

Pollination Problems & Its Control Measures in Temperate Fruits

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Abstract

The movement of pollen from the male to the female parts of a flower is known as pollination. Some fruit trees are referred to as self-fruitful or self-pollinating because they have the ability to pollinate themselves using their own pollen. Certain tree species are self-unfruitful and depend on pollen from another variation of the same species. Cross-pollination is the process by which pollen is transferred from one variety of a certain kind of tree to another variety. For temperate fruits like apple, pear, sweet cherry, and Japanese plum, cross-pollination is necessary. While it's not necessary, cross-pollination increases the number of fruits that develop on apricot, peach, nectarine, European plum/prune, and tart cherries.

Introduction:

Pollination is necessary for all temperate fruits to set fruit. Certain fruits may bear fruit on their own and only need one cultivar per block. Peaches, nectarines, tart cherries, apricots, and certain European plums may bear fruit on their own, and a single variety can be planted in a full block. For sufficient cross-pollination, mixed plantings of several cultivars are necessary for apple, pear, and sweet cherry plants. The proportion of blooms that require setting varies significantly between fruit crops. Yield is the most crucial component of a commercial harvest for crops like cherries, therefore 20–60% of the flowers from sweet cherries and 20–75% from sour cherries must be set for a commercial crop. For other fruit crops—apple, 2 to 8%; pear, 3 to 11%; peach, 15 to 20%; apricot, 20 to 25%; and plum, 3 to 20%—the proportion of flowers that must be pollinated is far smaller, since size plays a more significant role in their economic success or in preventing biennial cropping. Increased output can result from improved pollination since it can produce larger, better-shaped fruit and/or more fruit per tree. Studies have indicated that the number of seeds in a fruit is strongly correlated with its size and calcium content, and that the quantity of seeds is contingent upon effective pollination. The likelihood

of cross-pollination increases with the number of pollinizer trees planted in a planting. On the other hand, orchard operations lose some efficiency when pollinizers are used in rows. In an orchard, having two or more cultivars might cause confusion for pickers during harvesting, which can lead to mixed cultivars. It can also cause issues with spray-to-harvest and cultural practices. Due to variations in growing patterns, there might also be an inefficient use of the area.

Prerequisites for Proper Pollination

1. The availability of a sufficient supply of suitable and viable pollen
2. The pollinating agent has to get pollen to the stigma in an efficient manner.
3. Stigma must be open-minded.
4. Pollen tube growth that is enough
5. Sufficient double fertilization is necessary for the development of the embryo and endosperm.

Problems in Pollination:

1. Because most commercial cultivars are self-unfruitful and other kinds are only partially productive, fail to produce fruit because of inadequate pollination.
2. It has been noted that incompatibility and sterility are the two main reasons for infertility.
3. The weather, pollinators, and flower structure all have a significant impact on fruit set and pollination.
4. Self-fruitfulness to some extent
5. Incompatibility across
6. Inadequate pollen germination
7. Inconsistency in blooming timing
7. Flowers that are unisex
8. Particular pistil abortion extent even in the best of climatic conditions
9. Environmental aspects.

Solution to Overcome Pollination Problems in Temperate Fruit Crops

1. Pollinators are used in temperate fruit production
2. Pollinators are used in the cultivation of temperate fruits.
3. Applying growth inhibitors.

Use of Pollinizer

Plants that generate a lot of pollen grains are known as pollinizers, and they are necessary for properly pollinating fruit kinds that are self-incompatible, self-unfruitful, or self-infertile. Plants of different types are necessary for effective pollination, fruit set, and fruit production in self-unfruitful or self-incompatible forms. Therefore, enough space should be allotted while designing an orchard layout to allow for the planting of appropriate pollinizers. In an orchard, an adequate percentage of pollinizers (33%) should be maintained (every fourth tree in every fourth row).

Characteristics of ideal pollinizer:

1. An abundance of viable pollen
2. Pollen needs to be in harmony with the primary cultivar.
3. Flowering need to coincide with the primary cultivar's blooming period.
4. Consistent and abundant carrier
5. The blooming season of the profuse flowering should coincide with the main cultivar's flowering period.
6. Need to conceive at the same age as the primary cultivar. g. Need to yield some commercially valuable fruits
7. Must be devoid of illness, vermin, and insects.
8. Well-suited to the agroclimatic zone, where the principal cultivar thrives.

Use of Pollinators:

Organisms known as pollinators are those that move pollen from male to female organs. Pollinators like as insects, winds, birds, and water spread the developed pollen grains. The majority of fruit trees that are cross-pollinated are efficiently pollinated by wind or insects. Insects that often visit flowers include beetles, moths, syrphid flies, wasps, honeybees, and butterflies.

Honeybee:

1. Their bodily components are altered to allow them to absorb as much pollen as possible.
2. Put in extended hours at work
3. Perform even in unfavorable weather
4. Capable of adjusting to many challenging climates
5. Significant population growth.

Use of Plant Growth Regulator:

For improved fruit set, cytokinin, gibberellins, auxin, polyamines, and their mixtures can be used. Their combined action enhances fruit firmness and promotes the growth of larger, higher-quality fruits (Sabir et al., 2021).

Important Pollinizers:

Crop	Cultivar	Pollinizer
Apple	Royal Delicious, Ambri, Rich-a-Red, Lal Ambri, Red Delicious and Akbar.	Golden Spur, Granny Smith, More Spur Gold, Sunhari, Golden Delicious
Cherry	Bing, Lambert	Sam, Van, Montmorency, Rainer, Stella, Compact Stella, Garden Bing
Plum	Santa Rosa (partially- self fruitfull)	Satsuma, Shiro, Burbank
Peach	Bartlett	Fertility, d'Anjou, Bosc, Comice, Clapps Favourite and Conference

Conclusion

High-yield, high-quality crops are produced when a suitable amount of a good pollinator is used. Increased fruit set can be achieved by natural pollination and enhanced honeybee assistance. The highest percentage of pear pollen pellets is produced by the sequential introduction of honeybee colonies, and an increase in yield is produced by an average first fruit set. 4- Fruit set, hardness, and fruit weight were all enhanced in cherries by CPA, GA3 by itself, and GA4/7 in combination.

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