procedures in fruit picking, storage and evaluation will be discussed in Part III of this series.

Discussion

Between 1962 and 1971, approximately 2500 seedlings were planted annually at Beltsville and, since 1966, about 1200 at Wooster, Ohio. The initial plan was to grow the trees on a 10-year rotation cycle. With better growth and reduction of the juvenile period, this cycle has been reduced to 8 years at Beltsville. This schedule has been slightly modified recently by leaving the seedlings one extra year without psylla control sprays. Records are taken on defoliation as an indication of psylla resistance or susceptibility. As soon as superior seedlings can be identified, selections are tagged, propagated and more detailed tree data are collected. For additional information on tree and fruit characteristics of selections made in the pear breeding program, see Part IV of this series.

Spring frost damage in Maryland and Ohio in recent years has seriously reduced seed production from hybridization and subsequent seedling planting. Good cooperation with pear breeding programs at Rutgers University in New Jersey, the New York Agricultural Experiment Station at Geneva, the Canada Department of Agriculture at Harrow, Ontario, the East Malling Research Station in England, and the National Research Institute at Angers, France, have provided us with extra seed lots in the off years. Such cooperative efforts are extremely valuable in our pear breeding program.

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Self-Unfruitfulness of 'Anna' Apple[1]

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Additional Index Words

Malus, Pollination.

Abstract

Fresh pollen of 'Anna', 'Dorsett Golden', FL 1W-22 and ether-killed 'Dorsett Golden' mixed with 'Anna' about 1:1 was used to pollinate approx 650 flowers of 'Anna' apple to determine self-fruitfulness. 'Anna' is not self-fruitful. 'Dorsett Golden' was cross-fertile with 'Anna' and is recommended as a pollenizer because it matches 'Anna's' blossom period.

'Anna' apple originated in Israel and was introduced by Abba Stein in 1963.

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'Anna' resulted from crossing 'Red Hadassiya', a local variety, and 'Golden Delicious' in 1959. It is diploid, 2n = 34 (2). 'Anna' was introduced into the United States in 1965 as P.I. 1280400. The question of pollination requirements has arisen as this fruit has increased in popularity. Moderate to low fruit set has been reported with isolated trees of 'Anna' when no other cross-pollinating cultivar was known to be present. This study was undertaken in the spring of 1977 to determine if 'Anna' is self-fertile.

Five-year-old 'Anna' apple trees on seedling rootstock were enclosed in cheesecloth-type screen houses. Flowers were hand emasculated daily and viable 'Anna', 'Dorsett Golden', FL 1W-22 and a recognition pollen consisting of ether-killed 'Dorsett Golden' mixed 1:1 with 'Anna' pollen were applied on single trees. No more than 3 flowers per cluster were pollinated, others being removed. Approx 650-850 flowers per tree were hand-pollinated between March 2 to 7. Fruit were harvested from 'Anna' trees during June 10 to 30 and counts of plump seed were recorded.

Self-pollinated 'Anna' resulted in 0.3% fruit set (Table 1). The recognition pollen treatment resulted in no fruit set. This was unexpected and cannot be explained in that recognition pollen has been successfully used in apples (1). Thus, 'Anna' was highly self-unfruitful but results of selfing support the fact that some fruit has been observed on isolated trees. Fruit set was 8.8% and 19.4%, respectively, when pollen parents were 'Dorsett Golden' and FL 1W-22, demonstrating these 2 pollenizers are cross-compatible with 'Anna'.

The combination of lowest fruit set and lowest seed per fruit from 'Anna' selfed and recognition pollen treatments classifies 'Anna' as highly self-unfruitful (Table 1). 'Anna' crossed with 'Dorsett Golden' or FL 1W-22 had high fruit set and high seeds per fruit, a combination which results in a cross-fruitful classification. FL 1W-22 yielded a higher percentage fruit set and seed count than 'Dorsett Golden' but did not completely match 'Anna' in blossom period.

'Anna' apple is highly self-unfruitful and should be planted with a pollenizer to ensure good fruit set. 'Dorsett Golden' has consistently matched 'Anna' in bloom period and was cross-fruitful, thus is recommended as the preferred pollenizer.

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Table 1. Fruit set and seed/fruit from 4 pollination treatments on 'Anna' apple.

Treatment	Approx. No. Flowers Pollinated	Fruit		Seed	
		Harvested (No.)	Set (%)	Per fruit (No.)	Range per fruit
	650			4.5	3-6
	650			5.9	1-10
	850			6.2	2-10
	650			0	0