# Improvement of livelihood, food, and nutrition security through sustainable production of Dragon fruit

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**Abstract**

Dragon fruit (*Hylocereus undatus* [Haw.] Britton and Rose) has an economic life of almost 20-25 years and a 3-4-year-old vine may weigh around 100 kg. The average market price of the fruit ranges between Rs. 350-400/kg with a very high demand in Indian and international market. The dragon fruit plants come into flowering after 15 months of planting under long day condition and it produces around 5-7 flushes per year depending upon the climate and growing region.

**Introduction**

- **Dragon fruit (*Hylocereus spp.*) also known as Pitaya is a climbing vine cactus. The fruit has very attractive vibrant red or pink or yellow skin and sweet seed-speckled pulp.**
- **It is originated in the tropical and sub-tropical forest regions of Mexico and central and south America and now it is being cultivated in at least 22 countries all over the world like Australia, China, Indonesia, Japan, Malaysia, New Zealand, Sri Lanka, Thailand, Vietnam etc.**
- **Dragon fruit is known to prevent colon cancer and diabetes, reduce cholesterol and high blood pressure, control high sugar levels prevent cancer and bleeding.**

| Species | Colour of | |
|---|---|---|
| | Fruit skin | Fruit pulp |
| *Hylocereus undatus* | Red | White |
| *Hylocereus triangularis* | Yellow | White |
| *Hylocereus costaricensis* | Red | Red |
| *Hylocereus polyrhizus* | Red | Red |
| *Hylocereus ocamponis* | Yellow | Red |
| *Selenicereus megalanthus* | Yellow | White |

| Suitable growing condition for cultivation of dragon fruit | |
|---|---|
| Factors | Optimum condition |
| Altitude (m) | Up to 1700 |
| Temperature ($^0$C) | 20-30 |
| Rainfall (mm/year) | 500-2000 (with alternative dry and wet period) |
| Soil | Well drained red yellow podzolic, lateritic soil and reddish brown earth |
| pH | 5.5-6.5 |






Propagation

**Seed propagation**

- **Collection of seeds from selected mother plants, washing them with water and germinating them in wet blotting paper or sand clay mixture.**
- **Seeds starts germination in 3-4 days and seedlings can be potted in 4-5 weeks after germination. They are ready for field planting after 9-10 months. Seedlings takes 3-4 years to reach bearing stage.**

**Vegetative propagation**

- **Cutting is the cheapest and easiest method. Dragon fruit plants established by cutting comes to flowering after 1-2 years of planting.**
- **Usually 15-60cm long mature cladode cuttings are potted with suitable potting mixture for better rooting and sometimes dipped in rooting media then transferred to the main field.**

| Spacing (m) | | No of pillars/ha |
|---|---|---|
| Between rows | Within rows | |
| 3.0 | 3.0 | 1100 |
| 4.0 | 3.0 | 833 |
| 4.9 | 3.0 | 680 |
| 3.7 | 3.7 | 730 |

**Trellising**

**As dragon fruit is a climbing cacti, it needs to be trained to climb concrete or wooden post, fences, walls and trees for support. The use of concrete pillars is durable and strong. The suggested pillar should be 100-150 mm in diameter and 2m high and should be buried 40cm in the ground. If there are only a few vines, even a garden wall or tree trunk such as Arecanut could be used as pillar. Steel wires should not be used as it could cut and damage the vines and they also corrode and are not long lasting.**

**A used rubber tyre is cut cross-wise and placed on the top of pillar. The cladodes are trained along the pillar and hung downward over the tyre.**

**Planting**

**The planting of cuttings in well prepared hole is the most common method. The hole should be 30 cm deep and 20 cm wide. The supporting pillar is planted at the centre and the cuttings of the cladodes that may vary from 1-4 plants are planted around the pillar. It is important to flatten the soil around the base of the plant to ground level.**

**Training and Pruning**

**The plants grow fast and reach the trellis in a short period. The lateral branches should be pruned when the vines grow towards the trellis and only the outer leader vines should be allowed to grow. Once the vines reach the trellis free branching is allowed. A well grown plan should produce around 30 branches in the first year increasing to 130 branches in the fourth year leading to interference in the cultural operations and harvesting.**

**There should be about 50 main branches with one or two secondary branches on a main branch. The tertiary and quarterly branches should be removed.**

**Fertilizer Application**

**The crop has to be fertilized frequently in early phase of the growth. The dose of nutrients varies greatly with the region and soil condition. In Hawaiian plantations, a 16-16-16 NPK is applied at 4-6 monthly intervals @180-230g/ pillar. Calcium and micronutrients are also applied to enhance fruit growth and firmness.**

**In Vietnam, young (less than 3 years old) plants are fertilized with 10-15 kg of farm yard manure and 100g of super phosphate per pillar. Mature plants should be given 540g N, 720g $P_2O_5$, 300g $K_2O$ and 20 kg of farm yard manure per pillar/ year. The quantity is applied four splits. The first is applied immediately after harvest, and includes 40% of the N, 30% of the $P_2O_5$ and all of the farm yard manure. The second is applied two months later (30% of N, 20% of $P_2O_5$, 15% of $K_2O$) and the third just before flowering (10% of N, 40% of $P_2O_5$, 40% of $K_2O$). The fourth contains the remaining fertilizer and is applied when the young fruits are developing.**

**Dragon fruit can be grown organically as it has market potential for healthy organic fruit. Organic manure such as cattle or poultry manure or well decomposed compost can be used. The demand of the organically produced fruits is very high.**

**Irrigation**

**Although dragon fruit is a member of the family Cactaceae it requires adequate amount of water. The root system is distributed in the top 15-30 cm of the soil, hence irrigation is required to maintain the soil moisture level particularly during the long dry spell. The rainfall requirement is 1,145 – 2,540 mm per year.**


**Flowering and fruiting**

**The flowers are large, hermaphrodite, very fragrant, nocturnal and bell shaped. The flowers open rapidly, starting between 6.30-7.00pm and opening of the flower is completed by 10.00pm. If the flowers are not pollinated during the night, they remain open until the next morning. Flowering is induced by long days, hence it is photoperiod sensitive species. Bats and hawk moths are natural pollinators of dragon fruit, but in Sri Lankan condition honey bee, little honey bee and rock bee effectively pollinate the dragon fruit during the early hours of morning. The fruit is a berry and develop from both ovary (pulp) and the receptacle that surrounds the ovary (peel).**

**Harvesting**

**The ripening time is usually from June-December. In most of the countries including Sri Lanka, Dragon fruit ripen during this time. The harvesting is done carefully using pruning knives without damaging the fruits.**

**As dragon fruit is non-climacteric fruit, they should be picked at maximum sugar levels and acidity. At peak ripeness, the fruits become pink-red, although the scales remain green. The fruits can be harvested 28-35 days after fruit set.**

**Yield**

**Dragon fruit bears within six to nine months and yields could be obtained from the second year onwards. The average yield is around 10-12,000kg/ ha at the end of third year. However the commercial plantations in Israel, Malaysia and Taiwan produce between 16-27,000kg/ ha. Under Sri Lanka conditions a yield of about 18-22,000 kg/ ha of fruits can be obtained per year with fruit weight ranging from 350-850g/ fruit.**


**Conclusion**

- **❖ Dragon fruit is an emerging fruit crop that has very good market demand and if the farmer adopt the cultivation of dragon fruit they can relatively generate more profit than other conventional fruit crops.**
- **❖Thus their socio-economic life will be developed .**
- **❖Cultivation of dragon fruit will also provide good opportunity for making innovative processed products.**
- **❖Hence, it is the perfect time to establish a dragon fruit orchard to catch the high valued market price.**

**Reference**

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**Presented in the National Online Training Programme on "Conservation, Management and Utilization of Horticultural Genetic Resources for Livelihood and Nutritional Security" Organized by ICAR Indian Institute of Horticultural Research in association with Society for Promotion of Horticulture from Nomvember 22-26, 2021**