AN OVERVIEW OF DRAGON FRUIT CULTIVATION IN ANDHRA PRADESH

Abstract:

Dragon fruit is a wonderous fruit belonging to cactaceae family. This fruit is familiar~~as~~tostrawberry pear, pitaya and pitahaya. It is indigenous to the country, south America but is extensively cultivated in south Asian countries like Vietnam, China, Singapore on a large scale.[2]It is a very nutritious fruit which is fleshy inside and covered with a leathery skin with spike like structures. These can be propagated via stem cuttings or vis seeds. We can grow this at home in a pot by shallow planting. If it is propagated via stem cuttings it grows a notable height vertically. So, it needs anchorage and commonly cement poles are used for that purpose. They range from 160 to 240 rupees per kilogram in Andhra market. It has the potential to develop high revenues for the farmers.[1]White fleshed variety is the most common commercial variety cultivated. Dragon fruit is used against type-II diabetesi.e., diabetes mellitus, prediabetes, high blood pressure, high cholesterol levels, obesity. Pitahaya contains anti-cancer properties. ~~It's~~theflowers are used in the brewing industry. The horticultural university of Andhra Pradesh (Dr. YSR Horticultural University) have ~~been~~ made several trails on it and has observed very successful fruit growth in the agency areas of Vishakhapatnam (Chintapalli and Lambasingi villages).[3]The government should also implement new schemes for the dragon fruit cultivators. The government can install cold storages and make proper transport facilities for the farmers.

Key words:*selenicerus, hylocerus spikes, shallow planting, vertical poles, sternocerus, linoeic acid, brewing industry, megalanthus spp. ……..,*

Comment [EI1]: One objective of a research investigation is to alleviate government involvement in research and development toward self-sustainability. It is expected that the parent research activities should develop schemes to meet up with target.

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1.Introduction:

Dragon fruit, commonly called as pitahayaor strawberry pear is scientifically known as *Selenicerus* spp. (formerly *Hylocerus*) belonging to the *Cactaceae* family. The pitaya grown in America comes under genus *Sternocerus.* These are characterized by its leathery skin and scaly spikes on the exterior side of fruit whereas theinterior is fleshy.[4] Commonly gown varieties in India are white fleshed, yellow fleshed. But there are also black fleshed and red fleshed varieties. These are native of Mexico and the Americas.This fruit is cultivated in Southeast Asia, India, Thailand, Singapore, Japan, China, United States, the Caribbean, andAustralia. In India the western and the southern states are more apt for the dragon fruit cultivation.[5] This fruit has many health benefits and can help in weight loss and also contains anti-cancer properties that helps in curing cancer and is rich in anti-oxidants. News reports say that its firstly introduced in Andhra Pradesh by a farmer and a young entrepreneur T. Vijaya Sriram and Dr. C. Chandrasekhara Rao, Sr. Scientist & head, Horticultural research station, Dr. YSR horticultural university, Chintapalli, Vishakhapatnam in 2013-14. It was seen productive and further research is also being done.[7]

2.Cultivation:

Climatic and soil requirements: Sandy loam to clay loam soil is required and required soil pH ranges from 5.5 to 7. Soil must be rich in organic humus. It can also survive in poor soil conditions. [6]The minimum temperature ranges from 20 degrees to 30 degrees Celsius. These fruits can resist very short periods of frost, but cannot thrive long exposure to freezing temperatures. It requires an annual rainfall of 40 to 60 cm.

2.1. Planting

It can be propagated via seeds and stem cuttings commercially.[8] If they are planted via seeds they need to be planted in pots and will be germinating after

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11 to 14 days of shallow planting.Commercial plantings are done at high density with 1,100 to 1,350 plants per hectare.[9] Plants will take up to five years to reach the required stage for full commercial production, where the yield rate of 20 to 30 tons per hectare is expected.A beneficial tip for the cultivator is to plant this crop at the start of the monsoon to achieve higher yield.

2.2. Spacing

The distance between the plants depends on the type of support used (either vertical or horizontal) while being planted. In case of vertical support, the distance between the plants should be 2-3 meters while in horizontal support the distance can be reduced to almost 50 cm which allows the farmer to achieve intensive farming.[10]The vertical support like cement poles should be between 1m-1.2mhigh while the horizontal support should be between 1.4 m-1.6 m for appropriate and healthy growth.

2.3. Flowering

Once the plant reaches maturity around a mass of 4.5 kilograms (10 pounds) in weight, the flowers of the plant start blooming. An interesting thing about the flowers of dragon fruit is that they bloom overnight and will be wilted by evening. They rely on nocturnal pollinators such as bats and moths. Generally, self-pollination in these plants do not cause formation of fruit set whereas, cross pollination goes well but cross pollination may differ its mother kind. [12] So generally, while growing on a commercial purpose we use self-pollinating method.Its flowers are light yellowish in color.[13] The flower takes 20 days to develop fruit after fertilization and needs 40 to 45 days to ripe completely.[Fig.1]

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Fig.1. flowering bud of Dragon fruit

2.4. Nutrient requirement

Farmyard manure can be used 20 to 25 kg per acre. A water solubleNPK@20-20-20 can be given twice in a season, the first one at early spring and after complete bloom of flowers.[14] A tablespoon in a gallon of water is efficiently enough.

2.5. Irrigation

Dragon fruit doesn't need much water for irrigation~~at~~because it belongs to the cactus family.However, at the time of planting, flowering, fruit development stage and hot dry climatic conditions, frequent irrigations are required.[15] Drip irrigations can be used for effective water usage.

2.6. Harvesting

The plants bearing fruits can be found in the first year only. Generally, theflowering period of this plantis found to be in between the month ofMay to June ~~month~~ and fruit bearingperiod varies from August to December month. The fruits become available for harvesting after a month of flowering. The fruitturns red which indicates that the fruit is ready for harvesting. [Fig. 2]The fruit should be plucked and collected safely as soon it is fully grown because a delay of 4-5 days makes it to rot causing heavy losses to the farmer. The interesting thing in this plant is that we do no need to use ethylene or something

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for the ripening of the fruit.[16]A single plant typically produces around 1 kilogram of the fruit and each pole will be hosting 4 plants so 4 kg/pole will be received. An acre produces about 6 – 7 tons of dragon fruits per harvest. In a year, 45 to 50 tons of dragon fruits per a hectare could be produced under superior and apt farming conditions and prerequisites. The trail run of dragon fruit at Chintapalli of Andhra Pradesh in 2013 showed 420gm fruit weight which is very good and its higher than the dragon fruit grown in Vietnam which ranges around 300 gm.[3]

Fig.2. Fruit ready to harvest.

3.Varieties

1. *Selenicerusundatus*: it is the white fleshed variety covered with pink skin.Also known as *Pitahaya,* the variety has a white flesh with pink skin. The fruit is 6 to 12 cm in length and 4 to 9 cm in thickness with edible black seeds immersed in the white colored flesh.
2. *Seleniceruspolyrizus*: it is the red fleshed one wrapped with pink skin around.Also knows as *Red Pitaya,* it is recognised by its red flesh with its pink skin. It is basically indigenous to the country Mexico but is now grown in many countries.
3. *Selenicerusmegalanthus*: White fleshed and yellow skinned. This variety belongs to its homeland South America and known by its white flesh with a yellow skin wrapped around.[18]

Comment [EI2]: The data reported can be in a Table with the criteria: column 1 specimen name, column 2. Growth characteristics, column 3. Propagation information, column 4. Uses, and column 5. references

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4. Uses of dragon fruit

- Helps in curing cancer as it contains anti-cancer properties.
- Dragon fruit contains anti-inflammatory properties.
- It aids in reducing cholesterol and helps in weight loss.
- The Flowers can be used to make tea. [17]
- It is used to processed into different product such as jam, juice, ice cream, squash, wine.
- The flower bud is used soup, making salad and as vegetable.
- The dragon fruit is used to flavour and colour juices and alcoholic beverages like the "Dragon's Blood Punch" and the "Dragotini"
- The Niti Aayog in its report in 2017 says that dragon fruit Doubling Farmers Income and aids in crop diversification.[19]
- This crop has the potential to double the farmer's profit.
- Besides its various health benefits this fruit also improves your skin health. Dragon fruit could do miracles to your skin health that completes your skincare routine.
- Helps ward off anaemia during pregnancy. [20]

Comment [EI3]: This information should be presented in a Table with references

5. Nutrition values of Dragon fruit

100 gm of dry pitaya provides 1,100 kilojoules which is approximately 264 kilocalories of food energy comprising 82% of carbohydrates, 4% of protein, and 11% of the vitamin C and calcium each which compensates the daily requirement for a person.This contains many important and beneficial oils such as useful fatty acids like linoleic acidaround 50.1% and minute quantity of linolenic acid about1%. Besides these it also contains seed oils such asmyristic acid consisting of 0.3%, palmitic acid 17.6%, stearic acid 4.4%,oleic acid 23.8% and palmitoleic acid 0.6%.[23]

Comment [EI4]: Reference?

Comment [EI5]: Reference?

*These values are taken from the white fleshed pitahaya.

6. Pests and diseases of dragon fruit

- Dragon fruit can be affected by virus, bacteria, fungi and nematode.
- Heavy watering or excess rainfall cause the drooping of flowers also leads to rotting of fruits.
- The bacterium *Xanthomonas campestris* causes the stem rot. [Fig.3]
- The fungi*Dothiorella*cause brown spots on the fruit.[Fig.4]
- Other fungi known to infect pitaya include *Botryosphaeriadothidea* and*Colletotrichum gloesporioides* majorly.[22]

Fig.3. stem rot of dragon fruit caused due to *Xanthomonas campestris*.

Fig.4. brown spot on the fruit of dragon fruit caused due to fungi*Dothiorella*.

Comment [EI6]: Proper labelling is required

7. Economics of dragon fruit:

Generally, dragon fruit plant can be propagated through seed and for commercial purpose we propagate via stem cuttings. Now these cuttings after planting they need cement poles or bamboos for anchorage. As this plant can give crop for 20-25 years, we use cement poles for that as a long-term investment. A pole must be of 8-8.5 feet long. It should be placed 1.5 feet deep and 6.5 feet height and at the top of the pole we have to place rings. The plants should be trained through the rings for its growth. As these plants have clinging roots they will easily adapt around the pole. We can place 500 poles per acre and that costs up to 10 lakhs and the same quantity of rings. [21] The rings costs

around 1500-2000 rupees per unit. A pole can withstand 4 plants that means 2000 plants per acre and each plant gives 5 kg yield. Hence, a pole gives 20 kgs yield and therefore an acre produces 10,000 kgs of yield. Dragon fruit costs 160 to 200 rupees per kg. the metros like Bangalore, Chennai, Delhi, Mumbai, Kolkata, Hyderabad are showing really high demand for this fruit which is really a great deal for the dragon fruit farmers. We can market through online market retails such as reliance fresh, amazon groceries, big basket, etc. super markets like spencer's, more, reliance, Dmart are there to market our product. [14] It can be exported in order to get high returns. We can sell it wholesale also which can generate good profits. The primary investment is18 lakh per acre in the first year. The investment from the second year will only be 1lakh per acre. The profit will be15 lakh per acre per year and may further increase to 17-18 lakhs after two or three years. This crop has high foreign exchange. So, this will be one of the best crops to get such ~~cool~~high returns.[19]

8. Conclusion:

So, overall comparing all the pros and cons we can conclude that dragon fruit is a wonderous fruit and it is highly suitable to be cultured in Andhra Pradesh. This can also generate higher income for the farmers. This can be a great foreign exchange for the country. It's cost of cultivation is high in the start but government can provide subsidiary to the farmers and also the government should increase the awareness about the cultivation. Young farmers of Andhra are coming forward to grow this exotic crop on a large scale. Many farmers got succeeded and researches are being done for the further development of the fruit in the country. This fruit is also having such a great medical value so it shouldn't be ignored. It can be a boon to many patients.

Comment [EI7]: This should be modified for the purpose of clarification.

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Comment [EI8]: References should be numbered. 1,2,3 .....