



## Role of Pollinizers and Insect Pollinators in Apple Fruit

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Apple (*Malus pumila*) is the important temperate and cash fruit crop in Northern Himalayan states of India. It accounts about 90% of the total horticultural production in Himachal Pradesh (NHB, 2021). It is mostly cultivated in the states of Jammu & Kashmir, Himachal Pradesh, Uttaranchal, Arunachal Pradesh and Nagaland. Apple is rich source of vitamin C, antioxidant compounds that helps in building resistance and boosting immunity in humans (Bondonno *et al.* 2017). The quality and quantity of apple fruit depends on the many abiotic and abiotic factors, including pollinizers, insect pollinators, weather conditions, cultivar compatibility and synchronous blooming. Out of these factors, pollinizers and insect pollinators play a crucial role in successful pollination and the formation of many healthy seeds contribute to the eventual size and quality of apple fruit.

### About pollinizer plants

Pollination is one of the major factor to profitable apple production. Usually, apple varieties are not self-fertile and will not set a full crop without a compatible pollinizer. A pollinizer or pollinizer is a plant that often used in pollination management in many fruit crops. It provides abundant, compatible, and viable pollen at the same flowering time as the pollinated plant. For example, most crabapple varieties of apple are good pollenizers for any apple fruit tree that blooms at the same time and are often used in apple orchards for the purpose of pollination. Some apple cultivars produce very less pollen or pollen that is sterile or incompatible with other apple varieties that are known as poor pollenizers. Many apple fruit growers are using pollinizer cultivars for another cultivar.

### Role of pollinizers in apple

- The bloom periods of both pollinizer and main variety should be overlap.
- The pollinizer variety must have viable diploid pollen.
- The pollinizer variety must be located near the main apple producing tree.
- Pollinizer should have an upright growth habit.
- Generally, they should have a long flowering period.
- Pollinizer should flower profusely and produce compatible pollen.

### Pollinizer varieties of apple

S. No.	Pollinizers	Main varieties
1.	Redlum Gala	Red Chief
2.	Gale gala	Oregan spur
3.	Golden Delicious	Vance
4.	Malus floribunda	Top Red
5.	Golden Hornet	Royal Delicious
6.	Manchurian	Red Velox

## Selection of crabapple cultivars

The most commonly used crabapple cultivars are Pioneer Scarlet, Rosedale, Golden Hornet, Snowdrift and Simpson 10-35. Use of annual blooming ornamental crabapple trees in orchard help in supply of additional pollens and improve cross pollination. Nearly every apple fruit nursery sells ornamental crabapples. Growers should know that not all crabapples are suitable for use as pollinizers. The various studies show that the white single flowering crabs are better for cross-pollination because the appearances of these flowers are most like apple flowers. While, crabapples with dark colored flowers may alter honey bee visitation patterns. Remember that use of crabapple as pollinizers as they are often more susceptible to fire blight than the main apple trees and the disease can spread from these trees to main apple trees.

## Methods of planting of pollinizer cultivars

The main consideration in planting trees is planting of sufficient pollinators to ensure effective pollination. Usually one pollinator tree is needed for two to three large trees planted at 10 m distance or one row pollinator for two rows of main cultivar. For high density planting the pollinator tree is planted after every sixth tree in a row. The most widely used planting system is the square system. In this system, the pollinators are planted after every sixth or ninth tree. There are several methods are available when incorporating pollinizers into the design of a new orchard. The following methods are:

**1. One in nine method:** In this method, the pollinizers are included as every third main apple tree in every third row in both directions. It should insure that every tree is bordered by one pollinizer tree.

**2. Full row method:** In this method, the full rows of pollinizer varieties are planted next to the main apple variety. This method includes some planting patterns i.e. (i) Every second row, (ii) One row in three, (iii) One row in five and (iv) Two rows in six. The number of rows between pollinizer rows will largely depend on the orchard density, the number of bees working in the orchard and the crop-setting characteristics of the variety being pollinated.

## About insect pollinators

Insect pollinators include many species of bees, beetles, butterflies, flies, bumblebees, honey bees, ants, solitary bees and wasps. These insect pollinators actively transfer the pollen within or between flowers of many crops. More than 85 per cent of cross pollinated crops depend on insects for pollination. Top most pollinators of world are 73% bees, 19% flies, 6.5% bats, 5% beetles, 5% wasps, 4% birds, 4% butterflies and moths (Shaheen *et al.* 2017). In apple, about 34 species of insect pollinators are recorded that belongs to 5 orders and 11 families of class insect. Out of these highest numbers of species belongs to order Hymenoptera.

## Role of insect pollinators in apple

- Pollinators can increase apple yield and improve the quality of apple.
- Good pollination can increase the stability of apple production.
- If there are not enough appropriate insects available to pollinate apple crop that need it, then they will not yield to their full potential.
- Insect pollinated apple crops are high yielding, nutritious and of high economic value.
- Insect pollinated apple crops also form an important income source in developing countries.
- Apple crops depend on specialist pollinators like *Apis cerana* and *A. mellifera* that enhance the quality of apples, size and shape.
- Insect pollinators like honeybees can increase fruit yield of apple upto 50 per cent.

## Conclusion

The pollinizers and insect pollinators are important factors that enhance the fruit quality and quantity of apple significantly. During recent years, the apple production decrease due to changing farm land use, diseases, intensive agricultural management practices, environmental pollution, invasive alien species, climate change and agrochemicals threaten pollinator populations. It could be manage by using insect pollinator's friendly practices and adding hive bees to fruit orchards will ensure increased fruit production in various temperate fruit crops.

## References

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