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Constraints encountered by Dragon Fruit Growers and Suggestions for improving Cultivation

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Abstract

The present study was conducted in Solapur district of Maharashtra state with an objective to study identify the constraints encountered by dragon Fruit growers and suggestions for improving cultivation. A total of 120 dragon fruit growers were selected through simple random sampling from the Malshiras and Sangola tahsils. An ex-post facto research design was adopted for the study and data were collected through structured interview schedule through personal interview method. The major constraints included market price crashes, sunburn and heat stress, labour shortages, pest and disease incidence, shade net and trellis-related problems, bird damage, post-harvest losses, hand pollination and fruit cracking. The suggestions included adopting shade nets and protective sprays, providing training on scientific cultivation practices, using artificial lighting and value addition, improving pest and disease management, strengthening trellis and shade net systems and adopting appropriate harvesting, irrigation and nutrient management practices. The findings of the study indicated the need for strengthening technical guidance, production management and marketing support to improve the sustainability and profitability of dragon fruit cultivation.

Keywords: Dragon fruit, constraints, suggestions, bottlenecks, problems, cultivation, growers

Introduction

Dragon fruit (*Hylocereus* spp.), a perennial climbing cactus belonging to the family Cactaceae, has emerged as an important high-value fruit crop in tropical and subtropical regions. In India, the crop has gained increasing attention because of its nutritional value, growing consumer demand, adaptability to varied agro-climatic conditions and potential for farm income diversification. Its Crassulacean Acid Metabolism (CAM) pathway contributes to efficient water utilization, making the crop suitable for cultivation in drought-prone and semi-arid regions (Wakchaure *et al.*, 2020) ^[9]. Maharashtra is one of the important states where dragon fruit cultivation has expanded in recent years. Among the major growing regions, Solapur district has witnessed considerable adoption of the crop, particularly because of its suitability to the prevailing agro-climatic conditions and its economic potential as an alternative fruit crop (Sathe *et al.*, 2024) ^[6]. The increasing area under dragon fruit indicates growing interest among farmers; however, successful and sustainable cultivation requires appropriate management of production, harvesting and marketing activities. The expansion of dragon fruit cultivation has also brought several challenges at the farm level. Inadequate availability of quality planting material, high initial investment, difficulties in establishing suitable support systems, irrigation management, sunburn, pollination problems, pest and disease incidence, labour requirements and (Kakade *et al.*, 2025) ^[3]. In addition, fluctuations in market prices, seasonal market conditions and inadequate marketing arrangements can affect the returns obtained by growers. These factors may increase the cost of cultivation and create difficulties in maintaining profitable production (Wakchaure and Reddy, 2023) ^[8]. Recent evidence has also emphasized the importance of improved irrigation and plant protection practices, availability of quality planting material, skilled labour, harvesting facilities, value addition and better marketing arrangements for addressing the challenges faced by dragon fruit growers (Jadhav *et al.*, 2025) ^[2]. The presence of such constraints highlights the need to understand the problems experienced by growers under actual field conditions.

Identification of location-specific constraints and farmers' suggestions can help in prioritizing the areas requiring technical guidance, institutional support and appropriate interventions. Such information is particularly important in emerging production areas where cultivation practices and marketing systems are still developing. Therefore, the present study was undertaken to the constraints encountered and dragon fruit growers' suggestions for improving dragon fruit cultivation. The findings are expected to provide useful insights for agricultural extension personnel, horticultural departments, researchers and policymakers in developing suitable measures to address problems and to support dragon fruit cultivation.

Methodology

The present study was conducted in Solapur district of Maharashtra state. Malshiras and Sangola tahsils were selected purposively as these tahsils have a considerable concentration of dragon fruit growers. From the selected tahsils, villages having dragon fruit cultivation were identified and a total of 120 dragon fruit growers were selected as respondents through a simple random sampling method. An ex-post facto research design was adopted for the study. The data were collected through a pre-tested structured interview schedule by conducting personal interviews with the selected dragon fruit growers at their farms. The collected data were analysed using appropriate

statistical tools such as frequency and percentage. The constraints encountered in dragon fruit cultivation by the growers were identified according to the responses obtained from the them. The suggestions given by the growers for overcoming the constraints were also documented and presented based on their responses.

Results and Discussion

The Constraints encountered by dragon fruit growers

Constraints refer to the difficulties, problems or limitations experienced in dragon fruit cultivation by dragon fruit growers in carrying out agricultural activities efficiently and profitably. In the present study, the constraints encountered by dragon fruit growers were identified through personal interview method and the data regarding the constraints encountered by the dragon fruit growers are presented in Table 1. It is evident from Table 1 that severe market price crashes due to simultaneous regional harvesting were reported by more than two-fifth (45.83%) of the dragon fruit growers. Similarly, sunburn injury and stunted vegetative growth due to extreme heat stress during summer were reported by more than two-fifth (43.33%) of the respondents. The third major constraint was labour shortages and difficulties in field operations, shoot pruning and canopy management due to the highly thorny nature of the plants, which were reported by near about two-fifth (40.83%) of the growers.

Table 1: Distribution of dragon fruit growers according to the constraints by them

Sr. No.	Constraints	Respondents (n=120)	
		Frequency	Percentage (%)
1.	Severe market price crashes due to simultaneous regional harvesting.	55	45.83
2.	Sunburn injury and stunted vegetative growth due to extreme heat stress during summer.	52	43.33
3.	Labour shortages and difficulties in field operations, shoot pruning and canopy management due to the highly thorny nature of the plants.	49	40.83
4.	High prevalence of red ant infestations affecting plant health and field operations.	25	20.83
5.	Structural damage to shade nets caused by high wind velocities.	20	16.67
6.	The heavy weight of dragon fruit branches increases stress on the trellis system, resulting in trellis bending or structural failure.	18	15.00
7.	Significant fruit damage caused by birds during the ripening stage.	16	13.33
8.	High incidence of fungal diseases post-rainfall.	15	12.50
9.	Absence of cold storage infrastructure leading to post-harvest losses.	13	10.83
10.	High labor dependency for hand pollination in the yellow dragon fruit variety.	11	09.17
11.	High incidence of fruit cracking in the 'C' variety.	10	08.33

Further, high prevalence of red ant infestations affecting plant health and field operations was reported by one-fourth (20.83%) of the respondents, followed by structural damage to shade nets caused by high wind velocities (16.67%). The heavy weight of dragon fruit branches causing stress on the iron-wire trellis system, resulting in trellis bending or structural failure, was reported by (15.00%) of the growers, whereas significant fruit damage caused by birds during the ripening stage was reported by (13.33%). Similarly, high incidence of fungal diseases post rainfall was reported by (12.50%) of the respondents. The absence of cold storage infrastructure leading to post-harvest losses was reported by about one-tenth (10.83%) of the growers, followed by high labour dependency for hand pollination in the yellow dragon fruit variety (09.17%) and high incidence of fruit cracking in the 'C' variety (08.33%). Thus, the findings indicate that market price crashes, sunburn and extreme heat stress and

labour shortages and difficulties in field operations were the major constraints faced by dragon fruit growers in the study area. The findings of present study are consistent with findings of Wakchaure and Reddy, (2023)^[8], Jadhav *et al.*, (2025)^[2] and Akhil *et al.*, (2024)^[1].

The suggestions given by dragon fruit growers for improving dragon fruit cultivation

Suggestions refer to the measures or recommendations proposed by the farmers to overcome the constraints encountered in dragon fruit cultivation and to improve production, productivity and profitability. In the present study, suggestions were collected from the dragon fruit growers based on the major problems experienced by them during cultivation, harvesting and post-harvest management. The suggestions reported by the dragon fruit growers are presented in Table 2.

Table 2: Distribution of the dragon fruit growers according to their suggestions for improving dragon fruit cultivation

Sr. No.	Suggestions	Respondents (n=120)	
		Frequency	Percentage (%)
1.	Promote Adoption of shade net structures and timely application of kaolin or silicon-based foliar sprays to reduce sunburn injury and heat stress in dragon fruit cultivation.	55	45.83
2.	Conduct skill development and training programmes on timely and safe pruning, harvesting, canopy management and other crop management practices.	52	43.33
3.	Use artificial lighting for off-season fruiting and value addition of dragon fruit to obtain premium market prices.	50	41.67
4.	Adopt integrated chemical and biological pest management practices to control red ant infestations.	25	20.83
5.	Roll up or temporarily remove shade nets before the onset of high wind events to minimize structural damage.	21	17.50
6.	Promote the use durable, high-quality trellis materials and do regular maintenance to prevent structural damage and failure.	19	15.83
7.	Encourage harvesting fruits at the recommended maturity stage to minimize losses caused by birds.	17	14.67
8.	Promote timely fungicide application and proper field drainage to effectively manage fungal diseases.	15	12.50
9.	Strengthen market linkages to reduce post-harvest losses and improve marketing opportunities.	14	11.67
10.	Encourage the cultivation of self-pollinating and high-yielding dragon fruit varieties.	12	10.00
11.	Adopt uniform irrigation and balanced nutrient management to minimize fruit cracking in the 'C' variety.	10	08.33

It is evident from Table 2 that promote Adoption of shade net structures and timely application of kaolin or silicon-based foliar sprays to reduce sunburn injury and heat stress in dragon fruit cultivation. was the most frequently suggested recommendation, reported by nearly half of the respondents (45.83%). This finding is supported by Karunakaran *et al.* (2025) ^[4]. This was followed by conducting skill development and training programmes on timely and safe pruning, harvesting, canopy management and other crop management practices, suggested by over two-fifth of the respondents (43.33%). Similarly, use of artificial lighting for off-season fruiting and value addition of dragon fruit to obtain premium market prices, was suggested by over two-fifth of the respondents (41.67%), which is supported by the findings of Nguyen *et al.* (2021) ^[5] and Tarte *et al.* (2023) ^[7]. Further, adopt of integrated chemical and biological pest management practices to control red ant infestations, was suggested by about one-fifth of the respondents (20.83%). roll up or temporarily removing shade nets before the onset of high-wind events to minimize structural damage, was suggested by nearly one-fifth of the respondents (17.50%), while promoting the use of durable, high-quality trellis materials and regular maintenance to prevent structural damage and failure, was suggested by about one-sixth of the respondents (15.83%). Likewise, encourage the harvesting of fruits at the recommended maturity stage to minimize losses caused by birds, was suggested by nearly one-seventh of the respondents (14.67%). Furthermore, promote timely fungicide application and proper field drainage to effectively manage fungal diseases, was suggested by about one-eighth of the respondents (12.50%). strengthening market linkages to reduce post-harvest losses and improve marketing opportunities, was suggested by slightly more than one-tenth of the respondents (11.67%). Similarly, encourage the cultivation of self-pollinating and high-yielding dragon fruit varieties, was suggested by one-tenth of the respondents (10.00%), whereas adopte uniform irrigation and balanced nutrient management to minimize fruit cracking in the 'C' variety, was suggested by less than one-tenth of the respondents (8.33%). Thus, it can be

concluded that the major suggestions provided by dragon fruit growers were primarily related to reducing sunburn and heat stress, strengthening technical knowledge and skills through training, improving off-season production and value addition and adopting appropriate pest, disease and crop management practices. These suggestions indicated the need for improved extension support and location-specific technological interventions to enhance the dragon fruit cultivation.

Conclusion

The present study revealed that dragon fruit growers faced several constraints in the successful cultivation and management of the dragon fruit. The major issues included market price fluctuations resulting from simultaneous harvesting in different regions, sunburn and stunted growth caused by high summer temperatures and difficulties associated with labour-intensive operations such as pruning and canopy management. The other constraint included red ant infestation, damage to shade-net structures due to high winds, trellis failure caused by the heavy weight of branches, bird damage and fungal diseases following rainfall. The major suggestions offered by the growers focused on the adoption of shade-net structures along with kaolin or silicon-based foliar sprays to reduce sunburn and heat stress. This was followed by the need for skill development and training programmes on pruning, harvesting, canopy management and other crop management practices, as well as the use of artificial lighting for off-season fruiting and value addition to obtain better market prices. Other important suggestions included integrated pest management for red ant control, appropriate management of shade nets during high-wind events, the use of durable trellis materials with regular maintenance, timely harvesting to minimize bird damage, timely fungicide application and proper drainage, strengthening market linkages, cultivation of self-pollinating and high-yielding varieties and uniform irrigation with balanced nutrient management to minimize fruit cracking. The study indicated that dragon fruit growers faced important production and marketing constraints, particularly market price fluctuations, sunburn and heat

stress, labour shortages, pest and disease problems and orchard management difficulties. Therefore, extension and development agencies should provide location-specific technical guidance on scientific crop management, integrated pest and disease management, protective measures against sunburn, improved trellis systems, proper harvesting and strengthened market linkages to improve the productivity and profitability of dragon fruit cultivation.

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