

# Novole, an Apple Stock Resistant to Voles and Other Environmental Hazards<sup>1</sup>

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The pine vole (*Microtus pinetorum* Leconte) and the meadow vole (*M. pennsylvanicus* Ord) have become extremely important economic hazards for apple growers in the eastern USA and Canada. For example, Sutton (16) found that the pine vole was the major cause of apple tree death in Henderson County, NC. Similar species are important in the western North America, in Europe and in Asia.

A number of cultural and chemical control methods are available to the orchardist that reduce vole damage (2). Herbicide strips strongly discourage the meadow vole and have some effect on ranging of pine voles. Gravel at tree bases and various forms of tree guards reduce accessibility, especially for meadow vole. Alternative forage sources, including specific forbs, have been proposed (12). Predation may be increased by encouraging activities of barn owls and other raptors (8). Endrin was an extremely effective control agent for both species until resistant strains developed and the chemical was banned. Thylate paints are effective repellents against meadow voles (13); however, in practice, repellents may wash off during the winter and are ineffective where tunnelling voles gnaw on trunk and roots below the soil surface. Zinc phosphide and anticoagulant poison baits remain as the most important chemical controls (3).

We are introducing Novole as a third type of tool for vole control— inherent host resistance. We expect there to be further introductions from

the Geneva apple rootstock breeding program (4, 6, 7, 17).

## Nature of Resistance

In free-choice tests over a 3-year period at Winchester, VA, and in Pennsylvania, pine voles trapped in Virginia chose other *Malus* clones in preference to Novole (4, 11, 17). Similarly, at Geneva, NY, and in Pennsylvania, meadow voles (New York and Virginia ecotypes) exhibited strong non-preference for Novole, compared to other clones (11, 14). Preliminary trials with hybrids of Novole crossed with vole-preferred stocks such as Malling 9 produced evidence that many, but not all, such hybrids were non-preferred. Novole has been tested against only 2 pine vole and 2 meadow vole populations. We cannot therefore rule out the possibility that other local vole populations may find Novole acceptable forage. The resistance of Novole was determined by comparisons with other *Malus* clones. We have no observations on the long-term response of voles to older tissue of Novole in an orchard situation. In preliminary no-choice feeding trials, meadow voles under hunger stress did gnaw Novole shoots, indicating that the non-preference does not connote absolute rejection (Pearson & Cummins, unpublished).

## Origin

An open-pollinated seedling of *Malus prunifolia* (Willd.) Borkh., Novole fits closely the type description of *M. X sublobata* (Zab.) Rehd., the hybrid of *M. prunifolia* with *M. sieboldii* (Reg.) Rehd. (15). In 1963, seeds of

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*M. prunifolia* were sent from Morioka Research Station in Japan to the United States Department of Agriculture Plant Introduction Station in Glenn Dale, Maryland. Eleven seedlings survived; scion sticks of one of these were sent to Geneva and were grafted onto domestic apple seedlings in 1968 as PI 286613.

### Testing Against Other Hazards

We have tested the clone now named Novole for reaction with a number of other environmental hazards; it has been used extensively in the Geneva apple rootstock breeding program (5, 6, 10).

Novole is resistant to crown rot, incited by *Phytophthora cactorum* (Leb. & Cohn) Schroet. Novole is resistant to most strains of *Erwinia amylovora* (Burr.) Winslow, et al. (fire blight), and transmits a high level of resistance to about 10% of its seedlings (1, 9, 10). In the nursery, Novole has not usually been attacked by woolly apple aphids (*Eriosoma lanigerum* Hausm.); however, once initiated, a woolly apple aphid colony will flourish. Novole is resistant to *Venturia inaequalis* (Cke.) Wint. (apple scab). In the field it appears to be moderately resistant to powdery mildew, *Podosphaera leucotricha* (Ell. & Ev.) Salm.

Novole is highly sensitive to apple stem pitting virus and/or apple stem grooving virus (M. Welsh and J. N. Cummins, unpublished data). We have not been able to infect Novole with tomato ringspot virus by bud inoculation (Cummins & Gonsalves, unpublished).

Greenwood cuttings and leaf-bud cuttings of Novole root very readily under intermittent mist, and the rooted cuttings establish well in the field. In the stoolbed, Novole produces an abundance of shoots from axillary buds and latent buds but relatively few adventitious shoots. Shoots root well, producing a fibrous root system.

Stoolshoots are free of spines. We have never observed burrknots or their precursors in this clone.

When Novole is used as a rootstock under McIntosh and Northern Spy (*Malus domestica* Borkh.), 8- or 9-year-old trees are slightly larger than those on domestic seedlings, are well anchored, have few suckers, and are productive.

In laboratory tests, Novole appears to be somewhat less tolerant of low winter temperatures than is Malling 26 (P. Forsline and J. N. Cummins, unpublished).

### Availability

Novole has been assigned to Cornell Research Foundation, which has applied for a plant patent. Non-exclusive licensing arrangements with responsible nurseries will be made in 1983. Virus-free plant material will be available to licensees through Cornell Research Foundation. No plant material is available from the authors.

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## The Stearns Apple

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It rarely happens that a great American fruit variety virtually fails to be recorded and is not given substantial recognition in the American literature of pomology. But such has been the case with Stearns,<sup>2</sup> an apple variety first offered for sale in 1910 which still remains, in my opinion, one of the highest quality of any of my acquaintance. And except possibly for Spigold (Red Spy x Golden Delicious), a recent introduction of the New York Agricultural Experiment Station at Geneva, it may be the finest quality of all very large apples.

Scionwood of Stearns was sent to me in the Spring of 1955 by Ira Glackens of Center Conway, New Hampshire, then Chairman, Fruit Gardens Committee, American Pomological So-

ciety. It was among some dozen or so other varieties which he recommended for the beginning of a collection of high quality apples. I quote his comments:

"Scions from Forest Colby, an orchardist at Enfield, N.H., who had 170 varieties. Mr. Colby sent me the grafts unrequested (never heard of the apple) in a lot of other sorts and said of it: 'Size and season of Twenty Ounce. The largest apple that has quality.'"

My graft bore one magnificent huge apple in the Fall of 1957 which I picked on September 8 luckily at a stage of perfect ripeness. It was beautifully striped and splashed with dark and light red over an aquatint-like, light yellow ground with white dots on the sunny side. My notes say, "first quality—sweet rich delicate flavor—a deli-

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<sup>2</sup>The author has mentioned Stearns in articles on his favorite varieties. See *Fruit Varieties & Hort. Digest* 9 (1960); 19 *F. V. & H. Digest* 49, 63 (1965); 15 *Pomona* 14 (1982).

The variety has been described and pictured in the Southmeadow Fruit Gardens' catalog. Also, as grown at the National Fruit Trials in England, it is described in that monumental work by Muriel Smith, *The National Apple Register of the United Kingdom* (London, 1971), p. 547.