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Preliminary Field Observations of Meadow Vole Preferences among Selected Apple Clones

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Damage by voles has continued to be a major cause of tree mortality American orchards despite nearly universal use of herbicides and rodenticic (1,7). To reduce damage done by voles in infested orchards, one valuabi tool could be use of a stock system that voles found highly unattractive. Having such stock systems in place would be particularly valuable during periods when the orchardist could neither bait nor spray for control.

A cooperative VPI/Cornell research project initiated in 1974 identifiec a few cultivars with relatively high levels of resistance to pine voles, as expressed in free-choice tests under laboratory conditions. This work also provided data suggesting that such resistances to pine vole were simply inherited in Malus(2,6).

Apple growers have long held that certain cultivars were attacked preferentially by meadow voles; 'Hibernal' and Malling 9 (M.9) have been reported to be especially severely attacked. We initiated the study reported here to determine whether Malus clones consistently rejected by pine voles in free-choice situations in the Winchester laboratory tests would be similarly rejected by meadow voles under orchard conditions at Geneva.

MATERIALS AND METHODS

In a heavily sodded apple orchard at Geneva in November, 1979, we established 25 active test sites by providing covers of sheet-metal roofing approx 1 m square (Fig. 1)(4). Populations at each test site varied from moderately active with a single nest and few runways to highly active with multiple nests, numerous runways, and 15 or more voles consistently observed.

Apple clones which had been tested for pine vole response at Winchester were offered to meadow voles in the Geneva orchard test sites. From 12-gauge wire, we constructed rings approx 50 cm diam. and to each ring affixed 12 spring-type clothespins (Fig. 2). Into each clothespin, we inserted a shoot 12 cm long and 6-8 mm diam, 12 clones per ring (Table 1). We usually used 8 replications, each colony serving as a replication. 'Golden Delicious' was included in each trial as a standard. After 24 and 48 hr, each shoot was examined for damage and rated 0-11 on the Barratt-Horsfall scale (5). These scalar data were transformed to appropriate % damage and then compared by analyses of variance and Duncan LSD.

RESULTS AND DISCUSSION

Meadow voles at Geneva exhibited preferences (Fig. 3) somewhat different from those of the pine voles at Winchester. Malus X sublobata PI 286613 was

least attacked in 2 of the 3 trials in which it was entered; this clone had also been avoided by pine voles at Winchester. 'Golden Delicious' and M.9, which were susceptible at Winchester, were very heavily attacked by our meadow voles. Robusta 5, rather resistant at Winchester, was heavily attacked at Geneva.

SUMMARY

Our preliminary free-choice tests indicate that the methods used are effective for field evaluations of Malus clones for attractiveness to meadow voles. Field preference of meadow voles appear to be rather similar to the preferences of pine voles as expressed in laboratory tests.

We are developing no-choice screening systems. To test the efficacy of using resistant stocks in the orchard, we have begun production of trees of spur-type 'Golden Delicious' on PI 286613, M. X micromalus and 'Golden Delicious'; these stocks will make up both root system and the lower 30 cm of trunk.

Important additional research would include field studies in several locations to determine whether there are major variations in responses of local vole populations to the various stocks offered.

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Table 1. Apple clones used in meadow vole testing at Geneva, winter 1980.

Code	Clone identification
BR	Malus brevipes: A crabapple from Asia, similar to M. floribunda.
B9	Budagovsky 9 ('Red-Leaved Paradise'): A Russian rootstock.
CR	'Cranberry Crab': A red-wooded flowering crab.
CRC	East Malling Crab C: A vigorous rootstock of unknown parentage.
GD	'Golden Delicious' (M. domestica)
MM	M. X micromalus: A crab derived from M. baccata X M. spectabilis.
MN	M. baccata mandshurica
M9	Malling 9: The most dwarfing rootstock in commerce; M. pumila.
OS	'Osman': From the cross M. baccata X M. domestica 'Beautiful Arcade'.
R5	M. X robusta Robusta 5 (M. baccata X M. prunifolia).
SB	M. sieboldii: A Japanese crab.
SPC	M. spectabilis: A Chinese flowering crab.
SS	'Sissipuk': Canadian-bred M. pumila niedzwetzkiana X M. baccata.
SUG	'Sugar Crab'
VI	M. yunnanensis 'Vilmorin': A crab from inland China.
63	M. X sublobata PI 286613 (M. prunifolia X M. sieboldii).

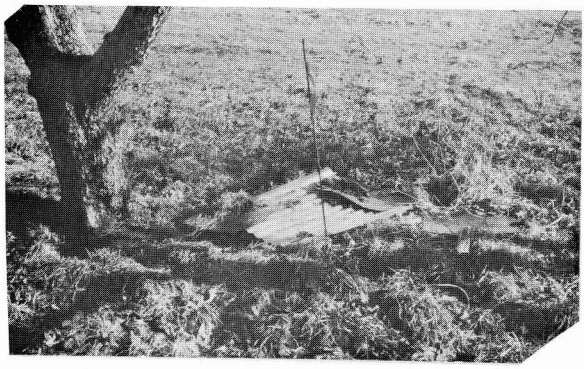

Fig. 1. Typical colony site with covering of tarpaper and sheet metal.

Fig. 2. Wire ring approximately 30 cm diameter with 12 spring-type clothespins, each holding 1 test shoot.

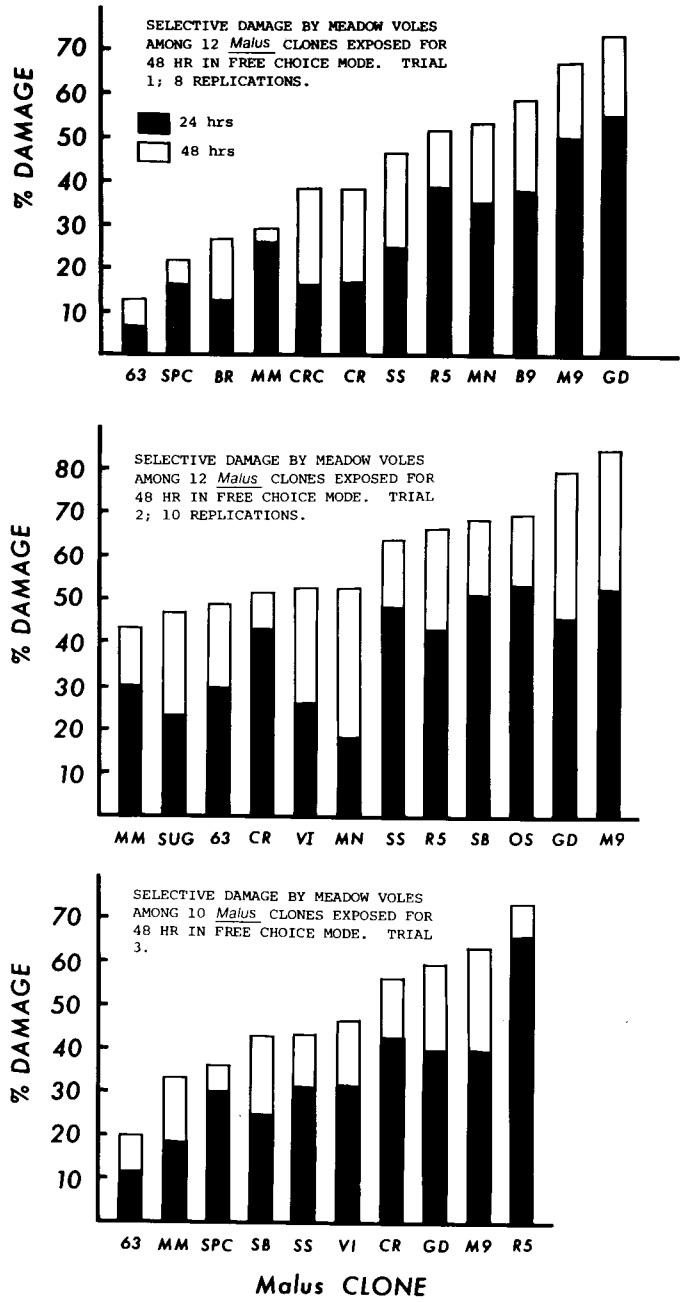

Fig. 3. Differences in damage by gnawing of meadow voles given free choice among 12 apple clones in 3 trials. Average damage after 24 and 48 hrs at 7 to 10 sites.