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PERSPECTIVE FOR RAISING HIGH DENSITY
PLANTS**

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Grow More”*



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FEATHERED NURSERY PLANTS: A NEW PERSPECTIVE FOR RAISING HIGH DENSITY PLANTS

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FEATHERING

It is a technique for developing lateral branches in nursery plants by making use of manual either practice or plant growth regulators or both.

Many temperate fruit crops growers are looking hard at making the investment in new orchards. With the large investment of money & management required to be successful, it is important to plan well & consider all details. Any mistake made at all the beginning about:

- Site selection
- Choice of rootstock or cultivars
- Pollination
- Soil preparation
- Training system etc.

have long term detrimental effects on the orchards performance & profitability.

WHY WE NEED FEATHERING?

Now-a-days intensive orchards/HDP feathered trees are preferred.

- Feathered plants are acknowledged as building block/key factor for an early crop in the orchard and early economic returns.
- Well-feathered nursery plants greatly contribute to plant architectural engineering and shorten the investment period.
- Future pruning is consequently simple and management costs reduced.

Non - feathers are non precocious bearing i.e. bearing starts in 3-4 years. Maximum production occurs after 5years late economic returns. Profitable at later stages. That's why we need feathering they are precocious bearing i.e. bearing starts in 2nd years. Maximum production in up to 5th years. Early economic returns. Plant architect is easy & natural. More profitable at early stage.

TYPE OF BRANCHES USING IN FEATHERING

- Vertical branches
- Horizontal branches

Vertical Branches: These branches are inhibit flower bud formation. These branches are lean & weak.

Horizontal branches: These branches are stimulate flower bud formation. These branches thick & strong

In feathering we prefer horizontal branches for more profitable because they accumulates more carbohydrates.



ADVANTAGES:

- Feathering is governed by apical dominance.
- Feathering leads to early flower bud formation.
- Plant architecture is easy
- Early economic returns
- Thick & strong crotch angles.

DISADVANTAGES:

- More costly
- Due to dense feathering reduce fruit quality because interception of light is does not reach at lower branches.

NURSERY TREES FOR THE NEW ORCHARD

Starting an orchard with high quality nursery trees is the first key to a successful planting. High quality trees will quickly establish grow to the desired height & fill their space. The right trees will be ready to produce fruit in the 2nd year & will reach full production a few years later. Planting the right trees means early cropping which is the profitability of new orchard. Trees of lesser quality can eventually fill their space & produce good yields but the early returns are lost, so profitability over the life of planting will be less. (Example: Fuji)

Feathers are sometimes produced in strong growing first year budded trees (although usually not enough feathers), or by a Knip-boom tree technique (where the one-year nursery tree is cut at the 60 cm (24") height and re-grown a 2nd year, producing feathers on a strong-growing leader).

SILENT FEATURES OF FEATHERED PLANT:

- A well feathered tree should have at least four to five branches in all the directions.
- It should be more than 12cm.
- A crotch angle of more than 45 degree.

COMPONENTS OF FEATHERING PLANTS:

- Feathers / spreading branch
- Crotch angle
- Propagation technique

SPREADING BRANCH:

- Assists in shaping a tree
- Assures strong scaffold branches
- Helps control growth and minimizes pruning
- Encourages strong auxiliary bud formation that may develop into strong fruiting spurs
- Encourages and increases flower bud formation
- Allows light penetration onto all portions of a limb
- Increases fruit-setting

CROTCH ANGLE:

- Branch angle is important component of nursery tree morphogenesis.
- Branch angle is the angle formed between the axis of the main trunk and the apparent axis of the branch at the point of attachment.
- Main branches with wide angles to the tree trunk are structurally strong and bear good/heavy fruit load.
- Branches with good crotch angle are horizontal and promote early flower bud formation.
- The crotch angle plays a role in light interception within the canopy.



- The crotch angle is particularly important for red skinned varieties, because anthocyanin development is influenced by light intensity and duration

METHOD OF FEATHERING

- PHYSIOLOGICAL CONCEPT
- HORMONAL CONCEPT

PHYSIOLOGICAL CONCEPT

- Feathering of nursery trees is controlled by apical dominance.
- Due to apical dominance plant exerts control over the development of the lateral buds.
- In order to produce a well-branched, highly marketable tree, apical dominance must be interrupted.

Hormonal concept:

- Auxins play a role in apical growth dominance, which can be overcome by various growth regulators like cytokinins.
- The application of 6-benzylaminopurine (BA) affects the flow of auxins and temporarily impedes the main shoot growth which helps overcome apical dominance and creates favourable conditions for feather formation.

TECHNIQUE: HOW TO DEVELOP FEATHERING: PGRS

- Benzyl adenine: One of the most important biological effects of kinetin on the plants is to induce cell division in the presence of sufficient amount of auxin (IAA), The application of BA phytohormones in higher concentration can negatively affect on the tree height. The best result was obtained at the concentration of 450microlitre/litre.

Neutralizing their negative effect on tree height is intensive irrigation accompanied with the provision of nutrients during the period of intensive growth of the main shoot, which should maintain an adequate growth rate.

- Gibberellins: Promote cell expansion or cell division or both of plant. Extensibility changes in GA treated tissues: height reduced the extensibility of hypocotyl tissues while darkness and GA overcome this inhibition. The best result was obtained at the concentration of the 450microlitre/litre.
- BA+GA: In BA & the combination of BA & GA play an important role in overcoming Apical dominance & in the production of well feathered nursery tree. The total no. of feathers increased with an increase in the concentration of BA & BA + GA. The highest no. of feathers was obtained with BA + GA 400microlitr/liter. Treatments while in 2012 it was obtained with BA+ GA 450 & 400treatments. Increase the concentration of BA & BA+ GA to a certain limit leads to an increase in the no. of feathers.

METHOD OF PGR APPLICATION

- Spray PGR 10 to 14 days after bud break to green tissue on the un-branched leader from the tip down to the existing branches or to 24 inches above the soil line on 1-year-old trees.
- Apply the PGR in white latex paint with a roller to the leader at bud swell, before any green tissue is showing.
- Notch the leader at bud swell before bud break with a hack saw or double-edged clippers.



RECOMMENDATIONS FOR NURSERIES:

- The key to branching trees is to start early and make multiple applications (3 to 5) of a PGR, depending on location.
- When the whip reaches 36 inches in height, treat the growing tip with a PGR. Repeat this application every 5 to 7 inches of new growth (7 to 14 days) for 4 to 5 applications.

IMPORTANT FACTORS IN FEATHERING ARE:

- Apical dominance
- Nutrient availability
- Ecological conditions.

Apical dominance is a refers to the control that the terminal bud exerts over the development of lateral buds. There are several hypotheses which try to explain the mechanism of apical dominance:

- The hormonal hypothesis.
- The photosynthetic hypothesis:
- The hypothesis of water & mineral nutrient transport.
- The hormonal hypothesis stresses the growth importance of auxins in the apical dominance & importance of cytokinins in overcoming apical dominance.

Nutrient availability: If adequate nutrients are provided to plants at early stage then plants grow healthy and they produced more feathers at early stage, they give high yield and early economic returns.

Ecological conditions: This factor also helped in producing enhanced feathering. If ecological conditions are best then they produced more feathers at early stage. Sometimes due to ecological conditions, feathers are less produced and then that year

yield becomes less. So that we also manage ecological conditions foe feathering.

PINCHING

Pinching is manual method to induce feathering, it is a form of pruning that encourages lateral branching on the plant.

THE MAIN PURPOSE OF PINCHING ARE:

- To encourage branching to produce a bushy growth.
- To increase the production of flower-buds on the branch which is pinched.
- Pinching is done at a stage when the plants are young and between 7 and 15cm in height, depending on their habits of growth.

CONCUSION:

- The use of strong, well-branched nursery trees is a prerequisite of early and high yields
- Well-feathered nursery plants greatly contribute to early and high orchards crop.
- The mechanical methods like heading, top twisting or removal of apical leaves are not so effective as plant growth regulators
- The use of PGR like BA and GA alone or in combination is an effective measure for promoting lateral branching to meet the growing demand of feathered plants.