Precision Farming
CHILLY
With Jain Technology™

Jain Irrigation Systems Ltd.

Small Ideas. Big Revolutions.®

Chilly is an annual herb, also called hot pepper or red pepper. The cultivated varieties in India belongs to *Capsicum annum*. India has many varieties of chilly with different quality factors. It is grown in almost all the states. Andhra Pradesh ranks first in India both in area and production with 2.4 lakh hectares producing 323 thousand tonnes.

The commercial value of of chilly comes from two distinct ingredients; 1. varieties with the red colour pigment, casanthin and 2. varieties with the biting pungency attributed to capsaicin.

Soil and Climatic Requirement

- Chilly requires deep fertile light loamy soils.
- The pH should be in the range of 6.5-7.5.
- Black soil is suitable for chilly cultivation especially rain-fed crop.
- Temperature range should be 25-32oC for hot chillies and 18-25oC for sweet varieties.
- Chilly will not tolerate frost.

Season

- Chilly can be grown through out the year under irrigated conditions.
- For Kharif, raising Nursery – July
- For Direct Sowing in Kharif- first week of July
- For Rabi, raising Nursery- September
- For Summer, raising Nursery- February

Varieties

G-3: It comes up well both under irrigated and rain fed conditions. Ideal for export, Fruits are medium in size with 44% seed to pod. 15-18 q/ha.

G-4 (Bhagyalakshmi) : It is grown extensively throughout AP particularly under irrigated areas. Fruits are medium with 40% seed to pod and olive green colour turning to bright red on ripening. Suitable for green chilly and tolerant to virus disease. 40-45 q/ha.

G-5 (Andhra Jyothi): Fruits are short and stout with conical shape. Seed content 42%. 35-40 q/ha.

Sindhur (CA-960): Early in bearing by two to three weeks. Suitable for suumer crop also. Pericarp light green turning to bright red on ripening. Seed content 38% and pungency is mild. 50-55 q/ha**.**

Kiran (X-200)(LCA 200): Fruits are long thin with light green pericarp and rose red colour on ripening. Fairly tolerant to thrips, mites and aphids. Seed content 42%. 40-45 q/ha.

Aparna : Plants tall growing and late in bearing by two weeks when compared to other varieties. Fruits yellow in colour on ripening. Seed content 42%. 35-40 q/ha Green Chilly.

Bhaskar: This Variety is characterized by compact plants with short internodes, small leaves and flowers with yellow anthers. Pods are olive green (5-6 cm long) with high seed content (45%) and high degree of pungency.Fairly tolerant to sucking pests like thrips, mites and aphids Fairly tolerant to virus. 55-60 q/ha Green Chilly.

Prakash(LCA 206) : Plants tall grown with light green leaves, fruits long and slender, fruits shining, red clour on ripening. Seed content 40%.45-50 q/ha Green Chilly.

Lam, 305 LCA: Pod larger than Bhaskar 235 with shining red colour plant bushy in type.Fruits 7-8 cm long and fairly tolerant to virus disease. 50-55 q/ha Green Chilly.

S.A-46: Plants dwarf and spreading with light green and broad leaves. Pods thin, 9-10 cm long and wrinkled. Seed content 35%. 200 q/ha Green Chilly.

Jwala 180: Pods are long (10-12 cm). Suitable for green chilly production. 180 q/ha Green Chilly.

Raising Nursery

- Raised beds of 1 m width and 10 m long in one or more bits according to the availability of space surrounded by drainage channels of 30 cm width are to be formed. The height of the bed should be 15 to 30 cm.
- Sowing of seeds uniformly using 650 g per 40 m2 bed area. Three such 40 m2 beds are required for planting one hectare transplanting.
- Consolidate the beds after sowing with a roller.
- Application of 100g of Furadan granules per 40 m2.
- Seed treatment with Thiram or Dithane M-45 is done at the rate of 3 g/kg seed.
- Spraying copper fungicide on 12th day and 19th day of sowing to prevent damping off disease.
- Only organic manures are to be applied.
- Six weeks old seedlings are to be used for transplantation.
- Top the seedlings on week prior to transplantation, if the seeding are more than 6 weeks.

Land preparation

- The field should be ploughed 3-4 times
- 25 t FYM /ha should be applied at the last ploughing
- Ridges and Furrows are to be formed at the required spacing.
- Spray 2 liter Basalin (Fluchloralin 1liter a.i./ ha) mixed in 500 liter water on the soil surface as pre emergent herbicide.
- Follow this by 6- 8 hr drip irrigation.

Plant Spacing

- At 75 cm x 45 cm(in light soils under low input management)
- 60 cm x 60 cm in fertile soils or light soils under intensive cultivation

Transplanting

- Transplanting 40-45 days old seedlings preferably on a cloudy day.

Jain® Drip

- For cold weather crop, transplantation is to be done during the last fortnight of August or first fortnight of September.
- For Kharif July-August
- For Rabi- October- November.
- Transplant 2-3 seedlings per hill under rainfed.
- In irrigated crop 1-2 seedlings per hill.

Direct Sowing

Recommended for a rain-fed crop under residual moisture in black soils. This also can be irrigated by drip and use the system for rotation crop.

- Seeds are to be drilled by the end of July or first week of August by using 6.25 kg of seed per ha.
- Seed is to be treated as in the case of nursery before sowing.
- After 30-40 days of sowing, thinning and gap filling are to be done preferably on a cloudy day.
- Plant to plant distance is to be maintained at 15 cm in the rows of 60 cm apart.
- Drip line to be installed at 120 cm spacing, each line wetting two rows of chilly.

Irrigation management

Give 4-6 hour drip irrigation soon after transplanting.

Water requirement of Chilly in liters per day per ha

Planting Month - June

Month	Water requirement	
	Mm/day	Lt/ha/day
June	0.51-0.61	5100-6100
July	1.05-1.34	10500-13400
August	2.39-3.25	23900-32500
September	4.90-5.53	49000-55300
October	4.61-5.51	46100-55100
November	3.82-4.45	38200-44500

Planting month- September.

Month	Water requirement	
	Mm/day	Lt/ha/day
September	0.49-0.55	4900-5500
October	1.15-1.38	11500-13800
November	2.62-3.05	26200-30500
December	3.87-4.87	38700-48700
January	4.35-5.06	43500-50600
February	4.44-5.34	44400-53400

Planting month- February.

Month	Water requirement	
	Mm/day	Lt/ha/day
February	0.53-0.58	5300-5800
March	1.60-1.76	16000-17600
April	4.10-4.65	41000-46500
May	7.16-8.48	71600-84800
June	5.13-6.10	51300-61000
July	3.59-4.55	35900-45500

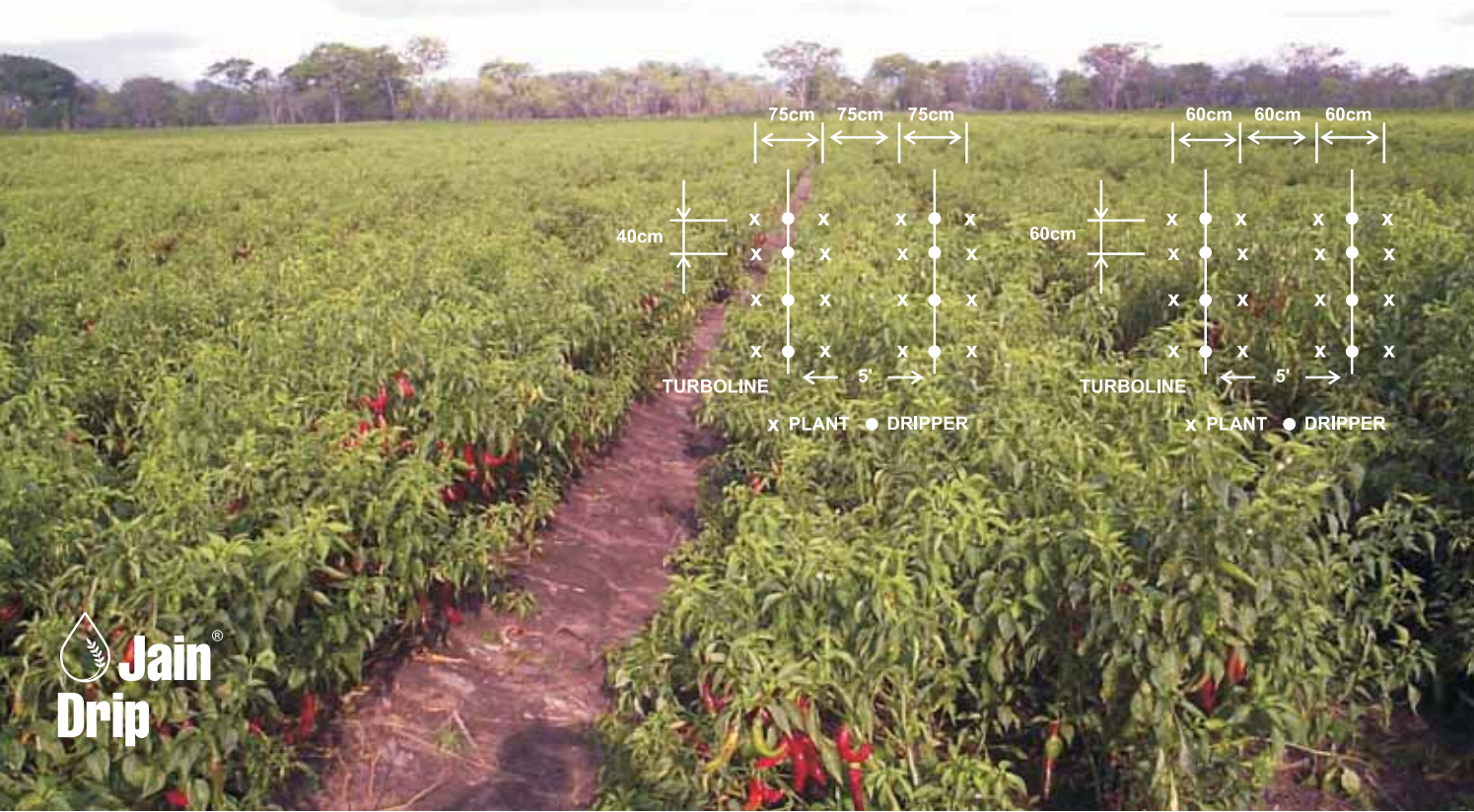
The rainfall events are very erratic and therefore not adjusted on a daily basis. The general recommendation is that if rainfall exceeds 10mm in any one day suspend drip irrigation for the next 2 to 3 days.

Drip system lay out

Inline drip system is suitable for Chilly. The drip laterals are spaced on a skip row basis i.e. at 120 cm spacing. In case of inline the entire strip (row of chilly plants) are wetted by placing drippers at 60 cm or 75 cm (based on soil texture) along the drip line.

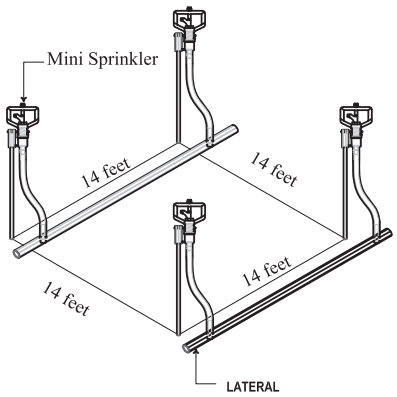
2. Rain port system. (give a drawing of rainport here).

Minisprinkler attached to metal risers are connected 16 mm or 20 mm laterals are provided in the Rainport system.



Water is applied every 3 or 5 days depending upon the soil texture and water holding duration of the soil. But irrigation with this system will create cyclic water excesses and shortages; both of which affect the growth and production of the crop. Irrigation efficiency is also lower (60%) than that of drip.

Nevertheless this system is less expensive and farmers may find this more affordable than drip system.



Application of fertilizer

- A basal dose of 25 t/ha of farmyard manure to be applied along with the last plough.
- Sheep penning (2500-3000 sheep/ha) is also recommended.
- Neem cake at 300-400 kg/ha preferably along with basal fertilizers at the time of final ploughing.
- Green manuring can be practised by sowing cowpea or sunhemp with early rains and incorporating it after 40 days growth.
- A basal dose of 60 kg N, 60 kg P2O5 and 30 kg K20 is to be applied at the time of final ploughing.
- After 45 days of planting three split doses of 20 kg N plus 10 kg K20 each at 15 days interval.
- Later on two more split doses of N alone at 20 kg/ha are to be given.

Fertigation Schedule

Time of application	Type of fertilizer	Quantity (Kg/ha)	Fertigation Schedule (kg/ha/week)
Basal	SSP Urea Potash (MOP)	375 130 50	All soil application All soil application All soil application
45 days after transplanting	Urea MOP	43.5 16.7	22 kg/ha/wk for 2 wks 8.5 kg/ha/wk for 2 wks
60 days after	Urea MOP	43.5 16.7	22 kg/ha/wk for 2 wks 8.5 kg/ha/wk for 2 wks
85 days after	Urea MOP	43.5 16.7	22 kg/ha/wk for 2 wks 8.5 kg/ha/wk for 2 wks
100 days after	Urea	43.5	43.5 kg/ha/wk
110 days after	Urea	43.5	43.5 kg/ha/wk

Foliar spray

Foliar application of 1% urea along with insecticidal or fungicidal spray can be given and at each time only 8 to 10 kg of Urea may be required.

Urea can be mixed with all insecticides and fungicides.

Micronutrients

In soils where Zinc deficiency is noticed, Zinc sulphate @ 50 kg/ha should be applied.

Inter cultivation

- Chilly requires frequent inter cultivation.
- In the direct sown crop blade harrow is to be worked starting from 30th day of sowing. Four inter cultivations are needed at 10 days intervals alternated with blade harrow (Guntaka) and tied harrow (danti) or gorru or Junior-how.
- Final inter cultivation is to be given by the country plough.
- For an irrigated crop, inter cultivation is to be given either by Junior hoe or light plough after each irrigation.
- Inter cultivation is to be followed by hand weeding to check the weed growth.

Pest and disease management

Thrips *(Scirtothrips drsalis)*

Young leaves and shoots are preferred but buds & flowersare also infested.

Spray Rogor 1ml/ l water,Phosalone or Monocrotophos 1.5 ml/l water.

Mites *(Polyohagotarsonemus latus)*

Back side of leaves infected,Causes “murda” disease ofchilli.

Miticide Ethion,Dicofol, 2ml/l water wettable sulphur are effective.

Aphids *(Aphis gossypii*

Present on under surface of leaves.

Spray Monocrtophos insecticide at 2ml/liter water.

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Pod borer *(Helicoverpa armigera)*

Infestation occur in Oct.-March leaves & seeds are infested.

Carbaryl, Endosulphan 2ml/liter water effective,HNPV can beused.

Ragi cutworm *(Spodoptera exigua)*

Leaves are infested.

Phosalone at 2ml/l water can be used.

Midge *(Asphondylia capsici)*

Ovary of the flower bud,floweror tender pod are infested.

Spray Triazophos,Chloro-pyriphos 3ml/liter.

Disease of Chilli

Damping off *(P. aphanidermatum)*

Proper cultural practiceseed treatment withThiram/Captan @3g/kg,seed treatment with *Trichoderma viride* @ 4g combined with 6g Apron is highly effective. Occur at seedlingstage.

Fruit rot or die-back *(Colletotrichum capsici)*

Use disease free seed,seed treatment with3g captan or mancozebper kg of seed,spray 2 times captan1.5g ormancozeb 3g/l water at flowering at 15days interval.

Appears when thefruit is mature and start ripening.

C. **Leaf spot** *(Cercospora capsici)*

Spray thrice at 10-15 with 2.5g mancozeb/1g carbendazim per litre of water.

leaf spot *(Alternaria solani)*

Destruction of crop debris, seed treatment with 2 gm mancozeb/kg of seed and foliar spray of mancozeb at 2g/ l.

High humidity, rain & dew are favourable for its spread .

Sclerotial wilt *(Sclerotium rolfsii)*

Infected plants should be rouged & destroyed.Apply 2g *Trichoderma viride* mixed with 50 kg of FYM. Disease occurs with sudden wilt of individual plant.

Fusarium wilt *(Fusarium oxysporum)*

Seed treatment with 4 gm *Trichoderma viride* or 2g carbendazimper kg of seed is effective.

Generally appears in localized area and scattered.

Bacterial leaf spot *(Xanthomonas compestris)*

Spray 200 ppm lantomycin mixed with 3g Cu-oxychloride per litre of water twice at 15 days interval. Leaf, fruit and stems are affected.

Chilli leaf curl Gemini virus

Avoid monoculturing, soaking seeds into solution of 150g Trisodium ortho -phosphate/l water for 30minutes.Spray the seed-ling in nursery with 1.5 ml/l monocrotophos. Leaves are infected.

Tips for Quality improvement of Chilly

- Timely harvest to improve quality. Delayed harvest will develop wrinkles on fruit.
- Heap the ripe fruits overnight to get uniform ripening
- Avoid insecticide sprays before picking to prevent pesticide residues.
- Dry the fruits till moisture reaches 10-11%.
- Dry them on cement floor to avoid Aflotoxins.
- Keep them free from dust and animals.
- Grade the fruits. Remove damaged ones.
- Store in Cold to retain colour and quality.
- Do not use any chemicals to enhance colour.

Dos

- Ensure good drainage in the field.
- Adopt drip or rainport system.
- Compulsorily apply organic manure as per recommendation
- Select high yielding, disease and pest tolerant variety suitable for each location.
- Practice drip irrigation from the beginning.
- Strictly follow the irrigation schedule given by the engineer.

- Follow the drip system maintenance schedule given by the engineer.
- Compulsorily weed/ inter-cultivate, timely operation helps in crop growth.
- Follow fertigation schedule as given by the engineer.
- Follow the precautions while operating the drip system as explained by the engineer.
- Apply micronutrient as and when needed.
- Follow disease and pest control measures timely and effectively.
- Apply sprays in the evening or early morning only.

Don'ts

- Don't over irrigate the crop at anytime.
- For fertigation don't mix solid fertilizers and dissolve them together. Prepare individual solutions and mix them for application.
- Don't spray the crop under hot sunlight.
- Don't use the fertigation unit for bulky organic manure and fertilizers that are not soluble in water
- Don't add solid fertilizer from the bag directly to the fertilizer tank. Prepare solution separately and pour the solution to the fertilizer tank. Prepare solution only in plastic buckets. Don't use metal container.
- Don't stir the solution with naked unprotected hand. Use wooden spoon or stick.
- Don't heat the fertilizer solution to increase solubility.

Frequently asked questions (FAQ's)

1.Whether the meagre quantity of water supplied through drip irrigation is enough?

- Irrigation rate in Drip method is estimated based on the Evapotranspiration of the location and therefore it is enough. With conventional flood / channel irrigation water completely replaces the air in root zone thereby suffocating the plant. The last few days of the irrigation cycle the crop also suffers from water stress. The periodical water logging and stress affects growth and production of chilly.

2. Can I prefer Sprinkler method of irrigation for Chilly ?

- The rain port system is less expensive and suitable.But it spreads water over the canopy. It may result in flower drop. Moreover wastage of water per irrigation will be high.

4. Can I go for rotation crops with drip irrigation?

- Yes. The crop spacing of the rotation crop has to be adjusted to suit the dripper line spacing to have more economic production.

Crop yields depend on climate, soil and management and therefore can't be guaranteed by the company.

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