Melon

Plant selection

2 weeks before seedling

Choosing a watermelon variety

There are a number of varieties of watermelon available.
Choose a variety that is suitable for your conditions and market needs. Here are some popular varieties:

- Improved shipper: It is developed by PAU, Ludhiana.
  Fruits are large in size with dark green skin colour and are moderately sweet. The average yield is 70-80 quintals per acre.
- Special no.1: It is developed by PAU, Ludhiana. Fruits are round and small in size with red flesh. This is an early maturing variety. This variety is less sweet than Improved shipper.
- Asahi Yamato: Developed by IARI, New Delhi. This variety gives medium-sized fruits with a weight of 6-8 kg. The variety is ready to harvest in 95 days. The flesh is deep pink in colour.
- Sugar Baby: Developed by IARI, New Delhi. Fruits in this variety are small in size, with a round shape and have an average weight of 3-5 kg. The skin is dark and bluish-black. The flesh is deep pink in colour and seeds are small. The average yield is 72 quintals per acre.
- Exotic varieties from China: Watermelon Hybrid Yellow
  Doll, Water Melon Hybrid Red Doll.
- Exotic varieties from the USA: Regency, Royal Flush, Royal Majesty, Royal Sweet, Paradise, Ferrari, Sunrise.

Planting

Week 1

Furrow,pit and hill planting methods

Seed rate: For one acre, use 600 to 800 grams of seeds.
Watermelon seeds can be sown in different ways:

- Furrow method: Create furrows 2-3 meters apart. Sow 3-4 seeds at a time and keep a plant to plant distance of 60-90cm. Sowing is done on either side of furrows.
  After germination, keep only one seedling.

- Pit method: Create pits of 60x60x60 cm. Keep a distance of 2-3.5 meters between two rows and 60 cm to 1.2 meters between pits. Fill the pits with well-decomposed farmyard manure and soil. Sow 4 seeds in each pit. After germination, keep only one seedling.
- Hill method: Create hills of 30x30x30cm. Keep a distance of 1-1.5 meters between hills. Sow two seeds per hill. After germination, keep only one seedling.

Plant training

Week 8

Improving natural pollination

In watermelon plants, male and female flowers grow on the same plant, but, separately. The male flowers are smaller in size and appear first while female flowers are very large and appear later. The female flowers have a small fruit at the base. In case it shrivels, it means there would be no pollination. In nature, bees carry the pollen while hopping from flower to flower gathering nectar.
Therefore, setting up an artificial beehive in the watermelon field is a good idea. One beehive per acre of watermelon field is more than enough.

Manual pollination of flowers

In a Nutshell

Plants from the Cucurbitacee family such as cucumber and watermelon produce both male and female flowers on the same plant. The female flowers will produce fruit only when pollen from the male flowers come in contact with the female flower. Pollination can be done by bees or other nectar seeking insects. If your production is in a polyhouse and/or the number of pollinating insects is low, you should proceed to manual pollination. Follow these steps for manual pollination:

4 Steps

Step 1

Manual pollination should be done in the early morning when the flowers open. First, pluck a male flower.

Step 2

Gently remove the petals around the male flower.

Step 3

Gently brush the stamen of the male flower (the part which contains pollen) against the stigma of the female flower (the part which is at the centre of the flower). This helps the

pollen stick to the female flower. Use 1 male flower to pollinate a maximum of 4 female flowers.
Repeat manual pollination a few days after new flowers appear and open.

Step 4

Locate the male and female flowers. Female flowers have a small immature fruit attached to them. The male flowers do not have a small immature fruit attached to them.

Monitoring

Week 11

Monitor fields frequently

Monitor the growth of your crop often. Walk through your field in a random manner or zigzag and check for signs of diseases, pests, or deficiencies. Deficiencies are characterized by the discoloration of leaves and the poor vigor of the plants. Diseases are often visible as discoloration and spots or streaks on leaves. Finally, remember that most of the insects present in the field are beneficial for your crop. Those that attack your crop will leave behind damage on leaves and buds in the form of holes. Make sure to talk to your neighbors and exchange information about current diseases with your local community. Also, seek support with public extension services in your area.

Site selection

3 weeks before seedling

Optimal conditions for watermelon

- Watermelon is a warm-season crop and requires dry weather with abundant sunshine for quality fruit production.
- Temperature range of 24-27°C is considered optimal for the growth of the vines.
- Cool nights and warm days are ideal for the accumulation of sugars in the fruits.
- The seed germinates best when temperatures are higher than 20°C.
- High humidity at the time of vegetative growth renders the crop susceptible to various fungal diseases.
- Watermelons can be grown on well-drained sandy to sandy loam, medium-black soils rich in organic matter.
- Soil along the river beds is also good for the production of watermelons.

- A soil pH range of 6.0-7.0 is considered optimal.

Field preparation

1 week before seedling

Field preparation for watermelons

Watermelon, like most plants from the Cucurbitaceae family, does not tolerate transplantation very well.
Unless necessary, sow your seeds directly in a well-prepared field. When preparing the fields, make sure to follow the recommendations listed below:

- Carry out a good ploughing to incorporate the remaining plant debris and weeds into the soil.
- Collect small stones, weeds, and crop stubble to facilitate good seed-soil contact at sowing.
- Later on, harrow 3-4 times to reduce clod size and compaction, and obtain a fine tilth.
- Incorporate 3-4 t/acre of well-decomposed farmyard manure.

Weeding

Week 2

Weed management

Here are some recommendations on proper weed management:

- Keep bed weed-free during the early stages of growth.
- Carry out intercultural operations 15-20 days after sowing.
- Depending on the severity and intensity of weeds, weed your fields approximately once a month.
- Later on as the vines begin to spread, less weeding is necessary.
- The use of herbicides must be done very carefully or else the healthy plants may be damaged.
- When weeds are not kept under control, they can cause yield loss up to 30%.

Irrigation

Week 1

Irrigating watermelon crops

- Watermelon is a dry season crop and must be irrigated.
- The first irrigation is done 2 days before planting.
- The second irrigation is done 5 days after sowing the seeds.
- Continue irrigating once a week.
- While irrigating, water must be restricted to the root zone of the plant.
- Wetting of vines or other vegetative parts of the plant must be avoided especially during flowering or fruiting time to avoid damages to the flowers, fruits or even the plant as a whole.
- Wetting of the vegetative parts can also lead to the development of fungal diseases.
- Maintain moisture near the roots so that the plants develop a central dominant root system.
- Reduce the irrigation frequency as the fruits mature and completely stop irrigating during the harvesting stage. This helps develop flavour and sweetness in the fruit.

Fertilization chemical

Week 1

Basal fertilization for watermelon

Basal fertilization is done during field preparation. The addition of farmyard manure is complemented by the application of mineral fertilizers containing the main nutrients, nitrogen (N), phosphorus (P), and potassium (K). For a successful crop, follow these recommendations:

- Add farmyard manure (12-16 tons/acre) and incorporate well during the last ploughing.
- Add 45 kg/acre of urea, 125 kg/acre of SSP and 35 kg/ acre of MOP when ridges are opened or at sowing.

Week 5

Fertilization before fruit set

- Apply 45 kg/acre of urea 30-35 days after planting, before the fruit set.
- Apply the fertilizer in a circle 6-7 cm away around the base of the stem.

Preventive measure

Week 1

Prevent angular leaf spot disease in your crops

The symptoms are caused by bacteria, which can infect all cucurbit crops. The disease causes the following symptoms:

- Small, circular spots on leaves.
- Later large, angular to irregular, water-soaked areas.
- Infected areas turn gray, fall off, and create irregular holes.
- Circular spots on fruits, later turning white and cracking open.

To prevent angular leaf spot disease in your crop, make sure to:

- Monitor the fields regularly for signs of the disease.
- Clean tools thoroughly after field work.
- Use furrow irrigation instead of sprinklers and do not overwater.
- Remove and destroy infected or suspicious plant material.
- In infected areas, do not plant cucurbits for at least 3 years.

Week 2

Prevent leaf miners in your plants

When leaf miners are present, white or grey serpentine leaf tunnels are visible on leaves, between the two epidermises. A thin, dark streak or dotted dark line is sometimes visible inside the tunnels, more conspicuous from the underside. Leaves may be deformed, twisted, or curled, but remain green. To prevent leaf miners, make sure to:

- Monitor the field regularly for signs of leaf miner infestation.
- Remove infected plants and plant parts and destroy them by burning.
- Apply mulch around plants to prevent the insects from breeding in the soil.
- Use yellow sticky traps or yellow basins filled with water to drown them. They are attracted to the color yellow.
- Practice thorough weed control in and around the field during the season.
- Do not use broad-spectrum insecticide that could affect natural enemies.
- Plow deep after harvest to expose the miners to natural enemies.
- Burn infected plant parts and destroy possible hosts such as old crop debris.
- Plan a crop rotation with non-susceptible crops.

Week 3

Prevent aphids in your plants

Low to moderate numbers are usually not harmful to crops. Severe infestation can cause damage on leaves and shoots and stunted plant growth. Honeydew secreted by the aphids also leads to additional infections and worsening of symptoms. To prevent aphids in your plants, make sure to:

- Monitor fields regularly for signs of aphid infestation.
- Hand-pick and remove infected plant parts.
- Not over-water or over-fertilize your crop.
- Control insecticide use in order to not affect beneficial insects.
- Control ant populations that protect aphids with sticky bands.
- Hold weeds in check, in and around the fields.
- Plow the field immediately after harvest to prevent their spread.
- Plan a rotation with resistant crops.

Week 4

Prevent powdery mildew in your crops

Powdery mildew mainly affects lower leaves. but can also appear on any above-ground plant part. As the disease progresses, the mildew gets denser and spreads up and down the length of the plant. Environments with high humidity favor the disease. To prevent powdery mildew, make sure to:

- Use a mulch to prevent the spreading from the soil up onto the leaves.
- Monitor your plants regularly for signs of the disease.
- Remove infected leaves when the first spots appear.
- Do not touch healthy plants after touching infected plants.
- Fertilize with balanced nutrient supply, avoiding excess nitrogen.
- Plow in or remove plant residue after harvest.

Prevent cucumber mosaic virus in your crop

The damage is caused by the cucumber mosaic virus
(CMV), which is transmitted through aphids. It causes the following symptoms:

- Yellow mosaic patterns on leaves and fruits.
- Downward-bending and crinkling leaves and petioles.
- Stunted and deformed growth.
- White streaks on flowers.

To prevent cucumber mosaic virus make sure to:

- Monitor fields and remove plants with signs of the disease.
- Remove any weeds that show the mosaic pattern.
- Remove other alternative hosts, growing near your crops.
- Ensure disinfection of tools or equipment used for vegetative propagation.

- Attach a floating cover to exclude migrant aphids during the early weeks of crop growth. Remove the cover after this period of greatest vulnerability has passed to ensure pollination.
- Plant barrier crops that will attract aphids.
- Use sticky traps to mass-catch the aphids.

Week 6

Prevent downy mildew in your cucurbit crops

Symptoms of downy mildew on cucurbits is generally characterised by yellow, angular leaf spots on the upper side of leaves that do not enlarge beyond major veins.
This gradually forms a yellow to brown mosaic pattern. A dense, white to grayish velvety and fuzzy coat develops beneath the spots during cool temperature and high, prolonged humidity.
It can cause the dwarfing or killing of young shoots, flowers or fruits and lead to stunted growth and poor yields. The coating cannot be removed easily.
To prevent downly mildew in your crops, be sure to:

- Plant cucurbit crops early in the season.
- Provide proper spacing between plants.
- Keep your plant dry, for example through proper ventilation.
- Keep the vines of the ground and properly tied.
- Make sure soils are well drained.
- Ensure balanced fertilization for plant vigor.
- Control weeds in and around the field.
- Remove plant residues from the field.
- Keep tools and equipment clean.
- Avoid distribution of infected soil and plant material.
- Fortifiers can be applied to strengthen the health of the plant.

Week 7

Prevent alternaria black spot and fruit rot in your crop

Black spot and fruit rot symptoms can be created by many fungi of the alternaria family and are
characterized by the appearance of small reddish-brown spots on fruits and leaves. The spots are surrounded by a green-yellow halo. As the disease progresses, these spots become bigger and form patches that can cover up to half of the fruit surface. Leaves become dry and may drop prematurely.
To prevent alternaria black spot and fruit rot in your crop, make sure to:

- Provide good drainage to the fields.
- Monitor your plants for any sign of disease especially during the flowering period.
- Fertilize your crop properly to increase the plant's natural resistance.
- Collect all the affected fruits and destroy them via burning.

- Infected, healthy-appearing fruit may drop to the ground by gently shaking the tree at the time of harvest.
- Remove old fruits and dead branches from the field.

Week 8

Prevent melon fruit fly in your crop

The melon fruit fly causes the following symptoms in your plants:

- Rotting and premature dropping of fruits.
- Small discoloured patches on fruits.
- Seedlings, roots, stems and buds can also be attacked.

To prevent melon fruit fly in your crop, make sure to:

- Monitor the field regularly by using traps.
- Plough the soil regularly to either expose pupae to the sun or bury them deeply.
- All unharvested crops should be buried at least 0.5 m
- deep to ensure the death of the entire maggot population.
- Do not transport contaminated crops to other locations.

Week 9

Prevent red pumpkin beetle in your crop

Symptoms of the red pumpkin beetle are:

- Large feeding holes on leaves.
- Deep holes on the roots and underground stems.
- Rotting and withering of roots and stems.

To prevent red pumpkin beetle damage in your crop, make sure to:

- Cover seedlings with polythene bags to protect them against beetle damage.
- Ensure good conditions for healthy plant growth, such as adequate nutrients, manure and watering using furrow irrigation.
- Monitor fields once a week for feeding damage and use yellow sticky traps.
- Handpick beetles early in the morning when they are still slow.
- Keep your field free of alternate host weeds.
- Collect and burn or bury the plant debris.
- Plough deeply during the summer to disturb and expose the beetle during its hibernating stage.

Week 10

Prevent thrips in your plants

Attacks by thrips are characterized by small silver patches on the upper side of leaves ("silvering") and marks on the fruit surface. Minute yellow or black insects 1-2 mm in length are visible on the underside of the leaves. To prevent thrips in your plants, make sure to:

- Remove the infected plant and any plant debris and destroy it.
- Control weeds in and around the field.
- Use sticky traps over a large area for monitoring of the infestation level.
- Keep plants well-irrigated and avoid excessive applications of nitrogen fertilizer.
- Plow and remove all plant waste after harvest.

Harvesting

Week 14

Timing and harvesting techniques

- Fruits only mature when they are still attached to the vine.
- The fruit is mature when the tendrils near the stem start drying and the white coloured part of the fruit touching the ground turns yellowish.
- Another sign of maturity is when a thudding sound is produced when the melons are thumped (a dense sound is produced from immature fruits).
- Ripe fruits are harvested by cutting the stem 3 cm away from the fruit with a knife or sharp pruners.
- Immature fruits must be left untouched and not removed.

Week 16

Seed saving techniques

If you are planning on harvesting some fruits to keep the seeds for next year, here are some recommendations:

- Seeds should be collected only from healthy-looking fruits.
- Only mature seeds should be collected.
- The optimum time to collect seeds is at least 1 week after fruits are ready for harvest for market sale.
- To help determine the optimum time for seed collection is when the tendril has withered on the shoot bearing the fruit.

Post harvest

Week 17

Storage of fruits

Follow these recommendations to maintain the quality of fruits after harvesting:

- Grade the fruits on basis of the fruit size.
- Fruits can be stored for 14 days at a temperature of 15°C.
- Do not store watermelon with apples and banana as it will develop an off-flavour and fruits will soften.