

Summer Squash: Adding savour to salad platter

Summer squash also known as zucchini or chappan kaddu is popularly used for making a gamut of preparations such as pastas, soups, stuffings, etc. particularly in metropolitan cities. However, it could be used as a refreshing and delicious salad for health-conscious millennials as it is nutritionally rich yet with lower calorific values. It further adds value to the salad platter with suitable vinaigrette and fresh garnishes. Zucchini fruits meant for salad should be harvested 9-12 days after anthesis when they are tender and weigh around 200-325 g. The quality of zucchini fruits is lost rapidly as the glossy look changes to a dull appearance as the fruit progresses towards maturity.

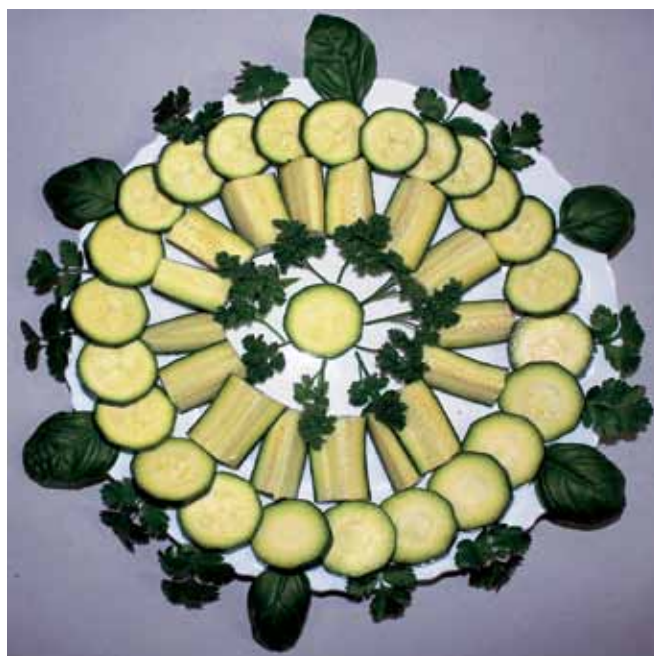
SUMMER squash (*Cucurbita pepo* L.) is also known as vegetable marrow, Italian marrow, zucchini and field pumpkin. Zucchini is the most widely grown and economically important group of the summer squashes. In Hindi, it is known as *chappan kaddu* or *vilayati kaddu*. Summer squash differs from winter squash and pumpkin in that, it is harvested before the rind hardens and the fruit matures. Differences in fruit shapes of summer squash determine their suitability for its various preparations or uses. In India, it is cultivated in the states of Punjab, Haryana, Delhi, Uttar Pradesh, Jammu and Kashmir, Himachal Pradesh and West Bengal.

Summer squash is an annual bush or vine often trailing in habit, which produces stem with greatly shortened internodes and set fruits in close succession. In our country, summer squash is usually harvested before hardening of rind and eaten as a cooked vegetable, especially in metropolitan cities. However, it can potentially be utilized as one of the finest salad vegetables when fruits are tender. Studies at ICAR-

IIVR, Varanasi have shown that, organoleptically, it fared better over cucumber as salad vegetables. Besides, being a refreshing and delicious salad, it has high nutritional value. It contains good amounts of minerals (magnesium, potassium and copper) and vitamins (vitamin C, carotenoids, vitamin B₆, riboflavin and niacin). As compared to cucumber, summer squash is richer in vitamin B, vitamin C, potassium and iron.

Since it is low in calories (17 calories/ 100 g) and high in water and fibre, it is a good salad for health-conscious people who intend to 'bend the curve' of life in a healthier, happier direction.

Fresh summer squash is crispy with soft pulp texture. Its outer pericarp is green and crunchy, while inner endocarp is white and soft. Summer squash meant for their use as salad should be cylindrical and of medium weight and size with straight neck similar to the parthenocarpic green cucumber. Though it is an excellent salad vegetable, appropriate dressing and complementing it with fresh garnishes further aids to colour, taste, and texture.



Healthy and mouth watering zucchini salad platter

Value Enhancement

Zucchini salads can be served as a fresh and light appetizer, or as a digestive with variety of leafy vegetables such as basil, celery, lettuce etc., soaked almond, minced garlic, dressed with cold sauce, vinegar, lime juice or olive oil and sprinkled with kitchen salt, black salt or black pepper as per taste preferences.



Summer squash being irrigated through drip system

Production technology

In northern Indian plains, summer squash may be sown during winter (September to November) or spring-summer (first fortnight of February). However, sowing or transplanting during October 20th to November 10th is the best in order to harvest a good crop and ensuring higher economic return. Varieties like Kashi Shubhangi, Punjab Chappan Kaddu-1, Pusa Alankar, Champion, Romulus, Cora, Green Star, Orelia, Antier Green, Australian Green, Goldy, C-135, PCK-1, Adlika etc. can be selected for cultivation. Seeds can be directly sown in the field at row to row spacing of 60-75 cm and plant to plant distance of 50 cm. Twenty five to thirty thousand plants can be accommodated per hectare.

Production of summer squash at a glance

Sowing time	: 20 October to 10 November
Seed rate	: 2.25 kg/ha
Varieties	: Kashi Shubhangi, Punjab Chappan Kaddu-1, Pusa Alankar, Champion, Romulus, Green Star, Orelia, Antier Green, Australian Green, Goldy, Kora, Adlika
Spacing	: 100 cm x 75 cm
Fertilizers	: NPK- 100:50:50 kg/ha
Harvesting	: 55-56 days after sowing, total 10-12 harvests
Yield	: 10-12 fruits/ plant or 3.5-4.0 kg/ plant or 350-380 q/ha
Cost of cultivation	: INR 140640.00/ha
Net profit	: INR 435360.00/ha

Alternatively, seedlings can also be grown in polybags (half kg capacity) in soil media containing soil, vermi-compost / FYM and sand in ratio of 2:1:1. About 25 days old seedlings with 2-true leaves are suitable for planting. A well prepared land is desirable for zucchini cultivation. To bring the soil to a fine tilth, 2-3 ploughing followed by

Zucchini meant for salad should be 20-23 cm long, 4.0-4.5 cm diameter elongated-shimmering green fruits. Such fruits weigh around 200-325 g and are harvested between 9-12 days after anthesis. The quality of zucchini fruits is lost rapidly as the glossy look changes to a dull appearance as the fruit matures.

harrowing is necessary. About 15-20 t/ha of well rotten farmyard manure should be incorporated at the time of land preparation. Besides, to sustain an optimum crop growth and fruiting, 60-80 kg N, 40-50 kg each of P_2O_5 and K_2O per hectare is also applied. Full dose of P_2O_5 and K_2O and half quantity of N are applied as basal dose. Rest of the nitrogen is top dressed about four weeks after seed sowing or transplanting. Application of boron (1 g borax/hill or two foliar spray of borax at 0.03% applied at 30 days intervals) significantly increases fruit yield. If summer squash is to be irrigated with surface irrigation system, it should be planted on 80-90 cm wide raised bed, and crop is sown/ planted on both side of bed leaving 7-10 cm margin. However, if the crop is grown under drip irrigation system, the water soluble fertilizers (e.g., 18:18:18 or 19:19:19) are administered through drip, usually twice a week in 8-10 split quantities. During November to February, crop is irrigated through drip at every third day mostly for 45-60 minutes.

Weeds pose serious problem during early growth stages of summer squash. Therefore, one manual weeding followed by hoeing and earthing-up at 20-25 days after seed sowing/ planting is usually recommended. Use of plastic mulch (black, black-silver, reflective or bio-degradable) is very useful for suppressing weed population and reducing the water requirement and aphid population. Summer squash is usually not much affected by pests during winter season; however sometimes, leaf minor can cause marginal losses to the crop. It can be managed



Reaping a rich harvest from zucchini



A picturesque view of zucchini field and harvested fruits

Table 1. Fruit growth and consumer preferences for zucchini as influenced by harvest date

Harvest date (days after anthesis)	Fruit length (cm)	Fruit diameter (cm)	Fruit weight (g)	Organoleptic taste value (9 point hedonic scale)
8	17.7	3.41	137.0	7.7
9	20.5	4.45	208.0	8.2
10	22.3	4.40	281.5	8.3
11	22.8	4.59	315.5	8.1
12	24.2	4.74	354.5	8.0
13	25.7	4.99	438.0	7.2
14	25.7	5.44	473.5	6.7
15	26.5	5.89	528.0	6.3
C.D. _{0.05}	1.77	0.43	32.50	-

by spray of 4% NSKE at weekly interval or dimethoate (30 EC) @ 1 ml/litre. Summer squashes are prone to the infection by powdery mildew during fruit set and fruit developmental stages, which can be managed by sprays of Kerathane (1.0-1.5 ml/litre) or Carbendazim (0.5-1.0 g/litre) or Calixin (1.0 g/litre).

Harvesting

For salad purpose, harvesting of fruit at optimum maturity stage is crucial. The first harvest of summer squash fruits for salad purpose usually starts about 55 days after sowing. Fruits should not be allowed to become too large, hard and seedy. For optimum quality, harvest the fruits while they are tender and still have a shiny or glossy appearance. A study conducted at ICAR-IIVR, Varanasi indicated that fruits of 9-12 days after anthesis (DAA) are the best for salad purpose as evidenced by organoleptic evaluation by a panel of experts (Table 1). Fruits harvested beyond 15 DAA have not been found fit for fresh consumption due to hardness of outer rind and prominence of seeds. Such fruits; however, can be utilized for culinary purposes.

The average fruit yield of summer squash varies from 25-40 t/ha during winters depending upon the variety, soil fertility, growing season and other inputs like; fertilizers, irrigation, intercultural operations and insect-pest and disease management practices. Fruit yield up to 70 t/ha can be achieved comfortably, if crop is grown under ideal conditions with standard agronomic practices. However, the yield during spring-summer is quite low (8-10 t/ha) as compared to winter season. For salad purpose, about 10-12 fruits weighing around 3.5-4.0 kg can be harvested from a single plant.

Economics

Summer squash is 100-110 days crop during winter season. Its cost of production including seeds, field preparation, intercultural operations, etc is ₹ 140640.00. Its marketable fruit yield is 320 q/ha with bulk selling price is ₹ 18/kg. Thus, a gross income of ₹ 576000.00 and net profit of ₹ 435360.00 with cost-benefit ratio (C:B) of 4.10 can be obtained from one hectare area. It may be recommended as cash vegetable crops with high income, especially in peri-urban areas.

SUMMARY

Summer squash or Zucchini has recently gained popularity as a vegetable crop in India and is being grown nearby metropolitan cities mostly for culinary purposes. It has observed that tender fruits of zucchini (9-12 days after anthesis, 200-275 g) can potentially be used as good salad vegetable. Its tender fresh fruits are crispy with soft pulp texture similar to the parthenocarpic green cucumber. It can be grown through seeds or seedlings between September to March. With good variety and standard agronomic practices, fruit yield up to 70 t/ha can be achieved. It is easy to grow and manage the crop with less inputs. It can fetch better market price as salad crop, particularly when cucumbers have less availability in market *i.e.* during December to February.

For further interaction, please write to:

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