



Package of practices for  
Organic Production of  
**MAIZE**

# PACKAGE OF PRACTICES FOR ORGANIC PRODUCTION OF MAIZE

Maize (*Zea mays* L.) is one of the most important cereal crops in the world, used as food for humans and feed for animals. Maize is the second most important crop next to rice in Meghalaya. Maize production plays a significant role in ensuring food security and is used for direct consumption as well as feed for animals. It has very high yield potential, there is no cereal on the earth which has so immense potentiality and that's why it is called 'queen of cereals'. Maize is grown in almost all the states of India. It is next to rice, wheat and sorghum with regards to area and production in India.

Maize crop is utilized in many ways like grain crops. Over 85% of maize produced in the country is consumed as human food. Several food dishes including 'chapatties' are prepared out of maize flour and grains. Green cobs are roasted and eaten by people with great interest. Maize grain contains about 10 percent protein, 4 percent oil, 70 percent carbohydrates, 2.3 percent crude fibre, 10.40 percent albuminoids, 10.4 percent ash. Maize protein 'Zein' is deficient in tryptophan and lysine, the two essential amino acids. Maize grain has vitamin A, nicotinic acid, riboflavin and vitamin E. Maize is low in calcium, fairly high in phosphorus.

## **Soil and Climate**

Maize is best suited in well drained sandy loam to silty loam soils. Water stagnation is harmful to the crop, therefore, proper drainage is a must for the success of the crop especially during kharif season. The pH ranges between 5.5 - 7.5. The alluvial soils are very suitable for growing maize crop. Maize is a warm weather plant. It grows from sea level to 3000 m altitude. It can be grown under diverse conditions. It is grown in many parts of the country. Kharif season is the main growing season in northern India. In the south, however, maize is sown any time from April to October. The most suitable temperature for germination is 21°C and for growth 32°C. Extremely high temperature and low humidity during flowering damage the foliage, desiccate the pollen and interfere with pollen germination.

## **Varieties:**

RCM1-1, RCM 1-2, RCM 1-3, DA 61-A, RCM 75, RCM 76, Vijay Composite, HQPM-1, HQPM-2, Ganga-11, Ganga-2

**Baby corn:** HM-4, VL-42, Prakash

**Seed treatment:** Seed inoculation with Azospirillum, Azotobacter and PSB @ 20 gm/kg seed before sowing.

### **Land Preparation**

Land should be plough 2-3 times to a depth of 20-25 cm. Planking should be done after each ploughing. A properly leveled and uniformly graded field is required for good water management. Good drainage should be provided in maize field, because stagnation of water in the field is harmful to the crop.

### **Soil Treatment**

Apply Soldier @ 3-5kg/acre mixing with well decomposed FYM to control white grub infestation in the field.

### **Seed rate and Spacing**

Optimum plant population about 60-66 thousand per hectare would be needed to attain optimum yield. Maize seed should be planted at 60 cm row to row and 20-25 cm plant to plant spacing. Seed rate 20-25 kg/ha is sufficient for sowing of one hectare land. Maize seed should be sown at a depth of 5-7 cm. For baby corn spacing between plant to plant can be reduced to 10 cm for accommodating more number of plants with increased seed rate of 30 kg/ha.

### **Time of planting**

Date of planting will differ from place to place. Kharif season maize should be sown two weeks before the onset of monsoon, where irrigation facilities are available. In rainfed, condition, the sowing of maize is generally done with the onset on rains.

### **Manures and Fertilizers**

Manures and fertilizers both play important role in the maize cultivation. Well decomposed FYM @ 15 t/ha or Vermicompost @ 2.5-3 t/ha should be applied 20 days before sowing of crop with 150 kg rock phosphate. Other alternative manure like Berkeley Compost also can be applied. Crop residue of maize plant after harvesting should be incorporated in the field. FYM doses can be reduced up to 10 t/ha if vermicompost is applied @ 2-3 t/ha along with rock phosphate @150 kg/ha. Neem cake can also be added @150 kg/ha to the field for effective control of soil borne insect pests. Maize plant should

be intercropped with legume crops or legumes should be incorporated in the cropping systems. Green manuring (dhaincha) and green leaf manuring (Tephrosia) are also very good source of plant nutrients to be incorporated into the soil.

### **Earthing up**

One earthing up may be given along with first weeding at 30-35 days after sowing to protect the plant from lodging.

### **Water Management**

Maize is very sensitive both to excess water and moisture stress. Never allow water to stand in a maize field during its life cycle. Water stagnation even for 6-7 hours continuously can damage the crop. Maize can tolerate heavy rains provided water does not stand in the field for long periods. Therefore, drain out excess water by making drains of adequate capacity at the lower end of the field. A good crop of maize requires about 500-600 mm of water during its life cycle. Tasseling and silking is most critical stage for irrigation. At critical growth stage water shortage even for 2 days can reduce maize yields by about 20 per cent.

### **Weed Management**

In kharif season weed problem is more due to abundant rainfall. Weeds emerge with the germination of maize seeds and grow along with plants till the early growth period. This causes severe crop-weed competition. Failure of timely weed control gives heavy loss to crop yield. Mechanical weeding should be done 15-20 days after sowing of maize, which provide aeration to soil and also manage the weeds. Second weeding (Hand weeding) was done after 30-35 DAS and third after 50-55 days sowing. Mulching in between two rows of maize with weed biomass also control the weeds.

### **Cropping System**

#### **Intercropping**

It is better to grow a legume as intercrop in maize. In high altitude, Maize + soybean (one row of soybean in between two rows of maize) is very good intercropping practice for the region. In maize + soybean inter cropping, soybean detopping is necessary in high rain fall area, which adds 8-10 kg N/ha and also improve the productivity of soybean. In mid and low altitude area Maize + arhar (1:1 ratio) or Maize + groundnut/soybean and maize + rice

bean is highly promising intercropping system. Paired row planting (2:2 row ratio) should be done for intercropping by adjusting spacing of the maize crop.

### **Cropping sequence**

**High altitude:** Maize + soybean

Mid & low altitude: Maize-French bean, maize- mustard and maize-vegetables  
Maize-pea (for vegetable purpose, 70 days duration) Maize (fodder)-Rice (early variety sown at the end of June) Maize + Soybean (2:2) – mustard.

### **Plant protection**

#### **Insect pests**

Maize cob borer, stem borer, cut worms are the major insect pest of maize. Use of resistant varieties (RCM 1-1 and local yellow are tolerant to cob borer) and timely sowing reduces the problem of disease and pests. Summer ploughing exposes the larvae of insect pest to natural predators like birds. Eggs of insect (Grasshoppers, crickets, etc) also gets exposed to sunlight and get killed. Burn the stubbles of infested crop to reduce the problem.

*Trichogramma chilonis* @ 50000 nos. per ha is suitable for most of the insect pest. Spraying Derisome (product of *Deris indica*) or neem oil @ 2.5 ml/litre of water at 20- 25 days after germination checks stem borer, cut worms and army worms. Spraying of lantana extract 10% and panchgavya 3 % control in insect pest. Application of Neem cake @150 kg/ha to the field for effective control of soil borne insect pests like cut worm.

#### **Fall Army Worm:**

##### **Scouting**

Start scouting in 'W' manner as soon as maize seedlings emerge

At seedling to early whorl stage (3-4 weeks after emergence). Action can be taken if 5% plants are damaged.

At Mid whorl to late whorl stage (5-7 weeks after emergence) - Action can be taken if 10% whorls are freshly damaged in mid whorl stage and 20% whorl damage in late whorl stage.

At tasseling and post tasseling (Silking stage)- Do not spray insecticides (No insecticide application). But 10% ear damage needs action.

## **Control Measures for Fall Army Worm**

- Deep ploughing is recommended before sowing. This will expose FAW pupae to predators.
- Timely sowing is advised. Avoid staggered sowings.
- Intercropping of maize with suitable pulse crops of particular region. (eg. Maize + pigeon pea/black gram /green gram).
- Erection of bird perches @ 10 /acre during early stage of the crop (up to 30 days).
- Sowing of 3-4 rows of trap crops (eg. Napier) around maize field and spray with 5% NSKE or azadirachtin 1500 ppm as soon as the trap crop shows symptom of FAW damage.
- Clean cultivation and balanced use of fertilizers.
- Cultivation of maize varieties with tight husk cover will reduce ear damage by FAW.
- Application of mud slurry in the whorl of affected maize plant.
- Application of dry sand in to the whorl of affected maize plants soon after observation of FAW incidence in the field.
- Mass trapping of male moths using pheromone traps @15/acre.
- Application of *Metarhizium anisopliae* talc formulation (1x10<sup>8</sup> cfu/g) @ 5g/litre whorl application at 15-25 days after sowing. Another 1-2 sprays may also be given at an interval of 10 days depending on pest damage OR *Nomuraea rileyi* rice grain formulation (1x10<sup>8</sup> cfu/g) @ 3g/litre whorl application at 15- 25 days after sowing. Another 1-2 sprays may also be given at an interval of 10 days depending on pest damage.
- Promote population of native parasitoids which have potential to reduce invasive fall armyworm population, Predatory beetles, Wasps and predatory spiders

## **Diseases**

Leaf blight, brown spot and rust are the major diseases of maize. These can be managed by using resistant varieties like MCU-9, COM-1, Local yellow, Local white, Vijay, MCU-204, MCU-314. Spraying the crop for 3 or 4 times at 15 days interval with neem oil/derisome @ 2.5 g/lit or panchgavya 3 % is effective for controlling of many diseases and also supply some nutrients to the plants. Preventive measures like collection and destruction of all infested plant materials after harvest and practice crop rotations with non-cereal crops preferably legumes should be followed to manage diseases effectively.

## **Harvesting**

Crop should be harvested by removing the mature cobs from the plants and keep the standing stalks in the field itself for putting mulch in succeeding crop. In baby corn, harvesting of cobs should be done immediately after emergence of the silk. Five to six harvesting can be done at two days interval in baby corn.

## **Shelling**

Use maize sheller developed by the ICAR Research Complex for NEH Region, Umiam, Meghalaya for shelling the dry cobs to save money, time and increase efficiency of labourers. After shelling seed should be sundried to keep the grain moisture at 20-12 %.

## **Yield**

A good crop of maize produces a grain yield of about 2.5 to 3.0 t/ha under organic production system.

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