

CULTIVATION OF KIWI FRUIT IN TEMPERATE REGION OF UTTARAKHAND

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Kiwi fruit (*Actinidia chinensis*) is native to China and it was originally known as Yang Tao. It was brought



to New Zealand from China by missionaries in the early 20th century with the first commercial planting occurring several decades later. In 1960, it was renamed Chinese Gooseberries which made its first appearance

in 1961 at a restaurant in the United States and were subsequently “discovered” by an American produce distributor who felt that the U.S. market would be very receptive to this uniquely exotic fruit. She initiated the import of these fruits into the United States in 1962, but to meet what was felt to be burgeoning demand, changed its name from Chinese Gooseberry to Kiwi fruit, in honor of the native bird of New Zealand, the Kiwi, whose brown fuzzy coat resembled the skin of this unique fruit. Currently, Italy, New Zealand, Chile, France, Japan and the United States are among the leading commercial producers of Kiwi fruit. It is a new fruit crop in India which is cultivated on a small scale and people don't know much about its cultivation. In India, it was first planted at Bangalore and after that in Himanchal Pradesh in 1963. In Uttarakhand, it was planted at NBPGR Bhowali, Nainital in 1990 with six varieties viz., Abbot, Allison, Bruno, Hayward, Monty and Tomuri. Tomuri is a male whereas others are female varieties.

Kiwi fruit is normally dioecious, individual plants are

either male or female. Only female plants bear fruit, when pollinated by a male plant. One male pollinizer is required for each three to eight female vines. Kiwi fruit is notoriously difficult to pollinate, because the flowers are not very attractive to bees. Some producers blow collected pollen over the female flowers.

Production:

Production of Kiwi fruit is not much all over the world. Only some countries are cultivating it on large scale. In India, Himachal Pradesh, Sikkim, Tamilnadu and Uttarakhand are the major producer of Kiwi fruit. It is the most nutritious fruit but its cultivation has not spread throughout the world. People don't know much about Kiwi fruit which is the main obstacle in the way of its cultivation. In Uttarakhand, it is cultivated in temperate region and grows well with good productivity. Kiwi fruit is commercially grown on sturdy support structures, as it can produce several tonnes per hectare.

Nutritional value of Kiwi fruit: (Per 100 g):

Kiwi fruit is a very nutritious fruit and it contains a number of nutrients which are responsible for good human health. Kiwi fruits are rich in various Vitamins, flavonoids and minerals. In particular, the fruit contains a high amount of Vitamin C (more than oranges), as much potassium as in banana and a good amount of beta-carotene. Shortness of breath was reduced by 32%, night time cough by 27%, severe wheeze by 41%, chronic cough by 25% and running nose by 28%. This result is not only traceable to the content in Vitamin C or Potassium, but in substances which are still largely unknown contained in kiwi fruit.

These substances are most likely flavonoids that help protect our cells from oxidative damage, and are therefore considered very helpful in protecting our DNA from mutations and damage.

Kiwi fruit can be grown in most temperate climates with adequate summer heat. These are generally equipped with a watering system for irrigation and frost protection in the spring. Ideal soil for Kiwi farming is sandy loam. Soil must be moist, deep, well drained with 5-6 pH. It can be cultivated between 200 - 2250 m altitudes but its yield is maximum between 1200-1500 m. Kiwi fruit is cultivated mainly in those hilly areas where in winter season temperature falls down below 7°C for 8-15 days. Wind is

Major Kiwi fruit producing countries:

Sr. No.	Name of Country	Production (Thousand metric tons)
1.	Italy	410
2.	New Zealand	360
3.	Chile	170
4.	France	80
5.	Greece	40
6.	Japan	40
7.	Iran	20
8.	United States	20
9.	Canada	10
10.	Cambodia	10
	Total	1,160

one of the greatest enemies in kiwi growing. The flowers and leaves of the plant are very fragile which are damaged by very strong winds. In regions where winds are strong, installing windbreaks may be able to solve the problem.

Farmers should also watch out for light frosts, as they can give undue damage to the leaves of kiwis. When applying fertilizers, a small amount should be used during the early parts of summer or spring to avoid burning.

Field preparation and planting:

Proper soil preparation is very important in Kiwi fruit cultivation. Soil should be well treated with formalin and sandy loamy soil is the best soil for Kiwi cultivation. FYM should be added in soil and any hard particle should be avoided which is obstacle in the growth of Kiwi vine. The site where Kiwi is planted should have good irrigation facility with good drainage system. Pits of 1x1 m sizes are prepared during September-October which are filled with FYM and well aerated loamy soil. The distance between plant to plant and row to row should be 5x5 m.



Propagation:

Kiwi fruit can be propagated both by seeds and vegetatively.

Seed propagation:

Plants of Kiwi fruit from seeds are raised for grafting. Freshly harvested seeds sown in nursery give good germination percentage. Soil of nursery should be well aerated, fertile and well drained.

Vegetative propagation:

Kiwi fruit plants are generally raised from vegetative methods. These are following:

Cutting:

Farmers mostly use this method because it produces rapid and quality plants. Cuttings are taken from mature plants of 0.5-1.0 cm thickness with relatively short internodes and about 15-20 cm length.

Budding:

Budding is a method whereby a bud of one variety is budded on a branch of another during growing season. Budding can only be performed when the cambium layer is soft and wet, and the bark of the rootstock lifts readily. The bud sticks should be kept in water, a moist paper of cloth to avoid drying, while budding the plants. It is advisable to use the healthy buds from the middle of the shoot, though all of them can be used for budding. Chip and T- buddings are most effective in Kiwi fruit.

Grafting:

Grafting is a method of joining the wood of one variety on to the rootstock of another. Grafting should be done during dormant season in January-February. The grafted wood, called the scion wood, is collected from mature tree. The scion wood should be collected from healthy, productive and proven tree. In Kiwi fruit tongue and whip grafting is most effective.

Pruning:

Pruning is most important cultural practice of Kiwi fruit. It prevents dense vine formation and allows access to bees during flowering period. Pruning should be done during dormant period, deformed and died branches are removed and the vine is made for proper light penetration. Adequate light penetration provides good fruit quality and

Nutritional composition in Kiwi fruit (per 100 g)

Energy	255 kJ (61 kcal)
Carbohydrate	14.66 g
Sugar	8.99 g
Dietary fibre	3.0 g
Fat	0.52 g
Protein	1.14 g
Vitamin C	92.7 mg
Vitamin E	1.5 mg
Vitamin K	40.3 µg
Calcium	34 mg
Iron	0.31 mg
Magnesium	17 mg
Phosphorus	34 mg
Potassium	312 mg
Sodium	3 mg
Zinc	0.14 mg
Manganese	0.098 mg

Source: USDA Nutrient database



ripening of the fruit.

Irrigation:

Irrigation is most important during summer when Kiwi fruit faces drought stress. It reduces

the fruit size and minimize fruit yield. Therefore, irrigation at the time of fruit setting is essential for good, healthy and big size fruits. Kiwi fruit requires irrigation every fortnight. Proper irrigation is most essential for good and healthy Kiwi fruit vine.

Insect pest and diseases:

In hilly region there is no serious insect pest or disease observed in Kiwi fruit except some damage by birds.

Harvesting and storage:

The shape of Kiwi fruit is conical and colour is light brown which contain hair on its outer surface. Before harvesting a lot, obtain a few and allow them to become soft which would take a few days. When they taste sweet that time is the best time for harvesting. It may be ripened after harvesting and fall of hair is the best indication of fully matured fruit. Firm Kiwi



fruit ripen after a few days to a week when stored at room temperature, but should not be kept in direct sunlight. Faster ripening occurs when placed in a paper bag with an apple, pear, or banana. Once Kiwi fruit is ripe, it is preserved optimally when stored far from other fruits. If stored appropriately, ripe Kiwi fruit may be kept for about one to two weeks.

Uses and medicinal value:

Kiwi fruit is most useful and it contains a number of nutritional elements which are beneficial to human beings. There is good demand for Kiwi fruit in the processing industry. Many value added products like Nectar, Candy, Papad, Toffee, Jam and Jelly etc have become good source of income in Indian fruit industry. Presently Kiwi processed products giving good competition to other fruit products in the market. Studies have proven that kiwifruits are useful in improving conditions of asthmatic children and in decreasing the probability of colon cancer by providing a good amount of dietary fiber. It also provides a healthy amount of antioxidants, vitamins and protects human DNA from mutation.

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