Custard apple April

- Ensure the soil suitability by digging of a profile pit of 3 X 3 X 3 ft.
- It can be cultivated in all types of soils including the poor, marginal and degraded soils.
- Collect soil sample for every one feet depth of soil from the suitable lands profile pit dug out.
- Based on soil test report, even if the soil PH is up to 7.5 it is considered as suitable for Custard apple plantation.

May

- Take up summer ploughing with MB plough twice and level the land.
- Alignment and peg marking for pit digging at 6X6 mtr. Spacing between the rows and plants should be given.(110 plants / acre) or at 5X4 mts. (200 plants / acre)
- Pit size to be followed is 60 X 60X 60 Cm.
- **Pit digging:** Dig the pits of 60X60X60 Cm size by placing the top soil to the right side and the bottom soil to the left side of the pit.
- Allow the pit for exposure to sun at least for two weeks before filling the pits to control soil born pest and diseases.
- Make arrangements for procurement of plant material from reliable nurseries preferably from Govt. nurseries or from nurseries recommended by department of horticulture.
- Select high yielding varieties like Balanagar or Hybrid varieties like Arkasahans or FRS Selection 1 (Atemoya X Balanagar).

June

- Pit filling fill the pits with top soil + 20 kgs of Farm Yard Manure (FYM) + 1 kg
 Single Super Phospate and 100 gm. of 10% Follidol dust per pit.
- Fill the pits with the soil at least 6" above the ground level so that when the soil settles it will be at the ground level at planting.
- Ensure thorn fencing or with any thick growing live fence to control cattle trespassing.

- Give mark out for trench cutting and complete the trench cutting for drip installation.
- With the onset of monsoon farmers can sow intercrops.

July

- Procure the grafts of recommended varieties from the selected nurseries by the farmers in coordination with CIG group members.
- Arrange for transportation of plant material from nursery to the planting site.
- Keep the grafts near water source and water them regularly till planting is done.
- If there is any delay in receipt of good rains the pits should be soaked by giving irrigation or by running the drip system. Ensure that the soil in the pit is at ground level other wise level the soil in pits.
- Plant the grafts by keeping in the centre of the pit without disturbing the ball of earth around the root system.
- Water the plant immediately after planting and give a support stick.
- Irrigate the plants at every week to 10 days interval during the first month and later at 10 to 15 days interval if there are no rains during the initial two years.

August

- Weeding should be done at least once in a month during monsoon season to control weeds. Simultaneously the basins around the plant should be made to retain water.
- To avoid Evapo-transpiration losses, mulch the basins with paddy husk or paddy straw or ground nut shells. Mulching also help in the control of weeds in the basins.
- Remove the side shoots which appear from the base of the plant on root stalk.
- Prune the lower branches up to a height of 2 to 3 feet to obtain a perfect shape.

September

• Work out the soils in the basin to keep weed free and improve aeration.

October

• **Gap filling** – If any gaps are noticed due to death of plants should be replaced by taking up gap filling.

- Prune the side shoots which appear from time to time on the root stalk and remove side branches up to the height of 2 to 3 feet.
- Cut the growing shoot to encourage lateral branches.
- If inter crop during June-July is not cultivated, farmers can sow inter crops for rabi season during this month.

November

- Soil working in the basins and mulching to be done.
- Prune the side shoots which appear from time to time on the root stalk and remove side branches up to the height of 2 to 3 feet.
- Ensure regular irrigations at 10 to 15 days interval.

December

- Leaf fall may take place due to low winter temperature.
- Ensure regular irrigations at 10 to 15 days interval.

January

- Leaf fall may take place due to low winter temperature.
- Ensure regular irrigations at 10 to 15 days interval.

February

- Irrigate the plants at 7 to 10 days interval regularly.
- Stem and shoot borer incidence will be severe during this month.
- Check up each and every plant periodically by going round the orchard. If any damage to growing shoots is noticed prevent them by pulling out the borers from the holes of the damaged shoots and injecting petrol or kerosene into the damaged holes and plugging the holes with mud or clay.
- Keep the basins weed free and apply 10 gms of Phorate granules / plant.

March

• Apply one basket full of mulch material to control evapo transpiration loses and weed growth in basins.

April

• Ensure regular irrigation through drip or at least once in 7 to 10 days interval through basins irrigation.

• The tender shoots will be infected with mealy bugs. Control them by spraying Acephate 1gm/lt or Dichlorovas1ml/lt of water.





May

- Ensure regular irrigation through drip or at least once in 7 to 10 days interval through basins irrigation.
- Take up summer ploughing to improve soil health.

Introduction

Custard Apple (Annuna squmos L.) is one of the finest fruits introduced in India from tropical America. It is also found in wild form in many parts of India. It is cultivated in Andhra Pradesh, Maharashtra, Karnataka, Bihar, Orissa, Assam, and Tamil Nadu. It is very hardy, medium in growth and deciduous in nature. The fruits are generally used as fresh, while some products or mixed fruits like custard powders, ice-creams are prepared from the fruits. Besides high nutritive value, it has also a high medicinal value. Unripe fruits, seeds, leaves and roots are considered and used in medicinal preparations.Custard Apple requires hot dry climate during flowering and high humidity at fruit setting.The Custard Apple withstands drought conditions cloudy weather and also when the temperatures go below 15⁰C. Annual rainfall of 50-80 cm is optimum, though it can withstand higher rainfall.It can grow well in deep black soils provided they are well drained.

Varieties

The following are some of the varieties grown in different agro-climatic regions of the country.

- Red Sitaphal
- Balanagar
- Hybrid
- Washington
- Purandhar

Maturity Indices

Require 100 to 120 days for full maturity. Scales on fruits becomes prominent, plummy and well space. On maturity, the fruits turn light green in colour. The inter-areolar space widens, and the fruits turn creamy white. grooves between the carpels widening and lightening in colour (creaming of the grooves may sometimes be present on the shoulders of the fruit). Carpels becoming fuller and more rounded, particularly at the base of fruit (fruit may also appear rounder and less pointed).

Harvesting

Custard apple starts bearing fruits from the fourth year of planting, and yield declines gradually after the fifteenth year. It yields fruits during August to October season in south India and during September to November in the northern parts of the country. The custard apple has the advantage of cropping in late winter and spring when the preferred members of the genus are not in season. It is picked when it has lost all green color and ripens without splitting so that it is readily sold in local markets. If picked green, it will not color well and will be of inferior quality. The tree is naturally a fairly heavy bearer. With adequate care, a mature tree will produce 75 to 100 lbs (34-45 kg) of fruits per year. The short twigs are shed after they have borne flowers and fruits.

Storage & Packaging

Individual film sealing of custard apple extended their shelf life non wrapped fruit had a shelf life of 13 days compared to 17 days of those wrapped with PD-955 (copolymer). Low density polyethylene (LDPE) film was found to be inadequate to package. Fruit should be unwrapped before ripening at room temperature to avoid off flavor development. The marketing potential of custard apple is hampered by its high perishability (at 18–20 °C it will ripen in 3–6 days) and susceptibility to chilling injury. The

optimum temperature for prolonged cold storage of custard apple, depending on the cultivar, ranges between 8 and 15 °C. The safe range of storage temperature for 'Balanagar' sugar apple was found to be between 15 and 20 °C, with maximum shelf life at 15 °C. Fruit ripening was observed on days 4, 6 and 9 during storage at 25, 20 and 15 °C, respectively. Pulp color, texture, taste and flavor of ripe fruit held at 25 and 20 °C were superior followed by fruit stored at 15 °C.

Print



Custard Apple: Diseases and symptoms

OriginalArticle: http://vikaspedia.in/agriculture/crop-production/integrated-pest-managment/ipm-for-fruit-crops/ipm-strategies-for-custard-apple/custard-apple-diseases-and-symptoms

Contents

- 1. Anthracnose
- 2. Leaf spot
- 3. Diplodia rot
- 4. Black canker
- 5. Spiral nematode and Stunt nematode

Anthracnose

Disease symptoms

- Infection begins at blossom-end of the fruit and later spreads on entire fruit surface, affected fruits shrivel and they may cling to the tree or fall down.
- Necrotic spots of 2-10 mm in diameter appear on unripe fruits which turn into dark brown to black spots. These spots coalesce later and cover entire fruit.



Favourable condition

• Wet and windy conditions favour the disease

Survival and spread

• Older fruits left on the trees provide inoculum for disease spread.

Leaf spot

Disease symptoms

- Alternaria leaf spot: Small yellowish spots first appear along the leaf margins, which gradually enlarge and turn into brownish patches with concentric rings. Severe infection leads to drying and defoliation. Dark brown-purplish patches appear on the infected fruits andrachis just below its attachment with the shoots.
- Cylindrocladium leaf spot: Upper: dark purple spots about 1 to 2 mm in diameter develop first on the shoulders of the fruit and then spread down the sides. Spots enlarge and then later dry out and crack. Similar in appearance to spotting bug damage, but spots are irregular in shape whereas spotting bug lesions are round, and damage does not extend very far into the fruit.



Cylindrocladium leaf spot symptoms on leaf and fruit

Survival and spread

• The pathogen survives through spores (conidia) or mycelium in diseased plant debris or other hosts.

Favourable conditions

• Relative humidity above 70% coupled with warm weather (12-25 °C temp.) and intermittent rains favours disease.

Diplodia rot

Disease symptoms

- Diseased fruits show symptoms of purplish to black spots or blotches confined to the surface of the fruit and eventually covered with white mycelia and black pycnidia.
- Diplodia rot is distinguished by its dark internal discolouration and the extensive corky rotting produces.
- The penetrated flesh eventually softens or hardens and cracks, depending on the presence of secondary microbes.



Favourable condition

• Optimum temperature is 25.9°C to 31.5°C and relative humidity is 80%

Survival and spread

• The pathogen persists in infected plant parts which serve as source of inoculums.

Black canker

Disease symptoms

- Irregularly shaped spots ranging from small specks to large blotches.
- Spots have an indistinct 'feathered' edge.
- Tissue damage under the spots is no more than 10 mm deep.



Favourable conditions

• The disease is favored by extremely wet weather and cool-to-moderate temperatures (15°C to 20°C). When prolonged rainy periods exist in the spring and provide at least six hours of continuous wetness

Survival and spread

• The pathogen persists in infected plant parts which serve as source of inoculums.

Spiral nematode and Stunt nematode

Life cycle

• Nematodes molt four times during each life cycle with a molt occurring at the end of each larval stage.

- Therefore, molts separate the first and second larval stages, the second and third larval stages, the third and fourth larval stages, and also the fourth larval stages and immature adults.
- The 5th stage larva grows to the limit of its new cuticle, at the same time developing into a sexually mature adult male or female.

Source: NIPHM, NCIPM and Directorate of Plant Protection, Quarantine & Storage

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Custard Apple: Insect and pest management

OriginalArticle: http://vikaspedia.in/agriculture/crop-production/integrated-

pest-managment/ipm-for-fruit-crops/ipm-strategies-for-custard-apple/custard-apple-insectmite-and-pest-management

Contents

- 1. Mealy bug
- 2. Fruit borer/ Fruit boring caterpillar
- 3. Fruit fly
- 4. Scales

Mealy bug

Biology

- Egg: The egg period is 28-32 days. Female and male adults live for 23 to 28 days, respectively. Pre-oviposition, oviposition and post-oviposition periods is 6-7, 8.-9 and 1-2 days, respectively. The total life span of female and male is 46 -49 and 23 -29 days. The reproduction took place both sexually as well as parthenogenetically and female laid an average of 155 eggs during its life period.
- **Nymph:** Yellow to pale white in colour. It has three to four nymphal instars and the total nymphal period is 21 to 29 days.
- Adult: Females apterous, long, slender covered with white waxy secretions. The life-span of the adult female is 12-31days.



Symptoms of Damage

• The tiny small bugs usually suck sap from twigs, leaves and flowers. Infested fruits will have uneven shapes, poor quality, and are susceptible to secondary infections by pathogens.

Natural enemies of mealybug

• **Predators:** Ladybird beetle namely Menochilus sexmaculatus, Rodolia fumida, Cryptolaemus montrouzieri

Fruit borer/ Fruit boring caterpillar

Biology

- **Eggs:** Eggs are laid singly on immature fruit. Upon hatching, the caterpillar bore into the fruits where they pupate.
- Larva: Fully developed gray to black coloured caterpillars are about 20 mm long.
- Adult: Light brown with transparent wing.



Damage symptoms

- Caterpillar makes irregular tunnels and damages the mesocarp by feeding the internal content of the fruits.
- The presence of excreta of the caterpillars near the entry holes on the affected fruits
- The growth of affected fruits is arrested and later fall down.

Natural enemies of fruit boring caterpillar

• **Predators:** Chrysoperla zastrowii Sellimi, coccinellids, king crow, common mynah, wasp, dragonfly, spider, robber fly, reduviid bug, preying mantid, fire ants, big eyed bugs (Geocoris sp), pentatomid bug (Eocanthecona furcellata), earwigs, ground beetles, rove beetles etc.

Fruit fly

Biology

• Egg: Under optimum conditions, a female can lay more than 3,000 eggs during its lifetime, but under field conditions from 1,200 to 1,500 eggs per female is considered to be the usual production. Development from egg to adult under summer conditions

requires about 16 days.

- Larva: The mature larva emerges from the fruit, drops to the ground, and forms a tan to dark brown puparium.
- Pupa: Pupation occurs in the soil. About nine days are required for attainment of sexual maturity after the adult fly emerges.
- Adult: Brown or dark brown with hyaline wings and yellow legs.

Damage symptoms

- Maggots bore into the semi ripened fruits and feed on the pulp.
- Affected fruits become shrivelled, deformed, rot and drop.

Natural enemies of fruit flies

• Parasitoids: Diachasmimorpha longicaudata, D. tryon, D. kraussi, Fopius arisanus.

Scales

Biology

- **Egg:** The eggs are pink to dark red and are laid under the scale's wax covering of adult females. Females lay about 2000 eggs.
- **Nymph:** First stage (instar) nymphs, called crawlers hatch from eggs over a period of 2 to 3 weeks. Immediately after hatching the first instar crawlers come out which are pink in colour. They disperse on the leaves and twigs and find a suitable feeding place to settle. The crawlers undergo three moults and develop into adults. The wax-covering secreted around their body gives them a star-like appearance. Soft scales have 3 or 4 instars in the female and 5 in the male
- Adult: The adults are elliptical, reddish brown with short anal process. The adult female is reddish which is coated with a thick layer of pinkish-white wax. Adults are mostly found on twigs and branches. The size of the female is about 2 to 4 mm in length and 1 to 3.5 mm in width. Males are not known in this species. Females have 2 to 3 immature stages without any pupa-like instars while males have 4 immature stages with the two pupa-like instars.



Damage symptoms

• The direct damage is caused by insertion of stylets during feeding by the nymphs, which causes premature leaf drop and drying of twigs.

• Sooty mould develops on honeydew excreted by these scale insects and incase of severe infestations shoots or branches die and host's death may also occur.

Natural enemies

• Parasitoids: Coccophagus lycimnia, Metaphycus eruptor and Scutellista cynea

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Custard Apple: Crop stage-wise IPM

OriginalArticle: http://vikaspedia.in/agriculture/crop-production/integrated-pest-managment/ipm-for-fruit-crops/ipm-strategies-for-custard-apple/custard-apple-crop-stage-wise-ipm

 Pre planting* Planting* Vegetative stages (1-5 years) Flowering and fruiting 		
Management	Activity	
Pre planting*		
	Common cultural practices: • Timely sowing should be done. • Field sanitation, rogueing • Destroy the alternate host plants • Apply manures and fertilizers as per soil test recommendations	
Nutrients	 Pits (50 x 50 x 50cm) are to be dug during summer season and kept open for controlling soil borne pests. Pits should be filled with a mixture of top soil and farmyard manure in 1:1 ratio a fortnight before planting. 	
Weeds	 Cultivate the field before planting to destroy existing weeds in the field. Summer ploughing is helpful in destroying weeds seeds and rhizomes in the soil. Adopt stale seed bed technique 	
Resting stages of diseases &pests and nematodes	 Cultural control: Dig the planting pit during summer season and keep it open for at least one month. Soil solarization: Cover the pits with polythene sheet of 45 gauge (0.45 mm) thickness for three weeks before sowing for soil solarization which wi help in reducing the soil borne pests. Apply neem cake @ 2 kg/pit. 	

Planting*

	Common cultural practices:	ade	
Nutriont	Planting is done in rainy season at a dis	stance of 4m x 4m	
Nation	 Add Trichoderma and Mycorrhiza mixtu 	re @ 50 g per pit at the time of	
	planting.		
	Apply 300 g of fertilizers mixture of Urea	a, Single super phosphate and	
	muriate of potash in equal proportion are	added in each pit.	
Weed	 Remove existing weeds in and around t Mulching with organic or biodegradable 	he pits at the time of planting. material.	
Soil borne diseases and	Cultural control:		
nematodes	 Make a trench keeping the distance from the main stem as per the plant 		
	canopy width and apply neem cake @ 2	kg/ plant/pit.	
Vegetative stages (1-	-5 years)		
	Common cultural practices:		
	Destroy crop debris		
	 Avoid water logging 		
	Avoid water stress		
	Enhance parasitic activity by avoiding chemical spray, when 1-2 larval		
	parasitoids are observed		
	• Custard apple bears lowers on current season growth and very rarely on		
	initiation of new growth. Therefore manual defoliation during the		
	mid-summer is recommended.		
	Common mechanical practices:		
	 Use light trap @ 1/acre and operate between 6 pm and 10 pm 		
	Install pheromone traps @ 4-5/acre for monitoring adult moths activity		
	(replace the lures with fresh lures after every 2-3 weeks)		
	 Erecting of bird perches @ 20/acre for encouraging predatory birds such 		
	as King crow, common mynah etc.		
	Common biological practices:		
	Conserve natural enemies through ecol		
Nutriant	Augmentative release of natural enemie	er plant)	
Nutrient	The bearing trees of Custard apple shoul	d be fertilized as follows	
	2nd to 5th year		
	FYM	30 kg	
	Ν	400 g	
	Р	250 g	
	К	800 g	
	Nitrogen should be applied in the form	of FYM and oil cakes each at 25%	

and the remaining 50% with chemical fertilizers. While P_2O_5 in the form of super phosphate and K_2O in the form of sulphate of potash.

Manures are applied in 2 to 3 equal doses i.e. first dose in December-

	January, 2nd done in June-July, 3rd dose in September, Potash application
	can be reduced if the soil is rich in this nutrient.
	 Nitrogen containing remizers should be applied in three equal splits in lanuary, July and November months: phosphorus containing fertilizers in
	two splits in January and July months and Potassium containing fertilizers
	may be applied as singly dose in January
	Adopt ring method of fertilizer application.
	• A mixture of zinc sulphate 0.5%, manganese sulphate 0.2%, boric acid
	0.1%, urea 1% and lime 0.4% has to be sprayed two or three times in a
	year to control chlorosis in leaves.
	• Intercrops: During pre bearing period short growing crops like groundnut,
	ragi, bajra wheat, pulses and vegetables (except solanaceous crops) can
	be profitably grown in the inter spaces.
	 In the bearing orchards green manure crops like sunhemp, green gram,
	cowpea etc., are raised and incorporated into the soil during the monsoon period.
Weeds	 Timely Interculture and hand weeding should be done with hand tools for initial 5 years.
	Mulching: After weeding and manuring, application of dry-leaf mulch or
	paddy husk to a thickness of 8 cm in the basin keeps down the weed
	growth and decreases the number of irrigations, and improves the fruit
	quality.
	 In the initial years of planting, intercrops like groundnut, minor millets,
	linseed and gram should be grown.
Mealy bug	Cultural control:
	 Collect and destroy the mealy bug infested leaves, twigs and fruits.
	• Flooding of orchard with water in the month of October kill the eggs.
	Ploughing of orchard in November.
	• Avoid plant stresses - nealthy plants are much less susceptible to attack
	Biological control:
	 Release Oryptolaemous montrouziem beeties @ 10/tree or @ 50 Janvae/plant twice at 15 days interval
	• The Coccinellid Menochilus (Chilomenes) sex maculatus (F) is a predator
	of the nymphs and adults, and the Hymenopterous parasite Anaysis
	alcocki (Ashm.) Anagyrus dactylopii and Aenasius advena are three
	parasitoids on mealy bugs.
	• Release of coccinellid Scymnus coccivora @ 10 beetles /tree or @ 30
	larvae/plant is a good predator of both nymphs and adults.
Scale insect	Cultural control:
	 Collect and destroy damaged leaves
	 Apply well rotten sheep manure @ 4 t/ acre in two splits or poultry
	manure in 2 splits
	 Control ants and dust which can give the scale a competitive advantage.
	Biological control:
	Field release of ladybird beetle.
	 Spray dormant oil in late winter before spring.
	 Spray horticultural oil, if needed, year round.

Anthracnose	 Cultural Control: Prune dead twigs before flowering leaves regularly. Leaf and soil analysis should be concentration in plants particularly. Avoid planting susceptible variet 	ng, and remove infected fruit and dead done to maintain adequate nutrient y calcium and nitrogen ties.	
Leaf spot(S)	 Cultural control: Collect and burn the infected plant parts to minimize the spread of the disease. Increase air circulation by proper training and pruning. 		
Flowering and fruiting	ng		
Nutrient	 The bearing trees of Custard app and 125 g K₂O per plant before the 	ple should be given 250 g N, 125 g P_2O5 , ne commencement of rainy season.	
	6th year o	nwards (per plant)	
	FYM	30 kg	
	Ν	600 g	
	Р	500 g	
	K	1200 g	
Weeds	 Remove weeds from basins around by mulching with organic material Control weeds between rows by crops as mentioned in vegetative 	und the trees by hand weeding followed ls. v shallow cultivation and grow the cover stage	
Mealy bug	Cultural control:	stage.	
Fruit borer/ Fruit boring	 Cultural control: Collect and destroy the mealy bug infested leaves, twigs and fruits. Flooding of orchard with water in the month of October kill the eggs. Ploughing of orchard in November. Avoid plant stresses - healthy plants are much less susceptible to attack Biological control: Release Cryptolaemous montrouzieri beetles @ 10/tree or @ 30 larvae/plant twice at 15 days interval. The Coccinellid Menochilus (Chilomenes) sex maculatus (F) is a predator of the nymphs and adults, and the Hymenopterous parasite Anaysis alcocki (Ashm.) Anagyrus dactylopii and Aenasius advena are three parasitoids on mealy bugs. Release of coccinellid Scymnus coccivora @ 10 beetles /tree or @ 30 larvae/plant is a good predator of both nymphs and adults. 		
caterpillar	Collect and destroy affected frui Physical Control:	ts.	
	 Adopt bagging of fruits. 		
	Biological control:		
	 Use of braconid parasitoids (Apa 	anteles spp.) to parasitize larvae;	

Fruit fly	 Cultural Control: Collect fallen infested fruits and destroy them. Provide summer ploughing to expose the pupae. Physical control: Immersion of fruits in hot water (45 to 47°C) for 60 minutes to kill eggs and maggots Use 10 traps per acre of methyl eugenol. Biological control: Field release of natural enemies Opius compensates and Spalangia
Scale insect	 philippines. Cultural control: Collect infeseted plant parts and destroy them. Apply well rotten sheep manure @ 10 t/ ha in two splits or poultry manure in 2 splits Control ants and dust which can give the scale a competitive advantage. Biological control: Field release of Vadalia and Australian ladybugs. Spray dormant oil in late winter before spring.
Anthracnose	 Cultural Control: Prune dead twigs before flowering, and regularly remove infected fruit and dead leaves. Leaf and soil analysis should be done to maintain adequate nutrient concentration in plants particularly calcium and nitrogen Avoid planting susceptible varieties.
Leaf spot (s)	 Cultural control: Collect and burn the infected plant parts to minimize the spread of the disease. Increase air circulation by proper training and pruning. Cultural control: Mulch under trees to reduce soil splash. Remove dead twigs and mummified fruit each season. Prune tree skirts to 50 cm above the ground. Regularly monitor fruit for infection during the season so that spraying can start before fruit diseases get too severe.
Diplodia rot	 Cultural control: Use mulching under trees to reduce soil splash. Remove dead twigs and mummified fruits. Maintain proper plant canopy to reduce the high humidity by appropriate pruting and training. Pruin trees 50 cm above the ground.
Black canker	 Cultural control: Use mulching under trees to reduce soil splash. Regularly monitor the diseases and remove dead twigs and mummified fruits. Follow proper plant canopy by appropriate prunning and training. Prune trees 50 cm above the ground.

Spiral nematode (Helicotylenchus sp.) Stunt nematode (Tylenchorhynchus sp.)

Cultural control:

- Fallow, flooding and deep summer ploughing,
- Timely planting, manuring and irrigation,
- Use cover crops, antagonistic crops, trap crops,
- Follow crop rotation
- Grow resistant/tolerant varieties

Physical control:

- Practice soil solarization
- Phytosanitary measures: Follow International/ Domestic regulatory measures.

Note: The pesticide dosages and spray fluid volumes are based on high volume sprayer. * Apply Trichoderma viride/harzianum and Pseudomonas fluorescens as seed/seedling/planting material, nursery treatment and soil application (if commercial products are used, check for label claim. However, biopesticides produced by farmers for own consumption in their fields, registration is not required).

Source: NIPHM, NCIPM and Directorate of Plant Protection, Quarantine & Storage

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