

CARROTS FOR MICHIGAN'S FUTURE

Developing Expanded Markets and New Pest Management Approaches

Project GREEN #: GR00-056

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Abstract

The carrot industry in Michigan is at a critical juncture for two reasons:

1. The sale of salvage carrots as deer bait was reduced by 50% as a result of baiting restrictions adopted by the Natural Resources Commission in an effort to eliminate Bovine tuberculosis from the wildlife herd
2. Products currently relied upon for pest management in carrot production face an uncertain future as a result of the Food Quality Protection Act (FQPA) and processor restrictions.

Objectives of this research are to:

1. Expand and/or develop additional markets for Michigan carrots
2. Develop a pest management transition strategy.

Analysis of marketing data showed that the quantity and value of imported carrots is greatest during the winter months to meet demands for holiday and football parties. Two focus groups in October, one of children and one of adults, preferred baby carrots over other carrot products and fresh carrots over processed ones. Greenhouse herbicide research showed oxyflurofen, prometryn and flumioxazin (post-emergence) may be viable alternatives to the standard linuron. Further evaluation of 2000 field research showed that susceptibility of cultivars to aster yellows and cultivar preferences of the aster leafhopper are both factors in determining aster yellows' resistance in carrot cultivars. A Carrot Research Advisory Committee made up of growers, packers and processors was formed to guide research objectives. Quadris on carrots was registered as Section 18 for use in Michigan in 2000 and as a full label for 2001. This research will ensure the economic stability and prompt future growth of the Michigan carrot industry through the development of new and expanded markets, value-added products and novel pest management and production systems that minimize pesticide use and utilize reduced risk pesticides.

Objectives

1. Expand and/or develop additional markets for Michigan carrots.

- Assess current markets.
- Develop alternative uses and value-added products.

2. Develop a pest management transition strategy.

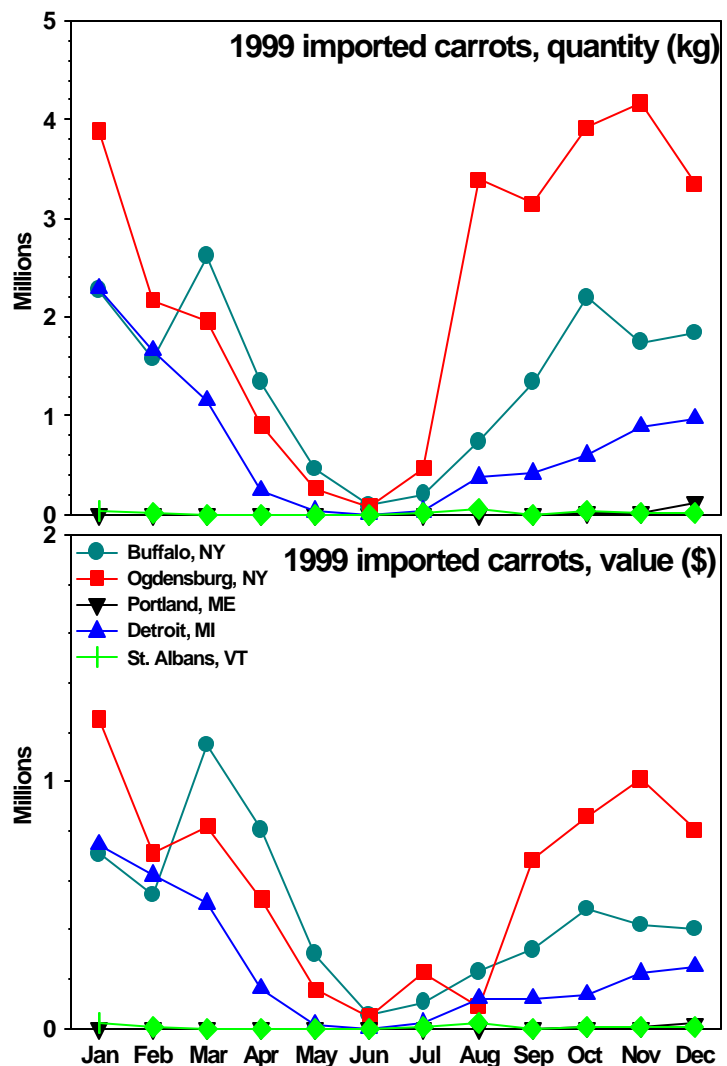
- Test alternatives for currently registered pesticides at risk with emphasis on reduced risk products or “soft” pesticides.
- Develop forecasting and pest monitoring systems to time sprays.
- Use precision application and technology to decrease amount of active ingredient and/or increase application interval.
- Screen varieties for disease, insect and nematode resistance.

Results

1a) Data on imported carrots were analyzed for quantity and value. The quantity and value of imported carrots is greatest during the winter months to meet demands for holiday (Christmas) and football (Superbowl) parties. The least is during June. Data showed that carrot supply has been fairly consistent throughout the years that were analyzed.

1b) Two focus group sessions of 12 children (8-10 years old) and 10 adults (18-65 years old) on carrot consumption habits were conducted by MORPACE International, Inc., on October 26, 2000. Participants in the focus groups preferred baby carrots because children like their smaller size and adults like their convenience. Both groups preferred fresh over processed carrots. Parents expressed a need to “hide” vegetables to get children to eat them.

2a) Three greenhouse weed control screening projects were conducted during Fall and Winter 2000



to discover herbicides and the rates to which carrots are tolerant. Herbicides were applied at various rates to carrots pre-emergence and post-emergence. The standard carrot herbicide, linuron, is safe on carrots both pre-emergence and post-emergence. Carrots have some tolerance for flumioxazin post-emergence, but it may be too toxic for pre-emergence use. Oxyflurofen and prometryn also were relatively safe on the carrots. Screening work will continue during 2001.

- 2d)** Carrots in a 26-variety trial in Oceana County, Michigan were monitored for presence of aster leafhoppers during the 2000 growing season. Numbers of leafhoppers was low (<10) most weeks except for 7/6 and 7/13 when carrot varieties at treatment threshold was influenced by both presumed leafhopper infectivity and presumed cultivar resistance. Carrots were harvested on 10/13 and rated for aster yellows symptoms in the roots and in the foliage. In many cases, roots showing symptoms were similar to foliage showing symptoms; in other cases it was different. Some varieties highly preferred by the leafhoppers were also those with diseased roots at harvest. This indicates that carrot varieties differ in susceptibility to aster yellows and to aster leafhopper preference and tests that assess aster yellows susceptibility of different carrot cultivars must take both into account.

Discussion

- 1a)** Based on data for carrots imported into the Northeastern United States for 1999, a considerable portion of the demand for fresh products is being met by Canadian imports. Michigan growers currently struggling to compete in this fresh carrot market will need to create new value-added products. Extracts from carrots can be used to enhance the nutritional content of foods that are primarily dark yellow, orange and red, hence the color of the original product will not change and deter consumers from purchasing them.
- 1b)** Adding carrots to tomato sauce (for use in pizza and spaghetti, for example) may be feasible.
- 2a)** Value-added carrot products, such as orange juice, pizza sauce and spaghetti sauce boosted with natural beta-carotene, were of interest to consumers who participated in focus group sessions. Parents are concerned about their children's nutritional needs and prefer natural sources of vitamins and minerals over synthetic. Products that are child-oriented and those which children consume vast quantities of can be marketed to both children and adults and potentially increase sales of such products.
- 2d)** Current tests to assess the proportion of infective leafhoppers are slow and expensive. Both accurate assessment of cultivar susceptibility (taking into account susceptibility of the cultivar and leafhopper preference) and an accurate measurement of leafhopper infectivity is crucial to determine accurate treatment thresholds for control of aster yellows.

Impacts

- A carrot Research Advisory Committee made up of growers, packers and processors was formed

to guide research objectives.

- During the 2000 growing season, five plant pathology research plots were established with grower cooperators investigating 70 treatments.
- Two separate carrot marketing focus groups were conducted with children (ages 8-10) and their parents and adults (ages 18-65) where food source, snacking and nutrition were discussed.
- Quadris on carrots was registered as Section 18 for use in Michigan in 2000 and as a full label for 2001. Quadris (reduced risk fungicide) used as a replacement for Rovral (B2 carcinogen), will result in fungicide cost savings of \$96.08 per acre (eight applications). Residues in carrots and carrot products are reduced, which are important in maintaining certain processor contracts which are worth \$2,636,000 to the industry.
- The Proptec sprayer was built, tested and demonstrated to growers, extension personnel and the EPA for carrots. It was also used experimentally in Christmas trees, potatoes, asparagus and ornamentals.
- When used with the Proptec sprayer, Kocide (copper) was an effective and inexpensive fungicide.
- The Tom-Cast disease forecaster (15 DSV, four applications) successfully reduced the number of fungicide sprays required for disease control compared to the standard fungicide Bravo was applied every seven days (eight applications) for a savings of \$49.48 per acre.
- Trials were conducted with new, not yet registered, fungicides and herbicides.
- A trial in a grower's field demonstrated that carrot varieties differ in susceptibility to aster yellows and to aster leafhoppers.
- A trial in a grower's field demonstrated that carrot varieties currently grown and favored by the industry are moderately resistant to leaf blights and aster yellows.
- Four extension field programs involving a total of 155 people were conducted that highlighted research efforts.

Extension Activities

"Carrot research update," presented by M.K. Hausbeck, Statewide Carrot Meeting, Comstock Park, MI, 2001.

"Carrot disease trials and other related topics," presented by M.K. Hausbeck; *"Consumer uses and perceptions of fresh carrots: Two focus group session results,"* developed by B. Behe and presented by J. Breinling; *"Weed control in carrots on sand and muck,"* presented by B. Zandstra; Great Lakes Vegetable Growers Convention, Grand Rapids, MI, 2001.

"Weed control in carrots," presented by B. Zandstra, MI Carrot Research Committee; East Lansing, MI, 2000.

"Weed control research in carrot," presented by B. Zandstra, International Carrot Conference; Pasco, WA, 2000.

"Proptec sprayer for postemergence weed control in carrot," presented by B. Zandstra, MSU Muck Farm Field Day, Laingsburg, MI, 2000.

"Using forecasting in carrot disease management," presented by M. Hausbeck; *"Monitoring for leafhoppers and variety resistance,"* presented by B. Bishop; *"Weed control in carrots grown on sand,"* presented by B. Zandstra; Oceana Vegetable Day, Hart, MI, 2000.

Anticipated End Date of Project

It is anticipated that this project will be completed in two years.

Funding Partnerships

The following organizations are funding partners in this project:

- < Carrot Research Committee, Managing Disease in Carrots (M. Hausbeck), \$4,500
- < USDA PMAP, Reducing Use of B2 Carcinogens in Carrots (M. Hausbeck), \$39,498
- < USDA RAMP, A Partnership Among U.S. Carrot Stakeholders to Develop and Implement IPM that includes cooperators from MSU, WI, NY and NJ, at \$1,254,061 for 3 years.