Pollinizers for Temperate Fruit crops Production

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SUMMARY

India is the second largest producer of fruits next to China and productivity is significantly low as compared to otherdeveloped countries. The majority of the temperate fruit crops and nuts are being cultivated in the north-western Himalayan, north eastern and small areas are lies in upper pulney hills in Tamil Nadu. High altitude and temperate regions are capable to produce high yield and good quality fruits. But the foothill where the chilling and pollinizers is insufficient adversely affects the yield and quality. In India, majority of the temperate fruits were introduced from other parts of the world and some are indigenous to India like walnuts and wild apple species. Therefore, the improvement of the temperate fruits and nuts were taken place mainly through introduction of promising varieties. The exotic species and cultivars are still the backbone of fruit production in India particularly for apple, pear, peach, plum and cherry. Pollinizers used to denote trees of those varieties which cross pollinate flowers of another variety, particularly, the commercial varieties. Varieties such as Golden delicious, Red Gold etc., are the pollinizers for Red delicious. It is a term borrowed from the American who use it to describe a producer of pollen.

INTRODUCTION

India is the second largest producer of fruits (81.29 million tonnes)and cultivating in an area of 6.99 million hectares. Apple and walnut represent major crops of temperate fruits covering about 52% and 23% of the total area and accounting for 79% and 5.44% of temperate fruit production respectively; while rest came from other fruits like pear, peach, plum, almond, apricot, etc. According to the FAO (2017) the productivity scenario in India is very low among temperate fruits including apple (7.42 t/ha), pear (7.86 t/ha), peach (7.13 t/ha), plum (8.40 t/ha), apricot (2.80 t/ha), almond (0.58 t/ha) and walnut (1.01 t/ha). However, it is more than double in many advanced countries like USA (apple 39.58 t/ha, pear 36.10 t/ha, peach 17.10 t/ha, plum 16.60 t/ha, apricot 9.92 t/ha, almond 2.54 t/ha and walnut 4.20 t/ha) and China (apple 18.64 t/ha, pear 17.2 t/ha, peach 18.2 t/ha, almond 3.33 t/ha and walnut 3.90 t/ha).

Causes of low productivity

The cause of low productivity is mainly associated with monoculture, old and traditional varieties, lack of pollinizers, senile /sick orchards, non-availability of high quality cultivar spectrum (narrow varietal base), non-availability of quality planting material of elite varieties on clonal and standard seedling roots stocks, poor diversification with new emerging early, mid and late cultivars, low rejuvenation and phased replacement of senile orchards, incidence of biotic and abiotic stress, rainfed cultivation etc.

(a) Varieties issues

Most apple varieties cannot set fruit unless their flowers are cross-pollinated with the pollen of another compatible variety. Varieties which cannot set fruit by self-pollination are known as self-unfruitful, while those which can set fruit by self –pollination are known as self-fruitful. There is hardy any apple variety, except perhaps the Yellow Transparent, which can be truly called self-fruitful. There are some varieties, however, which are partly self-fruitful and can produce some crops, though not full crops, by self-pollination. Certain varieties of apples can set a proportion of seedless fruit without any pollination. This condition is known as parthenocarpy which sometimes occurs after the flower has been damaged by severe frost. The parthenocarpic fruit is often not true to type and may be small and mis-shapen.

Varieties which otherwise have a viable pollen but cannot be fertilized with their own pollen, are known as self-incompatible in addition to being self-unfruitful. A variety which cannot be fertilized by the viable pollen of another variety is known as cross-incompatible or cross-unfruitful. For example, Akansas is cross-incompatible with Grieves.

Qualities of Pollinizers

A pollinizers must have some important qualities to effectively pollinate the main commercial varieties. These are enumerated below.

1. The most important consideration in selecting pollinizers is that the bloom time of the pollinizers and the main variety must be the same. If these varieties bloom at different times, viable pollen would not be available for pollinating flowers of the main variety.

2. The variety must be a diploid and must be capable of producing large quandities of viable pollen.

3. The age and size of the pollinizers should be roughly the same as the age and size of the main variety. If the pollinizers is very small, and the main tree variety is large, effective

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pollination will be difficult.

4. In dwarf plantations, the pollinizers should also be dwarf trees and not standard trees. In a standard tree plantation where dwarf trees are planted as fillers, the fillers must be provided with independent pollinizers because the standard tree will flower only when they are mature, where as the filler trees will mature earlier.

5. The pollinizers must be a regular annual bearer and not a biennial or alternate bearer. In case the pollinizer does not flower during a year, the entire crop of the main variety is lost.

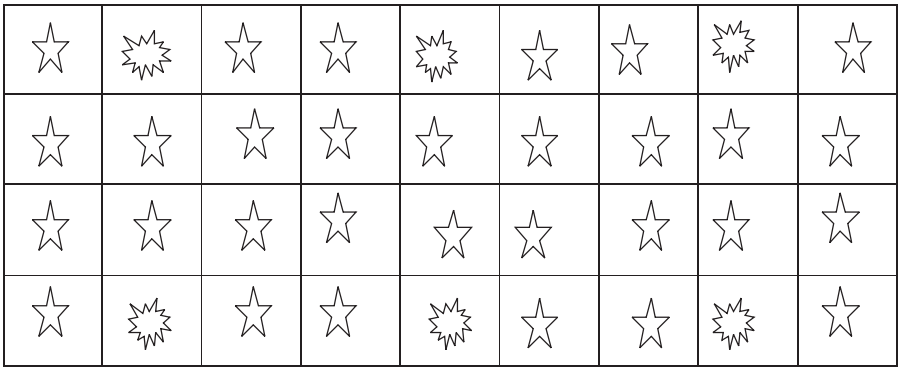

FIGURE 1: Layout plan for 11 per cent pollinizers.

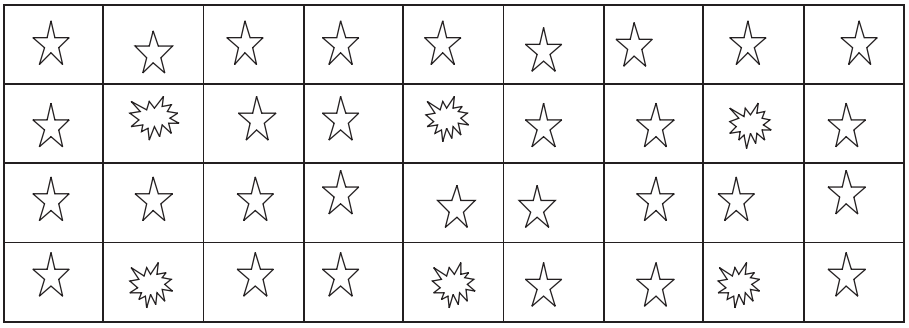

FIGURE 2: lay out plan for 15 per cent pollinizers.

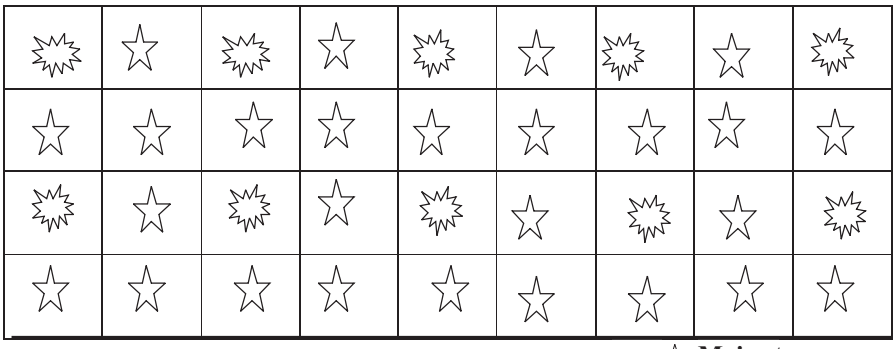

FIGURE 3: Lay out plan for 25 per cent pollinizers.

Main tree
Pollinizers

6. The flower of the pollinizer should be attractive to the bees and not cuase adverse behaviour in them.

In India, the most popular pollinizer for the Red Delicious group is the Golden Delicious. This cultivar does not always meet the requirements of a good pollinizers as its bloom time does not overlap that of the Red Delicious group at some altitudes and regions. Further, Golden Delicious is a biennial bearer and thus a total reliance on it can cuase heavy loss in the years when it does not bloom. It is, therefore, wise to plant two to three varieties of pollinizers, which should be well spread out in the ochard.

(a)Crap apple pollinizers

The latest pollinating techniques being researched in the USA and Europe, are to use Crab apples as pollinizers for the Red Delicious group. The crab apples are generally upright and take very little space, thus enabling an orchardist to plant solid block of one variety. The crab apple trees not only flower abduntly but also flower annually.

To be a suitable pollinizers , a crab apple variety should have the following qualities

1. It must have upright growing habits so that the tree does not take up much orchard space.

2. Should be vigorous and be able to produce 30 to 45 cm of terminal growth each year.

3. It should be able to flower profusely on one year old wood and produce large quandities of biable pollen.

4. Should not set any fruit or if it does, should shed it at an early stage. This will eliminates the need for defruiting and ensure regular annual flowering.

5. It should be less susceptible to frost during its bloom than normal varieties

6. It should not be unduly susceptible to common apple disease and should not act as a host to apple insects.

7. The flowering periods should overlap with the flowering period of the Red Delicious group or the main variety to be pollinated.

(b)Layout of Pollinizers

The lay out and number of pollinizers is an important part of orchard planning. Unless adequate pollinizers tree are provided, the orchard is not likely to be productive and the crops will be poor and erratic. Conventionally, five planting plans are used with 11, 15, 20, 25 and 33 per cent pollinizers. For apple plantations less than 11 per cent pollinizers are unacceptable, except in partly self-fruitful and regular cropping varieties. The exact percentage has to be determined by the grower, keeping in consideration his local conditions. The following factors should be considered while deciding the number of pollinizers to be planted.

The location of the orchard is the most important factor in deciding the extend of pollinizers. If the orchard is located in an area prone to spring frosts, a greater percentage of pollinizers trees will be needed. Frost at bloom time can kill many of the blossoms are properly pollinated for an adequate fruit set. In inclement weather, a bee may not travel to more than two standard trees and therefore, if the pollinizer is two trees away, the main varieties are not likely to be properly pollinated. On the other hand, sites which do not normally suffer from spring frost and remain sunny, activity lower percentage of pollinizers because bee activity will be unhindered and intensives.

Orchards located at sites which generally remain cloudy, windy or rainy during bloom time, will also require a higher percentage of pollinizers. Bees normally travel along the row and do not cross over a row. The layout plan should, therefore, provide for pollinizers in such a way that either side of the row has some such trees.

CONCLUSION

The majority of the temperate fruit crops and nuts are being cultivated in the north-western Himalayan, north eastern

and small areas are lies in upper pulney hills in Tamil Nadu. High altitude and temperate regions are capable to produce high yield and good quality fruits. The production and productivity of temperate fruit crops such as Apple, pear, plum, peach, Apricot, cherry and Kiwi is entirely depends upon the use of different pollinizers which is compatible to main cultivars. The placement of Pollinizers in the orchard is very important. Ideally, every treein an orchard should be located as close as to a Pollinizer tree.Thepreferred arrangement of pollinizers is in solid rows. One scheme is to alternatetwo rows of Pollinizers between four rows of the major cultivar.Hence, while lay out of orchard the percentage of pollinizers will be considers increasing temperate fruit crops production.

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