

as a trait source for 1) *Phytophthora* resistance, 2) citrus nematode resistance, and 3) tristeza virus resistance in a program objective to produce improved rootstocks. In a concurrent program objective to produce improved scion varieties, *Poncirus* was the trait source for 1) tree cold hardiness, 2) deciduousness, and 3) tristeza virus resistance. The various cultivars of *C. grandis*, *C. paradisi*, *C. sinensis*, and to a lesser extent *C. reticulata* were the sources of *Citrus* germplasm traits. Evaluation for *Phytophthora* resistance has been the most advanced of the rootstock objectives. *Poncirus* has had a record of variable performance as a donor as both *Phytophthora*-resistant and -susceptible hybrids have been produced in the same progeny.

For the scion variety objectives, *Poncirus* has been an excellent donor for tree cold hardiness. Hundreds of F_1 hybrids of the four named *Citrus* species and *Poncirus* subject to -12.2°C freeze survived with nearly complete leaf kill but no other visible damage. As a donor of deciduousness, *Poncirus* has been only fair. Partly or semi-deciduous F_1 hybrids were the general rule in all *Citrus* crosses. Only the crosses with *C. reticulata* produced a few completely deciduous F_1 hybrids. *Poncirus* has had a variable performance record as a donor of tristeza virus resistance. Both susceptible and resistant F_1 hybrids were produced in the same progeny.

There were many negative features found in all of the hybrids. The worst examples were the extremely thorny trees and the horrendous quality of the fruit. In all crosses and progenies where *Poncirus* has been one of the parents, the fruit of every F_1 hybrid has been acid, bitter, highly acid and inedible. In the various crosses of *Poncirus* and *C. grandis*, the latter appeared to be a good donor for relatively large fruit size and monoembryony. In the other *Citrus* species

crosses, their performance as donor sources was mixed or obscure. Fruit size was more variable but generally averaged smaller, and most hybrids were polyembryonic.

Because of time limitations, only a few comments will be made on advanced crosses derived from F_1 intergeneric hybrids. Details on these and other crosses, especially as they relate to breeding cold-hardy scion cultivars, may be found in Barrett (2). An F_1 hybrid of *C. paradisi* X *P. trifoliata* backcrossed to *C. sinensis* has produced several BC_1 selections that appear to be cold hardy and produce fruit closely resembling *C. sinensis* in fruit morphology, size, color, soluble solids, acidity, and flavor. Some of the same seedlings appear to be resistant to citrus tristeza virus also. The most complex cross now in the field is derived from three genera: *Citrus*, *Eremocitrus* and *Poncirus*, and from three species of *Citrus*: *grandis*, *paradisi* and *sinensis*. A few of these seedlings have given a negative reaction when challenged by citrus tristeza virus, but nothing is known of their fruit traits. We may reasonably expect that some unique recombinations of traits may appear in these and other complex intergeneric hybrids in the near future.

Literature Cited

1. Barrett, H. C., and A. M. Rhodes. 1976. A numerical taxonomic study of affinity relationships in cultivated *Citrus* and its close relatives. Syst. Bot. 1(2):105-136.
2. Barrett, H. C. 1981. Breeding cold-hardy citrus scion cultivars. Proc. Int. Soc. Citriculture 1:61-66.

ERRATUM

In paper by B. C. Strik in V39(1): p. 7 right hand column, line 20 should read: "However, in other cultivars, long days may be necessary for flower bud initiation (6)."