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The Challenge and Experiences of Dragon Fruit Farming and the Difficulty of Marketing Channel for Growers

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ABSTRACT

Dragon fruit farming in Thailand has been increasing rapidly in the past few years due to growing conditions, productivity, high demand, and with good returns. The plant establishes well in wide range atmosphere from north to south of the country in various elevations from 100 to 800 meters above sea level. There are three varieties, Hylocereus undatus, H. costaricensis and Selenicereus megalanthus, approximately produced in the ratio percentage of 95, 4 and less than 1 % respectively. Harvest period is mainly from June to October with very few off-season produce from November to May. Various problems involved include: fluctuation of price, a few serious types of pests and diseases, the amount of pesticide residue on the fruits, and lack of distribution channels. This article discusses the production of dragon fruits, best management practices to prevent pests and diseases, distribution markets and exporting dragon fruits in Loei, Thailand.

Keywords: Dragon fruit, pitaya, disease and insect pests, snails, market

INTRODUCTION

Dragon fruit or pitaya (*Hylocereus* spp. and *Selenicereus* sp.) is a climbing cactus species which originated from the tropical regions of Central and South America. It has gained popularity among farmers, consumers and exporters in the past two decades in Asian countries and around the world. The plant has many advantages including: 1) its well- established cuttings with less care and produces fruit early since the age of approximately one year or earlier, 2) can be harvested several times with high yield of up to 16 times a year to nearly all-year round, 3) continues to give high yield for at least, more than 20 years, 4) has high profits and net returns, 5) good functional properties and its uniqueness especially its health benefits because of its high level of antioxidants and the amount of fiber. The first three properties attract more growers to establish dragon fruit farming and expand their farm size. The last two provide opportunity for exporting to developed countries and also encourage farmers to produce high quality products to meet the market demands. However, on the negative side, many factors downgrade dragon fruit production quantitatively and qualitatively. Among them, the plant has been found to be too dry and has too much water due to heavy rainfall which causes less flowers to develop. Many dragon fruit growers have been found to have poor crop management practices like spraying more agro-chemicals against ants, snails and fruit flies that gives rise to the accumulation of pesticide residue. Poor production technologies, improper pruning creates more loss to the vines and fruit quality. All of the climbing stems will be destroyed completely within a year. Dragon fruit canker caused by *Neoscytalidium dimidiatum* (Penz.) Crous & Slippers has been found to be the most destructive disease and had wiped out dragon fruit plantations in Chantabury, a fruit producing area in the East of Thailand. Brown rot lesions on fruits, caused by *Bipolaris cactivora* (Petr.) Alcorn, after prolonging precipitation decreased fruit quality. Both diseases caused blemish to the fruit quality and

the fruits are being rejected or downgraded with nearly no value at all. In addition, over supply of fruits at a certain period of time causes more competition which lowers the price down. Several marketing channels may need more attention.

DRAGON FRUIT FARMING IN LOEI PROVINCE, THAILAND

Dragon fruit varieties

Dragon fruits in Dansai and Phurua Districts, Loei Province are the most famous among consumers and wholesalers because of the fruits' sweet taste. Phurua dragon fruit becomes famous and most wanted. There are three varieties of dragon fruits grown. More than 95% of the total production are red peel with white flesh, *Hylocereus undatus* (Haworth) Britton & Rose. No more than 4% is a red peel with red-flesh variety, *Hylocereus costaricensis* (Weber) Britton & Rose and is sometime recognized as *Hylocereus polyrhizus* (Weber) Britton & Rose. The *H. costaricensis* is gaining more popularity among dragon fruit lovers and is accepted for export to other countries around the world. The minority with less than %1 a yellow peel with white -fleshed variety, *Selenicereus megalanthus* (K. Schumann ex Vaupel) Moran, is being introduced into production lines.

Table 1. Dragon fruit production in Thailand

Location	Production area (ha)	Yield (ton)	No. of farm	Price (US$)/ton
Loei	1,680	8,744	1,488	650
Nakon Rachasima	320	2,634	269	850
Chantaburi	220	255	644	820
Northern part	226	1,260	288	580-1,140
NE part	2,386	15,241	3,396	730-1,200
Central part	493	8,349	513	580-890
Eastern part	304	486	819	810-950
Southern part	41	550	53	880-1,950
Total	3,465	25,887	5,082	760

Agricultural Information System (2016)

Dragon fruit farming rapidly increased in numbers of farms and growing areas since the last few years. In the districts of Dansai and Phurua in Loei Province, Thailand, the number of hectares has been increased to nearly double from 2017-2019. Production practices include: early and late seasons enforcement using chemicals to smear dragon fruit buds to bloom and to set fruits. These batches of fruit harvesting at this time provides very high price with high demand. At least a dollar/kg or more will be expected at the start from farms. On the other hand, fruit production in the season is over supplied due to the fruits' ripeness and its readily state to be shipped to markets more or less at the same time. Enormous amounts of mature fruit flushing the domestic markets but on the demand sites (consumers) are not enough, so that price of the fruit from farm is very low.

Common practices for farming dragon fruits

Planting is grown with 3-4 plants per concrete post with a ring of used-tire of a motorbike tightened on the top of the post. Planting distance is 3-4 meters between concrete posts. Numbers of stems become crowded after a few years after planting. Pruning the plants is a common practice to eliminate diseased stems and to obtain an open, manageable and productive umbrella shaped canopy. However, parts of the plant with diseased symptoms are left crowded on top of the post. Chicken manure is a common main fertilizer applied twice a year with additional complete fertilizer (10:10:24). Irrigation is critical during fertilizer and to allow blooming and fruit setting especially the early enforcement the plant to bloom during the dry month in April – May, as mentioned earlier.

Plants are attacked by a range of pests and diseases. Pests include scale insects, mealy bugs, ants (*Solenopsis invicta* Buren, 1972), giant snails (*Achatina fulica* Férussac, 1821) and fruit flies (*Bactrocera dorsalis* Hendel, 1912). Chlorpyrifos-based insecticides are sprayed to decrease pest problems. Stem canker caused by *Neoscytalidium dimidiatum* (Penz.) Crous & Slippers, and fruit brown rot, caused by *Bipolaris cactivora* (Petr.) Alcorn, are the main diseases to bring the market value of the fruit down. Copper based fungicides, dithane M45, mancocep, etc. and some systemic fungicides,

such as methyl benzimidazole, azoxystrobin etc., are applied as needed. Weeding and sanitation of orchards are recommended. Gasoline-driven weed cutter is a common practice but several farms spray herbicides, glyphosate, to suppress the weeds.

Marketing of dragon fruit in Loei province

Supply and demand are important mechanisms that mobilize commodities from production from farm to the consumers. Dragon fruit produces in Loei province, Thailand serves only the domestic market. As dragon fruit is very perishable and mature, more or less, at the same time. Quantity and quality of fruit are important factors to determine the price. Figure 1 shows distribution pathway from production farm to consumers. Fruit collectors and local traders dictate the fruit price from farms to consumers, using information from the previous day for their decision. There are no alternative distribution channels for farmers to sell their produce.

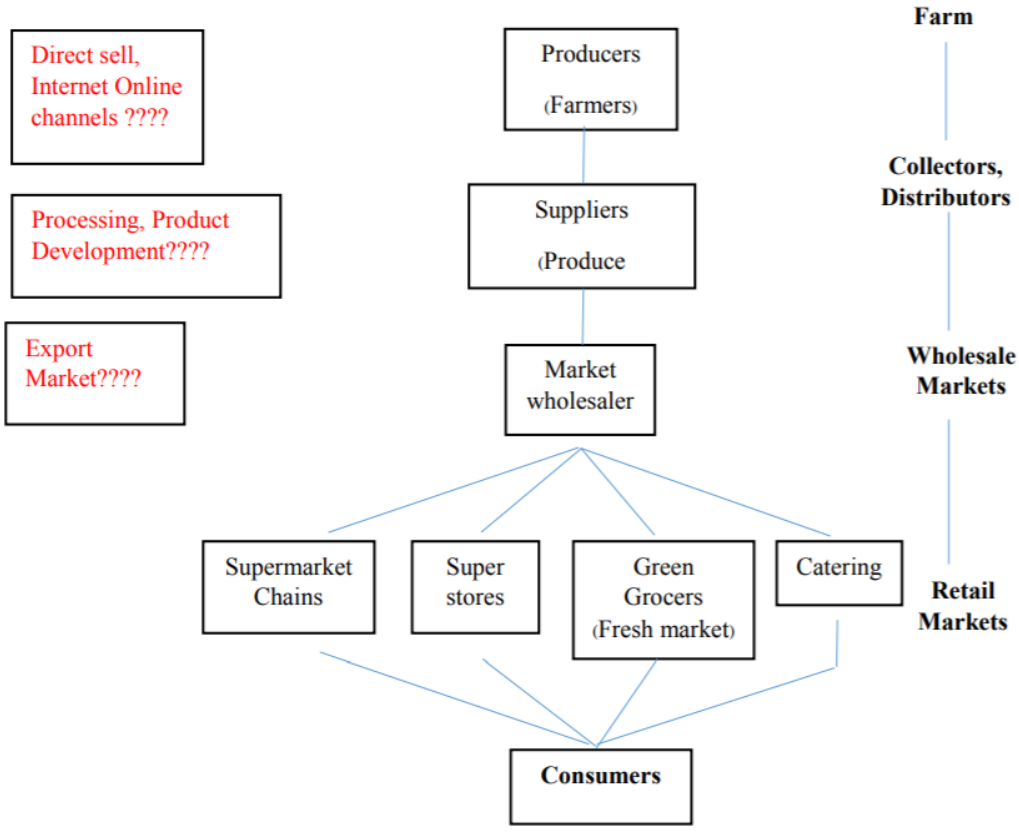

Figure 1. Marketing channels of dragon fruit from Loei province, Thailand (Modified from Chomchalow *et al.*, 2008)

THE CHALLENGES

1. Irregularity of fruit supply: Although several flushed of produce are expected during fruit cycle, irregular tons of produce occur. This leads to wide fluctuations in price.
2. Quality of produce: Dragon fruit quality does not meet market requirements, probably due to lack of market information, weed, problems with pesta and diseases. Fruit size, taste, chemical residue in the produce are the main concerns. If the produce has to go for high standard supermarket or to be exported to other countries, more best practices should be considered.
3. Packing techniques and transportation: Lack of know-how and standard requirements for packing, container size and materials in use, result in fruit damage during transportation.
4. Geographical Distance: Phurua, a district in Loei province, is at least 200 km away from local markets and >450 km from the main market in Bangkok. The produce needs to be well packed and should have good transportation and controlled environment.
5. Market Information: Grades, quality, quantity requirements, trends in demand, price and consumer preference are essential for dragon fruit growers. Farmer's practices can be planned ahead.
6. No export market.
7. The produce relies on only for flesh consumption.

MANAGEMENT PROSPECTIVES

1. Produce more off-season fruits to expand the fruiting season cycle by using chemical or electric light during the night to stimulate fruit set.
2. Apply gasoline weed cutter more often to reduce problem from herbicides.
3. Irrigate properly when dry season is prolonged.
4. Replace planting system to allow more open space and easy to get rid of diseased tissues from the plant.
5. Apply less chemicals, insecticides and fungicides and using safer products, such as *Beauveria* sp., *Streptomyces* sp., *Trichoderma* sp., sodium or potassium silicate (at 1,000 ml/L) more often to reduce pests and diseases problems and pesticide residue.
6. Maintain fruit quality by improving packing techniques, using proper containers under a controlled room.
7. Aim to produce high quality fruits to meet supermarket standard or for the export market.
8. Decrease power of wholesalers and fruit collectors:
9. Diversify dragon fruit products: Not only flesh consumption but create more modified, high value products, from dragon fruit as the fruit are good for health.

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