standard controlled atmosphere (SCA: 4.5% CO_2 & 2.5% O_2) and in 1991 they were stored for 4 and 8 months at 0°C in air, SCA and low-oxygen controlled atmosphere (LO: 1.5% CO_2 & 1.5% O_2). 'Moira,' 'Prima' and 'Priscilla' had very limited storage life (< 2 months), due mainly to the development of storage disorders and rots. 'Novamac,' 'Nova Easygro' and 'Macfree' were essentially at the end of their storage life after 4 months, as firmness in 'Novamac' decreased substantially and 'Nova Easygro' and 'Macfree' began to develop core browning and scald. 'Novaspy' stored very well and was the only cultivar to maintain its quality after long-term storage (8 months). Among the cultivars that have been evaluated for only one year, only 'Sir Prize' had no problem with storage disorders after long-term storage. Both 'Trent' and 'Liberty' developed some core browning after long-term storage, and 'Liberty' developed vascular breakdown in SCA and LO storage. In summary, 'Moira,' 'Prima' and 'Priscilla' do not store very well, 'Novamac,' 'Nova Easygro,' 'Macfree,' 'Trent' and 'Liberty' may be acceptable for mid-term storage, and 'Novaspy' and 'Sir Prize' are recommended for long-term storage.

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Early-Season Diseases Occurring on Scab-Resistant Apple Cultivars and Advanced Selections Grown in Southeastern New York State

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Introduction

Scab-resistant apple cultivars (SRCs) and scab-resistant advanced selections (SRASs) developed at the Geneva Experiment Station, Geneva, NY are also screened for resistance to powdery mildew, fire blight, and cedar apple rust. Several SRC/SRASs were further evaluated in the Hudson Valley in southeastern NY to determine the feasibility of growing SRCs with no fungicide treatments.

Methods

Four SRC/SRASs propagated on MM.111 rootstocks with M.9 interstems were planted at the research station in Highland in 1989. Four additional SRC/SRASs propagated on 'Mark' rootstocks were planted at each of two nearby sites in 1990. None of the trees received fungicide sprays. Development of leaf spot, powdery mildew, and other diseases was monitored at all sites during the 1992 growing season. Incidence of leaf spot was determined by counting the numbers of spots per leaf for all leaves on 25 terminal shoots in each of four replicates. Incidence of powdery mildew was determined by observing the eight youngest terminal leaves on each of 25 terminal shoots.

Results

The SRC/SRASs did not develop typical yellow cedar apple rust lesions, but they all developed severe leaf spotting when exposed to high levels of cedar apple rust inoculum, as in the Hudson Valley Lab orchard (Fig. 1) and Orchard B (Fig. 2). Cedar trees were growing adjacent to both of these orchards but were not found within several hundred meters of Orchard A. Yellow or orange pycnia

Cornell's Hudson Valley Lab, P.O. Box 727, Highland, NY 12528.

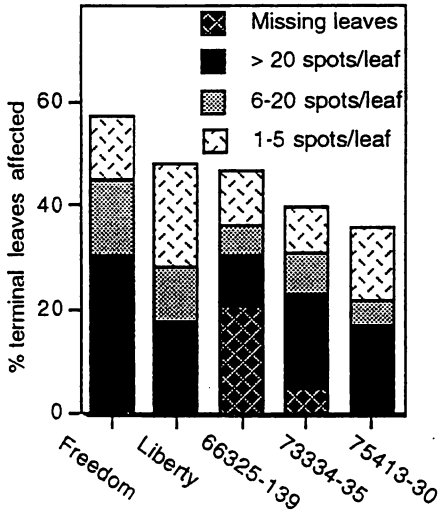

Figure 1. Incidence and severity of rust-induced leaf spot in 1992 on five SRC/SRACs grown at the Hudson Valley Lab.

were visible at the center of many developing leaf spots during June. Older leaf spots were indistinguishable from "frog-eye leaf spot" caused by *Botryo-sphaeria obtusa*. Most of the leaf spotting was apparently induced by infections of the cedar apple rust fungus, *Gymnosporangium juniperi-virginianae*. Although normal rust lesions failed to develop on any of the SRC/SRASs, germinating rust spores damaged or killed leaf cells before host resistance arrested development of the rust fungus. The rust-induced injuries on the leaves provided entry sites for other leaf-spotting fungi including *Alternaria* species, *Phomopsis mali, Botryosphaeria obtusa,* and *Botryosphaeria dothidea*. 'NY 66325-139' was especially sensitive to rust-induced leaf spot and lost more than 20% of its terminal leaves by 1 July 1992 (Fig. 1). Necrosis from leaf spots on 'NY 66325-139' expanded in irregular patterns to form spots > 1-cm in diameter.

Powdery mildew was more severe in Orchard A where mildew-susceptible cultivars were planted adjacent to

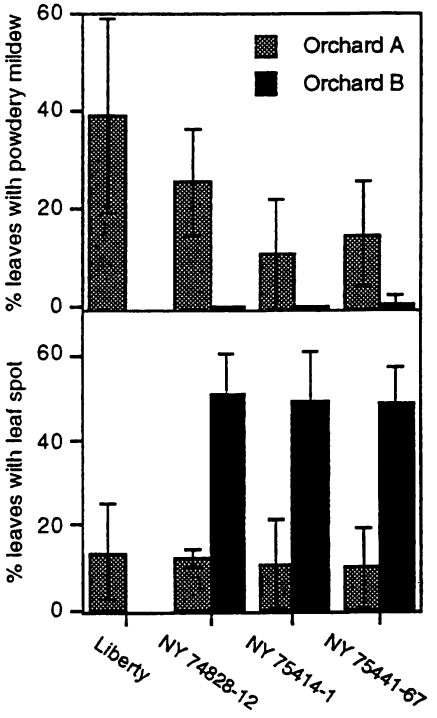

Figure 2. Incidence of powdery mildew and leaf spot on four SRC/SRACs in 1992. 'Liberty' was not included in Orchard B.

the SRC/SRASs than in Orchard B where the planting was isolated from other apple plantings (Fig. 2). Quince rust was observed on a few fruits of 'Liberty,' 'NY 75413-35.' However, incidence of quince rust has been low (< 1%) even in years when quince rust occurred on more than 12% of unsprayed 'Delicious' fruit in a nearby planting.

Conclusions

The SRC/SRASs evaluated were not immune to cedar apple rust or powdery mildew. Severity of these diseases on SRC/SRASs is affected by proximity to sources of inoculum. Rust-induced leaf spotting can cause significant damage to leaves of rust-resistant SRCs in areas where rust inoculum is abundant.