



THE MINISTRY OF AGRICULTURE AND AGRO-BASED INDUSTRY
KUALA LUMPUR
MALAYSIA

**TECHNICAL
DOCUMENT**



**FOR
MARKET ACCESS
ON
STAR FRUIT (Carambola)**



CROP PROTECTION & PLANT QUARANTINE SERVICES DIVISION
DEPARTMENT OF AGRICULTURE
KUALA LUMPUR
MALAYSIA
2004

Ms. Asna Booty Othman, Director, Crop Protection and Plant Quarantine Services Division, Department of Agriculture Malaysia, wishes to extend her appreciation and gratitude to the following for their contribution, assistance and cooperation in the preparation of this Technical Document For Star fruit (Carambola):-

Mr. Muhamad Hj. Omar, Assistant Director, Phytosanitary and Export Control Section, Crop Protection and Plant Quarantine Services Division, Department of Agriculture Malaysia;

Ms. Nuraizah Hashim, Agriculture Officer, Phytosanitary and Export Control Section, Crop Protection and Plant Quarantine Services Division, Department of Agriculture Malaysia;

Appreciation is also extended to Y. Bhg. Dato' Ismail Ibrahim, Director-General of Agriculture, for his support and guidance in the preparation of this Document.

TABLE OF CONTENTS

<u>Section</u>	<u>Page No.</u>
Agronomy Aspects	
Scientific Name	1
Family	1
Common Name	1
Introduction	1
Nutrient Composition	1
Origin	2
Adaptation	2
Use And Potential	2
Marketing	2
Main Areas	3
Varieties/Clones	3
Botanical Description	3
Tree	3
Leaves	3
Flowers	4
Fruit	4
Crop Requirement	4
Climate	4
Soil	4
Cultural Practices	4
Planting Materials	4
Spacing	4
Establishment	4
Shade Requirement	4
Pruning	5
Fertilizer Usage	5
Water Management	6
Pollination	6
Pest Management	6
Fruit Fly Management	8
Weed Control	8

Maturity And Harvest	8
Maturity	8
Yields	8
Seasonality	8
Fruit Thinning	8
Harvesting Indices	8
Post Harvest Handling And Storage	10
Grades And Sizes For Malaysia Standards MS 1127	11
Labeling Of Boxes	11
Shipping	12
References	12
Annex I	
Discovering Malaysian Fruits	13
Annex II	
Diseases List Of Star Fruit (Carambola)	15
Annex III	
Diseases Fact Sheet Of Star Fruit (Carambola)	18
Annex IV	
Pests (Insect) List Of Star Fruit (Carambola)	34
Annex V	
Pests (Insect) Fact Sheet Of Star Fruit (Carambola)	37

The Star Fruit (Carambola)

AGRONOMY ASPECTS

Scientific name: *Averrhoa carambola* L.

Family: Oxalidaceae

Common Names: a.k.a. Carambola, Belimbing (Malaysia), Carambolier (French), Ma Fueng (Thailand), Fuang (Laos), Khe (Vietnam)

Introduction

The starfruit gets its name from the shape of a cross-section of the fruit. This unique feature earns itself a status in the exotic fruit league, and slices of this smooth, juicy, crispy and sour-sweet delight are often used in the adornment of cuisine and salads. Also known as “carambola”, which, in Portuguese meaning “food appetizer”, it is often consumed fresh, and also processed into jam, jelly, sweets, fresh juice and cordial concentrates. Carambola fruits possess good nutrition value, as they contain very low fat, are high in vitamin B and C content, and also a source of potassium and fiber.

Nutrient Composition

Carambola nutrient composition is as follows: -

Component	Per 100g edible portion
Food energy	24.0 calories
Moisture	92.0g
Protein	0.7g
Fat	0.1g
Carbohydrate	5.0g
Fiber	1.8g
Ash	0.4g
Calcium	7.0mg
Iron	0.4mg
Beta-carotene	155.0µg
Vitamin B1	0.1mg
Vitamin B2	0.1mg
Vitamin C	25.8mg

Source: *Nutrient composition of Malaysian Foods. IMR, 1982*

Origin

Origin unknown, but probably native to Malaysia, Indonesia and Southern China. The star fruit has never been located in the wild. It was domesticated throughout India and southeast Asia in prehistoric times, and was established in the American tropics 150 years ago.

Adaptation

The carambola is classified as subtropical because mature trees can tolerate temperatures as low as 27° F for short periods of time with little damage. Like many other subtropicals, however, young plants are more susceptible to frost and can be killed at 32° F. Carambolas can be severely damaged by flooding or prevailing hot, dry winds. The small trees make good container plants.

Use and Potential

Carambola is mainly consumed fresh but there is seeing increasing use as a juice. It may also be processed into preserves, jams and jellies. On a rare note, starfruit is used in black tea infusion, and to produce starfruit wine and brandy. Starfruit have also been associated with certain beliefs that it may lead to the lowering of blood pressure, and prescribed in concoctions to relief headache, vomiting, coughing and restlessness. Trees in bloom can support hobbyist apiculture by supplying pollen and nectar, leading to high-quality honey.

Marketing

The four major export market for Malaysia's star fruit are Netherlands, France, Germany and Singapore. Nevertheless, it continues to play an important role in Malaysian agriculture, by contributing towards an export volume of more than 9000 tons worth RM31.5 million by 2001.

Year	Export Quantity (MT)	Export Amount (RM)
1995	13,778.08	21,964,665
1996	12,544.00	24,976,954
1997	7,597.42	24,202,730
1998	6,454.51	26,721,808
1999	6,599.52	28,125,069
2000	6,213.18	27,751,899
2001	9,182.29	31,561,325

Source : *Statistics Department, Malaysia(2001)*

Main Areas

Carambola trees can be found all over Peninsular Malaysia. In Malaysia, the main areas of production are in Johor, Selangor, Kedah, Perak, Melaka and N.Sembilan. Total area of about 1,202.7 ha was planted with starfruit with a production of 10,124.7 by 2001.

VARIETIES/CLONES

There are four clones of the plant available for cultivation, each having different characteristics and commercial implications.

Clones	Fruit Shape	Fruit Size	Fruit Colour	Flesh Texture (Ripe)
B2 (MAHA 66)	Oval	Medium size 160-220g each	Greenish yellow Yellow	Sweet, juicy and smooth texture
B10	Oval, big at the top and narrow at the end	Medium size 180-250g each	Reddish orange	-
B17 (Belimbing Madu)	Oblong	Large size 200-300g each	Orange with white freckles	Crispy, firm and slightly fibrous, taste very sweet and has aroma.
B11 (Chan Yong I)	-	A medium size fruit	greenish yellow when ripe	The flesh is sweet, juicy but the texture is considered fibrous

BOTANICAL DESCRIPTION

Tree

Carambola tree can reach a height of 5-12 m. It has a lot of branches thus producing a lot of water shoots. The young plant has a shape of a pyramid whereas the older plant has a round shape.

Leaves

The leaf is small and oval in shape. The upper surface of the leaf is smooth and is yellowish green in colour. The lower surface is dark green in colour. The leaf is 2-4 cm wide and 2-9 cm long.

Flowers

The flower is small and is purplish in colour. It has 5 sepals, 5 petals and 5 stamens. The ovary is located under the style. The flowers are formed all along the trunk, branches and twigs.

Fruit

The fruits are oval and there are 5.6 angles/ribs. When it is cross-cut, it will give a star shape. The fruit is green when small and turns yellow or orange when ripe. The flesh is smooth, juicy, crispy, sweet but sourish in taste.

CROP REQUIREMENTS

Climate

The Carambola plant suits well to the tropical climate. It needs plenty of rainfall and a dry weather.

Soils

Carambola will grow very well in friable and well-drained soil. Carambola can live well in other various types of soil right from sandy soil to clayey soil but it needs a good soil improvement and management especially irrigation system and application of fertiliser.

CULTURAL PRACTICES

Planting Materials

There are 2 types of vegetative propagation carried out on carambola for the reproduction of planting materials. They are patch budding/bud grafting and cleft methods. Both methods are suitable but the more popular method is bud grafting. The plant can be planted into the field 4 months after grafting.

Spacing

The most common planting system is square planting at 6m x 6m, resulting in a planting density of 278 plants per hectare.

Establishment

Planting holes of 0.6m x 0.6m x 0.6m are dug after liming is done. Organic matter or compost at 5-10 kg, CIRP 200 gm are incorporated into the holes and the seedling is then planted with minimal disturbance of the roots.

Shade Requirement

During the establishment stage, the plant requires shading of 40- 50%.

Pruning

Proper pruning of the carambola plant is important as to get a good shape for easy maintenance and subsequently give good yields. Removing unhealthy branches and water shoots improves ventilation, reduces occurrences of diseases and facilitates fruit bagging. The height of the tree is maintained at about 2-4 meters to enable foliar spraying. Pruning also induces flowering. Pruning usually stops when the tree starts to bear fruits. Pruning is supposed to form the shape of the carambola plants as follows: -

- i. Open centre
- ii. Modified central leader
- iii. Trellis branching system

Fertilizer Usage

Fertilizer management is very important to ensure a high and sustained level of fruit production. In soils of low fertility young trees should receive light applications every 60 to 90 days until well established. Thereafter, they should receive one or two applications a year in deep soils or three or more applications in shallow soils where nutrients are lost by leaching. Where symptoms of chlorosis appear, remedial action may be taken by use of soil and foliar application of chelated iron and other micronutrients.

The recommended fertilization program for the carambola is as follows: -

Phase	Plant Age (Years)	Fertilizer Type	Rate (kg/plant/year)	Application Time
Establishment	0	CIRP Organic Matter	0.2 5-10	Incorporated into planting hole.
Vegetative	1	15:15:15 or 15:15:6:4 Organic Matter	0.70 15	Applied 6-7 times/year Applied 3-4 times/year
		12:12:17:2+TE or 13:13:20:2+TE Organic Matter	1.2 30	Applied 6-7 times/year (3-4 times/year)
Reproductive	3	"	1.75 45	(3-4 times/year)
	4	"	2.7 45	(3-4 times/year)
	5 above	"	4.0 45	(3-4 times/year)

Water Management

The carambola requires sufficient soil moisture to ensure growth and fruit production. For optimum fruit production, water must be available to the crop during the fruiting season. Water is supplied by various methods in the farm. Supplementary irrigation is done to provide soil moisture especially during the dry season during fruiting. Two common types of irrigation used in the farms are the sprinkler system and micro-irrigation. In tin-tailing farms, irrigation is necessary to avoid production of small fruits, and the use of micro-irrigation is the most popular method.

Pollination

Pollination is essential for the production of a good crop. The common pollinators include honeybees, ants, thrips and stingless bees. To improve pollen supply, a branch of the B2 cultivar is grafted on the upper middle branch of a B10 tree.

PEST MANAGEMENT

Fruits are attacked by several insects including two species of fruit flies, *Bactrocera carambolae* and *B. papayae*, and two species of lepidopteran borers -- *Homona* sp. and *Cryptophlebia* sp. The flowers are commonly infested by the flower moth *Diacrotricha fasciola* Zeller. (Pterophoridae). Mites (*Tetranychus* sp.) are occasionally a problem in prolonged hot dry weather. Carambola is relatively free of any serious diseases. Occasionally however, during prolonged wet weather in conjunction with dense canopy conditions, the young stems and shoots succumb to thread blight while *Cercospora* leaf spot causes defoliation as well as spotting on young fruits.

Fruitfly Management

To minimize the economic impact of fruitflies, several measures are taken by the growers to control this important pest. Control programs are based on the use of methyl eugenol, insecticide sprays, poisoned protein hydrolysate bait, and the bagging of fruit. Bagging of fruits is usually done when the fruit reaches a length of 4-5cm, at a stage, which is well before any onset of fruitfly, attack can take place. In the packing-house, holes in the packing boxes are covered with a mesh to prevent fruitfly infestation. Fruits are also inspected twice for symptoms of fruitfly infestation, once during harvest in the farm, and again during the packing and grading processes.



Fruits are individually wrapped by hand using paper bags to prevent fruitfly infestation



The recommended stage to carry out the wrapping of the fruits is at 28 days or about 3 cm



Plastic bags may also be used as an alternative wrapping material in place of paper bags.



A methyl eugenol trap used for fruitfly control

Weed Control

Weeds compete with the crop for nutrients, water and light. They may harbour pests such as thrips, but can also be useful to support pollinator populations. For small farms located near edges of vegetation, complete clearing is preferred to facilitate human movement and sanitation. In large farms, selective weeding is carried out to maintain some vegetation for pollinators to tide over the low-flowering season. Use of herbicides such as glufosinate-ammonium and glyphosate is the most common method, and can be applied before and after planting.

MATURITY AND HARVEST

Maturity

The Carambola tree normally begins to flower a few months after planting. However, it is advisable to allow the plant to reach the age of two years to bear fruits.

Yields

The Carambola normally will produce about 300 fruits per tree at the age of 2 years. Production will increase from year to year until 9 years and above where the production stabilise (about 1200 fruits/tree). The average weight of the carambola fruit is between 17-66 tons/ha for the period of 20 years.

Seasonality

The Carambola tree flowers all throughout the year. But there are 2 main fruiting seasons and 2 small seasons in a year. The two main fruiting seasons are April - June and October - December of each year.

Fruit Thinning

A number of fruits should be thinned out in order to get good quality fruits and to ease the process of wrapping the fruits. Only one fruit is allowed to each spike.

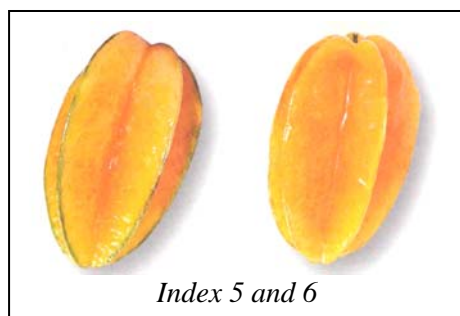
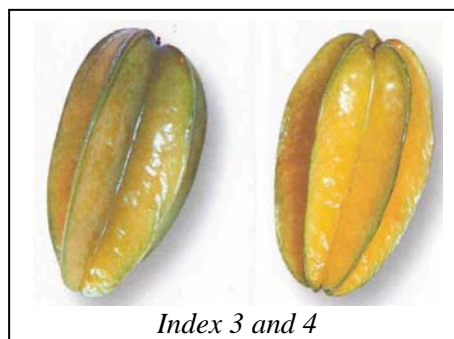
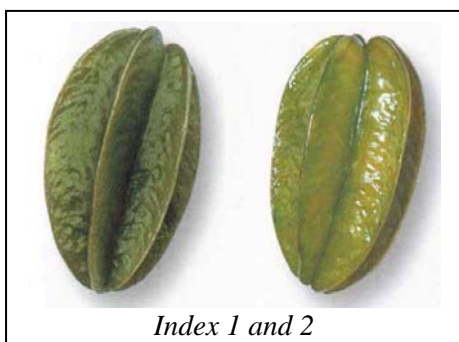
Harvesting Indices

The fruits can be harvested after 45-90 days after flower anthesis and this depends very much on the weather and the clones. Clone B10 needs 60-65 days to reach the colour index 3, whereas B17 needs 77-90 days after the anthesis. During rainy days, the fruits will ripen 2-3 days earlier compared to hot weather.

The colour indexes of carambola is as follows :-

Colour index	Indicator
1	The whole fruit is green
2	The fruit turns light green
3	The fruit turns to yellowish green
4	The fruit turns to greenish yellow
5	The whole fruit turns yellow
6	The whole fruit turns orange

Source: Federal Agricultural Marketing Authority (FAMA), Ministry of Agricultural Malaysia



POST HARVEST HANDLING AND STORAGE

The fruit should be harvested carefully and arranged in a basket with the wrappers still intact. It is then carried to the collection centre and arranged horizontally in a special plastic baskets or corrugated paper boxes which are insect proof as to avoid insect pest infestation. It is not necessary to get rid of the wrappers because this will prevent the fruits from damage due to bruises.

At the collecting center, the first phase inspection is conducted to look for damaged or fruit fly infected fruits are then removed or discarded. The fruits are then transported to the packing house using insect-proof cold trucks to keep them fresh, thereby preserving the quality. At the packing house, which is insect-proof and equipped with cold room and storage facilities, the wrappers are removed and the fruit are graded according to size, colour and quality.

The second phase inspection is conducted at the packing house where fruit fly attacked fruits are removed or discarded. The fruits are then labeled according to farms and collecting centers using individual code numbers assigned by the Department of Agriculture under the Malaysian Phytosanitary Certification Assurance Scheme (MPCA Scheme) for traceability.

Fruits that have been selected are carefully wrapped individually and packed in a box prior to export. Polystyrene mats or other protective materials are laid around packing boxes to serve as a cushion for the fruits. Air holes in the boxes are covered with plastic netting to prevent fruitfly and other insect infestation.



Packaging for overland and sea consignments



Packaging for air freight

Source: Federal Agricultural marketing Authority (FAMA), Ministry of Agricultural Malaysia

Grades and sizes for Malaysian Standard MS 1127

The Malaysian Federal Agricultural Marketing Authority (FAMA) provides a guideline for quality control and grading of exported fruits, as follows:-

Grade	Specification	Range of Flexibility (Maximum)
Premium	Fruits are collected from same cultivar, fresh and clean. Uniform size and maturity index and free from damages.	Maturity ≤ 3% Freshness ≤ 5% Damages ≤ 3% Abnormality ≤ 3% Size uniformity ≤ 5%
1	Fruits are collected from same cultivar, fresh and clean. Uniform size and maturity index and slight or free from damages	Maturity ≤ 5% Freshness ≤ 5% Damages ≤ 5% Abnormality ≤ 3% Size uniformity ≤ 10%
2	Fruits are collected from same cultivar, fresh and clean. Uniform size and maturity index and slightly damaged.	Maturity ≤ 10% Freshness ≤ 10% Damages ≤ 10% Abnormality ≤ 10% Size uniformity ≤ 10%

Source: FAMA – standard specification and grading for carambola. MS 1127

Quarantine inspection by officers from the Department of Agriculture is done during the packing, and quality control for grading is done by officers from FAMA. All boxes are sealed and kept at a temperature of 5-10°C with relative humidity of 85-90%. Yellow fruits (25% on the skin) have a storage life of 1-3 weeks at 20-30°C, 5 weeks at 10-15°C, and about 9 weeks at 5°C. Fruits with less than 25% yellow skin do not withstand long storage periods, as they are prone to chilling injuries.

Labeling of boxes

Boxes contain information on the source of the produce, including the name and address of the farm. This process allows for selective rejection of a consignment should some samples fail plant quarantine requirements, and would allow produce from compliant farms to pass through while produce from non-compliant farms is detained.

Code	Number of Fruits per Box	Weight per Fruit (g)	Size
XL	20	>220	Extra Large
L	26	181-220	Large
M	33	141-180	Medium
S	41	100-140	Small

Shipping

Produce is kept in cold storage until they are transferred to refrigerated containers for shipping, which include airfreight for distant destinations. All consignments are checked for compliance to standards by the relevant authorities.



Each box is labeled with information on the origin of the produce. Note mesh on air holes to prevent post-harvest fruitfly infestation

REFERENCE:

1. Anon (2000), Pakej Teknologi Belimbing. Jabatan Pertanian Semenanjung Malaysia.
2. www.mardi.my
3. www.agrolink.moa.my/doa/bdc/fruits/starfruits/str_pes.html
4. www.tradewindsfruit.com/star_fruit.htm
5. www.crfq.org/pubs/ff/carambola.html
6. http://edis.ifas.ufl.edu/BODY_MG269

DISCOVERING MALAYSIAN FRUITS

Starfruit

Averrhoa carambola

This extremely refreshing and juicy fruit has translucent attractive flesh with a distinctive flavour. Its deep ridges produce delightful star-shaped cross-sections, making it a popular choice for fresh fruit presentations. Starfruit is also very rich in vitamins and essential minerals. Two fruits a day provide one with a daily intake of potassium of 600 mg.



Pare away the skin of the ridges lightly.



Cut sectionally for star-shaped servings.



Can also be sliced longitudinally.



Savour with a fork.

Source: Federal Agricultural Marketing Authority (FAMA), Ministry of Agricultural Malaysia

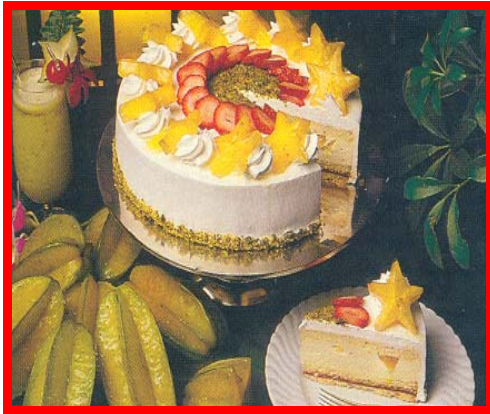
DISCOVERING MALAYSIAN FRUITS



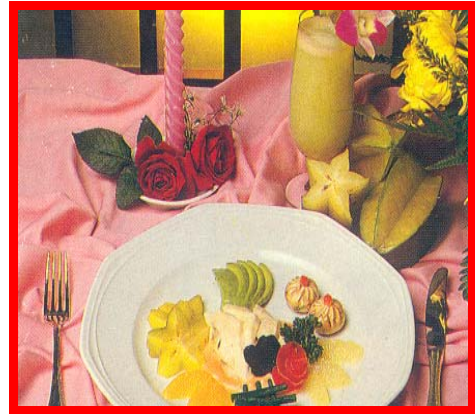
use it in your fruit cocktail or even your salad.



Star fruit cookies



Star fruit cream cheese cake



Salad De Volaille Chante Cler



A cool refreshing drink. Nourishes as well

Source: Federal Agricultural Marketing Authority (FAMA), Ministry of Agricultural Malaysia

**Diseases List
Of
Star Fruit (Carambola)**

DISEASES LIST OF STAR FRUIT (Carambola)

	Genus	Species	Order	Family	Common	Parts	Verification	Distribution	Status	Status
					name	Affected	Method(Ref.2)		K.G.Singh(1980)	upto 2003
1	<i>Asterina</i>	<i>venustula</i>	No information	Asterinaceae	Sooty mould	No information	L1, P1	Sa, Swk	P(5)(K.G.Singh,1980)	P(5)(Anon,2001)
2	<i>Cephaleuros</i>	<i>virescens</i>	No information	Trentepohliaceae	Red rust	Leaves, branches & fruit	C2, L1	PM	A(1)(No pest records)	P(5)(Anon,2001)
3	<i>Cercospora</i>	<i>averrhoae</i>	No information	No information	Leaf spot	Leaves	C2, L1	PM, Sa	P(5)(K.G.Singh,1980)	P(5)(Anon,2001)
4	<i>Collectotrichum</i>	<i>capsici</i>	No information	No information	Leaf spot	Leaves	L1	Sa	P(5)(K.G.Singh,1980)	P(5)(Anon,2001)
5	<i>Corticium</i>	<i>salmonicolor</i>	Polyporales	Corticaceae	Pink disease	Leaves and stems	C2, L1	PM, Swk, Sa	P(5)(K.G.Singh,1980)	P(5)(Anon,2001)
6	<i>Corticium</i>	<i>solani</i>	Stereales	Corticaceae	Leaf blight	Leaves	C2, L1	Swk	P(5)(K.G.Singh,1980)	A(1)(No pest records)
7	<i>Glomerella</i>	<i>cingulata</i>	Polystigmatales	Glomerellaceae	Leaf Anthracnose	Leaves	C2, L1	Sa	P(5)(K.G.Singh,1980)	P(5)(Anon,2001)
8	<i>Marasmius</i>	<i>scandens</i>	Agaricales	Marasmiaceae	White Thread blight	Whole plant	C2, L1	Swk	P(5)(K.G.Singh,1980)	A(1)(No pest records)
9	<i>Rigidoporus</i>	<i>lignosus</i>	Polyporales	Meripilaceae	Stem canker, white root	Root	C2, L1, P1	PM	P(5)(K.G.Singh,1980)	P(5)(Anon,2001)
10	<i>Stomiopeltella</i>	<i>nubecula</i>	No information	Micropeltidaceae	Sooty mould	No information	L1	Swk	P(5)(K.G.Singh,1980)	A(1)(No pest records)

REFERENCE:

- 1 Anon (2000), Pakej Teknologi Belimbing. Jabatan Pertanian Semenanjung Malaysia.
- 2 Barneet H.L. & Hunter B.B. (1972). Illustrated Genera Of Imperfect Fungi, Third Edition.
- 3 CABI. (2002 Edition). Crop Protection Compendium.
- 6 Kirk PM, Cannon PF, David JC, Stalpers JA, (2001). Dictionary of The Fungi, 9 th Edition. CAB International
- 4 Rahman M. A., Izham A & Raziah M.L (1992). Panduan Pengeluaran Belimbing. MARDI.
- 5 Singh, K.G (1980). A Check List of Host and Disease in Malaysia, . Bulletin No.154

DISTRIBUTION CODE

PM : Peninsular Malaysia
SWK : Sarawak
SB : Sabah

VERIFICATION CODE

C1 : Collection center
C2 : Compendium
L1 : Literature /Jurnal/Publication
P1 : Personal communication
S1 : Survey

STATUS CODE

A(1) Absent : no pest records
A(2) Absent: pest no longer present
A(3) Absent : pest records invalid
A(4) Absent: pest record unreliable
A(5) Absent : Intercepted only
P(1) Present : In all parts of the area
P(2) Present : only in some area
P(3) Present :except in specified pest free areas
P(4) Present : in all parts of the area where host crop(s) are grown
P(5) Present : only in some area where host crop(s) are grown
P(6) Present: only in protected cultivation
P(7) Present : seasonally
P(8) Present: but managed
P(9) Present : subject to official control
P(10) Present : under eradication
P(11) Present : at low prevalence
T(1) Transience: non-actionable
T(2) Transience : actionable, under surveillance
T(3) Transience: actionable, under eradication

**Diseases Fact Sheet
Of
Star Fruit (Carambola)**

1.0 PEST FACT SHEET (*Averrhoa carambola* L.)

Species name	<i>Asterina venustula</i> Syd.
Common name	Sooty mould
Domain	Eukaryota
Kingdom	Fungi
Phylum	Ascomycota
Class	Ascomycetes
Family	Asterinaceae
Other Names	No information.
Distribution	Sabah, Sarawak; (Singh KG, 1980)
Status	No information.
Biology, Ecology & Morphology	<p>1. Disease cycle No information.</p> <p>2. <u>Affected Plant Stages</u> No information.</p> <p>3. <u>Affected Plant Parts</u> No information.</p> <p>4. Symptom No information.</p> <p>5. <u>Damage</u> No information.</p>
Host	<i>Averrhoa belimbi</i> , <i>Averrhoa carambola</i> (Singh KG, 1980)
Control	-
References	<p>1. Kirk PM, Cannon PF, David JC, Stalpers JA, 2001. <i>Dictionary of The Fungi, 9th Edition</i>. CAB International: 49,165</p> <p>2. Singh KG, 1980. <i>A Check List of Host and Disease in Malaysia</i>. Ministry of Agriculture: 15, 192</p>

2.0 PEST FACT SHEET (*Averrhoa carambola* L.)

Species name	<i>Cephaleuros virescens</i> Künze
Common name	Red rust, algal leaf spots
Domain	Eukaryota
Kingdom	Viridiplantae
Class	Chlorophyta
Other Names	<i>Cephaleuros mycoidea</i> Karst. <i>Cephaleuros parasiticus</i> <i>Mycoidea parasitica</i> Cunn.
Distribution	Peninsular Malaysia; leaves, stem, fruits; (Anon., 2001)
Status	MAJOR.
Biology, Ecology & Morphology	<p>1. Pathogen Description No information</p> <p>2. Affected Plant Stages No information.</p> <p>3. Affected Plant Parts Leaves, branches and fruits.</p> <p>4. Symptom Alga forms green/red rust velvet spots on leaves, branches and fruits. Alga attack of the outer cortex of branches causing it become swollen and crack, leaves dropped and dieback of the plant. Alga grows on the epidermis layer of leaves which is less important as compared to attack on branches. Shoots attacked by alga is covered by velvety spots (Anon., 2001)</p> <p>5. Damage No information.</p>
Host	<i>Averrhoae carambola</i> (Anon., 2001)
Control	Cut back infected areas. Pruning to provide better aeration can reduce alga attack. Control infected trees by spraying copper oxychloride (Anon., 2001)
References	<p>1. Anon., 2001. <i>Pakej Teknologi Belimbing</i>. Jabatan Pertanian Semenanjung Malaysia, JP/PT01.02/04-01/1.2R: 14</p> <p>2. CABI, 2002. <i>Crop Protection Compendium 2002 Edition</i>. CAB International, 2002.</p>

3.0 PEST FACT SHEET (*Averrhoa carambola* L.)

Species name	<i>Cercospora averrhoae</i> Petch.
Common name	Leaf spot (Singh K. G,1980)
Domain	Eukaryota
Kingdom	Fungi
Phylum	Anamorphic fungi
Class	No information
Order	No information
Family	No information
Other names	No information
Distribution	Sabah; leaves (Singh K. G,1980) Peninsular Malaysia; (Anon, 2000)
Status	Minor
Biology, Ecology & Morphology	Conidiophores dark, simple, arising in clusters and burting out of leaf tissue, bearing conidia successively on new growing tips; conidia (sympodulospores) hyaline or dark, filiform (scolecospores), several-celled; parasitic on higher plants, commonly causing leaf spots. (Barnett & Hunter, 1972)
Affected Plant Stages	Vegetative growing stage
Affected Plant Parts	<ul style="list-style-type: none"> ▪ Leaves
Symptoms	The small chlorotic spots (up to 5mm) are at first brown and then turn grayish brown and lead to premature leaf loss. Reddish-brown sports appear on the leaf surfaces. These spots may expand and merge to form sections with Whitish-grey centers. Infection usually under wet conditions. (Rahman, 1992)
Damage (+ severity)	No information
List of Hosts	<i>Averrhoa carambola</i> L. (Singh,1980)
Control	<ol style="list-style-type: none"> 1. Use fungicides such as difolatan, maneb, mancozab or thiophanate-methyl. 2. Pruning and proper use of fertilizers
References	<ol style="list-style-type: none"> 1. Anon (2000), Pakej Teknologi Belimbing. Jabatan Pertanian Semenanjung Malaysia. p. 14-15. 2. Barneet H.L. & Hunter B.B. (1972). Illustrated Genera Of Imperfect Fungi, Third Edition. p124.

	<ol style="list-style-type: none">3. CABI. (2002 Edition). Crop Protection Compendium.4. Rahman M. A., Izham A & Raziah M.L (1992). Panduan Pengeluaran Belimbing. MARDI. p.33 & 34.5. Singh, K.G (1980). A Check List of Host and Disease in Malaysia, . Bulletin No.154; p 15, 41.
--	---

4.0 PEST FACT SHEET (*Averrhoa carambola* L.)

Species name	<i>Colletotrichum capsici</i> (Syd.) Butler & Bisby
Common name	Leaf spot
Domain	Eukaryota
Kingdom	Fungi
Phylum	Anamorphic fungi
Other Names	No information
Distribution	Sabah; Leaves; (Singh KG, 1980)
Status	No information
Biology & Ecology	<p>3. <u>Disease cycle</u> No information.</p> <p>4. <u>Affected Plant Stages</u> No information.</p> <p>5. <u>Affected Plant Parts</u> Leaves.</p> <p>6. Symptom No information.</p> <p>7. <u>Damage</u> No information.</p>
Host	<i>Ananas comosus</i> , <i>Arachis hypogaea</i> , <i>Asparagus officinalis</i> , <i>Averrhoa carambola</i> , <i>Bougainvillea</i> sp., <i>Brassica oleracea</i> , <i>Caladium</i> sp., <i>Capsicum annum</i> , <i>C. grossum</i> , <i>Cassia occidentalis</i> , <i>Carica papaya</i> , <i>Dahlia</i> hybrid, <i>Dioscorea</i> sp., <i>Elaeis guineensis</i> , <i>Gerbera jamesonii</i> , <i>Glycine max</i> , <i>Hibiscus rosa-sinensis</i> , <i>Lilium</i> sp., <i>Lycopersicon esculentum</i> , <i>Piper nigrum</i> , <i>Raphanus sativus</i> L. var. <i>hortensi</i> , <i>Sauropus androgynus</i> , <i>Solanum hyporhodium</i> , <i>S.melongena</i> , <i>Vigna sinensis</i> (Singh KG, 1980)
Control	No information
References	<p>1. Kirk PM, Cannon PF, David JC, Stalpers JA, 2001. <i>Dictionary of The Fungi, 9th Edition</i>. CAB International : 121</p> <p>2. Singh KG, 1980. <i>A Check List of Host and Disease in Malaysia</i>, Ministry of Agriculture : 15, 202</p>

5.0 PEST FACT SHEET (*Averrhoa carambola* L.)

Species name	<i>Corticium salmonicolor</i> Berk. & Br.
Common name	Pink disease, cendawan angin
Domain	Eukaryota
Kingdom	Fungi
Phylum	Basidiomycota
Class	Basidiomycetes
Order	Polyporales
Family	Corticaceae
Other name	No information
Distribution	Sarawak & Sabah (Singh, 1980) Peninsular Malaysia: widespread (CABI, 2002) Sarawak : widespread (CABI, 2002)
Status	Minor
Biology, Ecology & Morphology	<p>The fungus produces a teleomorphic (perfect or sexual) stage called the "corticium" stage, represented by the smooth, clammy, pinkish-white layer over the pink crust. Basidiospores are produced on sterigmata which protrude forth from basidia. The basidiospores are broadly ellipsoidal, thinwalled, hyaline, 8µm to 10µm x 5µm to 7µm.</p> <p>The basidia are narrowly clavate to cylindrical, and are formed densely crowded in a fertile hymenium layer in the pinkish white structure. The fungus also produces an anamorphic (imperfect or asexual) stage, represented by the orange "necator" stage on the infected bark. This stage consists of the orange pustules which are the sporodochia of the fungus. Hyaline, ellipsoid conidia are produced in orange masses in these sporodochia, which may be erumpent or superficial on the bark surface.</p> <p>The disease occurs commonly in high rainfall areas and during the wet periods. During wet weather both the teleomorphic and anamorphic stages can be observed, where both the basidiospores and conidia are formed and dispersed by rain-splash or wind, which has been attached to the disease.</p>

Affected Plant Stages	<ul style="list-style-type: none"> ▪ Flowering stage, fruiting stage, and vegetative growing stage.
Affected Plant Parts	<ul style="list-style-type: none"> ▪ Leaves, and stems.
Symptoms	<p>The disease first appears as silky-white, mycelial threads on the bark of small branches or twigs. Under favourable, moist conditions the enveloping threads becomes pink in colour. As the bark dies, this pink mass of mycelial form a rough, pink incrustation on the affected bark.</p> <p>This represents the mature stage and may take several weeks or months to develop. The crust is often broken up by irregular cracks. Sometimes the fungus forms a clammy, pinkish-white layer over the pink crust. This represents the fertile "corticium" stage of the fungus. Another fertile stage called the "necator" stage, characterized by orange pustules, can sometimes be observed on infected bark.</p> <p>The end result of infection is the wilting and death of foliage subtended by the infected twig or branch. However, the whole tree is not killed. (Anon, 2002)</p>
Damage	No information
List of Hosts	<p>Primary hosts <i>Hevea brasiliensis</i> (rubber), <i>Camellia sinensis</i> (tea), <i>Cajanus cajan</i> (pigeon pea), <i>Citrus</i>, <i>Cinchona</i>, <i>Coffea</i> (coffee), <i>Eucalyptus</i> (Eucalyptus tree), <i>Malus</i> (ornamental species apple), <i>Mangifera indica</i> (mango), <i>Theobroma cacao</i> (cocoa).</p> <p>Secondary hosts <i>Anacardium occidentale</i> (cashew nut), <i>Annona cherimola</i> (cherimoya), <i>Averrhoa carambola</i> L. (carambola), <i>Bougainvillea</i>, <i>Cinnamomum</i> (cinnamon), <i>Derris elliptica</i> (Tuba root), <i>Durio zibethinus</i> (Durian), <i>Erythrina subumbrans</i> (dadap), <i>Tamarindus indica</i> (Indian tamarind), <i>Artocarpus heterophyllus</i> Gackfruit), <i>Acacia</i> (wattles), <i>Garcinia mangostana</i> (mangosteen), <i>Piper nigrum</i> (black pepper). (CABI,2002)</p>
Control	<ol style="list-style-type: none"> 1. Prune away and burn seriously affected branches. 2. Prune tree to improve aeration. 3. Use a copper-base fungicide. (Anon, 2002)
References	<ol style="list-style-type: none"> 1. Anon (2002), Mengenalpasti Serangan Penyakit Tanaman Durian, Belimbing dan Nangka. Kursus Diagnosis Prestasi Tanaman, ILPP Serdang. Jabatan Pertanian Semenanjung Malaysia. 2. CAB International, 2002. Crop Protection Compendium 2002 Edition. 3. Singh K.G. (1980) A Check List of Host And Disease in Malaysia. Bulletin No.154; 15, 39 & 41

6.0 PEST FACT SHEET (*Averrhoa carambola* L.)

Species name	<i>Corticium solani</i> (Prill. & Delacr.) Bourd. & Galz. (teleomorph)
Common name	<ul style="list-style-type: none"> ▪ Leaf blight (Singh,1980)
Domain	Eukaryota
Kingdom	Fungi
Phylum	Basidiomycota
Class	Basidiomycetes
Order	Stereales
Family	Corticaceae
Other names	No information
Distribution	<ul style="list-style-type: none"> ▪ Sarawak (Singh,1980)
Status	No information
Biology, Ecology & Morphology	No information
Affected Plant Stages	No information
Affected Plant Parts	<ul style="list-style-type: none"> ▪ Leaves
Symptoms	No information
Damage (+ severity)	No information
List of Hosts	<i>Averrhoa carambola</i> L. (carambola)
Control	No information
References	<ol style="list-style-type: none"> 1. CABI. (2002 Edition).Crop Protection Compendium. 2. Singh K.G (1980).A Check List of Host and Disease in Malaysia, p 15 & 205

7.0 PEST FACT SHEET (*Averrhoa carambola* L.)

Species name	<i>Glomerella cingulata</i> (Stonem.) Spauld. & Schrenk [teleomorph]
Common name	Anthracnose
Domain	Eukaryota
Kingdom	Fungi
Phylum	Ascomycota
Class	Ascomycetes
Order	Polystigmatales
Family	Glomerellaceae
Other name	<i>Colletotrichum gloeosporioides</i> (Penz.) Sacco [anamorph]
Distribution	Sabah ; leaf (Singh, 1980)
Status	Minor
Biology, Ecology & Morphology	<p>The causal agent isolated is identified as <i>Colletotrichum gloeosporioides</i> Penz., the anamorphic state of <i>Glomerella cingulata</i> (Stonem.) Spauld & Schrenk. The teleomorph belongs to the family Polystigmataceae, under the class Ascomycetes.</p> <p>The strains isolated from leaves and durian fruits are identical, producing spreading, greywhite colonies on potato dextrose agar, with scattered salmon-coloured masses of spores produced in concentric rings. The reverse side of the colonies is grey. Conidia are produced in the acervuli, which do not have setae. The conidia are hyaline, cylindrical or ellipsoidal, with a refractive spot in the centre, measuring 10.72µm to 15µm by 4.5µm to 5.36µm.</p> <p>The strain isolated from the diseased twig is slightly different in terms of colony reverse, which is greenish-black, and the spores are produced in acervuli with setae and are not massed in concentric rings. Also, the conidia are comparatively larger and longer, 20µm to 28.8µm x 7µm to 8.4µm. The setae are dark cylindrical, septate, and 20µm to 90µm long by 2.6µm to 4µm wide.</p>
Affected Plant Stages	<ul style="list-style-type: none"> ▪ Vegetative stage
Affected Plant Parts	<ul style="list-style-type: none"> ▪ Leaves
Symptoms	No information
Damage (+severity)	No information

<p>List of Hosts</p>	<p>Primary hosts <i>Mangifera indica</i> (mango), <i>Persea americana</i> (avocado), <i>Allium cepa</i> (onion), <i>Citrus</i>, <i>Dioscorea</i> (yam), <i>Araceae</i>, <i>Orchidaceae</i> (orchids), <i>Acacia</i> (wattles), <i>Allium</i> (onions, garlic, leek, etc.), <i>Amaranthus</i> (grain amaranth), <i>Anacardium occidentale</i> (cashew nut), <i>Annona</i>, <i>Annona muricata</i> (soursop), <i>Anthurium andreanum</i>, <i>Camellia sinensis</i> (tea), <i>Carica papaya</i> (papaw), <i>Citrus aurantiifolia</i> (lime), <i>Citrus maxima</i> (pummelo), <i>Citrus limon</i> (lemon), <i>Coffea</i> (coffee), <i>Capsicum</i> (peppers), <i>Capsicum annuum</i> (bell pepper), , <i>Hibiscus</i> (rosemallows), <i>Hevea brasiliensis</i> (rubber), <i>Lycopersicon esculentum</i> (tomato), <i>Malus pumila</i> (apple), <i>Manihot esculenta</i> (cassava), <i>Piper</i> (pepper), <i>Piper nigrum</i> (black pepper), <i>Prunus dulcis</i> (almond), <i>Prunus persica</i> (peach), <i>Psidium guajava</i> (common guava), <i>Solanum melongena</i> (aubergine), <i>Theobroma cacao</i> (cocoa).</p> <p>Secondary hosts <i>Artocarpus altilis</i> (breadfruit), <i>Artocarpus heterophyllus</i> Uackfruit), <i>Allium cepa</i> var. <i>aggregatum</i> (shallot), <i>Annona reticulata</i> (bullock's heart), <i>Arachis hypogaea</i> (groundnut), <i>Averrhoa carambola</i> L. (<i>carambola</i>), <i>Banksia</i>, <i>Cajanus Galan</i> (pigeon pea), <i>Cocos nucifera</i> (coconut), <i>Chrysanthemum</i> (daisy), <i>Cicer arietinum</i> (chickpea), <i>Cinnamomum verum</i> (cinnamon), <i>Citrullus lanatus</i> (watermelon), <i>Calopogonium mucunoides</i>, <i>Castanea mollissima</i> (hairy chestnut), <i>Cucumis melo</i> (melon), <i>Cucurbita pepo</i> (ornamental gourd), <i>Colocasia esculenta</i> (taro), <i>Daphne</i>, <i>Daucus carDia</i> (carrot), <i>Durio zibethinus</i> (durian), <i>Elaeis guineensis</i> (African oil palm), <i>Eucalyptus</i> (Eucalyptus tree), <i>Ficus carica</i> (common fig), <i>Garcinia mangostana</i> (mangosteen), <i>Musa</i> (banana), <i>Vigna angularis</i> (adzuki bean), <i>Vigna radiata</i> (bean, mung), <i>Vigna mungo</i> (black gram), <i>Phaseolus vulgaris</i> (common bean), <i>Rosa</i> (roses), <i>Saccharum</i>, <i>Vigna unguiculata</i> (cowpea), <i>Xanthosoma</i> (cocoyam). (CABI,2002)</p> <p><i>Averrhoa carambola</i> L. (Singh, 1980)</p>
<p>Control</p>	<p>No information</p>
<p>References</p>	<ol style="list-style-type: none"> 1. Anon, 2000. Pakej Teknologi Belimbing. Jabatan Pertanian Semenanjung Malaysia. p. 14-15 2. CAB International, (2002). Crop Protection Compendium 2002 Edition. 3. Singh KG (1980) A Check List of Host And Disease in Malaysia. Bulletin No.154; p. 15 & 217.

8.0 PEST FACT SHEET BELIMBING (*Averrhoa carambola* L.)

Species name	<i>Marasmiellus scandens</i> (Mass.) Dennis & Reid.
Common name	White Thread blight
Domain	Eukaryota
Kingdom	Fungi
Phylum	Basidiomycota
Class	Basidiomycetes
Order	Agaricales
Family	Marasmiaceae
Other name	No information
Distribution	Sarawak (Singh, 1980)
Status	No information
Biology, Ecology & Morphology	<i>Marasmiellus scandens</i> is one of the fungi that causes white thread blight on a number of hosts. The incidence of the disease is higher in plantations with poor cultural practices, especially when the normal rounds of sanitation pruning are not maintained and shade is too dense. The disease spreads mainly through hyphal ramification from leaf to leaf or along branches within a tree, and from tree to tree through infected fallen branches from tall shade trees. The disease also spreads through airborne basidiospores released from basidiomata formed during wet weather. The disease might also be spread by a hemipteran bug and <i>usingeria mirabilis</i> . (CABI, 2002)
Affected Plant Stages	Vegetative stage and flowering stage,
Affected Plant Parts	Branches, trunk, leaves and fruit
Symptoms	Early attack result in the appearance of coarse white mycelium spreading from the trunk to the branches. Later, the mycelium spreads to the leaves, flower and fruit, causing defoliation and flower / fruit abortion. If left unchecked, can cause branches, and eventually the whole tree to die. (Anon, 2002)
Damage	No information
Hosts	Primary hosts <i>Theobroma cacao</i> (cocoa). Secondary hosts <i>Artocarpus integer</i> (jack tree), <i>Ananas comosus</i> (pineapple), <i>Annona</i>

	<p><i>muricata</i> (soursop), <i>Averrhoa bilimbi</i>, <i>Averrhoa carambola</i> (carambola), <i>Bambusa</i>, <i>Bougainvillea</i>, <i>Camellia sinensis</i> (tea), <i>Coffea arabica</i> (arabica coffee), <i>Coffea canephora</i> (robusta coffee), <i>Coffea liberica</i> (Liberian coffee tree), <i>Durio zibethinus</i> (durian), <i>Euphorbia</i> (spurges), <i>Garcinia mangostana</i> (mangosteen), <i>Hevea brasiliensis</i> (rubber), <i>Ixora</i>, <i>Litchi chinensis</i> (leechee), <i>Mangiferafoetida</i> (bachang), <i>Mangifera indica</i> (mango), <i>Mangifera odorata</i>, <i>Manilkara zapata</i> (sapodilla), <i>Metroxylon sagu</i> (sago palm), <i>Musa paradisiaca</i> (plantain), <i>Nephelium lappaceum</i> (rambutan), <i>Piper nigrum</i> (black pepper), <i>Psidium cattleianum</i> (strawberry guava), <i>Syzygium malaccense</i> (malay-apple). (CABI,2002) <i>Averrhoa carambola</i> L. (Singh, 1980)</p>
Control	<p>Prune and destroy infected branches Use fungicides such as copper oxide biweekly, 3-4 times (Anon, 2002)</p>
References	<ol style="list-style-type: none"> 1. Anon (2002), Mengenalpasti Serangan Penyakit Tanaman Durian, Belimbing dan Nangka. Kursus Diagnosis Prestasi Tanaman, ILPP Serdang. Jabatan Pertanian Semenanjung Malaysia. 2. CAB International, (2002). Crop Protection Compendium 2002 Edition. 3. Singh KG. (1980) A Check List of Host And Disease in Malaysia. Bulletin No.1 54; p 15, & 23.

9.0 PEST FACT SHEET (*Averrhoa carambola* L.)

Species name	<i>Rigidoporus microporus</i> (Fr.) Overeem (preferred name for <i>Rigidoporus lignosus</i> (Klotzsch) Imazeki)
Common name	Stem canker, white root
Domain	Eukaryota
Kingdom	Fungi
Phylum	Basidiomycota
Class	Basidiomycetes
Order	Polyporales
Family	Meripilaceae
Other Names	<i>Rigidoporus lignosus</i> (Klotzsch) Imazeki <i>Fomes auberianus</i> (Mont.) Murrill <i>Fomes lignosus</i> (Klotzsch) Bres. <i>Fomes semitostus</i> Berk. <i>Leptoporus lignosus</i> (Klotzsch) R. Heim <i>Oxyporus auberianus</i> (Mont.) Kreisel <i>Polyporus auberianus</i> Mont. <i>Polyporus lignosus</i> Klotzsch
Distribution	Peninsular Malaysia; root; (Singh KG, 1980)
Status	Major.
Biology, Ecology & Morphology	<p>3. Disease cycle <i>R. lignosus</i> is a rhizomorphic root-infecting fungus with an ectotrophic growth habit . The rhizomorphs extend ahead of the root rot and spread the disease to the tree collar and to other roots of the infected tree. Root contact spreads white root disease from a diseased tree to the roots of adjacent healthy trees. The infected trees are killed (CABI, 2002).</p> <p>4. <u>Affected Plant Stages</u> No information.</p> <p>5. <u>Affected Plant Parts</u> Root.</p> <p>6. Symptom Fungus spread through roots. Leaves of infected plants turned pale green, finally becoming yellow, dries and falls. White mycelium or rhizomorph is clearly visible on the root surface (Anon., 2001).</p> <p>7. <u>Damage</u> Serious infection can cause the plant to die (Anon., 2001).</p>

Host`	<p><i>Hevea brasiliensis</i> (rubber), <i>Theobroma cacao</i> (cocoa), <i>Cocos nucifera</i> (coconut), <i>Coffea</i> (coffee), <i>Elaeis guineensis</i> (African oil palm), <i>Ipomoea batatas</i> (sweet potato), <i>Manihot esculenta</i> (cassava), <i>Nephelium lappaceum</i> (rambutan), <i>Piper nigrum</i> (black pepper), <i>Solanum melongena</i> (aubergine).(CABI, 2002)</p> <p><i>Averrhoae carambola</i> (Anon., 2001)</p>
Control	<p>Infected roots should be removed and the surrounding soil is drenched with systemic fungicide. Plants with serious infection should be removed and burned together with the infected roots (Anon., 2001)</p>
References	<ol style="list-style-type: none"> 1. Anon., 2001. <i>Pakej Teknologi Belimbing</i>. Jabatan Pertanian Semenanjung Malaysia, JP/PT01.02/04-01/1.2R: 14 2. CABI, 2002. <i>Crop Protection Compendium 2002 Edition</i>. CAB International, 2002. 3. Singh KG, 1980. <i>A Check List of Host and Disease in Malaysia</i>, Ministry of Agriculture : 116-117, 246

10.0 PEST FACT SHEET (*Averrhoa carambola* L.)

Species name	<i>Stomiopeltella nubecula</i> (Berk. & Curt.) Theiss
Common name	Sooty mould
Domain	Eukaryota
Kingdom	Fungi
Phylum	Ascomycota
Class	Ascomycetes
Family	Micropeltidaceae
Other Names	No information.
Distribution	Sarawak; (Singh KG, 1980)
Status	No information.
Biology, Ecology & Morphology	<p>1. Disease cycle No information.</p> <p>2. <u>Affected Plant Stages</u> No information.</p> <p>3. <u>Affected Plant Parts</u> No information.</p> <p>4. Symptom No information.</p> <p>5. <u>Damage</u> No information.</p>
Host	<i>Averrhoa carambola</i> , <i>Nephelium longana</i> (Singh KG, 1980)
Control	-
References	<ol style="list-style-type: none"> 1. Kirk PM, Cannon PF, David JC, Stalpers JA, 2001. <i>Dictionary of The Fungi, 9th Edition</i>. CAB International : 165, 506 2. Singh KG, 1980. <i>A Check List of Host and Disease in Malaysia</i>. Ministry of Agriculture : 15, 250

**Pests List (Insect)
Of
Star Fruit (Carambola)**

PESTS LIST OF STARFRUIT IN MALAYSIA

Genus	Species	Order	Family	Common Name	Parts Affected	Verification Method	Distribution	Status Ahmad Yunus(1980)	Status Upto 2004
<i>Adoxophyes</i>	<i>privatana</i>	Lepidoptera	Tortricidae	Leaf curling moth	Leaves, fruit	L1	PM	P(5)(Rahman et. al, 1992)	P(8) DOA (2003)
<i>Animula</i>	<i>sumatrensis</i>	Lepidoptera	Psychidae	no common name	fruit	L1	PM	P(5)(Ahmad&Ho,1980)	A(1)
<i>Archips</i>	<i>tabescens</i>	Lepidoptera	Tortricidae	no common name	Leaves, fruit	L1	PM	P(5)(Rahman et. al, 1992)	P(8) DOA (2003)
<i>Bactrocera</i>	<i>cucurbitae</i>	Diptera	Tephritidae	Melon fruit fly	fruit	C1, L1	PM,Sa, Swk	P(5)(Ahmad&Ho,1980)	P(8) DOA (2003)
<i>Bactrocera</i>	<i>dorsalis</i>	Diptera	Tephritidae	Oriental fruit fly	fruit	C1,C2, L1	PM, Sa, Swk	P(5)(Ahmad&Ho,1980)	P(8) DOA (2003)
<i>Bactrocera</i>	<i>latifrons</i>	Diptera	Tephritidae	Solanum fruit fly	fruit	L1	PM,Sa, Swk	P(5)(Ahmad&Ho,1980)	P(11) DOA 2003
<i>Cacoecia</i>	<i>machlopiis</i>	Lepidoptera	Tortricidae	no common name	no information	C1, L1	PM	P(5)(Ahmad&Ho,1980)	A(1)
<i>Carpophilus</i>	<i>foveicollis</i>	Coleoptera	Nitidulidae	no common name	no information	L1	PM	P(5)(Ahmad&Ho,1980)	A(1)
<i>Cryptoplebia</i>	<i>encarpa</i>	Lepidoptera	Tortricidae	Cacao husk borer	Leaves, fruit	L1	PM	P(5)(Rahman et. al, 1992)	P(8) DOA (2003)
<i>Diacrotricha</i>	<i>fasciola</i>	Lepidoptera	Pterophoridae	no common name	Leaves, fruit	L1	PM	P(5)(Rahman et. al, 1992)	P(8) DOA (2003)
<i>Drosophilla</i>	<i>ananassae</i>	Diptera	Drosophilidae	no common name	no information	L1	PM	P(5)(Ahmad&Ho,1980)	A(1)
<i>Euproctis</i>	<i>scintillans</i>	Lepidoptera	Lymantriidae	no common name	Leaves, fruit	L1	PM	P(5)(Rahman et. al, 1992)	P(8) DOA (2003)
<i>Haptoncus</i>	<i>luteolus</i>	Coleoptera	Nitidulidae	no common name	no information	L1	PM	P(5)(Ahmad&Ho,1980)	A(1)
<i>Helina</i>	<i>propinqua</i>	Diptera	Anthomidae	no common name	no information	L1	PM	P(5)(Ahmad&Ho,1980)	A(1)
<i>Indarbela</i>	<i>disciplaga</i>	Lepidoptera	Metarbelidae	no common name	Stem	L1	PM	P(5)(Rahman et. al, 1992)	P(8) DOA (2003)
<i>Lamprosema</i>	<i>charasalis</i>	Lepidoptera	Pyraustidae	no common name	leave, fruit	L1	PM	P(5)(Ahmad&Ho,1980)	P(8) DOA (2003)
<i>Lasiodactylus</i>	<i>pictus</i>	Coleoptera	Nitidulidae	no common name	no information	L1	PM	P(5)(Ahmad&Ho,1980)	A(1)
<i>Rapala</i>	<i>sequiera</i>	Lepidoptera	Lycaenidae	no common name	no information	L1	PM	P(5)(Ahmad&Ho,1980)	A(1)
<i>Stomoxys</i>	<i>calcitrans</i>	Diptera	Muscidae	no common name	no information	L1	PM	P(5)(Ahmad&Ho,1980)	A(1)

REFERENCE:

1. Ahmad Y. and Ho T. H. (1980). *List of economic pests, host plants, parasites and predators in West Malaysia (1920-1978)*. Ministry of Agriculture Malaysia. Buletin No. 153:538pp.
2. Anonymous (2002) *Crop Protection Compendium*. CAB International
3. M. A. Rahman, A. Izham, M. L. Raziah (1992). *Panduan Pengeluaran Belimbing*. Bahagian Penyelidikan Buah-Buahan, Stesen Ibu Pejabat MARDI Serdang, Peti Surat 12301, 50774 Kuala Lumpur. 26 pp.

DISTRIBUTION CODE

PM : Peninsular Malaysia
SWK : Sarawak
SB : Sabah

VERIFICATION CODE

C1 : Collection center
C2 : Compendium
L1 : Literature /Jurnal/Publication
P1 : Personal communication
S1 : Survey

STATUS CODE

A(1) Absent : no pest records
A(2) Absent: pest no longer present
A(3) Absent : pest records invalid
A(4) Absent: pest record unreliable
A(5) Absent : Intercepted only
P(1) Present : In all parts of the area
P(2) Present : only in some area
P(3) Present :except in specified pest free areas
P(4) Present : in all parts of the area where host crop(s) are grown
P(5) Present : only in some area where host crop(s) are grown
P(6) Present: only in protected cultivation
P(7) Present : seasonally
P(8) Present: but managed
P(9) Present : subject to official control
P(10) Present : under eradication
P(11) Present : at low prevalence
T(1) Transience: non-actionable
T(2) Transience : actionable, under surveillance
T(3) Transience: actionable, under eradication

**Pest Fact Sheet
Of
Star Fruit (Carambola)**

1.0 PEST FACT SHEET (STARFRUIT)

Species name	<i>Animula sumatrensis</i> , Heyl.
Common name	No information
Phylum	Arthropoda
Class	Insecta
Order	Lepidoptera
Family	Psychidae
Synonym	<i>Chalioides sumatrensis</i> Heylaerts
Distribution	Peninsular Malaysia : Leaf (Ahmad & Ho, 1980)
Status	Malaysia : Peninsular Malaysia (Robinson ea) Sarawak (Robinson ea)
Biology & Ecology	<p>1) Life Cycle no information</p> <p>2) Affected Plant Stages Fruiting stage.</p> <p>3) Affected Plant Parts Leaves, fruits/pods and seeds.</p> <p>4) Symptom no information</p> <p>5) Damage no information</p>
Host	Primary hosts: <i>Casuarina equisetifolia</i> (coast she-oak).
Control	No control measures had been recommended
References	<ol style="list-style-type: none"> 1. Ahmad Y. and Ho T. H. (1980). <i>List of economic pests, host plants, parasites and predators in West Malaysia (1920-1978)</i>. Ministry of Agriculture Malaysia. Buletin No. 153:538pp. 2. Anonymous (2002) Crop Protection Compendium. CAB International

2.0 PEST FACT SHEET (STARFRUIT)

Species name	<i>Cacoecia machlopis</i> , Meyr.
Common name	No information
Phylum	Arthropoda
Class	Insecta
Order	Lepidoptera
Family	Tortricidae
Synonym	<i>Archips machlopis</i> Meyrick <i>Cacoecia transcutata</i> <i>Cacoecia isocyrta</i> Meyrick <i>Tortrix isocyrta</i> Meyrick <i>Tortrix transcutata</i> Meyrick
Distribution	Peninsular Malaysia : Leaf (Ahmad & Ho, 1980)
Status	Malaysia: present, no further details (Waterhouse, 1993)
Biology & Ecology	<p>1) Life Cycle no information</p> <p>2) Affected Plant Stages no information</p> <p>3) Affected Plant Parts no information</p> <p>4) Symptom no information</p> <p>5) Damage no information</p>
Host	Primary hosts: <i>Theobroma cacao</i> (cocoa). Citrus.
Control	No control measures had been recommended
References	<ol style="list-style-type: none"> 1. Ahmad Y. and Ho T. H. (1980). <i>List of economic pests, host plants, parasites and predators in West Malaysia (1920-1978)</i>. Ministry of Agriculture Malaysia. Buletin No. 153:538pp. 2. Anonymous (2002) Crop Protection Compendium. CAB International 3. Waterhouse DF, 1993. The major arthropod pests and weeds of agriculture in Southeast Asia. The major arthropod pests and weeds of agriculture in Southeast Asia., v + 141 pp.; [ACIAR Monograph No. 21]; 3 pp. of ref.

3.0 PEST FACT SHEET (STARFRUIT)

Species name	<i>Carpophilus foveicollis</i> , Murr.
Common name	No information
Phyllum	Arthropoda
Class	Insecta
Order	Coleoptera
Family	Nitidulidae
Synonym	No information
Distribution	Peninsular Malaysia : Fruit (Ahmad & Ho, 1980)
Status	No information
Biology & Ecology	<p>1) Life Cycle no information</p> <p>2) Affected Plant Stages no information</p> <p>3) Affected Plant Parts no information</p> <p>4) Symptom no information</p> <p>5) Damage no information</p>
Host	No information
Control	No control measures had been recommended
References	<p>1. Ahmad Y. and Ho T. H. (1980). <i>List of economic pests, host plants, parasites and predators in West Malaysia (1920-1978)</i>. Ministry of Agriculture Malaysia. Buletin No. 153:538pp.</p>

4.0 PEST FACT SHEET (STARFRUIT)

Species name	<i>Dacus (Strumeta) cucurbitae, Coq.</i>
Common name	melon fly melon fruit fly
Phylum	Arthropoda
Class	Insecta
Order	Diptera
Family	Tephritidae
Synonym	<i>Bactrocera cucurbitae</i> Coquillett <i>Bactrocera (Zeugodacus) cucurbitae</i> (Coquillett) <i>Dacus cucurbitae</i> Coquillett <i>Dacus yayeyamanus</i> <i>Chaetodacus cucurbitae</i> (Coquillett) <i>Strumeta cucurbitae</i> Coquillett <i>Zeugodacus cucurbitae</i> (Coquillett)
Distribution	Peninsular Malaysia : Fruit (Ahmad & Ho, 1980)
Status	Malaysia: widespread (EPPO, 2002) Peninsular Malaysia: present, no further details (Drew, 1982; EPPO, 2002) Sabah: present, no further details (Natural History Museum, London; EPPO, 2002) Sarawak: present, no further details (Drew, 1982; EPPO, 2002)
Biology & Ecology	<p>1) Life Cycle Adult</p> <p>Adult description derived from computer-generated description from White and Hancock (1997). Larval description from White and Elson-Harris (1994).</p> <p>Head: Pedicel+1st flagellomere not longer than ptilinal suture. Face with a dark spot in each antennal furrow; facial spot round to elongate. Frons - 2-3 pairs frontal setae; 1 pair orbital setae.</p> <p>Thorax: Predominant colour of scutum red-brown. Postpronotal (=humeral) lobe entirely pale (yellow or orange). Notopleuron yellow. Scutum with parallel sided lateral postsutural vittae (yellow/orange stripes) which extend anterior to suture and posteriorly to level of the intra-alar setae. Medial vitta present; not extended anterior to suture. Scutellum yellow, except for narrow basal band. Anepisternal stripe not reaching anterior notopleural seta. Yellow marking on both anatergite and katatergite. Postpronotal lobe (=humerus) without a seta. Notopleuron with anterior seta. Scutum with or without anterior supra-alar setae; with prescutellar acrostichal setae. Scutellum rarely (5%) with basal as well as apical pair of setae.</p> <p>Wing: Length 4.2-7.1mm. With a complete costal band; depth to below R2+3, sometimes reaching R4+5. Costal band expanded into a spot at apex, which extends about half way to M. With an anal streak. Cells bc and c colourless. May have a transverse mark over crossvein r-m. Always with transverse mark over crossvein dm-cu. Cells bc and c without extensive covering of microtrichia. Cell br</p>

(narrowed part) with extensive covering of microtrichia.

Legs: All femora pale basally, red-brown apically.

Abdomen: Predominant colour orange-brown. Tergites not fused. Abdomen not wasp waisted. Pattern distinct; transverse band across tergite 3; tergite 4 dark laterally; medial longitudinal stripe on T3-5.

Terminalia and secondary sexual characters: male wing without a bulla. Male tergite 3 with a pecten (setal comb) on each side. Male sternite 5 not V-shaped. Surstylus (male) with a long posterior lobe. Wing (male) with a deep indent in posterior margin. Hind tibia (male) with a preapical pad. Aculeus apex pointed.

Egg

The egg of *Bactrocera olae* was described in detail by Margaritis (1985) and those of other species are probably very similar. Size, 0.8 mm long, 0.2 mm wide, with the micropyle protruding slightly at the anterior end. The chorion is reticulate (requires scanning electron microscope examination). White to yellow-white in colour.

Larva

Third instar larva: Large, length 9.0-11.0 mm; width 1.0-2.0 mm. Head: Stomal sensory organ small, completely surrounded by 6-7 large preoral lobes, some bearing serrated edges similar to oral ridges; oral ridges with 17-23 rows of moderately long, uniform, bluntly rounded teeth; accessory plates numerous, with serrated edges and interlocking with oral ridges; mouthhooks large, heavily sclerotized, each with a small but well defined preapical tooth. Thoracic and abdominal segments: anterior portion of T1 with an encircling, broad band of spinules which dorsally and laterally form small plates 7-10 rows deep, becoming discontinuous rows ventrally; T2 with smaller, stouter spinules, forming 5-7 discontinuous rows around anterior portion of segment; T3 similar to T2, but reduced to 4-6 rows. Creeping welts obvious, with 9-13 rows of small spinules. A8 with large well rounded intermediate areas, almost linked by a large, slightly curved, pigmented transverse line (mature larvae only). Tubercles and sensilla well defined. Anterior spiracles: 16-20 tubules. Posterior spiracles: spiracular slits large, with heavily sclerotized rimae; about 3 times as long as broad. Spiracular hairs long, fine and often branched in apical half; dorsal and ventral bundles of 6-12 spiracular hairs; lateral bundles of 4-6 hairs. Anal area: lobes large with a lightly sculptured surface, surrounded by 3-7 rows of spinules. Around outer edges spinules small, in discontinuous rows; closer to anal lobes, spinules becoming stouter, and forming small groups below anal opening.

Puparium

Barrel-shaped with most larval features unrecognisable, the exception being the anterior and posterior spiracles which are little changed by pupariation. White to yellow-brown in colour. Usually about 60-80% length of larva.

	<p>2) Affected Plant Stages Flowering stage, fruiting stage, and post-harvest.</p> <p>3) Affected Plant Parts Leaves, stems, roots, inflorescence, and fruits/pods.</p> <p>4) Symptom Following oviposition there may be some necrosis around the puncture mark ('sting'). This is followed by decomposition of the fruit.</p> <p>Descriptors: Leaves: internal feeding. Stems: internal feeding. Roots: internal feeding. Inflorescence: internal feeding. Fruits/pods: internal feeding; lesions: black or brown.</p> <p>5) Damage B. cucurbitae is a very serious pest of cucurbit crops throughout its native range (tropical Asia) and in introduced areas such as the Hawaiian Islands. Damage levels can be anything up to 100% of unprotected fruit.</p>
<p>Host</p>	<p>Primary hosts are species of Cucurbitaceae, as follows: <i>Cucumis melo</i> (Drew, 1989; Allwood et al., 2000), <i>Cucurbita maxima</i> (Tsuruta et al., 1997; Allwood et al., 2000), <i>Cucurbita pepo</i> (Drew, 1989; Allwood et al., 2000) and <i>Trichosanthes cucumerina</i> (Tsuruta et al., 1997; Allwood et al., 2000).</p> <p>Secondary Hosts are species of Cucurbitaceae and rarely species of other families, as follows: Cucurbitaceae: <i>Benincasa hispida</i> (Allwood et al., 2000) fruit and flowers, <i>Citrullus colocynthis</i> (White and Elson-Harris, 1994), <i>Citrullus lanatus</i> (Allwood et al., 2000), <i>Coccinia grandis</i> (Tsuruta et al., 1997; Allwood et al., 2000) fruit and flowers, <i>Cucumis anguria</i> (Ravi et al., 1998), <i>Cucumis sativus</i> (Drew, 1989; Tsuruta et al., 1997; Allwood et al., 2000), <i>Cucurbita moschata</i> (Allwood et al., 2000) fruit and flowers, <i>Lagenaria siceraria</i> (Tsuruta et al., 1997; Allwood et al., 2000), <i>Luffa acutangula</i> (Tsuruta et al., 1997; Allwood et al., 2000), <i>Luffa aegyptiaca</i> (Allwood et al., 2000) fruit and flowers, <i>Momordica balsamina</i> (White and Elson-Harris, 1994), <i>M. charantia</i> (Drew, 1989; Tsuruta et al., 1997; Allwood et al., 2000), <i>M. cochinchinensis</i> (White and Elson-Harris, 1994) and <i>M. dioica</i> (Ranganath and Veenakumari, 1995).</p> <p>Caricaceae: <i>Carica papaya</i> (Tsuruta et al., 1997); Fabaceae: <i>Phaseolus vulgaris</i>, <i>Vigna sinensis</i> and <i>V. unguiculata</i> (Allwood et al., 2000); Loganiaceae: <i>Strychnos nux-vomica</i> (Tsuruta et al., 1997); Malvaceae: <i>Abelmoschus moschatus</i> (Allwood et al., 2000); Myrtaceae: <i>Psidium guajava</i> (Allwood et al., 2000); Pandanaceae: <i>Pandanus odoratissimus</i> (Tsuruta et al., 1997); Passifloraceae: <i>Passiflora edulis</i> (Tsuruta et al., 1997); Rhamnaceae: <i>Ziziphus jujuba</i> (Allwood et al., 2000); Sapotaceae: <i>Manilkara zapota</i> (Allwood et al., 2000); Solanaceae: <i>Lycopersicon esculentum</i> (Allwood et al., 2000).</p>

Control	No control measures had been recommended
References	<ol style="list-style-type: none"> <li data-bbox="496 232 1331 360">1. Ahmad Y. and Ho T. H. (1980). <i>List of economic pests, host plants, parasites and predators in West Malaysia (1920-1978)</i>. Ministry of Agriculture Malaysia. Buletin No. 153:538pp. <li data-bbox="496 398 1267 461">2. Anonymous (2002) Crop Protection Compendium. CAB International <li data-bbox="496 499 1347 696">3. Allwood AL, Chinajariyawong A, Drew RAI, Hamacek EL, Hancock DL, Hengsawad C, Jipanin JC, Jirasurat M, Kong Krong C, Kritsaneepaiboon S, Leong CTS, Vijaysegaran S, 1999. Host plant records for fruit flies (Diptera: Tephritidae) in Southeast Asia. Raffles Bulletin of Zoology, Supplement, in press. <li data-bbox="496 734 1347 862">4. Drew RAI, 1982. I. Taxonomy, In: Drew RAI, Hooper, GHS, Bateman MA, eds. Economic Fruit Flies of the South Pacific Region. 2nd ed. Brisbane, Australia: Queensland Department of Primary Industries, 1-97. <li data-bbox="496 900 1331 1030">5. Ranganath HR, Suryanarayana MA, Veenakumari K, 1997. Management of melon fly (<i>Bactrocera</i> (<i>Zeugodacus</i>) <i>cucurbitae</i> Coquillett) in cucurbits in South Andaman. Insect Environment, 3(2):32-33. <li data-bbox="496 1068 1347 1198">6. Tsuruta K, White IM, Bandara HMJ, Rajapakse H, Sundaraperuma SAH, Kahawatta SBMUC, Rajapakse GBJP, 1997. A preliminary notes on the hosts of fruit flies of the tribe Dacini Diptera, Tephritidae) in Sri Lanka. Esakia, 37:149-160. <li data-bbox="496 1236 1331 1332">7. White IM, Elson-Harris MM, 1994. Fruit Flies of Economic Significance; Their Identification and Bionomics. Wallingford, UK: CAB International. <li data-bbox="496 1370 1315 1467">8. White IM, Hancock DL, 1997. CABIKEY to the Dacini (Diptera, Tephritidae) of the Asian, Pacific and Australasian Regions. Wallingford, UK: CAB International.

4.0 PEST FACT SHEET (STARFRUIT)

Species name	<i>Dacus (Strumeta) sp. dorsalis</i>, Hend.
Common name	Oriental fruit fly
Phylum	Arthropoda
Class	Insecta
Order	Diptera
Family	Tephritidae
Synonym	<p><i>Bactrocera dorsalis</i> (Hendel, 1912) <i>Bactrocera conformis</i> Doleschall, 1858, preocc. <i>Bactrocera ferrugineus</i> (Fabricius) <i>Chaetodacus dorsalis</i> (Hendel) <i>Chaetodacus ferrugineus</i> (Fabricius) <i>Chaetodacus ferrugineus dorsalis</i> (Hendel) <i>Chaetodacus ferrugineus okinawanus</i> Shiraki, 1933 <i>Dacus dorsalis</i> Hendel, 1912 <i>Dacus ferrugineus</i> (Fabricius) <i>Dacus ferrugineus dorsalis</i> Fabricius <i>Dacus ferrugineus okinawanus</i> (Shiraki) <i>Dacus ferrugineus var. dorsalis</i> Fabricius <i>Musca ferruginea</i> Fabricius, 1794, preocc. <i>Strumeta dorsalis</i> (Hendel) <i>Strumeta ferrugineus</i> (Fabricius)</p>
Distribution	Peninsular Malaysia : Fruit (Ahmad & Ho, 1980)
Status	Malaysia: absent, invalid record (EPPO, 2002)
Biology & Ecology	<p>1) Life Cycle Eggs of <i>B. dorsalis</i> are laid below the skin of the host fruit. These hatch within a day (although delayed up to 20 days in cool conditions) and the larvae feed for another 6-35 days, depending on season. Pupariation is in the soil under the host plant for 10-12 days but may be delayed for up to 90 days under cool conditions. Adults occur throughout the year and begin mating after about 8-12 days, and may live 1-3 months depending on temperature (up to 12 months in cool conditions) (Christenson and Foote, 1960). Adult flight and the transport of infected fruit are the major means of movement and dispersal to previously uninfested areas. Many <i>Bactrocera</i> spp. can fly 50-100 km (Fletcher, 1989).</p> <p>2) Affected Plant Stages Fruiting stage, and post-harvest.</p> <p>3) Affected Plant Parts Fruits/pods.</p> <p>4) Symptom Following oviposition there may be some necrosis around the puncture mark ('sting'). This is followed by decomposition of the fruit.</p> <p>Descriptors: Fruits/pods: internal feeding; lesions: black or brown; premature drop.</p>

	<p>5) Damage <i>B. dorsalis</i> is a very serious pest of a wide variety of fruits and vegetables throughout its range and damage levels can be anything up to 100% of unprotected fruit.</p>
Host	<p>Primary hosts: <i>Artocarpus altilis</i> (breadfruit), <i>Artocarpus heterophyllus</i> (jackfruit), <i>Aegle marmelos</i> (bael fruit), <i>Anacardium occidentale</i> (cashew nut), <i>Areca catechu</i> (betelnut palm), <i>Citrus aurantiifolia</i> (lime), <i>Coffea arabica</i> (arabica coffee), <i>Chrysophyllum cainito</i> (caimito), <i>Cucumis melo</i> (melon), <i>Cucumis sativus</i> (cucumber), <i>Dimocarpus longan</i> (longan tree), <i>Diospyros kaki</i> (oriental persimmon), <i>Ficus racemosa</i> (cluster tree), <i>Flacourtia indica</i>, <i>Mimusops elengi</i> (Asian bulletwood), <i>Mangifera foetida</i> (bachang), <i>Manilkara zapota</i> (sapodilla), <i>Momordica charantia</i> (balsam apple), <i>Nephelium lappaceum</i> (rambutan), <i>Prunus avium</i> (gean), <i>Prunus cerasus</i> (sour cherry), <i>Prunus mume</i> (Japanese apricot tree), <i>Punica granatum</i> (pomegranate), <i>Spondias purpurea</i>, <i>Syzygium aromaticum</i> (clove), <i>Syzygium cumini</i> (black olum tree), <i>Ziziphus jujuba</i> (common jujube), <i>Ziziphus mauritiana</i> (Chinese date), <i>Malus pumila</i> (apple), <i>Psidium guajava</i> (common guava), <i>Mangifera indica</i> (mango), <i>Prunus persica</i> (peach), <i>Pyrus communis</i> (European pear), <i>Annona reticulata</i> (bullock's heart), <i>Annona squamosa</i> (sugarapple), <i>Averrhoa carambola</i> (carambola), <i>Carica papaya</i> (papaw), Citrus, <i>Citrus maxima</i> (pummelo), <i>Citrus reticulata</i> (mandarin), <i>Capsicum annuum</i> (bell pepper), <i>Malpighia glabra</i> (acerola), <i>Musa</i> (banana), <i>Muntingia calabura</i> (Jamaica cherry), <i>Persea americana</i> (avocado), <i>Prunus armeniaca</i> (apricot), <i>Prunus domestica</i> (damson), <i>Syzygium aqueum</i> (water apple), <i>Syzygium jambos</i> (rose apple), <i>Syzygium malaccense</i> (malay-apple), <i>Syzygium samarangense</i> (malay apple), <i>Terminalia catappa</i> (beach almond).</p> <p><i>Litchi chinensis</i> (leechee).</p>
Control	No control measures had been recommended
References	<ol style="list-style-type: none"> Ahmad Y. and Ho T. H. (1980). <i>List of economic pests, host plants, parasites and predators in West Malaysia (1920-1978)</i>. Ministry of Agriculture Malaysia. Buletin No. 153:538pp. Anonymous (2002) <i>Crop Protection Compendium</i>. CAB International Christenson LD, Foote RH, 1960. Biology of fruit flies. <i>Annual Review of Entomology</i>, 5:171-192. Fletcher BS, 1989. Ecology; life history strategies of tephritid fruit flies, In: Robinson AS, Hooper G, eds. <i>Fruit Flies; their Biology, Natural Enemies and Control</i>. World Crop Pests. Amsterdam, Holland: Elsevier, 3(B):195-208.

5.0 PEST FACT SHEET (STARFRUIT)

Species name	<i>Dacus ferrugineus</i> , F.
Common name	No information
Phyllum	No information
Class	No information
Order	Diptera
Family	Tephritidae
Synonym	No information
Distribution	Peninsular Malaysia : Fruit (Ahmad & Ho, 1980)
Status	No information
Biology & Ecology	<p>1) Life Cycle no information</p> <p>2) Affected Plant Stages no information</p> <p>3) Affected Plant Parts no information</p> <p>4) Symptom no information</p> <p>5) Damage no information</p>
Host	No information
Control	No control measures had been recommended
References	1. Ahmad Y. and Ho T. H. (1980). <i>List of economic pests, host plants, parasites and predators in West Malaysia (1920-1978)</i> . Ministry of Agriculture Malaysia. Buletin No. 153:538pp.

6.0 PEST FACT SHEET (STARFRUIT)

Species name	<i>Dacus latifrons</i>, (Hendel).
Common name	Malaysian fruit fly Solanum fruit fly
Phylum	Arthropoda
Class	Insecta
Order	Diptera
Family	Tephritidae
Synonym	<i>Bactrocera (Bactrocera) latifrons</i> (Hendel) <i>Chaetodacus antennalis</i> Shiraki, 1933 <i>Chaetodacus latifrons</i> Hendel <i>Dacus latifrons</i> (Hendel) <i>Dacus parvulus</i> Hendel, 1912
Distribution	Peninsular Malaysia : Fruit (Ahmad & Ho, 1980)
Status	[Malaysia] Peninsular Malaysia: present, no further details (NHM, London, UK; EPPO, 2002) Sabah: present, no further details (NHM, London, UK; EPPO, 2002)
Biology & Ecology	<p>1) Life Cycle Eggs (9-587 eggs) are laid below the skin of the host fruit. These hatch within a few days (mean 2.3) and the larvae feed for about a week (mean 8.5 days). Pupariation is in the soil under the host plant for little over a week (mean 10.2 days). Adults occur throughout the year and females begin oviposition after 6-17 days, and continue laying eggs for 6-117 days; data from Vargas and Nishida (1985). Adult flight and the transport of infected fruit are the major means of movement and dispersal of <i>Bactrocera</i> spp. to previously uninfected areas. Many <i>Bactrocera</i> spp. can fly 50-100 km (Fletcher, 1989).</p> <p>A pre-adult life-table for <i>B. latifrons</i> was produced by Vargas and Nishida (1985) and further ecological studies were carried out by Liquido et al. (1994) who showed that <i>B. latifrons</i> outcompeted <i>B. dorsalis</i>, <i>B. cucurbitae</i> and <i>Ceratitis capitata</i> in its Solanaceous hosts but not in its non-Solanaceous hosts.</p> <p>2) Affected Plant Stages Fruiting stage.</p> <p>3) Affected Plant Parts Fruits/pods.</p> <p>4) Symptom Following oviposition there may be some necrosis around the puncture mark ("sting"). This is followed by decomposition of the fruit.</p> <p>5) Damage This is a pest of solanaceous crops throughout its range (see List of Hosts).</p>
Host	Primary hosts: <i>Capsicum</i> (peppers), <i>Capsicum annuum</i> (bell pepper), <i>Solanum nigrum</i> (black nightshade).

	Secondary hosts: <i>Capsicum frutescens</i> (chilli), <i>Lycopersicon esculentum</i> (tomato), <i>Lycopersicon pimpinellifolium</i> (currant tomato), <i>Physalis peruviana</i> (cape gooseberry), <i>Solanum incanum</i> ,
Control	No control measures had been recommended
References	<ol style="list-style-type: none"> 1. Ahmad Y. and Ho T. H. (1980). <i>List of economic pests, host plants, parasites and predators in West Malaysia (1920-1978)</i>. Ministry of Agriculture Malaysia. Buletin No. 153:538pp. 2. Anonymous (2002) Crop Protection Compendium. CAB International 3. EPPO, 2002. PQR database (version 4.1). Paris, France: European and Mediterranean Plant Protection Organization. 4. Fletcher BS, 1989. Ecology; life history strategies of tephritid fruit flies, In: Robinson AS, Hooper G, eds. <i>Fruit Flies; their Biology, Natural Enemies and Control</i>. World Crop Pests. Amsterdam, Holland: Elsevier, 3(B):195-208. 5. Liquido NJ, Harris EJ, Dekker LA, 1994. Ecology of <i>Bactrocera latifrons</i> (Diptera: Tephritidae) populations: host plants, natural enemies, distribution, and abundance. <i>Annals of the Entomological Society of America</i>, 87(1):71-84; 45 ref.

7.0 PEST FACT SHEET (STARFRUIT)

Species name	<i>Drosophila ananassae</i> , Dol.
Common name	No information
Phyllum	No information
Class	No information
Order	Diptera
Family	Drosophilidae
Synonym	No information
Distribution	Peninsular Malaysia : Fruit (Ahmad & Ho, 1980)
Status	No information
Biology & Ecology	<p>1) Life Cycle no information</p> <p>2) Affected Plant Stages no information</p> <p>3) Affected Plant Parts no information</p> <p>4) Symptom no information</p> <p>5) Damage no information</p>
Host	No information
Control	No control measures had been recommended
References	<p>1. Ahmad Y. and Ho T. H. (1980). <i>List of economic pests, host plants, parasites and predators in West Malaysia (1920-1978)</i>. Ministry of Agriculture Malaysia. Buletin No. 153:538pp.</p>

8.0 PEST FACT SHEET (STARFRUIT)

Species name	<i>Haptoncus luteolus</i> , (Erichson)
Common name	No information
Phylum	Arthropoda
Class	Insecta
Order	Coleoptera
Family	Nitidulidae
Synonym	<i>Epuraea luteola</i> Er.
Distribution	Peninsular Malaysia : Fruit (Ahmad & Ho, 1980)
Status	No information
Biology & Ecology	<p>1) Life Cycle no information</p> <p>2) Affected Plant Stages no information</p> <p>3) Affected Plant Parts no information</p> <p>4) Symptom no information</p> <p>5) Damage no information</p>
Host	<i>Annona</i> , <i>Ficus carica</i> (common fig), <i>Malus pumila</i> (apple), <i>Phoenix dactylifera</i> (date-palm), <i>Prunus persica</i> (peach).
Control	No control measures had been recommended
References	<ol style="list-style-type: none"> 1. Ahmad Y. and Ho T. H. (1980). <i>List of economic pests, host plants, parasites and predators in West Malaysia (1920-1978)</i>. Ministry of Agriculture Malaysia. Buletin No. 153:538pp. 2. Anonymous (2002) <i>Crop Protection Compendium</i>. CAB International

9.0 PEST FACT SHEET (STARFRUIT)

Species name	<i>Helina propinqua</i> , Stn.
Common name	No information
Phyllum	No information
Class	No information
Order	Diptera
Family	Anthomidae
Synonym	No information
Distribution	Peninsular Malaysia : Fruit (Ahmad & Ho, 1980)
Status	No information
Biology & Ecology	<p>1) Life Cycle no information</p> <p>2) Affected Plant Stages no information</p> <p>3) Affected Plant Parts no information</p> <p>4) Symptom no information</p> <p>5) Damage no information</p>
Host	No information
Control	No control measures had been recommended
References	1. Ahmad Y. and Ho T. H. (1980). <i>List of economic pests, host plants, parasites and predators in West Malaysia (1920-1978)</i> . Ministry of Agriculture Malaysia. Buletin No. 153:538pp.

10.0 PEST FACT SHEET (STARFRUIT)

Species name	<i>Lamprosema charasalis</i> , Walk.
Common name	No information
Phyllum	No information
Class	No information
Order	Lepidoptera
Family	Pyraustidae
Synonym	No information
Distribution	Peninsular Malaysia : Fruit (Ahmad & Ho, 1980)
Status	No information
Biology & Ecology	<p>1) Life Cycle no information</p> <p>2) Affected Plant Stages no information</p> <p>3) Affected Plant Parts no information</p> <p>4) Symptom no information</p> <p>5) Damage no information</p>
Host	No information
Control	No control measures had been recommended
References	1. Ahmad Y. and Ho T. H. (1980). <i>List of economic pests, host plants, parasites and predators in West Malaysia (1920-1978)</i> . Ministry of Agriculture Malaysia. Buletin No. 153:538pp.

11.0 PEST FACT SHEET (STARFRUIT)

Species name	<i>Lasiodactylus pictus</i> , Mcl.
Common name	No information
Phyllum	No information
Class	No information
Order	Coleoptera
Family	Nitidulidae
Synonym	No information
Distribution	Peninsular Malaysia : Leaf (Ahmad & Ho, 1980)
Status	No information
Biology & Ecology	<p>1) Life Cycle no information</p> <p>2) Affected Plant Stages no information</p> <p>3) Affected Plant Parts no information</p> <p>4) Symptom no information</p> <p>5) Damage no information</p>
Host	No information
Control	No control measures had been recommended
References	1. Ahmad Y. and Ho T. H. (1980). <i>List of economic pests, host plants, parasites and predators in West Malaysia (1920-1978)</i> . Ministry of Agriculture Malaysia. Buletin No. 153:538pp.

12.0 PEST FACT SHEET (STARFRUIT)

Species name	<i>Rapala pheretima sequiera</i> , Dist
Common name	No information
Phylum	Arthropoda
Class	Insecta
Order	Lepidoptera
Family	Lycaenidae
Synonym	<i>Rapala pheretima</i> (Hewitson)
Distribution	Peninsular Malaysia : Leaf (Ahmad & Ho, 1980)
Status	Malaysia: present, no further details (Waterhouse, 1993)
Biology & Ecology	<p>1) Life Cycle no information</p> <p>2) Affected Plant Stages no information</p> <p>3) Affected Plant Parts no information</p> <p>4) Symptom no information</p> <p>5) Damage no information</p>
Host	Primary hosts: <i>Nephelium lappaceum</i> (rambutan).
Control	No control measures had been recommended
References	<ol style="list-style-type: none"> 1. Ahmad Y. and Ho T. H. (1980). <i>List of economic pests, host plants, parasites and predators in West Malaysia (1920-1978)</i>. Ministry of Agriculture Malaysia. Buletin No. 153:538pp. 2. Anonymous (2002) Crop Protection Compendium. CAB International 3. Waterhouse DF, 1993. The major arthropod pests and weeds of agriculture in Southeast Asia. The major arthropod pests and weeds of agriculture in Southeast Asia., v + 141 pp.; [ACIAR Monograph No. 21]; 3 pp. of ref.

13.0 PEST FACT SHEET (STARFRUIT)

Species name	<i>Stomoxys calcitrans</i> , L.
Common name	No information
Phyllum	No information
Class	No information
Order	Diptera
Family	Muscidae
Synonym	No information
Distribution	Peninsular Malaysia : Fruit (Ahmad & Ho, 1980)
Status	No information
Biology & Ecology	<p>1) Life Cycle no information</p> <p>2) Affected Plant Stages no information</p> <p>3) Affected Plant Parts no information</p> <p>4) Symptom no information</p> <p>5) Damage no information</p>
Host	No information
Control	No control measures had been recommended
References	<p>1. Ahmad Y. and Ho T. H. (1980). <i>List of economic pests, host plants, parasites and predators in West Malaysia (1920-1978)</i>. Ministry of Agriculture Malaysia. Buletin No. 153:538pp.</p>

14.0 PEST FACT SHEET (STARFRUIT)

Species name	<i>Dacus dorsalis</i> complex
Common name	Oriental fruit fly species complex
Phylum	Arthropoda
Class	Insecta
Order	Diptera
Family	Tephritidae
Synonym	<i>Bactrocera dorsalis</i> species complex
Distribution	Malaysia (M. A. Rahman, A. Izham, M. L. Raziah (1992))
Status	Malaysia: present, no further details (Waterhouse, 1993) Peninsular Malaysia: present, no further details (Drew & Hancock, 1994) Sabah: present, no further details (Drew & Hancock, 1994)
Biology & Ecology	<p>1) Life Cycle The biology of <i>B. dorsalis</i> is probably typical of the group. Eggs of <i>B. dorsalis</i> are laid below the skin of the host fruit. These hatch within a day (although delayed up to 20 days in cool conditions) and the larvae feed for another 6-35 days, depending on season. Pupariation is in the soil under the host plant for 10-12 days but may be delayed for up to 90 days under cool conditions. Adults occur throughout the year and begin mating after about 8-12 days, and may live 1-3 months depending on temperature (up to 12 months in cool conditions) (Christenson and Foote, 1960). Adult flight and the transport of infected fruit are the major means of movement and dispersal to previously uninfested areas. Many <i>Bactrocera</i> spp. can fly 50-100 km (Fletcher, 1989).</p> <p>2) Affected Plant Stages Fruiting stage.</p> <p>3) Affected Plant Parts Fruits/pods</p> <p>4) Symptom Following oviposition there may be some necrosis around the puncture mark ('sting'). This is followed by decomposition of the fruit.</p> <p>Descriptors: Fruits/pods: internal feeding; lesions: black or brown; premature drop.</p> <p>5) Damage <i>B. dorsalis</i> is a very serious pest of a wide variety of fruits and vegetables throughout its range and damage levels can be anything up to 100% of unprotected fruit. <i>B. carambolae</i> and <i>B. papayae</i> are also very serious pests in Malaysia and the recent outbreak of <i>B. papayae</i> in northern Queensland caused a great deal of concern; both of these species attack some of their hosts at the pre-ripe stage (D. L. Hancock, Queensland Department of Primary Industries, Australia, personal communication, 1996) and <i>B. carambolae</i> attacks such small carambola fruits that bagging (a normally effective control) is quite impractical. In the Philippines mango is very heavily attacked</p>

	by both <i>B. philippinensis</i> and <i>B. occipitalis</i> (although trapping suggests the latter is of less importance than the former) following the onset of ripening.
Host	<p>Primary hosts: <i>Artocarpus altilis</i> (breadfruit), <i>Annona muricata</i> (soursop), <i>Annona reticulata</i> (bullock's heart), <i>Annona squamosa</i> (sugarapple), <i>Averrhoa carambola</i> (carambola), <i>Carica papaya</i> (papaw), Citrus, <i>Citrus maxima</i> (pummelo), <i>Citrus limon</i> (lemon), <i>Citrullus lanatus</i> (watermelon), <i>Coffea</i> (coffee), <i>Capsicum annuum</i> (bell pepper), <i>Ficus</i>, <i>Lycopersicon esculentum</i> (tomato), <i>Mangifera indica</i> (mango), <i>Musa</i> (banana), <i>Musa paradisiaca</i> (plantain), <i>Psidium guajava</i> (common guava), <i>Psidium longipes</i> (strawberry guava), <i>Syzygium malaccense</i> (malay-apple), <i>Syzygium samarangense</i> (malay apple).</p> <p>Secondary hosts: <i>Artocarpus heterophyllus</i> (jackfruit), <i>Arenga pinnata</i> (sugar palm), <i>Anacardium occidentale</i> (cashew nut), <i>Averrhoa bilimbi</i>, <i>Citrus x paradisi</i> (grapefruit), <i>Nephelium lappaceum</i> (rambutan),</p>
Control	No control measures had been recommended
References	<ol style="list-style-type: none"> 1. M. A. Rahman, A. Izham, M. L. Raziah (1992). Panduan Pengeluaran Belimbing. Bahagian Penyelidikan Buah-Buahan, Stesen Ibu Pejabat MARDI Serdang, Peti Surat 12301, 50774 Kuala Lumpur. 26 pp. 2. Anonymous (2002) Crop Protection Compendium. CAB International Christenson LD, Foote RH, 1960. Biology of fruit flies. Annual Review of Entomology, 5:171-192. 3. Fletcher BS, 1989. Ecology; life history strategies of tephritid fruit flies, In: Robinson AS, Hooper G, eds. Fruit Flies; their Biology, Natural Enemies and Control. World Crop Pests. Amsterdam, Holland: Elsevier, 3(B):195-208 4. Hancock DL, Hamacek EL, Lloyd AC, Elson-Harris MM, 2000. The distribution and host plants of fruit flies (Diptera: Tephritidae) in Australia. Department of Primary Industries, Queensland, Information Series Q199067: 1-75. 5. Waterhouse DF, 1993. The major arthropod pests and weeds of agriculture in Southeast Asia. The major arthropod pests and weeds of agriculture in Southeast Asia., v + 141 pp.; [ACIAR Monograph No. 21]; 3 pp. of ref.

15.0 PEST FACT SHEET (STARFRUIT)

Species name	<i>Cryptophlebia encarpa</i> (Meyrick)
Common name	cocoa huskborer cacao husk borer cacao husk borer
Phylum	Arthropoda
Class	Insecta
Order	Lepidoptera
Family	Tortricidae
Synonym	No information
Distribution	Malaysia (M. A. Rahman, A. Izham, M. L. Raziah (1992))
Status	Malaysia: present, no further details (Waterhouse, 1993)
Biology & Ecology	<p>1) Life Cycle no information</p> <p>2) Affected Plant Stages Fruiting stage.</p> <p>3) Affected Plant Parts Leaves, fruits/pods and seeds.</p> <p>4) Symptom no information</p> <p>5) Damage no information</p>
Host	Primary hosts: <i>Theobroma cacao</i> (cocoa).
Control	No control measures had been recommended
References	<ol style="list-style-type: none"> 1. M. A. Rahman, A. Izham, M. L. Raziah (1992). Panduan Pengeluaran Belimbing. Bahagian Penyelidikan Buah-Buahan, Stesen Ibu Pejabat MARDI Serdang, Peti Surat 12301, 50774 Kuala Lumpur. 26 pp. 2. Anonymous (2002) Crop Protection Compendium. CAB International 3. Waterhouse DF, 1993. The major arthropod pests and weeds of agriculture in Southeast Asia. The major arthropod pests and weeds of agriculture in Southeast Asia., v + 141 pp.; [ACIAR Monograph No. 21]; 3 pp. of ref.

16.0 PEST FACT SHEET (STARFRUIT)

Species name	<i>Diacrotricha fasciola</i> Zeller
Common name	No information
Phylum	Arthropoda
Class	Insecta
Order	Lepidoptera
Family	Pterophoridae
Synonym	No information
Distribution	Malaysia (M. A. Rahman, A. Izham, M. L. Raziah (1992))
Status	Malaysia: present, no further details (Waterhouse, 1993)
Biology & Ecology	<p>1) Life Cycle no information</p> <p>2) Affected Plant Stages Fruiting stage.</p> <p>3) Affected Plant Parts Leaves, fruits/pods and seeds.</p> <p>4) Symptom no information</p> <p>5) Damage no information</p>
Host	Primary hosts: <i>Averrhoa carambola</i> (carambola).
Control	No control measures had been recommended
References	<ol style="list-style-type: none"> 1. M. A. Rahman, A. Izham, M. L. Raziah (1992). Panduan Pengeluaran Belimbing. Bahagian Penyelidikan Buah-Buahan, Stesen Ibu Pejabat MARDI Serdang, Peti Surat 12301, 50774 Kuala Lumpur. 26 pp. 2. Anonymous (2002) Crop Protection Compendium. CAB International 3. Waterhouse DF, 1993. The major arthropod pests and weeds of agriculture in Southeast Asia. The major arthropod pests and weeds of agriculture in Southeast Asia., v + 141 pp.; [ACIAR Monograph No. 21]; 3 pp. of ref.

17.0 PEST FACT SHEET (STARFRUIT)

Species name	<i>Euproctis scintillans</i> (Walker)
Common name	No information
Phylum	Arthropoda
Class	Insecta
Order	Lepidoptera
Family	Lymantriidae
Synonym	<i>Porthesia scintillans</i> Walker <i>Nygmia scintillans</i> Walker
Distribution	Malaysia (M. A. Rahman, A. Izham, M. L. Raziah (1992))
Status	Malaysia: present, no further details (Waterhouse, 1993)
Biology & Ecology	<p>1) Life Cycle no information</p> <p>2) Affected Plant Stages Fruiting stage.</p> <p>3) Affected Plant Parts Leaves, fruits/pods and seeds.</p> <p>4) Symptom no information</p> <p>5) Damage no information</p>
Host	Primary hosts: <i>Averrhoa carambola</i> (carambola), <i>Nephelium lappaceum</i> (rambutan), polifago (polyphagous), , <i>Vigna unguiculata</i> (cowpea), <i>Capsicum</i> (peppers).
Control	No control measures had been recommended
References	<ol style="list-style-type: none"> 1. M. A. Rahman, A. Izham, M. L. Raziah (1992). Panduan Pengeluaran Belimbing. Bahagian Penyelidikan Buah-Buahan, Stesen Ibu Pejabat MARDI Serdang, Peti Surat 12301, 50774 Kuala Lumpur. 26 pp. 2. Anonymous (2002) Crop Protection Compendium. CAB International 3. Waterhouse DF, 1993. The major arthropod pests and weeds of agriculture in Southeast Asia. The major arthropod pests and weeds of agriculture in Southeast Asia., v + 141 pp.; [ACIAR Monograph No. 21]; 3 pp. of ref.

18.0 PEST FACT SHEET (STARFRUIT)

Species name	<i>Archips tabescens</i> (Meyrick)
Common name	No information
Phylum	Arthropoda
Class	Insecta
Order	Lepidoptera
Family	Tortricidae
Synonym	<i>Cacoecia tabescens</i> Meyrick
Distribution	Malaysia (M. A. Rahman, A. Izham, M. L. Raziah (1992))
Status	Malaysia: present, no further details (Waterhouse, 1993)
Biology & Ecology	<p>1) Life Cycle no information</p> <p>2) Affected Plant Stages Fruiting stage.</p> <p>3) Affected Plant Parts Leaves, fruits/pods and seeds.</p> <p>4) Symptom no information</p> <p>5) Damage no information</p>
Host	Primary hosts: <i>Artocarpus heterophyllus</i> (jackfruit), <i>Arachis hypogaea</i> (groundnut).
Control	No control measures had been recommended
References	<ol style="list-style-type: none"> 1. M. A. Rahman, A. Izham, M. L. Raziah (1992). Panduan Pengeluaran Belimbing. Bahagian Penyelidikan Buah-Buahan, Stesen Ibu Pejabat MARDI Serdang, Peti Surat 12301, 50774 Kuala Lumpur. 26 pp. 2. Anonymous (2002) Crop Protection Compendium. CAB International 3. Waterhouse DF, 1993. The major arthropod pests and weeds of agriculture in Southeast Asia. The major arthropod pests and weeds of agriculture in Southeast Asia., v + 141 pp.; [ACIAR Monograph No. 21]; 3 pp. of ref.

19.0 PEST FACT SHEET (STARFRUIT)

Species name	<i>Adoxophyes privatana</i> (Walker)
Common name	leaf-curling moth, apple tea tortrix, small
Phylum	Arthropoda
Class	Insecta
Order	Lepidoptera
Family	Tortricidae
Synonym	No information
Distribution	Malaysia (M. A. Rahman, A. Izham, M. L. Raziah (1992))
Status	Malaysia: present, no further details (Waterhouse, 1993)
Biology & Ecology	<p>1) Life Cycle no information</p> <p>2) Affected Plant Stages Fruiting stage.</p> <p>3) Affected Plant Parts Leaves, fruits/pods and seeds.</p> <p>4) Symptom no information</p> <p>5) Damage no information</p>
Host	Primary hosts: <i>Arachis hypogaea</i> (groundnut), <i>Nephelium lappaceum</i> (rambutan).
Control	No control measures had been recommended
References	<ol style="list-style-type: none"> 1. M. A. Rahman, A. Izham, M. L. Raziah (1992). Panduan Pengeluaran Belimbing. Bahagian Penyelidikan Buah-Buahan, Stesen Ibu Pejabat MARDI Serdang, Peti Surat 12301, 50774 Kuala Lumpur. 26 pp. 2. Anonymous (2002) Crop Protection Compendium. CAB International 3. Waterhouse DF, 1993. The major arthropod pests and weeds of agriculture in Southeast Asia. The major arthropod pests and weeds of agriculture in Southeast Asia., v + 141 pp.; [ACIAR Monograph No. 21]; 3 pp. of ref.

20.0 PEST FACT SHEET (STARFRUIT)

Species name	Indarbela disciplaga <i>Swinch</i>
Common name	No information
Phyllum	Arthropoda
Class	Insecta
Order	Lepidoptera
Family	Metarbelidae
Synonym	No information
Distribution	Malaysia (M. A. Rahman, A. Izham, M. L. Raziah (1992))
Status	No information
Biology & Ecology	<p>1) Life Cycle no information</p> <p>2) Affected Plant Stages Fruiting stage.</p> <p>3) Affected Plant Parts Leaves, fruits/pods and seeds.</p> <p>4) Symptom no information</p> <p>5) Damage no information</p>
Host	No information
Control	No control measures had been recommended
References	<ol style="list-style-type: none"> 1. M. A. Rahman, A. Izham, M. L. Raziah (1992). Panduan Pengeluaran Belimbing. Bahagian Penyelidikan Buah-Buahan, Stesen Ibu Pejabat MARDI Serdang, Peti Surat 12301, 50774 Kuala Lumpur. 26 pp. 2. Anonymous (2002) Crop Protection Compendium. CAB International