

Seminar report

**DRAGON FRUIT: A SUPER FRUIT**

By

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**FSC 591: Master's Seminar (0+1)**



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## DECLARATION

I, Swega Antony K. (2018-12-025) hereby declare that the seminar entitled 'Dragon fruit: A superfruit' has been prepared by me, after going through various references cited at the end and has not copied from any of my fellow students.

Vellanikkara

15/11/2019

Swega Antony K

2018-12-025

**CERTIFICATE**

This is to certify that the seminar report entitled 'Dragon fruit: A superfruit' has been solely prepared by Swega Antony K. (2018-12-025) under my guidance and has not been copied from fellow students.

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## 1. Introduction

Dragon fruit (*Hylocereus* sp.) is a perennial climbing cactus, belonging to the family Cactaceae. It is one of the newly introduced exotic fruit crop in India. It is commonly called as Pitaya, Strawberry pear, Night blooming cereous, Queen of night and Honorable queen (Martin *et al.*, 1987). Its botanical name, *Hylocereus*, refers to both its adaptation to habitat (*hulos* means “forest” in Greek) and the way in which it resist the drought situation (the wax or cereus covering the stems)

Dragon fruit originated in tropical and subtropical forest regions of Central and South America (Mirzahi *et al.*, 1996). From the centre of origin, dragon fruit has spread to Tropical and Subtropical America, Asia, Australia and Middle East. Farmers in the Indian states of Karnataka, Kerala, Tamil Nadu, Maharashtra, Gujarat, Orissa, West Bengal, Andhra Pradesh and Andaman & Nicobar Islands have already taken up its cultivation, and the estimated total area under Dragon fruit cultivation in these regions may be less than 400 ha. Majority of the dragon fruits presently available in Indian markets are imported from Vietnam, Thailand, Malaysia and Sri Lanka.

It has received worldwide recognition, as an ornamental plant as well as a fruit crop. It is a perennial and fast growing climber, which needs vertical support to grow. The stem is succulent in nature with branched segments. Each stem segment has three to five wavy wings and one to three spines. Aerial roots developing from the stem segments of Pitaya adheres to the support to climb up and keep the plant erect. The fruit is round in shape having red/pink/yellow coloured skin studded with green scales and the edible portion of the fruit is white or red in colour, having numerous tiny black seeds.

Spiny nature of the plant opens up the possibility of cultivating this fruit crop in areas facing threat from the attack of wild animals. Being a xerophytic plant, dragon fruit can be successfully grown in drought prone areas too.

The juicy flesh of the fruit is delicious in taste when eaten as a fresh fruit. Fruit can be processed into products such as juice, sherbets, jams, jellies, ice-creams, preserves, candies and pastries. The fresh fruit contains 82.5- 83.0 % moisture, 0.16- 0.23 % protein, 0.21- 0.61 % fat and 0.7- 0.9 % fibre. Hundred grams of fresh fruit pulp contains 6.3- 8.8 mg of calcium, 30.2- 36.1 mg of phosphorous, 0.5- 0.61 mg of iron and 8- 9 mg of vitamin C (Morton, 1987).

The active principle compound present in dragon fruit is betalains, of two forms, one is betacyanin imparting red purple pigment and the other is betaxanthin imparting yellow pigment to the fruit. Betacyanins and the polyphenolic compounds in dragon fruit possess high nutritional benefits. (Nurliyana *et al.*, 2010).

## **2. Species of dragon fruit**

The classification of Dragon fruit into different species by Britton and Rose in the year 1963 is given below.

### *2.1 H. undatus* (Haw.)

This is the white fleshed pitaya species with red peel. It is one of the most widely cultivated species in the world. It has long and green stems, more or less thorny in its margins. Flowers are very long (up to 29 cm), outer perianth segments are green (or yellow-green) and inner perianth segments are pure white. Its rosy-red fruit (length: 15–22 cm; weight: 300–800 g) is oblong and covered with large and long scales, red and green at the tips. It has white flesh with many small black seeds, pleasant flesh texture and a good taste.

### *2.2 H. polyrhizus*

This is the red pitaya species with red flesh and red peel. It has very long (25–30 cm) flowers with margins. Its scarlet fruit (length: 10– 12 cm; weight: 130–350 g)



is oblong and covered with scales that vary in size. It has red flesh with many small black seeds, pleasant flesh texture and good taste. High antioxidant properties make it nutritionally better than white fleshed varieties

### 2.3 *H. megalanthus*

Yellow pitaya species with white flesh and yellow peel. It is native to Columbia and less widely grown species in the world. People of Europe and Canada prefer to eat this. Among all the other species, it is rich in polyunsaturated fatty acids.

## **3. Production technology of dragon fruit**

### 3.1 Climate

India is a tropical country with moderate climate all-round the year. Dragon fruit plant prefers a dry tropical climate with an average temperature of 20-29°C, but can withstand temperatures of 38-40°C, and as low as 0°C for short periods (Karunakaran, et.al., 2014). The plants will be damaged at temperatures above 40°C, due to yellowing of the stem. Heavy rain fall areas are not suitable for the crop, as excessive rain causes flower drop and fruit drop (Karunakaran and Arivalagan, 2019). Generally an altitude up to 1500 m is suitable for the cultivation. Very high temperature and very low temperature is not suitable for the growth of the plant.

### 3.2 Soil

Dragon fruit plants can tolerate any type of soil, however they grow well in sandy loam soil having good drainage. Dragon fruit plant prefer light acidic soil with pH ranging from 5.5 to 6.5 (Tripathi *et al.*, 2014). Sandy loam soil with high organic matter are suitable for the cultivation of the Dragon fruit.

### 3.3 Propagation

Dragon fruit is multiplied through seeds or vegetative methods.

#### 3.3.1 Seed propagation:

Seeds are sown to produce seedlings. The seeds are black in colour and small. The seed will germinate rapidly if sown soon after extraction. The seeds are sown in trays and pots for better germination. The seed takes almost one month for germination. The small seedlings are planted in pots after 2 months of sowing in polyethylene bags. The seedlings take longer time to be planted in the field. The seed propagation studies carried out at CHES, Chettalli has shown that seedlings remain smaller with thin stem even after one year of sowing. Further the plants produced from seeds are not true to type and there are lot of variability among the plants. Thus, seed are generally not used for commercial propagation in dragon fruit. (Tripathi *et al.*, 2014).

#### 3.3.2 Vegetative propagation

Dragon fruit can be easily multiplied through stem cuttings. Generally 20-25cm long stem cuttings are used for planting. The cutting should be prepared one to two days prior to planting and the latex oozing out of the cut is allowed to dry. The cuttings should be taken from elite mother plants during fruiting season. The entire stem segment or 20-30 cm long cuttings are used. A slanting cut should be given at the base of the cutting. The cutting should be treated with fungicides to prevent diseases. These cuttings are planted in 12 x 30 cm size polyethylene bags filled with 1:1:2 ratio of soil, farmyard manure and sand. The bags are kept at a shady place for rooting. Excess moisture should be avoided for prevention of rotting of cuttings. These cuttings root profusely and become ready for planting within 5-6 months. (Tripathi *et al.*, 2014).

### 3.4 Planting

Dragon fruit plants prefer open areas with full sunlight. The shady areas are not suitable for planting of these plants. The planting distance depends on the size, slope of field and type of trellis used. Generally in single post system, planting is done at 3x3 m distance. Optimum planting distance provide adequate air circulation and reduce chances of occurrence of diseases. For planting, pits of 60 x 60 x 60cm are dug. These pits are filled by top soil, farmyard manure or compost with 100 g of super phosphate. (Tripathi *et al.*, 2014). To improve the drainage, add small brick pieces and some amount of sand at the bottom of the pit. Generally planting should be done in rainy season i.e. June and July for better establishment. If irrigation is available planting may be done in other season also. The best time of planting is late afternoon or early evening.

### 3.5 Trellis

Dragon fruit is a climbing cactus with segmented stem. It requires a vertical pole as support for optimum growth and fruiting. It has an economic life span of 15-20 years. Weight of one plant may goes up to 100kg and therefore the selection of support material is very important. Generally wooden logs, cement poles and metal frameworks are used for support. Commercial orchards need well designed trellis system. The trellis may be made in two ways. The single pole type and continuous standing type. The single pole type may be constructed with cement or hard timber pole. The wooden poles are hard but their durability is less compared to cement poles. It is not possible to change the poles in between because of the vigorous growth and entangling of the branches. Therefore it is better to go with cost effective durable concrete poles. These poles are erected at 3 to 4 m distance. Generally 10-15cm diameter and 2 meter height poles are to be used. These poles should be grouted at least 1 feet in ground. In some areas rubber tyres are placed on the top of the poles for stringing wines. Steel or metal

wire should not be used for supporting the vines as it damage the vines. One to four dragon fruit cuttings can be planted near the poles to climb easily.

Continuous type stands made of G.I. pipe and G.I. angles can also be used for dragon fruit training. This pyramid shape with a length of 10-15 metre has fixed at each and every point. By this way more number of plants can be planted, but precaution should be taken for providing adequate aeration to avoid disease and pests. The dragon fruit plant may be planted at 2-3 feet distance on both the sides of the structure. The distance between two structures may be 5-6 m (Tripathi *et al.*, 2014).



Fig. 1. Single pole system



Fig. 2. Continuous type stands

### 3.6 Nutrient management

Dragon fruit plant has superficial root system and can rapidly assimilate even the smallest quantity of nutrients. The experiment conducted in BCKV, Kolkatta, for different combination of N, P, and K fertilizer doses revealed that the dosage of N 450: P<sub>2</sub>O<sub>5</sub> 350: K<sub>2</sub>O 300 gave best result for yield and quality. The nutrients were supplied as per treatment schedule in four split doses to each pillar having four plants @ 10%, 10% and 30% of total, before flowering, 20%, 40% and 25% at fruit set, 30%, 20% and 30% at harvest and finally 40%, 30% and 15 % of total N, P<sub>2</sub>O<sub>5</sub> K<sub>2</sub>O after two months

of harvest (Perween, 2017). A combination of organic manure with neem cake and 100g of complete fertilizer (19-19-19) applied every three to four months were also found beneficial. (Karunakaran, *et al.*, 2014).

### 3.7 Training

The dragon fruit plants are fast growing vines and produce more thick dense branches during initial stages. The lateral buds and branches should be pruned so that the vine grows towards the stand. Once vines reach up to the top of the stands the branches are allowed to grow. The removal of tip of stem induces lateral branching. The well grown vine may produce 30 to 50 branches in 1 year and may be more than 100 branches in 4 year. These branches should be trimmed to better aeration, easy cultural operation and prevention of disease & pests. (Tripathi *et al.*, 2014).

### 3.8 Water management

Dragon fruit require water for growth and good yield. The root system is shallow and distributed in 15 to 30 cm depth. Hence irrigation should be ensured to provide sufficient water during dry season. Excessive irrigation may cause fungal diseases. Therefore proper drainage should be provided in rainy season. Frequent dry period without irrigation reduces the yield and quality of the fruits. The dry period before flowering is required for production of more fruits. Drip irrigation is found beneficial for better yield and growth. Irrigation by flooding is not recommended as it wastes water and increases work of weeding. Approximately 1 to 2 liters of water per day per plant is sufficient during the summer/dry days. Water requirement may increase or decrease depending upon soil and climatic conditions.

### 3.9 Flowering, fruiting and yield

The flowers starts as small spiral button type attractive structures at the stem margins. These develop to flower buds in 10-15 days. The beautiful white hermaphrodite flowers are scented and bloom only during night period. It is a cross

pollinated crop. To increase the fruit set, hand pollination can be done. Generally honey bees and dragon flies are the pollinators for the dragon fruits. Flower production generally takes place during April - October and fruits are harvested in 30-40 days after flowering.

Fruiting period will continue up to 3-4 months. Harvesting may be done three-four times within this period. Outer cover of immature is bright green in colour. It will become red in colour with ripening. Proper time of harvesting is after four days of colour changing. Dragon fruit normally fruits after 18-24 months after planting. The fruit weight ranges from 300-800g and each plant produces 40 to 100 fruits per year. One plant normally yields 15 to 25 kg of fruits. The market price rate is in range between Rs. 125 to 200 per kg.

Quality of the fruit does vary between varieties, but harvest time has much greater effect on quality than varietal differences. There are self-compatible and self-incompatible varieties. There is considerable variation in fruit size and shape between the varieties. At present, very little knowledge is available on varietal and production aspects ((Karunakaran and Arivalagan, 2019).

### 3.10 Pests and diseases

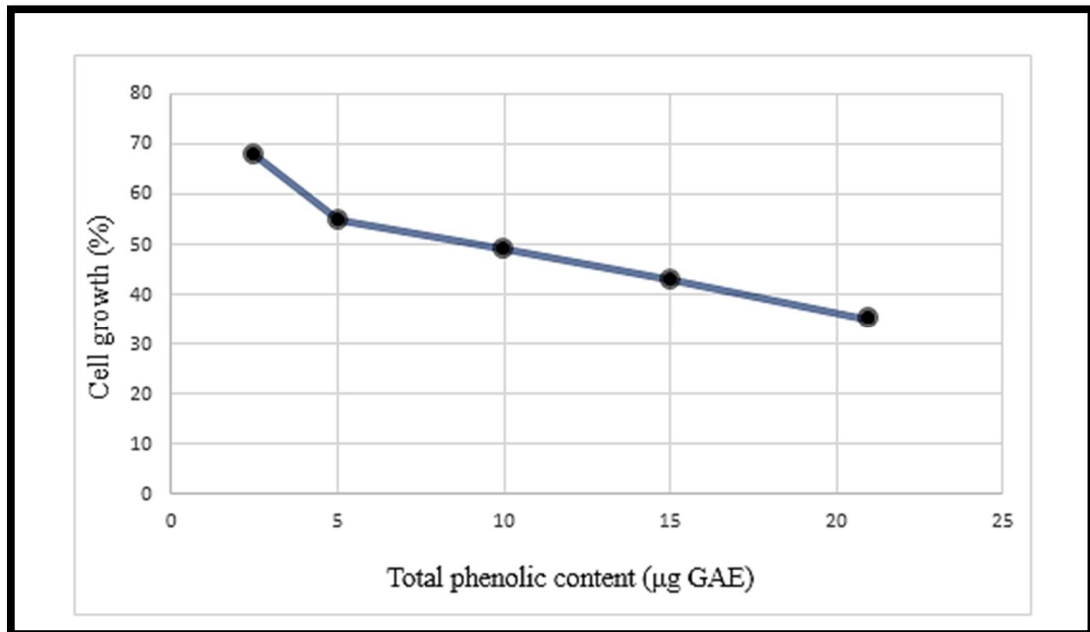
Dragon fruit is less affected by pests and diseases. The pests like mealy bugs and termites have been found causing damage to the dragon fruit. As far as the disease is concerned the watery stem rot caused by *Xanthomonas* sp. was found to damage vines in heavy rainfall areas. Proper drainage, wider spacing, adequate air circulation and proper sunlight will help in reducing the incidence of diseases.

## 4. Health benefits of dragon fruit

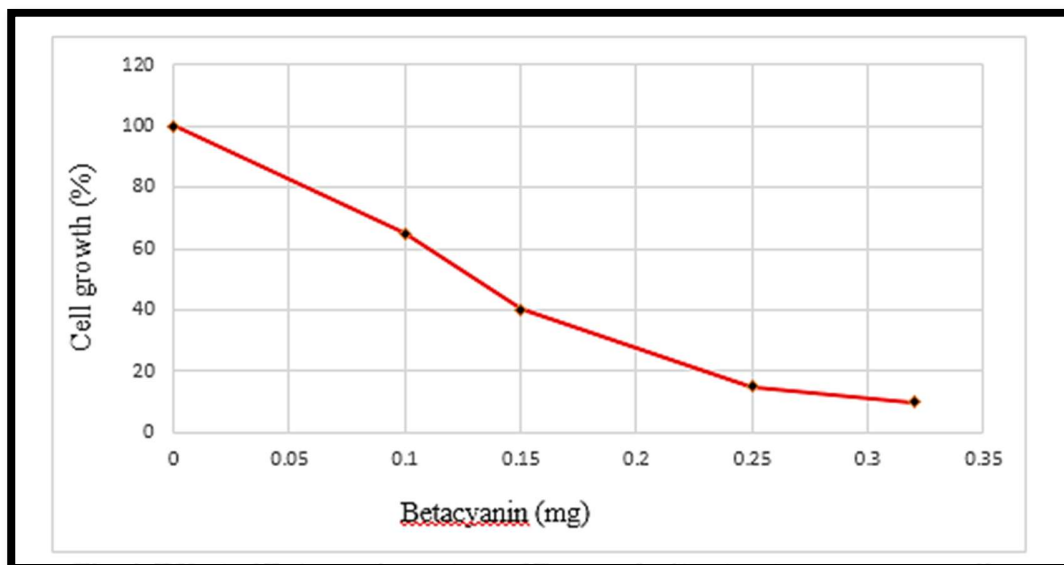
### 4.1. Anticancerous activity

Cancer is a group of diseases involving abnormal cell growth and multiplication with the potential to invade or spread to other parts of the body. Approximately 5-10% of cancers are genetically inherited. Tobacco use causes about 22% of cancer deaths. Obesity, lack of physical activity or excessive drinking of alcohol results in another 10% and the rest due to several other reasons. Though anticancer properties of *Hylocereus* species were studied recently, several evidences showed that polyphenols, flavonoids and betanins that are present in the *Hylocereus* species are responsible for the anticancer effects.

Polyphenols were believed to be the main phytochemical compound for such effect, although the exact compound has yet to be identified. The polyphenols acted through scavenging nitric oxide (NO) free radicals which promoted tumor vascularization and metastasis. Compounds that inhibited NO might be considered as potential anticancer agents. On the other hand, the presence of C2- C3 double bond and three adjacent hydroxyl groups in the flavonoids were suggested to be crucial for anticancerous effects. Betacyanins that have similar molecular structure as flavonoids were proposed to have the similar anti-cancer effects. . Lichen et al., (2005) reported that increased concentration of total phenolic content (Fig. 3) and betacyanin compounds (Fig. 4) in the dragon fruit extract showed an increased growth inhibition activity of cancerous cell.



**Fig. 3. Effect of total phenolic content of dragon fruit extract on inhibition of the growth of cancerous cells**

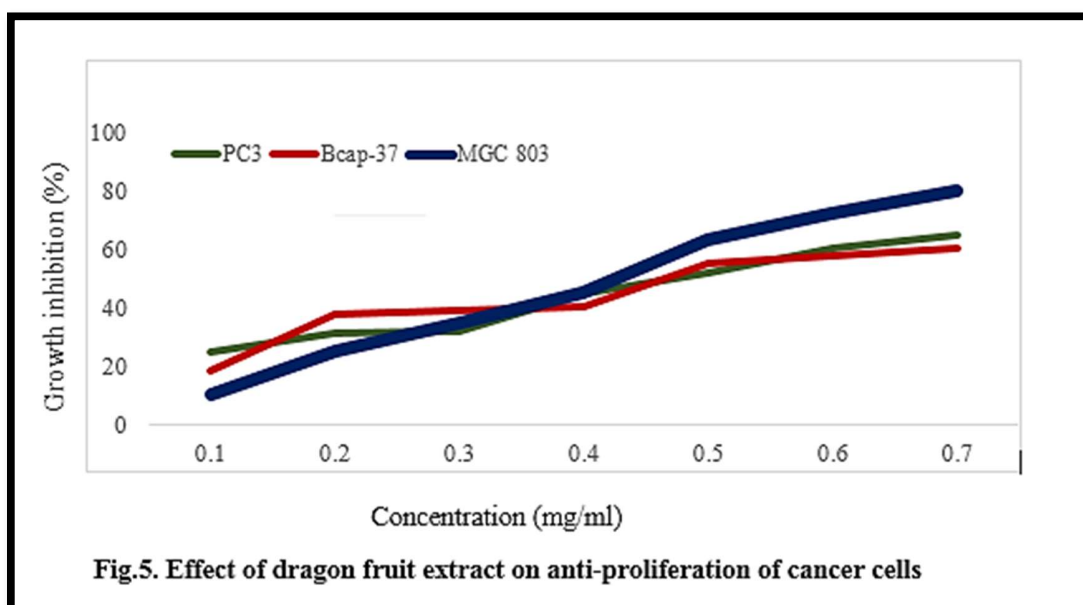


**Fig. 4. Effect of betacyanin content of dragon fruit extract on inhibition of the growth of cancerous cells**



Jaykumar and Kanthimathi (2011) reported the anti-cancer effects exerted by *H. undatus* extract on breast cancer cells (MCF-7). *H. undatus* extract inhibited MCF-7 cell growth by approximately 85% at 600  $\mu\text{g/mL}$ .

The peel of *H. polyrhizus* prepared via supercritical carbon dioxide extraction demonstrated good cytotoxic effects against human prostate cancer (PC3), human breast cancer (Bcap-37) and human gastric cancer (MGC-803) cell lines in a dose-dependent manner (Fig. 5). Among the three type of cancer cells, growth of gastric cancer cells were found to be inhibited at greater percentage. The present findings concluded that the bioactive compounds that contributed to the anticancer effects were  $\beta$ -amyrin,  $\beta$ -sitosterol and stigmast-4-en-3-one, in which  $\beta$ -sitosterol exhibited the greatest effects (Luo *et al.*, 2014)



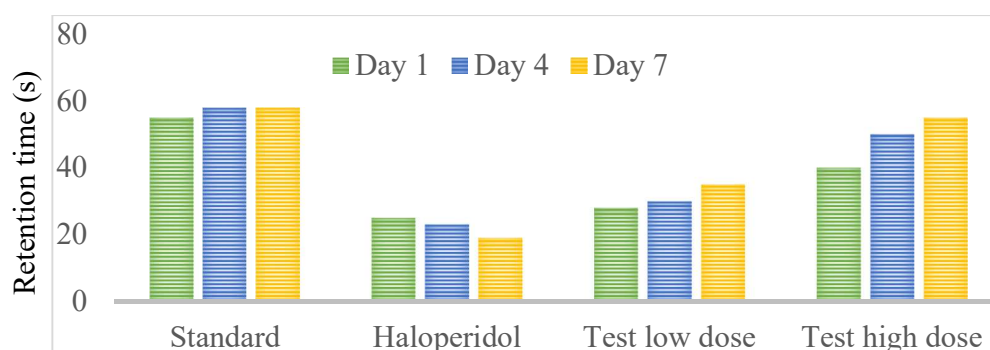
The exact anticancer mechanism exerted by *Hylocereus* species is still unknown. However, previous researchers reported that the anti-cancer effects of polyphenol might be mediated through suppression of nuclear factor- $\kappa$ B and growth factor receptor-mediated pathway, cell cycle arrest, apoptosis induction, inhibition of

angiogenesis, mitogen-activated protein kinases, as well as antioxidant and anti-inflammatory mechanisms.

#### 4.2 Antiparkinson and laxative activity

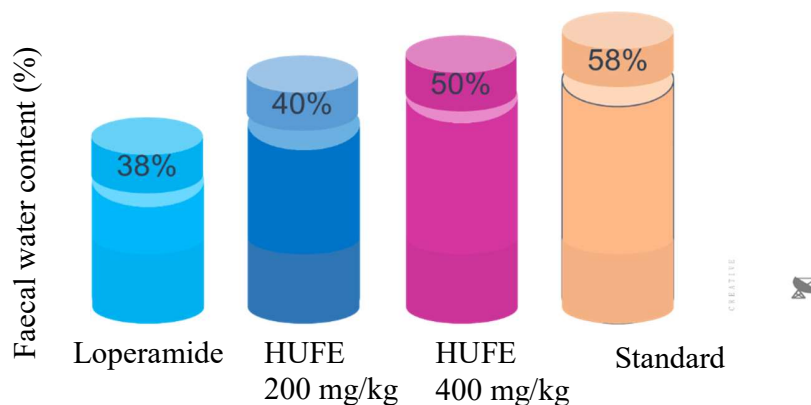
Kanchana *et al.* (2018) reported the antiparkinson and laxative effects of dragon fruit. Parkinson's disease (PD) is a neurodegenerative disorder that affects predominately dopamine-producing neurons in a specific area of the brain called substantia nigra. The main symptom of the Parkinsonism disease is muscle rigidity.

In the present study, the fruit pulp of *Hylocereus undatus* was shade dried and then extracted with ethanol by maceration method. Test low dose (200mg/kg) and test high dose (400mg/kg) of fruit pulp extract were given as treatments along with haloperidol drug and the standard drug to Swiss mice. Haloperidol is an antipsychotic drug which acts on dopamine receptors in the striatum thereby inducing Parkinsonism. The standard drug used for parkinson disease was Carbidopa (10mg/kg). The antiparkinson effect could be easily studied in Swiss mice by using rotarod apparatus. The animal was placed on the rotating rod at a speed of 25rpm for 3 mins. Latency to fall off from the rotating rod of animal in control and the treated group was recorded. Movement impairment was indicated by the inability of the animal to remain on the rotating rod for a 3 min test period. The experiment results showed that effect of high dose of fruit pulp extract was comparable with that of standard drug in prolonging the retention time on rotarod indicating its antiparkinson effect. (Fig. 6)



**Fig.6 Effect of dragon fruit extract on retention time in rotarod test**

Constipation is a highly prevalent functional gastro-intestinal disorder, affecting the quality of life in constipated persons. Dragon fruit loaded with dietary fibres is an effective laxative that loosens the stool and increase the bowel movement Kanchana *et al.* studied the effect of dragon fruit extract on increasing water content in the faecal matter of rats. Higher fruit extract dose of 400mg/kg was found to increase water content in the faecal matter as comparable to that of standard drug(Bisacodyl 20mg/kg)(Fig.7)



**Fig. 7 Effect of dragon fruit extract on improving water content in faecal matter of rats**

### 4.3 Hypocholesterolemic activity

Polyphenol contents in *H. polyrhizus* flesh were proven to be able to reduce cholesterol level in the body. Generally, ROS (Reactive Oxygen Species) or free radicals in the body interact with lipid leading to the formation of lipid peroxidase. The lipid peroxidase in turn causes the oxidation of low-density lipoprotein (LDL) that interacts with platelet to develop into foam cells. Formation of foam cells increases the rate of atherosclerosis. Polyphenols were found to be able to aid in the prevention of lipid peroxidation and LDL oxidation; hence reducing the risk of cardiac-related

diseases. Polyphenols also possessed anti-thrombotic effects which further enhanced its cardio-protective properties.

Research conducted by Khalili *et al.* (2009) showed that feeding of diluted freeze-dried *H. polyrhizus* flesh for 5 weeks in hypercholesterolemic rats reduced total cholesterol, triglyceride as well as LDL levels and increased high density lipoprotein levels (HDL). Reduction in total cholesterol was found the highest in the rats fed with 1.17% of pitaya (from 3.448 to 1.412 mmol/L), followed by 0.83% of pitaya (from 3.435 to 1.487 mmol/L) and lastly 0.5% of pitaya (from 3.356 to 1.707 mmol/L). Rats fed with 1.17% pitaya showed significant reduction in triglyceride and LDL levels by 59.52% and 39.06%, respectively. On the other hand, increment in HDL level was found to range from 19.31% to 34.42%.

#### 4.4 Prebiotic activity

Prebiotics are non-digestible oligosaccharides that beneficially affect the host by stimulating the growth of normal flora in the colon. Several studies showed that prebiotics provide protective effects against colon cancer and reduce the tendency of inflammation associated bowel diseases. Growth of micro flora in the colon such as Lactobacilli and Bifidobacteria prevents the invasion of pathogenic bacteria into the gastrointestinal tract, hence promoting healthy digestive system.

The mixed oligosaccharides content in the *H. undatus* ethanolic flesh extract was detected as approximately 85%. These oligosaccharides had higher resistance towards the human salivary  $\alpha$ -amylase compared to inulin. The oligosaccharides also showed higher resistance to hydrolysis by the artificial human gastric juice. Approximately 50% of the consumed pitaya mixed oligosaccharides would reach the colon despite the hydrolysis by salivary  $\alpha$ -amylase (16%), stomach acids (2.5%) and other brush-border enzyme in the small intestine (30%).

The mixed oligosaccharides in pitaya also promoted the growth of good bacteria such as *Lactobacillus delbrueckii* and *Bifidobacterium bifidum* in the gut

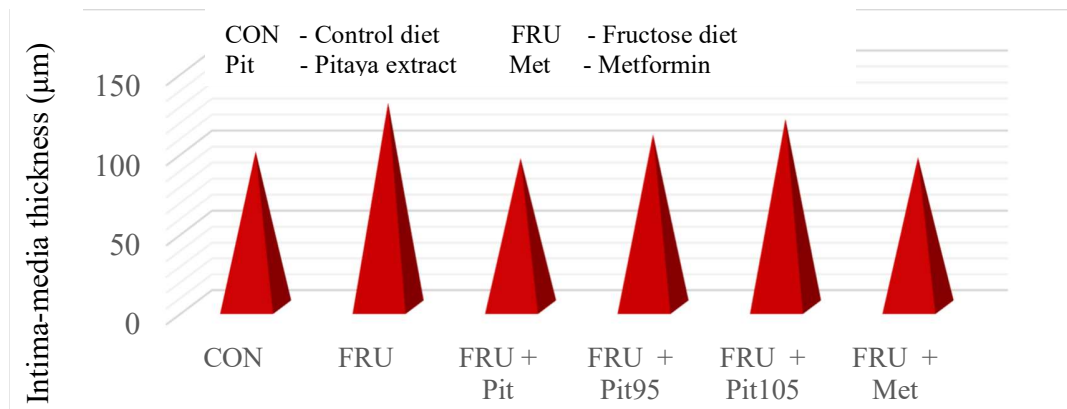
region. The microbial count of *L. delbrueckii* increased from  $9.02 \times 10^7$  to  $6.17 \times 10^9$  when extracts obtained from *H. undatus* was used as carbon source which was found to occur in much more folds than inulin which is a standard prebiotic agent (Table 1) (Wichienchot *et al.*, 2010)

Sample	Microbial count (CFU/ml)		
	0h	24h	48h
Oligosaccharide extract	$9.020 \times 10^7$	$6.42 \times 10^8$	$6.17 \times 10^9$
Inulin	$9.14 \times 10^7$	$7.47 \times 10^8$	$8.24 \times 10^8$

**Table 1. Effect of dragon fruit oligosaccharides on colon microbial count**

#### 4.5 Antidiabetic activity

Arterial medial proliferation is one of the major problems in diabetic patients. This thickening of artery wall (intima-media) is mediated by multiple causes such as hyperglycemia and hyperinsulinemia in diabetes mellitus. The study conducted by Omidzadeh *et al.*, (2014) on histological examination of abdominal aorta of the insulin resistant rats revealed intima-media thickening and the maximum thickness was observed in the high fructose diet group (FRU group). Also, endothelial denudation and cell detachment of the abdominal aorta were observed in rats of high fructose diet group. Pitaya fruit extract along with high fructose diet in Wistar rats showed the results similar to the effect caused by standard drug metformin in reducing intima media thickness as well as reducing endothelial denudation in diabetic rats (Fig.9).



**Fig.8 Effect of pitaya diet on thickness of intima media in rats**

## 5. Conclusion

Dragon fruit is a versatile super fruit with superior health benefits and easy cultivation practices. Its increasing demand in market expands its commercial utility in the pharmaceutical, processing and cosmetic industries. The high market price and the export potential makes this fruit crop highly remunerative and it can be considered as a crop for the future.

## 6. Discussion

1. Whether intercrop cultivation is possible in dragon fruit?

Since it is having vertical growth habit, horizontal space between the rows can be effectively utilized for growing vegetable crops like ginger, yam, amaranthus *etc.* which serves as an additional source of income for farmers.

2. Whether Dragon fruit is climatic or non climatic fruit? What are the maturity indices for harvesting this fruit?

Dragon fruit is a non climatic fruit. Softening of fruit, bright red colour change on peel, Increase in fruit weight to more than 300g, attaining TSS of 13° brix are some of the maturity indices for its harvesting. It takes about 28-30 days for attaining full maturity from the day of anthesis.

3. List out the important pest and diseases adversely affecting the crop?

Dragon fruit is less affected by pests and diseases. The pests like mealy bugs and termites have been found damaging the dragon fruit. As far as the disease is concerned the watery stem rot caused by *Xanthomonas* sp. damaged vines in heavy rainfall areas. Proper drainage, wider spacing, adequate air circulation and proper sunlight will help to minimize the diseases.

4. Whether there is any released variety in dragon fruit?

White fleshed varieties include Delight, Guyute and Lake Atitlan

Red fleshed varieties include Makisupa, Natural Mystic and Zomorano

5. What are prebiotics and probiotics?

Prebiotics are non-digestible plant fibers which will act as source of nutrition for the beneficial microorganisms present in the gut region of human colon whereas, probiotics are the live microbes ingested in form of capsules which can keep our gut healthy.

6. What is the expansion of MCF?

MCF is the acronym of Michigan Cancer Foundation, referring to the institute in Detroit where the breast cancer cell lines were identified.

7. What is the mode of administration of Dragon fruit extract in rats?

Extracts were administered through intraperitoneal injections in rats.

8. Whether Dragon fruit cultivation is profitable in Kerala?

Dragon fruit is a xerophytic in nature which can be accommodated as an alternative crop in drylands of Kerala. It has a cost benefit ratio of about 1.67 which make it an economical one. It has high export potential in European markets and currently it is being sold in market at a rate of 200-250 rupees per Kg. Economic lifespan of this crop is about 20 years and farmers are getting huge profit out of its cultivation.

9. What is the significance of pitaya extract on thermal treatment?

Betalains, the active bio compound present in Dragon fruit are heat labile and it will lose its phenolic content and scavenging activity on heating. Thus intake of fresh products are nutritionally better than processed foods.

10. Is there any self-compatible species in dragon fruit?

All species except *H. monocanthus* are self-compatible or partially self-compatible in nature. *Hylocereus undatus* (white fleshed species) with shortest distance between stigma and stamen is self-compatible species and does not require cross pollination for fruit set.



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## 8. Abstract

**KERALA AGRICULTURAL UNIVERSITY  
COLLEGE OF HORTICULTURE, VELLANIKKARA**

**Department of Fruit Science**

**FSC 591: Masters Seminar**

<b>Name</b>	: Swega Antony K.	<b>Venue</b>	: Seminar Hall
<b>Admission No</b>	: 2018-12-025	<b>Date</b>	: 15-11-2019
<b>Major Advisor</b>	: Dr. Jyothi Bhaskar	<b>Time</b>	: 10. 00 am

**Dragon fruit: A super fruit**

**Abstract**

Dragon fruit (*Hylocereus* sp.) is a perennial climbing cactus belonging to the family Cactaceae. It is one of the recently introduced exotic fruits in India and is considered to be a super fruit. Dragon fruit is also known as pitaya (Martin *et al.*, 1987). This fruit has its origin from the tropical and subtropical regions of Central and South America. There are mainly three species of dragon fruit namely, *H. undatus*, *H. polyrhizus* and *H. megalanthus*. The optimum temperature range for dragon fruit cultivation is about 20-30°C with well distributed annual rainfall of 100-150 cm. It is mainly propagated through cuttings and it starts bearing after 18-24 months of planting (Tripathi *et al.*, 2014).

Dragon fruit is a low calorie fruit rich in fibre, vitamins and minerals. The active principle compound present in dragon fruit is betalains which possess high antioxidant property (Nurliyana *et al.*, 2010).

The sanative properties of dragon fruit are anti-cancerous, anti-diabetic, anti-parkinson, anti-ageing *etc.* Anti-cancerous property of dragon fruit is attributed to the

bio-compounds like  $\alpha$ - Amyrin,  $\beta$ - Amyrin,  $\beta$ - Sitosterol and Stigmast- 4-en-3-one. The peel extract of *H. polyrhizus* and *H. undatus* prepared by supercritical carbon dioxide extraction showed good cytotoxic effect against human prostate cancer (PC3), human breast cancer (Bcap-37) and human gastric cancer (MGC-803) cells in a dose-dependent manner (Luo *et al.*, 2014).

The administration of dragon fruit extract was found to be effective in increasing the water content in the faecal matter of mice in which constipation was induced using loperamide, indicating the laxative property of *H. undatus*. Haloperidol induced Parkinson's disease was controlled by the administration of high dose of dragon fruit extract (400 mg/kg) which was comparable with the effect of standard drugs (Kanchana *et al.*, 2018).

When high dose of dragon fruit extract was fed to hypercholesterolemic rats, there was a significant increase in the level of High Density Lipoprotein (HDL) cholesterol which is known to impart protection to heart (Khalili *et al.*, 2009).

Spiny nature of the plant opens up the possibility of cultivating this fruit crop in areas facing threat from the attack of wild animals. Being a xerophytic plant, dragon fruit can be successfully grown in drought prone areas too.

The title "Super fruit" awarded to this fruit is substantiated by the superior health benefits and also due to its commercial utility in the pharmaceutical, processing and cosmetic industries. The high market price and the export potential makes this fruit crop highly remunerative and it can be considered as a crop for the future.

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