



Improved production technology of *Kharif* maize

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Maize (*Zea mays* L.) is one of the most important cereal crop in the world agricultural economy both as food for man and feed for animal. Maize is grown in almost all the states of India. In India, maize is the third most important food crops after rice and wheat. Maize is known as queen of cereals because it has the highest genetic yield potential among the cereals. The maize is cultivated throughout the year in all states of the country for various purposes like grain, fodder, sweet corn, baby corn, and pop corn etc. Maize grain content 70 per cent carbohydrate, 10 per cent protein, 4 per cent oil, 2.3 per cent crude fiber, 10.4 per cent albuminoids etc. maize grain has significant quantities of vitamin A, riboflavin, and vitamin E. Maize protein 'Zein' is deficient in tryptophane and lysine the two essential amino acids.

Soil : Well drained sandy loam and silty loam soil is best for maize crop production. Soil with good organic matter content having high water holding capacity and neutral pH are considered good for higher productivity.

Time of sowing : Maize can be grown in all seasons. In

Kharif season it is desirable to complete the sowing programme on 10-15 days before onset of monsoon. In rainfed situations the sowing of maize is generally done with the onset of rains. For obtaining higher yield the sowing of maize should be done by maize planter or seed drill machine. In absence of these implements sowing of maize should be done behind the country plough in furrows.

Seed rate : One should ensure that the seed is viable and free from external infections. Based on seed weight and required plant population per hectare, the following calculations have been made -

A – Small variety seed – 16-18 kg/ha

B – Hybrid variety – 20-25 kg/ha

C – Composites – 18-20 kg/ha

Seed treatment : To protect the crop from seed and major soil born diseases and insect-pests seed treatments with fungicides and insecticides recommended as per the below given details :

Fungicide/ pesticides - Rate of application

Bavistin + captan in 1:1 ratio - 2.0 g/kg seed

Improved variety- (Hybrid)

Sr. No.	Variety	Maturity (days)	Yield (q/ha)
1.	Pusa sankar makka -5	80-85	35-45
2.	Ganga-11	100-105	45-50
3.	Malviya sankar makka -5	90-95	40-45
4.	Prakash	80-85	35-40
5.	Ganga-5	100-110	50-55
6.	Sartaj	95-100	45-50
7.	J.H.-3459	80-85	35-40

Composite

Sr. No.	Variety	Maturity (days)	Yield (q/ha)
1.	Pusa composite-2	85-90	35-40
2.	Surya	75-80	25-30
3.	Kanchan	75-80	25-30
4.	Vivek 27	75-80	25-30
5.	Gaurav	80-85	30-35
6.	Pragati	80-85	30-35
7.	Bio-9681	105-110	40-45
8.	Bio-9637	90-95	40-45
9.	Bio-9682	90-95	40-45
10.	Kh-9451	90-95	40-45

Apran 35 SD	- 4.0 g/ kg seed
Captan	- 2.5 g/ kg seed
Imidachlorpit	- 4.0 g/ kg seed

Crop rotation and mixed cropping : In irrigated area many rotation of crops involving maize are feasible. Many crops like potato, wheat, toria, gram, barseem, barley, sugarcane etc, can be grown after harvest of maize. Some important crop rotation are given below :

Maize – wheat	1 year
Maize – potato	1 year
Maize – potato – wheat	1 year
Maize – toria – sugarcane	2 year
Maize – wheat – cotton – barseem	2 year
Maize – toria – wheat	1 year
Maize – wheat – sugarcane	2 year
Maize – barseem	1 year

Some crops like urd, moong, cowpea, etc. are grown mixed with maize. These legume crops are grown in the space between two rows of maize crop.

Weed management : Any unwanted plant at a place where it is not required is a weed. Most of weeds grow naturally and get propagated from crop field. Weed seed can come mixed with crop seed, through irrigation water, air and through animal excreta. These weed create serious problem for crop production by reducing more crop yield under poor or no management condition.

Maize crop is infested with grassy and broad-leaved annual weeds. Among grassy weeds – Echinochloa colonum, echinochloa crusgulli (sawan), Dactyloctenium aegypticum (makra), cynodon dactylon (doob), cyperus rotundes (motha), sorghum halepanse (banchari), Elicune indica (kodo), etc.

The broad-leaved weeds are amaranthus viridis (chaulai), celosia argentia (chilimil), phylanthus niruri. Solanum nigrum, commelina benghalensis, etc.

The maize crop kept weed free for 30 to 45 days after sowing is almost similar in yield as that kept weed free for entire crop season. Two to three manual weeding would be needed for this purpose. Generally khurpi, hand

hoe and spades are used for weed control in maize.

Atrazine is an effective herbicide for weed control in pure maize crop, but it cannot be used in legume and cereal mixture. Atrazine being a selective and broad-spectrum herbicide in maize checks the emergence of wide spectrum of weeds. After three to four days sowing Spray the immediately to Pre-emergence application of Atrazine 50% w.p. @ of 1.0-1.5 kg a.i. per hectare in 700-800 litre water. Among many herbicide tested for such a situation pendimethaline has been found to be most effective and protects both the legume and cereal crop in pre-emergence application. The practice of chemical weed control may not be considered mandatory for general cultivation. So long maize is a poor farmers in majority , manual weeding has many advantages and may be given first priority over the chemical methods. Residues of chemical persist in soil and gradually build up the store and may likely to pollute the soil and water environment.

Manures and fertilizers management : Manures and fertilizer both play an important role in maize cultivation. In maize field 10 to 15 tonnes of well rotted organic matter in the form of farm yard manure or compost before sowing. The application of organic matter to the soil ensures good tilth and improves water holding capacity. Soil testing is very important before supplied of fertilizers. In general recommendation of fertilizer is 120 kg nitrogen, 60 kg phosphorus and 40 kg potash per hectare for hybrids and 80 kg nitrogen, 30 kg phosphorus, and 30 kg potash per hectare for composites.

The method of fertilizer application is also very important. The basal dose should be placed in the soil. This can be done with the help of fertilizer drill and if is not possible use a funnel attachment behind the plough. The fertilizer should be placed about 4-5 centimeter to the side and 4-5 centimeter deeper than the seed. It general the full dose of p and k and one third of nitrogen at sowing time and split of the remaining two- thirds of nitrogen in two equal doses one is about 30-35 days after sowing and the rest at tasseling. In some area, where the soil is deficient in zinc, it is advisable to apply 20-25 kg zinc sulphate per hectare



before sowing.

Irrigation : Maize is very susceptible both to excess water and moisture stress. Never allow water to stand in a maize field at any stage of its growth. Tasseling to silking stage is critical stage for water at this stage water shortage can reduce maize yields. Maize can tolerate heavy rains, provided water does not stand in the field for long time.

Crop protection : Some of major insect pests of maize crop like – stem borer, cut worm, White grub, maize leaf roller, shoot fly, Termites, etc.

Stem borer : Stem borer is a very serious pest of maize crop. The damaging stage of the pest is larvae. The larva enters in the whorl and cause damage in the leaves.



Pink borer : It attacks the crop in late stage when cob formation starts in the field. The larva enters the plant near the base and first feed on the tender leaves and then bore towards the central shoot and cause damage.



Control measures : Control measures are same for both the stem borers. Spray monocrotophos 36 SL @ 1.25 litre/ha, or chlorpyrifos 20 EC 1.5 litre/ha. The spraying should be done about 10-15 after germination.

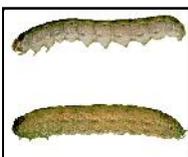
Shoot fly : Pest attack mainly at seedling stage of crop. They cut the growing point or central shoot which results in to dead heart formation.



Control measures :

- Apply 10 per cent Phorate granules @ 15 kg/ha at the time of sowing in furrows will control this pest.
- Use resistant/ tolerant varieties.
- Use high seed rate and remove the infested plants at thinning operation.

Cut worm : The larva of this pest cut the seedling at the ground level. They live in soil during day and feed at night.



Control measures :

Apply carbaryl 10 D @ 25 kg/ha

White grub : This pest is very serious in sandy soils. The larva is feed on the roots of plants.



Control measures : For controlling white grub apply the Furadan 3 G @ 30 kg per hectare or Thimet 10 G @ 15 kg/ha should be mixed in the soil before sowing.

Maize leaf roller : Damage is caused by the caterpillar

which is glossy green in colour and 2-2.5 cm. length and becomes pink when fully grown up.



Control measures : Dusting the carbofuron 3 G 20 kg/ha, in 3-5 cm. standing water or spray quinolphos 25 EC @ 1.5 lit./ha mixed with 500-600 litre water.

Diseases : Across the country several diseases occurs during different seasons, if they are not managed at proper time than they leads to yield loss. Maize crop suffers from different pathological maladies resulting in considerable loss in yield. *i.e.* Bacterial stalk rot, Brown strip downey mildew, black bundle disease, seed rot and seedling blight, maydis and turicum leaf blight etc.

Seed rot and seedling blight : These diseases symptoms are poor emergence or patchy growth. Rotting of seed in the collar region of mesocotyle, presence of red brown lesion on radical or mesocotyle and wilting of seedlings.

Control measures : Seed treatment should be done by 3 gm thiram or captan per kg of seed.

Downey mildew : In this disease the leaf is seen yellowish colour. Fine cottony growth of fungus can be seen on the affected leaf surface during morning hours.

Control measures :

- Deep ploughing of field in summer season.
- Followed crop rotations.
- Improved and resistant variety is sown.
- Seed treatment should be done by Thiram 75% WS @ 2.5 g/kg seed or carbendagim 50% WP 2.g/kg seed.
- Spraying of zineb 75% WP @ 2.0kg ha, or mancozeb 75% WP @ 2 kg/ha with mixed with 500-600 litres of water.

Black bundle disease : Blackening of vascular bundles appears as black dots on the cut ends of the stalk. In severe cases leaves dry and plants wilt.

Control measure : To control this disease seed treatment with systematic fungicides bavistin @ 2g/kg seed.

Maydis leaf blight : In maydis leaf blight, individual spots are grayish, tan upto one and a half inches in length, oval shaped with straight zonations.

Control measures : (i) Grow resistant maize variety like - Deccan, ganga -5, Ganga-4, Decon-103 etc. (ii) Spraying of Zineb or Maneb (1.5 kg/ha mixed with 600 litres of water).