R A Ram*

Strategies for organic production of mango

Indiscriminate use of agro-chemicals in mango production has resulted in various environmental and health hazards along with socio-economic problems. The degenerative effects of agro-chemicals based farming practices have forced for alternative system of farming. However, high cost of chemical fertilizers, their toxic effect on fruit quality and health of soil has prompted to find out alternative source(s) of nutrients. In general, 4-6 sprays of pesticides are being done in mango production. Presence of residual toxicity of agro-chemicals is one of the major bottlenecks in capturing international markets. In mango crops, there is ample scope of organic farming and produce so obtained, is of superior quality and safe for health. Sometimes quality of externally sourced organic inputs is doubtful and they are also not cost effective. Therefore, emphasis for on-farm production of organic inputs is to be given to maintain the quality as well as cost effectiveness.

Nutrient mangement

In newly planted mango plants (1-5 years), 10-20 kg of well decomposed compost is applied 0.3 meter away from the trunk in trench during the month of September-October. About 3-4 inch thick mulching with orchard's organic wastes is done in basin. In 10 or more than 10 years old tree 30-40 kg vermi/biodynamic compost is applied one meter away from the trunk in trench and trench should be covered with soil during the months from July-September. Basin should be mulched with on-farm available organic wastes and drenched with 20% jeevamrita twice in the year i.e. before rainy and after season. Tree trunk should be pasted up to the height of 1.5 meter from ground level with biodynamic tree paste twice in a year for the management of gummosis and stem borer. Foliar spraying of vermiwash (50%) is also helpful for better growth, flowering and fruiting.

Insect pest management

Mango hopper

Incidence of mango hopper occur during flowering and fruiting. Severe incidence causes fruit drop and heavy loss to the growers. Adult insects secrete honey dew on the leaves which causes incidence of black shooty mould. Infected leaves become black and photosynthesis is affected due to black layer of mould developed on upper surface of leaves. For the management of mango hopper, spraying of bio-pesticides should be done at the time of panicle emergence. First spray should be done with biodynamic liquid pesticide. Afterwards neem seed extract (4-5%) should be done. 4-5 sprays of neem based bio-pesticide have been found effective for the management of mango hopper.

Organic production of mango

Method of organic manure application in mango tree

Mealy bug

Nymph of this insect crawl on the tree during the month of December- January and suck the sap from small fruits, new leaves and causes fruit drop. For effective managemnt of this insect 20-30 cm wide polythene is wrapped on the trunk one feet above the ground. Both the upper and lower ends of polythene are pasted with grease which protect the nymphs from climbing on the tree. Hoeing of mango basin during September-October also kills the eggs of the insect. Application of 250 g of *Beauveria bassiana* in the basin of tree during December-January has also been found beneficial in management of mealy bug.

Fruit fly

Fruit fly incidence is common in late maturing mango varieties. Female fly lays egg in the fruit and after hatching of egg, larva start eating fruit flesh which leads to rottening of fruits. For the management of fruit fly, all the infected fruits are to be collected and buried in soil. Hanging of 4-5 pheromone traps per acre also helps in management of fruit fly incidence.

Stem borer

Maximum incidence of stem borer occurs during rainy season. Incidence of stem borer is very common in old and senile mango orchards. Insect makes hole in the trunk and eat the xylem part vigorously, which causes slow dying of the tree. For the management of stem borer, hole should be cleared with thick iron wire or spike of the bicycle and plucked after insertion of cotton soaked with neem oil or petrol.

Tent caterpillar

Caterpillar makes bunch of leaves of new shoots during rainy season and eats new leaves. In severe incidence, tree shows burning appearence, which affect flowering, and fruiting in coming season. For the management of tent caterpillar, removal of tent with tool is necessary and removed bunches of leaves should be destroyed. After removal of leaf bunch 2-3 spraying of biodynamic liquid pesticide/ neem seed extract have been found effective in management of tent caterpillar.

Powery mildew

Symptoms of powdery mildew can be seen on leaves, panicles and fruit with appearance of white powder. Affected panicles and fruits dry up and fall on the ground. Foliar sprays of bioynamic preparation-501 (13g/100 liter of water)/lime sulphur (2%) have been found for the management of powdery mildew.

Anthracnose

Black spots are developed on the fruits and leaves after incidence of anthracnose. The size of these spots increases with time. After harvesting of fruits, black spots develop in storage and cause severe loss due to rottening of fruits. Hot water treatment (52°C) for 10 minutes helps in management of disease. Pre-harvest foliar spraying of copper oxychloride/bordeux mixture (2%) at the interval of 15 days is also helpful in management of anthracnose.

Pasting of biodynamic tree paste

Gummosis

Oozing of gum from the trunk and branches causes drying of the tree. In severe case trees start dying back and ultimately dies after few months. For the management of this disease, pasting of affected part with biodynamic tree paste has been found helpful. After cleaning of gum, pasting of affected part with bordeux mixture/copper oxychloride has also been found helpful. Pasting of tree trunk of healthy trees with biodynamic tree paste twice in a year is also effective in management of gummosis.

Panicle midge

Midge incidence commonly occurs on panicle and new leaves. Adult makes hole in the panicle for egg laying. After hatching of eggs, larva comes out and eats the tissues of the panicle. In severe incidence panicle dries up. Foliar application of 20% biodynamic liquid pesticide/ neem oil (3%) at the interval of 7 days has been found effective in management of midge.

Thrips

Thrips incidence occur at the time of flowering and fruit setting during April and May. In severe cases brown spots develop and size of spots increase with time, growth and development of fruits significantly affected and fruits become unmarketable. For effective management of this insect, 2-3 foliar sprays of biodynamic liquid pesticide/ 3% neem oil at the interval of 7 days is recommended.

Mango malformation

Mango malformation is important problem of mango in north Indian conditions. It causes maximum economic loss to Mango growers. In nursery, it affects the growth of grafted and seedling plants. Floral malformation affects the growth of panicles in bearing trees. Vegetative and floral malformation both affect the growth, development and yield of plant. In seedling plants, leaves are converted into the bunch and affect the growth and development. In floral malformation, panicle becomes malformed and persist for longer time on the plants. Affected panicles bear no fruit. Pruning and burning of malformed panicles every year, reduces the occurrence in coming year. Pruning and burning of vegetative malformation is also recommended for minimizing the incidence. Plant propagation from affected mother plants should be avoided to reduce this disease.

Brief accounts of organic production of mango and possibilities of their integration to develop organic farming package of practices are enumerated below.

Salient features of organic production

- Proper habitat development around orchards by encouraging wide range of plantation i.e. trees, shrubs, water bodies, for providing congenial atmosphere, proper ecosystem creation and biomass production.
- Establishment of young orchard and its management with organic inputs.
- Encouraging mixed farming by inclusion of annual crops and short duration fruits such as papaya, guava, drumsticks, etc. as per soil, climate, family and market demand.
- Nutrient management through organic means, i.e. use of composts, leaf mould, bio-enhancers, mulching and need base foliar sprays of bio-pesticides.
- Pests and disease management with organic techniques.
- Rejuvenation of old orchard and organic management.
- Promotion of export quality varieties and organic production to capture export market.
- Integration of post-harvest handling and processing with organic techniques.

Nutrient management

- Growing of legumes for green manuring or as inter/cover crops as per requirement in young orchards.
- Application of organic manures (30-40 kg/tree) through NADEP, vermi/biodynamic after fruit harvest in trench 1.5 meter away from the trunk in 10 or more than 10 years old trees.
- Mulching after application of 100 g CPP, spraying of cow horn manure (BD-500)/ 3% of *Panchagavya*/ 20% *Jeevamrita/Amritpani*.
- Two foliar spraying of biodynamic liquid manures/ vermi-wash at the interval of 15 days after fruit harvest for proper growth and development.

Insect pest management

- Spraying of biodynamic liquid pesticides as per requirement and experience.
- Nettle leaves extract sprays to manage hard pests like mango hopper, mites, etc.
- Use of NSKE for the management of mango hopper.
- Application of tree paste for repelling stem borer twice in a year i.e. before and after rainy season.
- Manual killing of stem borers, injecting neem oil and plugging bores with clay soil during September -October.
- Use of pheromone traps for the management of fruit fly in late maturing cultivars.
- Biodynamic tree paste/cow dung paste for the management of gummosis and dieback.
- Two sprays of cow horn silica (BD-501)/ (2%) wettable sulphur/lime for the management of powdery mildew.
- Spraying of horsetail (*Equisetum arvensis*)/casuarina leaves extract for the management of other fungal diseases.
- Spraying of 2% bordeux mixture for anthracnose and 2% lime sulphur for powdery mildew management.

For further interaction, please write to
R A Ram (Principal Scientist), ICAR-Central Institute for Subtropical Horticulture, Rehmankhera, Lucknow, Uttar Pradesh 227 101. *Corresponding author e-mail: ra.ram@icar.gov.in