VISIT TO HIGH DENSITY ORCHARD OF FRUIT CROPS

Exercise

Visit to high density orchards of fruit crops.

Objectives

- To know about high density orcharding in fruit crops.

- To learn about establishment of high density orchands.

Delivery schedule: 01period

Student expectations/learning objectives:

- To know about high density orcharding in fruit crops.

- To know about advantages and limitations of high density orcharding in fruit crops.

Handouts/material/equipment's & tools required: Practical note book, pen, and pencil to note down the important points on establishment of high density orchards in fruit crops.

Pre-learning required: Pre-requisite knowledge about planting systems of fruit trees, and different fruit crops grown in the locality.

Introduction

High Density Planting (HDP) is a very intensive form of fruit production which has high relevance to the food and nutritional security of our ever increasing population. HDP system is normally understood as a system in which a higher number of plants are accommodated within a unit area in comparison to the conventional planting density. Hence, interest in HDP in fruit crops has increased considerably among fruit growers. Many fruit trees are now grafted on to size controlling clonal rootstocks and planted at much higher densities.

The high density planting has certain definite advantages as well as limitations compared to the conventional low density planting. It is worth mentioning here that under high density planting system the yield per plant in low as compared to low density planting. However, the total yield per unit area of land is several times more than low density planting as number of plants is more in HDP.

Advantages

- High density planting facilitates better utilization of incident solar radiation and increase in bearing surface per unit land area.

- High density orchards have better amenability to modern input saving horticultural techniques such as drip irrigation, mechanical harvest etc.

- The use of dwarf trees and checking of excessive vegetative growth gives higher productivity and harvest index as well as early economic returns.

- High density planting system is more amenable to horticultural operations such as pruning, plant protection measures and harvesting, which reduces the labour cost involved.

Limitations

- High density planting needs higher establishment cost.

- Need more professional and scientific approach for management compared to the conventional planting at wider spacing.

- Crowding and intermingling of branches may occur in coming years which can result in poor performance of trees.

Key aspects of high density planting

- Use of dwarfing rootstock and scion cultivars

- Use of clonal rootstock

- Pruning of plants

- Use of growth retardants

- Training system

- Light interception

- Planting density

- Row orientation and rectangularity

- Canopy management

Steps involved in establishment of high density orchards

Example: Mango

- Germinate mango stones *in situ* at the planting distance of 2.5 x 2.5 meters.

- Graft rootstock seedlings *in situ* with Amrapali scion.

- Apply 10 kg of Farm Yard manure (FYM) and 0.5 kg fertilizer mixture (ammonium sulphate, single super phosphate and sulphate of potash in 1:3:1 ratio) in first year.

- Increase doses of FYM by 10 kg each year upto seven years age of the tree and that of fertilizer mixture to 1.0 kg during second and third year, to 1.5 kg during fourth and fifth year and to 2.0 kg later on.

- Apply full quantity of FYM during October, whereas, fertilizer mixture in single dose in July up to three years and subsequently in two split doses (first after harvest and the second in September)

- Irrigate trees at fortnightly interval during summer and at monthly interval in winter during non-fruiting stage. Irrigate bearing trees at fortnightly interval from marble stage of fruit to fruit maturity.

- It was observed that after 11 years of planting yield of orchard drastically reduced due to overlapping canopy of adjoining trees. Therefore, exercise judicious pruning to manage the canopy and to remove intermingling branches which allows proper sun light penetration and results in better yield and quality.

Mango high density orchard

Guava high density orchard

Papaya high density orchard

Citrus high density orchard

Planting distance and total number of trees

The knowledge of traditionally recommended planting densities in fruit crops is a must. For example most of the mango varieties are recommended to be planted at a distance of 10 m (row to row) x 10 m (plant to plant) under square system of planting and a total of 100 plants can be accommodated in a hectare area. In comparison to traditionally recommended planting distance, dwarf varieties of mango like 'Amrapali' is recommended to be planted at a distance of 2.5 m (between rows) and 2.5 m (between plants). In this condition, total 1,600 plants can be accommodated in one hectare area following triangular system of planting.

Calculation of number of trees: Students can know the total number of plants accommodated in one hectare area by following formula.

One hectare = $10,000 \, m^2$

Total number of plants / hectare = 10,000 / {row to row distance (R) x plants to plantdistance(P)}

Example 1

Plant to Plant (m)	Row to Row (m)	10,000 / (R X P)	Total No. of Plants/ hectare
2	2	= 10,000 / 4	2,500
3	3	= 10,000 / 9	1,111
4	4	= 10,000 / 16	625
5	5	= 10,000 / 25	400
6	6	= 10,000 / 36	278
7	7	= 10,000 / 49	204
8	8	= 10,000 / 64	156
9	9	= 10,000 / 81	123
10	10	= 10,000 / 100	100

By observing the above table it is clear that with the decrease in planting distance the number of plants which can be accommodated in a hectare is increasing. Students can calculate number of plants for any specified area of land if they know the planting distance.

Students Activities

1. Calculate the number of plants for one hectare land with given planting distances in the following exercise table 1.

2. Visit fruit orchards in your locality and observe planting system and distance between rows and plants.

Exercise table 1.

Crop	Row to Raw Distance (m)	Row to Raw Distance (m)	Calculation as per Formula	Total number of plants / hectare
Mango	3.0	2.5		
Guavava	1.0	2.0		

Papaya	1.25	1.25		
Pineapple	0.75	0.75		
Banana	2.0	2.0		

Study Material

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- Chadha, K. L. (2001). Handbook of Horticulture. ICAR, New Delhi.

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- Goswami, A. M., Saxena, S. K. and Kurien, S. (1993). High density planting in citrus. In: Advances in Horticulture Vol. 2- Fruit Crops, Eds. K. L.Chadha and O. P. Pareek, Malhotra Publishing House, New Delhi

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