum (Schiffermüller)	p	205
		Heliothis armigera (Hübner)	p	205
		Heliothis assulta Guenée	p	205
		Mamestra brassicae (Linnaeus)	p	205[II]
		Prodenia litura (Fabricius)	p	205
		Pyrrhia umbra (Hüfnagel)	p	205
		Xylena formosa (Butler)	p	205

[I] Recorded as *Agrotis ypsilon* (Rottemberg)
[II] Recorded as *Barathra brassicae* (Linnaeus)

Berberis thunbergii
Japanese barberry

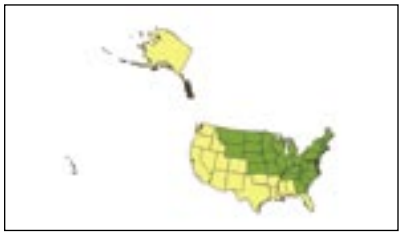
Introduction
With approximately 500 thorny members worldwide, the genus *Berberis*, commonly known as barberry, is widely distributed in the temperate regions of the northern hemisphere. In China, more than 250 species have been reported from western and southwestern regions [183].

Species of *Berberis* in China
(See table at end of chapter)

Taxonomy
Family: Berberidaceae
Genus: *Berberis* Linn.

Description
Berberis thunbergii D C. is a deciduous branched shrub that can reach 1 m in height. Grooved or angled twigs are glabrous and pinkish-green when young, turning reddish-pink at maturity. The solitary or trifurcate stem has spines at each node with the internode being 1-1.5 cm. The papery leaves are obovate, spatulate, or spoon shaped, 1-2 cm long and 5-2 mm wide, apiculate or obtuse apically and cuneate at the base, with entire margin. Usually in small clusters of two to five blossoms, flowers are grayish yellow with two glands near the base of the obovate petal, and appear from April to June. Fruits are bright red elliptic berries, 8 mm long and 4 mm in diameter, appearing from July to October[183].

Habitat and Distribution
B. thunbergii is widely planted nationwide, mainly in the northern cities [183], therefore, no map of the Chinese distribution is available.



Leaves and fruits of *Berberis thunbergii*.

Economic Importance
Famous for its brilliant fall colors, Japanese barberry is commonly grown as an ornamental plant. Stems and roots are rich in berberine. Branches and leaves are reported to be helpful in treating conjunctivitis; the roots can be used for invigorating the stomach and for making yellow dye[183].

Related Species
B. amurensis Rupr. is commonly seen in China. It occurs at an elevation of 1100-2850 m in mountainous thickets, valleys, forest edges, sparse forest, or along stream banks. It is distributed in Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Inner Mongolia, Shaanxi, Shandong, and Shanxi provinces[183].

Natural Enemies of *Berberis*
Twelve species and one variety of fungi and 22 insect species are reportedly associated with *Berberis* plants. Of them, two fungi and two insects may attack *Berberis thunbergii*.

Fungi

Phylum	Family	Species	H.R.	Ref.
Ascomycota	Erysiphaceae	*Microsphaera penicillata* (Wallr.) Lév.	po	23
		Microsphaera berberidicola F.L. Tai	oo	22
			mo	22†
			oo	23
		Microsphaera berberidis (DC.) Lév.	oo	23
		Microsphaera berberidis var. *berberidis* (DC.) Lév.	o	22
		Microsphaera divaricata (Wallr.) Lév.	po	23
		Microsphaera grossulariae (Wallr.) Lév.	po	23
		Microsphaera multappendicis Z.Y. Zhao & Y.N. Yu	mo	22
		Microsphaera sichuanica Y.N. Yu	mo	22
Basidiomycota	Incertae sedis	*Aecidium niitakense* Hirats.	mo	23
	Pucciniaceae	*Puccinia culmicola* Dietel	po	23
		Puccinia graminis Pers.	p	23
			po	149
		Puccinia pygmaea Erikss.	po	149
	Pucciniastraceae	*Uredo clemensiae* (Arthur & Cummins) Hirats. f.	po	23

† Recorded as *Microsphaera berberidicola* (DC.) Lev. var. *dimorpha* Yu et Z. Y.

Arthropods

Order	Family	Species	H. R.	Ref.
Coleoptera	Cerambycidae	*Cacia cretifera* Hope	po	124
			po	140
	Chrysomelidae	*Aphthona varipes* Jacoby	oo	140
		Orhespera glabricollis Chen et Wang	oo	140
			oo	185
		Orhespera impressicollis Chen et Wang	oo	140
		Sphenoraia berberii Jiang	oo	140
		Sphenoraia yajiangensis Jiang	mo	140
		Stenoluperus nipponensis (Laboissiere)	po	65
			po	140
			po	158
	Megalopodidae	*Zeugophora cyanea* Chen	po	140
	Scolytidae	*Xyleborus brevis* Eichhoff	po	182
Hemiptera	Acanthosomatidae	*Elasmostethus brevis* Lindberg	oo	193
Homoptera	Coccidae	*Ceroplastes japonicus* Green	po	65
			po	140
			po	151
	Pseudococcidae	*Phenacoccus prodigialis* Ferris	oo	150

Lepidoptera	Noctuidae	*Euscotia inextricata* (Moore)	oo	209
	Pieridae	*Aporia agathon* (Gray)	po	203
		Aporia hippia (Bremer)	po	203
		Aporia leucodice (Eversmann)	po	203
	Saturniidae	*Attacus atlas* (Linnaeus)	po	65
			po	207
	Sphingidae	*Rhagastis mongoliana centrosinaria* Chu et Wang	po	65
		Rhagastis mongoliana mongoliana (Butler)	po	65
			po	206
			p	208
		Rhagastis mongoliana pallicosta Mell	po	141
			po	206
			p	208
	Tortricidae	*Pandemis ribeana* (Hübner)	po	113
		Pseudargyrotoza conwagana (Fabricius)	po	66

Species of *Berberis* in China

B. aemulans Schneid.	*B. aggregata* Schneid.	*B. agricola* Ahrendt
B. alpicola Schneid	*B. amabilis* Schneid.	*B. amoena* Dunn
B. amurensis Rupr.	*B. angulosa* Wall. ex Hook. f et Thoms	*B. anhweiensis* Ahrendt
B. anproxbota Sprague	*B. arguta* (Franch) Schneid.	*B. aristato-serrulata* Hayata
B. asmyana Schneid.	*B. atrocarpa* Schneid.	*B. atroviridis* Ying
B. batangensis Ying	*B. beaniana* Schneid.	*B. beijingensis* Ying
B. bergmanniae Schneid.	*B. bicolor* Lévl.	*B. brachypoda* Maxim.
B. bracteata (Ahrendt) Ahrendt	*B. calcipratorum* Ahrendt	*B. campylotropa* Ying
B. candidula Schneid.	*B. cavaleriei* Lévl.	*B. centiflora* Diels
B. chingii Cheng	*B. chryeqhaera* Mulligan	*B. chunanensis* Ying
B. circumserrata (Schneid) Schneid.	*B. concinna* Hook. f. et Thoms.	*B. concolor* W. W. Smith
B. contracta Ying	*B. coryi* Veitch	*B. crrasilimba* C. Y. Wu ex S. Y. Bao
B. daiana Ying	*B. daochengensis* Ying	*B. dasystachya* Maxim.
B. davidii Ahrendt	*B. dawoensis* K. Meyer	*B. deinacantha* Schneid.
B. derongensis Ying	*B. diaphana* Maxin.	*B. dictyoneura* Schneid.
B. dictyoPhylla Franch.	*B. dielsiana* Fedde	*B. dongchuanenis* Ying
B. dubia Schneid	*B. dumicola* Schneid.	*B. erythroclada* Ahrendt
B. everestiana Ahrendt	*B. fallaciosa* Schneid.	*B. fallax* Schneid.
B. farreri Ahrendt	*B. feddeana* Schneid.	*B. fengii* S. Y. Bao
B. ferdinandi-coburgii Schneid	*B. forrestii* Ahrendt	*B. franchetiana* Schneid.
B. francisci-ferdinandi Schneid.	*B. fujianenis* C. M. Hu	*B. gilgiana* Fedde
B. gilungensis Ying	*B. gngnepainii* Schneid.	*B. graminea* Ahrendt
B. griffithiana Schneid.	*B. grodtmannia* Schneid.	*B. guizhouensis* Ying
B. gyalaica Ahrendt	*B. haoi* Ying	*B. hayatana* Mizush.
B. hemsleyana Ahrendt	*B. henryana* Schneid.	*B. hersii* Ahrendt
B. heteropoda Schrenk.	*B. hobsonii* Ahrendt	*B. holocraspedon* Ahrendt
B. honanensis Ahrendt	*B. hsuyunensis* Hsiao et Sung	*B. humido-umbrosa* Ahrendt
B. hypericifolia Yins	*B. hypoxantha* C. Y. Wu ex S. Y. Bao	*B. ignorata* Schneid.
B. iliensis Popov.	*B. impedita* Schneid.	*B. insignis* subsp. *incrassata* (Ahrendt) Chamberlain et Hu
B. insolita Schneid.	*B. integripetala* Ying	*B. iteophylla* C. Y. Wu ex S. Y. Bao

B. jamesiana Forret et W. W. Smith	*B. jiangxiensis* C. M. Hu	*B. jingfushanenis* Ying
B. jiulongensis Ying	*B. johannis* Ahrendt	*B. julianae* Schneid.
B. kangdinsensis Ying	*B. kansuensis* Schneid.	*B. kaschgarica* Rupr.
B. kawakamii Hayata	*B. kerriana* Ahrendt	*B. kongboensis* Ahrendt
B. kunmingensis C. Y. Wu ex S. Y. Bao	*B. laojunshanensis* Ying	*B. leboensis* Ying
B. lecomtei Schneid.	*B. lempergiana* Ahrendt	*B. lepidifolia* Ahrendt
B. levis Franch.	*B. lijiangensis* C. Y. Wu ex S. Y. Bao	*B. liophylla* Schneid.
B. longispina Ying	*B. lubrica* Schneid.	*B. luhuoensis* Ying
B. malipoensis C. Y. Wu et S. Y. Bao	*B. medogensis* Ying	*B. mekongensis* W. W. Smith
B. metapolyantha Ahrendt	*B. miannigensis* Ying	*B. micropetala* Ying
B. microtricha Schneid.	*B. minutiflora* Schneid.	*B. morrisonensis* Hayata
B. mouilicana Schneid.	*B. muliensis* Ahrendt	*B. multicaulis* Ying
B. multiovula Ying	*B. multiserrata* Ying	*B. nemorosa* Schneid.
B. nullinervis Ying	*B. nutanticarpa* C. Y. Wu ex S. Y. Bao	*B. obovatifolia* Ying
B. pallens Franch.	*B. papillifera* (Franch.) Koehne	*B. parapruinosa* Ying
B. paraspecta Ahrendt	*B. parisepala* Ahrendt	*B. pectinocracpedon* C. Y. Wu ex S. Y. Bao
B. phanera Schneid.	*B. photiniaefolia* C. M. Hu	*B. pingbienensis* S. Y. Bao
B. pingwuensis Ying	*B. pinshanensis* Sung et Hsiao	*B. platyphylla* (Ahrendt) Ahrendt
B. poiretii Schneid.	*B. polyantha* Hemsl.	*B. potaninii* Maxim.
B. prattii Schneid.	*B. pruinocarpa* C. Y. Wu ex S. Y. Bao	*B. pruinosa* Franch.
B. pseudoamoena Ying	*B. pseudo-tibetica* C. Y. Wu ex S. Y. Bao	*B. pubescens* Pamp.
B. pulangensis Ying	*B. purdomii* Schneid.	*B. qiaoiaensis* S. Y. Bao
B. racemulosa Ying	*B. replicata* W. W. Smith	*B. reticulata* Byhouw.
B. reticulinervis Ying	*B. retusa* Ying	*B. sabulicola* Ying
B. salicaria Fedde	*B. sanguinea* Franch.	*B. sargentiana* Schneid.
B. shensiana Ahrendt	*B. sherriffii* Ahrendt	*B. sibirica* Pall.
B. sichuanica Ying	*B. sikkimensis* (Schneid.) Ahrendt	*B. silva-taroucana* Schneid.
B. silvicola Schneid.	*B. soulieana* Schneid.	*B. stenostachya* Ahrendt
B. subacuminata Schneid.	*B. subholophylla* C. Y. Wu	*B. sublevis* W. W. Smith
B. taliensis Schneid.	*B. taronensis* Ahrendt	*B. temoaica* Ahrendt
B. tenuipedicellata Ying	***B. thunbergii*** DC.	*B. tianshuiensis* Ying
B. tischleri Schneid.	*B. tomentulosa* Ahrendt	*B. triacanthophora* Fedde
B. trichiata Ying.	*B. tsarica* Ahrendt	*B. tsarongensis* Stapf
B. tsienii Ying	*B. ulicina* Hook. f. et Thoms.	*B. umbratica* Ying
B. valida (Schneid.) Schneid.	*B. veitchii* Schneid.	*B. vernae Schneid.*
B. vernalis (Schneid.) Chamberlain et C. M. Hu	*B. verruculosa* Hemsl.	*B. vinifera* Ying
B. virescens Hook. f. et Thoms.	*B. virgetorum* Schneid.	*B. wangii* Schneid.
B. weiningensis Ying	*B. weixiensis* C. Y. Wu ex S. Y. Bao	*B. weixinensis* S. Y. Bao
B. wilsonae Hemsl.	*B. woomungensis* C. Y. Wu ex S. Y. Bao	*B. wuliangshanenis* C. Y. Wu ex S. Y. Bao
B. wuyiensis C. M. Hu	*B. xanthoclada* Schneid.	*B. xanthophloea* Ahrendt
B. xingwensis Ying	*B. yuii* Ying	*B. yunnanensis* Franch.
B. zanlanscianensis Pamp.	*B. ziyunensis* Hsiao et Z. Y. Li	

Bischofia javanica
Bishop wood

Leaves of *Bischofia javanica*.

Introduction
The genus *Bischofia* is a small member of the family Euphorbiaceae; and contains only two species distributed from southern and southeastern Asia to Australia and Polynesia. They also occur in southwestern, central, eastern, and southern China[87].

Species of *Bischofia* in China

Scientific Name
B. javanica Bl.
B. polycarpa (Lévl.) Airy Shaw

Taxonomy
Family: Euphorbiaceae
Genus: *Bischofia* Bl.

B. javanica may be synonymous with *B. polycarpa* (Lévl.) Airy Shaw in many Chinese plant publications. Wherever bishop wood is mentioned, it may be followed by either *Bischofia javanica* Bl. or *B. polycarpa* (Lévl.) Airy Shaw.

Description
B. javanica is an evergreen or semi-evergreen woody tree with a maximum height of 40 m and diameter of 2.3 m. The relatively short trunk is erect, but branches low. Though coarse at maturity, the bark is nearly smooth, grayish brown to brown, and 1 cm thick, and contains a red milky sap that becomes a resinous semi-solid when dried. Leaves are trifoliate, rarely palmate, with petiole 8-20 cm in length. Each papery leaflet may be ovate, elliptic, subovate, or elliptic-ovate, 7-15 cm long and 4-8 cm wide, acute or caudate-acuminate apically and broadly cuneate to obtuse at base, with two to three denticles per centimeter along the serrated margin. The petiole of the terminal leaflet is 2-5 cm in length, while that of lateral leaflet is 5-20 mm. A stipule is present, also papery, 8 mm long; and it falls off early. Small axillary flowers are borne on dioecious panicles in April to May.

The male inflorescence is 8-13 cm long and pubescent to glabrous, while the female inflorescence is 15-17 cm long and pendant. Appearing in August to October, berry-like fruits are light brown, globular or subglobular, 6-13 mm in diameter, containing oblong seeds 5 mm in length[87].

Habitat
B. javanica occurs in humid valley forests. It is cultivated in plains, especially along stream banks, avenues, and in gardens, at elevations of less than 800 m. The young tree is shade-resistant and prefers moist conditions, growing well in sandy soil that is thick and fertile[87].

Distribution
B. javanica occurs in Fujian, Guangdong, Guangxi, Guizhou, Hainan, Taiwan, Yunnan, and possibly Jiangxi [87][25][30][81][153].

Related Species
Chinese bishop wood, *B.polycarpa,* is a popular deciduous tree common in central China occurring in forests at elevations less than 1,000 m. It is also cultivated in plains areas as an ornamental[87].

Economic Importance
The wood of *B. javanica* is red, heavy, hard, and fine grained, making it useful

material for building. The fruits are used in winemaking. Containing 30-54 percent oil, the edible seeds are used as a source of lubricant. The bark is a source of red dye. The roots are used medicinally [87].

Natural Enemies of *Bischofia*

In China, at least five fungi and six arthropods have been reported associated with members of genus *Bischofia*. Among them, three fungi and one arthropod can attack bishop wood. It should be noted that *Pseudocercospora bischofiae* (Yamam.) Deighton, which is host-specific to bishop wood, appears to be a candidate agent of biological control for *B. javanica*.

Fungi

Phylum	Family	Species	H. R.	Ref.
Ascomycota	Capnodiaceae	*Aithaloderma clavatisporum* Syd. & P. Syd.	p	23†
	Erysiphaceae	*Uncinula bischofia*e C.T. Wei	o	22
			mo	23
		Phellinus williamsii (Murrill) Pat.	po	23
Anamorphic *Mycosphaerella*		*Pseudocercospora bischofiae* (W. Yamam.) Deighton	m	23‡
			m	110
Anamorphic *Pestalosphaeria*		*Pestalotiopsis adusta* (Ellis & Everh.) Steyaert	mo	23

†Recorded as *Aithaloderma clavatispora* Syd.
‡Recorded as *Cercospora bischofiae* Yamam

Arthropods

Order	Family	Species	H. R.	Ref.
Homoptera	Aphididae	*Toxoptera odinae* (van der Goot)	p	100
			p	189
	Cicadellidae	*Erythroneura subrufa* (Motschulsky)	po	48
Lepidoptera	Lymantriidae	*Dasychira conjuncta* Wileman	po	65
		Teia parallela (Gaede)	po	199
	Psychidae	*Chalia larminati* Heylaerts	po	141
		Clania variegata Snellen	po	141*

* Recorded as *Eumeta variegata* Snellen

Broussonetia papyrifera

Paper mulberry

Introduction

The genus *Broussonetia* contains four species and one variety, mainly distributed in East Asia and the Pacific islands. Although *B. papyrifera* is considered an invasive species in North America, it has great economic value in China. All four species are also produced in China, mostly in the southwest and southeast of the country [194]. Paper mulberry is well-known for drought tolerance.

Species of *Broussonetia* in China

Scientific Name
B. papyifera (Linn.) L'Hert. Ex Vent.
B. kaempferi Sieb.
B. kazinoki Sieb.
B. kurzii (Hook. F.) Corner

Taxonomy

Family: Moraceae
Genus: *Broussonetia* L'Hert. ex Vent.

Description

B. papyrifera is a woody tree that can reach 10-20 m in height. The bark is dark gray in color. Leaves are broadly ovate to narrowly elliptic-ovate, 3 - 5 lobed or without lobes, 6-18 cm long and 5-9 cm wide, with coarsely serrate edges, acuminate apexes and asymmetrically cordate bases, arranged spirally on densely pubescent branchlets. Leaves are densely tomentose beneath and sparsely tomentose above. The scabrous petiole is 2.3-8 cm in length. Stipules are ovate, 1.5-2 cm long and 0.8-1 cm wide with an attenuate apex. Flowers are dioecious, blooming from April to May. Male inflorescences are catkins, 3-8 cm long, with lanceolate, pubescent bracts. The perianth of the male flower is four-lobed. Each lobe is triangular-ovate and pubescent. Female inflorescences are globose-capitate, and bracts are clavate, apically pubescent.

Leaves of *Broussonetia papyrifera.*

The female perianth is pipelike, apically lobed and adnate to the style. Appearing from June to July, fruits are syncarps or achenes. The syncarp is fleshy, 1.5-3 cm in diameter and orange-red when mature. Achenes are equal in length to the peduncle and have a verrucose surface [194].

Habitat

B. papyrifera is cultivated in some regions [22], and occurs naturally on hillsides, roadsides, ditch banks, crop field margins, valleys, forests, and open ground near urban areas at elevations below 1,500 m [68] [72] [194] [201].

Distribution

B. papyrifera is widely distributed in China. It occurs in most of the provinces south of the Yellow River, including Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shanxi, Shandong, Sichuan, Taiwan, Yunnan, and Zhejiang. It also occurs in Liaoning, in northeastern China, and an adjacent province of Hebei.

Economic Importance

The phloem fiber of *B. papyrifera* is used in papermaking. The fruits, root and bark have numerous medicinal uses [105].

Related Species

There are two species similar to *B. papyrifera* under Section Broussonetia *Broussonetia kazinoki* Sieb, which produces male and female flowers on the same plant, has a distribution similar

to that of paper mulberry, occurring in the same habitat type; *Broussonetia kurzii* (Hook. F.) Corner, with leaves arranged alternately in two rows, grows in tropical rainforests in Yunnan and southern China, at elevations of 200-600 m.

Natural Enemies of *Broussonetia*

Twelve species and one variety of fungi have been reported to cause damage to *B. papyrifera*. Three species, *Aecidium mori* Barcl. var. *broussonetia*, *Dendryphiella broussonetiae* Y. L. Guo et Z. Y. Zhang and *Phomopsis broussonetiae* (Sacc.) Diet., are reportedly host specific to *Broussonetia papyrifera*. Thirteen species of insects and mites belonging to six families and five orders are reported to attack members of the genus *Broussonetia.*

Fungi

Phylum	Family	Species	H. R.	Ref.
Ascomycota	Erysiphaceae	*Phyllactinia broussonetiae- kaempferi* Sawada	o	22
		Phyllactinia moricola (Henn.) Homma	p	23
	Mycosphaerellaceae	*Mycosphaerella mori* (Fuckel) F.A. Wolf	p	23†
Basidiomycota	Incertae sedis	*Aecidium mori* Barclay	po	23
		Aecidium mori var. *broussonetia*	m	186
	Phakopsoraceae	*Phakopsora fici-erectae* S. Ito & Y. Otani ex S. Ito & Muray.	p	23
	Septobasidiaceae	*Septobasidium bogoriense* Pat.	p	23
Oomycota	Pythiaceae	*Phytophthora boehmeriae* Sawada	p	188
Anamorphic Ascomycetes		*Myxosporella miniata* Sacc.	p	23
		Nothopatella chinensis Miyake	p	23
Anamorphic *Diaporthe*		*Phomopsis broussonetiae* (Sacc.) Died.	m	23
Anamorphic *Mycosphaerella*		*Pseudocercospora broussonetiae* (Chupp & Linder) Y.L. Guo & X.J. Liu	oo	23‡
			o	110
Anamorphic *Pleospora*		*Dendryphiella broussonetiae* Y.L. Guo & Z.Y. Zhang	m	55

† Recorded as *Septogloeum mori* Briosi et Cav.
‡ Recorded as *Cercospora broussonetiae* Chupp et Linder

Arthropods

Order	Family	Species	H. R.	Ref.
Acariformes	Tetranychidae	*Eotetranychus broussonetiae* Wang	m	143
		Eotetranychus smithi Pritchard et Baker	p	143
		Eotetranychus suginamensis (Yokoyama)	p	143
		Tetranychus cinnabarinus (Boisduval)	p	143
		Tetranychus kanzawai Kishida	p	143
Coleoptera	Cerambycidae	*Megopis sinica ornaticollis* (White)	p	79
Hemiptera	Pentatomidae	*Cantao ocellatus* (Thunberg)	p	192
		Dalpada smargdina (Walker)	po	192
Homoptera	Callaphididae	*Tiliaphis coreanus* Quednau	p	100
	Ricaniidae	*Ricania speculum* (Walker)	po	204
Lepidoptera	Sphingidae	*Enpinanga transtriata* Chu et Wang	p	65
		Marumba sperchius Ménéntriès	p	206
			p	208
		Parum colligata (Walker)	p	65
			p	141
			p	158
			po	206
			p	208

Buddleja davidii
Butterfly bush

Leaves and flowers of *Buddleja davidii*.

Introduction
The genus *Buddleja* includes 100 species occurring from tropical to temperate regions of the Americas, Africa and Asia[86]. Twenty-nine species and 4 varieties occur in most provinces of China except Xinjiang and those of northeastern China.

Species of *Buddleja* in China

Scientific Name	Scientific Name
B. adenantha Diels	*B. hastata* Prain ex Marq. †
B. alata Rehd. & Wilson†	*B. heliophila* W. W. Smith†
B. albiflora Hemsl.	*B. limitallea* W. W. Smith†
B. alternifolia Maxim. †	*B. lindleyana* Fortune
B. asiatica Lour.	*B. macrostachya* Wall. ex Benth.
B. brachystachya Diels	*B. madagascariensis* Lamk.
B. candida Dunn	*B. myriantha* Diels
B. caryopteridifolia W. W. Smith†	*B. nivea* Duthie
B. colvilei Hook.f. & Thoms.	*B. officinalis* Maxim.
B. crispa Benth.	*B. paniculata* Wall.
B. curviflora Hook. & Arn.	*B. purdomii* W. W. Smith†
B. davidii Franch.	*B. taliensis* W. W. Smith†
B. delavayi Gagnep.	*B. wardii* Marq. †
B. fallowiana Balf. f. & W.W. Smith	*B. yunnanensis* Gagnep. †
B. forrestii Diels	

† Not included or accepted as hybrid in revised *Flora of China*[88]

The upper leaf surface is hair-covered becoming glabrous, with 9-14 lateral veins. Ovate or semicircular, and occasionally caducous, two stipules may be present between the leafstalks, which are 1-5 mm long. Flowering from May to October, the inflorescence occurs terminally as a raceme or in a panicle-like cyme arrangement, 4-30 cm long and 2-5 mm wide. The calyx is bell-shaped and 2-3 mm long. Each lobe is membranous and triangular. The fragrant corollas are 7.5-14 mm long, light violet, then yellowish white to white, with an orange-yellow throat and suborbicular lobes. The fruit is a capsule, which is narrowly ellipsoid to narrowly ovoid, 5–9 mm long and 1.5–2 mm wide, appearing from September to December. Seeds are ellipsoid, 2–4 mm in length and about 0.5 mm

Taxonomy
Family: Loganiaceae
Genus: *Buddleja* L.

Description
B. davidii is a shrub 1-5 m in height. The branches are somewhat drooping. Most parts of the plant are covered with white stellate hairs. Opposite leaves are membranous or thin papery, narrowly ovate, narrowly elliptic to ovate-lance shaped, 1-20 cm long and 0.3-7.5 cm wide, with serrate margin, acuminate apex, and base obtuse to broadly cuneate.

in diameter, with long wings at both ends[88][86].

Habitat

B. davidii occurs in thickets on hillsides and trenches, at elevations of 800-3,000 m[86].

Distribution

B. davidii occurs in Anhui, Gansu, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan, Yunnan, Zhejiang, and possibly Guangdong [26][31][50][88][86][156][162].

Economic Importance

The entire plant is used medicinally. Fragrant essential oils can be extracted from the flower. It is also grown as an ornamental plant for its graceful flowers and down-swept twigs [86].

Natural Enemies of *Buddleja*

Three fungi and thirteen arthropods are reported for *Buddleja* speceis. One fungal species, *Pseudocercospora buddleiae*, is reported to infect *B. davidii*.

Fungi

Phylum	Family	Species	H. R.	Ref.
Ascomycota	Meliolaceae	*Irenina buddlejae* Hansf.	oo	23
Anamorphic *Mycosphaerella*		*Pseudocercospora buddleiae* (W. Yamam.) Goh & W.H. Hsieh	oo	23†
			o	110
		Septoria merrillii Syd.	mo	23

† Recorded as *Cercospora buddlejae* Yamam

Arthropods

Order	Family	Species	H. R.	Ref.
Coleoptera	Chrysomelidae	*Hemipyxis lusca* (Fabricius)	po	185
		Hemipyxis plagioderoides (Motschulsky)	po	65
			po	158
		Hemipyxis tonkinensis (Chen)	po	185
		Hespera bipilosa Chen et Wang	oo	140
		Hespera univestis Chen et Wang	oo	140
		Stenoluperus nipponensis (Laboissiere)	p	65
			po	140
			po	158
		Trachyaphthona bidentata Chen et Wang	oo	140
			oo	185
		Trachyaphthona buddlejae Wang	po	185
		Trachyaphthona cyanea (Chen)	oo	140
			po	185
		Trachyaphthona fulva Wang	oo	140
Homoptera	Pseudococcidae	*Pedronia planococcoides* Borchsenius	po	150
		Planococcus sinensis Borchsenius	po	150
Thysanoptera	Thripidae	*Dendrothrips stannardi* (Ananthakrishnan)	po	56

Caesalpinia decapetala
Cat's claw

Leaves and flowers of *Caesalpinia decapetala*.

Introduction
The genus *Caesalpinia* contains more than 100 species, occurring in tropical and temperate regions worldwide. Seventeen species are reported from China, occurring primarily in the southwest and north [200].

Species of *Caesalpinia* in China

Scientific Name	Scientific Name
C. bonduc (Linn.) Roxb.	*C. millettii* Hook. et Arn.
C. caesia Hand.-Mazz.	*C. mimosoides* Lam.
C. crista Linn.	*C. minax* Hance
C. cucullata Roxb.	*C. pulcherrima* (Linn.) Sw.
C. decapetala* (Roth) *Alston	*C. sappan* Linn.
C. digyna Rottler	*C. sinensis* (Hemsl.) Vidal
C. enneaphylla Roxb.	*C. tortuosa* Roxb.
C. hymenocarpa (Prain) Hattink	*C. vernalis* Champ.
C. magnifoliolata Metc.	

Taxonomy
Family: Leguminoseae (Fabaceae)
Genus: *Caesalpinia* Linn.

Description
C. decapetala is a shrub bearing thorns and fine hairs on the inflorescence and red stems. Leaves are bipinnate, 20-30 cm long, divided into three to ten pairs of opposite pinnae with 8-12 pairs of leaflets each with one pair of thorns in the joint between the pinna and leaf axil. Each leaflet is glabrescent, membranous, oblong, 10-25 mm long and 6-12 mm wide, and obtuse at both ends. The stipule is slender, oblique-ovate with an acuminate apex. The terminal raceme is erect and 15-30 cm long. Petals are yellow and revolute during full bloom, but easily shed due to the presence of the node on the pedicel near the base of the calyx. Smooth, brown, leathery pods, containing 6 - 9 brown seeds, are ligule-shaped, 6-12 cm long and 2.5 –3 cm wide, beaked at both ends, splitting along the ventral suture at maturity [200].

Habitat
C. decapetala occurs on bushy hillsides, uplands, and along streams in temperate and tropical regions [200].

Distribution
C. decapetala is found in Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan, Yunnan, and Zhejiang provinces [159][200].

Economic Importance
The bitter tasting stems and roots can be used medicinally, while other parts of the plant are useful in the chemical industry. The fruits and bark are rich in tannin. With an oil content of 35 percent, the seeds serve as a source of lubricant and soap. *C. decapetala* is also grown as a hedge plant in China [200].

Natural Enemies of *Caesalpinia*

Three fungi and five arthropods are reported to be associated with *Caesalpinia*. In China, the fungus *Phyllactinia caesalpiniae* Yu, also known as *Phyllactinia corylea* (Pers) Karst., infects *C. decapetala*. Five arthropod species are known to damage cat's claw [22][23].

Fungi

Phylum	Family	Species	H. R.	Ref.
Ascomycota	Erysiphaceae	*Phyllactinia caesalpiniae* Yu	o	22
	Meliolaceae	*Meliola caesalpiniicola* Deighton	oo	61
Anamorphic *Mycosphaerella*		*Pseudocercospora caesalpiniae* Goh & W.H. Hsieh	oo	110

Arthropods

Order	Family	Species	H. R.	Ref.
Coleoptera	Cerambycidae	*Apriona swainsoni* (Hope)	p	65
			p	79
Hemiptera	Plataspidae	*Coptosoma lasciva* Bergroth	p	193
		Megacopta horvathi (Montandon)	p	193
Lepidoptera	Lycaenidae	*Catochrysops panormus* (Felder)	po	203
	Pieridae	*Eurema hecabe* L.	p	24
			po	158

Carduus nutans
Musk thistle

Introduction
The genus *Carduus*, comprised of approximately 95 species, is distributed in Eurasia and northern and tropical Africa. There are only three species native to China[104].

Species of *Carduus* in China

Scientific Name
C. acanthoides L.
C. crispus L.
***C. nutans* L.**

Taxonomy
Family: Compositae (Asteraceae)
Genus: *Carduus* L

Description
Carduus nutans is a biennial or perennial herb 20-100 cm tall. Stems are grayish white, ribbed, usually multi-branched, rarely unbranched, sparsely arachnoid, and apically tomentose. Leaves of the lower and middle parts are ovate to lance-shaped, 10-40 cm long and 3-10 cm wide, pinnatifid or pinnatipartite with five to seven pairs of lateral lobes, which are obliquely triangular or triangular-ovate, and at the tip of each lobe is a light yellow or brown spine that is about 4-6 mm long. The upper leaves gradually decrease in size upward, and are lobed pinnately or entire, bearing spinules shorter than those of the lower and middle leaves. Inflorescence consists of 4-6 solitary heads at the end of the branches. The involucre is bell-shaped or broadly so and 4-7 cm in diameter. Bracts are multi-layered and imbricate. The outermost bract is triangular, 1.4-1.5 cm long and 4-5 mm wide; innermost bract is broadly linear to linear-lanceolate, 2-2.2 cm long and 2-3 mm wide, with the midrib raised and elongated apically into a spine. Middle and inner bracts are triangular-lanceolate, elliptic, or elliptic-lanceolate, 1.5-2 cm long and 5 mm wide. Corollas are purple red and about 2.5 cm long. Fruits are gray-yellow achenes about 3.5 mm long, with many thin grooves that are pale brown and wrinkled. Pappus bristles are white, scabrid, and unequal. Flowers and fruits appear from June to September[104].

Carduus nutans flower.

Habitat and Distribution
C. nutans occurs in valleys, croplands and grasslands at elevations of 540–2300 m in the Tian Shan mountains and Dzungarian Basin of Xinjiang[20][104].

Economic Importance
C. nutans is nectariferous.

Related Species
Carduus crispus L. is a common weed throughout China occurring on grassland slopes, farmlands, wastelands, riversides and forests at elevations of 400–3,600 m. *Carduus acanthoides* L. is also distributed throughout China and occurs on hilly slopes, grasslands, forest edges, thickets, valleys, lakesides, and farmlands at elevations of 260–3,500 m[104].

Natural Enemies of *Carduus*
Of the four fungi found on members of the genus *Carduus*, two are reported to infect musk thistle, one rust, *Puccinia galatica* is host specific. Seven arthropod species from five families are associated

with the members of the genus

Fungi

Phylum	Family	Species	H. R.	Ref.
Ascomycota	Erysiphaceae	*Erysiphe cichoracearum* DC.	po	22
Basidiomycota	Incertae sedis	*Aecidium cardui* Syd. & P. Syd.	oo	23
	Pucciniaceae	*Puccinia carduorum* Jacky	o	23
		Puccinia galatica Syd.	m	23

Arthropods

Order	Family	Species	H. R.	Ref.
Coleoptera	Hispidae	*Cassida rubiginosa rugo-sopunctata* Motschulsky	po	140
Hemiptera	Tingidae	*Tringis ampliata* (Herrich-Schaeffer)	po	193
Homoptera	Aphididae	*Capitophorus carduinus* (Walker)	po	189
Lepidoptera	Noctuidae	*Apamea vetusta* (Hübner)	po	13
		Orthosia gracilis (Schiffermüller)	po	12
	Nymphalidae	*Vanessa cardui* (Linnaeus)	po	203
	Tortricidae	*Aethes cnicana* Westwood	po	66

Celastrus orbiculatus
Oriental bittersweet

Colorful fruits of *Celastrus orbiculatus*.

Introduction
There are approximately 30 species in the genus *Celastrus* distributed throughout the tropic and subtropic regions worldwide. In China, 24 species and 2 varieties of *Celastrus* have been reported, primarily south of the Yellow River[14].

Species of *Celastrus* in China†

Scientific Name	Scientific Name
C. aculeatus Merr.	*C. kusanoi* Hayata
C. angulatus Maxim.	*C. monospermus* Roxb.
C. cuneatus (Rehd. et Wils.) C. Y. Cheng et T. C. Kao*C. flngellaris* Rupr.	*C. oblanceifoius* Wang et Tsoong
C. gemmatus Loes.	***C. orbiculatus*** Thunb.
C. glaucophyllus Rehd. et Wils.	*C. paniculatus* Willd.
C. hindsii Benth.	*C. punctatus* Thunb.
C. hirsutus Comber	*C. rosthornianus* Loes.
C. homaliifolius Hsu	*C. rugosus* Rehd. et Wils.
C. hookeri Prain	*C. stylosus* Wall.
C. hypoleucoides P. L. Chiu	*C. tonkinensis* Pitard
C. hypoleucus (Oliv.) Warb. ex Loes.	*C. vaniotii* (Lévl.) Rehd.
C. virens (Wang et Tang) C. Y. Cheng et T. C. Kao	

† varieties not listed

Taxonomy
Family: Celastraceae
Genus: *Celastrus* L.

Description
Celastrus orbiculatus is a deciduous woody vine. The smooth branches are greyish white or brown to darker brown at maturity, with a few inconspicuous lenticels. Leaves are broadly obovate, circular, or oblong, measuring 5-13 cm in length and 3-9 cm in width, with toothed margins, apiculate apex, and a broadly cuneate or nearly obtuse base. Greenish-yellow flowers are produced from May to June, either terminally or in the leaf axils. Occurring from July through October, fruits are round, yellow-orange capsules, 8-10 mm in diameter. They open when mature to expose the reddish-brown, ovate seeds, 4-5 mm in length and 2.5-3 mm in diameter[14].

Habitat
C. orbiculatus usually occurs in thickets on hillsides at elevations of 450-2,200 m[14].

Distribution
C. orbiculatus is one of the *Celastrus* species that has a wide distribution in China. It can be found in Anhui, Gansu, Hebei, Heilongjiang, Henan, Hubei, Jiangsu, Jiangxi, Jilin, Liaoning, Shandong, Shaanxi, Shanxi, Sichuan, and Zhejiang [14], Guangxi[50], Hunan [126], and Inner Mongolia[45][120]. It is cultivated in Xinjiang[175].

Economic Importance
Fruits are considered to be medically helpful. The bark is a source of fine fiber. Containing 50 percent oil, the seeds are industrially useful. *C. orbiculatus* can be used as an insect control agent [74] and it is also cultivated as an ornamental [130]. It is not regarded as a noxious weed in China.

Natural Enemies of *Celastrus*
Records of natural enemies associated

Celastrus orbiculatus leaves.

with the genus *Celastrus* are poor. There are only three fungal species reported to infect it. *Uncinula sengokui* is host-specific to *C. orbiculatus* [22][23]. Six arthropod species have been reported to cause damage to oriental bittersweet, and two of them may be host-specific.

Fungi

Phylum	Family	Species	H. R.	Ref.
Ascomycota	Erysiphaceae	*Microsphaera celastri* Y.N. Yu & Y.Q. Lai	mo	22
		Uncinula sengokui E.S. Salmon	m	22
			m	23
	Meliolaceae	*Amazonia celastri* Y.X. Hu & B. Song	oo	133

Arthropods

Order	Family	Species	H. R.	Ref.
Coleoptera	Scolytidae	*Hypothenemus eruditus* Westwood	o	134
Hemiptera	Coreidae	*Plinachtus bicoloripes* Scott	m	193
Homoptera	Aphididae	*Aphis clerodendri* Matsumura	p	100
	Diaspididae	*Unaspis euonymi* (Comstock)	p	131
	Triozidae	*Trioza celastrae* Li	m	90
Lepidoptera	Yponomeutidae	*Yponomeuta sociatus* Moriuti	o	114

Cinnamomum camphora
Camphor tree

Leaves of *Cinnamomum camphora*.

Introduction
The genus *Cinnamomum*, with approximately 250 species, occurs in Australia, the Pacific islands, and in the tropics and subtropics of East Asia. In China, 46 species and one variety occur primarily in the south, with Shaanxi and southern Gansu as the northern boundary[94].

Species of *Cinnamomum* in China

Scientific Name	Scientific Name
C. appelianum Schewe	*C. micranthum* (Hay.) Hay.
C. austro-sinense H. T. Chang	*C. migao* H. W. Li
C. austro-yunnanense H. W. Li	*C. mollifolium* H. W. Li
C. bejolghota (Buch.-Ham.) Sweet	*C. osmophloeum* Kanehira
C. bodinieri Lévl.	*C. pauciflorum* Nees
C. burmannii (C. G. et Th. Nees) Bl.	*C. philippinense* (Merr.) C. E. Chang
C. camphora (L.) Presl	*C. pingbienense* H. W. Li
C. cassia Presl	*C. pittosporoides* Hand'-Mazz.
C. caudiferum Kosterm.	*C. platyphyllum* (Diels) Allen
C. chartophyllum H. W. Li	*C. porrectum* (Roxb.) Kosterm.
C. contractum H. W. Li	*C. reticulatum* Hay.
C. glanduliferum (Wall.) Nees	*C. rigidissimum* H. T. Chang
C. ilicioides A. Chev.	*C. saxatile* H. W. Li
C. iners Reinw. ex Bl.	*C. septentrionale* Hand.-Mazz.
C. japonicum Sieb.	*C. subavenium* Miq.
C. javanicum Bl.	*C. tamala* (Buch.-Ham.) Nees et Eberm.
C. jensenianum Hand.-Mazz.	*C. tenuipilum* Kosterm.
C. kotoense Kanehira et Sasaki	*C. tonkinense* (Lec.) A. Chev.
C. kwangtungense Merr.	*C. tsangii* Merr.
C. liangii Allen	*C. tsoi* Allen
C. longepaniculatum (Gamble) N. Chao ex H. W. Li	*C. validinerve* Hance
C. longipetiolatum H. W. Li	*C. wilsonii* Gamble
C. mairei Lévl.	*C. zeylanicum* Bl.

Taxonomy
Family: Lauraceae
Genus: *Cinnamomum* Trew

Description
Cinnamomum camphora is a large evergreen tree that can grow to 30 m in height and 3 m in diameter, with a broadly ovate crown. Terminal buds are broadly ovoid or globular, and covered with sericeous scales. Bark is yellowish brown with irregular vertical splits. Branches are light brown, cylindrical, and glabrous.

Alternate leaves are ovate-elliptic, 6-12 cm long and 2.5-5.5 cm wide, margin entire or occasionally repand, with acute apices and broadly cuneate to subrounded base. Upper leaf surface is shiny green to yellowish green, while the underside is opaque and lighter in color. The leaves are glabrous on both surfaces or sparsely puberulent beneath only when young; triplinerved or sometimes inconspicuously five-nerved, with conspicuous midrib on both surfaces and 1-5(7)-paired lateral nerves from the midrib. The axils of lateral nerves and veins are conspicuously bullate above, dome-shaped, and always villous beneath. The axillary panicle is 3.5–7 cm long. Greenish white to yellow flowers are glabrous or downy and pale to yellowish brown, and about 3 mm in length. The perianth is glabrous or puberulent outside and densely pubescent inside. The purplish-black fruit is an ovate or subglobose drupe, 6-8 mm in diameter. The perianth-cup in fruit is cupuliform, 5 mm long, longitudinally sulcate, with truncate apex up to 4 mm wide and base 1 mm wide[94]. Flowers appear in April to May, and fruits in August to November[94][95].

Habitat
Cinnamomum camphora occurs in valleys and on mountain slopes. It is also widely cultivated[94].

Distribution

C. camphora is found in southern and southwestern China including Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shandong, Sichuan, Yunan, and Zhejiang provinces[94].

Economic Importance

Roots, branches, leaves, and wood of *C. camphora* can be used for extracting camphor and camphor oil for pharmaceutical use and as a flavoring. The core of the fruit, which has both industrial and medicinal uses, is approximately 40 percent oil. The wood is used for construction, shipbuilding, and cabinet-making[94].

Natural Enemies of *Cinnamomum*

The reported natural enemies found on members of the genus *Cinnamomum* number 22 fungi and 92 arthropods covering 33 families in 7 orders. Most arthropods in the list are reported to infest *C. camphora* and possibly other species within the genus.

Fungi

Phylum	Family	Species	H. R.	Ref.
Ascomycota	Asterinaceae	*Asterina cinnamomi* Syd.	m	23
	Capnodiaceae	*Capnodium footii* Berk. & Desm.	po	23
	Erysiphaceae	*Erysiphe cichoracearum* DC.	po	22
			po	23
	Glomerellaceae	*Glomerella cingulata* (Stoneman) Spauld. & H. Schrenk	p	23
	Meliolaceae	*Armatella formosana* W. Yamam.	oo	61
		Armatella longispora W. Yamam.	oo	23
			oo	61
		Meliola beilschmiediae var. *cinnamomi* Hansf.	oo	61
		Meliola neolitseae W. Yamam.	oo	61
Basidiomycota	Atheliaceae	*Athelia rolfsii* (Curzi) C.C. Tu & Kimbr.	p	23[I]
	Ceratobasidiaceae	*Thanatephorus cucumeris* (A.B. Frank) Donk	p	23[II]
	Hymenochaetaceae	*Phellinus williamsii* (Murrill) Pat.	p	23
	Incertae sedis	*Aecidium cinnamomi* Racib.	mo	23
	Pucciniaceae	*Puccinia cinnamomi* F.L. Tai	po	23
	Pucciniaceae	*Puccinia cinnamomicola* Cummins	oo	23
	Septobasidiaceae	*Septobasidium albidum* Pat.	p	23
Oomycota	Pythiaceae	*Phytophthora cinnamomi* Rands	p	188
Anamorphic Ascomycetes		*Elaeodema cinnamomi* Syd.	o	23
		Elaeodema cinnamomi f. *brunnea* Keissl.	mo	23
		Elaeodema floricola Keissl.	mo	23
Anamorphic Ectolechiaceae		*Chlorocyphella aeruginascens* (Karst.) Keissl.	po	23
Anamorphic *Guignardia*		*Phyllosticta nobilis* Thüm.	po	23
Anamorphic *Mycosphaerella*		*Pseudocercospora cinnamomi* (Sawada & Katsuki) Goh & W.H. Hsieh	mo	23[III]
			o	110

[I] Recorded as *Corticium centrifugum* (Lév.) Bres.
[II] Recorded as *Cortlcium sasakii* (Shirai) Matsum.
[III] Recorded as *Cercospora cinnamomi* Sawada & Katsuki

Arthropods

Order	Family	Species	H. R.	Ref.
Acariformes	Eriophyidae	*Acerimina cinnamomi* Kuang	m	83
		Anothopoda cinnamomi Kuang et Feng	oo	83
	Tetranychidae	*Oligonychus punicae* (Hirst)	p	143
Coleoptera	Cerambycidae	*Eupromus ruber* (Dalman)	po	9
		Eurypoda antennata Saunders	p	124
		Eurypoda batesi Gahan	oo	9
		Mimothestus annulicornis Pic	m	124
		Monochamus bimaculatus Gahan	p	9
		Oberea griseopennis Schwarzer	m	79
		Paraglenea fortunei (Saunders)	po	9
		Pyrestes haematica Pascoe	m	9
		Uraecha angusta (Pascoe)	mo	124
	Cetoniidae	*Oxycetonia jucunda* (Faldermann)	p	140
	Chrysomelidae	*Atysa marginata* (Hope)	p	158
			m	185
		Clitenella fulminans (Faldermann)	p	65
	Eumolpidae	*Aulexis cinnamoni* Chen et Wang	m	139
		Chalcolema cinnamoni Chen et Wang	m	139
	Scolytidae	*Cnestus maculatus* Browne	p	140
		Coptodryas perparvus (Sampson)	p	65
		Hadrodemius armorphus (Eggers)	p	65
		Phloeosinus camphoratus Tsai et Yin	m	182
		Phloeosinus cinnamomi Tsai et Yin	m	182
		Terminalinus eggersi (Besson)	p	65
		Xyleborus huangi Browne	p	65
Hemiptera	Coreidae	*Homoeocerus walkerianus* Lethierry et Severin	p	192
	Pentatomidae	*Dolycoris baccarum* (Linnaeus)	p	192
		Erthesina fullo (Thunberg)	po	192
	Tingidae	*Stephanitis laudata* Drake et Poor	oo	193
		Stephanitis macaona Drake	po	192
		Stephanitis mendica Horvath	oo	193
Homoptera	Aphididae	*Aphis citricola* van der Goot	po	140
	Aphrophoridae	*Trigophora obliqua* (Uhler)	p	140
		Yezophora flavomaculata (Matsumura)	m	140
	Asterolecaniidae	*Asterolecanium cinnamomi* Borchsenius	p	65
			oo	151
	Cicadidae	*Mogannia hebes* (Walker)	p	158
	Coccidae	*Ceroplastes floridensis* Comstock	p	158
		Chloropulvinaria aurantii (Cockerell)	p	151
		Chloropulvinaria psidii (Maskell)	p	151
		Coccus hesperidum (Linnaeus)	po	65
			p	151
		Dicyphococcus bigibbus Borchsenius	p	151
		Eucalymnatus tessellatus (Signoret)	p	151
		Neoplatylecanium cinnamomi Takahashi	m	151
		Saissetia formicarii (Green)	p	151

	Diaspididae	*Aulacaspis yabunikkei* Kuwana	p	65
		Parlatoria pergandii Comstock	p	65
		Pseudaonidia duplex (Cockerell)	p	140
			p	158
		Unaspis yanonensis (Kuwana)	p	158
	Margarodidae	*Icerya purchasi* Maskell	p	140
	Pseudococcidae	*Formicococcus cinnamomi* Takahashi	m	150
		Pseudococcus comstocki (Kuwana)	po	150
	Tropiduchidae	*Tambinia debilis* Stål	p	204
Lepidoptera	Drepanidae	*Macrauzata ferestraria* (Moore)	m	158
		Macrauzata maxima chinensis lnoue	m	65
		Tridrepana crocea (Leech)	p	158
	Geometridae	*Hypomecis punctinalis conferenda* (Butler)	p	158
		Thalassodes quadraria Guenée	p	141
			m	158
		Trigonoptila latimarginaria Leech	m	158
	Limacodidae	*Latoia pastoralis* Butler	m	158
			p	158
		Thosea sinensis (Walker)	p	158
	Lymantriidae	*Euproctis bipunctapex* (Hampson)	p	141
			p	198
		Ivela eshanensis Chao	m	199
		Lymantria dispar (Linnaeus)	p	141
		Lymantria viola Swinhoe	p	141
	Noctuidae	*Ischyja manlia* Cramer	p	141
			po	205
	Nymphalidae	*Charaxes bernardus* (Fabricius)	p	158
			p	203
	Papilionidae	*Chilasa agestor matsumurae* Fruhstorfer	p	203
		Chilasa clytia dissimilis (Linnaeus)	po	203
		Chilasa epycides agestorides Fruhstorfer	p	158
		Chilasa epycides melanoleuca (Ney)	p	203
		Graphium sarpedon (Linnaeus)	p	158
			p	203
		Graphium sarpedon connecteus (Fruhstorfer)	p	203
		Papilio thaiwanus Rothschild	p	203
		Pazala timur Ney	m	158
	Psychidae	*Amatissa snelleni* Heylaerts	po	141
		Dappula tertia Templeton	p	141
		Clania variegata Snellen	po	1 4 1 †
	Saturniidae	*Actias selene ningpoana* Felder	p	141
		Actias sinensis Walker	p	65‡
			p	158
		Antheraea frithii javanensis Bouvier	p	158
		Antheraea pernyi Guérin-Méneville	p	141
			p	158
		Loepa anthera Jordan	po	158
		Samia cynthia (Drurvy)	p	65
			p	158‡
	Sphingidae	*Clanidopsis exusta* (Butler)	mo	206
	Tortricidae	*Homona magnanima* Diakonoff	p	158

Parasitiformes	Phytoseiidae	*Amblyseius orientalis* Ehara	p	65
Thysanoptera	Phlaeothripidae	*Litotetothrips rotundus* (Moulton)	m	56
	Thripidae	*Anisopilothrips venustulus* (Priesner)	po	56
		Astrothrips aucubae Kurosawa	p	56
		Elixothrips brevisetis (Bagnall)	po	56
		Helionothrips aino (Ishida)	p	56
		Heliothrips haemorrhoidalis (Bouché)	po	56
		Megalurothrips distalis (Karny)	po	56

† Recorded as *Eumeta variegata* Snellen

‡ Recorded as *Philosamia cynthia walkeri* Felder et Felder

Cirsium arvense
Canada thistle

Flowers of *Cirsium arvense*.

Introduction
The genus *Cirsium* is comprised of approximately 250–300 species distributed in Asia, Europe, North Africa, and both North and Central America. More than 50 species belonging to eight sections have been reported from China[104].

Species of *Cirsium* in China

Scientific Name	Scientific Name
C. alatum (S. G. Gmel.) Bobr.	*C. leo.* Nakai. et. Kitag.
C. alberti Rgl. et Schmalh.	*C. lidjiangense* Petrak ex Hand.-Mazz.
C. argyrancanthum DC.	*C. lineare* (Thunb.) Sch.-Bip.
C. arvense (L.) Scop.	*C. maackii* Maxim.
C. bracteiferum Shih	*C. monocephalum* (Vant.) Lévl.
C. chinense Gardn. et Champ.	*C. muliense* Shih
C. chlorolepis Petrak	*C. pendulum* Fisch. ex DC.
C. chrysolepis Shih	*C. periacanthaceum* Shih
C. eriophoroides (Hook. f.) Petrak	*C. racemiforme* Ling et Shih
C. esculentum (Sievers) C. A. Mey.	*C. sairamense* (C. Winkl.) O. et B. Fedtsch.
C. fangii Petrak.	*C. salicifolium* (Kitag.) Shih
C. fanjingshanense Shih	*C. schantarense* Trautv. et Mey.
C. fargesii (Franch.) Diels	*C. semenovii* Rgl. et Schmalh.
C. fusco-trichum Chang	*C. serratuloides* (L.) Hill
C. glabrifolium (C. Winkl.) O. et B. Fedtsch.	*C. setosum* (Willd.) MB.
C. griseum Lévl.	*C. shansiense* Petrak
C. handelii Petrak ex Hand.-Mazz.	*C. sieversii* (Fisch. et Mey.) Petrak
C. helenioides (L.) Hill	*C. souliei* (Franch.) Mattf.
C. henryi (Franch.) Diels	*C. subulariforme* Shih
C. hupehense Pamp.	*C. tenuifolium* Shih
C. incanum (S. G. Gmel.) Fisch. ex MB.	*C. tianmushanicum* Shih
C. interpositum Petrak	*C. vernonioides* Shih
C. japonicum Fisch. ex DC.	*C. verutum* (D. Don) Spreng.
C. lanatum (Roxb. ex Willd.) Spreng.	*C. vlassovianum* Fisch. ex DC.
C. leducei (Franch.) Lévl.	*C. vulgare* (Savi) Ten.

Taxonomy
Family: Compositae (Asteraceae)
Genus: *Cirsium* Mill.

Description
Cirsium arvense is a dioecious, herbaceous perennial 50 - 160 cm tall with creeping rootstock and erect stem, branched near the top. Leaves are green, concolorous or lighter on the lower side, and glabrous or very sparsely arachnoid on the lower side. Leaves of the lower stems are elliptic or elliptic-lanceolate, 7-17 cm long and 1.5-4.5 cm wide, pinnatifid, with a short petiole. Leaf margins are dentate with two to three spines bearing spinules 5 mm long. The upper leaves are sessile, similar in division to the lower stem leaves, but turning slightly upwards on the stem. Most heads are arranged terminally in an umbel. The involucre is ovate or ovate-oblong, sparsely arachnoid or glabrous, 1.5-2 cm in diameter. Five rows of bracts are imbricate, spinule-bearing, and different in shape. Florets have purplish-red corollas and filiform tubes. Fruits (achenes) are light yellow, cylindroid, cuneate at tip, with dirty white to brownish pappus, and appear from June to September[104].

Habitat and Distribution
C. arvense can be found in moist places by ditches or lakesides, in cropfields, wastelands, sands, grasslands, and arid hillsides in the deserts, at elevations of 700-4,250 m in Gansu, Xinjiang, and Tibet [104][112].

Economic Importance
The economic impact of the plant has not been evaluated, although the damage to host sites is obvious. In some areas of Xinjiang, the plant has invaded croplands, vegetable plots, and prairie, causing serious yield declines[27].

Related Species
With a nationwide distribution, *C. japonicum*, a common species in China, occurs at edges of forests, in thickets, grasslands, farmlands, wastelands, roadsides, streamsides, and in forests

at elevations of 400-2,100 m[104].

Natural Enemies of *Cirsium*

Seventeen fungi, and 42 insect species belonging to 19 families of 6 orders have been found on members of the genus *Cirsium*. The investigation of natural enemy insects of *C. arvense* in Xinjiang was conducted in the early 1990s. Data indicate that eleven species, including one unidentified Mordellidae species (not listed in the following table), were found to occur on the plant, with four causing serious negative effects and therefore being regarded as potential biological control agents against *C. arvense*. The four arthropod species are *Lixus depressipennis, Cleonus piger*, *Altica cirsicola* and *Terellia* sp[27].

Fungi

Phylum	Family	Species	H.R.	Ref.
Ascomycota	Erysiphaceae	*Erysiphe cichoracearum* DC.	po	22
		Sphaerotheca fuliginea (Schltdl.) Pollacci	p	23
		Sphaerotheca fusca (Fr.) S. Blumer	o	22
	Sclerotiniaceae	*Sclerotinia sclerotiorum* (Lib.) de Bary	po	23
Basidiomycota	Pucciniaceae	*Puccinia cirsii* Lasch	o	23
		Puccinia cirsii-maritimi Dietel	oo	23
		Puccinia dioicae Magnus	po	23
			po	149
		Puccinia infra-aequatorialis Jørst.	mo	23
		Puccinia nishidana Henn.	mo	23
		Puccinia punctiformis (F. Strauss) Röhl.	o	23†
Oomycota	Albuginaceae	*Albugo tragopogonis* var. *cirsii* Ciferri & Biga apud Biga	o	188‡
	Albuginaceae	*Albugo tragopogonis* (DC.) Gray	p	23
	Peronosporaceae	*Bremia cirsii* (Jaczewski ex Uljanish) J.F. Tao & Y.N. Yu	oo	188
Anamorphic *Guignardia*		*Phyllosticta cirsii* Desm.	mo	23
Anamorphic *Mycosphaerella*		*Cercospora cirsii* Ellis & Everh.	mo	23
		Ramularia balcanica Bubák & Ranoj.	oo	23
		Septoria cirsii Niessl	po	23

† Recorded as *Puccinia obtegens* (Link) Tul.

‡ Recorded as *Albugo tragopogi* (Persoon) Schrötet var. *cirsii* Ciferri et Biga apud Biga

Arthropods

Order	Family	Species	H.R.	Ref.
Coleoptera	Cerambycidae	*Thyestilla gebleri* (Faldermann)	po	9
	Chrysomelidae	*Altica cirsicola* Ohno	*	27
			oo	65
			oo	140
			oo	158
			oo	185
	Crioceridae	*Lema concinnipennis* Baly	po	65
			po	139
		Lema lacosa Pic	po	65
			po	139
	Curculionidae	*Cleonus piger* Scopoli	po	2
			*	27
		Larinus ovalis Kono	po	2
		Larinus planus (Fabricius)	*	27
		Larinus tarbinatas	*	27
		Lixus acutipennis Roelofs	po	2
		Lixus depressipennis Roelofs	*	27
	Eumolpidae	*Basilepta fulvipes* (Motschulsky)	po	139
		Pachnephorus seriatus Lefèvre	po	139
	Scolytidae	*Thamnurgus cauccsicus*	*	27
Diptera	Tephritidae	*Terellia* sp.	*	27
		Urophora sp.	*	27
Hemiptera	Lygaeidae	*Oxycarenus* sp.	*	27
	Pentatomidae	*Eurydema wilkinsi* Distant	po	193
	Tingidae	*Tringis ampliata* (Herrich-Schaeffer)	po	193
Homoptera	Aphididae	*Capitophorus carduinus* (Walker)	po	189
		Capitophorus elaeagni (del Guercio)	po	65
		Capitophorus evelaeagni Zhang	mo	100
			mo	189
		Hyperomyzus sinilactucae Zhang	po	189
		Uroleucon cephalonopli Takahashi	oo	65
Lepidoptera	Lycaenidae	*Plebejus argus* (Linnaeus)	po	203
	Noctuidae	*Diachrysia intermixta* Warren	po	65
			po	158
			po	209[I]
	Nymphalidae	*Melitaea scotosia* Butler	po	203
		Vanessa cardui (Linnaeus)	*	27[II]
	Pyralidae	*Homoeosoma binaevella* Hübner	po	145
		Loxostege verticalis Linnaeus	p	145
	Saturniidae	*Samia cynthia ricina* (Donovan)	po	207
	Tortricidae	*Aethes cnicana* Westwood	po	66
		Aethes rubigana Treitschke	po	66
		Aphelia paleana (Hübner)	po	113
		Archips seminubilus (Meyrick)	po	141
		Cnephasia chrysantheana (Duponchel)	po	113
		Eucosma fulvana (Stephens)	po	113

Thysanoptera	Phlaeothripidae	*Haplothrips chinensis* Priesner	po	56
		Haplothrips subtilissimus Haliday	po	56
		Haplothrips tritici (Kurdjumov)	po	56
	Thripidae	*Anaphothrips sudanensis* Trybom	po	56
		Frankliniella intonsa (Trybom)	po	56
		Thrips tabaci Lindeman	po	56

* based on research conducted on *C. arvense,* the arthropods attack Canada thistle, but their host range information is not given.

[I] Recorded as *Plusia intermixta* Warren

[II] Recorded as *Cynthia cardui* L.

Colubrina asiatica

Asiatic colubrine, latherleaf

Leaves of *Colubrina asiatica*.

Introduction

The genus *Colubrina* contains approximately 23 species, distributed in South Asia, islands of Oceania, Africa, and Latin America. Two species reportedly occur in Guangdong, Guangxi, Taiwan, and Yunnan provinces of China[11].

Species of *Colubrina* in China

C. asiatica (L.) Brongn
C. pubescens Kurz.

Taxonomy

Family: Rhamnaceae
Genus: *Colubrina* Rich. ex Brongn.

Description

Colubrina asiatica is a vine-like glabrescent shrub. Alternate leaves are nearly membranous or thinly papery, glabrous or nearly so, ovate or broadly ovate in shape, 4-8 cm long and 2-5 cm wide, with two or three raised lateral veins. The leaf margin is crenate, apex acuminate and slightly notched, and base round or subcordate. Cyme inflorescences of yellow flowers appear in the axils from June to September. The calyx is five-lobed; each sepal is ovately-triangular. Petals are obovate-rounded, hooded, and equal in length to the stamen. Fruits appear from September to December as capsule-like drupes, globose, and 7-9 mm in diameter. A single grayish- brown seed is enclosed in each of three pyrenes[11].

Arthropods

Order	Family	Species	H. R.	Ref.
Coleoptera	Cerambycidae	*Artimpaza argenteonotata* Pic	m	16
		Niphona parallela White	po	16
Hemiptera	Plataspidae	*Paracopta duodecimpunctatum* (Germar)	p	192

Habitat and Distribution

Colubrina asiatica occurs in forested areas and brush along the coast.

Economic Importance

No information is available on the economic importance of *C. asiatica* in China.

Related Species

Colubrina pubescens is distinguished from Asiatic colubrine in that the young shoots and veins on the underside of the leaves of *C. pubescens* are coated with hairs. The fruit pedicel (8-12 mm long) is longer than that of *C. asiatica* (4-6 mm long).

Natural Enemies of *Colubrina*

No microorganisms have been reported. Of the three arthropod species reported, a beetle, *Artimpaza argenteonotata* is probably host-specific to *C. asiatica*.

Commelina communis
Asiatic dayflower

Flower of *Commelina communis*.

Introduction
The genus *Commelina* has approximately 100 species worldwide, distributed primarily in tropical and temperate regions. Eight species occur in China[60][167] .

Species of *Commelina* in China

Scientific Name	Scientific Name
C. auriculata Bl.	*C. maculata* Edgew.
C. bengalensis L.	*C. paludosa* Bl.
C. communis L.	*C. suffruticosa* Bl.
C. diffusa Burm. f.	*C. undulata* R. Br.

Taxonomy
Family: Commelinaceae
Genus: *Commelina* L.

Description
Commelina communis is an annual herb with numerous branched, creeping stems, which are minutely pubescent distally, 1 m long. Leaves are lanceolate to ovate-lanceolate, 3–9 cm long and 1.5–2 cm wide. Involucral bracts grow opposite the leaves. Bracts are 1.2–2.5 cm long, folded and cordate when unfolded, with 1.5–4 cm long stalk, often hirsute-ciliate marginally, and acute apically. Cyme inflorescence has one flower near the top, with dark blue petals and membranous sepals 5 mm long. Capsules are elliptic, 5–7 mm, and two-valved. The two seeds in each valve are brown-yellow, 2–3 mm long, irregularly pitted, flat-sided, and truncate at one end[60][167].

Habitat
C. communis prefers moist, shady forest edges. It is common in wet areas of crop fields, orchards, ditches, and roadsides [60].

Distribution
C. communis is widely distributed in China, [60] but no records are reported for its distribution in Qinghai, Xinjiang, Hainan, and Tibet [6][116][167].

Economic Importance
Commelina communis has caused serious damage in the orchards of northeastern China [96]. *C. communis* is used in Chinese herbal medicine. [60].

Related Species
C. diffusa occurs in forests, thickets and moist areas of southern China and can be distinguished from *C. communis* by its lanceolate bracts and acuminate apex [60].

Natural Enemies of *Commelina*
Ten fungi have been found on members of the genus *Commelina*, four of which can infect Asiatic dayflower. *Kordyana commelinae* and *Phyllosticta commelinicola* are recorded to be host specific to *C. communis*. There are 12 arthropod species contained in four orders and six families that are associated with *C. communis*.

Fungi

Phylum	Family	Species	H. R.	Ref.
Ascomycota	Hyponectriaceae	*Physalospora commelinae* Sawada	mo	23
	Sclerotiniaceae	*Sclerotinia sclerotiorum* (Lib.) de Bary	po	23
Basidiomycota	Atheliaceae	*Athelia rolfsii* (Curzi) C.C. Tu & Kimbr.	po	23†
	Brachybasidiaceae	*Kordyana commelinae* Sawada	m	23
	Ceratobasidiaceae	*Thanatephorus cucumeris* (A.B. Frank) Donk	po	23‡
	Phakopsoraceae	*Phakopsora tecta* H.S. Jacks. & Holw.	oo	23
	Pucciniaceae	*Puccinia adhikarii* Ono	po	149
		Uromyces commelinae Cooke	p	23
	Ustilaginaceae	*Ustilago commelinae* (Kom.) Zundel	mo	23
			m	54
Anamorphic *Guignardia*		*Phyllosticta commelinicola* E. Young	m	195

† Recorded as *Corticium centrifugum* (Lév.) Bres.

‡ Recorded as *Corticium sasakii* (Shirai) Matsum.

Arthropods

Order	Family	Species	H. R.	Ref.
Coleoptera	Crioceridae	*Lema chujoi* Gressitt et Kimoto	mo	65
			mo	139
		Lema concinnipennis Baly	p	65
			p	139
		Lema coromandeliana (Fabricius)	mo	139
		Lema coronata Baly	p	65
			p	139
		Lema delicatula Baly	m	65
			m	139
		Lema diversa Baly	p	65
			p	139
		Lema scutellaris (Kraatz)	m	139
	Eumolpidae	*Acrothinium gaschkevitschii* (Motschulsky)	p	139
	Hispidae	*Cassida piperata* Hope	po	140
Hemiptera	Pentatomidae	*Aeschrocoris ceylonicus* Distant	m	65
Homoptera	Aphididae	*Aphis commelinae* Shinji	m	65
			m	100
Lepidoptera	Sphingidae	*Rhyncholaba acteus* (Cramer)	po	206
			p	208

Convolvulus arvensis
Field bindweed

Convolvulus arvensis leaves and flowers.

Introduction
The genus *Convolvulus*, with approximately 250 members worldwide, is distributed in temperate and subtropical regions of both hemispheres. Eight species have been reported in China[173].

Species of *Convolvulus* in China

Scientific Name	Scientific Name
C. ammannii Desr.	*C. lineatus* Linn.
C. arvensis Linn.	*C. pseudocantabrica* Schrenk
C. fruticosus Pall.	*C. steppicoala* Hand.Mazz.
C. gortschakovii Schrenk	*C. tragacanthoides* Turcz.

Taxonomy
Family: Convolvulaceae
Genus: *Convolvulus* L.

Description
Convolvulus arvensis is a perennial with rhizomes and glabrous procumbent or twining stems that are slightly ridged with vertical grooves on the surface. The leaf is ovate-oblong to lanceolate, 1.5-5 cm long and 1-3 cm wide, with an acute or mucronate apex and a hastate, sagittate or cordate base. The leaf margin is entire or divided into three lobes, with lateral ones spreading and the middle one ovoid elliptic, narrowly triangular, lanceolate, oblong or suborbicular. Palmate veins begin at the base of leaf and become pinnate for the remainder of the leaf. The axillary cyme is composed of one to three flowers, the pedicel is significantly longer than the calyx, with hairy sepals being 2.5-5 mm long. The two outer sepals are oblong to elliptic, hairy margined, and shorter than inner sepals, which are suborbicular and somewhat lobed with a membranous margin. The broad funnel-shaped corolla is 15-26 mm long, five-lobed, white or pink, and occasionally has a pinkish or whitish midpetaline band or bands. The flowers appear from June to August. Fruits that appear from June to September are ovoid global or conical capsules, about 5-8 mm in length, containing four dark brown or black, subovate seeds[173][166].

Habitat
Convolvulus arvensis can be found in disturbed areas, roadsides, and grassy slopes at elevations of 600 to 4,500 m[173][166].

Distribution
Convolvulus arvensis is widely distributed throughout China, including the provinces of Anhui, Gansu, Hebei, Heilongjiang, Henan, Jiangsu, Jiangxi, Jilin, Liaoning, Inner Mongolia, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Tibet, and probably Hubei [84][166][173].

Economic Importance
Field bindweed is one of the most common weeds found in orchards, gardens, and crop fields of wheat, cotton, soybeans, and vegetables. Recently, it has caused serious damage in northern and northwestern China[96]. Field bindweed is used medically.

Natural Enemies of *Convolvulus*
Eight fungi, including seven species and one variety, and ten arthropods have been found on members of the genus *Convolvulus*.

Fungi

Phylum	Family	Species	H. R.	Ref.
Ascomycota	Erysiphaceae	*Erysiphe convolvuli* DC.	p	22†
		Erysiphe convolvuli var. *dichotoma* R.Y. Zheng & G.Q. Chen	p	22
		Erysiphe betae (Vaňha) Weltzien	p	23
Basidiomycota	Glomosporiaceae	*Thecaphora seminis-convolvuli* (Duby) Liro	m	54
	Pucciniaceae	*Puccinia convolvuli* (Pers.) Castagne	po	23
		Uromyces gemmatus Berk. & M.A. Curtis	po	23
Oomycota	Albuginaceae	*Albugo ipomoeae-panduratae* (Schwein.) Swingle	po	188
Anamorphic *Pyrenopeziza*		*Cylindrosporium convolvuli* Miura	mo	23

† Recorded as *Erysiphe polygoni* DC.

Arthropods

Order	Family	Species	H. R.	Ref.
Acariformes	Eriophyidae	*Aculops lycopersici* (Massee)	p	83
Coleoptera	Hispidae	*Aspidomorpha indica* Boheman	po	65
			po	140
		Taiwania circumdata (Herbst)	po	65
			po	140
Homoptera	Coccidae	*Ceroplastes floridensis* Comstock	po	151
Lepidoptera	Arctiidae	*Lemyra maculifascia* (Walker)	po	40‡
			po	41
	Noctuidae	*Emalaena sulphuralis* (Scopoli)	p	13
		Trichoclea albicolon (Sepp)	po	12
	Sphingidae	*Herse convolvuli* (Linnaeus)	po	206
	Tortricidae	*Clepsis rurinana* (Linnaeus)	po	65
		Clepsis semialbana (Guenée)	po	113

‡ Recorded as *Paralacydes maculifascia* (Walker)

Cotoneaster spp.
Cotoneaster

Leaves and colorful fruits of *Cotoneaster microphyllus*.

Introduction

Cotoneaster, a medium-sized genus of the Rosaceae, consists of 90 species, distributed in temperate regions of Europe, North Africa, and most areas of Asia (except Japan). In China, 58 species occur mainly in the south and southwest area of the country[184].

Species of *Cotoneaster* in China

Scientific Name	Scientific Name
C. acuminatus Lindl.	*C. mongolicus* Pojark.
C. acutifolius Turcz.	*C. morrisonensis* Hayata
C. adpressus Bois	*C. moupinensis* Franch.
C. affinis Lindl.	*C. multiflorus* Bge.
C. ambiguus Rehd. et Wils.	*C. nitens* Rehd. et Wils.
C. apiculatus Rehd. et Wils.	*C. nitidifolius* Marq.
C. bullatus Bois	*C. nitidus* Jacq.
C. buxifolius Lindl.	*C. obscurus* Rehd. et Wils.
C. chengkangensis Yü	*C. oliganthus* Pojark.
C. coriaceus Franch.	***C. pannosus*** Franch.
C. dammerii Schneid.	*C. reticulatus* Rehd. et Wils.
C. dielsianus Pritz.	*C. rhytidophyllus* Rehd. et Wils.
C. divaricatus Rehd. et Wils.	*C. rotundifolius* Wall. ex Lindl.
C. fangianus Yü	*C. rubens* W. W. Smith.
C. foveolatus Rehd. et Wils.	*C. salicifolius* Franch.
C. franchetii Bois	*C. sanguineus* Yü
C. frigidus Wall. ex Lindl.	*C. schantungensis* Klotz
C. glabratus Rehd. et Wils.	*C. sherriffii* Klotz
C. glaucophyllus Franch.	*C. silvestrii* Pamp.
C. glomerulatus W. W. Smith	*C. soongoricus* (Regel et Herd.) Popov
C. gracilis Rehd. et Wils.	*C. subadpressus* Yü
C. harrovianus Wils.	*C. submultiflorus* Popov
C. harrysmithii Flinck et Hylmö	*C. taylorii* Yü
C. hebephyllus Diels	*C. tenuipes* Rehd. et Wils.
C. horizontalis Dcne.	*C. turbinatus* Craib
C. integerrimus Medic.	*C. uniflorus* Bge.
C. langei Klotz	*C. verruculosus* Diels
C. melanocarpus Lodd.	*C. wardii* W. W. Smith
C. microphyllus Wall. ex Lindl.	*C. zabelii* Schneid.

I. ***Cotoneaster microphyllus***
Small leaf cotoneaster, rock spray cotoneaster.

Taxonomy

Family: Rosaceae
Genus: *Cotoneaster* B. Ehrhart

Description

Cotoneaster microphyllus is a dwarf evergreen shrub that can grow to 1 m tall. The nearly cylindrical, spreading branches are reddish brown or darker, yellow-pubescent, and gradually glabrous. Slightly rolled downward in the margin, the thick leaves are leathery, obovate to oblong-obovate, 4-10 mm long and 2.5-7 mm wide, with apex being obtuse, rarely retuse or acute, and base broadly cuneate. Upper surface of the leaves is glabrous or sparsely pubescent; the lower surface is pale and pubescent. Appearing from May to June, the terminal inflorescence is 1 cm in diameter, usually solitary, or occasionally in groups of three, with bell-shaped hypanthium that is sparsely pubescent outside and glabrous inside. Sepals are ovate-triangular and apically obtuse. White petals are spreading, suborbicular, about 4 mm in length and width. The fruit, a red, globose, drupe-like pome, 5-6 mm in diameter and often containing two pyrenes, appears in August to September[184].

Habitat
Cotoneaster microphyllus occurs on rocky mountain slopes, in thickets, and in river valleys, at elevations of 2,000–4,200 m [184].

Distribution
Cotoneaster microphyllus occurs in Sichuan, Tibet, and Yunnan provinces [184].

Economic Importance
Cotoneaster microphyllus is well suited for use as an ornamental because of its graceful white flowers in spring and brilliant red fruit in autumn[184].

Related Species
There are 4 varieties within the species:
1) *Cotoneaster microphyllus* var. *conspiocuus* Messel has a wider growth form and broader leaves and fruits, and occurs at elevations of 2,700–3,300 m in the Brahmaputra River valley, Tibet. The fruit has important ornamental value due to its persistent brilliant color.
2) *Cotoneaster microphyllus* var. *glacialis* Hook. f. occurs in rocky mountainous areas at elevations of 3,900-4,200 m in southeastern Tibet.
3) *Cotoneaster microphyllus* var. *cochleatus* (Franch.) Rehd. et Wils., with revolute leaves, and occurs in Yunnan and Sichuan.
4) *Cotoneaster microphyllus* var. *thymifolius* (Baker) Koehne has relatively narrow, revolute leaves and bright red fruit, occurs at elevations of 3,000-4,000 m, in northwestern Yunnan, and southeastern Tibet[184].

II. ***Cotoneaster pannosus***

Taxonomy
Family: Rosaceae
Genus: *Cotoneaster* B. Ehrhart

Description
Cotoneaster pannosus is a semi-evergreen shrub up to 2 m in diameter with arch-like branches. Branchlets are thin, dark brown, and initially covered with short, dense hairs that are shed as it matures. Leaves are elliptic or ovate, 1-2.5 cm long and 0.8-1.5 cm wide, obtuse or acute apically and broadly cuneate at the base, with midrib impressed on the glabrous or sparsely pubescent upper surface and raised on the densely tomentose lower surface. Generally consisting of less than ten flowers (21 at the maximum), corymbs are 1-3 cm in diameter and 1.5-2.5 cm in length, with dense hair-covered pedicel and rachis. Bracts are linear and caducous. Flowers are 8 mm in diameter, with bell-shaped calyx and triangular, apically short acuminate or acute sepals; both are glabrous inside and densely hairy outside. Petals are white, broadly ovate or subglobose, 3-3.5 mm in length with an obtuse apex and a short claw-bearing base. Fruits are red, globose or ovate, 7-8 mm in diameter, enclosing two pyrenes. Flowers appear in June to July and fruits in October[184].

Habitat
Cotoneaster pannosus occurs in mountainous scrub land, rocky areas, or wastelands at elevations of 1,100-3,200 m [184].

Distribution
Cotoneaster pannosus is native to Sichuan and Yunnan[184].

Related Species
One variety, *C. pannosus* var. *robustior*, has narrowly elliptic leaf blades, and occurs in northwestern Sichuan. Another two cotoneasters are apparently similar to *C. pannosus*. *C. franchetii* Bois is distinguished by the densely pubescent upper leaf surface, shorter

Cotoneaster pannosus invading mountainous scrubland.

petioles, erect petals, and orange fruits containing three pyrenes; *C. silvestrii* Pamp. has thinner leaves, which are sparsely hairy on the underside, and yellow stamens. The fruits contain a single pyrene.[184].

Natural Enemies of *Cotoneaster*

Eight fungi and three arthropods are reported to attack members of the genus *Cotoneaster.*

Fungi

Phylum	Family	Species	H. R.	Ref.
Ascomycota	Erysiphaceae	*Phyllactinia pyri* (Castagne) Homma	po	22
Basidiomycota	Incertae sedis	*Aecidium cunninghamianum* Barclay	mo	23
		Coleopuccinia kunmingensis F.L. Tai	o	23
		Roestelia nanwutaiana (T.L. Tai & C.C. Cheo) Jørst.	oo	23
		Roestelia sikangensis (Petr.) Jørst.	oo	23
	Pucciniaceae	*Gymnosporangium clavariiforme* (Jacq.) DC.	po	23
		Gymnosporangium confusum Plowr.	oo	23
Anamorphic *Mycosphaerella*		*Pseudocercospora cotoneastri* (Katsuki & Ts. Kobay.) Deighton	oo	110†

† Recorded as *Pseudocercospora cotoneasteris* (Kats. et Kobayashi) Deighton

Arthropods

Order	Family	Species	H. R.	Ref.
Coleoptera	Scolytidae	*Scolytus abaensis* Tsai et Yin	mo	140
			oo	182
Homoptera	Pseudococcidae	*Pseudococcus comstocki* (Kuwana)	po	150
Lepidoptera	Arctiidae	*Arctia flavia* (Fueszly)	oo	40‡
			oo	41

‡ Recorded as *Phragmatobia flavia* (Fuessly)

Dioscorea batatas (*Dioscorea polystachya*)

Chinese yam

Leaves of *Dioscora batatas*.

Introduction

The genus *Dioscorea* includes more than 600 species worldwide in tropical and temperate regions. According to early publications of Chinese flora, 49 species are distributed in China; however, in the updated versions, there are 53 species (listed in the next section). *Dioscorea* is a genus of great economic value as an important food plant. Some species are also resources for the pharmaceutical industry[28][29].

Species of *Dioscorea* in China

Scientific Name	Scientific Name
D. alata L.	*D. kamoonensis* Kunth
D. althaeoides R. Knuth	*D. linearicordata* Prain et Burkill
D. aspersa Prain et Burkill	*D. martini* Prain et Burkill
D. banzuana Péi et C. T. Ting	*D. melanophyma* Prain et Burkill
D. benthamii Prain et Burkill	*D. menglaensis* H. Li‡
D. bicolor Prain et Burkill	*D. nipponica* Makino
D. biformifolia Péi et C. T. Ting	*D. nitens* Prain et Burkil
D. birmanica Prain et Burkill†	*D. panthaica* Prain et Burkill
D. bulbifera L.	*D. pentaphylla* L.
D. chingii Prain et Burkill	*D. persimilis* Prain et Burkill
D. cirrhosa Loar.	*D. poilanei* Prain et Burkill
D. collettii Hook. f.	***D. polystachya*** Turczaninow‡
D. cumingii Prain et Burkill†	*D. scortechinii* Prain et Burkill var. *parviflora* Prain et Burkill
D. decipiens Hook. f.	
D. delavayi Franchet‡	*D. simulans* Prain et Burkill
D. deltoidea Wall.	*D. sinoparviflora* C. T. Ting‡
D. esculenta (Lour.) Burkill	*D. spongiosa* J. Q. Xi et al. ‡
D. esquirolii Prain et Burkill	*D. subcalva* Prain et Burkill
D. exalata C. T. Ting et M. C. Chang	*D. tentaculigera* Prain et Burkill
D. fordii Prain et Barkill	*D. tenuipes* Franch. et Savat.
D. futschauensis Uline ex R. Knuth	*D. tokoro* Makino
D. garrettii Prain et Burkill†	*D. velutipes* Prain et Burkill
D. glabra Roxb.	*D. wallichii* Hook. f.
D. gracillima Miq.	*D. xizanensis* C. T. Ting
D. hemsleyi Prain et Burkill	*D. yunnanensis* Prain et Burklll
D. hispida Dennst.	*D. zingiberensis* C. H. Wright
D. japonica Thunb.	

† listed in the revised *Flora of China* [28]

‡ Updated names, previously cited in FRPS [29] as *D. henryi* (Prain et Burkill) C. T. Ting , *D. septemloba* Thunb., *D. arachidna* Prain et Burkill , *D. opposita* Thunb., and *D. parviflora* C. T. Ting.

Taxonomy

Family: Dioscoreaceae
Genus: *Dioscorea* L.

There are many scientific synonyms and common names for *D. batatas*. *Dioscorea batatas* is called Chinese yam, cinnamon yam, wild yam, or common yam; it is referred to as *Dioscorea polystachya* and *Dioscorea opposita*. It is also synonymous with *Dioscorea oppositifolia*. *Dioscorea batatas* is the taxonomic name generally used in the United States[29].

Description

Dioscorea batatas is a twining herbaceous vine that has an erect, cylindroid tuber up to 1 m in length. A cross section of the tuber is white when dry. Usually twining in a counter-clockwise direction, stems are purple and glabrous. Simple leaves begin alternately from the lower stems then become opposite farther up the stem. Sometimes the leaves also occur in whorls of three. They are often three-lobed, with the middle lobe being ovate-elliptic to lanceoate, and lateral lobes round to nearly squared, or earlobe-shaped; leaf blades vary from ovate-triangular to broadly ovate or hastate, 3-9 cm long and 2-7 cm broad, with acuminate apices, and deeply to broadly cordate or subtruncate

bases. Flowers appear from June to September. Rarely in panicles, the male inflorescences are two to eight spikes, 2-8 cm in length, that grow erect from the leaf axil, with zigzag rachis. The outer lobes of male flowers are broadly ovate while the inner lobes are ovate. Female inflorescences form one to three spikes in the axils. Fruiting from July to November, capsules are oblate or globose, 1.7–2 cm long and 1.5-3 cm wide, white-dotted, and contain membranous winged seeds near the middle of the capsule[28][29].

Habitat

Dioscorea batatas occurs in forests, scrub land forests, herb communities, along rivers, roadsides, hillside, and disturbed areas, at elevations of 100 – 2,500 m[28].

Distribution

Dioscorea batatas occurs in the provinces of Anhui, Fujian, eastern Gansu, northern Guangdong, Guangxi, Guizhou, Hainan,

Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, southern Shaanxi, Shandong, Sichuan, northern Yunnan, and Zhejiang [6][28].

Economic Importance

Also known as Huai Shan, the edible tuber of Chinese yam is used for medicinal purposes[29].

Natural Enemies of *Dioscorea*

Thirteen species of fungi have been recorded to infect members of *Dioscorea*. Twenty-two species of arthropods in five families of three orders are reported.

Fungi

Phylum	Family	Species	H. R.	Ref.
Ascomycota	Botryosphaeriaceae	*Guignardia dioscoreae* A.K. Pande	oo	23[I]
			o	23[II]
	Meliolaceae	*Meliola hirsuta* Hansf. & Deighton	po	23
		Meliola lianchangensis G.Z. Jiang	mo	62
Basidiomycota	Atheliaceae	*Athelia rolfsii* (Curzi) C.C. Tu & Kimbr.	po	23[III]
	Pucciniaceae	*Puccinia dioscoreae* Komarov	oo	23
			oo	149
	Urocystaceae	*Urocystis dioscoreae* Syd.	mo	23
Anamorphic *Diplocarpon*		*Gloeosporium pestis* Massee	o	23
Anamorphic *Mycosphaerella*		*Cercospora dioscoreae* Ellis & G. Martin	mo	23
		Cercospora pachyderma Syd. & P. Syd.	oo	23
		Pseudocercospora contraria (Syd. & P. Syd.) Deighton	oo	110
		Pseudocercospora cylindrata (Chupp & Linder) N. Pons & B. Sutton	oo	23[IV]
			oo	110
		Pseudocercospora ubi (Racib.) Deighton	oo	23[V]
			mo	110
Anamorphic *Pyrenopeziza*		*Cylindrosporium dioscoreae* Miyabe & S. Ito	o	23

[I] Recorded as *Phyllosticta dioscoreacearum* Bacc.
[II] Recorded as *Phyllosticta dioscoreae* Cooke
[III] Recorded as *Corticium centrifugum* (Lév.) Bres.
[IV] Recorded as *Cercospora cylindrata* Chupp et Linder
[V] Recorded as *Cercospora ubi* Racib.

Arthropods

Order	Family	Species	H. R.	Ref.
Acariformes	Tetranychidae	*Schizotetranychus baltazarae* Rimando	po	143
Coleoptera	Crioceridae	*Lema adamsii* Baly	oo	65
		Lema fortunei Baly	oo	65
			oo	139
		Lema honorata Baly	oo	139
		Lema infranigra Pic	oo	65
			oo	139
		Lilioceris cheni Gressitt et Kimoto	oo	139
		Lilioceris egena (Weise)	po	65
			mo	139
		Lilioceris impressa (Fabricius)	po	139
		Lilioceris lateritia Baly	po	65
		Lilioceris maai Gressitt et Kimoto	oo	139
		Lilioceris ruficollis (Baly)	po	139
		Sagra femorata purpurea Lichtenstein	p	65
			p	139
Lepidoptera	Arctiidae	*Spilarctia strigatula* (Walker)	p	40
			p	41
	Hesperiidae	*Abraximorpha olavidii* Mabille	p	158
		Daimio tethys moori (Mabille)	po	203
		Tagiades litigiosa Möschler	p	203
	Lycaenidae	*Loxura atymnus* (Stoll)	po	203
		Spindasis kuyaniana (Matsumura)	p	203
		Spindasis lohita (Hewitson)	po	158
		Spindasis lohita formosana (Moore)	po	203
		Spindasis syama (Horsfield)	p	203
		Spindasis syama sepulveda (Fruhstorfer)	p	158

Elaeagnus spp.

Introduction

Consisting of about 80 species, the genus *Elaeagnus* has a wide distribution in the subtropical and temperate regions of East and Southeast Asia, and is rare in the rest of Asia or temperate Europe. Approximately 51 species occur in China nationwide, primarily in the area of the Yellow River, as well as south of the river [196].

Leaves and flowers of *Elaeagnus angustifolia*.

Species of *Elaeagnus* in China

I. *Elaeagnus angustifolia*
Russian olive

Scientific Name	Scientific Name
E. angustata (Rehd.) C. Y. Chang	*E. macrantha* Rehd.
E. angustifolia L.	*E. macrophylla* Thunb.
E. argyi Lévl.	*E. magna* Rehd.
E. bambusetorum Hand.-Mazz.	*E. micrantha* C. Y. Chang
E. bockii Diels	*E. mollis* Diels
E. cinnamomifolia W. K. Hu et H. F. Chow	*E. morrisonensis* Hayata
E. conferta Roxb.	*E. multiflora* Thunb.
E. courtoisi Belval	*E. nanchuanensis* C. Y. Chang.
E. delavayi Lecomte	*E. oldhami* Maxim.
E. difficilis Serv.	*E. oxycarpa* Schlechtend.
E. formosana Nakai	*E. pallidiflora* C. Y. Chang
E. glabra Thunb.	*E. pilostyla* C. Y. Chang
E. gonyanthes Benth.	***E. pungens*** Thunb.
E. griffithii Serv.	*E. retrostyla* C. Y. Chang
E. grijsii Hance	*E. sarmentosa* Rehd.
E. guizhouensis C. Y. Chang	*E. schlechtendalii* Serv.
E. henryi Warb.	*E. stellipila* Rehd.
E. jiangxiensis C. Y. Chang	*E. thunbergii* Serv.
E. jingdonensis C. Y. Chang	*E. tonkinensis* Serv.
E. lanceolata Warb.	*E. tubiflora* C. Y. Chang
E. lanpingensis C. Y. Chang	*E. tutcheri* Dunn
E. liuzhouensis C. Y. Chang	***E. umbellata*** Thunb.
E. longiloba C. Y. Chang	*E. viridis* Serv.
E. loureirii Champ.	*E. wenshanensis* C. Y. Chang
E. luoxiangensis C. Y. Chang	*E. wushanensis* C. Y. Chang
E. luxiensis C. Y. Chang.	

Taxonomy

Family: Elaeagnaceae
Genus: *Elaeagnus* L.

Description

Elaeagnus angustifolia is a deciduous small tree or shrub that can reach a height of 5-10 m. The plant has shiny brownish red spines. Stems, leaves, flowers, and fruits are covered with silver-white scales. Leaves are inconspicuously veined, lance-shaped or linear lanceolate, 3-7 cm long and 1-1.3 cm wide, obtuse at the apex, and cuneate at the base. Appearing from May to June, the fragrant flowers are erect or nearly erect, and have bell-shaped calyx tubes and a conspicuous, glabrous, conical floral disc, which surround the base of the style. Fruits are pink, elliptic, 9-12 mm long and 6-10 mm wide, and mature in September[196].

Habitat

Eleagnus angustifolia has a wide habitat range, including mountainous areas, plains, sands, and desert, with little preference as to soil type, temperature, or moisture [196].

Distribution

Russian olive occurs in Anhui[30], Gansu, Henan, Hebei, Liaoning, Inner Mongolia, Ningxia, Qinghai, Shaanxi, Shanxi, and Tibet[196].

Economic Importance
The edible fruits and leaves of *E. angustifolia* are rich in saccharides, starches, proteins and vitamins. Essential oils extracted from the flowers are used in the manufacture of perfumes and flavorings. Russian olive is used medicinally in China [196].

Related Species
Elaeagnus angustifolia L. var. *orientalis* (L.) Kuntze, with broadly elliptical leaves, occurs on hillsides, wastelands, moist areas of deserts, and at the edges of croplands[196].

II. *Elaeagnus pungens*
Thorny elaeagnus

Taxonomy
Family: Elaeagnaceae
Genus: *Elaeagnus* L.

Description
Elaeagnus pungens is an erect evergreen shrub that can reach 3-4 m in height. As the common name implies, thorny elaeagnus has dark brown thorns, about 20-40 mm long on branch edges or in leaf axils. Young shoots are flat, covered with dense brown scales; mature branches are glossy black and lack scales. Leathery leaves are revolute, veined, elliptic or broadly elliptic, 5-10 cm long and 1.8-5 cm wide, and obtuse at both ends or round at the base. Both sides of the leaves are dotted with silver brown scales, which shed from the upper side when mature, and turn glossy brown after drying. Having cylindrical calyx tubes, flowers are white, drooping, and scale-covered, and bloom in leaf axils from September to December. Fruits are elliptic, red, drupe-like berries, 12-14 mm in length, appearing from April to June in the year following blooming [196].

Fruit of *Elaeagnus pungens*.

Leaves of *Elaeagnus pungens*.

Habitat
E. pungens can be found on hilly slopes with sun exposure and along roadsides at elevations below 1,000 m[196].

Distribution
The native range of *E. pungens* in China includes Anhui, Fujian, Guangdong, Guizhou, Henan, Hubei,

Hunan, Jiangsu, Jiangxi and Zhejiang provinces [26][50].

Economic Importance

Some parts of thorny elaeagnus are used medicinally[196].

III. *Elaeagnus umbellata*
Autumn olive

Taxonomy

Family: Elaeagnaceae
Genus: *Elaeagnus* L.

Description

Spiny and erect, *Elaeagnus umbellata* is a deciduous shrub that can grow to 1-4 m in height. Twigs are covered with silvery white, yellowish brown, or dark brown- to rust-colored scales when young. Scales are shed at maturity, leaving a grayish black surface. Leaves are papery or membranous, elliptic or ovoid lanceolate in shape, 3-8 cm long and 1-3.2 cm wide, obtuse or acuminate at the apices, and round to cuneate at the bases. Each has an entire margin, white petiole, and glabrescent and sparsely scaled underside. Blooming before the leaves appear, flowers are yellowish white, fragrant, and covered with shield-shaped scales. Calyx tubes are cylindrical, funnel-like, and 5-7 mm in length. Appearing from July to August, scale-covered fruits are global or ovate, 5-7 mm long, green when young and red at maturity, and also scale-covered[196].

Leaves and fruit of *Elaeagnus umbellata*.

Habitat

E. umbellata commonly occurs in subtropical and temperate regions at elevations of 20 to 3,000 m. Habitat range includes forest edges, thickets, hillside wastelands, and stream banks[196].

Distribution

Elaeagnus umbellata is distributed in north, east, and southwest China[196] in the provinces of Anhui[30], Guizhou[97], Hebei[18], Jiangsu[81], Jiangxi[84], Shandong[8], Shanxi[39], Sichuan[207], Yunnan[165] and Zhejiang[127]. In addition, its native range includes the provinces of Gansu[196], Henan[26], Hubei[196], Hunan[126], Liaoning[196], Ningxia[196], Qinghai[107], Shaanxi[196] and Taiwan.

Growth habit of *Elaeagnus umbellata*.

Economic Importance

Elaeagnus umbellata is planted as an ornamental. The edible fruits are used to make wine and jam. The leaves can be used to control the cotton aphid, an insect pest. Along with fruits and leaves, roots also have medical uses[29].

Natural Enemies of *Elaeagnus*

Ten fungi have been found on members of the genus *Elaeagnus*, including *Aecidium elaeagni,* which may be host-specific to members of the genus *Elaeagnus*, and *Septobasidium albidum,* which has a host range that includes autumn olive as well as members of other genera.

Twenty-two arthropods belonging to ten families of five orders are reported to attack members of the genus *Elaeagnus*. A moth, *Teia prisca,* may be specific to Russian olive.

Fungi

Phylum	Family	Species	H. R.	Ref.
Ascomycota	Erysiphaceae	*Leveillula elaeagnacearum* Golovin	mo	22
			oo	23
Basidiomycota	Hymenochaetaceae	*Phellinus robustus* (P. Karst.) Bourdot & Galzin	po	23
	Incertae sedis	*Aecidium elaeagni* Dietel	o†	23
		Aecidium elaeagni-umbellatae Dietel	oo	23
		Aecidium quintum Syd. & P. Syd.	mo	23
	Pucciniaceae	*Puccinia achroa* Syd.	oo	23
		Puccinia elaeagni Yoshin.	mo	23
	Septobasidiaceae	*Septobasidium albidum* Pat.	p‡	23
Anamorphic *Guignardia*		*Phyllosticta argyrea* Speg.	oo	23
Anamorphic *Mycosphaerella*		*Septoria argyrea* Sacc.	mo	23

† species that can attack Russian olive
‡ species that can attack autumn olive

Arthropods

Order	Family	Species	H. R.	Ref.
Acariformes	Tetranychidae	*Eotetranychus kankitus* Ehara	po	141
			p*	143
Coleoptera	Cerambycidae	*Asias halodendri* (Pallas)	po	9
Hemiptera	Pentatomidae	*Brachynema germarii* Kolenati	p†	193
Homoptera	Aphididae	*Capitophorus elaeagni* (del Guercio)	po	65
			o†**	100
		Capitophorus hippophaeus (Walker)	oo	100
		Capitophorus javanicus Hille Ris Lambers	p†*	189
	Margarodidae	*Drosicha corpulenta* (Kuwana)	p*	65
	Psyllidae	*Cacopsylla ciliensis* Li	oo	65
		Cacopsylla meniscata Li	mo	137
		Cacopsylla prona Li et Yang	po	140
		Cacopsylla sp.	m*	132
Lepidoptera	Geometridae	*Apocheima cinerarius* Erschoff	p†	66
	Lymantriidae	*Euproctis karghalica* Moore	p†	198
			p†	199
		Gynaephora alpherakii (Grum-Grschimailo)	p†	198
		Teia ericae Germar	p†	198
			p†	199
		Teia prisca (Staudinger)	m†	199
	Saturniidae	*Actias selene ningpoana* Felder	p†	65
		Eriogyna pyretorum pyretorum Westwood	p†	207
		Neoris haraldi Schawerda	p†	207
	Sphingidae	*Celerio euphorbia* Leech	p†	141
		Celerio hippophaës (Esper)	p†	206
			p†	208
		Celerio lineata livornica (Esper)	p†	206
			p†	208

† species that can attack Russian olive
* species that can attack thorny Elaeagnus
** species that can attack autumn olive

Elytrigia repens
Quackgrass

Elytrigia repens.

Introduction
The genus *Elytrigia* contains approximately 40 species that are widespread throughout the cold temperate regions of the northern and southern hemispheres. Six species occur or are cultivated in China as a pasture grass. *Elytrigia* is often used to hybridize with wheat [53].

Species of *Elytrigia* in China

Scientific Name	Scientific Name
E. elongata (Host) Nevski	***E. repens*** (Linn.) Nevski
E. intermedia (Host) Nevski	*E. smithii* (Rydb.) Nevski
E. juncea (L.) Nevski	*E. trichophora* (Link) Nevski

Taxonomy
Family: Poaeceae (Gramineae)
Genus: *Elytrigia* Desv.

Description
E. repens is a perennial, rhizomatous grass. Stems are erect, decumbent, reaching heights of 40 – 80 cm, with three to five nodes. The leaf sheath is glabrous except for the hairy base. The ligule is short, 0.5 mm long, with slender and membranous auricle. Leaves are flat, 10-20 cm long and 5-10 mm wide, coarse or pubescent on the upper surface, but glabrous on the lower surface. The inflorescence is an erect spike, 10-18 cm long and 8-15 mm wide. Internodes are typically 10-15 mm long, reaching 30 mm near the base. Each spikelet consists of five to seven florets, and measures 10-18 mm long and 6-10 mm wide. Glumes are lance-shaped, 10-15 mm long, five- to seven-veined, glabrous, and sometimes coarse between the veins. Longer than the palea, which is about 5 mm long with 2 ridges and has short hard hairs, lemma is oblong-lanceolate, and five- to seven-veined, with yellow anthers and awn 2 mm long [53].

Habitat
E. repens occurs in plains, oases or valley meadows, as well as hill sides, wastelands, roadsides, and field margins at elevations below 2,500 m [21][53][163]. It is also cultivated in some areas as pasture grass[45].

Distribution
Elytrigia repens occurs in Gansu, Qinghai, Tibet[7][53], Xinjiang and some northeastern provinces, including Liaoning and Inner Mongolia[45][93][121].

Economic Importance
Because of its high protein and starch content, *Elytrigia repens* is regarded as one of the most valuable forage plants. Quackgrass is favored by horses, sheep, and especially cattle because of its low fiber content and sweet taste prior to heading. It is also planted for soil and water conservation and to strengthen dykes. However, it becomes a problem weed when it invades crop fields[33]. *E. repens*, of itself, is not seriously damaging; however, it is host to ergot and rust fungi that are poisonous to livestock[59][96].

Related Species
Elytrigia repens subsp. *longeristata* N. R. Cui is recorded in the *Flora*

Xinjiangensis. It is distinguished by its dark green spike inflorescence and 4- 8 mm long awns[21].

Natural Enemies of *Elytrigia*

At least four fungi have been reported to infect *Elytrigia repens* as well as other members of genus *Elytrigia* and other genera. No record of insects.

Fungi

Phylum	Family	Species	H. R.	Ref.
Ascomycota	Clavicipitaceae	*Claviceps purpurea* (Fr.) Tul.	p	23
Basidiomycota	Pucciniaceae	*Puccinia graminis* Pers.	p	23
		Puccinia rangiferina S. Ito	p	23
		Puccinia recondita f.sp. *agropyrina* D.M. Hend.	p	23

Euonymus spp.
Euonymus

Introduction
The genus *Euonymus* contains approximately 200 species worldwide, distributed mainly in warm subtropical regions, with a few species extending into the frigid temperate regions of the northern hemisphere. In China, 111 species, ten varieties and four forms have been reported[15].

Species of *Euonymus* in China
(NEXT PAGE)

I. ***Euonymus alatus***
Winged burning bush

Taxonomy
Family: Celastraceae
Genus: *Euonymus* L.

Description
Euonymus alatus is a deciduous shrub, 1-3 m tall, with two to four columns of corky wings along the twigs. Opposite leaves are ovate-elliptic or oblong elliptic, rarely obovate, 2-8 cm in length and 1-3 cm in width, with serrate margins. Petiole is inconspicuous or absent. Cyme inflorescence consists of one to three yellowish green flowers, occurring from May to June. Fruit is a purplish capsule 7-8 mm long with one to four splits, appearing from July to October. Seeds are brownish, elliptic and 5-6 mm in length[15][74].

Brilliant autumn foliage of *Euonymus alatus*.

Habitat
Euonymus alatus occurs on hillsides, in deciduous broadleaf mixed forests, and along ditches[15].

Distribution
E. alatus is native to northeastern Asia and most of China except for the provinces of Guangdong, Hainan, Tibet, Xinjiang, and Yunnan [15] [164].

Economic Importance
The bright red leaf color of the *Euonymus alatus* in fall makes it a popular ornamental. The stems with corky wings are used in traditional Chinese medicine [15].

Related Species
Euonymus alatus var. *pubescens* Maxim. has short hairs along the main vein on the lower leaf surface. *Euonymus alatus* var. *pubescens* grows on hillsides or dry forest edges, in Hebei, Heilongjiang, Inner Mongolia, Jilin, and Liaoning provinces[15].

II. ***Euonymus fortunei***
Wintercreeper

Taxonomy
Family: Celastraceae
Genus: *Euonymus* L.

Description
Euonymus fortunei is an evergreen shrub. The shape of its thin leathery leaves varies greatly from elliptic, oblong, linear-obovate to lanceolate; they are 3.5-8 cm long and 1.5-4 cm wide. The whitish green flowers bloom in June

Euonymus alatus in summer.

and occur in a cymose inflorescence. The fruit of *Euonymus fortunei* is a pinkish, subglobular capsule 6-12 mm in diameter. The seed is brown, oblong, and ripens in October[2].

Habitat

Euonymus fortunei occurs on hillsides, in forests, forest margins, and thickets along riverbanks[15].

Distribution

Euonymous fortunei occurs in Anhui, Fujian[36], Gansu[70], Guangxi[51], Guizhou[97], Henan[25], Hubei, Hunan, Jiangxi, Jiangsu, Shaanxi, Sichuan, Yunnan, and Zhejiang provinces [15].

Economic Importance

Stems and leaves are medicinally useful [74].

Natural Enemies of *Euonymus*

Ten species of fungi and 28 arthropods have been recorded in association with the genus *Euonymus*.

Species of *Euonymus* in China

Scientific Name	Scientific Name	Scientific Name
E. acanthocarpus Franch.	*E. actinocarpus* Loes.	*E. aculeatus* Hemsl
E. aculeolus C. Y. Cheng ex J. S. Ma	***E. alatus*** (Thunb.) Sieb	*E. amygdalifolius* Franch.
E. angustatus Sprague	*E. austro-tibetanus* Y. R. Li	*E. bockii* Loes.
E. carnosus Hemsl.	*E. centidens* Lévl.	*E. chengii* J. S. Ma
E. chenmoui Cheng	*E. chloranthoides* Yang	*E. chuii* Hand.-Mazz.
E. cinereus Laws	*E. clivicolus* W. W. Smith	*E. contractus* Sprague
E. corntus Hemsl.	*E. crenatus* C. H. Wang	*E. dielsianus* Loes.
E. distichus Lévl.	*E. dolichopus* Merr. ex J. S. Ma	*E. echinatus* Wall. ex Roxb
E. ellipticus (C. H. Wang) C. Y. Cheng	*E. euscaphis* Hand.-Mazz.	*E. fertilis* (Loes.) C. Y. Cheng ex C. Y. Cheng
E. ficoides C. Y. Cheng ex J. S. Ma	*E. fimbriatus* Wall. ex Roxb.	***E. fortunei*** (Turcz.) Hand.-Mazz.
E. frigidus Wall. ex Roxb.	*E. gibber* Hance	*E. giraldii* Loes.
E. gracillimus Hemsl.	*E. grandiflorus* Wall.	*E. hainanensis* Chun et How
E. hamiltonianus Wall. ex Roxb.	*E. hederaceus* Champ. ex Benth.	*E. hemsleyanus* Loes.
E. hui J. S. Ma	*E. hukuangensis* C. Y. Cheng ex J. S. Ma	*E. hystrix* W. W. Smith
E. japonicus Thunb.	*E. jinfoshanensis* Z. M. Gu	*E. jinggangshanensis* M. X. Nie
E. jinyangensis C. Y. Chang	*E. Kengmaensis* C. Y. Cheng ex J. S. Ma	*E. kiautschovicus* Loes.
E. kwangtungensis C. Y. Chen	*E. lawsonii* C. B. Clarke ex Prain	*E. laxicymosus* C. Y. Cheng ex J. S. Ma
E. laxiflorus Charmp. ex Benth	*E. leclerei* Lévl.	*E. lichiangensis* W. W. Smith
E. linearifolius Franch.	*E. maackii* Rupr.	*E. macropterus* Rupr.
E. maximowiczianus (Prokh.) Varosh	*E. mengtseanus* (Loes.) Sprague	*E. microcarpus* (Oliv.) Sprague
E. mitratus Pierre	*E. morrisonensis* Kanehira et Sasaki	*E. myrianthus* Hemsl.
E. nanoides Loes.	*E. nanus* Bieb	*E. nitidus* Benth.
E. oblongifolius Loes. et Rehd.	*E. omeiensis* Fang	*E. oxyphyllus* Miq.
E. pallidifolius Hayata	*E. parasimilis* C. Y. Cheng ex J. S. Ma	*E. paravagans* Z. M. Gu
E. pashanensis S. Z. Qu et Y. H. He	*E. pendulus* Wall. ex Roxb.	*E. perbellus* C. Y. Chang
E. percoriaceus C. Y. Wu ex J. S. Ma	*E. phellomanus* Loes.	*E. porphyreus* Loes.
E. potingensis Chun et How ex J. S. Ma	*E. przwalskii* Maxim	*E. pseudo-sootepensis* Y. R. Li et S. G. Wu
E. rehderianus Loes.	*E. rostratus* W. W. Smith	*E. sanguineus* Loes.
E. saxicolus Loes. et Rehd.	*E. scandens* Graham	*E. schensianus* Maxim.
E. semenovii Regel	*E. spraguei* Hayata	*E. subsessilis* Sprague
E. subtrinervis Rehd.	*E. szechuanensis* C. H. Wang	*E. tashiroi* Maxim.
E. tengyuehensts W. W. Smith	*E. theacolus* C. Y. Cheng	*E. theifoius* Wall.
E. tibeticus W. W. Smith	*E. tingens* Wall.	*E. tonkinenis* Loes.
E. trichocarpus Hayata	*E. vagans* Wall. ex Roxb.	*E. vasanoides* C. Y. Cheng ex J. S. Ma
E. venosus Hemsi	*E. verrucosoides* Loes.	*E. verrucosus* Scop.
E. viburnoides Prain	*E. wensiensis* J. W. Ren et D. S. Yao	*E. wilsonii* Sprague
E. wui J. S. Ma	*E. xylocarpus* C. Y. Cheng et Z. M. Gu	*E. yunnanensis* Franch.

Fungi

Phylum	Family	Species	H. R.	Ref.
Anamorphic *Acantharia*		*Fusicladium euonymi-japonici* Hori	mo	23
Anamorphic Ascomycetes		*Coleophoma cylindrospora* (Desm.) Höhn.	oo	23[†]
		Sphaeropsis euonymi Gabotto	mo	23
Anamorphic *Broomella*		*Pestalotia planimi* Vize	mo	23
Anamorphic *Erysiphe*		*Oidium euonymi-japonici* (Arcang.) Sacc.	mo	23
Anamorphic *Guignardia*		*Phyllosticta bolleana* Sacc.	oo	23
Anamorphic *Leptosphaeria*		*Phoma subnervisequa* Desm.	mo	23
Anamorphic *Mycosphaerella*		*Cercosporella euonymi* Erikss.	oo	23
		Pseudocercospora destructiva (Ravenel) Y.L. Guo & X.J. Liu	mo	23[‡]
			oo	110
Anamorphic *Pyrenopeziza*		*Cylindrosporium frigidum* (Sacc.) Vassiljevsky	mo	23

[†] Recorded as *Macrophoma cylindrospora* (Desm.) Berl. et Vogl.
[‡] Recorded as *Cercospora destructiva* Rav.

Arthropods

Order	Family	Species	H.P.R.	Ref.
Coleoptera	Cerambycidae	*Acalolepta sublusca* (Thomson)	po	124
Homoptera	Aphididae	*Aphis clerodendri* Matsumura	po	100
	Coccidae	*Ceroplastes japonicus* Green	po	151
		Ceroplastes rubens Maskell	po	151
		Chloropulvinaria aurantii (Cockerell)	p	85
			po	151
		Chloropulvinaria floccifera (Westwood)	p	65
			p	85
			po	151
	Diaspididae	*Aonidiella aurantii* (Maskell)	p	85
		Chrysomphalus dictyospermi (Morgan)	p	85
		Lepidosaphes corni (Takahashi)	p	85[I]
		Lepidosaphes gloverii (Packard)	p	65
			p	140
		Parlatoria camelliae Comstock	p	85
		Unaspis euonymi (Comstock)	p	131
	Margarodidae	*Icerya purchasi* Maskell	p	140
Lepidoptera	Geometridae	*Abraxas suspecta* Warren	p	65
			p	138[II]
			p	158
		Amraica superans (Butler)	p	65
		Buzura recursaria superans Butler	p	85
			po	138
		Buzura thibetaria Oberthür	p	158
		Calospilos suspecta Warren	p	85
		Phthonosema invenustaria Leech	p	85
			p	138
		Xandrames dholaria sericea Butler	m	158
	Tortricidae	*Homona magnanima* Diakonoff	p	65
			p	158
	Yponomeutidae	*Yponomeuta anatolicus* Stringer	oo	114
		Yponomeuta bipunctellus Matsumura	m	114
		Yponomeuta griseatus Moriuti	mo	114
		Yponomeuta kanaiellus Matsumura	mo	114
		Yponomeuta pedallus (Linnaeus)	p	114
		Yponomeuta polystigmellus Felder et Felder	p	85
			m	114
		Yponomeuta tokyonellus Matsumura	m	114

* For *Euonymus alatus* only, *Euonymus fortunei* is not included.
[I] Recorded as *Insulaspis corni* (Takahashi)
[II] Recorded as *Calospilos suspecta* Warren

Euphorbia esula
Leafy spurge

Euphorbia esula.

Introduction
The genus *Euphorbia* contains about 2,000 species worldwide, primarily in the tropical regions of Africa and Central America. At least seventy-six identified species and four suspected species of *Euphorbia* are reported in China, primarily in the Hengduan Mountain ranges in southwestern China and arid areas of the northwest[117].

Species of *Euphorbia* in China
(NEXT PAGE)

Taxonomy
Family: Euphorbiaceae
Genus: *Euphorbia* L.

Description
Euphorbia esula L. is a perennial herb with a brown to dark brown cylindrical root. The root is usually branched and flexuous, more than 20 cm in length, and 3-5 cm in diameter. Sometimes appearing in clusters, the stem may grow solitarily, branched from the base, reaching 30-60 cm long and 3-5 mm in diameter. The infertile shoot is usually branched from the base of the leaf axil. Generally 2-7 cm long and 4-7 mm broad, the sessile leaves have various shapes ranging from linear to ovate, with acute apices and truncate or cuneate bases. The leaves on the infertile shoots are needle-shaped, about 2-3 cm long and 1 mm in diameter, and sessile. The sessile solitary cyathium inflorescence grows on the tips of dichotomous branches. The cyathia are monoecious, with one pistillate flower in the center and many staminate flowers surrounded by bracts. The fruits are triangular global capsules, with three ridges on the surface. The seed is ovate, 2.5-3.0 mm long and 2.0-2.5 mm in diameter, and brownish yellow when mature. Like other members of the genus, *E. esula* has milky sap that is poisonous to livestock. Flower and fruit occurs from April to October[117].

Habitat
Leafy spurge can be found along roadsides, on hillsides, dunes, in grasslands, and arid, sandy wastelands[96][117].

Distribution
E. esula has a nationwide distribution in China with the exception of Hainan, Tibet, Taiwan, and Yunnan provinces [117][146].

Economic Importance
E. esula is of limited importance for its rich oil content (about 30 percent by weight). *E. esula* is used medicinally in China[117]. It is a common weed in orchards and roadsides. Although it flourishes in the prairie of Inner Mongolia, it has not become a serious ecological threat[96].

Related Species
Some other species can be easily confused with *E. esula* in appearance. *Euphorbia latifolia* Meyer ex Lebeb, which occurs in ravines, grasslands, forest edges, and thickets at elevations of 1,000-1,500 m, is easily identified through its large size and a pedicellate inflorescence, which is absent in *E. esula*. *Euphorbia sieboldiana*, a member of the genus *Euphorbia* with a diverse appearance, has rhizomes and adventious roots that are absent in *E. esula* [117].

Natural Enemies of *Euphorbia*
Twenty-three species of fungi have

been reported on members of the genus *Euphorbia*. Two of them, *Melampsora euphorbiae* and *Melampsora euphorbiae-dulcis* can infect *E. esula* as well as members of the genus *Euphorbia*. Twenty arthropods have been recorded to attack the plant; three of them, *Aphthona chinchihi*, *Aphthona seriata*, and *Oberea erythrocephala* are regarded as promising biological control agents [123].

Species of *Euphorbia* in China

Scientific Name	Scientific Name	Scientific Name
E. altaica Meyer ex Ledeb.	*E. lingiana* Shih	*E. alatavica* Boiss.
E. lioui C. Y. Wu & J. S. Ma	*E. alpina* Meyer ex Ledeb.	*E. lucorum* Rupr.
E. altotibetica O. Pauls.	*E. macrorrhiza* Meyer ex Ledeb.	*E. antiquorum* L.
E. maculata L.	*E. atoto* Forst. f.	*E. makinoi* Hayata
E. bifida Hook. & Arn.	*E. marginata* Pursh.	*E. blepharophylla* Meyer ex Ledeb.
E. micractina Boiss.	*E. buchtormensis* Meyer ex Ledeb.	*E. milii* Ch. des Moulins
E. consanguinea Schrenk †	*E. monocyathium* Prokh.	*E. cotinifolia* L.
E. neriifolia L.	*E. cyathophora* Murr.	*E. pachyrrhiza* Kar. & Kir.
E. dentata Michx.	*E. pekinensis* Rupr.	*E. donii* Oudejians
E. peplus L.	*E. dracunculoides* Lam.	*E. pilosa* L.
E. esula L.	*E. prolifera* Hamilt. ex D. Don	*E. fischeriana* Steud.
E. prostrata Ait.	*E. franchetii* B. Fedtsch.	*E. pulcherrima* Willd. ex Kl.
E. garanbiensis Hayata	*E. rapulum* Kar. & Kir.	*E. granula* Forssk.
E. royleana Boiss.	*E. griffithii* Hook. f.	*E. schuganica* B. Fedtsch. †
E. hainanensis Croizat	*E. seguieriana* Neck. †	*E. heishuiensis* W. T. Wang
E. serpens H. B. K.	*E. helioscopia* L.	*E. sessiliflora* Roxburgh. †
E. heterophylla L.	*E. sieboldiana* Morr. & Decne.	*E. heyneana* Spreng.
E. sikkimensis Boiss.	*E. hirta* L.	*E. soongarica* Boiss.
E. hsinchuensis (Lin & Chaw) C. Y. Wu & J. S. Ma	*E. sororia* A. Schrenk	*E. humifusa* Willd. ex Schlecht.
E. sparrmannii Boiss.	*E. humilis* Meyer ex Ledeb.	*E. stracheyi* Boiss.
E. hylonoma Hand.-Mazz.	*E. taihsiensis* (Chaw & Koutnik) Oudejians	*E. hypericifolia* L.
E. thomsoniana Boiss.	*E. hyssopifolia* L.	*E. thymifolia* L.
E. inderiensis Less. ex Kar. & Kir.	*E. tibetica* Boiss.	*E. jolkinii* Boiss.
E. tirucalli L.	*E. kansuensis* Prokh.	*E. tongchuanensis* C. Y. Wu & J. S. Ma
E. kansui T. N. Liou ex S. B. Ho	*E. turczaninowii* Kar. & Kir.	*E. kozlovii* Prokh.
E. turkestanica Regel.	*E. lathyris* L.	*E. wallichii* Hook. f.
E. latifolia Meyer ex Ledeb.	*E. yanjinensis* W. T. Wang	

† recorded as suspected species in the *Flora Reipublicae Popularis Sinicae*[11]

Fungi

Phylum	Family	Species	H. R.	Ref.
Ascomycota	Erysiphaceae	*Sphaerotheca euphorbiae* (Castagne) E.S. Salmon	oo	22
		Sphaerotheca fuliginea (Schltdl.) Pollacci	po	23
Basidiomycota	Incertae sedis	*Aecidium euphorbiae* J.F. Gmel.	oo	23
		Aecidium tithymali Arthur	oo	23
	Melampsoraceae	*Melampsora ricini* E.A. Noronha	o	23[†]
		Melampsora euphorbiae-dulcis G.H. Otth	o	23
	Pucciniaceae	*Endophyllum* sp.	o	123
		Uromyces euphorbiae-lunulatae Liou & Wang	oo	23
		Uromyces kalmusii Sacc.	oo	23
		Uromyces kawakamii Syd. & P. Syd.	mo	23
		Uromyces proeminens Lév.	mo	23
		Uromyces striolatus Tranzschel	oo	23
		Uromyces tuberculatus Fuckel	oo	23
Oomycota	Peronosporaceae	*Peronospora euphorbiae* Fuckel	mo	23
	Pythiaceae	*Phytophthora cryptogea* Pethyb. & Laff.	po	188
		Phytophthora euphorbiae Fuckel	po	188
		Phytophthora insolita Ann & W.H. Ko	mo	188
Anamorphic *Apiognomonia*		*Discula kirinensis* Miura	mo	23
Anamorphic *Glomerella*		*Colletotrichum euchroum* Syd.	mo	23
Anamorphic *Mycosphaerella*		*Cercospora euphorbiae* Kellerm. & Swingle	oo	23
		Cercospora pulcherrimae Tharp	mo	23
		Pseudocercospora brachypus (Ellis & Everh.) Y.L. Guo & X.J. Liu*	po	23[‡]
		Pseudocercospora petila Goh & W.H. Hsieh	mo	110

[†] Recorded as *Melampsora euphorbiae* (Schub.) Cast.
[‡] Recorded as *Cercospora brachypus* Ell. et Ev.
* Also listed in reference 110.

Arthropods

Order	Family	Species	H. R.	Ref.
Coleoptera	Cerambycidae	*Oberea erythrocephala* Shrank	‡	123
	Chrysomelidae	*Aphthona chinchihi* Chen	‡	123
			oo	185
		Aphthona seriata Chen	‡	123
			oo	185
		Hespera auricuprea Chen et Wang	po	140
Homoptera	Cerococcidae	*Cerococcus bryoides* (Maskell)	po	151
	Pseudococcidae	*Planococcus sinensis* Borchsenius	po	150
Lepidoptera	Aegeriidae	*Chamaesphecia* sp.	‡	123
	Arctiidae	*Eucharia festiva* (Hüfnagel)	mo	40†
			mo	41
		Hyphantria cunea (Drury)	po	41
	Danaidae	*Danaus chrysippus* (Linnaeus)	po	203
		Danaus plexippus (Linnaeus)	po	203
	Drepanidae	*Oreta insignis* (Butler)	po	65
	Noctuidae	*Achaea melicerta* (Drury)	po	205
		Amathes triangulum Hufnagel	po	141
		Simyra nervosa (Schiffermüller)	po	12
	Sphingidae	*Celerio lineata* (Esper)	‡	123
	Tortricidae	*Clepsis rurinana* (Linnaeus)	po	65
		Clepsis semialbana (Guenée)	po	113
		Cnephasia chrysantheana (Duponchel)	po	113
Thysanoptera	Phlaeothripidae	*Neoheegeria flavipes* Moulton	po	56

† Recorded as *Arctia hebe* (Linnaeus)

‡ the insects attacked leafy spurge, but their H. R. is not mentioned in the report.

Ficus spp.

Leaves of *Ficus microcarpa.*

Introduction

Ficus, a large genus in the family Moraceae, is composed of approximately 1,000 members and is distributed in tropical and subtropical regions. Ninety-eight species, three subspecies, 43 varieties, and two forms occur in China. The phloem fibers of *Ficus* are good substitutes for hemp. Fruits of some species are edible or used medicinally. Many *Ficus* species are hosts of *Laccifer lacca* Kerr, a scale insect that secrets a resinous substance[194].

Species of *Ficus* in China

(NEXT PAGE)

I. ***Ficus altissima***

Lofty fig, false banyan, council tree

Taxonomy

Family: Moraceae
Genus: *Ficus* L.

Description

Ficus altissima is a large woody tree, 25-30 m tall and 40-90 cm in diameter, with smooth gray bark. Young shoots are green, puberulous, and 10 mm in diameter. Leaves are thick, leathery, and broadly ovate to broad-ovate elliptic, 10-19 cm long and 8-11 cm wide, with entire margins, obtuse apices and cuneate bases. Both leaf surfaces are smooth, glabrous, with five to seven pairs of long basal lateral veins. Stipules are thick, leathery, 2-5 mm long, and covered with gray silky hairs. Wrapped within the hood-like bract when young, fruits are paired axillary syconia or figs. Male florets are scattered on the inner wall of the fig, with four membranous sepals. Female florets are sessile and have four sepals. Achenes are tuberculate. Flowers occur from March to April, and fruits occur from May to July[194].

Habitat

Ficus altissima occurs in mountains and plains at elevations of 100-2,000 m[194].

Distribution

Ficus altissima occurs naturally in Guangdong, Guangxi, Hainan, Sichuan, Yunnan,[10][194] and is cultivated in Fujian[84].

Economic Importance

Ficus altissima is cultivated as an ornamental and as a host for *Laccifer lacca* [10].

II. ***Ficus microcarpa***

Laurel fig

Taxonomy

Family: Moraceae
Genus: *Ficus* L.

Description

Ficus microcarpa is a woody tree that grows to 15-25 m in height and 50 cm in diameter, with a spreading crown and prop roots that are rust-brown when mature. Leaves are thin, leathery, narrowly elliptic, 4-8 cm long and 3-4 cm wide, with entire margins, obtuse apically and cuneate at bases, with three to ten pairs of long basal lateral veins. Dark green initially, leaves are dark brown and shiny when dried. Depressed globose syconia are 6-8 mm in diameter, yellow or slightly red at maturity, and occur in pairs in the leaf axils or old leafless branches. The bracts are broadly ovate and persistent. Male, female flowers, and galls, (the abnormal swollen flowers caused by insects), share the same syconium and flower May to June. Male flowers are sessile or stalked, scattered on the inner wall of the fig. Gall and female flowers are similar.

Fruits are ovate achenes[194].

Habitat

Ficus microcarpa occurs near urban areas and in forests[66].

Distribution

Ficus microcarpa occurs naturallyin Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Taiwan, Yunnan[194], and possibly Zhejiang provinces[126][144][159] [194] It is cultivated in Hubei and Shandong[7][194].

Economic Importance

The bark fibers of laurel fig are used for making fishing nets and artificial cotton. Prop roots are used medicinally. *Ficus microcarpa* is also grown as a windbreak and as an ornamental[10][66].

Natural Enemies of *Ficus*

Thirty-nine species of fungi have been reported to injure plants of the genus *Ficus*. Seventy-three arthropods in 28 families of five orders have been found on members of the genus.

Species of *Ficus* in China

Scientific Name	Scientific Name	Scientific Name
F. abelii Miq.	*F. maclellandi* King	***F. altissima*** L.
F. microcarpa L. f.	*F. ampelas* Burm. f.	*F. napoensis* S. S. Chang
F. annulata L.	*F. neriifolia* J. E. Sm.	*F. asperiuscula* Kunth et Bouch.
F. nervosa Heyne ex Roth	*F. aurantiaca* Griff.	*F. oligodon* Miq.
F. auriculata Lour.	*F. orthoneura* Lévl. et Vant.	*F. beipeiensis* S. S. Chang
F. ovatifolia S. S. Chang	*F. benguetensis* Merr.	*F. pandurata* Hance
F. benjamina L.	*F. pedunculosa* Miq.	*F. callosa* Willd.
F. pisocarpa L.	*F. cardiophylla* Merr.	*F. polynervis* S. S. Chang
F. carica L.	*F. prostrata* Wall. ex Miq.	*F. caulocarpa* (Miq) Miq.
F. pubigera (Wall. ex Miq.) Miq.	*F. chapaensis* Gagnep.	*F. pubilimba* Merr.
F. chartacea Wall. ex King	*F. pubinervis* L.	*F. chrysocarpa* Reinw.
F. pumila L.	*F. ciliata* S. S. Chang	*F. pyriformis* Hook. et Arn.
F. concinna (Miq.) Miq.	*F. racemosa* L.	*F. cumingii* Miq.
F. religiosa L.	*F. curtipes* Corner	*F. ruficaulis* Merr.
F. cyrtophylla Wall. ex Miq.	*F. rumphii* L.	*F. daimingshanensis* S. S. Chang
F. ruyuanensis S. S. Chang	*F. dinganensis* S. S. Chang	*F. sagittata* Vahl
F. drupacea Thunb.	*F. sarmentosa* Buch.-Ham. ex J. E. Sm.	*F. elastica* Roxb. ex Hornem.
F. semicordata Buch.-Ham. ex J. E. Sm.	*F. erecta* Thunb.	*F. septica* Burm. f.
F. esquiroliana Lévl.	*F. simplicissima* Lour.	*F. filicauda* Hand.-Mazz.
F. squamosa Roxb.	*F. fistulosa* Reinw. ex L.	*F. stenophylla* Hemsl.
F. formosana Maxim.	*F. stricta* Miq.	*F. fusuiensis* S. S. Chang
F. subincisa J. E. Sm.	*F. gasparriniana* Miq.	*F. subulata* L.
F. geniculata Kurz	*F. superba* Miq.	*F. glaberrima* L.
F. tannoensis Hayata	*F. guangxiensis* S. S. Chang	*F. tikoua* Bur.
F. guizhouensis S. S. Chang	*F. tinctoria* Forst. f.	*F. hederacea* Roxb.
F. trichocarpa L.	*F. henryi* Warb. ex Diels	*F. trivia* Corner
F. heteromorpha Hemsl.	*F. tsiangii* Merr. ex Corner	*F. heterophylla* L. f.
F. tuphapensis Drake	*F. heteropleura* L.	*F. undulata* S. S. Chang
F. hirta Vahl	*F. vaccinioides* Hemsl. ex King	*F. hispida* L.
F. variegata L.	*F. hookeriana* Corner	*F. variolosa* Lindl. ex Benth.
F. irisana Elmer	*F. vasculosa* Wall. ex Miq.	*F. ischnopoda* Miq.
F. virens Ait.	*F. laevis* L.	*F. virgata* Reinw. ex L.
F. langkokensis Drake	*F. yunnanensis* S. S. Chang	

Fungi

Phylum	Family	Species	H. R.	Ref.
Ascomycota	Capnodiaceae	*Aithaloderma clavatisporum* Syd. & P. Syd.	po	23[I]
		Chaetoscorias vulgare W. Yamam.	po	23
		Neocapnodium tanakae (Shirai et Hara) Yamam.	po	23
		Scorias communis W. Yamam.	po	23
		Triposporiopsis spinigera (Höhn.) W. Yamam.	po	23
	Chaetothyriaceae	*Chaetothyrium dictyosporum* Petr.	mo	23
		Chaetothyrium javanicum (Zimm.) Boedijn	po	23[II]
	Erysiphaceae	*Phyllactinia broussonetiae-kaempferi* Sawada	po	22
	Glomerellaceae	*Glomerella cingulata* (Stoneman) Spauld. & H. Schrenk	po	23
	Hyponectriaceae	*Physalospora fici-formosanae* Sawada	mo	23
	Meliolaceae	*Irenina cheoi* Hansf.	oo	23
		Irenopsis benguetensis F. Stevens & Roldan ex Hansf.	oo	23
			oo	62
		Meliola bangalorensis Hansf. & Thirum.	po	62
		Meliola microtricha Syd. & P. Syd.	oo	23
			oo	62
		Meliola sakahensis W. Yamam.	mo	23
	Phyllachoraceae	*Phyllachora aspidea* (Berk.) Sacc.	mo	23
		Phyllachora fici-beecheyanae Sawada	mo	23
		Phyllachora fici-septicae Sawada	mo	23
		Phyllachora fici-variolosae Petr.	mo	23
		Phyllachora ficuum Niessl	oo	23
		Phyllachora yatesii E. Castell. & Cif.	oo	23[III]
		Phyllachora banahaensis Petr.	oo	23[IV]
Basidiomycota	Atheliaceae	*Athelia rolfsii* (Curzi) C.C. Tu & Kimbr.	po	23[V]
	Corticiaceae	*Corticium salmonicolor* Berk. & Broome	po	23
	Incertae sedis	*Uredo sawadae* S. Ito	oo	23
	Phakopsoraceae	*Phakopsora fici-erectae* S. Ito & Y. Otani ex S. Ito & Muray.	po	23
		Cerotelium fici (Castagne) Arthur	oo	23[VI]
Oomycota	Pythiaceae	*Phytophthora carica* (Hara) Hori	mo	23
Anamorphic Ascomycetes		*Plenophysa mirabilis* Syd. & P. Syd.	mo	23
Anamorphic *Botryotinia*		*Botrytis depraedans* (Cooke) Sacc.	po	23
Anamorphic *Glomerella*		*Colletotrichum caricae* F. Stevens & J.G. Hall	mo	23
		Colletotrichum elasticae Tassi	mo	23

Anamorphic *Mycosphaerella*	*Pseudocercospora angulo-maculae* (Karr & M. Mandal) W.H. Hsieh & Goh	mo	110
	Pseudocercospora cladophora Sawada ex Goh & W.H. Hsieh	oo	110
	Pseudocercospora fici (Heald & F.A. Wolf) X.J. Liu & Y.L. Guo	mo	23[VII]
		oo	110
	Pseudocercospora fici-septicae Sawada ex Goh & W.H. Hsieh	mo	110
	Pseudocercospora kallarensis (T.S. Ramakr. & K. Ramakr.) Y.L. Guo & X.J. Liu	mo	110
	Septoria pirottae Tassi	mo	23
Anamorphic *Nectria*	*Tubercularia fici* Edgerton	mo	23

[I] Recorded as *Aithaloderma clavatispora* Syd.
[II] Recorded as *Phaeosaccardinula javanica* (Zimm.) Yamam.
[III] Recorded as *Trabutia chinense* Yates
[IV] Recorded as *Trabutia elmeri* Theiss. et Syd.
[V] Recorded as *Corticium centrifugum* (Lév.) Bres.
[VI] Recorded as *Phakopsora nishidana* Ito.
[VII] Recorded as *Cercospora fici* Heald & F.A. Wolf

Arthropods

Order	Family	Species	H. R.	Ref.
Acariformes	Eriophyidae	*Cecidophyes thailandica* Keifer	o	83
	Tetranychidae	*Brevipalpus californicus* (Banks)	po	143
		Eotetranychus sexmaculatus (Riley)	po	143
		Tetranychus piercei McGregor	po	143
Coleoptera	Cerambycidae	*Aeolesthes holosericea* (Fabricius)	po	9
		Anoplophora chinensis (Förster)	po	9
		Anoplophora chinensis macularia (Thomson)	po	9
		Apriona germari (Hope)	po	9
		Batocera horsfieldi (Hope)	po	9
		Batocera rubus (Linnaeus)	po	9
		Epepeotes uncinatus Gahan	po	124
		Macrochenus guerini White	po	124
		Monochamus bimaculatus Gahan	po	9
		Olenecamptus bilobus (Fabricius)	po	9
		Psacothea hilaris (Pascoe)	po	9
			po	158
	Chrysomelidae	*Morphosphaera cavaleriei* Laboissiere	o	185
	Scolytidae	*Coccotrypes apicalis* Beeson	p	140
		Hadrodemius artecomans (Schedl)	p	65
		Terminalinus eggersi (Besson)	po	65

Homoptera	Cerococcidae	*Cerococcus ficoides* Green	po	151
	Cicadellidae	*Tartessus ferrugineus* (Walker)	po	48
	Coccidae	*Ceroplastes ceriferus* (Anderson)	po	151
		Ceroplastes floridensis Comstock	po	65
			po	151
		Ceroplastodes chiton Green	po	151
		Chloropulvinaria floccifera (Westwood)	po	65
			po	151
		Coccus elongatus (Signoret)	po	151
		Coccus hesperidum (Linnaeus)	po	65
		Dicyphococcus ficicola Borchsenius	mo	151
		Paralecanium expansum (Green)	po	151
		Parasaissetia nigra (Nietner)	po	151
		Protopulvinaria mangiferae (Green)	po	151
		Saissetia formicarii (Green)	po	151
		Saissetia oleae (Bernard)	po	151
	Diaspididae	*Chrysomphalus aonidum* (Linnaeus)	po	65
		Pseudaonidia duplex (Cockerell)	po	65
	Flatidae	*Geisha distinctissima* (Walker)	po	158
			po	204
	Greenideidae	*Greenidea guangzhouensis* Zhang	o	189
	Margarodidae	*Drosicha corpulenta* (Kuwana)	po	65
		Laccifer lacca (Kerr)	p	65
	Pseudococcidae	*Anaparaputo liui* Borchsenius	oo	150
		Gossypariella siamensis (Takahashi)	oo	150
		Planococcus sinensis Borchsenius	po	150
		Ripersia sera Borchsenius	oo	150
	Tropiduchidae	*Mesepora onukii* (Matsumura)	po	204
Lepidoptera	Arctiidae	*Asota egens* (Walker)	oo	41
		Lacides ficus (Fabricius)	o	41
		Nyctemera adversata (Schaller)	po	40†
			po	41
			po	65
	Bombycidae	*Ocinara brunnea* Wileman	po	65
		Ocinara varians Walker	p	65
			po	65
			po	65
			po	65
	Danaidae	*Euploea core* (Cramer)	p	203
		Euploea mulciber (Cramer)	po	203
		Euploea mulciber barsine Fruhstorfer	p	203
		Euploea sylvester (Fabricius)	p	203
	Hesperiidae	*Badamia exclamationis* (Fabricius)	po	203

	Lycaenidae	*Iraota timoleon* (Stoll)	po	203
	Lymantriidae	*Euproctis bipunctapex* (Hampson)	p	141
		Lymantria serva iris Strand	mo	65
			p	141
			oo	199
		Orgyia truncata Chao	oo	199
	Noctuidae	*Chrysodeixis eriosoma* (Doubleday)	po	65
		Plusia chryson (Esper)	po	65
	Nymphalidae	*Cyrestis cocles* (Fabricius)	po	203
		Cyrestis thyodamas Boisduval	p	203
			oo	158
		Cyrestis thyodamas formosana Fruhstorfer	p	203
		Hypolimnas bolina kezia (Butler)	p	203
	Psychidae	*Chalia larminati* Heylaerts	p	141
	Pyralidae	*Cirrhochrista brizoalis* Walker	mo	65
			mo	158
		Diaphania bivitralis (Guenée)	oo	145
	Sphingidae	*Marumba jankowskii* (Oberthür)	po	208
	Uraniidae	*Nyctalemon menoetius* Hopffer	po	65
Thysanoptera	Phlaeothripidae	*Haplothrips leucanthemi* (Schrank)	po	56
		Mesothrips jordani Zimmermann	mo	56
	Thripidae	*Anisopilothrips venustulus* (Priesner)	po	56
		Astrothrips aucubae Kurosawa	p	65

† Recorded as *Nyctemera plagifera* Walker

Humulus scandens (*Humulus japonicus*)

Japanese hop

Introduction

The genus *Humulus* contains only three species that are confined to the temperate and subtropical regions of the northern hemisphere. All three species of hops are reported from across southern China [194].

Species of *Humulus* in China

Species Name
Humulus lupulus L.
H. yunnanensis Hu
H. scandens (Lour.) Merr.

Taxonomy

Family: Moraceae
Genus: *Humulus* L.

Description

Humulus scandens is a twining or prostrate vine that grows as an annual in northeastern China and as a perennial in southern China [109]. The opposite leaves are 7-10 cm in length and deeply divided into five distinct palmate lobes with a serrate margin and rough surface. The underside of the leaf is pubescent, bearing yellow glands. The stems and petiole are covered with sharp, downward-curving hairs. Bracts occur at the bases of leaf petioles. Flowers appear spring through summer, followed by achenes that are exposed from the bract at maturity in the autumn [194]. Male flowers are yellowish green panicles 15-25 cm long. Female flowers are catkin-like drooping spikes about 5 mm in diameter. The ovary, covered in a white tomentum, is triangular with an acuminate apex, and enclosed in a papery bract with two external stigmata.

Habitat

Humulus scandens occurs in wastelands, forest margins, and thickets along streams[194][74]. It has also been reported to grow along roads, hedges and buildings, in cropland, stony ground, lawns, and under willow trees on river banks[37][68][76][109]. Elevational distribution ranges from 500-1,200 m (max. 1,800 m) in eastern Yunnan province [76], to below 1500 m in Hubei province [201]; 300-2100 m in areas of the Loess-Plateau [72]; and 500-1500 m on both the south and north slopes of the Qinling Mountains [68].

Leaves and flowers of *Humulus scandens*.

Distribution

H. scandens is distributed widely in most provinces in China, with the exception of Hainan, Tibet, and Qinghai [144][74][130].

Economic Importance

In China, *H. scandens* is a useful traditional herb. The stem fibers can be used for papermaking, and the seed oils are used in soap production. The fruits can be substituted for *H. lupulus* in brewing[94]. As a climbing twining vine, *H. scandens* may cause damage to fruit trees and grain crops or decrease production because of its climbing and twining tendency [34]. It is also an alternate host for *Hemiptera* pest species that cause serious damage to cotton [37].

Related Species

Humulus yunnanensis Hu, which has raised veins on the bracts, is native to Yunnan province, occurs in the lower elevation forests at 1,200-2,800 m.

Humulus lupulus L., which lacks raised veins, is native to Xinjiang, and is cultivated in some northern provinces. These two species are delineated from *H. scandens* by their entire leaf margins and fruits that are enclosed within glabrous bracts.[194]

Natural Enemies of *Humulus*

Agrobacterium tumefaciens Biotype 1 is a gram-negative baculiform bacterium that can cause crown gall on the common hop [129].

Nine fungi are known to infect plants of the genus *Humulus*, but only one, *Pseudocercospora humuli,* may be specific to Japanese hop. Of the 27 insects associated with the genus *Humulus*, two species, *Epirrhoe sepergressa* and *Chytonix segregata*, may have narrow host ranges.

Fungi

Phylum	Family	Species	H. R.	Ref.
Ascomycota	Erysiphaceae	*Sphaerotheca humuli* (DC.) Burrill	po	23
			mo	22†
Oomycota	Peronosporaceae	*Pseudoperonospora humuli* (Miyabe & Takah.) G.W. Wilson	oo	23
			o	188
	Pythiaceae	*Phytophthora citrophthora* (R.E. Sm. & E.H. Sm.) Leonian	o	188
Anamorphic *Botryotinia*		*Botrytis cinerea* Pers.	po	23
Anamorphic *Hypomyces*		*Verticillium albo-atrum* Reinke & Berthold	po	23
Anamorphic *Mycosphaerella*		*Cercospora cantuariensis* E.S. Salmon & Wormald	mo	23
		Pseudocercospora humuli (Hori) Y.L. Guo & X.J. Liu	mo	23‡
			m	110
Anamorphic Mycosphaerellaceae		*Ascochyta humuli* Kabát & Bubák	oo	23
Anamorphic *Pyrenopeziza*		*Cylindrosporium humuli* Ellis & Everh.	mo	23

† Recorded as *Sphaerotheca macularis* (Wallr. : Fr.) Lind.

‡ Recorded as *Cercospora humuli* Hori

Arthropods

Order	Family	Species	H. R.	Ref.
Acariformes	Tetranychidae	*Tetranychus urticae* (Koch)	po	57
Coleoptera	Chrysomelidae	*Psylliodes attenuata* (Koch)	po	57
			p	185
	Elateridae	*Agriotes fuscicollis* Miwa	po	57
	Melolonthidae	*Maladera orientalis* Mots	po	57
Homoptera	Aphididae	*Aphis craccivora usuana* Zhang	p	100
		Aphis humuli (Tseng et Tao)	p	100
		Phorodon japonensis Takahashi	p	57
			po	58
			p	189
	Cicadellidae	*Empoasca bipunctata ulmicola* A. Z	po	57
		Tettigoniella viridis (Linné)	po	57†
	Triozidae	*Trioza magnisetosa* Log	po	57

Lepidoptera	Geometridae	*Epirrhoe supergressa* (Butler)	m	138
	Noctuidae	*Abrostola triplasia* (Linnaeus)	oo	65
			oo	209
		Chytonix segregata Butler	m	67
			m	178
			m	209
		Crino satura (Schiffermüller)	po	209
		Heliothis armigera (Hübner)	po	57
	Nymphalidae	*Inachis io* (Linnaeus)	po	24
			po	203
		Polygonia c-album (Linnaeus)	po	203
		Polygonia c-album hemigera Butler	p	24
		Polygonia c-aureum Linnaeus	p	24
		Polygonia c-aureum lunulata Esaki et Nakahara	p	203
		Vanessa indica Linnaeus	p	24
	Psychidae	*Clania minuscular* Butler	p	66
	Tortricidae	*Adoxophyes orana* Fischer von Röslerstamm	p	65
		Grapholitha delineana Walker	p	66
Parasitiformes	Phytoseiidae	*Amblyseius anuwati* Ehara et Bhandhufalck	p	65
Thysanoptera	Thripidae	*Megalurothrips distalis* (Karny)	po	132
		Thrips tabaci Lindeman	po	57

† recorded as *Cicadella viridis* L

Lespedeza cuneata

Chinese lespedeza, bush clover

Growth habit of *Lespedeza cuneata*.

Introduction

Approximately 60 species constitute the genus *Lespedeza,* which occurs from East Asia to Northeast Australia and North America. The members of this genus are tolerant of arid environments, and consequently are often planted to prevent soil erosion. Twenty-six species of the genus have been reported from China[91].

Species of *Lespedeza* in China

Scientific Name	Scientific Name
L. bicolor Turcz.	*L. forrestii* Schindl.
L. buergeri Miq.	*L. inschanica* (Maxim.) Schindl.
L. caraganae Bunge	*L. juncea* (L.f.) Pers.
L. chinensis G. Don	*L. maximowizii* Schneid.
L. cuneata (Dum.-Cours.) G. Don	*L. mucronata* Rick.
L. cyrtobotrya Miq.	*L. patens* Nakai
L. daurica (Laxm.) Schindl.	*L. pilosa* (Thunb.) Sieb. et Zucc.
L. davidii Franch.	*L. potaninii* Vass.
L. dunnii Schindl.	*L. pubescens* Hayata
L. fasciculiflora Franch.	*L. tomentosa* (Thunb.) Sieb. ex Maxim.
L. floribunda Bunge	*L. viatorum* Champ. ex Benth.
L. fordli Schindl.	*L. virgata* (Thunb.) DC.
L. formosa (Vog.) Koehne	*L. wilfordi* Rick.

Taxonomy

Family: Leguminoseae (Fabaceae)
Genus: *Lespedeza* Michx.

Description

Lespedeza cuneata is an erect or ascending subshrub standing up to 1 meter tall. The stem is covered with white pubescence, angled upwards. Closely spaced trifoliate leaves alternate along the stem. The blade of the leaflet is cuneate or linear cuneate, about 1-3 cm long and 2-5 mm wide; the truncate apex is somewhat retuse with a mucronate tip. The upper surface of the leaf is glabrous or pilose, and the underside is white pubescent. The petiole measures less than 10 mm in length. The stipule is rhomboid and persistent. From July to August, racemes emerge from the leaf axil bearing two to four flowers each. The apetalous flowers occur in clusters having two narrow branchlets, above which is the narrowly campanulate calyx, with five lanceolate pubescent lobes. The corolla is light yellow to white; the keel is violet-spotted at the base, and longer than the standard and the wing, both of which are about 7 mm long. The pubescent pod is broadly ovoid or subglobose, 2.5-3.5 mm long and 2.5 mm wide. Fruits appear from September through October[70][74][91].

Habitat
Lespedeza cuneata can be found along roadsides, slopes, ridges, streambanks, ravines, and crop field margins at elevations less than 2,500 m[70][91].

Distribution
L. cuneata occurs in many provinces including Gansu, Guangdong, Henan, Hubei, Hunan, Shaanxi, Shandong, Sichuan, Taiwan,Tibet, Yunnan[91],Anhui[30], Fujian[36], Guangxi[50], Guizhou[99], Jiangsu[81], Jiangxi[84], Shanxi[38], and Zhejiang[153].

Economic Importance
The roots of the plant are medically useful. Chinese lespedeza can also serve as livestock forage and green manure in some areas[74].

Related Species
Shrubby lespedeza, *L. bicolor*, is functionally similar to Chinese lespedeza, and distributed in Heilongjiang, Hebei, Henan, Inner Mongolia, Jilin, Liaoning, Shaanxi, and Shanxi[91].

Natural Enemies of *Lespedeza*
At least ten fungi and 65 arthropods are associated with some plants of the genus *Lespedeza*, most of which are found associated with shrubby lespedeza, *L. bicolor*. Only three fungi, *Erysiphe glycines* var. *lespedezae*, *Erysiphe beta*, and *Uromyces lespedezae-procumbentis* can infect *L. cuneata*, and none is reported to be host-specific.

Fungi

Phylum	Family	Species	H. R.	Ref.
Ascomycota	Erysiphaceae	*Erysiphe glycines* var. *lespedezae* (R.Y. Zheng & U. Braun) U. Braun & R.Y. Zheng	o	22
		Erysiphe betae (Vaňha) Weltzien	p	23†
		Microsphaera robiniae F.L. Tai	po	22
	Phyllachoraceae	*Phyllachora lespedezae* (Schwein.) Sacc.	po	23
	Pleosporaceae	*Pleospora lespedezae* Miyake	oo	23
Basidiomycota	Pucciniaceae	*Uromyces lespedezae-bicoloris* Tai & Cheo	oo	23
		Uromyces lespedezae-macrocarpae Liou & Wang	p	23
		Uromyces rugulosus Pat.	po	23
Anamorphic *Mycosphaerella*		*Pseudocercospora latens* (Ellis & Everh.) Y.L. Guo & X.J. Liu	po	23‡
			po	110
		Pseudocercospora lespedezicola Goh & W.H. Hsieh	mo	110

† Recorded as *Erysiphe polygoni* DC.

‡ Recorded as *Cercospora latens* Ell. et Ev.

Arthropods

Order	Family	Species	H. R.	Ref.
Acariformes	Tetranychidae	*Eotetranychus geniculatus* Ehara	po	143
		Schizotetranychus leguminosus Ehara	po	143
Coleoptera	Bruchidae	*Spermophagus complectus* Sharp	po	139
	Chrysomelidae	*Cneorane cariosipennis* Fairmaire	mo	140
			po	185
		Cneorane violaceipennis Allard	oo	185
			mo	65
			mo	85
			mo	140
			mo	158
		Gonioctena fulva (Motschulsky)	po	158
			po	185
		Hespera fulvipes Chen et Wang	oo	140
	Curculionidae	*Alcidodes trifidus* (Pascoe)	po	65
			mo	85
		Alcidodes waltoni (Bohemen)	po	85
		Episomus chinensis Faust	po	158
		Rhynchites plumbeus Roelofs	mo	85
	Eumolpidae	*Cleoporus variabilis* (Baly)	po	140
		Cryptocephalus kraatzi Chûjô	mo	139
		Cryptocephalus kulibini Gebler	mo	139
		Cryptocephalus scutemaculatus T'an	po	140
		Labidostomis bipunctata (Mannerheim)	po	85
			po	139
		Labidostomis chinensis (Lefèvre)	po	139
		Microlypesthes aeneus Chen	oo	139
			po	139
		Pachybrachys scriptidorsum Marseul	mo	85
			po	139
		Smaragdina laevicollis (Jacoby)	po	85
			po	139
		Trichochrysea imperialis (Baly)	po	65
			po	85
			po	139
	Meloidae	*Mylabris calida* Pallas	po	85

Hemiptera	Berytidae	*Metatropis brevirostris* Hsiao	po	193
	Coreidae	*Homoeocerus dilatatus* Horvath	po	192
		Megalotomus junceus (Scopoli)	oo	193
		Mictis angusta Hsiao	po	192
	Lygaeidae	*Metochus abbreviatus* (Scott)	po	193
	Miridae	*Ectmetopterus micantulus* (Horvath)	mo	132
			mo	193
	Pentatomidae	*Carbula obtusangula* Reuter	po	65
			po	192
		Cyclopelta parava Distant	po	65
		Homalogonia obtusa (Walker)	po	65
			po	193
		Sepontia variolosa (Walker)	po	65
		Stollia guttiger (Thunberg)	po	192
	Plataspidae	*Coptosoma biguttula* Motschulsky	po	192
		Coptosoma nigrella Hsiao	po	193
		Coptosoma notabilis Montandon	po	65
		Megacopta cribraria (Fabricius)	po	192
		Megacopta distanti (Montandon)	po	193
		Megacopta horvathi (Montandon)	po	65
			po	85
Homoptera	Aphididae	*Megoura lespedezae* (Essig Kuwana)	mo	65
	Coccidae	*Coccus elongatus* (Signoret)	po	151
	Margarodidae	*Icerya purchasi* Maskell	po	140
	Membracidae	*Jingkara hyalipunctata* Chou	po	85
Lepidoptera	Gelechiidae	*Recurvaria albidorsella* Snellen	mo	141
	Lycaenidae	*Celastrina albocaerulea* Moore	po	158
		Celastrina argiolus (Linnaeus)	po	158
	Lymantriidae	*Cifuna locuples* Walker	po	141
	Noctuidae	*Chrysorithrum amata* Bremer	mo	141
			mo	158
	Notodontidae	*Rosama ornate* (Oberthür)	oo	1
		Stauropus persimilis Butler	po	1
	Nymphalidae	*Neptis hylas* (Linnaeus)	po	85[I]
		Neptis sappho (Pallas)	mo	85[II]
			oo	158
	Pieridae	*Eurema asakii* Boisduval	po	158
		Eurema hecabe (Linnaeus)	po	85
			po	158
		Eurema laeta bethesba (Janson)	po	158
	Pyralidae	*Endotricha portialis* (Walker)	mo	65
	Saturniidae	*Caligula boisduvalii fallax* Jordan	po	207
	Tortricidae	*Archips hemixantha* (Meyrick)	po	141

Thysanoptera	Phlaeothripidae	*Haplothrips chinensis* Priesner	po	132
		Haplothrips kurdjumovi Karny	po	132
	Thripidae	*Hydatothrips proximus* Bhatti	po	132
		Megalurothrips distalis (Karny)	po	56
			po	132
		Scolothrips takahashii Priesner	po	65
		Thrips flavidulus Bagnall	po	56
			po	65
		Thrips flavus Schrank	po	132

[I] Recorded as *Neptis hylas emodes* Moore
[II] Recorded as *Neptis hylas intermedia* Pryer

Ligustrum sinense
Chinese privet

Fruits of *Ligustrum sinense*.

Introduction
The genus *Ligustrum* contains approximately 45 species worldwide. Members of the genus are small trees or shrubs, growing primarily in warm regions of Asia, but also found in northwestern Europe, and southern Australia, Malaysia and New Guinea. In China, 28 native species, with two introduced species, two subspecies, nine varieties, and one form have been reported [128][191].

Species and Some Varieties and Subspecies of *Ligustrum* in China

Scientific Name	Scientific Name
L. amamianum Koidz.	*L. morrisonense* Kanehira et Sasaki
L. angustum Miao	*L. obovatilimbum* Miao †
L. compactum (Wall. ex G. Don) Hook. f. et Thoms. ex Brandis	*L. obtusifolium* Sieb. et Zucc. subsp. *suave* (Kitag.) Kitag.
L. confusum Decne.	*L. ovalifolium* Hassk.
L. delavayanum Hariot	*L. pricei* Hayata
L. expansum Rehd.	*L. punctifolium* M.C. Chang
L. gracile Rehd.	*L. quihoui* Carr.
L. gyirongense P.Y. Bai	*L. retusum* Merr.
L. henryi Hemsl.	*L. robustum* (Roxb.) Blume
L. ibota Sieb. et Zucc. var. *microphyllum* Nakai‡	*L. sempervirens* (Franch.) Lingelsh.
L. japonicum Thunb.†	***L. sinense*** Lour.
L. lianum Hsu	*L. strongylophyllum* Hemsl.
L. longipedicellatum H.T. Chang	*L. tenuipes* M.C. Chang
L. longitubum Hsu	*L. xingrenense* D.J. Liu
L. lucidum Ait.	*L. yunguiense* Miao
L. molliculum Hance	

† native to Japan and cultivated widely in China
‡ possible synonym of *Ligustrum obtusifolium* subsp. *microphyllum* (Nakai) P. S. Green[191]

Taxonomy
Family: Oleaceae
Genus: *Ligustrum* L.

Description
Chinese privet is a deciduous shrub or small tree that grows to 2-4 m. Branchlets are cylindrical and glabrescent. Leaves are papery or thin leathery, sparsely pubescent or glabrescent. The leaf blade is ovate, oblong, elliptic to lanceolate or suborbicular, 2-7 cm long and 1-3 cm wide, with apex acute, acuminate, or obtuse and retuse, and base cuneate to nearly rounded. Both leaf surfaces have four to eight pairs of lateral veins impressed on the upper side and raised on the underside. Flowers bloom from March to July. Pubescent panicles are terminal or axillary, 4–11 cm long and 3–8 cm wide, with a noticeable pedicel. The subglobose fruits are 5-8 mm in diameter and appear from September to December[128].

Habitat
L. sinense occurs in mixed forests, valleys, scrublands, ravines and along streams at elevations of 200-2,600 m[128].

Distribution
The native range of *L. sinense* includes Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Henan[26], Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Taiwan, Yunnan, and Zhejiang[128]. It is cultivated in Shandong and Xi'an of Shaanxi[128].

Economic Importance
Ligustrum sinense is grown nationwide as a hedge plant. The fruits are used in brewing. The oils extracted from the seeds are used in soap making. The bark and leaves are medicinally useful.

Related Species
With the exception of *Ligustrum sinense* var. *sinense*, *L. sinense* has seven varieties in China:

1. *L. sinense* var. *luodianense* M. C. Chiang is native to Luodian County, Guizhou Province, and occurs with other shrubs on hillsides and riversides at elevations of 150-300 m[128].
2. *L. sinense* var. *coryanum* (W. W. Smith) Hand.-Mazz. is native

to eastern Yunnan Province and Jinshajiang valley areas of Sichuan Province and occurs in mountainous mixed forests, among hillside shrubs, in both dense or sparse forests, and at forest edges at elevations of 500-2,500 m [128].

3. L. sinense var. *rugosulum* (W. W. Smith) M. C. Chiang is native to Yunnan and southeastern Tibet and occurs in valleys, riversides, roadsides, sparse hillside forests, and thickets at elevations of 400-2,000 m [128].

4. L. sinense var. *opienense* Y. C. Yang is native to northwestern Guangxi, western and southern Guizhou, and southern and southeastern Sichuan and occurs in thickets, sparse forests, trenches, hillsides, roadsides, and dense forests of limestone mountains at elevations of 500-2,100 m [128].

5. L. sinense var. *myrianthum* (Diels) Höfk is native to Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, southern Shaanxi, Sichuan, and Yunnan and occurs in thickets or sparse forests, trenches, hillsides, roadsides, and dense forests at elevations of 130-2,700 m [128].

6. L. sinense var. *concavum* M. C. Chang is native to western Guangxi and eastern Yunnan and occurs in thickets, sparse or dense hillside forests, valleys, and streambanks[128].

7. L. sinense var. *dissimile* S. J. Hao is native to Guangxi, Guizhou, Yunnan and occurs in thickets on hillsides at elevations of 400–1,200 m[191].

Natural Enemies of *Ligustrum*

Eleven species of fungi are reported to damage members of the genus *Ligustrum*. Seven of them have been found on Chinese privet. Of the seven, *Meliola mayapeicola*, *Cercospora ligustri* and *Phyllosticta ligustri* appear to be host-specific to *L. sinense*, whereas the other four species can infect other *Ligustrum* species. Ninety-five species of arthropods in 39 families from seven orders are associated with members of the genus *Ligustrum*.

Fungi

Phylum	Family	Species	H. R.	Ref.
Ascomycota	Chaetothyriaceae	*Chaetothyrium javanicum* (Zimm.) Boedijn	po	23†
	Meliolaceae	*Meliola mayepeicola* F. Stevens	m	62
		Meliola osmanthi Syd. & P. Syd.	p	62
Basidiomycota	Incertae sedis	*Aecidium klugkistianum* Dietel	o	23
		Aecidium ligustricola Cummins	o	23
	Polyporaceae	*Trametes hirsuta* (Wulfen) Pilát	po	23
	Septobasidiaceae	*Septobasidium bogoriense* Pat.	po	23
Anamorphic *Guignardia*		*Phyllosticta ligustri* Sacc.	m	23
		Phyllosticta ligustrina Sacc. & Speg.	oo	23
Anamorphic *Mycosphaerella*		*Cercospora ligustri* Roum.	m	23
		Cercospora ligustricola T.L. Tai	o	23

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

Arthropods

Order	Family	Species	H. R.	Ref.
Acariformes	Eriophyidae	*Aculops longispinosus* Kuang et Hong	mo	85
		Aculus ligustri (Keifer)	mo	83
	Rhyncaphytoptidae	*Diptilomiopus camerae* Mohanasundaram	po	83
	Tetranychidae	*Brevipalpus obovatus* Donnadieu	po	85
Coleoptera	Anobiidae	*Anobium* sp.	mo	85
	Cerambycidae	*Batocera horsfieldi* (Hope)	po	9
			po	85
		Batocera lineolata Chevrolat	po	85
			po	140
		Eutetrapha sedecimpunctata (Motschulsk)	po	85
		Trichoferus campestris Faldermann	po	85
	Cetoniidae	*Clinteria ducalis* White	po	118
		Euselates pulchella (Gestro)	po	118
		Euselates quadrilineata (Hope)	po	118
		Oxycetonia bealiae (Gory et Percheron)	p	65
			po	118
			po	140
			po	158
		Protaetia fusca (Herbst)	po	118
		Taeniodera garnieri (Bourgoin)	po	118
		Thaumastopeus nigritus (Fröhlich)	po	118
	Chrysomelidae	*Argopistes hoenei* Maulik	mo	185
		Argopistes tsekooni Chen	po	185
		Linaeidea adamsi adamsi (Baly)	mo	85
	Curculionidae	*Dyscerus cribripennis* Matsumura et Kono	po	2
	Eumolpidae	*Platycorynus parryi* Baly	po	65
			po	85
			po	139
	Rutelidae	*Anomala corpulenta* Motschulsky	po	85
	Scolytidae	*Xyleborus rubricollis* (Eichhoff)	po	182
	Trichiidae	*Trichius dubernardi* Pouillaude	po	65
	Valgidae	*Dasyvalgus laliganti* (Fairmaire)	po	118
		Dasyvalgus sellatus (Kraatz)	po	118
		Hybovalgus bioculatus Kolbe	po	118
			po	140
		Hybovalgus thoracicus Moser	po	118
		Oreoderus crassipes Arrow	po	118
		Oreoderus momeitensis Arrow	po	118
Hemiptera	Pentatomidae	*Okeanos quelpartensis* Distant	o	65
		Poeciiocoris sanszesignatus Yang	po	192
Homoptera	Aleyrodidae	*Aleurocanthus spiniferus* (Quaintance)	po	85
		Dialeurodes citri (Ashmead)	po	85
	Aphrophoridae	*Aphrophora obliqua* Uhler	mo	65
	Cicadidae	*Cryptotympana atrata* (Fabricius)	po	85
			po	158
	Coccidae	*Ceroplastes ceriferus* (Anderson)	po	85
		Ceroplastes rubens Maskell	po	151
		Ericerus pela (Chavannes)	p	65
			oo	85
			po	151
			oo	158

	Diaspididae	*Chrysomphalus dictyospermi* (Morgan)	po	85
		Diaspidiotus perniciosus (Comst)	po	140
		Dynaspidiotus britannicus (Newstead)	po	85
			po	140
		Hemiberlesia lataniae (Signoret)	po	85
		Lepidosaphes tubulorum Ferris	po	85
		Parlatoria zizyphua (Lucas)	po	158
		Pseudaulacaspis pentagona (Targioni-Tozzetti)	po	85
	Fulgoridae	*Lycorma delicatula* (White)	po	140
			po	204
	Ricaniidae	*Ricania sublimbata* Jacobi	po	85
Isoptera	Termitidae	*Odontotermes formosanus* (Shiraki)	po	85
Lepidoptera	Arctiidae	*Callimorpha similis* (Moore)	po	40
			po	41
			po	141
		Lemyra phasma (Leech)	po	40[I]
			po	41
			po	65[I]
			po	141[I]
	Brahmaeidae	*Brahmaea certhia* Fabricius	mo	85
			p	85
		Brahmaea hearseyi (White)	po	65
		Brahmaea ledereri Rogenhofer	po	65
		Brahmaea porphyrio Chu et Wang	o	85
		Brahmophthalma hearseyi (White)	p	85
		Brahmophthalma wallichii (Grey)	o	85
	Ctenuchidae	*Amata* sp.	po	85
	Geometridae	*Acasis viretata* (Hübner)	po	177
		Ascotis selenaria dianaria Hübner	po	85
		Biston marginata Matsumura	po	85
		Garaeus parva distans Warren	p	85
			po	138
		Naxa seriaria (Motschulsky)	po	85
			po	138
		Problepsis superans (Butler)	mo	158
		Trichopteryx polycommata (Denis et Schiffermüller)	po	177
	Hesperiidae	*Pelopidas mathias* (Fabricius)	po	85
	Lycaenidae	*Artopoetes pryeri* (Murray)	po	203
	Lymantriidae	*Euproctis bipunctapex* (Hampson)	po	65
			po	85
			po	141
			po	158
			po	198
	Noctuidae	*Craniophora ligustri* (Schiffermüller)	po	12
			po	141
		Euplexia lucipara (Linnaeus)	po	85
			po	209
		Ischyja manlia Cramer	po	85
		Pangrapta obscurata (Butler)	mo	85

	Notodontidae	*Clostera anachoreta* (Fabricius)	mo	85[II]
	Nymphalidae	*Athyma ranga* Moore	po	203
	Papilionidae	*Papilio bianor* Sonan	po	85
	Psychidae	*Chalioides kondonis* Matsumura	po	85
		Clania minuscula Butler	po	85
		Clania variegata Snellen	po	85
	Pyralidae	*Diaphania nigropunctalis* (Bremer)	po	145
			po	158
		Plodia interpunctella Hübner	po	85
	Saturniidae	*Syntherata loepoides* Butler	po	207
	Sphingidae	*Acherontia lachesis* (Fabricius)	p	85
		Acherontia styx Westwood	p	85
		Amorpha amurensis (Staudinger)	po	85
		Dolbina tancrei Staudinger	po	65
			p	85
			po	206
			po	206
			po	208
		Herse convolvuli (Linnaeus)	mo	85
		Kentrochrysalis streckeri Staudinger	po	65
			po	85
			po	85
			po	206
			oo	206
			po	208
		Oxyambulyx schauffelbergeri (Bremer et Grey)	po	65
		Psilogramma increta (Walker)	po	65
			p	85
			po	206
			po	206
			po	208
		Psilogramma menephron (Cramer)	p	85
			po	85
			po	141
			po	206
			po	208
		Sphinx ligustri constricta Butler	po	206
	Tortricidae	*Homona magnanima* Diakonoff	po	65
			po	85
			po	158
		Lozotaenia forsterana (Fabricius)	po	113
		Pseudargyrotoza conwagana (Fabricius)	po	113
Orthoptera	Mecopodidae	*Mecopoda elongata* (Linnaeus)	mo	85

[I] Recorded as *Alphaea phasma* (Leech)

[II] Recorded as *Melalopha anachoreta* (Fabricius)

Lonicera spp.
Honeysuckle

Introduction
The genus *Lonicera* contains more than 200 species worldwide and is distributed in temperate and subtropical regions of North America, Europe, North Africa, and Asia. Most of the species are small trees or shrubs. Ninety-eight species of *Lonicera* are reported from China; it is distributed nationwide with considerable species diversity in southwestern China[176].

Species of *Lonicera* in China[24]
(NEXT PAGE)

I. ***Lonicera fragrantissima***
fragrant honeysuckle

Taxonomy
Family: Caprifoliaceae
Genus: *Lonicera* L.

Description
Lonicera fragrantissima is a sub-evergreen or deciduous shrub that can grow 2 m tall. The leaves may be thick and papery or somewhat leathery, with noticeable variations in shape, ranging from obovate to elliptic, ovate, or oblong. Leaf length is 3-7 cm, with a tapered or retuse apex and a round or broadly cuneate base. Flowers with red to light-red labiate corolla are produced in the axils of young shoots appearing from mid-February to April. The oblong, showy, red fruits are about 1 cm long and appear from late April to May. The rough brown seeds are oblong and about 3.5 mm in length[176].

Growth habit of *Lonicera japonica*.

Habitat
L. fragrantissima occurs in scrub land at elevations of 200 –700 m[176].

Distribution
L. fragrantissima is indigenous to Anhui, Henan, Hubei, Jiangxi, Shanxi, and Zhejiang provinces[176], and is also cultivated in some cities, including Shanghai, Hangzhou in Zhejiang, Wuhan in Hubei, and Taian in Shandong[8].

Economic Importance
Honeysuckle is cultivated in private gardens and in cities as an ornamental because of its large, fragrant flowers and brilliant red fruits[71].

Related Species
There are two subspecies of *Lonicera fragrantissima* in China. *Lonicera fragrantissima* subsp. *standishii* (Carr.) Hsu et H.J. Wang occurs on sunny forested slopes and along ravines, in Anhui, Gansu, Guizhou, Henan, Hubei, Hunan, Jiangxi, Shaanxi, Sichuan, and Zhejiang provinces (at elevations of 100–2,000 m). The other subspecies, *L. fragrantissima* subsp. *phyllocarpa* (Maxim.) Hsu et H. J. Wang, grows on slopes, in valleys, and in riparian areas, in Anhui, Hebei, Henan, Jiangsu, Shaanxi, and Shanxi provinces (at elevations of 480–2,000 m) [176].

II. ***Lonicera japonica***
Japanese honeysuckle

Taxonomy
Family: Caprifoliaceae
Genus: *Lonicera* L.

Description
Lonicera japonica is a semi-evergreen vine with pubescent stems. The papery leaves are 3-5 cm long and covered with coarse hairs. The leaf blades are ovate, with rounded or subcordate bases, apices are acute or acuminate, and slightly notched. A distinguishing feature separating *L. japonica* from

Leaves and flowers of *Lonicera japonica*.

related species is the upper leaf surface, which is greener than the underside. Growing in the leaf axils, the pubescent flowers, appearing from April to June, have conspicuous leaf-like bracts and white corollas, and appearing from April to June. The peduncle and leaf petiole are similar in size. The shiny, dark blue fruits are round, 6-7 mm in diameter, and mature from October to November[176].

Habitat

Lonicera japonica occurs among shrubs, along slopes, roadsides, in sparse forests, hedges, and on gravel banks at elevations up to 1500 m[176].

Distribution

L. japonica is distributed nationwide in China: however, it is not native to Hainan, Heilongjiang, Inner Mongolia, Ningxia, Qinghai, Xinjiang, or Tibet[176].

Economic Importance

Extracts of chlorogenic acid and isochlorogenic acid are used medicinally in China [176].

Related Species

Lonicera japonica var. *chinensis* (Wats.) Bak. occurs in Anhui at elevations of up to 800 m. It is also cultivated in Jiangsu, Jiangxi, Yunnan, and Zhejiang[176].

III. ***Lonicera maackii***
Amur honeysuckle

Taxonomy

Family: Caprifoliaceae
Genus: *Lonicera* L.

Description

Lonicera maackii (Rupr.) Maxim is a deciduous shrub that can reach a height of 6 m and a stem diameter of 10 cm. The entire plant is covered with glandular hairs. Winter buds are small, ovoid, and covered with more than five pairs of scales. Papery leaves are ovate-elliptic to ovate-lanceolate, 5-8 cm long with acuminate to narrowly acuminate apices and a rounded or wedge-shaped leaf bases. The petiole is 2-5 mm cm long and is longer than the 1-2 mm long peduncle. White to yellow, fragrant, axillary flowers with labiate corollas and a linear to lanceolate bracts appear from May to June. Fruits are globular, dark-red, 5-6 mm in diameter, and mature from August to October[176].

Habitat

L. maackii occurs in riparian areas at the edge of forests at elevations of 1,800 m (3,000 m in some areas of Yunnan and Tibet)[176].

Distribution

L. maackii is distributed throughout

Fruits of *Lonicera maackii*..

Anhui, Gansu, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi[84], Jilin, Liaoning, Ningxia[116], Shaanxi, Shandong, Shanxi, Sichuan, Yunnan, and Zhejiang[176], and recorded as *L. maackii podocarpa* Franch. ex Rehd in Tibet.

Economic Importance

Essential oil of honeysuckle is extracted from the flower of Amur honeysuckle. The stem is a source of artificial cotton[176].

Related Species

One variety of Amur honeysuckle, *L. maackii* var. *erubescens* Rhed., grows on hillside slopes in Anhui, Gansu, Jiangsu, and Henan[176].

IV. ***Lonicera tatarica***

Tartarian honeysuckle

Taxonomy

Family: Caprifoliaceae
Genus: *Lonicera* L.

Description

Lonicera tatarica is a deciduous shrub that grows 3 m in height. The whole plant is nearly glabrous. The winter buds have approximately four pairs of scales. Leaves are papery, ovate, oblong or ovate-oblong, 2-5 cm in length, with a tapering apices and rounded to subcordate bases. Leaf margins are covered with coarse hairs. Flowers are produced from May to June. Bracts are linear lanceolate or linear oblanceolate, equal to or longer than the length of the calyx tube. Corollas are pink or white, 1.5 cm long, and labiate. Fruits are red, globular, 5-6 mm in diameter and mature from July to August[176].

Colorful flowers of *Lonicera tatarica*.

Habitat

L. tatarica occurs on rocky slopes, forest edges, and scrubland in ravines at elevations of 900–1,600 m.

Distribution

Lonicera tatarica is native to northern Xinjiang. It is cultivated in Hebei[18], Heilongjiang, Liaoning[176], and Shanxi .

Related Species

L. tatarica L. var. *micrantha* Trautv. occurs in Xinjiang, on riverbanks at 700-800 m elevation[176].

Natural Enemies of *Lonicera*

Twenty-one fungi have been reported to damage *Lonicera*. Six species are found on *L. japonica*; four on *Lonicera maackii*, and one on fragrant honeysuckle. *Microsphaera lonicerae* can damage both Japanese and fragrant honeysuckle. *Puccinia festucae* Plowright is found on both Japanese and amur honeysuckle. Forty-four arthropod species have been found on *Lonicera* spp., of which 23 species attack Japanese honeysuckle and four damage amur honeysuckle. Approximately 20 insect species have a narrow H. R. within the genus *Lonicera*.

Species of *Lonicera* in China[24]

Scientific Name	Scientific Name	Scientific Name
L. acuminata Wall.	*L. nervosa* Maxim.	*L. altmannii* Regel et Schmalh.
L. nigra L.	*L. angustilfolia* Wall. ex DC.	*L. nubium* (Hand.-Mazz.) Hand.-Mazz.
L. anisocalyx Rehd.	*L. oreodoxa* H. Smith ex Rehd.	*L. bourtnei* Hemsl.
L. pampaninii Lévl.	*L. brevisepala* Hsu et H. J. Wang	*L. pileata* Oliv.
L. buchananii Lace	*L. praeflorens* Batal.	*L. buddleioides* Hsu et S. C. Cheng
L. prostrata Rehd.	*L. caerulea* L.	*L. retusa* Franch.
L. calcarata Hemsl.	*L. rhytidophylla* Hand.-Mazz.	*L. calvescens* (Chun et How) Hsu et H. J. Wang
L. rupicola Hook. f. et Thoms.	*L. carnosifolia* C. Y. Wu ex Hsu et H. J. Wang	*L. ruprechtiana* Regel
L. chrysantha Turcz.	*L. semenovii* Regel	*L. ciliosissima* C. Y. Wu ex Hsu et H. J. Wang
L. sempervirens L.	*L. cinerea* Pojark.	*L. setifera* Franch.
L. confusa (Sweet) DC.	*L. similis* Hemsl.	*L. crassifolia* Batal.
L. stephanocarpa Franch.	*L. cyanocarpa* Franch.	*L. subaequalis* Rehd.
L. dasystyla Rehd.	*L. subhispida* Nakai	*L. elisae* Franch.
L. sublabiata Hsu et H. J. Wang	*L. fargesii* Franch.	***L. tatarica*** L.
L. ferdinandii Franch.	*L. tatarinowii* Maxim.	*L. ferruginea* Rehd.
L. tragophylla Hemsl.	*L. fragilis* Lévl.	*L. trichosantha* Bur. et Franch.
L. fragrantissima Lindl. et Paxt.	*L. trichosepala* (Rehd.) Hsu	*L. fulvotomentösa* Hsu et S.C. Cheng
L. tubliflora Rehd.	*L. graebneri* Rehd.	*L. virgultorum* W. W. Smith
L. gynochlamydea Hemsl.	*L. yunnanensis* Franch.	*L. hildebrandiana* Coil. et Hemsl.
L. alberti Regel	*L. hispida* Pall. ex Roem. et Schult.	*L. codonantha* Rehd.
L. humilis Kar. et Kir.	*L. hemsleyana* (O. Ktze.) Rehd.	*L. hypoglauca* Miq.
L. heterophylla Decne.	*L. hypoleuca* Decne.	*L. jilongensis* Hsu et H.J. Wang
L. inconspicua Batal.	*L. litangensis* Batal.	*L. inodora* W. W. Smith
L. minuta Batal.	***L. japonica*** Thunb.	*L. minutifolia* Kitam.
L. kansuensis (Batal. ex Rehd.) Pojark.	*L. modesta* Rehd.	*L. kawakamii* (Hayata) Masam.
L. oblata Hao ex Hsu et H.J. Wang	*L. lanceolata* Wall.	*L. oiwakensis* Hayata
L. ligustrina Wall.	*L. saccata* Rehd.	*L. longilflora* (Lindl.) DC.
L. schneideriana Rehd.	*L. longituba* H. T. Chang ex Hsu et H. J. Wang	*L. serreana* Hand.-Mazz.
L. maackii (Rupr.) Maxim.	*L. spinosa* Jacq. ex Walp.	*L. macrantha* (D. Don) Spreng.
L. szechuanica Batal.	*L. macranthoides* Hand.-Mazz.	*L. alpeiensis* Hsu et H.J.Wang
L. maximowiczii (Rupr.) Regel	*L. tangutica* Maxlm.	*L. microphylla* Wllld. ex Roem. et Schult.
L. tomentella Hook.f. et Thoms.	*L. mucronata* Rehd.	*L. trichogyne* Rehd.
L. myrtilllus Hook. f. et Thoms.	*L. webbiana* Wall. ex DC.	

Fungi

Phylum	Family	Species	H. R.	Ref.
Ascomycota	Erysiphaceae	*Microsphaera dipeltae* Y.N. Yu & Y.Q. Lai	oo	22
		Microsphaera erlangshanensis Y.N. Yu	mo	22
		Microsphaera lonicerae (DC.) G. Winter	o*‡	22
		Microsphaera vanbruntiana W.R. Gerard	po	22
	Meliolaceae	*Asteridiella lonicerae* (W. Yamam.) Hosag.	o*	62
			oo	23[I]
	Phyllachoraceae	*Phyllachora xylostei* (Fr.) Fuckel	mo	23
	Rhytismataceae	*Rhytisma lonicericola* Henn.	o†	23
Basidiomycota	Hymenochaetaceae	*Phellinus setulosus* (Lloyd) Imazeki	po	23
	Polyporaceae	*Fomes calcitratus* (Berk. & M.A. Curtis) Cooke	oo	23
	Pucciniaceae	*Puccinia festucae* Plowr.	*	22
			p*†	23
		Puccinia longirostris Kom.	oo	23
Anamorphic Ascomycetes		*Rhabdospora decipiens* (Berk. & M.A. Curtis) Sacc.	mo	23
Anamorphic *Discosphaerina*		*Kabatia latemarensis* Bubák	oo	23
Anamorphic *Guignardia*		*Phyllosticta caprifolii* (Opiz) Sacc.	mo	23
Anamorphic *Lophodermium*		*Leptostroma lonicericola* Rabenh.	oo	23[II]
Anamorphic *Mycosphaerella*		*Cercospora lonicericola* W. Yamam.	m*	23
		Cercospora periclymeni G. Winter	o*	23
		Septoria lonicerae-maackii Miura	m†	23
Anamorphic Mycosphaerellaceae		*Ascochyta tenerrima* Sacc. & Roum.	m*	23
Anamorphic *Rhytisma*		*Melasmia lonicerae* Jacz.	o†	23

* attacks *Lonicera japonica*
† attacks *Lonicera maackii*
‡ attacks *Lonicera tartarica*
[I] Recorded as *Irenina lonicerae* Yamam
[II] Recorded as *Leptostroma lonicericolum* Rabenh.

Arthropods

Order	Family	Species	H. R.	Ref.
Acariformes	Rhyncaphytoptidae	*Rhyncaphytoptus lonicerae* Kuang et Zhuo	m†	83
Coleoptera	Cerambycidae	*Asias halodendri* (Pallas)	p*	65
		Xylotrechus grayii (White)	m*	85
			p*	140
	Chrysomelidae	*Liroetis loniceris* Jiang	oo	140
		Pseudoliroetis fulvipennis (Jacoby)	p*	85
		Trachyaphthona obscura (Jacoby)	oo	140
			oo	158
			oo	185
		Zangia signata Jiang	po	140
Hemiptera	Acanthosomatidae	*Platacantha forfex* (Dallas)	po	193
	Pentatomidae	*Piezodorus lituratus* (Fabricius)	p*	193

Homoptera	Aphididae	*Amphicercidus sinilonicericola* Zhang	m*	85
			m*	189
		Microlophium carnosa (Buckton)	po	140
		Neorhopalomyzus lonicericola (Takahashi)	m*	158
		Neotoxoptera oliveri (Essig)	m*	100
		Semiaphis heraclei (Takahashi)	p†	100
			p†*	158
			p†*	189
		Trichosiphonaphis lonicerae (Uye)	o†*	65
			oo	85
			m†	100
		Tuberocephalus sp.	m*	85
	Membracidae	*Telingana scutellata* China	po	140
	Pemphigidae	*Prociphilus ligustrifoliae* (Tseng et Tao)	mo	189
Hymenoptera	Argidae	*Arge similis* (Vollenhoven)	p*	65
Lepidoptera	Arctiidae	*Hyphantria cunea* (Drury)	p†	41
		Pericallia matronula (Linnaeus)	p*	40
			p*	41
	Geometridae	*Angerona glandinaria* Motschulsky	po	138
		Ourapteryx sambucaria Linnaeus	p*	138
		Somatina indicataria Walker	m*	85
			p*	138
		Trichopteryx polycommata (Denis et Schiffermüller)	p*	177
	Lymantriidae	*Porthesia similis* (Fueszly)	p*	65
			p*	198
	Noctuidae	*Conistra ligula* (Esper)	po	12
		Crino satura (Schiffermüller)	po	209
		Polia thalathina (Rottemberg)	po	12
	Nymphalidae	*Limenitis camilla* (Linnaeus)	p*	203
		Limenitis moltrechti Kardakoff	p*	203
		Limenitis sulpitia (Cramer)	p*	158
			po	203
		Parasarpa dudu (Westwood)	p*	203
			po	203
	Saturniidae	*Antheraea yamamai* Guerin-Meneville	po	207
	Sphingidae	*Haemorrhagia staudingeri staudingeri* (Leech)	p*	65
			m*	206
			m*	206
			m*	208
	Tortricidae	*Adoxophyes orana* Fischer von Röslerstamm	p*	65
			p*	113
		Archips xylosteana (Linnaeus)	p*	113
		Choristoneura diversana (Hübner)	p*	113
		Clepsis rurinana (Linnaeus)	p*	65
		Clepsis semialbana (Guenée)	p*	113
		Lozotaenia forsterana (Fabricius)	p*	113
		Pandemis dumetana Treitshke	po	141
Thysanoptera	Thripidae	*Frankliniella intonsa* (Trybom)	po	56

* attacks *Lonicera japonica*
† attacks *Lonicera maackii*

Lotus corniculatus

Bird's foot trefoil

Lotus corniculatus.

Introduction

The genus *Lotus* contains approximately 100 species, distributed in the Mediterranean area, Eurasia, America, and temperate Australia. Eight species and one variety have been reported in China, primarily in the northwestern areas[154].

Species of *Lotus* in China†

Scientific Name	Scientific Name
L. alpinus (Ser.) Schleich. ex Ramond	*L. frondosus* (Freyn) Kupr.
L. angustissimus L.	*L. praetermissus* Kupr.
L. australis Andr.	*L. tenuis* Waldst. et Kit. ex Willd.
L. corniculatus L.	*L. tetragonolobus* L.

† variety not listed

Taxonomy

Family: Leguminoseae (Fabaceae)
Genus: *Lotus* L.

Description

Lotus corniculatus is a glabrous to sparsely pubescent perennial herb that grows 15-50 cm tall. Stems are nearly square, solid, and occur in clumps with a prostrate or ascending growth form. Leaves are pentafoliate on the 4-8 mm long, hair-covered rachis. The petiolule is short and yellow villous. The leaflets are papery, asymmetrical to oblanceolately ovate, 5-15 cm long and 4-8 mm wide, with the basal pair resembling stipules. From May to September, three to seven flowers grow in an axillary umbel with three leafy bracts. The glabrous or sparsely pubescent calyx is bell-shaped, 5-7 mm long and 2-3 mm wide, and lobed deeply to a length equal to the tube. Corollas are yellow or gold colored, turning blue when dried. Pods are brown, linear to cylindrical, 20-25 mm long and 2-4 mm in diameter, containing many grayish-brown ovate seeds 1 mm long. The "bird's foot" like fruits appear from July to October[70][154].

Habitat

Lotus corniculatus prefers to grow in warm, moist places. Due to its extensive root system, it is drought-tolerant. It tends to grow in well-drained sandy soil and is intolerant of prolonged periods of water logging. It occurs on hillsides, in grasslands, in crop fields, and on riverbanks, where the soil is moist and alkaline[154]. In China, the most favorable habitat for *L. corniculatus*

Flowers of *Lotus corniculatus*.

is in Weining, Guizhou province, at an elevation of about 2500 m, where the plant grows well and the seeds mature naturally[32].

Distribution

Lotus corniculatus is distributed in Guangxi[50], Guizhou[32][74], Gansu[70][74], Henan[25], Hubei[46], Hunan[126], Shaanxi[70][74], Sichuan[70][74], Tibet[160], Xinjiang[174], and Yunnan[164] provinces and other areas along the middle and upper Yellow River[154].

Economic Importance

L. corniculatus is used as forage and green manure because of its high carbohydrate and moisture content[96][154].

Related Species

One variety of *Lotus corniculatus*, *Lotus corniculatus* var. *japonicus* Regel, has been reported to occur in China. It is glabrescent, and has fewer flowers than *L. corniculatus*, with sepals slightly longer than or equal to the calyx tube[154].

Another common *Lotus* species that has caused serious harm in China is *L. tenuis*. It occurs in grasslands, near ponds, in crop fields, and wasteland, and is distributed in Gansu, Guizhou, Shaanxi, Shanxi, and Xinjiang[96][154].

Natural enemies of *Lotus*

Lotus corniculatus has only one fungal associate, *Erysiphe betae*. This fungus can also infect members of the genus *Polygonum*. Seven species of arthropods are reported to occur on *Lotus* including one bug and six lepidopterans. Four of them can live on *L. corniculatus*.

Fungi

Phylum	Family	Species	H. R.	Ref.
Ascomycota	Erysiphaceae	*Erysiphe betae* (Vaňha) Weltzien	p	23†

† Recorded as *Erysiphe polygoni* DC.

Arthropods

Order	Family	Species	H. R.	Ref.
Hemiptera	Plataspidae	*Coptosoma scutellatum* (Geoffrey)	po	193
Lepidoptera	Lycaenidae	*Everes argiades* (Pallas)	p	203
		Zizina otis riukuensis (Matsumura)	po	203
	Pieridae	*Colias erate* (Esper)	p	158
		Colias erate formosana Shirôzu	po	203
	Pyralidae	*Nephopteryx semirubella* Scopoli	p	145
		Salebria semitrubella (Scopoli)	p	158

Lythrum spp.
loosestrife

Introduction
The genus *Lythrum* has a worldwide distribution. It is comprised of 35 species; four are reported to occur in China[92].

Species of *Lythrum* in China

Scientific Name
Lythrum anceps (Koehne) Mak.
Lythrum intermedium Ledeb.
Lythrum salicaria L.
Lythrum virgatum L.

Flowers of Lythrum salicaria.

I. ***Lythrum salicaria***
Purple loosestrife

Taxonomy
Family: Lythraceae
Genus: *Lythrum* L.

Description
Lythrum salicaria is a perennial with creeping rhizomes. Stems are erect, nearly square, 30-100 cm tall, and coated by downy pubescence. Growing in opposite arrangement or in whorls of three, the sessile leaves are lanceolate or broadly lanceolate, 4-6 cm long and 8-15 mm wide, entire-edged, acuminate apically, and orbicular, cordate, or clasping at the bases. The sessile, six-petaled magenta flowers form dense, compound, terminal, interrupted spikes. The hairy calyx is tubular, 4-6 mm long, six-lobed, with twelve thin vertical ridges on the outer surface. Fruits are oblate capsules appearing July through September. [74][92].

Lythrum salicaria growth habit.

Habitat
L. salicaria occurs along river banks, lakes, ditches, and moist grasslands[92].

Distribution
L. salicaria has a nationwide distribution in China[92] except for Hainan, Qinghai, Taiwan, Tibet, and Yunnan.

Economic Importance
Purple loosestrife grows near rivers and may be planted as an ornamental. Medically, it has a variety of uses [92].

II. ***Lythrum virgatum***
European wand loosestrife

Taxonomy
Family: Lythraceae
Genus: *Lythrum* L.

Description
Lythrum virgatum, is a perennial subshrub that can reach 50 to 100 cm in height. It can be distinguished from *L. salicaria* by the glabrous stem, cuneate leaf base,

and denticulate leaf margin. Leaves are opposite, but sometimes alternate on the upper part of the stem. The cyme inflorescence consists of two or three flowers and appears from April to August. Cylindrical capsules are 4-5 mm in length and appear from July to September[92].

Habitat and Distribution

Lythrum virgatum occurs naturally in wetlands near rivers, swamps, pools, reservoirs, and riverbanks in northern Xinjiang[92][175] and is reported to grow in Hebei [92].

Economic Importance

Lythrum virgatum is often cultivated as an ornamental.

Related Species

Similar to *Lythrum salicaria*, *L. intermedium* Ledeb. ex. Colla is a perennial that flowers in July through September and fruits in October. A distinguishing characteristic is the glabrous surface, and hairs only at the edges of leaves and bracts. It occurs in moist grasslands and is distributed in Hebei, Heilongjiang, Liaoning, and Shandong[92].

Natural Enemies of *Lythrum*

No fungi have been reported to occur on the genus *Lythrum* in China. Only two insects are recorded for *L. salicaria*.

Arthropods

Order	Family	Species	H. R.	Ref.
Lepidoptera	Pyralidae	*Cryptoblabes gnidiella* (Millière)	po	145
	Sphingidae	*Pergesa elpenor lewisi* (Butler)	p	65
			p	141
			p	158
			p	206
			po	208

Microstegium vimineum

Japanese stiltgrass

Microstegium vimineum.

Introduction

The genus *Microstegium* contains approximately 40 species worldwide, with 16 species reported from China.

Species of *Microstegium* in China

Scientific Name	Scientific Name
M. biaristatum (Steud.) Keng	*M. japonicum* (Miq.) Koidz.
M. biforme Keng	*M. monanthum* (Nees ex Steud.) A. Camus
M. ciliatum (Trin.) A. Camus	*M. nodosum* (Kom.) Tzvel.
M. delicatulum (Hook. f.) A. Camus	*M. nudum* (Trin.) A. Camus
M. dilatatum Koidz.	*M. somai* (Hayata) Ohwi
M. fauriei (Hayata) Honda	*M. vagans* (Nees ex Steud.) A. Camus
M. geniculatum (Hayata) Honda	***M. vimineum* (Trin.) A. Camus**
M. glaberrimum (Honda) Koidz.	*M. yunnanense* R. J. Yang

Taxonomy

Family: Gramineae (Poaceae)
Genus: *Microstegium* Nees

Description

Microstegium vimineum is an annual, with prostrate stems, and many branches that can reach a height of 1 m. *M. vimineum* spreads by rooting at nodes along the stem, with new plants emerging from each node. The sheath is glabrous and shorter than the internode. The ligule is truncate-shaped, 0.5 mm long, and covered with hairs on the underside. Leaves have a white midrib and are 4-8 cm long and 5-8 mm wide, coarse-margined, acuminate apically, and somewhat cuneate at the bases. The inflorescence is a raceme consisting of two to six spikelets, 5 cm long, and growing in a finger-like arrangement along the flat rachis. The sessile spikelets are glabrous, and 4-4.5 mm in length. The anther is about 1 mm long. The length of the anther and the awnless spikelets distinguish *M. vimineum* from *M. nodosum* (Kom.) Tzvel. Fruits are oblong caryopses, 2.5 mm in length[136]. The flowers and fruits appear from August to November.

Habitat

M. vimineum occurs in moist, shady areas, such as forest edges, moist grasslands, open fields, wetlands, margins of crop field, ditch banks, hedges, and ravines. It occasionally occurs in gardens and crop fields[34][69][96][136].

Distribution

M. vimineum occurs in Anhui[84], Fujian, Guangdong, Guangxi, Guizhou, Henan, Hubei[201], Hunan, Jiangsu[80], Jiangxi, Sichuan, Shandong[7], Taiwan, Yunnan, and Zhejiang[102] provinces [136].

Economic Importance

M. vimineum is grown as a forage plant and is used in papermaking[49][136].

Related Species

Microstegium nodosum (Kom.) Tzvel, is a forage plant similar to *M. vimineum*, occurs in forests, on riverbanks, and along roads and ditches, at elevations of

Leaves and stem of *Microstegium vimineum*.

400 - 1,200 m. It occurs in Guangdong, Jiangsu, Jinlin, Shaanxi, Shanxi, Sichuan, and Yunnan provinces.[136]

Natural Enemies of *Microstegium*

Twelve species of fungi and eight arthropod species are reported for the genus *Microstegium*.

Fungi

Phylum	Family	Species	H. R.	Ref.
Ascomycota	Clavicipitaceae	*Balansia andropogonis* Syd. & E.J. Butler	po	23
	Meliolaceae	*Meliola setariae* Hansf. & Deighton	po	62
	Phyllachoraceae	*Phyllachora leptotheca* Theiss. & Syd.	oo	23
		Phyllachora ischaemi Syd. & P. Syd.	mo	23†
Basidiomycota	Phakopsoraceae	*Phakopsora incompleta* (Syd. & P. Syd.) Cummins	p	23
Basidiomycota	Pucciniaceae	*Puccinia aestivalis* Dietel	po	149
		Puccinia benguetensis Syd.	o	149
		Puccinia polliniae Barclay	p	23
			po	149
		Puccinia polliniae-imberbis (Ito) Hirats. f.	o	23
		Puccinia polliniicola Syd.	o	23
			oo	149
Anamorphic Ascomycetes		*Cerebella paspali* Cooke & Massee	po	23
		Ustilaginoidea polliniae Teng	mo	23

† Recorded as *Phyllachora microstegii* Saw.

Arthropods

Order	Family	Species	H. R.	Ref.
Homoptera	Aphididae	*Semiaphis montana* van der Goot	po	189
Lepidoptera	Satyridae	*Lethe confusa* (Aurivillius)	po	203
		Lethe europa Fabricius	po	203
		Melanitis phedima Cramer	po	203
		Mycalesis mineus (Linnaeus)	po	158
			po	203
		Ypthima balda (Fabricius)	po	203
		Ypthima balda zodina Fruhstorfer	po	203
		Ypthima baldus (Fabricius)†	po	158

† possible synonym of *Ypthima balda* (Fabricius)

Morus alba
White mulberry

Morus alba leaves and immature fruit.

Introduction
The genus *Morus* contains approximately 16 members, occurring primarily in northern temperate regions with some extending into tropical areas of Africa and the South American Andes. There are 11 species distributed widely in China [194].

Species of *Morus* in China

Scientific Name	Scientific Name
M. alba L.	*M. nigra* L.
M. australis Poir.	*M. notabilis* Schneid.
M. cathayana Hemsl.	*M. serrata* Roxb.
M. liboensis S. S. Chang	*M. trilobata* (S. S. Chang) Cao
M. macroura Miq.	*M. wittiorum* Hand.-Mazz.
M. mongolica (Bur.) Schneid.	

Taxonomy
Family: Moraceae
Genus: *Morus* L.

Description
Morus alba is woody tree or shrub that can reach 3-10 m in height and 0.5 m in diameter. The bark is gray, thick, with many irregular longitudinal cracks. The ovate winter buds are reddish brown, bearing grayish brown, imbricate bud scales that are coated with hairs resembling those on the twig surface. Ovate or broad ovate, 5-15 cm long and 5-12 cm wide , the leaves are sparsely pubescent along the lower surface veins, with serrate margins, acuminate apices, abruptly acute or obtuse, and rounded or subcordate bases. Pubescent, green unisexual flowers emerge with leaves in April to May, blooming axillarily. Deep purple to red subovate, syncarpous fruits develop from May to August[194].

Habitat and Distribution
Morus alba is native to central and northern China, and is now cultivated nationwide. It also occurs naturally in sparse forests on hillsides at a wide range of elevation. Due to its long history of cultivation, the species has many varieties [68][194].

Economic Importance
Mulberry leaves are well-known as food for silkworms, the silk-producing larvae of the silkworm moth, *Bombyx mori* L. Other plant parts are used in making textiles, paper, pesticides, furniture, musical instruments, sculptures, medicines[194].

Related Species
Morus alba var. *multicasulis* (Perrott.) Loud. has larger, thicker, wrinkled leaves about 30 cm in length. The syncarp is greenish white to purple when mature. It is cultivated in Jiangsu, Shaanxi, Sichuan, and Zhejiang [194].

Natural Enemies of *Morus*
At least 61 species of fungi are reported to infect members of the genus *Morus*. Fifty-four of them infect white mulberry. At least 263 species of arthropods belonging to 56 families and seven orders, have been reported to occur on white mulberry.

Fungi

Phylum	Family	Species	H. R.	Ref.
Ascomycota	Botryosphaeriaceae	*Botryosphaeria rhodina* (Berk. & M.A. Curtis) Arx	p	23[I]
	Dothioraceae	*Pringsheimia mori* Hara	m	23
	Erysiphaceae	*Phyllactinia moricola* (Henn.) Homma	p	22
			p	23
			p	23
		Phyllactinia pyri (Castagne) Homma	po	22
		Uncinula mori I. Miyake	o	22
			m	23
	Helotiaceae	*Mitrula shiraiana* (P. Henn.) Ito & Imai	m	23
	Massariaceae	*Massaria moricola* Miyake	m	23
		Massaria phorcioides Miyake	m	23
	Meliolaceae	*Armillaria mellea* (Vahl) P. Kumm	p	23
	Mycosphaerellaceae	*Mycosphaerella mori* (Fuckel) F.A. Wolf	m	23[II]
			p	23[III]
	Nectriaceae	*Gibberella baccata* (Wallr.) Sacc.	oo	23
			o	23[IV]
	Phyllachoraceae	*Phyllachora moricola* (P Henn.) Saw	mo	23
	Pleosporaceae	*Pleospora tarda* E.G. Simmons	p	23[V]
		Botryotinia moricola (I. Hino) W. Yamam.	mo	23[VI]
	Sclerotiniaceae	*Ciboria carunculoides* (Siegler & Jenkins) Whetzel	m	21[1]
		Ciboria shiraiana (Henn.) Whetzel	m	21[1]
		Sclerotinia sclerotiorum (Lib.) de Bary	p	23
	Tubeufiaceae	*Ophiochaeta moricola* (Berl.) Sawada	m	23
	Valsaceae	*Valsa sordida* Nitschke	p	23
	Xylariaceae	*Rosellinia necatrix* Berl. ex Prill.	oo	23
Basidiomycota	Atheliaceae	*Athelia rolfsii* (Curzi) C.C. Tu & Kimbr.	p	23[VII]
	Ceratobasidiaceae	*Thanatephorus cucumeris* (A.B. Frank) Donk	p	23[VIII]
	Corticiaceae	*Corticium salmonicolor* Berk. & Broome	po	23
	Hymenochaetaceae	*Inonotus rheades* (Pers.) Bondartsev & Singer	po	23
		Xanthochrous hispidus (Bull.) Pat.	p	23
	Incertae sedis	*Aecidium mori* Barclay	p	23
		Uredo morifolia Saw.	o	23
	Phakopsoraceae	*Phakopsora fici-erectae* S. Ito & Y. Otani ex S. Ito & Muray.	p	23
	Platygloeaceae	*Helicobasidium mompa* Tanaka	p	23
		Septobasidium tanakae (Miyabe) Boedijn & B.A. Steinm.	p	23
	Polyporaceae	*Fomes fomentarius* (L.) J.J. Kickx	po	23
		Poria moricola L. Ling	m	23
	Septobasidiaceae	*Septobasidium bogoriense* Pat.	p	23

Plasmodiophoromycota	Plasmodiophoraceae	*Plasmodiophora mori* Yenda	oo	23
Anamorphic Ascomycetes		*Aplosporella longipes* Ellis & Barthol.	m	23[IX]
		Aplosporella minor Ellis & Barthol.	m	23[X]
		Clasterosporium mori Syd. & P. Syd.	o	23
		Myxosporella miniata Sacc.	p	23
		Nothopatella chinensis Miyake	p	23
		Rhabdospora curvula Berl.	m	23
Anamorphic *Botryosphaeria*		*Diplodia mori* Westend.	m	23
		Diplodia moricola Cooke & Ellis	m	23
		Diplodia morina Syd. & P. Syd.	oo	23
Anamorphic *Botryotinia*		*Botrytis cinerea* Pers.	p	23
Anamorphic *Diaporthe*		*Phomopsis orientalis* Nom.	o	23
Anamorphic *Gibberella*		*Fusarium lateritium* var. *mori* Desm.	m	23
Anamorphic *Glomerella*		*Colletotrichum morifolium* Hara	m	23
Anamorphic *Guignardia*		*Phyllosticta kuwacola* Hara	m	23
Anamorphic *Leptosphaeria*		*Coniothyrium fuscidulum* Sacc.	m	23
		Phoma morearum Brunaud	m	23
		Phoma morifolia Berl.	m	23
Anamorphic *Melanochaeta*		*Sporoschisma mori* Sawada & Katsuki	m	23
Anamorphic *Mycosphaerella*		*Cercospora missouriensis* Wint.	o	23
		Cercospora moricola Cooke	o	23
		Cercospora snelliana Reichert	oo	23
		Hormodendrum mori Yendo	m	23
		Pseudocercospora mori (Hara) Deighton	o	23[XI]
			o	110
		Septoria kuwacola Yendo	m	23
Anamorphic Mycosphaerellaceae		*Ascochyta moricola* Berl.	m	23
		Ascochyta morifolia Sawada	m	23
Anamorphic *Phyllactinia*		*Ovulariopsis moricola* Delacr.	m	23

[I] Recorded as *Diplodia natalensis* Evans
[II] Recorded as *Mycosphaerella morifolia* Pass.
[III] Recorded as *Septogloeum mori* Briosi et Cav.
[IV] Recorded as *Gibberella baccata* (Wallr.) Sacc. var. moricola (de Not.) Wollenw.
[V] Recorded as *Stemphylium botryosum* Wallr.
[VI] Recorded as *Sclerotinia moricola* Hino
[VII] Recorded as *Corticium centrifugum* (Lév.) Bres.
[VIII] Recorded as *Corticium sasakii* (Shirai) Matsum.
[IX] Recorded as *Haplosporella longipes* Ell. et Barth.
[X] Recorded as *Haplosporella minor* Ell. et Barth.
[XI] Recorded as *Cercospora mori* Hara

Arthropods

Order	Family	Species	H. R.	Ref.
Acariformes	Eriophyidae Tarsoneomidae	*Aculus meliae* Kuang et Zhuo	p	83
		Leipothrix bombycis Huang	m	83
		Panonychus citri (McGregor)	p	85
		Panonychus ulmi (Koch)	p	85
		Polyphagotarsonemus latus (Bank)	p	85
	Tetranychidae	*Brevipalpus obovatus* Donnadieu	p	85
		Eotetranychus smithi Pritchard et Baker	p	143
		Eotetranychus suginamensis (Yokoyama)	p	143
		Petrobia latens (Müller)	p	85
			p	143
		Tetranychus agropyronus Wang	p	143
		Tetranychus cinnabarinus (Boisduval)	p	85
		Tetranychus kanzawai Kishida	p	143
		Tetranychus urticae (Koch)	p	85
Coleoptera	Attelabidae	*Paroplapoderus pardalis* Snelle van Vollenhoven	m	85
		Paroplapoderus semiannuletus Jekel	p	85
	Cerambycidae	*Acalolepta permutans* (Pascoe)	p	158
		Aeolesthes holosericea (Fabricius)	p	9
		Allotraeus grahami Gressitt	o	124
		Anaesthetobrium luteipenne Pic	m	9
		Anoplophora chinensis (Förster)	p	9
			p	65
			p	140
			p	158
			p	85
		Anoplophora chinensis macularia (Thomson)	p	9
			p	158
		Anoplophora glabripennis (Motschulsk)	p	85
		Apriona germari (Hope)	p	9
			p	85
			p	140
			p	158
		Aristobia hispida (Saunders)	p	65
			p	85
		Aromia moschata (Linnaeus)	p	65
		Batocera horsfieldi (Hope)	p	9
			p	85
			p	158
		Batocera lineolata Chevrolat	p	65
			p	140
		Ceresium sinicum White	p	9
			p	85
		Chlorophorus sexmaculatus (Motschulsky)	p	85
		Clytobius davidis (Fairmaire)	p	124
		Coscinesthes porosa Bates	p	9
			p	65
			p	140
		Epepeotes luscus Fabricius	p	124

		Epepeotes uncinatus Gahan	p	124
		Exocentrus guttulatus subconjunctus (Gressitt)	p	79
		Glenea centroguttata Fairmaire	m	9
			m	140
		Linda artricornis Pic	m	85
		Macrochenus guerini White	p	124
		Mallambyx raddei (Blessig)	p	9
			p	85
		Megopis severini Lameere	m	79
		Megopis sinica ornaticollis White	p	79
			p	85
		Megopis sinica White	p	9
			p	85
		Menesia subcarinata Gressitt	m	85
		M*esosa perplexa* Pascoe	m	9
		Microlenecamptus biocellatus (Schwarzer)	m	79
		Oberea formosana Pic	p	9
		Oberea fuscipennis Chevrolat	p	9
			m	85
		Oberea japonica (Thunberg)	p	9
			m	85
			p	158
		Olenecamptus bilobus (Fabricius)	p	9
		Olenecamptus clarus Pascoe	m	9
			m	85
			p	85
		Olenecamptus cretaceus Bates	p	85
		Paraglenea fortunei (Saunders)	p	9
			p	65
			p	85
			p	140
		Philus antennatus (Gyllenhal)	p	85
			p	158
			p	9
		Psacothea hilaris (Pascoe)	p	9
			p	65
			p	85
			m	85
			p	140
Coleoptera	Cerambycidae		p	158
		Psacothea tonkinensis (Aurivil)	m	9
			m	85
		Pterolophia annulata (Chevrolat)	m	9
		Pterolophia rigida (Bates)	p	9
		Ropica subnotata Pic	m	9
			m	85
		Trirachys orientalis Hope	p	9
		Xenolea tomentosa asiatica (Pic)	p	9
		Xylotrechus chinensis Chevrolat	p	9
			m	85
		Xystrocera globosa (Olivier)	p	9
			p	85

	Chrysomelidae	*Chrysomela maculicollis* (Jacoby)	m	65
			p	185
		Clitea metallica Chen	m	85
		Fleutiauxia armata (Baly)	p	185
		Fleutiauxia mutifrons Gressitt et Kimoto	o	185
		Mimastra cyanura (Hope)	p	85
			p	140
			p	158
		Oides decempunctata (Billberg)	m	85
		Phygasia fulvipennis (Baly)	p	185
	Curculionidae	*Calomycterus obconicus* Chao	p	2
		Catapionus viridimetallicus fossulus Motschulsky	m	2
		Chlorophanus sibiricus Gyllenhyl	p	85
		Hypomeces squamosus Fabricius	p	2
			p	85
		Lepropus flavovittatus Pascoe	p	2
		Lepropus lateralis Fabricius	p	2
		Piazomias validus Mostchulsky	p	2
		Pissodes nitidus Roelofs	p	85
		Platymycteropsis mandarinus Fairmaire	p	85
		Sympiezomias velatus (Chevrolat)	p	2
			p	85
			p	85
	Elateridae	*Pleonomus canaliculatus* (Faldermann)	p	85
	Eumolpidae	*Abirus fortunei* (Baly)	p	65
			p	85
			p	139
		Chrysochus chinensis Baly	p	85
	Hispidae	*Taiwania circumdata* (Herbst)	p	65
			m	85
	Melolonthidae	*Holotrichia convexopyga* Moser	p	85
		Holotrichia diomphalia Bates	p	85
		Holotrichia parallela Motschulsky	p	85
			p	85
		Maladera japonica Motschulsky	p	85
		Maladera orientalis Mots	p	85
	Rutelidae	*Adoretus sinicus* Burmeister	p	85
	Scolytidae	*Cryphalus exignus* Blandford	m	182
		Trypodendron lineatum Olivier	p	85
Hemiptera	Coreidae	*Homoeocerus walkerianus* Lethierry et Severin	p	65
			p	85
		Leptocorisa varicornis (Fabricius)	p	192
	Miridae	*Adelphocoris lineolatus* (Goeze)	p	85
			p	192
	Pentatomidae	*Aspongopus chinensis* Dallas	p	192
		Dalpada nodifera Walker	m	85
		Dalpada smargdina (Walker)	p	85
		Halyomorpha halys (Stål)	p	85
		Menida histrio (Fabricius)	p	192
		Placosternum taurus (Fabricius)	p	85
		Plautia crossota (Dallas)	p	65
		Poecilocoris druraei (Linnaeus)	p	65
			p	85
			m	193
		Stollia guttiger (Thunberg)	p	85
			p	192
		Stollia montivagus (Distant)	p	85
		Stollia ventralis (Westwood)	p	85
	Plataspidae	*Megacopta cribraria* (Fabricius)	p	85
			p	192

Homoptera	Aphrophoridae	*Aphrophora intermedia* Uhler	p	85
			p	85
			p	140
		Trigophora obliqua (Uhler)	p	140
	Cercopidae	*Cosmoscarta bispecularis* (White)	p	158
	Cicadellidae	*Drabescus ogumae* Matsumura	m	2
		Empoasca biguttula (Ishida)	p	48
			p	85
		Empoasca flavescens (Fabricius)	p	48
			p	85
		Empoasca pirisuga (Matsumura)	p	48
			m	85
		Erythroneura apicalis (Nawa)	p	48
			p	85[I]
		Erythroneura hirayamella (Matsumura)	p	48
		Erythroneura mori (Matsumura)	p	48
		Erythroneura multipunctata (Matsumura)	p	48
		Eutettix disciguttus (Walker)	p	48
		Hishimonus sellatus (Uhler)	p	85
		Nirvana suturalis Melichar	p	48
		Pseudonirvana orientalis (Matsumura)	m	48
		Tettigoniella albomarginata (Signoret)	p	48
		Tettigoniella ferruginea (Fabricius)	p	48
			p	85[II]
		Tettigoniella spectra (Distant)	p	48
		Tettigoniella viridis (Linné)	p	48
			p	85[III]
			p	85[IV]
		Zygina apicalis (Nawa)	p	85
	Cicadidae	*Cryptotympana atrata* (Fabricius)	p	85
		Cryptotympana mandarina Distant	p	85
		Cryptotympana pustulata (Fabricius)	p	65
		Huechys sanguinea De Geer	p	85
		Platypleura hilpa Walker	p	65
		Platypleura kaempferi (Fabricius)	p	65
			p	85
		Platypleura nobilis (Germar)	p	65
	Cixiidae	*Oliarus apicalis* (Uhler)	p	204
	Coccidae	*Ceroplastes ceriferus* (Anderson)	p	65
			p	85
			p	158
		Ceroplastes japonicus Green	p	65
			p	140
		Ceroplastes pseudoceriferus Green	p	85
		Ceroplastes rubens Maskell	p	65
			p	85

		Chloropulvinaria polygonata (Green)	p	85
		Chloropulvinaria psidii (Maskell)	p	85
		Parthenolecanium persicae (Fabricius)	m	85
	Diaspididae	*Aonidiella aurantii* (Maskell)	p	85
		Chrysomphalus dictyospermi (Morgan)	p	85
		Hemiberlesia lataniae (Signoret)	p	85
		Lepidosaphes tubulorum Ferris	p	85
			p	140
		Pseudaulacaspis pentagona (Targioni-Tozzetti)	p	85
			p	158
	Dictyopharidae	*Dictyophara patruelis* (Stål)	p	85
			p	204
		Dictyophara sinica Walker	p	204
		Orthopagus splendens (Germar)	m	85
			p	204
	Flatidae	*Geisha distinctissima* (Walker)	p	85
			p	204
	Fulgoridae	*Fulgora candelaria* (Linnaeus)	p	204
	Margarodidae	*Icerya purchasi* Maskell	p	65
			p	140
		Icerya seychellarum (Westwood)	p	85
	Membracidae	*Gargara genistae* (Fabricius)	p	85
	Pseudococcidae	*Dysmicoccus brevipes* (Cockerell)	p	85
		Ferrisiana virgata (Cockerell)	p	85
			p	150
		Nipaecoccus vastator (Maskell)	p	85
		Planococcus citri (Risso)	p	65
			p	85
			p	150
		Planococcus sinensis Borchsenius	p	150
		Pseudococcus comstocki (Kuwana)	p	85
			p	150
	Psyllidae	*Anomoneura mori* Schwarz	m	65
			p	85
	Ricaniidae	*Euricania fascialis* Walker	p	204
		Euricania ocellus (Walker)	p	85
			p	204
		Pochazia zizzata Chou et Lu	m	140
		Ricania simulans Walker	p	204
		Ricania speculum (Walker)	p	85
			p	140
			p	204
	Tropiduchidae	*Tambinia debilis* Stål	p	204
Lepidoptera	Arctiidae	*Aloa lactinea* (Cramer)	p	85
		Callimorpha similis (Moore)	p	40
			p	141
		Chionarctia nivea (Ménéntriès)	p	85[V]
		Creatonotos gangis (Linnaeus)	p	40
			p	65
			p	85

			p	158
		Creatonotos transiens (Walker)	p	65
			p	85
			p	141
			p	158
		Hyphantria cunea (Drury)	p	40
		Lemyra infernalis (Butler)	p	40[VI]
			p	158[VI]
		Lemyra melli (Daniel)	p	141[VII]
		Lemyra phasma (Leech)	p	40[VIII]
		Lemyra rhodophila (Walker)	p	40[IX]
			p	65[X]
			p	85[IX]
			p	141[IX]
		Spilarctia casigneta (Kollar)	p	65
		Spilarctia obliqua (Walker)	p	40
			p	85
			p	141
			p	158
		Spilarctia seriatopunctata (Motschulsky)	p	40
			m	85
		Spilarctia subcarnea (Walker)	p	85
			p	141
			p	158
		Spilosoma album (Bremer et Grev)	m	85
		Spilosoma lubricipedum (Linnaeus)	m	85[XI]
			p	141[XI]
			p	158
		Spilosoma punctarium (Stoll)	m	85
		Spilosoma urticae (Esper)	p	40
	Bombycidae	*Bombyx mori* Linnaeus	m	85
			m	207
		Bondotia menciana Moore	m	85
			p	207
		Oberthueria falcigera Butler	p	207
		Oberthüria caeca Oberthür	p	65
		Ocinara apicalis Walker	m	207
		Ocinara bipuncta Chu et Walker	p	207
		Ocinara brunnea Wileman	m	207
		Ocinara nitidoadea Chu et Wang	m	207
		Ocinara signifera Walker	m	207
		Ocinara tetrapuncta Chu et Wang	m	207
		Prismosticta unilhyala Chu et Wang	p	207
		Theophila albicurva Chu et Wang	m	207
		Theophila mandarina Moore	p	85[XII]
			p	141
			p	207

		Theophila ostruma Chu et Wang	p	207
		Theophila religiosa Helfer	p	65
			m	85
			m	207
	Ctenuchidae	*Amata germana* (Felder)	p	65
			p	85
	Geometridae	*Ascotis selenaria dianaria* Hübner	p	85
		Biston marginata Matsumura	p	85
		Bizia aexaria Walker	m	65
			m	85
			m	158
		Culcula panterinaria (Bremer et Grey)	p	85
		Hemerophila atrilineata (Butler)	m	85
		Menophra atrilineata (Butler) ‡	p	65
			m	141
		Ophthalmodes irroratariа Bremer et Grey	p	85
		Ophthalmodes giraffata Oberthür (Guenée)	p	158
		Percnia giraffata (Guenée)	p	158
		Phthonosema atrilineata (Butler)	m	85
		Phthonosema tendinosaria Bremer	p	85
		Zamacra excavata Dyar	p	85
	Lasiocampidae	*Malacosoma dentata* Mell	p	85
		Malacosoma neustria testacea Motschulsky	p	85
	Limacodidae	*Cnidocampa flavescens* (Walker)	p	85
		Monema flavescens Walker	p	65
		Parasa consocia Walker	p	85
		Setora postornata (Hampson)	p	85
		Thosea sinensis (Walker)	p	65
			p	158
	Lithosiidae	*Stigmatophora flava* (Bremer et Grey)	p	65
			m	85
			p	158
	Lymantriidae	*Dasychira mendosa* (Hübner)	p	198
		Euproctis bipunctapex (Hampson)	p	65
			p	85
			p	141
			p	158
			p	198
		Euproctis chrysorrhoea (Linnaeus)	p	198
		Euproctis karghalica Moore	p	198
			p	199
		Euproctis montis (Leech)	p	65
			p	85
			p	198
		Euproctis pseudoconspersa Strand	p	85
		Lymantria dispar (Linnaeus)	p	141
			p	198
		Orgyia thyellina Butler	p	198
		Porthesia similis (Fueszly)	p	65
			p	85
			p	198
		Porthesia xanthorrhoea (Kollar)	m	198

	Noctuidae	*Acontia bicolora* Leech	m	85
		Acronicta major Bremer	p	65
			p	85
		Agrotis tokionis Butler	p	85
		Agrotis ypsilon (Hufnagel)	p	85[XIII]
		Brevipecten consanguis Leech	m	85
		Mamestra brassicae (Linnaeus)	p	85[XIV]
			p	141
		Melanchra persicariae (Linnaeus)	p	85[XV]
		Polia illoba (Butler)	m	85
			p	209
		Prodenia litura (Fabricius)	p	85
	Nolidae	*Celama taeniata* (Snellen)	p	65
			m	85
			p	141
	Nymphalidae	*Calinaga buddha* Moore	m	85
		Hestina assimilis (Linnaeus)	p	85
	Pieridae	E*urema hecabe* (Linnaeus)	p	85
	Psychidae	*Clania variegata* Snellen	p	85
	Pyralidae	*Diaphania indica* (Saunders)	p	85
			p	158
		Diaphania pyloalis (Walker)	p	85
			m	145
			m	158
	Saturniidae	*Dictyoploca japonica* Moore	p	207
	Sphingidae	*Parum colligata* (Walker)	p	65
			p	85
			p	141
			p	158
			p	206
		Parum porphyria (Butler)	p	85
	Tortricidae	*Pandemis heparana* (Denis et Schiffermüller)	p	85
		Pandemis ribeana (Hübner)	p	85
Orthoptera	Gryllidae	*Brachytrupes portentosus* Lichtenstein	p	85
	Mecopodidae	*Mecopoda elongata* (Linnaeus)	p	85
	Oedipodidae	*Trilophidia annulata* (Thunberg)	m	85
	Phaneropteridae	*Ducetia japonica* (Thunberg)	p	85
		Holochlora japonica Bremer von Wattenwyi	p	85
	Pyrgomorphidae	*Atractomorpha lata* (Motschulsky)	p	85
		Atractomorpha sinensis I. Bolivar	p	85[XVI]
		Atractomorpha sinensis I. Bolivar	p	85
Thysanoptera	Thripidae	*Frankliniella intonsa* (Trybom)	p	65
		Heliothrips haemorrhoidalis (Bouché)	p	56
		Pseudodendrothrips mori (Niwa)	p	56
			m	85
		Scolothrips dilongicornis Han et Zhang	p	56
		Scolothrips takahashii Priesner	p	56
			p	65
		Thrips hawaiiensis (Morgan)	p	56
			p	65

† Possible synonym of *Hemerophila atrilineata* Butler
‡ Possible synonym of *Cnidocampa flavescens* (Walker)
[I] Recorded as *Zygina apicalis* Nawa
[II] Recorded as *Tettigella ferruginea* (Fabricius)
[III] Recorded as *Cicadella viridis* Linnaeus
[IV] Recorded as *Tettigella viridis* Linnaeus
[V] Recorded as *Spilosoma niveus* (Menetries)
[VI] Recorded as *Spilarctia infernalis* (Butler)
[VII] Recorded as *Spilarctia melli* Daniel
[VIII] Recorded as *Alphaea plasma* (Leech)
[IX] Recorded as *Spilarctia rhodophila* (Walker)
[X] Recorded as *Thanatarctia rhodophila* (Walker)
[XI] Recorded as *Spilosoma menthastri* (Esper)
[XII] Recorded as *Bombyx mandarina* Moore
[XIII] Recorded as *Agrotis ypsilon* Rottemberg
[XIV] Recorded as *Barathra brassicae* (Linnaeus)
[XV] Recorded as *Poecilophilides persicariae* Linnaeus
[XVI] Recorded as *Atractomorpha ambigua* Bolivar

Paederia foetida
Skunk vine

Paederia foetida growth habit.

Introduction
The genus *Paederia* contains 20-30 species worldwide, generally distributed in the tropics of Asia. In China, eleven species and one variety have been reported, occurring mainly in the south and southwest China[47].

Species of *Paederia* in China

Scientific Name	Scientific Name
P. cavaleriei Lévl.	***P. scandens*** (Lour.) Merr.
P. foetida L.	*P. spectatissima* H. Li ex C. Puff
P. lanuginosa Wall.	*P. stenobotrya* Merr.
P. laxiflora Merr. ex Li	*P. stenophylla* Merr.
P. pertomentosa Merr. ex Li	*P. yunnanensis* (Lévl.) Rehd.
P. praetermissa C. Puff	

Taxonomy
Family: Rubiaceae
Genus: *Paederia* L.

Description
Paederia foetida, a twining vine-like shrub, may release a strong fetid odor when bruised. The opposite, membranous leaves are ovate to lanceolate, 5-10 cm long and 2-4 cm wide, with mucronate apices and rounded to cordate bases. The upper leaf surface is glabrous, the underside pubescent. Conspicuous stipules are ovate lanceolate and 2-3 mm in length, with two notches in the top. Flowering terminally or from leaf axils, panicles reach a length of 6-18 cm. Corollas are violet, 12-16 mm long, and commonly hair-covered with short lobes. Topped with a conical flower discs and persistant lobes of the calyx, fruits are shiny black, broadly elliptic, with oblate nutlets 6-8 mm both long and wide, each with one broad wing[47].

Paederia scandens (Lour.) Merr., fever vine, is more common than *P. foetida*. It is a twining vine with a length of 3-5 m. It grows on hillsides, in forests, along forest edges, along streamsides, and twining on trees at elevations of 300-2,000 m in Anhui, Fujian, Guangdong, Sichuan, Taiwan, Yunnan, and Zhejiang[47].

Although there are some differences in appearance between *Paederia foetida* and *P. scandens,* recent work has reduced *P. scandens* to a synonym of *P. foetida*[125].

Habitat and Distribution
Paederia foetida is reported to occur in the southern coastal provinces of Fujian and Guangdong [47] and is suspected in the island provice of Hainan [5]. *P. foetida* can be found in sparse forests at low elevations [47].

Economic Importance
The shading effect of *Paederia scandens* may cause crop damage. It is medically useful and it is also used in treating pesticide poisoning[47].

Natural Enemies of *Paederia*
At least six fungi and seven arthropods are reported to attack *Paederia* spp.

Fungi

Phylum	Family	Species	H. R.	Ref.
Basidiomycota	Coleosporiaceae	*Coleosporium paederiae* Dietel	oo	23
	Incertae sedis	*Uredo paederiae* Syd. & P. Syd.	oo	23
	Pucciniaceae	*Puccinia paederiae* Dietel	mo	23
		Puccinia zoysiae Dietel	po	23
			†	149
Anamorphic *Guignardia*		*Phyllostictina paederiae* Petr.	mo	23
Anamorphic *Mycosphaerella*		*Cercospora paederiae* Tai	mo	23‡
		Pseudocercospora paederiae Sawada ex Goh & W.H. Hsieh	mo	110

† Appears as spring spore of *Aecidium paederiaei*
‡ Regarded as synonym of *Pseudocercospora paederiae* Sawada ex Goh & W.H. Hsieh [110]

Arthropods

Order	Family	Species	H. R.	Ref.
Acariformes	Tetranychidae	*Tetranychus hydrangeae* Pritchard et Baker	po	142
Coleoptera	Chrysomelidae	*Phygasia fulvipennis* (Baly)	oo	65
Homoptera	Aphididae	*Aulacorthum nipponicus* (Essig et Kuwana)	mo	65
Lepidoptera	Sphingidae	*Gurelca himachala* (Butler)	mo	206
			mo	208
		Gurelca hyas (Walker)	po	206
			po	208
		Macroglossum corythus luteata (Butler)	po	206
			po	208
		Macroglossum pyrrhosticta (Butler)	mo	206
			mo	208

Paulownia tomentosa
Princess tree

Leaves and fruit of *Paulownia tomentosa*.

Introduction
All seven species of the genus *Paulownia* are reported to grow in almost all the provinces of China, except Inner Mongolia, northern Xinjiang, and Tibet. Members of this genus prefer to grow in well-drained soil with a pH of 6-8. *Paulownia* species are among the most popular cultivated trees in China[202].

Species of *Paulownia* in China

Scientific Name	Scientific Name
P. australis Gong Tong	*P. fortunei* (Seem.) Hemsl.
P. catalpifolia Gong Tong	*P. kawakamii* Ito
P. elongata S. Y. Hu	***P. tomentosa*** (Thunb.) Steud.
P. fargesii Franch.	

Taxonomy
Family: Scrophulariales
Genus: *Paulownia* Sieb. et Zucc.

Description
Paulownia tomentosa is a woody tree that may reach 20 meters in height, with a broad, umbelliform crown. The bark is brownish gray. The branches have numerous nodes and obvious lenticels; young branches are covered with short glandular hairs. The cordate leaves are about 40 cm long, hairy on both surfaces, with the underside especially so. The leaves have acute apices and entire or lobed margins; which distinguishes *P. tomentosa* from *P. tomentosa* var. *tsinlingensis*. The violet, bell-shape flowers of the pyramidal to narrowly conical thyrses bloom from April to May. Fruits are ovate capsules 3-4.5 cm long, coated with viscid hair when young. The capsules appear from August to September. Seeds, including wings, are 2.5-4 mm long [202].

Habitat and Distribution
Paulownia tomentosa occurs naturally at elevations below 1,800 m in Henan, Hubei, Shaanxi, and probably northern Sichuan[202].

Economic Importance
Similar to other members of the genus, *P. tomentosa* is cultivated for timber because of the texture of its wood, as well as its ability to tolerate harsh environments. It is also used medicinally [202].

Related Species
Paulownia tomentosa var. *tsinlingensis* is distinguished from *Paulownia tomentosa* var. *tomentosa* by its round to shallowly cordate leaf base and glabrous or sparsely hairy lower leaf surface. It occurs below 1,700 m in Gansu, Henan, Hubei, Shaanxi, Shandong, Shanxi, and Sichuan[202].

Natural Enemies of *Paulownia*
At least ten species of fungi have been reported to infect members of the genus *Paulownia*. Eight fungal species can live on *P. tomentosa,* four of which, *Ascochyta paulowniae*, *Gloeosporium kawakamii*, *Mycosphaerella corylea* and *Phyllactinia paulowniae* appear to be host specific. Paulownia witch's-broom, caused by a mycoplasma-like organism, occurs on *P. tomentosa* nationwide. There are 113 insects in 39 families within 7 orders associated with *Paulownia*.

Fungi

Phylum	Family	Species	H. R.	Ref.
Ascomycota	Erysiphaceae	*Phyllactinia paulowniae* Yu	m	22
		Phyllactinia salmonii S. Blumer	oo	22
			p	23
		Uncinula clintonii Peck	p	23
	Mycosphaerellaceae	*Mycosphaerella corylea* (Pers.) Karst.	m	23
Basidiomycota	Platygloeaceae	*Septobasidium tanakae* (Miyabe) Boedijn & B.A. Steinm.	p	23
Oomycota	Pythiaceae	*Phytophthora palmivora* (E.J. Butler) E.J. Butler	po	188
		Pythium myriotylum Drechsler	po	188
Anamorphic *Diplocarpon*		*Gloeosporium kawakamii* Miyabe	m	23
Anamorphic *Mycosphaerella*		*Cercospora paulowniae* Hori	o	23†
		Pseudocercospora paulowniae Goh & W.H. Hsieh	oo	110
Anamorphic Mycosphaerellaceae		*Ascochyta paulowniae* Sacc. & Brunaud	m	23

† Regarded as synonym of *Pseudocerospora paulowniae* Goh & Hsieh

Arthropods

Order	Family	Species	H. R.	Ref.
Coleoptera	Cerambycidae	*Batocera horsfieldi* (Hope)	po	9
			po	85
			po	158
		Batocera lineolata Chevrolat	po	85
		Dere thoracica White	po	85
		Dorysthenes hydropicus Pascoe	po	85
		Dorysthenes paradoxus (Faldermann)	po	85
		Megopis sinica White	po	85
		Xylotrechus grayii (White)	po	9
			po	85
	Cetoniidae	*Glycyphana horsfieldi* (Hope)	po	65
	Chrysomelidae	*Aulacophora nigripennis* Motschulsky	po	85
		Gallerucida bifasciata Motschulsky	mo	85
		Hemipyxis chinensis (Weise)	mo	140
		Hemipyxis jeanneli (Chen)	po	185
		Hemipyxis plagioderoides (Motschulsky)	po	65
			mo	85
			po	185
		Oides bowringii (Baly)	po	85

		Oides tarsatus (Baly)	po	85
		Paleosepharia fulvicornis Chen	po	85
		Pseudespera paulowniae Jiang	oo	140
	Crioceridae	*Sagra femorata purpurea* Lichtenstein	po	85
		Sagra fulgida janthina Chen	po	85
	Curculionidae	*Phytoscaphus gossypii* Chao	po	85
		Piazomias fausti Frivaldszky	mo	85
		Piazomias validus Mostchulsky	po	2
		Scythropus yasumatsui Kono et Morimoto	po	2
	Eumolpidae	*Nodina tibialis* Chen	po	85
			po	139
			po	140
	Hispidae	*Basiprionota bisignata* (Boheman)	po	158
		Basiprionota chinensis (Fabricius)	po	65
			po	65
			mo	85
			po	140
			po	140
			po	158
		Basiprionota whitei (Boheman)	po	85
		Laccoptera quadrimaculata (Thunberg)	po	85
	Lucanidae	*Aegus laevicollis* Saunders	po	65
		Aegus parallelus Hope et Westwood	po	85
	Meloidae	*Epicauta sibirica* Pallas	po	85
	Melolonthidae	*Holotrichia trichophora* (Fairmaire)	po	85
			po	85
		Maladera ovatula (Fairmaire)	po	85
	Rutelidae	*Anomala antiqua* (Gyllenhal)	po	85
	Scolytidae	*Ambrosiodmus rubricollis* (Eichhoff)	po	65
Hemiptera	Berytidae	*Gampsocoris pulchellus* (Dallas)	mo	85
			po	192
		Yemma signatus (Hsiao)	mo	85
	Coreidae	*Cletus tenuis* Kiritshenko	po	85
	Miridae	*Gallobelicus crassicornis* Distant	po	192
		Nesidiocoris tenuis (Reuter)	mo	85[1]
	Pentatomidae	*Dalpada cinctipes* Walker	po	65
		Dolycoris baccarum (Linnaeus)	po	65
			po	192

		Erthesina fullo (Thunberg)	po	85
			po	192
		Eurostus grossipe Dallas	po	65
		Eurostus validus Dallas	po	85
		Lamprocoris roylii (Westwood)	mo	65
		Laprius varicornis (Dallas)	po	65
			po	85
		Menida metalliea Hsiao et Cheng	m	193
		Menida scotti Puton	po	193
		Plautia fimbriata (Fabricius)	po	85
			po	192
		Rubiconia peltata Jakovlev	mo	85
		Stollia guttiger (Thunberg)	po	85
			po	192
	Tingidae	*Eteoneus angulatus* Drake et Maa	mo	85
			m	192
Homoptera	Cicadellidae	*Empoasca flavescens* (Fabricius)	po	85
		Hishimonus sellatus (Uhler)	po	132
		Tettigoniella ferruginea (Fabricius)	po	85[II]
		Tettigoniella viridis (Linné)	po	85[III]
	Cicadidae	*Oncotympana maculaticollis* (Motschulsky)	po	85
			po	158
		Platypleura kaempferi (Fabricius)	po	85
	Diaspididae	*Pseudaulacaspis pentagona* (Targioni-Tozzetti)	po	85
			po	158
	Margarodidae	*Drosicha corpulenta* (Kuwana)	po	85
	Membracidae	*Jingkara hyalipunctata* Chou	po	85
	Ricaniidae	*Ricania sublimbata* Jacobi	po	85
Isoptera	Termitidae	*Macrotermes barneyi* Light	po	85
Lepidoptera	Arctiidae	*Hyphantria cunea* (Drury)	po	41
		Lemyra melli (Daniel)	po	41
			po	141[IV]
		Lemyra proteus (DE Joannis)	po	41
	Eupterotidae	*Eupterote chinensis* Leech	po	85
	Geometridae	*Ascotis selenaria dianaria* Hübner	po	85
		Biston marginata Matsumura	po	85
		Culcula panterinaria (Bremer et Grey)	po	65
			po	85

			po	158
		Odontopera aurata (Prout)	po	158
	Hepialidae	*Phassus excrescens* Butler	po	85
		Phassus sinifer sinensis Moore	po	85
	Limacodidae	*Latoia hilarata* (Staudinger)	po	85[V]
		Parasa consocia Walker	po	85
		Thosea sinensis (Walker)	po	65
			po	85
			po	158
	Lymantriidae	*Dasychira grotei* Moore	po	65
			mo	85
		Dasychira horsfieldi Saunders	po	199
		Euproctis bipunctapex (Hampson)	po	141
		Euproctis pseudoconspersa Strand	po	85
		Lymantria mathura Moore	po	141
			po	158
		Porthesia atereta Collenette	po	65
			po	85
			po	158
		Porthesia scintillans (Walker)	po	65
			po	85
		Porthesia similis (Fueszly)	po	65
			po	85
			po	158
	Noctuidae	*Argyrogramma agnata* Staudinger	po	85[VI]
			po	85[VI]
		Artena dotata (Fabricius)	po	85[VII]
		Euxoa oberthuri Leech	po	85
		Helicoverpa armigera (Hübner)	po	85
		Prodenia litura (Fabricius)	po	85
		Spodoptera exigua (Hübner)	po	85[VIII]
	Nymphalidae	*Junonia orithya* Linnaeus	po	158
	Psychidae	*Chalia larminati* Heylaerts	po	141
		Clania variegata Snellen	po	85[IX]
			po	141[X]
			po	158
	Pyralidae	*Dichocrocis chlorophanta* Butler	po	85
		Mimicia pseudolibatrix Caradja	m	65
		Pycnarmon cribrata (Fabricius)	m	65
			po	85
			m	141
			mo	145

	Saturniidae	*Attacus atlas* (Linnaeus)	po	65
			po	207
		Eriogyna pyretorum cognata Jordan	po	207
		Eriogyna pyretorum pyretorum Westwood	po	207
		Samia cynthia (Drurvy)	po	85[XI]
			po	207
		Samia cynthia insularis (Vollendofen)	po	207
	Sphingidae	*Clanis bilineata tsingtauica* Mell	po	85
		Dolbina tancrei Staudinger	po	85
		Parum colligata (Walker)	po	85
		Psilogramma increta (Walker)	po	85
		Psilogramma menephron (Cramer)	po	85
			po	141
			po	206
			po	208
		Theretra oldenlandiae (Fabricius)	po	85
	Tortricidae	*Homona coffearia* (Nietner)	po	85
Orthoptera	Pyrgomorphidae	*Atractomorpha sinensis* I. Bolivar	po	85
Thysanoptera	Thripidae	*Selenothrips rubrocinctus* (Giard)	po	65
		Thrips andrewsi (Bagnall)	mo	85

[I] Recorded as *Cyrtopeltis tenius* Reuter
[II] Recorded as *Tettigella ferruginea* (Fabricius)
[III] Recorded as *Cicadella viridis* Linnaeus
[IV] Recorded as *Spilarctia melli* Daniel
[V] Recorded as *Parasa hilarata* (Staudinger)
[VI] Recorded as *Plusia agnata* Staudinger
[VII] Recorded as *Laceoptera dotata* Fabricius
[VIII] Recorded as *Laohygama exigua* Hübner
[IX] Recorded as *Cryptothelea variegata* Snellen
[X] Recorded as *Eumeta variegata* Snellen
[XI] Recorded as *Philosamia cynthia* Walker et Felder

Perilla frutescens
Perilla

Introduction
Native to Eastern Asia, the genus *Perilla* contains only one species and three varieties. *Perilla frutescens* is well-known in Chinese medicine and has a long history of cultivation in China[172].

Species and Related Varieties of *Perilla* in China

Scientific Name
Perilla frutescens (L.) Britt.
Perilla frutescens var. *auriculato-dentata* C.Y. Wu et Hsuan ex H.W.Li
Perilla frutescens var. *acuta* (Thunb.) Kudo
Perilla frutescens var. *crispa* (Thunb.) Hand.-Mazz.

Taxonomy
Family: Labiatae (Lamiaceae)
Genus: *Perilla* L.

Description
Perilla frutescens is an erect, annual herb that grows 0.3 to 2 m tall. The villose stems are purple or green with four parallel grooves. Opposite leaves are membranous or herbaceous, broadly ovate or orbicular, 7-13 cm long and 4.5-10 cm wide, with mucronate tips, a rounded or broad cuneate bases, and dentate margins. The pilose surface of the leaves may be green or purple on both sides, or purple on the underside only. Each leaf has seven to eight pairs of lateral veins, which are closer together near the base. The veins on the upper surface are slightly raised, significantly so on the underside. The petiole is flat and villose. Composed of a pair of flowers, the villose corymb inflorescence may grow terminally or from the leaf axil. The ten-veined, campanulate calyx is villous basally outside and yellow glandular dotted on the surface, and pilose near the inside base, arranged in a ring. The calyx is initially about 3 mm long, but expands to 1.1 cm, spreading or drooping and swollen at the base when fruited. The labiate calyx has a broad upper sepal that is three-lobed and slightly longer than the lower sepal, which has two lanceolate lobes. The corolla is campanulate, white to magenta, 3-4 mm long, glabrous, and slightly pilose outside but less so inside. The limb of the corolla is also labiate, and composed of a slightly lobed upper petal and three-lobed lower petal. The sub-globose fruits are reticulate nutlets, grayish-brown, about 1.5 mm in diameter. In China, flowers and fruits appear in August and linger until November to December[172].

Leaves and flowers of *Perilla frutescens*.

Habitat
P. frutescens grows along roadsides, ditches, forest margins, and on hillsides.

Distribution
P. frutescens occurs naturally and is also cultivated in almost all provinces of China[172].

Economic Importance
P. frutescens is widely cultivated as a source of medicine and spices. Perilla oil, which is contained in the seed, is edible and also used as a preservative[172].

Other Varieties

Perilla frutescens var. *acuta* (Thunb.) Kudo has a pilose stem, smaller calyx, ovate leaves 4.5-7.5 cm long and 2.8-5 cm wide; its nutlet is light brownish yellow and 1-1.5 mm in diameter. This variety grows along roadsides, in disturbed areas, hillsides, and forest edges, and may be seen near houses. It occurs in Fujian, Guangdong, Guangxi, Guizhou, Hebei, Hubei, Jiangxi, Jiangsu, Shanxi, Sichuan, Taiwan, Yunnan, and Zhejiang provinces.

Perilla frutescens var. *auriculato-dentata* C.Y. Wu et Hsuan ex H.W. Li is similar to *P. frutescens* var. *acuta.* This variety can be distinguished by the rounded or subcordate base, and earlike lobed leaf margin. It occurs on hillsides, roadsides, and in forests in Anhui, Guizhou, Hubei, Jiangxi, and Zhejiang provinces.

Similar to P. frutescens, *P. frutescens* var. *crispa* (Thunb.) Hand.-Mazz. has a deeply cut, dentate leaf margin. It is planted nationwide for its medicinal uses and as a spice[172].

Natural Enemies of *Perilla*

Six fungi and fourteen arthropods have been reported to damage *Perilla.* Two insect species, *Cryptaphis siniperillae* and *Pyrausta phoenicealis,* may be monophagous and oligophagous, respectively.

Fungi

Phylum	Family	Species	H. R.	Ref.
Basidiomycota	Coleosporiaceae	*Coleosporium perillae* Syd. & P. Syd.	p	23
Oomycota	Peronosporaceae	*Peronospora perilla*	o	188
Anamorphic *Mycosphaerella*		*Pseudocercospora perillulae* (Togashi & Katsuki) X.J. Liu & Y.L. Guo	o	110
		Septoria kishitai Fukui	o	23
		Septoria perillae Miyake	o	23
Anamorphic Mycosphaerellaceae		*Ascochyta perillae* P.K. Chi	m	23

Arthropods

Order	Family	Species	H. R.	Ref.
Coleoptera	Chrysomelidae	*Apophylia flavovirens* (Fairemaire)	p	65
			p	185
Hemiptera	Pentatomidae	*Stollia guttiger* (Thunberg)	p	192
		Stollia ventralis (Westwood)	p	192
Homoptera	Aphididae	*Cryptaphis siniperillae* Zhang	m	189
	Cicadellidae	*Carinata* sp.	p	132
		Empoasca biguttula (Ishida)	p	48
Lepidoptera	Arctiidae	*Hyphantria cunea* (Drury)	p	41
	Noctuidae	*Argyrogramma agnata* Staudinger	p	85[I]
		Mamestra brassicae (Linnaeus)	p	85[II]
			p	205
		Polia illoba (Butler)	p	209
	Pyralidae	*Loxostege sticticalis* Linnaeus	p	145
		Pyrausta phoenicealis Hübner	m	85
			o	145
			o	145
		Syngamia abruptalis Walker	p	145
Thysanoptera	Phlaeothripidae	*Haplothrips aculeatus* (Fabricius)	p	56

[I] Recorded as *Plusia agnata* Staudinger

[II] Recorded as *Barathra brassicae* (Linnaeus)

Phellodendron amurense

Amur corktree

Introduction

The genus *Phellodendron* contains four species, distributed primarily in eastern Asia. Two species and one variety are native to China. Members of the genus *Phellodendron* are famous for their abundant alkaloid (berberine, palmatine, cadicine, phellodendrine, magnoflorine), essential oil, and flavonoid (amurensin) content[3].

Species of *Phellodendron* in China

Scientific Name
P. amurense Rupr.
P. chinense Schneid.

Taxonomy

Family: Rutaceae
Genus: *Phellodendron* Rupr.

Description

Phellodendron amurense is a deciduous tree that grows to 10-20 m, with a maximum height of 30 m. At maturity, the bark is light gray or grayish brown, with webbed fissures on the surface of a thick corky layer. Wide-spreading branches are dark purple and glabrous. The slender rachis bears 3-15 papery leaflets, which are ovate lanceolate or ovate, 6-12 cm long and 2.5-4 cm wide, and have an acuminate apices and cuneate bases, with lightly serrate and hairy margins. Flowers bloom from May to June. Corollas are purple green and 3-4 mm long. The calyx is slender, broadly ovate and about 1 mm long. Appearing from September through October, the round fruits are dark blue, 1 cm in diameter, with five to eight longitudinal grooves, and each fruit contains five seeds[3].

Habitat

P. amurense occurs in forested areas or along rivers, but it prefers sunny areas. It adapts easily to poor environmental conditions. It grows easily along streets and near houses, as well as other areas at low elevations[3].

Leaves of *Phellodendron amurense.*

Phellodendron amurense fruits.

Distribution

P. amurense occurs naturally in Hebei, eastern Inner Mongolia[3],and the three northeastern provinces, Heilongjiang, Jinlin, and Liaoning[3][63]. It is cultivated in Anhui[30], Fujian[35], Henan[25], Hubei[201], Hunan[126], Jiangsu[81], Ningxia[115], Shandong[8], Shanxi[39], Xinjiang[175], and Zhejiang provinces [153].

Economic Importance

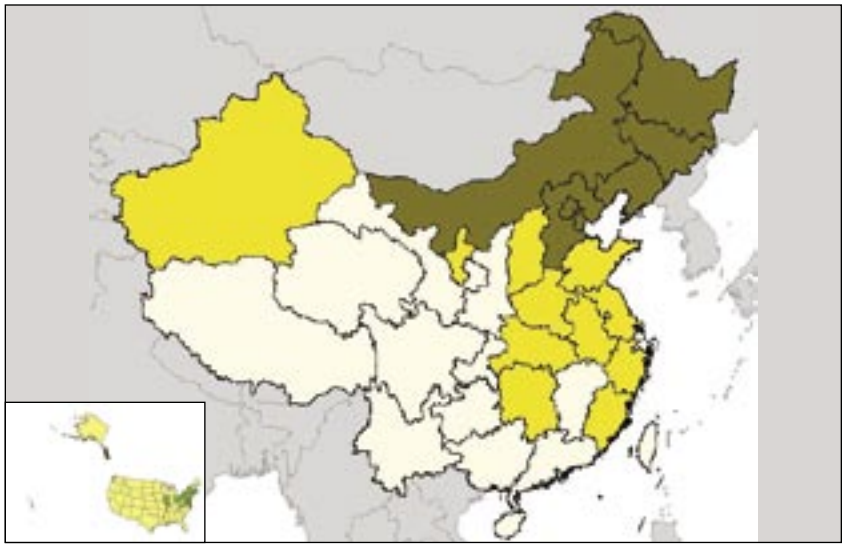
The bark is a good source of cork. The trunk can be used as timber for furniture and other decorative materials. Fruits are chemically useful in making dye, insecticide, soap, and lubricants. The inner layer of bark, known as *Huang Bo*, is medically useful [3].

Related Species

Similar to *P. amurense*, *P. chinense* Schneid can be distinguished by its brown hairy leaf rachis and petiole. Growing in the diverse woody forest of the adjacent areas of Hubei, Hunan and Sichuan provinces at elevations above 900 m [3].

Natural Enemies of *Phellodendron*

Four fungi and nine Lepidoptera were reported for the genus *Phellodendron.* Although all four fungi can infect *P. amurense*, *Ascochyta pirina* may be host-specific.



Fungi

Phylum	Family	Species	H. R.	Ref.
Basidiomycota	Coleosporiaceae	*Coleosporium phellodendri* Kom.	p	23
Anamorphic *Mycosphaerella*		*Cercospora phellodendri* P.K. Chi & C.K. Pai	p	23
Anamorphic Mycosphaerellaceae		*Ascochyta phellodendri* Kabát & Bubák	p	23
		Ascochyta pirina Pegl.	m	23

Arthropods

Order	Family	Species	H. R.	Ref.
Lepidoptera	Arctiidae	*Hyphantria cunea* (Drury)	p	41
	Geometridae	*Biston betularia* (Linnaeus)	p	138
	Lymantriidae	*Porthesia similis* (Fueszly)	p	65
			p	198
	Papilionidae	*Papilio bianor* Cramer	oo	203
		Papilio bianor kotoensis Sonan	p	203
		Papilio helenus Linnaeus	p	158
		Papilio maackii Ménétriès	p	203
	Pieridae	*Aporia hippia* (Bremer)	p	203
	Saturniidae	*Samia cynthia* (Drurvy)	p	207

Scientific Name Index

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 inflorecence 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 – dviding 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 Graminaceae

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

Mericarp – 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 Leguminoseae

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 dgrees

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

Tendril – 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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