

Density Planting in Fruit Crops Beneath Hills

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INTRODUCTION

India is one of the major fruit producing countries in the world. In Indian Himalayas, the hill and mountain ecosystem extends over 12 states from Jammu and Kashmir in the northwest to Nagaland in the northeast and is about 2800 kms. long and 222 to 300 kms. wide. The region is endowed with diverse agro-climatic conditions, which permit successful production of all kinds of fruits (temperate to sub-tropical). The temperate fruits viz., apple, pear, cherry, plum, peach etc. provide a remunerative means for the diversification of the land use for improving productivity and returns. Temperate fruits are mostly confined to the hill region in Indian condition. At present the productivity and production of these fruits are far from the optimum level in our country. Therefore there is a need to increase fruit production several folds. The production of the temperate fruits can be increased mainly by three ways-

1. Expansion of land under the fruits cultivation
2. Density planting of orchard
3. Proper orchard management practices in existing orchards.

But in the hills, land holdings are small and scattered (0.14 ha/head) indicating limited scope for expansion under the fruit. Therefore, density fruit planting remain only way to boost the temperate fruit production in Hill and Mountain areas.

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Merits of Density Planting

- Fruit plants acquire mature terribly early, typically in second or third year when planting, as compared to plain trees that acquire bearing 5-6 years when planting.
- Plants reach full bearing potential at the end of 4 to 8 year's growth as compared to 10-15 years for standard planting.
- Several folds (about 8-10 times) higher yield of good quality fruits can be obtained per unit area up to 15-20 years as compared to standard planting.
- Plants under density planting are more easily and more economically pruned, sprayed, thinned and harvested.
- Maximum utilization of land and solar power will be done by accommodating additional variety of plants per unit space through completely different systems of density planting.
- Early fruiting and higher yields may create an interest among the farmers for fruit cultivation.
- It facilitates mechanized cultivation and production of fruits.
- It also avoids shading effects (common feature of standard trees) as leaves of dwarf plants are well exposed to the Sun.
- Reducing labour cost resulting in low cost of production
- Facilitates more efficient use of agricultural inputs like fertilizers, fungicides, insecticides, weedicides etc.

Demerits of Density Planting

- High initial cost than conventional system.
- Skilled persons are required.
- Economic life span of the orchard becomes lower.
- High incidence of insect, pest and disease attack due to overcrowded growth of canopy.
- In long run, it results in heavy completion for space, light, nutrients and water.

Component of Density Planting

1. **Increasing plant density-** Plant density in a piece of land can be increased by decreasing the planting distance for the particular fruit trees. On the basis of degree of dwarfness and tallness of plants

the planting density may be of following types-

- a) Low density planting (LDP)
- b) Medium density planting (MDP)
- c) High density planting (HDP)
- d) Ultra density planting (UDP)/Meadow orcharding

Planting densities also depend upon many factors such as topography of land, soil fertility, climatic conditions, insects and diseases problems, irrigation facilities etc. Density plantings, particularly ultra and high densities, require flat land, high soil fertility, assured irrigation, low wind velocity low rainfall during rainy season, disease and insect free areas, suitable climate, staking and high technical knowledge.

2. **Use of genetically dwarf scion cultivars-** It is very easy to establish density orchards if the fruit trees are genetically/naturally dwarf. Genetically compact dwarf cultivar with higher yield potential is essential to success in density plantings. Planting of genetically dwarf scion cultivars offer great scope for close plantings, which have the potential for higher yields and net returns than traditional plantings. Use of naturally dwarf mutants shall also be helpful in developing such plantations.
3. **Use of dwarfing root-stocks at the time of propagation-** Density planting can be achieved by use of dwarf root-stocks at the time of propagation of fruit trees. In temperate fruits, there are many dwarf rootstocks (both seedling and clonal) which can be used for density planting of orchard. Rootstocks can greatly influence the productivity and production of temperate fruits. The latest trend in density orchard planting includes use of clonal dwarfing rootstocks with specific traits like growth control (dwarfness), tolerance to soil and climatic variables, resistance to insects and diseases, uniformity, precocity, yield efficiency, compatibility and anchorage.

- 4. Efficient plant structure/Training and Pruning-** Efficient tree structure can be maintained by proper and timely training and pruning of fruit trees under density planting. Slow growing trees respond a lot of favorably to pruning and coaching and may be maintained at a given size and form while not sacrificing yield. High densities must be coupled with proper tree structures by regular pruning and training. Trees on dwarf and semi-dwarf rootstocks are generally pruned and trained with modified system such as cordon, dwarf pyramid, espalier, spindle bush, tatura trellis, palmette, V-shaped tatura trellis, two scaffold vase, pillar, hedgerow, etc. to obtain efficient tree structures.
- 5. Use of growth retardants-** Application of growth retardants on plants reduce canopy growth, eliminate summer pruning, increase yield and advance fruit maturity. Paclobutrazol @ 0.5-2 gm/tree to root zone during Autumn and mefluidide [N-{2,4-dimethyl-5-(trifluoromethyl) sulfone amino phenyl} acetamide] @ 0.24-1.92 gm/litre in Spring, have been found effective in controlling tree growth. A combination of retardants and pruning

proved most effective in keeping the plants dwarf under density plantings.

- 6. Efficient orchard management-** Important management practices such as planting, weeding and hoeing, manure and fertilizer application, protection measures, control of insects, pests and diseases, irrigation, pruning and training, spraying, harvesting etc. play significant role in density planting. Therefore, these practices should be done at proper time with appropriate techniques to achieve early and higher yield under density planting.

CONCLUSION

High density planting (HDP) systems may not be feasible (except some valley areas) under hill and mountain conditions due to sloppy lands, un-assured irrigation, high wind velocity, unavailability of suitable dwarfing rootstocks and low fertile soil. However, medium density planting needs to be encouraged in the hills to enhance fruit production through use of semi-dwarf rootstocks, adopting new pruning and training systems, use of growth retardants and efficient orchard management practices.