



The Philippines is known for its excellent fruit products. The carabao mango, better known as Manila Super Mango, makes the country competitive in the world market. The major importers of mango are Japan, Singapore, and Hongkong.

The Manila Super Mango is one of the world's best varieties. Other popular varieties are Pico and Katchamita.

Our mango industry supports some 2.5 million farmers and farm family members.

Tagged as "sure export winner", there is a projected export increase at 13% annually. It is exported in its fresh or processed form. Mango is known for its versatility as all stages of fruit development is suitable for processing. The unripe or immature fruits can be processed into hot or sweet pickles while the ripe ones can be prepared as slices in syrup or in brine, mango juice, concentrate and puree, jam, chutneys, pulp fruit bar, mango wafer, mango powder, dehydrated mango slices, mango milk powder, and vermicelli.

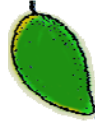
Leading areas producing mangoes are Western Visayas (Region VI), Central Luzon and Ilocos Region.

VARIETIES

1. CARABAO OR MANILA SUPER MANGO - originated from India, Burma and Malaya. It is best served as fresh fruit. It has a perfect blend of sweetness and sourness, succulent, and has a pleasant aroma. Fleshy and yellow when ripe, very tender, melting in the mouth and less fibrous.



1. PICO - originated from India, Burma and Malaya. Smaller than the carabao variety. Kidney shaped with round apex and base, which is more flattened. Light yellow orange when ripe, thick and tough. Has fibrous orange to yellow orange flesh. Sweeter than the carabao variety but not melting.



1. KATCHAMITA - originated from India and commonly known as India Mango. Skin is green and flesh is yellowish.



CULTURAL PRACTICES

A. Land Preparation

For backyard planting, prepare the land simply by digging a hole wide and deep enough to accommodate the ball of soil that goes with the planting material. This is recommended particularly in fertile, deep and friable soil. On poor soil, dig big, deep holes with a diameter of 30-50 cm. Set aside the top soil to be used to re-fill the hole after planting or transplanting.

For orchard planting in flat or slightly rolling terrain, plow the field as deep as possible and harrow the field twice until fine tilt is attained before the onset of the rainy season. To accommodate other cultural activities and to ensure straight alignment of trees, layout the field using the desired planting system such as, square, quincunx, or triangular system.

B. Planting

- Carefully remove the plant material from its container and set it in the hole.
- Fill the extra space with topsoil or compost. Preferably do this activity at the onset of rain.
- Re-plant dead and missing hills one week after planting.

C. Intercropping

Use leguminous plant as intercrop to add fertility to the soil and to keep down the weeds. Fertilize your intercrop to prevent it from competing with the major crop.

D. Weed Control

Hands pull the weeds and continue cultivating the area. Hand pulling is recommended when the plants are still small and the weeds are too close to the plants. For bearing trees, spray herbicides such as round up or gramoxine to provide better weed control.

E. Irrigation

Irrigate the young and newly established trees, whenever necessary, during the first season (dry) of its growth. For matured trees, water or irrigate the plants during flowering and fruiting.

Mango trees need water during the flowering and the fruiting stages, which coincide with the dry season. Water increases the number of fruits per panicle and, also, minimizes fruit drop.

Irrigation can be coupled with moisture conservation practices such as mulching, maintaining good vegetation between rows, and shallow cultivation.

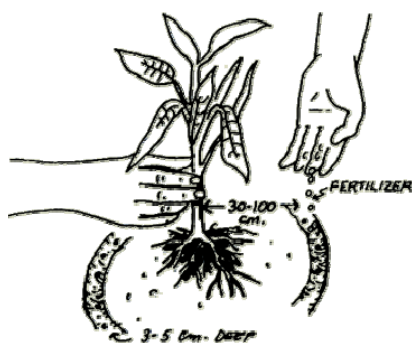
F. Mulching

Mulch the base of the tree with dried grass or weeds, or other suitable mulching materials to restrict weed growth, maintain relatively low temperature and prevent excessive loss of soil moisture.

Dense mulches are effective means of reducing weed infestation.

G. Fertilization

Necessary to stimulate early growth and rapid development of young fruit bearing trees.



For one-year-old trees, apply 200-300 grams complete fertilizer in two equal doses per tree. For older trees, mix 300-500 grams complete fertilizer and 200-300 grams of urea per tree. Split the recommended dosage in two, apply at the start and before the end of the rainy season.

For bearing trees, apply 1.5-2.5 kilogram complete fertilizer per tree. The usual method of applying fertilizer to young and bearing trees is to dig 10-15 holes or use the ring method of fertilizer application by digging a canal around the base of the tree, approximately 3-5 inches deep following the tree canopy. The fertilizer is then placed into the hole and covered with soil.

H. Flower Induction

1. **SMUDGING** - Make smokey fire below the tree canopy and allow smoke to pass through the foliage for several days. To produce heavy smoke, place green grasses on top of combustible materials such as dry leaves and coconut husks. It is done continuously for several days. Discontinue when no flowers appear two weeks. Repeat this process one-month to two months after.



1. CHEMICAL INDUCTION - The more reliable method of inducing off-season flowering is by spraying with potassium nitrate. Besides being effective, potassium nitrate is cheaper and forces mangoes to flower more uniformly. Application rate is 10 grams per liter of water. Spray toward the leaves evenly from the top downward to the bottom of the canopy.



I. Bagging/Wrapping

Mango fruits are as big as chicken's egg 55-60 days after induction. Wrap the fruits with sturdy materials to resist rain and strong winds. The wrapping bag should be big enough to allow room for fruit development. Its bottom portion should be closed to prevent mango and seed borers from laying its eggs at the apex of the fruit.



J. Pruning

Usually done after harvest to prepare the tree for the next bearing season. Pruning helps increase fruit production, improve quality of fruits, attain desired size and shaped of crown, eliminate undesirable branches and achieve dwarfing effect to enable the trees to be resistant to lodging.



PEST AND DISEASES AND THE WAYS TO CONTROL

PESTS

1. Mango Hopper

Damage: Sucks the plant sap that results in withering and drying of tender shoots, inflorescence and very young fruits. Leaves sweet sticky fluids in plant parts that promotes development of fungus called sooty mold.

Control: Spray the recommended chemicals starting from fruit formation to fruit development.

2. Mango Tip Borers

Damage: Shoots wilt and terminal parts die. Affected panicles break and flowers shed off.

Control: Prune dead branches to discourage pests boring into the tree canopy. Pruning and burning parts prevent its spread.

3. Twig Cutters

Damage: Very destructive during the dry season thus reducing the number of flowers formed. It is characterized by the presence of dead twigs and leaves in the canopy.

Control: Pruning and burning of infected parts to prevent its spread.

4. Oriental Fruit fly

Damage: Laying of eggs on the fruit skin provides easy entry for rots and maggots, which feed on the flesh. The mango seed borer eats not only the flesh but also the seed of the fruit.

Control: Bagging or wrapping the fruit when its size is as big as chicken's egg. Harvesting of fruits when matured green to prevent infestation.

5. Mealy Bugs

Damage: Attacks newly flushed leaves, flowers and fruits by sucking vital plant sap. Affected parts turn yellow, dry up and eventually fall.

Control: Removing of infested fruits, flowers, or leaves from the tree.

DISEASES

1. Anthracnose

Symptoms: Shot holes appear on mature leaves. The most serious fungal disease of mango which causes major damage during flowering up to fruit setting and again after, harvest. Upon ripening of fruit, circular brown to black spots appears resulting to fruit rot.

Control: Spray the recommended chemicals from floral bud formation to fruit development. Dip ripe fruits in hot water.

2. Scab

Symptoms: Grayish-brown spots on the fruits with crack at the center and becomes corky.

Control: Use the same control measures as in anthracnose.

3. Diplodia Stem-end Rot

Symptoms: Grayish violet to light brown lesion at the stem-end of the fruit that later turns black.

Control: Wash fruits with copper fungicide suspension.

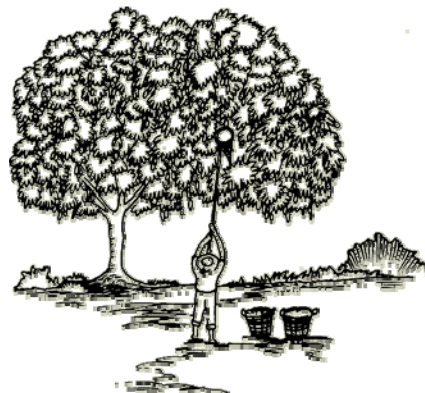
HARVESTING, HANDLING, STORING AND GRADING

Do not harvest mangoes before 120 days from induction. If mangoes are for export, maturity index is needed. Fruits are either picked by hand or by means of a net attached to the end of a bamboo pole with a loop or knife at the end.

Sort out immature, undersize, damaged and diseased fruits during grading. Fruits are graded according to variety, size, weight or diameter.

Bamboo baskets lined with newspapers are used for packing mangoes intended for local markets. For export, the mangoes are placed either in wooden crates or carton boxes.

If necessary, mangoes should be stored at 9-10 degrees Centigrade. Ripe mangoes at this temperature can be stored for 18-21 days while freshly matured fruits for 23-26 days.



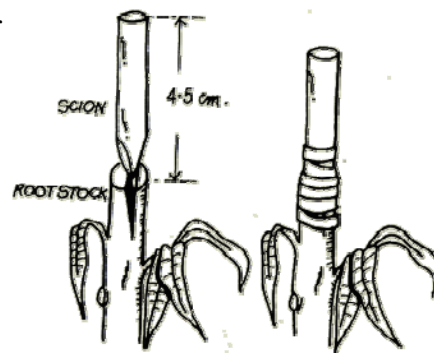
PROPAGATION OF MANILA SUPER MANGO

One simple way of propagating Manila Super Mango (carabao mango) is by grafting. The advantage derived from this method is early fruiting of the tree and the specific knowledge of what variety the plant will bear. It is the surest way of perpetuating the desirable characteristics of parent plants and good qualities of the fruit.

Grafting is making use of the plant's scion and connecting it to its own kind. One tip to be considered to attain better production is that the young scion must come from the tree proven to bear good quality fruits and the stock to be used should be healthy, vigorous and disease free. It is the scion that will bear fruits and not the stock where the scion is connected.

Things Needed in Grafting

1. One year old mango seedling.
2. Scion with pronounced bud.
3. Sharp knife for cutting the scion and the stock.
4. Black plastic pouch with hole, 5 inches in diameter.
5. Plastic strip to wrap the connection of the scion to the stock.



How to Connect Scion

1. Chip on both sides of the trunk of the scion making a spearlike shape.
2. Take the leaves off the stock where the scion will be connected which should fit exactly to the split in the stock. Cut the rootstock to a height where there is active growth.
3. Fit the scion to the stock and bind the connection with a plastic strip/tape up to the near tip of the scion where young leaves will come out.
4. Set aside (place where there is shade) the grafted young Manila Super Mango seedling and leave it there for one month until new leaves appear.
5. If enough leaves appear loosen the plastic strip and remove all the shoots that develop below the graft union. Transplant the new plant when the leaves of the shoots are already mature.

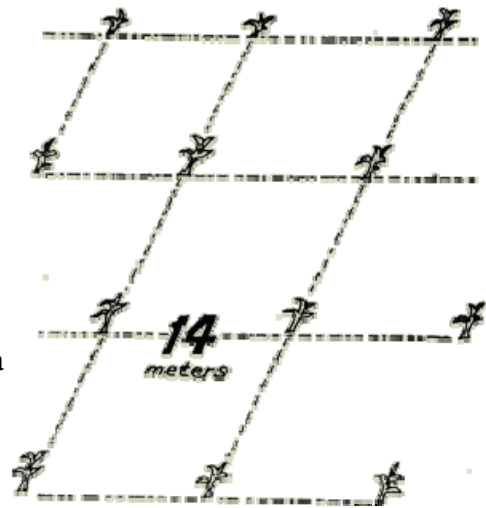
Planting

Start planting at the start of the rainy season. The recommended planting distance is between 10-14 meters.

For fertile, deep, friable soil make deep, wide holes enough to accommodate the mass of soil adhering to the roots of grafted seedlings.

For clayey, rocky or poor soils, make deep, big holes with a distance of 30-50 cm.

Be sure that the topsoil is mixed with compost.



Irrigation

see Cultural practices (letter E)

Harvesting and Post-Harvest Handling

For trees that bear fruit without the use of chemical inducer, fruits mature 82-88 days after full blooming of flowers. Those, which are treated with chemicals, mature at 110-120 days after flower induction (DAFI).

Visual characteristics of fruit maturity DAFI are the following:

1. flattened shoulder at the stem end
2. fullness of the cheeks
3. yellow-green pedicel end
4. yellowing of the pulp

All fruits within its panicle do not mature at the same time, but mature or not it has specific days when to be harvested. In separating mature fruits from immature ones, floatation in 1% solution is a convenient non-destructive method.

SOME MANGO RECIPES

Pastillas de Mangga

Ingredients

2 cups mango puree
½ cup flour
½ cup refined sugar
½ cup powdered skim milk

Procedure

Sift together powdered skim milk, all purpose flour, and refined sugar. Mix well with mango puree. Cook mixture over moderate fire with constant stirring until mixture no longer sticks to the cooking pan. Remove mixture from pan and form into a cooky sheet. Let stand until cool and slightly stiff. Cut into strips and roll in sugar. Wrap in cellophane paper lined with wax paper.

Frozen Mangoes

Ingredients

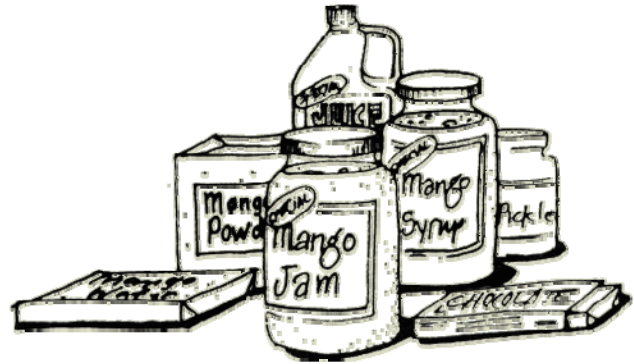
Ripe mangoes
Refined sugar
Ascorbic acid or calamansi juice

Procedure

Proportion of ingredients must be five parts fruit to one part sugar. Wash mangoes to remove surface dirt. Slice and scoop out flesh. Gently mix mangoes and sugar with 0.1 percent ascorbic acid or calamansi juice (1tsp juice for every 2 cups of sugar). Pack in polyethylene bags, seal, and freeze.

Mango Syrup Concentrate for Juice Preparation

Ingredients



4-5 medium-sized ripe mangoes
or 2 ½ cups of mango flesh
½ cup refined sugar
½ teaspoon citric acid

Procedure

Wash mangoes to remove surface dirt. Slice and scoop out flesh from slices with a stainless steel spoon. Separate the flesh from the seed using the blunt end of the knife. Be careful not to include the fibers. Macerate the flesh in a blender to obtain a smooth puree. Add sugar equivalent to one-fifth of the puree. Adjust the flavor by adding citric acid. Pasteurize until temperature reaches 82 degree C (180 degree F). Pour the mixture into cans or glass jars, leaving a 6-cm headspace. Seal immediately. Cool, label, and store.

Mango Halves in Syrup

Ingredients

Firm ripe mangoes
Refined sugar
Calcium chloride
Citric acid

Procedure

Select firm ripe mangoes free from bruises and blemishes. Wash mangoes to remove surface dirt, slice into halves, scoop out flesh with a stainless steel, and place in sterilized jars. Prepare medium syrup 35 degree Brix (approximate 1 cup sugar for every 2 cups of water). If desired, use 50-degree Brix syrup (1-cup sugar for a cup of water). Boil and add calcium chloride (1/4 teaspoon per 4 cups syrup) and citric acid (1/8 teaspoon per 4 cups syrup). Pour hot syrup into jars leaving a ¼-inch headspace. Exhaust by heating the filled jar over a steamer until the internal pressure seals cap jars tightly. Process in boiling water for 25 minutes. Cool, label, and store.

Mango Chutney

Ingredients

4 cups sliced green mangoes (Carabao or Pico variety)
1 piece of ginger root
1 clove garlic
8 pcs native onions
2 pcs hot pepper
1 small box raisins
2 cups vinegar

3 cups brown sugar
4 tbsp coarse salt

Procedure

Salts sliced green mangoes and allow to stand overnight, then drain. Boil vinegar and sugar. Add spices. Simmer until thick. Add the sliced mangoes and continue cooking until transparent. Pack in sterilized jars. Cool and store.

Source: Philippine Council for Agriculture, Forestry and Natural Resources
Research and Development
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