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Current Status of Dragon Fruit Diseases in Sangola Tehsil

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Abstract: *Dragon fruit (Hylocereus sp.) is a tropical fruit with a unique appearance, crunchy texture and sweet taste. It has become increasingly popular across the Sangola Tahsil as an alternative crop to pomegranate due to its claimed health benefits and commercial value. It is rich in antioxidants like Betalains, Hydroxycinnamates, Flavonoids which may reduce issues from heart problems to cancer. Four varieties are widely planted such as white, red-flesh, Jumbo red and yellow varieties. Dragon fruit production area is about 75 acres. Now a day, dragon fruit growers facing significant challenges due to different diseases and insect pests which impacts on fruit yield production and profitability. This paper provides a comprehensive review of dragon fruit diseases in the study area and their current management options. Correct identification of the causal pathogen is a prerequisite for and effective disease management strategies. We conclude that insect pest attacks, sunburns and fungal reported diseases of dragon fruit and actions are needed to address the growing problems associated with these diseases as no disease management strategies for Dragon fruit diseases has been studied, published and yet to be identified..*

Keywords: Dragon Fruit, Fungal diseases, disease management, antioxidants, Flavonoids

I. INTRODUCTION

Dragon fruit is an exotic fruit. Tropical climate is suitable for dragon fruit cultivation. The Dragon fruit (*Hylocereus undatus*) is indigenous to the Americas, but it is currently being cultivated in large quantities in Thailand, Vietnam, Israel and Sri Lanka and now it has started in India also. It can grow in arid and semi-arid regions (Nobel, 1994; Nerd et al., 2002; Nobel, 2002) with very low input cost. It requires less water. It is cultivated in places with dry environment and in soil with proper drainage and good fertilizer density. It cannot be cultivated in waterlogged land. Dragon fruit plants grow well at high temperatures. Temperature about 25°C suitable for its growth & when fruits are growing on the plant, it needs a temperature of 30°C to 35°C but its plant can also tolerate maximum temperature of 40°C and minimum of 7°C. The total world production is about 1 million tons, with the US being the top importing country and Europe as the top importing region (Mercado-Silva, 2018).

The dragon fruit was introduced to home gardens in India in the 1990s. It has many essential properties and energy-building body-building components which makes dragon fruit different from every other fruit on the market. Commercially, dragon fruit appear to have numerous selling points; they are attractive in shape and color, and very good nutraceutical property which attract growers from all over India. Mainly dragon fruit cultivation is found in Maharashtra, Karnataka, Andhra Pradesh, West Bengal, Telangana, Tamil Nadu, Odisha, Gujarat and the Andaman and Nicobar Islands, as well as in many north eastern states. According to the Indian Council of Agriculture Research (ICAR), the fruit can be sold between Rs. 200-250 per kg in metropolitan cities and thus can fetch a huge profit for the farmers. The fruits are in high demand in metropolitan cities due to their nutritive value. The rates of fruits vary from Rs 50 to Rs 120 per kg in the Mumbai, Pune and Surat markets. Retailers sell fruits at Rs 60-Rs 100 per piece in the local market.

II. MATERIAL AND METHOD

The study area was selected from Sangola Tahsil like Anil Salunkhe Dragon Fruit Farm and Rukmini Dragon Farm which are the very first and experimental dragon fruit cultivation farms. The Dragon fruit cultivation started in 2013 from three

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acres on hard soils at Rukmini dragon fruit farm. Now a day total 15-acre is under cultivation - 7 acres in black cotton soil and 6 acres in hard soil. While cultivation in Anil Salunkhe Dragon Fruit farm was started in 2011 with 4.5 acres and now 24.5-acre land is under cultivation The frequent visits were arranged to know about the current status of the different diseases observed in the study area. After the observations and discussions with owner and experimental farmers of these farms some results were concluded.

Figure: Anil Salunkhe Dragon Fruit Farm

III. RESULT AND DISCUSSION

In Maharashtra, farmers of Solapur, Nagar, and Satara areas are cultivating the dragon fruit from foreign soil, as the demand for the fruit is high and the price received is suitable too. From Solapur district, Sangola Taluka is leading in Dragon fruit farming. In 2011, Anil Salunkhe dragon fruit farm, Bamni and in 2013 Rukmini Dragon fruit farm, Akola is established in 4.5 and 3 acres respectively.

Sangola Taluka is actually famous in the world for Pomegranate and ber cultivation. Due to climate change and other issues like bacterial disease locally known as telya, Pomegranate cultivation become lesser. This has led to a steep increase in dragon fruit cultivation as an alternative crop in Sangola Taluka as the climate and soil conditions are suitable for cultivation. Now a day, Anil Salunkhe Dragon Fruit farm is in 24.5 acres and Rukmini dragon Fruit Farm is in 17 acres. The low maintenance and high profitability of dragon fruits (Merten, 2003) has attracted the farming community throughout Sangola Taluka. To encash on the popularity of the dragon fruit, many farmers and stakeholders have jumped into the nursery business and are selling cuttings at the rate of Rs. 30 to 80 per plant. It is a fruit that is affordable and nutritious for the poor and adds to the income of the farmer.

Available Information on Dragon Diseases and Its Management

Information regarding dragon fruit diseases and management practices was searched through websites, proceedings of scientific conferences. The first demonstrated significant impact of a disease in dragon fruit was reported in the 1990's in

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Colombia when several pathogens, in particular, the fungus *Drechslera cactivora* (*B. cactivora*), reduced the area planted with *H. megalanthus* by 93% (from 4000–250 ha) (Varela et al., 1995; Bibliowicz and Hernandez, 1998; Nerd et al., 2002). The fungus infects the base of pre-mature fruits and induces yellowing (Varela et al., 1995; Bibliowicz and Hernandez, 1998). The majority causes fungal diseases in stem, fruits, and flowers. There are only two bacterial, one viral and a nematode disease. The most recent report was anthracnose caused by *C. siamense* in India (Abirammi *et.al.*). The reviews on taxonomy (Mercado-Silva (2018), botany (Tel Zur (2015), medicinal properties (Nobel (2002), geographical distribution (Le Bellec et al. (2006) and industrial uses (Carillo Salazar (2012) of dragon fruits are available but no comprehensive review has been made for dragon fruit pathology and its management. Few pests have been recorded on Hylocereus. Ants belonging to the genera Atta (Barbeau, 1990) [4] and Solenopsis (N'Guyen, 1996 and Le Bellec, 2004) [21, 14] are very notorious pest and can cause major damage to the plants as well as to the flowers and fruits.

Current fungal diseases of dragon fruit found in visited farms.

Information regarding current status of dragon fruit diseases and management practices is collected by visiting the Anil Salunkhe dragon fruit farm, Bamni and Rukmini dragon fruit farm, Akola *Hylocereus undatus*, fruits with red peel and white flesh (pulp), is the most cultivated species worldwide (Nerd et al., 2002). In 2011 and in 2013 fruits with red peel and white flesh (pulp) variety was initially planted in both the farms. But now a total of 4 types of dragon fruit are planted.

- **Hylocereus undatus:** Also known as Pitahaya, the variety has a white flesh with pink skin. The fruit is 6-12 cm in length and 4-9 cm in thickness with edible black seeds.
- **Hylocereus polyrhizus:** Also knows as Red Pitaya, it is recognized by its red flesh with its pink skin.
- **Hylocereus costaricencis:** The variety is known for its violet, red flesh and pink skin. The fruit is magenta, and the seeds are pear-shaped.
- **Hylocereus (Selenicerus) megalanthus:** This variety is characterised by its white flesh with yellow skin.

Fungal Diseases

From the discussion with them after visiting both the farms, it was found from their experience that the ***Hylocereus costaricencis*** variety locally known as Jambo Red variety has more disease resistant potential than the other two varieties like regular red **(Hylocereus polyrhizus)** and yellow white (***Hylocereus (Selenicerus) megalanthus*)**. Initially Dragon fruit requires very little attention for pests and diseases. There was a very low rate of fungal disease on dragon fruit plant planted in 2011-2013, but now due to climate change, changed soil conditions, changed plantation method, intercropping, the intensity of fungal disease in dragon fruit, stem, fruits, and flowers has increased in these 2,3 years. It was observed that fungal attack is increased during rainy season.

Stem canker and fruit rot; Infected dragon fruit specimens having varied symptoms were observed at Agri Farm. Stem canker exhibited symptoms on the stem. They were small, circular, sunken, orange spots that developed into cankers and the stems subsequently rotted. Same symptoms were observed on fruit.

Pest Diseases

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Recently for the last 2-3 years, papaya, guava and other fruit cultivation in the vicinity of Dragon Fruit Farm has seen an increase in fruit fly infestation resulting in a lot of fruit damage at Rukmini farm while no fruit plants are in the vicinity of Anil Salunkhe Dragon fruit farm and as a result fruit fly damage was not observed till now.

Sunburns

Although dragon fruit is heat loving, it can be damaged by long periods of intense sun and heat**.** Growth and sun burning injuries closely related to heat stress experienced by the several (80−95%) dragon fruit farmers. It occurred particularly during summer season. The symptom appeared during the month of March and April that witness higher variation in day and night temperatures in regions crosses above 38ºC (Arivalagan et al., 2019). The intensity of sun burning on plant leaves and stem varies between 10−50%. The dragon fruit plants which facing to direct sun rays causing sunburns while those growing in low light intensity are without sunburns.

Disease management practices in visited dragon fruit farms.

At the very beginning when there is no severe attack, dragon fruit diseases were treated using traditional methods such as farm sanitation, manual removal of diseased parts, etc. Recently as the fungal attack is severe in both the farms spraying of fungicides like Bavistin (1.5-2 g/lit) one to two times in a month or as per requirement and Blue Copper(1.5g/lit) is used as per the severity of disease at regular intervals.

Generally, sunburn is a common problem in semi-arid and arid tracts and it can be managed by providing 25-30 per cent shade by installing artificial shade nets during the harsh summer months at Anil Salunkhe Dragon Fruit farm while is it managed by giving water stress in months of March to May at Rukmini Dragon fruit farm. Both the methods have positive result by decreasing sunburns in dragon fruit farms.

IV. CONCLUSION

Dragon fruit used to be an alternative crop to Pomegranate as the soil and climate conditions are suitable for proper growth. Now, it is more than just fruit from one's farm. Dragon fruit is now considered as a cash crop. There is a global growth of dragon fruit production of which growers are profiting. The export/import market is booming with other countries producing dragon fruits from production areas that rapidly expanded throughout the years. There is an ever-increasing demand for dragon fruit from the European import markets due to dragon fruits.

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