Breeding Plums in Florida

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Two plum species account for a majority of the commercial plums in the world, *Prunus domestica* and *P. salicina.* The former is hexaploid (6X) and in general has a higher requirement for exposure to winter cold to terminate dormancy. Because of its more complex genetics and higher chilling requirement, it has not been used in breeding in the Southeastern United States. *P. salicina* (Japanese plum) is diploid (2X) and requires less winter chilling for satisfactory adaptation and growth. However, these plums have too high a winter cold need to set good crops at Gainesville, and they bear irregularly, even in northwest Florida (4).

Japanese plums were introduced into this country about 1870 (1). Burbank began importing seeds and varieties of the species extensively about 1885 (2); and he is given most of the credit for the variety improvement upon which the California plum industry was established. Immediate selection was made for annual production by escape from late spring frost (5). This type of selection would favor genes for a high chilling requirement. Because this characteristic is quantitatively inherited, there may be genes for low chilling types present in Japanese plums in a masked condition.

Evaluations of plum varieties in Florida were reported in Proceedings of the Florida State Horticulture Society even before 1900. The varieties recommended have practically no commercial value by today's standards, and some portray delayed foliation due to insufficient winter cold. In fact, many commercially accepted varieties have exhibited delay of bloom at State College, Mississippi following relatively mild winters (3). If low chilling, commercially acceptable plums could be produced in Florida, they would ripen at a time when no fresh plums are readily available on the eastern market. It was with this objective in mind that a plum breeding program was initiated.

Native Species and Variety Evaluation

Florida's native plums, *Prunus americana,* Marsh, *P. angustifolia,* Marsh, *P. umbellata* Ell. and *P. geniculata,* Harper. are generally adapted to northern, north central and south central parts of the state (Fig. 1). In general, the further the southern range, the lower their respective winter cold requirement. The latter two species have small, bitter fruit, and are not considered useful in breeding. *P. angustifolia* has been hybridized with *P. salicina,* producing varieties like Excelsior and Terrell. These hybrids are rather low in fruit quality and have not been good enough to provide the basis for an industry. No organized breeding attempt has been made to incorporate genes for high quality, very low chilling, and a short fruit development cycle.

A major objective of breeding plums in Florida is to obtain genetic material with a low winter cold need. A number of open-pollinated seedlings from *P. salicina* varieties were evaluated March 19, 1968, at the USDA Horticultural Field Station, Bryon, Georgia; and bud break ranged from dormant to past anthesis. In addition, many Japanese varieties do

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not overlap each other in bloom and are, therefore, incapable of serving as pollen donors for each other. The varieties Mariposa, Burmosa and Frontier always bloom earlier than other varieties located at Gainesville. This spread in bloom date of seedlings and varieties indicates the existence of genetic diversity in Japanese plums for adaptation to Florida's mild winters.

Evaluation of plum clones for a low winter cold need is part of a continual testing program at Gainsville. Two sources have been found that have extremely low cold requirements. The first was found after following up a report on the plum industry in Taiwan.* This suggested the availability of types with probable value for Florida. Several seed sources have been obtained from Taiwan. The first seed lot has been fruited and proved to have a very low cold need. Several seedlings were propagated and have fruited at Homestead. Two selections have fruited well at Gainesville: one is short cycle, yellow-fruited and the other is long cycle, red-fruited. Neither has the astringency of native species and both are slightly larger than 1" diameter. They have been crossed with varieties of *P. salicina* but resulting seedlings had not yet fruited in 1969.

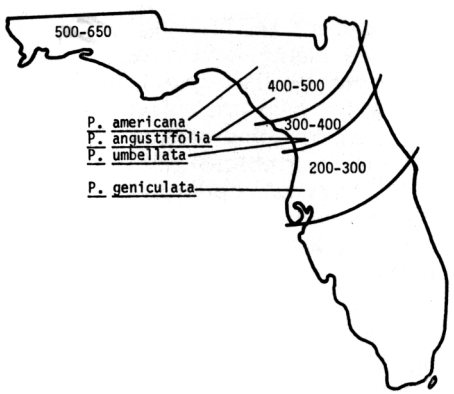

Fig. 1. General areas of native plums in Florida and approximate hours <45F received to February 10 in 75 percent of the winters.

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The second source of material with low winter cold need came from the selection testing program. P.I. 285531, 'Jamuni,' collected from New Delhi, India, was obtained in April, 1968. It was topworked and grew vigorously during the summer. Dormancy was terminated in early January, 3 months earlier than any of the other 55 varieties belonging to *P. salicina.*

Summary

Crossing high quality Japanese plums with those of low chilling requirement should give F_1 hybrids intermediate in chilling requirement. These can be inter-crossed to give an effective F_2 segregating generation. Selections from this generation can be back-crossed to good commercial varieties and intercrossed with each other, and these third generation progeny should provide the basis for initial variety selection. The breeding program for low chilling, high quality plums will be difficult, but some work seems justified.

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