

Package of Practices for Chilli Cultivation

1. Introduction

Chilli is one of the most valuable spice crop. India is the largest producer consumer and exporter of Chilli cultivating in the area of 775 thousand hectares with 1492 metric tons production (2014-15 estimates) contributing about 40 % of the World's chilli production. In India Andhra Pradesh is the leading state in Chilli production followed by Karnataka, West Bengal and Odisha.

Chilli belongs to the genus *Capsicum* under Solanaceae family. Five species of *Capsicum* are under cultivation, through number of wild species have been identified recently. In India, only two species viz. *Capsicum annum* and *Capsicum frutescens* are known and most of the cultivated varieties belong to the species *Capsicum annum*.

2. Climate and Soils

Chilli requires a warm and humid climate for its best growth and dry weather during the maturation of fruits. Chilli crop comes up well in tropical and sub-tropical regions, but it has a wide range of adaptability and can withstand heat and moderate cold to some extent. The crop can be grown over a wide range of altitudes from sea level upto nearly 2 100 meters. It is generally a cold weather crop, but can be grown throughout the year under irrigation. Black soils which retain moisture for long periods are suitable for rainfed crop whereas well drained chalky soils, deltaic soils and sandy loams are good under irrigated condition.

3. Land preparation

Chilli crop requires fine tilth which can be attained by ploughing 2-3 times. Stones and gravel are to be removed. In case of direct sowing, three to four ploughings are undertaken and sowing is done along with the last ploughing. The soil can be treated with azatobacter or azospirillum @ 11.25 kg mixed with 50 kg of farm yard manure and the same may be broadcast in the field. Farm Yard manure @ 46 t and 12 t of vermicompost can be added per acre.

4. Varieties – Characteristics

G3: Plants are dark green in colour with medium sized pods with high pungency. It can be cultivated under rainfed and irrigated conditions. Gives yield up to 6-7 q/acre under rainfed conditions and 15-18 q/acre in irrigated conditions. Suitable for all regions in Andhra Pradesh and Telangana.

G4 (Bhagya Lakshmi): Plants grow high and pods turn in to dark red colour on ripening. Resistant to pests and diseases. Yields up to 40-45 q/acre. Suitable for Guntur, Prakasam, Krishna, Nalgonda, Warangal, Chittoor, Srikakulam and Khammam districts.

G5 (Andhra Jyothi): Plants grow high with broad leaves and pods are short and stout. Pericarp is thick, glossy with dark red colour. Yields up to 40-50 q/acre. Suitable for Nellore, Chittoor, Srikakulam, Visakhapatnam districts under irrigated conditions.

C.A – 960 (Sindhur): Plants are bushy in nature and grow high. Pods are long and stout with less pungency. Susceptible to virus. Suitable for all regions under irrigated conditions. Gives yield up to 50-55 q/acre.

C.A – 1068 (Aparna): Plants grow high with long cylindrical shaped pods which turns in to yellow colour on ripening. Recommended for East Godavari and Srikakulam districts under irrigated conditions. Yields up to 35-40 q/ha.

L.C.A – 235 (Bhaskar): Plants are short and bushy in nature. Pods are short with high pungency. Tolerant to Mites and virus. Suitable for all regions under reianfed conditions. Yields up to 50-60 q/ha.

L.C.A – 305: Plants are bushy in nature and pale green in colour. Pods are long and stout. Tolerant to virus up to some extent. Recommended for light soils under irrigated conditions. Gives yield up to 50-60 q/ha.

L.C.A – 334: Plants grow high and bushy in nature. Pods are long and deep red in colour. Suitable for both rainfed and irrigated conditions in all regions. Suitable variety for exports. Capable of withstanding under unfavourable climatic conditions and gives good yield. Yields up to 60-65 q/ha.

L.C.A – 353: Plants are bushy and medium sized with light green coloured pods. This is an early maturing variety, pods turns in to attractive red colour after maturing. Gives yield up to 60-65 q/ha.

Paprika Variety: Pods are long and stout with less pungency and good colour. Mainly used for making pickles, salads and oleoresin. Paprika varieties have huge demand in European market, considering demand in the international markets Lam Research Centre initiated developing export oriented varieties from 1985. These varieties are developed by crossing local varieties grown in East Godavari, West Godavari, Warangal, Karimnagar with Paprika varieties from America and Japan to withstand the local conditions in Andhra Pradesh and Telangana. L.C.A-424, L.C.A-436, L.C.A-444 are results of these experiments.

5. Nursery bed preparation

Ideal nursery beds should be of 1m width, 40 m long and 15 cm height. Seedlings grown in this bed are enough to transplant in one acre main field. If there is more than one seed bed it's better to make 30 cm width canals for drainage purpose.

6. Seed rate

For Nursery: 650 g seed is sufficient for transplanting in one acre.

Direct Sowing: 2.5 Kg to 3 Kg per acre

7. Sowing time

Kharif: July -August

Rabi: September- October

8. Seed Treatment

Seed treatment for viral disease prevention: To prevent seed borne viral diseases, seeds should be treated with Trisodium orthophosphate. Dissolve 150 g of Trisodium Orthophosphate in 1 litre water and soak 1 kg seed for 20 minutes in that solution. Remove the chemical water and wash the seed with fresh water for two times and keep the seed for drying under shadow.

Seed treatment for protecting from sucking pest: Treat 1 kg seed with 8 gm Imidacloprid

Seed treatment for protecting from seed borne diseases: For preventing seed borne diseases seeds should be treated with 3g Mancozeb or Captan per Kg seed.

9. Transplanting

Seedling of 6 weeks age are ideal for transplanting. Spacing for raifed crop should be 60 x 15 cm and for irrigated crop 60 x 60cm or 75 x 60 cm or 90 x 60cm.

10. Weed Control & Inter cultivation

One or two days before planting spray 1 litre Fluchloralin 45% per acre and plough the soil to mix properly or Spray 1.3 to 1.6 litres pendimethalin 30% or oxyfluorfen 23.5 % 200 ml by diluting in 200 litres of water before 1 or 2 days of planting. After 25-30 days of planting at frequent intervals of 15 -20 days based on necessity inter cultivation can be done by using cultivator or Indigenous blade harrow (Guntaka).

11. Fertilizers

10 tons of Farm Yard Manure per acre or grow and incorporate green manure crops.

For rainfed crop : Apply 60-40-50 Kgs Nitrogen, Phosphorus and Potash per hectare

For irrigated crop: Apply 300-60-120 Kgs Nitrogen, Phosphorus and Potash per hectare

Plant Protection

Insect agement

1. Thrips (Scirtothrips dorsalis) Causes: Upward curling of leaves

Found in almost all chilly growing areas. It is a polyphagus pest. Besides chilli, it also infests brinjal, cotton, groundnut, castor, bottlegourd, guava, tea and grapevine. It is more common on unirrigated chilli crop than irrigated one. They are slender, tiny, straw coloured insects with fringed wings. A female adult inserts 40-48 white, minute eggs into veins. Both nymphs and adults lacerate the leaf tissues and suck the oozing sap, sometimes even the buds and flowers are attacked. Generally they attack tender leaves and growing shoots. Rarely the older leaves are attacked. Their damage results in

The infested leaves curling upward, crumbling and shedding. Infested buds turning brittle with petiole becoming brown and dropping down. Affected fruits showing light brown scars. Pest infestation is severe in dry weather. The damage ranges between 30-50%. One life cycle is completed on an average in 2- 2.5 weeks. There are about 25 generations in a year. Reproduction in thrips is generally sexual, parthenogenesis is also present.

Management

Seed treatment with imidacloprid @ 3 -5 g/kg of seed.

2. Chilli Mites (*Polyphagotarsonemus latus*) Causes: Downward Curling of leaves

A minor pest emerged as a major pest in recent past. The infestation starts in the nursery after 40 days of germination. Severe infestation is seen in transplanted crop of 2-3 months old. The tiny white transparent mites are found in large numbers on the undersurface of leaves under fine webs. Both nymphs and adults suck sap and devitalize the plant causing 'Murda' disease of chillies. Infestation results in

Downward curling of leaves. The affected leaves becoming inverted boat shaped. The leaves rolling down along the margin with elongation of petioles. Affected leaves turning dark green in certain cases. Younger leaves at the tip of branch clustering.

Management

Foliar spraying of dicofol 5ml/l or wettable sulphur 3g/l. Synthetic pyrethroids not to be used. If both thrips and mites are noticed, spraying phosalone 3ml/l or diafenthuron 1.5 g /l or chlorfenapyr 2 ml/l.

3. Chilli Aphids (*Aphis gossypii*, *Myzus persicae*)

They are polyphagous pests. Cloudy weather is very favourable for multiplication of aphids. Heavy rains cause reduction in their population. Adults are found in large numbers on the under surface of leaves and growing shoots of plants. Both nymphs and adults suck sap and also excrete honeydew on which black sooty mould develops affecting photosynthetic activity thus it causing

Retardation in growth and fruiting capacity of the plant. •Sooty mould

Management

Foliar spray with methyl demeton 1 ml/l or acephate 1.5 g/l is effective.

4. Chilli Pod borers

(*Spodoptera litura*, *S. Exigua* *Helicoverpa armigera* *Utetheisa pulchella*)

Feeding by *S. Litura*, *S. Exigua* leads to irregular holes on the leaves and fruits. Affected pods turn whitish and dry up. In fruits, seeds are also eaten. Attack of *H.armigera* leads to round hole on fruits. In addition to these borers, sometimes *U. Pulchella* also feeds on the pericarp leaving the seed intact. Ladder like marks are seen on chilli pod due to *U.pulchella* . Their detailed history can be is given under pests of cotton and millets (*S. Exigua*).

Managemet

Deep summer ploughing. Monitoring with pheromone traps @ 4/acre Raising trap crops like castor (*S. Litura*), marigold (*H.armigera*). Spraying with SNPV/HaNPV at 250 LE/acre in the evening. Spraying novuluron 1.0 ml/l or diflubenzuron 1.0 g/l controls just hatched larvae. Foliar spraying of thiodicarb 1.0 g/l or acephate 1.5 g/l or chlorpyrifos 2.5 ml/l or spinosad 0.3 ml/l or quinalphos 2 ml/l. Poison baiting with rice bran 5 kg + chlorpyrifos 500 ml or carbaryl 500g + jaggery 500g with water in the form of small balls in the evening hours.

5. Root grub (*Holotrichia consanguinea*)

Damages plants by eating stem and roots. Initially survives on weed plants soon after planting chilli attacks plants which results in wilting and drying.

Management

Application of well rotten Farm Yard Manure (FYM) will helps in prevention of root grubs Application of Carbofuran 3% granules @ 33 Kg per hectare or 10 kg Phorate 10% granules per hectare

6. Chilli Blossom Midge (*Asphondylia capsici*)

Fly is dark reddish brown mosquito like midge that lays eggs in flower buds. Maggot is tiny pale orange colored and feeds on the floral parts leading to poor development of fruits. The ovary is distorted into gall like structure of varied shape.

Management

Foliar spray with triazophos 2 ml/l or carbosulfan 2 ml/l followed by chlorpyrifos 2.0 ml/l one week later is found effective.

7. Stem Borer

Insects bore and enter in to the main stem at 5-6 cm above from the ground level. Incidence of this pest is mainly during early stages, flowering stage. Due to stem damage plant growth will be restricted and plants start slowly wilting. Damage by this insect leads to inadequate supply of food and water which resulting in death of the plants.

Management

Changing crop patterns like not growing chilli after brinjal will help up to some extent in prevention. Destroying the infected plants. Application of Chloropyrifos 2.5 ml or Thiodicarb 1 g by mixing in 1 litre of water.

Disease Management

1. Damping off (*Pythium aphanidermatum*)

Disease of nursery beds and young seedlings resulting in reduced seed germination and poor stand of seedlings. Very high seedling mortality 25-75%. Infected areas turn brown and rot. Plants shrivel and collapse as a result of softening of tissues.

Management

Raising nursery in light soil with proper drainage
Rabbing – burning farm trash on the surface of the beds
Sowing seed on raised beds of 6-8" high (15cm)
Using optimum seed rate of 650 g/cent
Seed treatment with Thiram or Captan @ 2-3 g/kg.
Soil drenching with Bordeaux mixture 1% or Copper oxychloride 0.3% or Metalaxyl (Ridomil) 0.2%
Biocontrol with *Trichoderma viride* and *T. harzianum*
Raising modern nurseries in polyhouses under controlled conditions in polyhouses

2. Die-back and fruit rot (*Colletotrichum capsici*)

Infects young branches and flowers results in flower drop. Branches start drying from the tips. Black spots appear on ripened fruits and leads to rotting of fruits. Severe in Guntur and Krishna districts.

Management

Seed treatment with Captan or Thiram 3-4g/kg
Collect seeds only from fruits without infection
Avoid intercropping with susceptible turmeric cultivars
Collect and destroy all infected plant parts
Removal and destruction of Solanaceous weed hosts and infected plant debris
Spray three times with Captan 1.5% or [Mancozeb@0.25%](#) just before flowering, at fruit formation stage and 15 days after second spray

3. Bacterial leaf spot (*Xanthomonas campestris* pv. *Vesicatoria*)

Leaves, fruits and stems are affected, Lesions on leaf begin as circular, water soaked spots, Spots become necrotic with brown center with chlorotic borders, Enlarged spots may develop straw coloured centres, Lesions are slightly raised on lower leaf surface, Severely spotted leaves turn yellow and drop, Raised brown lesions appear on fruits, Narrow elongated lesions or streaks may develop on stems.

Management

Seeds should be collected from healthy fruits
Seed treatment with Copper oxychloride 2g/kg
seed
Field sanitation by removal and destruction of infected plant debris
Add 1g Streptocycline or 2g Plantomycin to 10 litres of water and mix 3g of Copper oxychloride per litre of water and spray twice at 10 days interval

4. Cercospora leaf spot (*Cercospora capsici*)

Circular spots with brown margins and grey centre appear on leaves, The spots enlarge and coalesce with others, The central portion of the spot becomes white and the leaves turn yellow and defoliate, Sometimes central portion of spot drops off, Spots also appear on stems and twigs as dark brown, irregular lesions with whitish centers, In severe cases die-back of twigs occur.

Management

Seed treatment with carbendazim @ 2g/Kg seed
Spray Carbendazim 0.1% or Difolaton 0.15% @ 15 days interval

5. Choanephora Wet Rot (*Choanephora cucurbitarum*)

Plants from seedling to early flowering stage are susceptible, Being a weak parasite the fungus colonises dead or dying tissues before it actively invades living tissues, Fruit infection is observed predominantly around calyx. Infected young fruits may abort.

Management

Adopt recommended spacing to maintain adequate air circulation
Field sanitation by destroying infected debris
Select the seeds from healthy fruits and treat the seed with Captan or Thiram 3g/kg seed
Spray Mancozeb 0.25% or Copper oxychloride 0.3%

Management

Spraying wettable Sulphur 0.3% or Dinocap or Carbendazim or Tridemorph 0.1%.

6. Dry Root rot (Sclerotium species / Fusarium Species)

Plants get infected by the fungus in the soil and dries

Management

Crop rotation practices
Application of Copper oxychloride at the plant base by mixing 3 g of Copper oxychloride in 1 litre water
Application of 2 Kg Trichoderma formulation in 90 Kg FYM and 10 Kg Neem seed powder

8. Viral disease management

a.) Leaf Curl (Gemini Virus)

Transmitted by Whiteflies. High humidity and rainy climatic conditions are favourable for whiteflies and helps in severe spread of virus. Young leaves becomes small and upward curling is observed. Leaves turn in to pale green colour, intermodal distance also decreases. Leaf curl virus symptoms resemble micro nutrient deficiency symptoms whereas deficient plants are can be observed in groups and virus infected plants spread all over the field here and there.

b.) Cucumber Mosaic Virus

Transmitted by Aphids. Restricts the plant growth and black sooty mould can be observed on leaves and pods. Decrease in chlorophyll content of leaves leading to mosaic symptoms. Downward curling along with midrib. Pods may be small or distorted.

c.) Peanut bud Necrosis Virus

Virus develops on weeds which grown on bunds like Parthenium, Abutilon indicum and transmitted by thrips. Prolonged dry period after rains increases thrips incidence. Black spots occurs on stem and leaves and gradually transforms in to stripes. Necrotic spots occur leaves resulting in leaves falling off.

Management

Harvesting

For getting better yields frequent picking of ripened fruits should be dried on tarpaulin / silpaulin sheets or on raised cement platforms. We can go for 3-4 pickings for rainfed crop and 6-8 pickings for irrigated crop.

References and Sources:

Publication on Chilly crop by Andhra Pradesh Horticultural University, Horticulture Research Centre
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