AGRIBLOSSOM
ISSN-2582-8258
A monthly peer reviewed e-magazine for Agriculture & allied Sciences

Cultivation of cucurbitaceous crops in Haryana

Archana Brar, Monika Yadav and Sumit Deswal
Department of Vegetable Science
CCS Haryana Agricultural University
Hisar, Haryana, India

Introduction

Cucurbits form an important and a big group of vegetable crops, which are used as salad (cucumber and long melon), cooked curries (all gourds and squashes-bottle gourd, bitter gourd, ivy gourd, ridge gourd, smooth gourd, round gourd, summer squash and pumpkin), dessert fruits (muskmelon, snap melon and water melon), candy and preserved (ash gourd), or for pickle making (cucumber and parwal).This group includes mostly seed propagated crops, besides few vegetatively propagated i.e., pointed gourd (parwal) and few perennials like chow-chow and ivy gourd (kundru).The use of cucurbits as food is not primarily for calorie, minerals, or vitamins since they are poor or only modest sources of nutrients. There are few exceptions like bitter gourd richer in vitamin C, pumpkin containing high carotenoid pigments, kakrol (*Momordica dioica*) high in protein and chow-chow fairly high in calcium. Some cultivars of squashes and pumpkins are relatively high in energy and carbohydrates.

Climatic requirement

Cucurbits are warm season vegetable crops; so, they cannot endure frost excluding summer squash. They require moderately long growing phase through high temperature. Being drought resistant crops, these can be mature successfully even in warm and dry regions. 16-35°C temperature range is most favourable for germination is. High temperature and long days tend to keep plants in staminate phase (male flowers), while low temperature and short days speed up the development of pistillate flowers (female flowers). Dry weather and good sunshine during ripening of musk melon and water melon promote the flavour and sugar contents. Dusty winds during summer check the plant growth particularly in Bottle gourd.

Soil and its preparation

Most of the cucurbitaceous vegetables can be grown profitably on different types of soil *i.e.*, from heavy sandy to clay loam. Well drained sandy loam soil rich in organic matter with good water holding

capacity is best for the cultivation of these vegetables. To obtain the fine tilth, 2-4 times land ploughing is done. Musk melon can tolerate moderately acidic and saline soils.

Cultivated varieties of cucurbits

Muskmelon	Watermelon	Bottle Gourd	Bitter Gourd	Round Gourd
Punjab Sunheri	Sugar Baby	Pusa Summer Prolific Long	Pusa Do Mausami	Bikaneri Green
Hara Madhu	ArkaManik	Pusa Summer Prolific Round	Pusa Vishesh	Hisar Tinda
Punjab Rasila	Pusa Bedana	Pusa Naveen	Priya (VK-1)	Arka Tinda
Arka Jeet	Asahi Yamato	Pusa Sandesh	Arka Harit	Tinda Ludhiana
Arka Rajhans	New Hampshire Midget	Punjab Komal		Tinda Tonk
Pusa Sarbati	Durgapur Meetha	Punjab Long		
Pusa Madhuras	Durgapur Kesar	Arka Bahar		

Cucumber	Pumpkin	Ridge gourd	Smooth gourd	Summer squash
Japanese Long Green	Pusa Viswas	Pusa Nasdar	Pusa Chikni	Pusa Alankar
Straight-8	Arka Chandan	CO-1	Pusa Sneha	Early Yellow Prolific
Sheetal	Arka Suryamukhi	CO-2	Pusa supriya	Punjab ChappanKaddu
Poinsette	PusaVikas	PKM-1	**Long melon**	Patty Pan
Pant Khira-1.	Pusa Hybrid-1	Satputia	Lucknow Early	Australian Green

PusaSanyog	CO-1	Konkan Harita	Karnal Selection	
Pant Shankar Khira-1		Pusa Superiya		

Sowing time

Being a tropical set of vegetables, these crops are cultivated twice once in spring-summer and another in rainy season. Most of them are sown during late winter or early spring. Obviously, melons are cultivated only in those seasons, when the climate is dry and cool for the period of fruit development. In riverbeds, early sowing of cucurbitaceous vegetables is done in November and extending to February in garden lands. The sowing of cucurbitaceous vegetables is done in June-July in rainy season. In Haryana, the cucurbits are sown mainly from November-March when the climate is comparatively dry.

Sowing method

In rainy period, all these cucurbits are sown 2-4 cm deep on the edges of raised beds and on flat beds in summer period. Per hill, 2 to 3 seeds are sown at a spacing of 3-4 cm within the hill. After germination of seeds and attaining 2-4 true leaves, one healthy seedling per hill is retained and rest of the seedlings are uprooted for giving proper spacing to avoid competition. Seeds of those cucurbits whose seed coat is hard, *i.e.*, bitter gourd, bottle gourd and round melon should be drenched in water overnight before sowing for better and rapid germination. Water-soaked seeds should be sown in fields having sufficient moisture, not in dry soil.

Manure and fertilizers

Being poorly exhaustive, all the cucurbits require small quantity of manure and fertilizers, *i.e.*, farmyard manure 10 tonnes, nitrogen 50 kg, phosphorus 25 kg and potassium 25 kg/ha. Well decomposed farmyard manure should be incorporated in the main field 3-4 weeks before sowing of crop. Full dose of phosphorus + full of potash + one-third of nitrogen should be applied at the time of sowing as basal dose, and rest of the two-third dose of nitrogen is incorporated in furrows in the standing crop in two equal installments at 30 days after sowing and at flowering time followed by earthing up.

Irrigation requirement

A pre-sowing irrigation is necessary for quick and better germination of seeds. If moisture in field is not sufficient, apply light irrigation just after sowing. After completion of germination, water the field at 5-7 days interval during summer and 8-10 days interval in rainy season or as and when required depending upon rainfall. Irrigation after the application of nitrogenous fertilizer in furrows in standing crop is essential. Irrigation at flowering and fruiting stage is also very essential. However, irrigation in musk melon and water melon at full maturity of fruit must be stopped, if not, it will decrease fruit sweetness.

Intercultural operations

Destroy the weeds in the early stages of cucurbits growth, unless the vines start spreading. One or two hoeing are enough to keep the field weed free. In musk melon and water melon, the hoeing in late stages should be stopped since the tall weeds will protect the fruits from sunscald disorder. Earthing up is followed when rest of the nitrogen dose is applied as side dressing.

Pruning in musk melon

Musk melon bears staminate flowers on main stem, whereas, secondary branches bear both staminate and hermaphrodite flowers. The first hermaphrodite flower in Hara Madhu variety is generally borne on 7^{th} node of secondary branch, therefore, the secondary branches up to 6th node are pinched off at their emergence and subsequent ones are permitted to develop. Perfect flowers arising from branches on 7th node onwards are permitted to set fruits. These secondary branches are also de-topped at two leaves above the first perfect flower. In comparison to un-pruned plants, the pruned plants give higher fruits with bigger size, thus, pruning technique is quite helpful in getting 20-25% higher yield in Hara Madhu variety. This technique is also useful in Punjab Sunheri variety, where pinching of secondary branches is done up to 3rd node.

Pinching in bottle gourd, ridge gourd, smooth gourd and water melon

It is advisable to remove the apical growing point of plants at 4-6 true leaf stage since doing so enhances early fruiting and maturity by 10-12 days and gives 20-25% higher yield as compared to un-pinched plants.

AGRIBLOSSOM
ISSN-2582-8258
A monthly peer reviewed e-magazine for Agriculture & allied Sciences

Application of PGRs

Bottle gourd and round melon: Spraying 50% Ethrel 100 ppm (4 ml/20 liters of water) at 2- and 4- true leaf stage of plant growth enhances the number of pistilate flowers per plant and ultimately increases the yield. Some surfactant should be added for uniform distribution of solution.

Summer squash: Spraying 50% Ethrel 250 ppm (10 ml/20 liters of water) at 2- and 4- true leaf stage of plant growth is beneficial for producing more female flowers at lower nodes and hence, increases the crop yield. It is advisable to leave few plants unsprayed for the purpose of effective pollination. Some stickers like Teepol or Tween-20 should also be added for proper and uniform distribution of solution.

Watermelon: Spraying gibberellic acid (GA_3) 20 ppm at 2- and 4-true leaf stage increases yield and sweetness. Mix 0.5g GA_3in small quantity of alcohol and then mix it in 20 liters of water.

Bitter gourd: In Pusa Do Mausami variety, spraying of 50% Cycocel 250 ppm (10 ml in 20 liters of water) at 2- and 4-true leaf stage increases the yield.

Ridge and smooth gourd: Spraying of 100 ppm Ethrel 50% (4-ml/20 liters of water) at 2- and 4- true leaf stage increases number of pistillate flowers and ultimately increases 25-35%yield. Adding some sticker in spray solution is important for sticking of solution on leaves surface.

Long melon: Foliar spray of 50% Ethrel @ 200 ppm (10 ml 50% Ethrel in 20 liters of water) at 2- and 4- true leaf stage produces more fruits per plant and fruit weight and ultimately yield.

Rising of seedlings in polyethylene bags for early crop

In December and January, polyethylene bags of' 0.5-1 kg (preferably 15x10 cm) size are packed with a mixture of sand, garden soil and compost in the proportion of 1: 1: 1. Do not use poultry manure since it has inhibitory effect on germination. In the bottom of polyethylene bags, 2-3 holes are made by using the sharp scissors or knife. 2-3 seeds per bag are sown at 3-4 cm depth. After that, the bags are watered with water cane.

The bags are enclosed with polyethylene sheet at night to protect them from frost and chilling winds and for early germination of seeds. Generally, the bags are placed on southern side of house near the wall so that the seeds/seedlings may get sunlight throughout the day and may get protection from cold

waves. The polyethylene sheet should be detached during daytime. After germination, the polyethylene sheet should not touch the seedlings, otherwise that may cause low temperature injury to the seedlings.

The bags after completion of germination are watered with water cane as and when required. After attaining appropriate size and passing away the frost danger, the seedlings can be transplanted in the field without disturbing the earth ball since any damage to earth ball will lead to death of the seedlings. The bags before transplanting should be detached carefully without disturbing the seedling roots. Water should be given to the crop soon after transplanting the seedlings in field.

Harvesting of cucurbitaceous crops

Watermelon

When the fruits of watermelon are thumbed, it emits dull and hollow sound. At maturity, the tendril accompanies the fruit gets shrivelled and dried. The portion of fruit resting on the ground gets changed from pale white to creamy yellow. When fruit is pressed with hand, mature fruit emits crisp cracking sound. Plugging or cutting a little part of outer layer is a sure method or test but it spoils the fruit, as it can't be sent to the market. This test is good only for consumer while purchasing fruit from near market.

Muskmelon

Fruits at *half-slip stage* are not completely ready for table use but are good for distant market since being climacteric fruits they can ripe during transition. In case of half-slip stage, slight pressure is needed to separate fruit from stem. Fruits at *full slip stage* are considered ready for table use and are best for near market. At full slip stage, the fruit itself is separated from the pedicel. No pressure is necessary to separate fruit from stem. On ripening, fruit produces a very pleasant musky flavour. The green pigment is disappeared due to degradative process and yellow pigments are appeared due to synthesis processes. In a few of the varieties, a net like structure is developed on the fruit surface on ripening.

Bottle gourd: Harvest the fruit when these fruits are tender, yellowish green in colour and non-fibrous. The fruits of bottle gourd are tender, if on pressing, nail goes within the fruit.

Bitter gourd: Immature fruits when these fruits are tender and non-fibrous with light greenish colour should be harvested.

Long melon: Harvest the fruits when these fruits become 15-30 cm long, tender, non-fibrous and good flavoured with light green colour.

Pumpkin: Fruits should be harvested when they have developed fully and attained maximum size.

Cucumber: Harvest the fruits at immature tender stage and contain marketable size of fruits. The fruits are tender if nail goes within the fruits on pressing.

Insects-pests of cucurbits

Red pumpkin beetle (Raphidopalpa fovelcollis)

An adult beetle is oblong, shining and yellowish-red in colour and grubs are creamy-white in colour. Beetles make holes in leaves and convert them into a vein's skeleton. Severe attack causes death of small plants. The grubs remain inside the soil and feed on underground portion of host plants.

Control

Where seedlings wilt due to grubs, apply monocrotophos 2.5 l/ha with irrigation water after one month of sowing.

Aphid, jassid and mite

These tiny insects suck cell sap from tender leaves, hence, growth of crop remains poor and it gives lesser yield.

Control

Spray the crop with 0.1% Malathion as and when the pest appears and repeats spay at 10-12 days interval.

Fruit fly (Bactrocera cucurbitae)

The female lays eggs below the rind by puncturing tender fruits. Its attack spoils the fruits. The damage is more severe in ridge gourd, bitter gourd, bottle gourd, musk melon and round melon.

Control

Collect and devastate the infected fruits.

Bait spray of 400 ml Malathion mixed with 1.25 kg *Gur* in 250 litres of water at 10-12 days interval is done.

Bait spray on lower surface of maize plants grown in cucurbits field at 8-10m distance is moderately effective as fruit flies rest on them.

Diseases of cucurbitaceous vegetables

Powdery mildew (Erysiphe sp. and Sphaerotheca sp.)

The fungus forms white coloured patches on upper and lower surface of the leaves, stem, *etc*. particularly in dry weather. The rigorously affected plants turn brown. Because of its infestation, the fruits quality is poor.

Control

Spraying with 0.2% wettable sulfur (Sulfex) as and when the disease starts appearing in crop.

Anthracnose (Colletotricum capsici)

This disease is mainly occurred in sponge gourd, bottle gourd and summer squash, *etc*. Its symptoms differ according to host. The small spots of yellowish colour are produced on leaves and fruits, which later turn into brown. In moist weather, gum like substance is seen on these spots. Sometimes, petioles are attacked and defoliation occurs.

Control

Spraying with 0.2% Dithane M-45 or mancozeb at 10-12 days interval is followed.

Gummy collar rot (Rhizoctonia bataticola)

This disease is noticed mainly in Muskmelon during April-May. Typical symptoms of this disease are stem yellowing at collar region, stem splitting and oozing of gum like substance.

Control

Spray the stems of affected plants with 0.1 % Bavistin solution.

Downey mildew (Pseudoperonospora cubensis)

Angular and yellow or orange colour spots are formed on upper surface of leaves. During moist weather, a white or light purplish downy growth of this fungus appears on lower side of these spots. Later on, the entire leaves become dried.

Control

Spray the crop regularly with 0.2% Dithane M-45, Ridomil, Blitox, or mancozeb at 10-12 days interval.

Mosaic virus

The leaves of infected plants show yellow green patches and become small and chlorotic. As a result, the yield is affected adversely. This disease is mainly transmitted by leafhoppers like aphids.

Control

Spraying with systemic insecticides, *i.e.*, Confidor (imidacloprid) 50 ml/100 liter of water at 10-15 days interval to check the virus-vectors like aphids and whitefly.