Course Seminar

On

FUTURE CROP: DRAGON FRUIT

By

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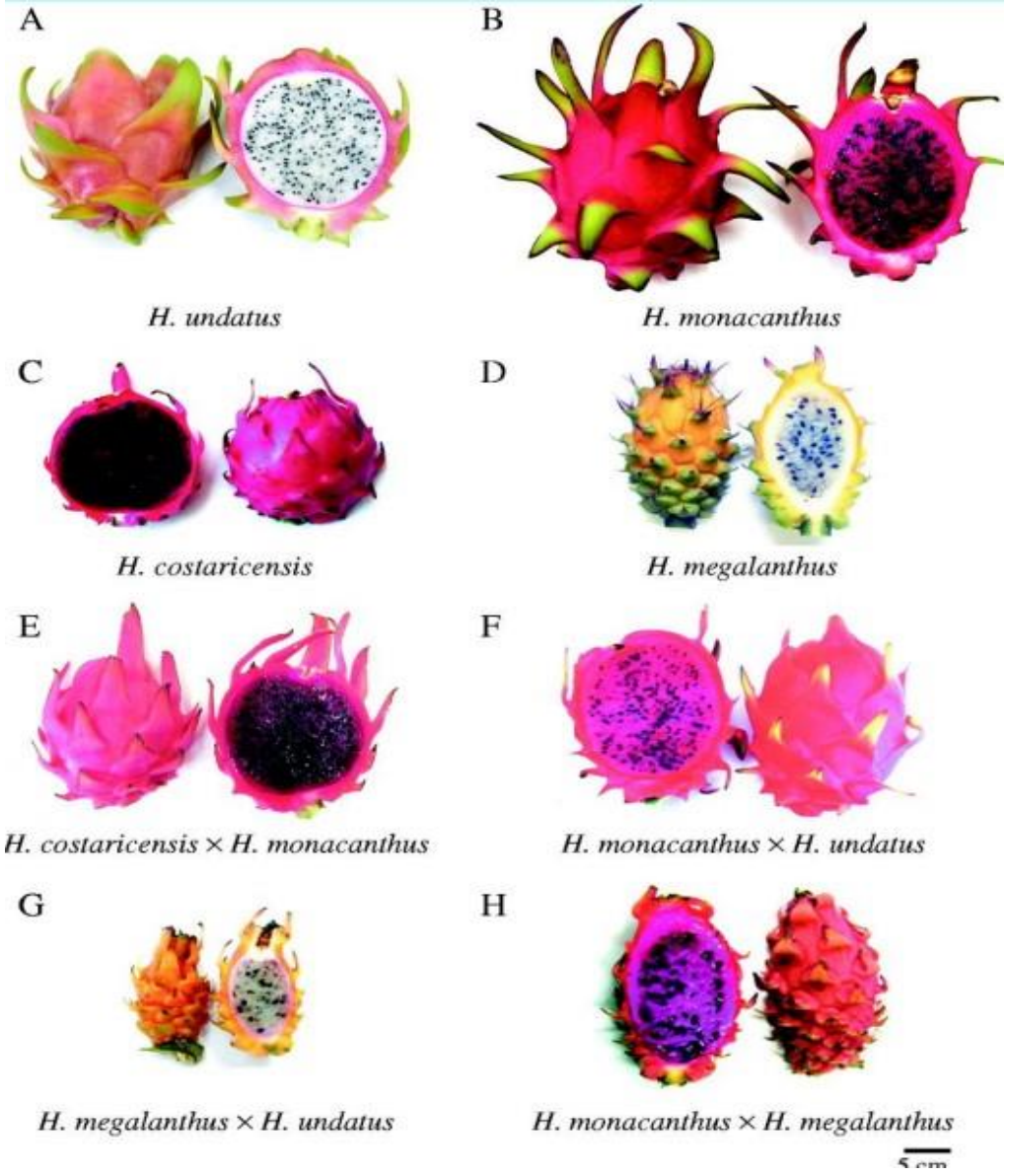
INTRODUCTION

- Dragon fruit, pitaya or strawberry pear (*Hylocereus* spp. and *Selenicereus* spp.) or Kamalam.
- Chromosome no. = 22.
- Family – Cactaceae.
- Originated Central and South America.
- Super foods due to its nutrient richness.
- Help in the control of chronic illnesses and boosting the body's immunity.
- Tolerant to the abiotic stresses.
- Resistant to pests and diseases.
- Low water and nutrient requirements.
- Multiple harvest of fruit in a year.
- Potential to sustain high yield up to 20 years.
- High cost- benefit ratio.

DIFFERENT TYPES OF DRAGON FRUITS



Red skin, white flesh

Red skin, red flesh

Red skin, purple flesh

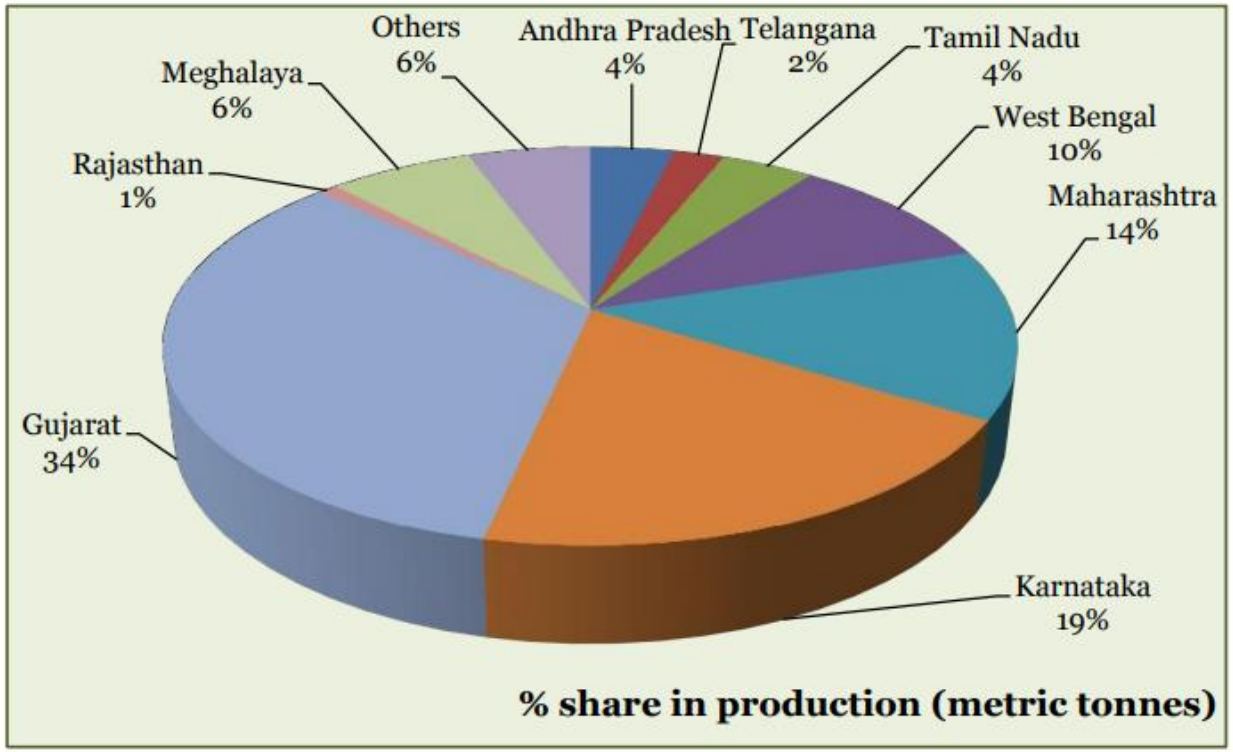
Yellow skin, white flesh

DRAGON FRUIT PRODUCTION IN INDIA

- In India, dragon fruit was introduced during the late 1990s. Thereafter, area under its cultivation was gradually increased from 4 to 400 ha in different states during 2005–2017 (Table 3).

Table 3. Year wise estimated area (ha) under dragon fruit cultivation in India.

Years	Area (ha) under cultivation
1990	Introduced in India (0.5)
2005	4.0
2010	12.0
2012	15.0
2014	35.0
2017	400.0
2020	3,085.0#



- Nowadays, its cultivation has extended to Rajasthan, Punjab, Haryana, Madhya Pradesh, Uttar Pradesh and North Eastern States. (Fig. 4).

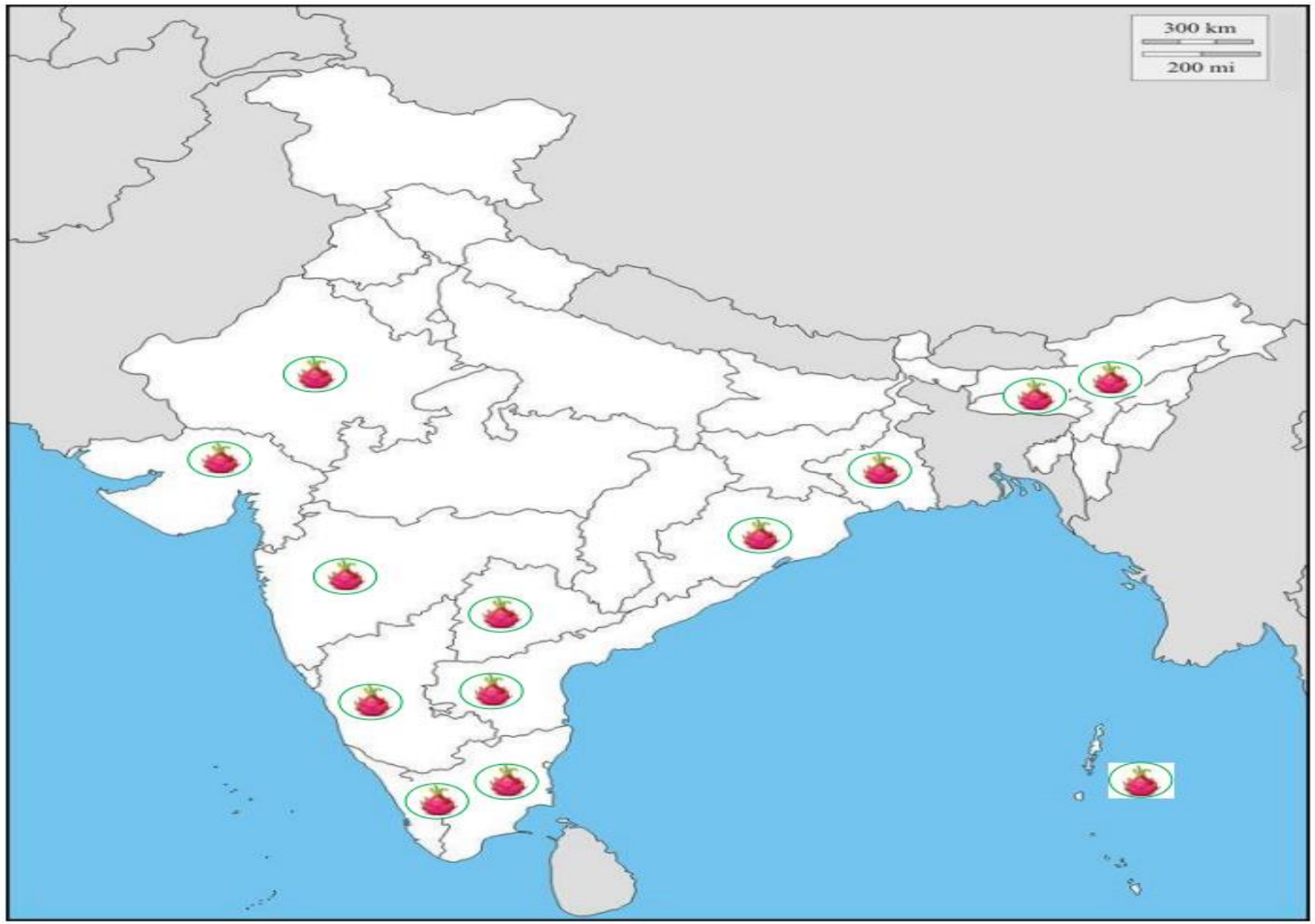


Fig. 4. Major dragon fruit producing states of India.

WORLD DRAGON FRUIT PRODUCTION

- Three major countries viz., Vietnam, China and Indonesia contribute more than 93% of dragon fruit production of the world (Fig. 2). The share of Vietnam alone is more than half (51.1%) of the world's production.

Table 1. Major dragon fruit producing countries (2017-18).

Country	Area (ha)	Production (ton)	Productivity (t ha^{-1})
Vietnam	55,419	10,74,242	22–35
China	40,000	7,00,000	17.5
Indonesia	8,491	2,21,832	23.6
Thailand	3,482	26,000	7.5
Taiwan	2,490.6	49,108	19.7
Malaysia	680	7,820	11.5
Philippines	485	6,062.5	10–15

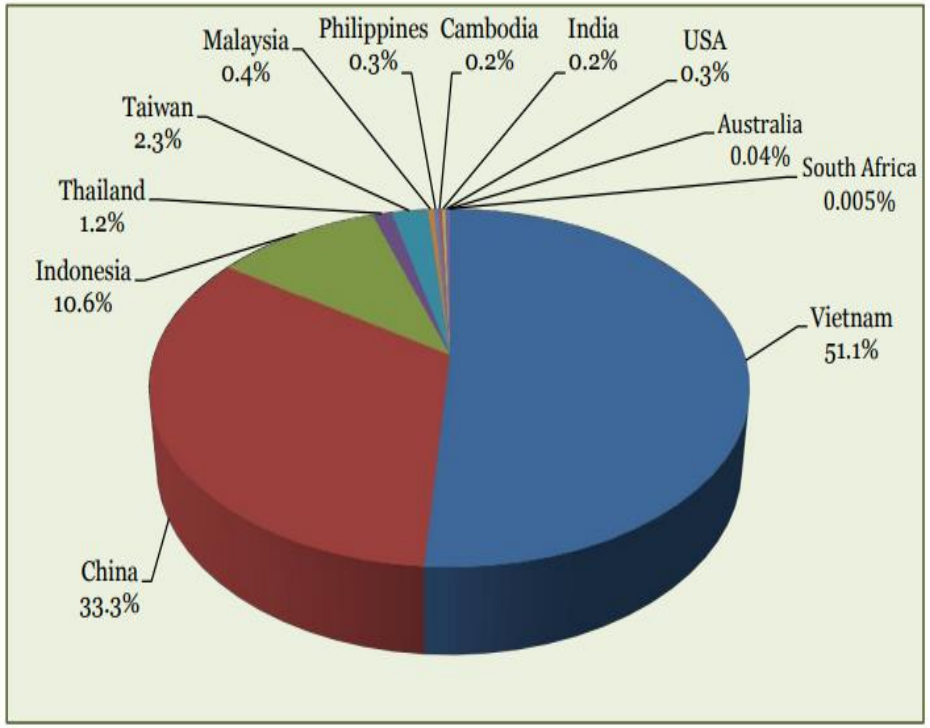


Fig. 2. Global dragon fruit production (% share country-wise).

GLOBAL LEADING SUPPLIERS, MARKET, EXPORT & IMPORTS

- World major supplier countries of dragon fruit can be broadly divided into following three main hubs (Fig. 3). 1. Asia: Vietnam, China, Thailand, Taiwan, Indonesia, Malaysia, Philippines, Cambodia, India and Sri Lanka. 2. Middle East and Europe: Israel, Switzerland and EU. 3. America: Mexico, Colombia, Ecuador, Guatemala and Costa Rica.

Fig. 3. World three major hubs of dragon fruits.

NUTRITIONAL VALUES

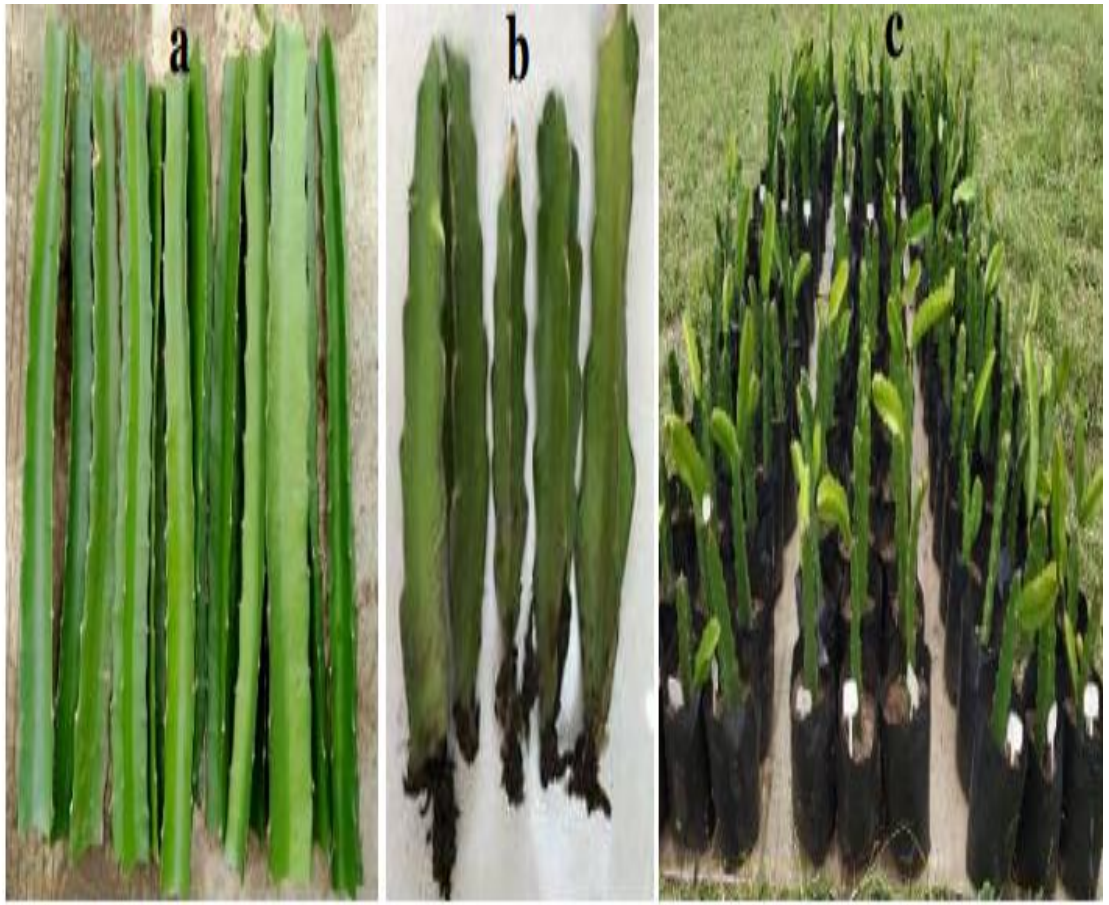
100 grams of edible part contains:

- ❑ 85.4 g Water
- ❑ 0.4 g Protein
- ❑0.1 g Fat
- ❑ 13.2 g Carbohydrates
- ❑ 0.5 g Fiber
- ❑ 16 mg Phosphorous
- ❑ 0.3 mg Iron
- ❑ 0.04 mg Riboflavin
- ❑ 0.2 mg Niacin
- ❑ 4 mg Ascorbic Acid
- ❑ 50 Calories

CLIMATIC REQUIREMENTS

- Dry tropical climate
- Average temperature of 20-29°C
- Can withstand temperatures of 38-40°C
- Plants damaged at temperatures above 40°C
- Rainfall requirement is 1145-2540 mm/year.
- Soil type sandy loam with high organic matter and well drained

PROPAGATION



, Dragon fruit stem sapling material (a) fresh cut (b) rooted cut and (c) rooted sapling with soil bags.

- Through stem cutting 20-25cm long
- Taken from mother plants after the fruiting season.
- Planted in 12 x 30 cm size polyethylene bags
- Filled with 1:1:1 ratio of soil farmyard manure and sand
- The bags are kept at a shady place for rooting
- Become ready for planting with 5-6 months.

PLANTING

- Full sunlight open area
- Pole to pole distance 3x3 m
- Vertical height of pole 1.25 m to 2 m
- Number of plants per pole may be 2 to 4 plants
- 2-3 main stems are allowed to grow
- Soil enriched with farmyard manure, vermi compost along with biofertilizers.

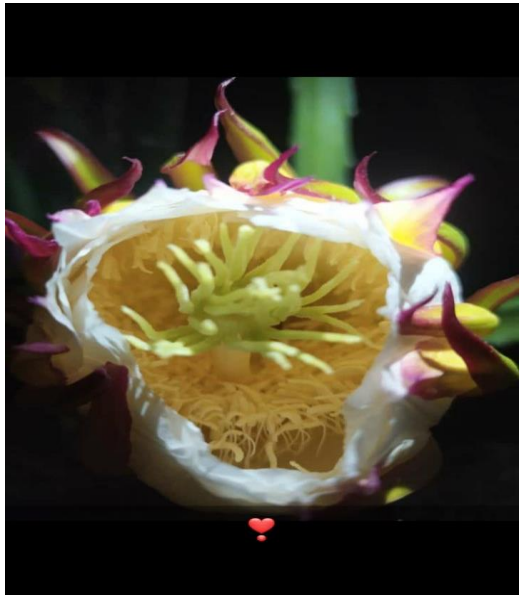
TRAINING SYSTEMS

- Average growth rate of dragon fruit vines 8.2 cm per week.
- Lateral buds and branches pruned to grow towards stands.
- Once vines reach up to the top of the stands, branches allow to grow.
- To remove the tip of main stem, allow to grow of new lateral shoots.
- Climb at the ring to form an umbrella like structure of vines.
- Well grown vine produce 30 to 50 branches in one year.
- Many trellis designs are used in India.

Different trellis systems namely (a) concrete pole and rings (b) 'T' stand and iron wires (c) wooden ladder for dragon fruit establishment.

FLOWERING

- The flowers starts with on small spiral button type structures at the stem margins. These develop to flower buds in 10-15 days.
- Beautiful hermaphrodite nature
- Flowers length (25-30cm)
- White inside and greenish yellow with purple dyes on the outside.
- They are scented and only blooming at night and last one only night.
- Flower production generally takes place during May - August and fruit harvest 30-40 days after fruits set.



NUTRIENT MANAGEMENT

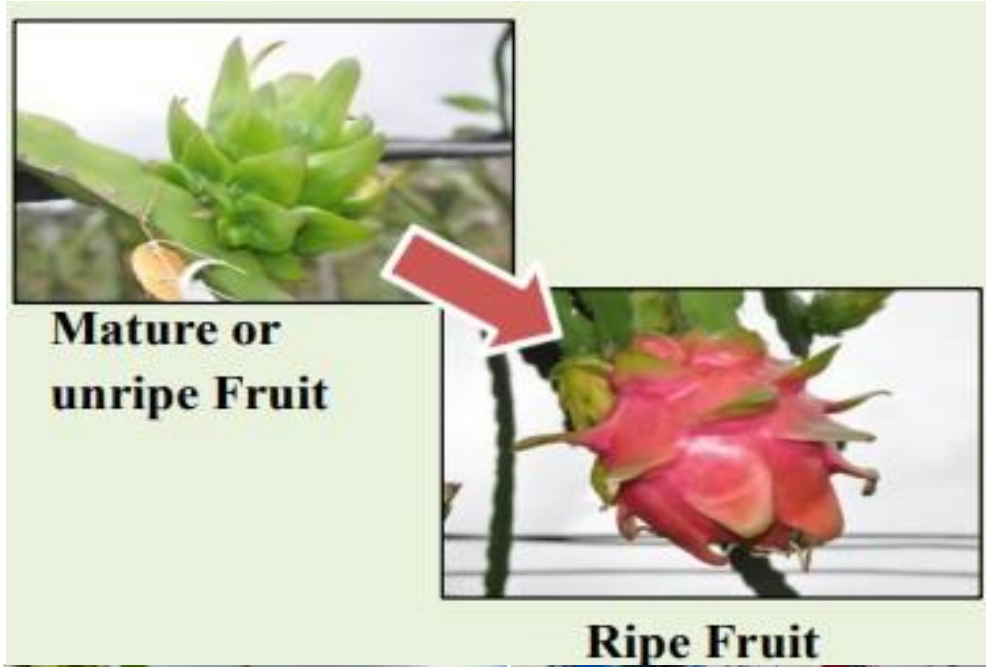
- India for different combination of N, P, K fertilizer doses revealed the dose of N 450g: P_2O_5 350g: K_2O 300g perform best result for yield and quality.
- Shallow root system and distributed in 15 to 30 cm depth.
- Flooding irrigation is not recommended because of wastes water and increases work of weeding.
- Approximately 2-4 liters of water weekly twice per plant is sufficient during the summer/dry days.

FRUIT QUALITY PARAMETERS

- Excellent taste and its texture.
- Average fruit weight in white pulped (457.0 g), Red pulped (331.0 g).
- Maximum fruits per pole in White pulped (14), Red pulped (22) one year old plants.
- The cultivar having deep red or purple color pulp (11.54^0 B) with the higher values of TSS as compared to the one having white colour pulp (9.75^0 B).

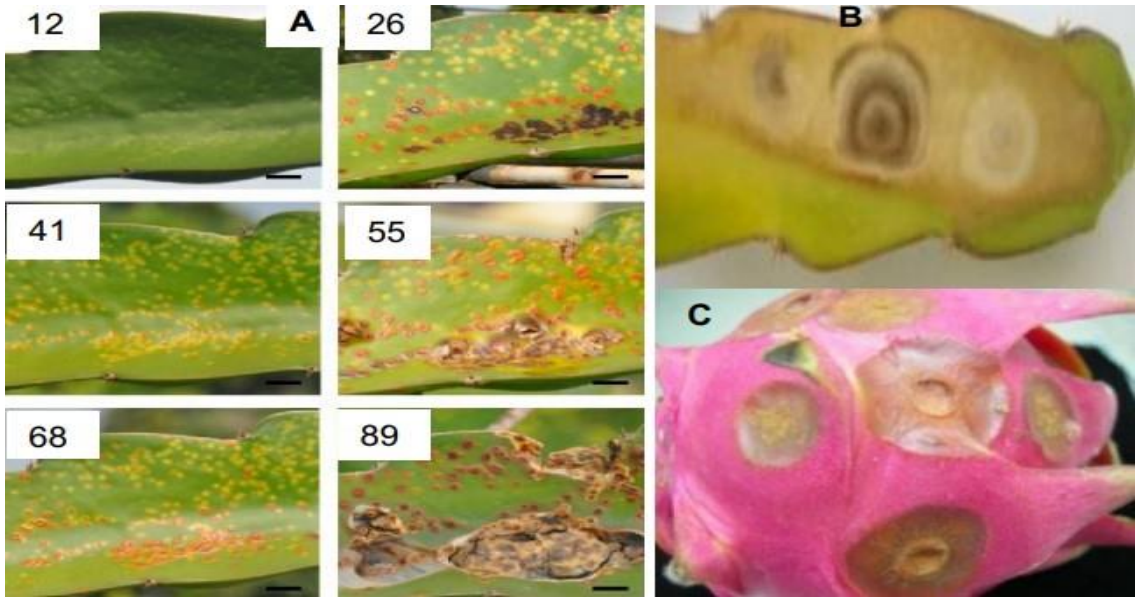
HARVESTING

- Plant start yielding after 12-15 months from the date of planting.
- Fruit maturity change of fruit color from green to red.
- Proper time of harvesting - Seven days of color transition.
- Harvest - June to September and three to four times in a month.
- Fruit weight - 300-800g,
- Average yield - 30 to 35 kgs per single pole in three years old plant.



EXPECTED PESTS AND DISEASES

- Dragon Fruit is comparatively free of pests and diseases.
- Prevalence of common insects like ants, scale insects, mealy bugs and controlled through the application of common insecticide.
- Important diseases of dragon fruit crop are anthracnose, brown spots and stem rots (fungal and bacterial pathogens).
- Heavy rainfall and overwatering or waterlogged conditions predispose the crop for these diseases.



YIELD

- Dragon fruit starts fruiting from second year onwards.
- While the average yield of 12- 15 t ha^{-1} can be expected from third year onwards with the recommended package and practices.

STORAGE

- keeping quality of this fruit is good and stored up to 5-7 days at room temperature 28 C.
- 10-12 days and 20-21 days in cold storage at temperature of 18 C and 8 C, respectively.
- Storage temperature for fresh market 15-20 C at 85-90% RH.
- Dragon fruit store up to 45 days at 7-10 C at a relative humidity of 90-98%.

PRODUCTION AND PRICE OF DRAGON FRUIT

- For the 2 nd year, the dragon fruit farmer can get about 2 t/ha of fruits It increases upto 5th year.
- Dragon fruit is sold at Rs. 80 per kg (wholesale price at the farm gate), though rate may vary from Rs. 40-150.
- Yield and return of dragon fruit is given in Table 4. From the 5 th year onwards, the dragon fruit farmer can earn up to Rs. 6-7 lakh per annum per ha.

Table 4. Yield and returns from dragon fruit.

Year	Yield (kg ha-1)	Price (Rs. kg-1)	Gross return (Rs. ha-1)	Net return (Rs. ha-1)	Benefit cost ratio
1	-	-	-	-	-
2	2000	80	1,40,800	-	-
3	5000	80	3,52,000	85,400	0.32
4	10000	80	7,04,000	4,26,150	1.53
5 onwards	15000	80	10,56,000	6,87,400	1.75-1.86

CONCLUSION

- Prove to be an asset to small holders as well as entrepreneur farmers.
- It is a fast return perennial fruit with high yield, as regular bearing brings steady income to the growers.
- Beside high initial establishment cost due to cement poles and trellies, its becoming very much demanding amongst the farmers because of its very high return.
- It starts giving return immediately one and half year after plantation through selling of pruned plant parts as planting material and from second year onwards through selling of fruits.
- The annual income from dragon orchard can be obtained in a range of Rs 3-4 lakhs per year per ha during third year and expected to reach at a peak of Rs. 5-6 lakhs from 4th year onward.
- Also, as fruit is rich in nutritive and medicinal values with better production potential even under adverse conditions with limited inputs, this crop can be included as an integral part in improving the economic status as well as nutritional security of farmers.

REFERENCE

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Thank You