



Studies on Strawberry (*Fragaria ananassa*) Cultivation under Hydroponic System

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Hydroponics is the cultivation of plants without using soil. Hydroponic flowers, herbs, and vegetables are planted in inert growing media and supplied with nutrient-rich solutions, oxygen, and water. This system fosters rapid growth, stronger yields, and superior quality. When a plant is grown in soil, its roots are perpetually searching for the necessary nutrition to support the plant. If a plant's root system is exposed directly to water and nutrition, the plant does not have to exert any energy in sustaining itself. The energy the roots would have expended acquiring food and water can be redirected into the plant's maturation. As a result, leaf growth flourishes as does the blooming of fruits and flowers.

How Does Hydroponics Work?

Hydroponic systems work by allowing minute control over environmental conditions like temperature and pH balance and maximized exposure to nutrients and water. Hydroponics operates under a very simple principle: provide plants exactly what they need when they need it. Hydroponics administer nutrient solutions tailored to the needs of the particular plant being grown. They allow you to control exactly how much light the plants receive and for how long. pH levels can be monitored and adjusted. In a highly customized and controlled environment, plant growth accelerates.

What are Hydroponic Systems and How do they Work?

Hydroponics is the art of gardening without soil. Hydroponics is a Latin word meaning "working water." In the absence of soil, water goes to work providing nutrients, hydration, and oxygen to plant life. From watermelons to jalapeños to orchids, plants flourish under the careful regimen of hydroponics. Using minimal space, 90% less water than traditional agriculture, and ingenious design, hydroponic gardens grow beautiful fruits and flowers in half the time.

Strawberry

Strawberry, (genus *Fragaria*), genus of more than 20 species of flowering plants in the rose family (Rosaceae) and their edible fruit. *Fragaria ananassa*: Rosaceae, $X=7$, $2n=8X-56$, Octoploid: Artificial man-made hybrid: Garden Strawberry *Fragaria chilonensis* *Fragaria virginiana* (Diploid species) first bred in Europe in the early 18th century via an accidental cross The name "straw" berry comes from the practice of the farmers making mulching over the plants of strawberries by using straw. it is low growing perennial and shallow rooted crop and also called kitchen garden, accessory fruit crop. 1st fruit crop micropropagation studied. flowers are borne in small cluster and white in colour. type of inflorescence is Dichotomic raceme. type of fruit is Etaerio of achenes. type of pollination is Both self and cross. major pollinator is honey bees. strawberry is a heavy feeder crop. responsible for flavour of strawberry fruits: Ethyl esters.

The low-growing, herbaceous plant has a fibrous root system and a crown from which basal leaves arise. The leaves are compound, with three leaflets, sawtooth-edged and hairy. Small clusters of white flowers grow on slender stalks. Botanically, the strawberry fruit is not a berry or a single fruit, but is instead a greatly enlarged stem end that contains many partially embedded true fruits (achenes), popularly called seeds. The plant propagates by stolons as it ages. Strawberries are very perishable and require cool, dry storage. They are eaten fresh or prepared for use in desserts or preserves. Rich in vitamin C, they also provide iron and other minerals.

Origin: Strawberries are native to the temperate regions of the Northern Hemisphere, and cultivated varieties are widely grown throughout the world.

Physical Description: Strawberries are low-growing herbaceous plants with a fibrous root system and a crown from which arise basal leaves. The leaves are compound, typically with three leaflets, sawtooth-edged, and usually hairy. The flowers, generally white, rarely reddish, are borne in small clusters on slender stalks arising, like the surface-creeping stems, from the axils of the leaves. As a plant ages, the root system becomes woody, and the “mother” crown sends out runners that touch ground and root, thus enlarging the plant vegetatively. Botanically, the strawberry fruit is considered an “accessory fruit” and is not a true berry. the flesh consists of the greatly enlarged flower receptacle and is embedded with the many true fruits, or achenes, which are popularly called seeds. fruit of strawberry is complete fruit with 98% of edible portions. strawberries are rich in vitamin C, ascorbic acid and ellagic acid. the fruits are rich in vitamin C and are commonly eaten fresh as a dessert fruit, are used as a pastry or pie filling, and may be preserved in many ways. Strawberry shortcake—made of fresh strawberries, sponge cake, and whipped cream—is a traditional American dessert. fruit of strawberry is complete fruit with 98% Edible portion. Flower colour-white. Excellent source of vitamin C.

Propagation: Matted row system of training is commonly followed in India. USA is highest producer of strawberry. Mulching is an important cultural operation in strawberry cultivation. It is commercially propagated by runner plants Strawberry grows well under temperate climate Mulching is most important cultural operation in strawberry especially June., to maintain temperature above 15°C. there are 4 training system, among them matted row system is commercially followed in India. commercial propagation: Runners Induction of runners formation: IBA @ 100ppm Ideal time of planting runners or crown in hilly regions: September to October.

Cultivation: The cultivated large-fruited strawberry (*Fragaria ×ananassa*) originated in Europe in the 18th century. Most countries developed their own varieties during the 19th century, and those are often specially suitable for the climate, day length, altitude, or type of production required in a particular region. Strawberries are produced commercially both for immediate consumption and for processing as frozen, canned, or preserved berries or as juice. Given the perishable nature of the berries and the unlikelihood of mechanical picking, the fruit is generally grown near centres of consumption or processing and where sufficient labour is available. The berries are handpicked directly into small baskets and crated for marketing or put into trays for processing. Early crops can be produced under glass or plastic covering. Strawberries are very perishable and require cool dry storage.

The strawberry succeeds in a surprisingly wide range of soils and situations and, compared with other horticultural crops, has a low fertilizer requirement. It is, however, susceptible to drought and requires moisture-retaining soil or irrigation by furrow or sprinkler. Additionally, the plants are susceptible to nematodes and pathogenic soil fungi, and many growers sterilize the soil with chemicals such as methyl bromide prior to planting.

Runner plants are planted in early autumn if a crop is required the next year. If planted in winter or spring, the plants are deblossomed to avoid a weakening crop the first year. Plants are usually retained for one to four years. Runners may be removed from the spaced plants, or a certain number may be allowed to form a matted row alongside the original parent plants. In areas with severe winters, plants are put out in the spring and protected during the following winters by covering the rows with straw or other mulches. all the cultivated varieties of strawberries are allo-octoploid Early bearer cultivars are day neutral types. monoecious, short day and quick growing fruit plant. unique place among cultivated berry fruits. Edible portion: Succulent thalamus. Spring frost is a major limiting factor in early strawberry production. major blooming season: December

Major Species: In addition to the dominant commercial variety (*Fragaria ×ananassa*), the musk, or hautbois, strawberry (*F. moschata*) is also cultivated in some areas for its unique musky aroma and flavour. wild strawberries grow in a variety of habitats, ranging from open woodlands and meadows to sand dunes and beaches. The woodland, or alpine, strawberry (*F. vesca*) can be found throughout much of the Northern Hemisphere and bears small intensely flavourful fruits. Common North American species include the Virginia wild strawberry (*F. virginiana*) and the beach, or coastal, strawberry (*F. chiloensis*).

Varieties: Premier, Red Coat, Local Jeolikot, Dilpasand, Bangalore, Florida-90, Katrain Sweet, Blackmore, Pusa Early Dwarf, Phenomenal, Majestic, Sujatha, Labella. Pajaro: most successful under summer system and tolerant to viruses. Most popular acceptable variety in North Indian plains: Chandler: resistant to viruses, resistant to physical damages caused by rain and suitable for fresh market and processing.

Diseases and Pest: Physiological disorder: Albinism- Lack of fruit colour. Serious disease of cultivated strawberry: Grey mould or Fruit rot (*Botrytis cinerea*). Frost injury symptoms: leaf bronzing, blackening of flowers and fruit malformation. Harvesting stage: 2 to 3/4th of skin develops colour.

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