Salt accumulation by some new citrus hybrids

S.R. Sykes

CSIRO Division of Horticultural Research, Merbein, Vic., 3505.

While the maintenance of low leaf Cr concentrations does not necessarily guard against photosynthetic reduction in salt stressed citrus (1), high leaf C1 concentrations are associated with leaf burn, and also shoot dieback, and have been associated with yield reductions in the Murray Valley (2). Although salt excluding rootstocks can restrict Cl accumulation in leaves of a scion, they are not corn m only used since they do not possess other desired characters. Variation in salt exclusion in citrus is well documented and a breeding program based on Rangpur lime and Cleopatra mandarin as salt excluding parents (3) has resulted in new hybrids which restrict salt (C1 and Na⁺) accumulation in leaf tissues. Results presented here demonstrate this.

Methods

Techniques used for hybrid selection and subsequent testing under glasshouse conditions using either solution culture or irrigated sand culture have been described (3). The results presented here concern three hybrids from the cross Rangpur lime x Trifoliate orange. Hybrids 80-02-08 and -38 were selected as C1 excluders while hybrid 80-02-02 was selected as a C1 accumulator. There were two glasshouse experiments; the first compared own-rooted hybrids propagated from cuttings with seedlings of parent cultivars and the second investigated CI accumulation in Valencia orange scions grafted to the hybrids. Brief details of the experiments are given in the titles of tables 1 and 2.

Results and discussion

Concentrations of Na⁺ and CI in leaves were as follows:

Table 1. Mean (n = 6) leaf Na⁺ and CI concentrations (% D 14) of three hybrids and their parent cultivars grown in nutrient solution containing NaC1 (50m M) for 50 days. (LS D(P⁼0.05)for C1 = 0.47 and for Na⁺ = 0.31).

Genotype	Na ⁺	C1
Rangpur lime	0.46	0.32
Trifoliate orange	1.01	1.61
80-02-02	0.75	2.07
80-02-08	0.07	0.34
80-02-38	0.49	0.46

Mean (n=5) leaf C1 concentrations (% DW) of Valencia orange scion grafted to hree Rangpur lime x Trifoliate orange rootstocks grown in sand culture irrigated with nutrient solution with and without NaCl (50 m M) for 56 days. (LSD (P=0.05); rootstocks =).11, NaCl = 0.09, interaction = 0.16).

Rootstock	OmM NaCl	50 mM NaCl	mean (n = 15)
80-02-02	0.13	0.58	0.36
80-02-08	0.13	0.18	0.16
80-02-38	0.17	0.22	0.19
mean (n = 15)	0.14	0.33	877.517

Clearly hybrids 80-02-08 and -38 behave as salt excluders under glasshouse conditions. They are both efficient C1 excluders while 80-02-08 *is* superior in terms of restricting Na⁺ accumulation in leaves. The fact that hybrid 80-02-02 accumulated salt, supports the efficiency of the screening technique employed in the breeding program (3).

The breeding program aimed at developing new salt excluding citrus rootstocks has resulted in approximately 2,500 hybrids, the majority of which have been screened. Of these, 273 have been retained as C1 excluders and await further evaluation for other characters before any are released as new salt tolerant citrus rootstocks. Other desired characters include disease and pest resistance, polyembryony, scion compatibility and horticultural performance.

- 1. Walker, R.R., Torokfalvy, E. and Downton, W.J.S. 1982. Aust. J. Plant Physiol. 9 783-90.
- 2. Cole, P.J. 1983. Aust. Citrus News, November 10-11 1985.
- 3. Sykes, S.R. 1985. Aust. J. Agric. Res. 36 779-89.