Trials To Demonstrate The Production Of Non-Traditional Crops (Vegetables, Herbs, Grains And Fruits)

Norfolk SCIA Major Grant Project

Purpose:

There were three main purposes of this project:

1. To demonstrate the wide range of non-traditional crops that can be grown in Ontario, and give growers options to diversify cropping systems
2. To identify and demonstrate the agronomic challenges of growing non-traditional crops, including nutrient and pest management
3. To raise awareness of the challenges and opportunities for marketing non-traditional crops in Ontario

Methods:

Non-Traditional Crop Demonstrations

A plot consisting of 36 Non-traditional crops was established at the Simcoe Research Station in spring 2009. There was an average of two cultivars per crop. Two crops, sea buckthorn and Russian dandelion, were not seeded in the field but grown in pots. The 36 crops were:

kohlrabi	fenugreek	goji
leaf/heading mustards	skullcap	Russian dandelion
tahtsai	edamame	sea buckthorn
Oriental radish	specialty hot peppers	chia
cilantro/coriander	Asian eggplants	mousemelon
perilla	tomatillo	Oriental cucumber
Oriental lettuce	specialty basils	hairy gourd
celtuce	calendula	bottle gourd
amaranth	edible chrysanthemum	luffa
artichoke	yard long bean	winter gourd
coloured carrots	lovage	bitter melon
gobo	Rainbow Swiss chard	Brilliant melon

Crops were grown according to standard practices in other regions, or requirements for related crops in Ontario. Thirty-three crops were monitored on a regular basis for pests, stage of maturity, and agronomic issues. The three crops that were not monitored for pests were either grown in pots and only brought to the field for the demonstration day (sea buckthorn and Russian dandelion) or did not germinate (perilla). Registered pest control products were applied to control downy mildew and Alternaria on cucurbits, and were also applied to several other crops with severe disease or insect pressures.

On-Farm Research Demonstration Trials:

Nitrogen trials were conducted on kohlrabi and Brilliant melon to demonstrate how to conduct an on-farm research trial. On-farm trials would be necessary for many of these crops because specific Ontario recommendations for agronomic practices such as fertilization do not exist. There is a nitrogen recommendation for kohlrabi in Ontario, but

the cultivar ‘Kossak’ that was planted in these trials is grown to a much larger size and would require higher nitrogen application rates as a result.

Kohlrabi Nitrogen Trial
‘Kossak’ kohlrabi was seeded in the greenhouse in 128-cell plastic trays on 21 May 2009. Before transplanting into the fields, a soil sample was collected from each block and sent to A&L Canada Laboratories Inc., for full nutritional analysis. The kohlrabi was transplanted to the field on 12 June in rows spaced 50 cm apart, with an in-row spacing of 30 cm. There were four rows per plot, each 5 m in length. Treatments consisted of 0, 100, 200, and 300 kg/ha nitrogen applied as ammonium nitrate, with 65% preplant incorporated and 35% applied as a sidedress four weeks after transplanting. The trial was arranged in a randomized complete block design with four replications. Phosphorus and potassium were applied based on soil tests. The plots were monitored on a regular basis for pests and pesticides were applied according to standard grower practice for Brassica crops. On 19 Aug. the middle 3 m of the inside two rows of each plot were harvested, weighed, and assessed for marketability. Tissue and soil samples were collected at harvest and sent for full nutrient analysis. The results of these analyses are pending.

Brilliant Melon Nitrogen Trial
‘Brilliant’ melon was direct seeded in the field on 15 June 2009 in rows spaced 1.5 m apart, with an in-row spacing of 50 cm. Prior to seeding, a soil sample was collected from each block and sent to A&L Canada Laboratories Inc., for full nutritional analysis. There were three rows per plot, each 5 m in length. Treatments consisted of 0, 75, 150, and 300 kg/ha nitrogen applied as ammonium nitrate, with 60% preplant incorporated and 40% applied as a sidedress four weeks after transplanting. The trial was arranged in a randomized complete block design with four replications. Phosphorus and potassium were applied based on soil tests. The plots were monitored on a regular basis for pests and pesticides were applied according to standard grower practice for melon crops. Melons were harvested on 17 and 30 Sept. from a 12 m^2 area in the middle of each plot. Many melons did not reach full ripeness due the cool conditions in 2009, but this did not impact yield results because they did reach full size. Fruit were weighed and assessed for marketability. Tissue and soil samples were collected at harvest for full nutrient analysis. The results of these analyses are pending.

Alternative Crop and Vegetable Open House

An Open House was held at the Simcoe Research Station in the afternoon of August 18, 2009 to demonstrate to growers the challenges and opportunities in non-traditional crops. The Open House was combined with a demonstration of nutrient management for specialty crops organized by Dr. Alan McKeown of the University of Guelph as part of an OSCIA Nutrient Management Demonstration Grant. The day was advertised in a wide range of newsletters, trade magazines, crop reports and radio broadcasts.

Presentations were given by OMAFRA and University of Guelph staff introducing on-farm research, pest management, sprayer technology, and fertility requirements for non-traditional crops. A refreshment break sponsored by Agrium Inc. and A&L Canada Laboratories Inc. included many non-traditional crop snacks such as dried goji, kohlrabi, specialty melon, coloured carrots, and oriental cucumber. A self-guided tour of the plots

allowed participants to learn more about the individual crops. Local and Provincial media were in attendance and several positive articles have appeared since the event.

Results:

Non-Traditional Crops Demonstration Plots:

Pests were the biggest production challenge in these plots, with 30 of 33 monitored crops having some form of insect or disease damage. Thirty eight different insect and disease pests were observed, many of which attacked multiple crops. Twenty of these pests significantly impacted quality or yield. Some examples of severe pest issues were downy mildew and Alternaria on cucurbits, leafhoppers on yard long beans and fenugreek, flea beetles on Brassicas, Verticillium on eggplant, millipedes on radish, and Japanese beetles on basil.

Main lessons learned from these demonstration plots:

1. While pests are often not a major issue for new crops, pests can be severe even in the first year of production and the crop should be continually monitored.
2. Many long-season tropical and sub-tropical crops may not mature in cool summers in Ontario. Season extension techniques such as mulches or row covers should be used for these crops.
3. Not all crops can be grown in Ontario. For example, chia (salvia grain) grew well in the plots but did not flower the entire growing season. Chia is a short-day crop adapted to growing in a sub-tropical region over the winter and it is not possible to provide the conditions necessary to flower in Ontario.
4. It is a good idea to experiment with a crop before growing it on a large scale. Of the 34 crops seeded or transplanted into the field, 18 of the crops would have been grown differently if we had to grow them again. Had these been grown on a large scale, there would have been either no yields or poor yields.

The information gathered from observations of these demonstration plots were used to compile profiles for each of the crops. The profiles include other common names for the crop, uses for the crop, traditional markets, related crops, agronomic requirements, and pest issues. These profiles were provided in a booklet handed out at the Demonstration Day held in August. The profiles were amended with photos after the Demonstration Day and sent to interested participants in CD format. These profiles will eventually be posted on the OMAFRA website as part of a virtual tour of non-traditional crops.

On-Farm Research Demonstration Trials:

Kohlrabi Nitrogen Trial

The effect of nitrogen on the yield of kohlrabi is shown in Figure 1. Overall, increases in the rate of applied nitrogen corresponded positively to the overall yield of kohlrabi. The number of marketable heads also increased with increasing nitrogen (Figure 2). The results suggest that the ‘Kossak’ variety of kohlrabi requires a higher nitrogen rate for optimal yield and quality than the Ontario recommended rate of 110 kg/ha. This trial demonstrates that non-traditional varieties do not necessarily have the same nitrogen requirements as traditional varieties.

Brilliant Melon Nitrogen Trial
The effect of nitrogen on the yield of Brilliant melon is shown in Figure 3. Overall, increases in the rate of applied nitrogen corresponded positively to the overall yield of Brilliant melon, but the increase was minimal and variable above 75 kg/ha. The number of marketable heads showed a similar response to nitrogen (Figure 4). The results suggest that the Ontario recommended nitrogen rate of 110 kg/ha for cucurbits may be sufficient for optimal yield of Brilliant melon.

Figure 1.

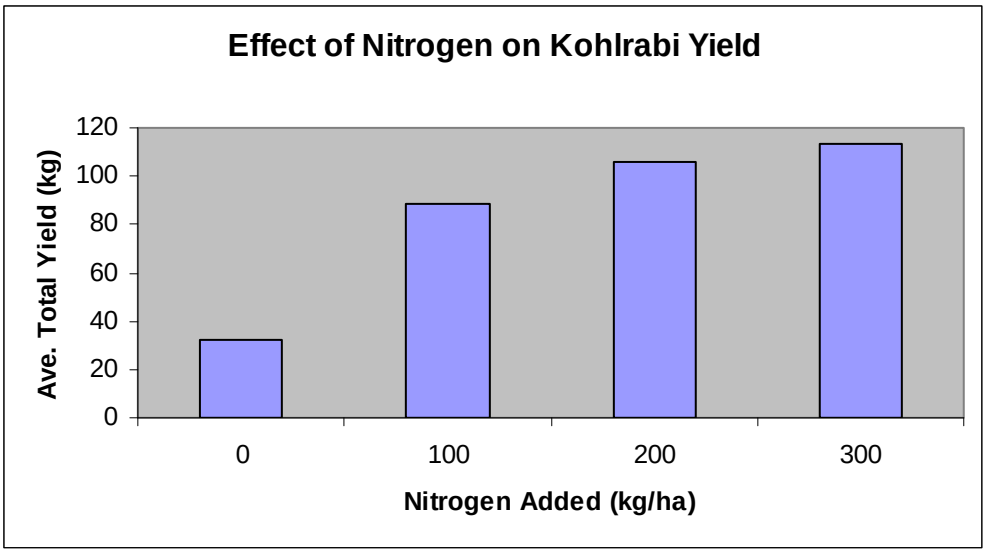
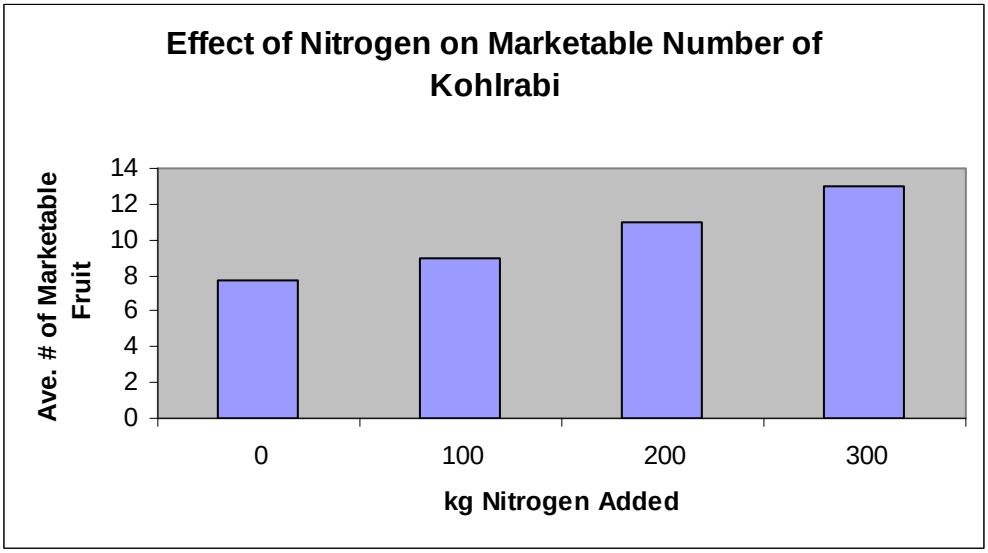


Figure 2



These nitrogen trials were intended to demonstrate the need for on-farm trials on non-traditional crops to perfect agronomic techniques. Although Ontario nitrogen recommendations exist for both kohlrabi and melon, it was unknown whether the recommendations would apply to non-traditional varieties of these crops. The trials

suggest that the current recommendation for kohlrabi is too low for the 'Kossak' variety, but the recommendation for cucurbits may be sufficient for 'Brilliant' melon. The trials confirm that in-field verification of nitrogen requirements and other agronomic practices is required before a grower grows any non-traditional crop on a large scale.

Figure 3

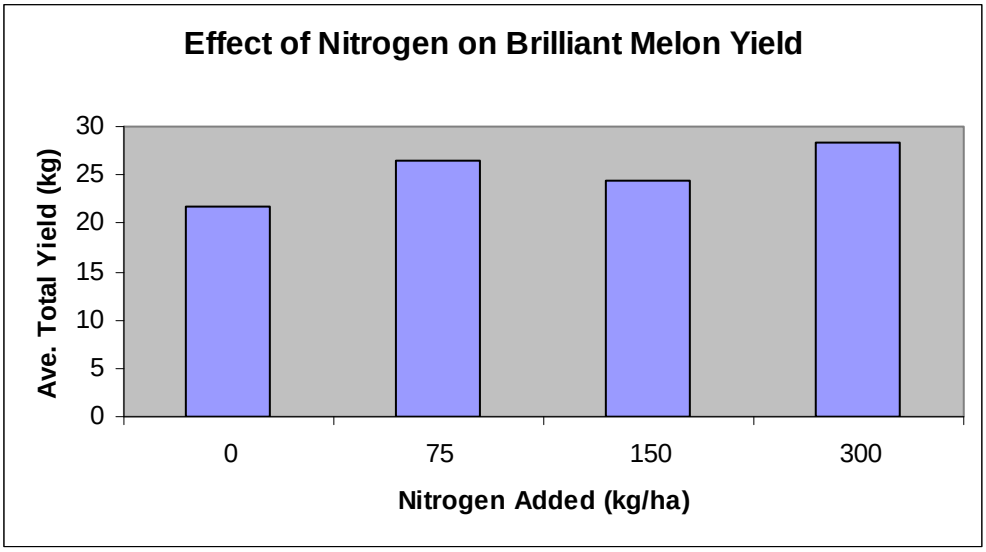
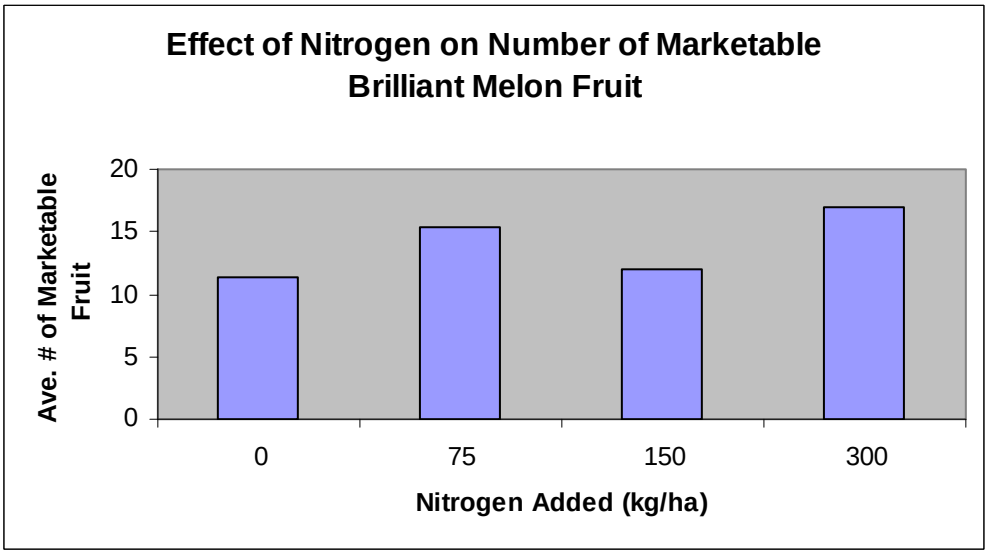


Figure 4



Alternative Crop and Vegetable Open House **(**August 18, 2009)
There were over 100 registered participants in the Open House representing a cross-section of the agriculture industry including growers, consultants, research, government, students, and agricultural suppliers. All talks given by OMAFRA and University of Guelph personnel were well attended.

An evaluation form was given to each participant. A total of 18 evaluations were returned at the end of the Alternative Crop and Vegetable Open House. Of the evaluations that

were returned, 75% were from producers or consultants. Participants were very pleased with information relating to fertility, specialty crops, soil management and cover crops. A few would have preferred more in-depth information on each of the specialty crops and their pest management options. A more in-depth summary of the crops and their pests was included in a booklet provided at the Open House and amended with additional information for a CD sent to interested participants. 83% of the respondents enjoyed the format of the field day.

Information gaps that were noted and should be addressed in the future include: Marketing information for alternative crops, supply chain/value-added chain, storage/post-harvest handling/shelf life, and yields/cost of production information. Suggestions to have producers who currently grow alternative crops discuss their experiences were also given.

Overall the comments submitted were very positive and helpful for the organizing committee. Requests for a similar day in the future were received on the evaluation forms.

Summary:

This project successfully met its objectives of educating growers on various aspects of non-traditional crop production and on-farm research trials. The project also highlighted the challenges of marketing these crops. In addition, the crop profile information sheets will be a useful resource for farmers in Ontario. Finally, this project laid the groundwork for future research and demonstrations of non-traditional crop production and marketing.

Next Steps:

We are currently editing the crop profiles to a standard format. Once done, the profiles will be posted on the OMAFRA website where they will be accessible to all interested stakeholders.

Acknowledging the information gaps and recognizing the desire for a similar demonstration day in the future has provided a clear course of action. The development of marketing information and tools in addition to the exploration of other non-traditional crop options will provide growers with the information required to develop a thriving agricultural sector.

Acknowledgements:

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Location of Project Final Report: