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The Northeast SARE (LISA) Apple Production Project

Developing sustainable apple production systems based on the use of scab-resistant apple cultivars (SRCs) and IPM techniques is a key objective of this multi-disciplinary project involving 19 principal investigators across the 5 cooperating institutions. Cultivar selection is a crucial decision for an apple grower which will impact the farm's competitiveness and profitability for many years. Factors that growers consider when deciding what cultivars to plant include consumer acceptance and marketability; winter hardiness; yield potential; fruit storage qualities, color, taste, and size; and potential pest management problems. These factors are being researched in this Project. Also, scab-resistant orchards will undoubtly present new economic considerations to growers, wholesalers, and processors. A further objective of this Project is to provide economic analyses of alternative techniques and to forecast the impact of changes in production systems on the Northeast apple industry. In addition, apple growers must have access to research-generated information that addresses the critical issues facing them. Rapid information dissemination is a high priority of this project. The Northeast Sustainable Apple Production Newsletter has over 1200 active subscribers across the United States and in 7 foreign countries including Canada, Australia, Israel, Chile, Argentina, South Africa and India. The Management Guide for Low-Input Sustainable Apple Production has been well received and continues to be requested world-wide.

Cornell University, Rodale Institute, Rutgers University, University of Massachusetts, and the University of Vermont.

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Using Disease-Resistant Apple Cultivars to Reduce Fungicide Applications for Disease Control

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Most disease-resistant apple cultivars (DRAC) are resistant to apple scab; some are resistant to other diseases. However, many of these cultivars are susceptible to other diseases including cedar apple rust, powdery mildew, fireblight, fly speck, and sooty blotch. The objective of this research was to determine to what extent DRAC could be used to reduce fungicide applications for disease control. During 1983, a replicated planting of standard cultivars and DRAC was established at the Univ. of Missouri's Horticulture Research Center in New Franklin, MO. Standard varieties included: 'Jonathan,' 'Red Delicious,' and 'Golden Delicious'; DRAC included: 'Prima,' 'Priscilla,' 'Sir Prize,' 'Redfree,' 'Jonafree,' 'Dayton,' 'Williams Pride,' 'Liberty,' and four numbered selections from the Purdue-Rutgers-Illinois breeding program. Fungicide applications for control of diseases were reduced

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by an average of 64% using the DRAC 'Liberty,' 'Priscilla,' and 'Redfree,' compared to the standard varieties 'Jonathan,' 'Red Delicious,' and 'Golden Delicious' during a two-year test period from 1987-1988. An average 45% reduction in fungicide applications also was obtained during the same period on the scab-immune variety 'Prima' which is very susceptible to cedar-apple rust. DRAC offer fruit growers an opportunity to reduce production costs while protecting the environment.

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Non-Target Effect of a Fungicide Spray Program on Phytophagous and Predacious Mite Populations in a Scab Resistant Apple Orchard

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Scab resistant cultivars can reduce the need for fungicides in apple production. However, management of powdery mildew, cedar apple rust and frog-eye leaf spot may require limited fungicide use. Since fungicides can have mite suppressive activity, it is important to determine the impact this reduction would have on mite populations. This study, conducted during 1988 and 1989, investigated the impact of a fungicide spray program (6 applications of benomyl and mancozeb versus no fungicide application) on phytophagous and predacious mite populations in a Vermont apple orchard. Levels of mite infestation were determined on 4 scab resistant cultivars and 2 scab susceptible cultivars by counting motile phytophagous and predacious mites on leaf samples collected on 16 dates in each growing season. Data were evaluated separately for each cultivar, on each assessment date and over time, using an analysis of variance with a completely randomized design. Within each cultivar there were 3-5 single tree replicates per treatment. The impact of the fungicide spray program on predacious mite populations were clearly evident in both years. Approximately four weeks after the last fungicide application, significantly higher predacious mite populations were detected on non-treated trees. Out of the 56 samples for all cultivars in which there was a significant difference in predacious mites, on 54 of those incidences (96.4%), the mean number of predacious mites was significantly higher on non-fungicide treated trees. In 1988, few significant differences in phytophagous mite populations within cultivars were detected. However, incidences where there were significant differences in phytophagous mite populations increased in 1989; in the majority of the incidences, populations were significantly higher on fungicide treated trees. This study shows that a fungicide spray program consisting of 6 applications can impact the mite populations on apple trees and documents the potential benefit of eliminating fungicide applications.

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