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# EVALUATION OF CRAB APPLES FOR POLLINATION

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Eight flowering crab apples namely *Malus robusta, Malus, floribunda, Malus georgious, Malus* E M Wilson, Snowdrigt, Manchurian, Redflush and Golden Hornet were tested in various apple growing situations of Kotkhai area for their growth, flowering and fruit set responses to Delicious cultivars. All the crab apples under study, except *Malus robusta* and *Malus* E M Wilson were observed slow growing with compact and spreading habit. In branch grafting of *M. robusta* on primary or secondary branches, it was found to overgrow the main tree. In respect to flowering behaviour, Manchurian and Redflush are very early in flowering but their bloom often coincides with king bloom of Delicious. Snowdrift is an excellent annually flowering crab with pronounced effect on fruit set, though it is also little early in bloom. *M. georgious, M.* E M Wilson, *M. floribunda* have the bloom period almost coinciding with the Delicious, whereas Golden Hornet is late like Golden Delicious. Golden Hornet and Snowdrigt had high flower bud intensity (0.86 and 0.70 respectively). Highest fruit set (152.2 per 100 spurs) was recorded in Snowdrift pollinated Delicious trees. It was followed by Manchurian (104 per cent). *Malus robusta* and *M. floribunda* had the least response on fruit set.

Key words : Crab apples, pollinisers, flowering, pollination, fruit set

Due to irregular bearing of present apple pollinising varieties and production of low value crop, the modern trend in pollinisers is being shifted world over to crab apples as these are becoming important in apple pollination (Crasswellar *et al.*, 1980). The advanrages of crab apples as pollinisers for apple cultivars are seen as source of abundant flower production and prolonged flowering period, production of large open flowers attractive to bees and high pollen viability and fertilizing ability (Georgiev and Blagov, 1988). Keeping this in view the eight crab apple species/varieties were evaluated for their growth behaviour, flowering period and pollination responses to select appropriate polliniser.

## MATERIALS AND METHODS

Eight crab apple varieites/species namely Manchurian, Snowdrift, Golden Hornet, Redflush, *M.* E M Wilson, *Malus georgious, M. floribunda, M. robusta* were planted in various apple orchards having inadequate polliniser proportion in different placement systems. These crabs were studied for their growth behaviour under different systems of placement systems. These crabs were studied for their growth behaviour under different systems of placements, flowering behaviour with respect to Delicious, flower bud intensity and fruit set responses on Delicious as per standard procedures.

## RESULTS AND DISCUSSION

1. Growth behaviour - Two crab apple species namely *Malus robusta* and *Malus E M Wilson* were semivigorous to vigorous in growth of trees. However later was comparatively slow in branch top grafting. In branch top working of *M. robusta* on primary or secondary branches, it was found to overgrow the main tree which is the behaviour

of Red Gold variety. Such vigorous growth habit of crabs is not desirable since we have only to plant these for pollination. All other varieties/species were slow growing with spreading type of growth habit (Table 1).

## 2. Flowering

i) *Flowering period and duration* : *Malus georgious, M. E M* Wilson, and *M. floribunda*, had their bloom almost coinciding with Starking Delicious behaviour but differentily under different

**Table 1. Growth behaviour of various pollinisers in different placement systems**

| Name of pollinisers/placement systems | Standard plants | Branch top working on Delicious | |
|---|---|---|---|
| | | Basal Periphery | Mid periphery |
| Manchurian | Slow growing, spreading type. | Slow growing, spreading type | Slow growing, spreading type |
| Snowdrift | Slow growing, spreading type | Little vigorous and spreading type | Slow growing, compact |
| *M. robusta* | Vigorous, upright, spreading | Vigorous | Semi vigorous, spreading |
| Golden hornet *Malus floribunda* | Slow growing, erect and compact | Slow growing and erect | Slow growing |
| *M. E M* Wilson | Semi vigorous, spreading | Slow growing and erect | Slow growing |
| *M. georgious* | Semi dwarf, spreading | Slow growing | Slow growing |
| Red flush | Very slow growing (abundant powdery mildew attack) | Slow growing and spreading | Slow growing |
| Control (Commercial pollinisers) | | | |
| Golden Delicious | Semi vigorous, spreading | Semi vigorous, spreading, Slow growing | |
| Red Gold | Very vigorous spreading | Very vigorous spreading | Slow growing and spreading |

**Table 2. Flowering behaviour to different crop pollinisers at different situations and aspects with respect to Delicious**

| Name of pollinisers | Flowering period with respect to Delicious | | | |
|---|---|---|---|---|
| | 1800M SW | 1800M N | 2800M SW | 2100M N |
| Manchurian | 5-6 days early | 4-5 days early | almost coinciding | 2- 3 days early |
| Snowdrift | 3-4 days early | 3-4 days early | 2-3 days early | almost coinciding |
| *M. robusta* | 3-4 days early | coinciding | coinciding | coinciding |
| Golden Hornet | 2-3 days late | 2-3 days late | 3-4 days late | 2-3 days late |
| *M. E M* Wilson | 2-3 days late | coinciding | coinciding | coinciding |
| *M. georgious* | coinciding | coinciding | coinciding | coinciding |
| *M. floribunda* | coinciding | 2-3 days early | almost coinciding | coinciding |
| Redflush | 3-4 days early | 3-4 days early | almost coinciding | 2-3 days early |
| Control (Commercial pollinisers) | | | | |
| Golden Delicious | 4-5 days late | 2-3 days late | 2-3 days early | 1-2 days coinciding |
| Red Gold | coinciding | 2-3 days early | 2-3 days early | coinciding |

systems of placements and altitudes/aspects. The flowering duration in Snowdrift, Manchurian and Golden Hornet is quite prolonged. Though earlier two flowers little early but they also cover the full bloom of Delicious there by having beneficial effect on its fruit set.

ii) *Flower characters* : The data on different flower characters of these crabs are given in Table 3. It is evident from the persual of table that crab apple generally have high flower bud intensity. Golden Hornet has the highest flower bud intensity (0.86) followed by Snowdrit (0.70) and least was in our commercial varieties like Golden Delicious and Red Gold. Manchurian and Snowdrift also had higher numbers of flower buds (7 to 10) in a spur, number and weight of anthesis per flower.

**Table 3. Flower bud intensities and other characteristics of crab flower parts**

| Name of pollinisers | Flower bud intensity (per inch shoot length) | No. of flower per spur | Wt of anthers per flowers (mg) | No. of anthers per flower |
|---|---|---|---|---|
| Manchurian | 0.50 | 9-10 | 16-0 | 20.0 |
| Snowdrift | 0.70 | 7-8 | 14-0 | 20.0 |
| *Malus robusta* | 0.45 | 5 | 11-0 | 19.0 |
| Golden Hornet | 0.86 | 5-6 | 8-0 | 20.0 |
| *Malus floribunda* | 0.65 | 5-6 | 4-0 | 19.0 |
| *M. E M Wilson* | 0.40 | 5-0 | 15-0 | 11.0 |
| Redflush | 0.40 | 5-0 | 15-0 | 11.0 |
| *Malus georgious* | 0.60 | 5-0 | 9-0 | 12.0 |
| Control (Commercial pollinisers) | | | | |
| Golden Delicious | 0.80 | 5-0 | 12-0 | 18.0 |
| Red Gold | 0.48 | 5-0 | 18-0 | 20.0 |

### 3. Effect on fruit set of Delicious

The data on fruit set is given in Table 4. The fruit set was higher with Manchurian, Snowdrift in comparison with commercial varieties as well as other crabs.

**Table 4. Effect of different crab pollinisers on fruit set of Delicious**

| Sr. No. | Name of polliniser | Mean fruit set (in 100 spurs) | | |
|---|---|---|---|---|
| | | Site I 1800 M (SW) | Site II 100M (NE) | Mean |
| 1. | Manchurian | 57.0 | 152.0 | 104.0 |
| 2. | Snowdrift | 114.2 | 190.2 | 152.2 |
| 3. | Golden Hornet | 50.4 | 98.0 | 74.2 |
| 4. | Red flush | 25.0 | 55.0 | 40.0 |
| 5. | *M. georgious* | 56.0 | 96.2 | 71.2 |
| 6. | *M. E M* Wilson | 72.0 | 102.7 | 87.3 |
| 7. | *M. floribunda* | 35.0 | 60.0 | 47.5 |
| 8. | *M. robusta* | 15.0 | 45.0 | 30.0 |
| Control (Commercial pollinisers) | | | | |
| 1. | Red Gold | 10.0 | 125.0 | 69.5 |
| 2. | Golden Delicious | 8.4 | 70.0 | 39.2 |

Two crab apple species namely *M. robusta* and *M. E M Wilson* were found vigorous in growth habit. These types of pollinisers are generally not desirable due to their occupying more space without commerical fruit production. In respect of flowering behaviour, Manchurian and Red flush were early in their flowering but Manchurian have given pronounced effect fruit set. *M. georgious, M. E M* Wilson and *M. floribunda* have the bloom period almost coinciding with Delicious, whereas Golden Hornet was late like Golden Delicious. Golden ornet and Snowdrift also have the highest flower bud intensity.

Wild apple species have been reported to cause 50 to 80 per cent fruit set compared to open pollinated Golden Delicious (Blasse and Schrotter, 1985; Selli and Montalti, 1985 and Gautam et al., 1994). Manchurian crab has been reported tohave the advantage of flower shape which abstract more top workers (Mayer, 1987)

Vigorous growth behaviour of *M. robusta* and *M. E M* Wilson makes them unfit for apple pollination use. Manchurian and Redflush are very early in flowering, however Manchurian due

to prolong flowering duration has beneficial effect on fruit set of Delicious. Snowdrift with high flower bud intensity, prolong flowering period and annual flowering habit has been observed as excellent crab polliniser for Delicious. This was however closely followed in some locations by Manchurian. *Malus florobunda*, Red flush, *M. robusta* and Golden Hornet had resulted in poor performance on fruit set of Delicious apple.

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