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"In This Issue"

Garlic Biological Product Trial 2017-2018 Results

Travis Cranmer, Vegetable Crop Specialist, OMAFRA

The terms biofertilizers, biopesticides and biostimulants are often used interchangeably when discussing biological products, but there are key differences between these terms. Biofertilizers describe microbials that contain nitrogen-fixing bacteria or microbials that improve nutrient uptake from the soil and are regulated similar to conventional fertilizers. Biopesticides are microbes, microbial extracts, plant extracts or other products derived from natural materials that target specific pests which are regulated under the Pest Management Regulatory Agency (PMRA). Biostimulants in the form of microbials, plant extracts, amino acids or organic acids are used to aid in nutrient assimilation and this class of products is not currently regulated under the PMRA or fertilizer act.

These biological products have been said to stimulate the crop to induce immune defenses, increase nutrient availability, suppress pests or pathogens and/or promote a healthy microbial rhizosphere. Last fall, garlic was planted at two field sites near Dashwood, ON in Huron clay loam and Mount Forest, ON in Harriston loam to determine if five biological products had an effect on yield, bulb size or overall plant health.

SUMMARY

The treatments were Synergro by ConcentricAg (previously Inocucor), Phyter by Endo Plant Health, Rhizovital 42 by Sylvar, ON-Gard 5-0-0 by BioWorks, LCFX by TerraBioGen, as well as a non-inoculated check. Of these products, Synergro, Phyter and Rhizovital 42 contain living microbes, ON-Gard 5-0-0 contains plant-derived amino acids and peptides and LCFX contains microbial extracts. These products were applied in the fall, at planting in a randomized complete block design. Weights for each plot of 30 cloves were measured prior to planting to remove potential starting bias for each of the four replications. Neither field site was irrigated throughout the growing season.

Figure 1. Trial near Mount Forest, Ontario June 15th, 2018.

Both locations showed no significant differences in plant emergence in the early spring or differences in a mid-season height and leaf stage assessment roughly 6 weeks later. Harvest was conducted in late July when an average of 50% of the leaves had senesced. Bulb basal plates were rated for damage (**Table 1**) by assessing the percentage of basal plate missing using a 0-4 rating scale: where 0 = no damage, 1 = 1-24% basal plate missing; 2 = 25-50% basal plate missing; 3 = > 50% basal plate missing and 4 = completely desiccated bulb. Bulbs were hung to dry in a mesh bag in a forced air drying shed and dry weights were collected to determine yield (**Table 1**).

While not statistically significant, Rhizovital 42 performed well across most measured variables at harvest and had less basal plate rot at both locations. It was interesting to note that the fresh weight of the entire plant that the product LCFX performed significantly better at the Mount Forest location while it was approximately the same as the control at the Dashwood location (**Table 1**). It is likely that the different soil types with different nutrient deficiencies or microbial communities are bound to drastically alter the effectiveness of biological products in the field.

Table 1. Plant measurements collected July 23rd and 24th and dry weights collected August 13th for various biological treatments on garlic grown near Dashwood and Mount Forest, Ontario, 2017-2018.

Dashwood	Plant Fresh Weight (g)	Diameter (cm)	Bulb Circumference (cm)	Basal Plate Rot[1]	Bulb Fresh Weight (g)	Marketable Weight (kg)[2]	# Cloves
SYNERGRO	91.6ns	4.8b	15.8ns	0.2ns	63.1ns	1.35ns	6.4ns
ONGARD 5-0-0	90.3	4.8b	15.9	0.2	63.4	1.17	6.5
LCFX	89.4	4.9ab	16.2	0.2	65.0	1.24	6.6
RHIZOVITAL 42	95.2	5.3a	16.5	0.1	67.6	1.38	6.4
PHYTER	93.0	5.1ab	16.5	0.2	68.1	1.30	6.5
Non-inoculated control	90.2	5.0ab	16.3	0.2	64.6	1.22	6.5
Mount Forest	**Plant Fresh Weight (g)**	**Diameter (cm)**	**Bulb Circumference (cm)**	**Basal Plate Rot[1]**	**Bulb Fresh Weight (g)**	**Marketable Weight (kg)[2]**	**# Cloves**
SYNERGRO	73.1ab	4.5ns	15.2ns	0.5ab	52.3ns	0.92ns	6.5ns
ONGARD 5-0-0	84.6ab	4.8	16.0	0.3ab	57.1	1.10	6.7
LCFX	85.6a	5.2	16.0	0.3ab	56.5	1.01	6.8
RHIZOVITAL 42	84.1a	4.8	15.8	0.2b	56.8	1.12	6.9
PHYTER	72.6b	4.5	15.1	0.5a	50.0	0.89	6.5
Non-inoculated control	74.9ab	4.6	15.4	0.5ab	54.2	0.73	6.9

[1] Basal plate rot rating is calculated by assessing the percentage of basal plate missing using a 0-4 rating scale: where 0 = no damage, 1 = 1 - 24% basal plate missing; 2 = 25 -50% basal plate missing; 3 = > 50% basal plate missing and 4 = completely desiccated bulb

[2] Marketable weight was determined by combining all marketable cloves within a single replicate

[3] ns = no significant differences were found among the treatments

Full Report

EVALUATION OF BIOLOGICAL PRODUCTS FOR YIELD IMPROVEMENTS IN GARLIC INFECTED WITH BULB AND STEM NEMATODE DURING THE 2017-2018 FIELD SEASON

MATERIALS
Garlic (*Allium sativum* L.), cv. Music, SYNERGRO (Potash 0.2% and microbial consortium 5.2%), ONGARD 5-0-0 (Soy protein hydrolysates), LCFX (Microbial extract), RHIZOVITAL 42 (*Bacillus amyloliquefaciens* strain FZB4) PHYTER (*Clonostachys rosea*)

OBJECTIVES
Determine if biological products improved yield or decrease the incidence of basal rot caused by stem and bulb nematode.

METHODS
Garlic cloves contaminated with stem and bulb nematode (*Ditylenchus dipsaci*) were seeded by hand in Mount Forest, Ontario, in Harriston loam, on 19 October, 2017 and in Dashwood, Ontario, in Huron clay loam, on 20 October, 2017. The trial was arranged in a randomized complete block design with four replicates at two sites. Each replicate consisted of three rows (2m long) with ten plants per row for a total of 30 plants per plot. Biostimulant products were applied as a drench or weighed and applied as a granular formulation in furrow directly after planting before the furrow was closed. The cloves were covered with 2-5 cm of soil and grown under standard cultivation conditions.

Emergence was assessed 3 April, 2018 in Mount Forest and 4 April, 2018 in Dashwood. Mid-season plant height was measured 24 May in Mount Forest and 25 May in Dashwood. Scaping was conducted in Mount Forest 21 June and Dashwood 19 June. The plots at each site were hand weeded as necessary and plants were harvested and assessed on 23 July in Dashwood and 24 July in Mount Forest when an average of 50% of the leaves had senesced. At harvest, bulb basal plates were rated for damage by assessing the percentage of basal plate missing using a 0-4 rating scale: where 0 = no damage, 1 = 1 – 24% basal plate missing; 2 = 25 -50% basal plate missing; 3 = > 50% basal plate missing and 4 = completely desiccated bulb. Basal plate damage was assumed to be caused by bulb and stem nematode. Budget limitations did not allow for quantification of nematodes before planting or after harvesting however nematodes were extracted from several bulbs from both sites. Bulbs were hung to dry in a mesh bag in a forced air drying shed shortly after harvesting for 12 days and dry weights were collected on 13 August. Data were analyzed using SAS version 9.3 (SAS Institute, Cary NC). Means were separated using Tukey-Kramer multiple mean comparison test (P = 0.05).

RESULTS
As outlined in **Table 1**.

CONCLUSIONS
Both locations showed no significant differences in plant emergence in the early spring or differences in a mid-season height and leaf stage assessment roughly six weeks later. While not statistically significant from the non-inoculated control, RHIZOVITAL 42 performed well across most measured variables at harvest and had less basal plate rot at both locations. (**Table 1, Figure 2**).

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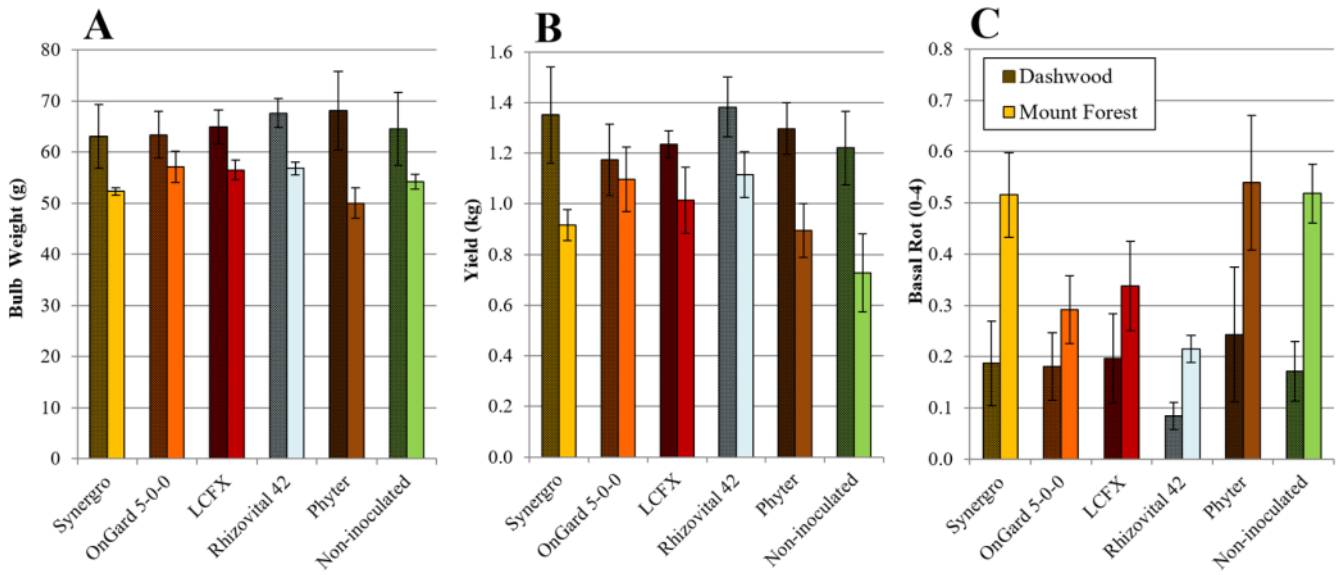


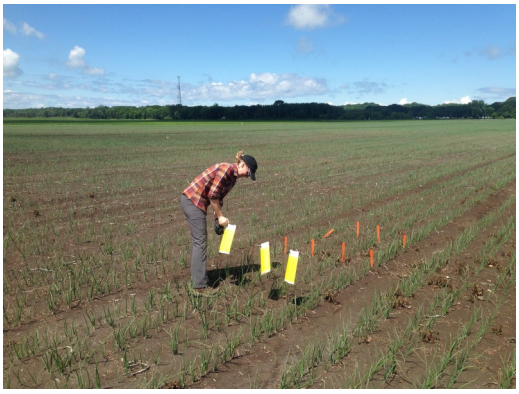
Figure 2. Bulb fresh weight (A), dry marketable yield per plot (B) and basal rot at harvest (C) for various biological treatments on garlic grown near Dashwood (shaded bars) and Mount Forest (solid bars), Ontario, 2017-2018.

FUTURE WORK

A follow-up trial was planted in fall 2018 at multiple locations with most of the same products as the 2017-2018 trial. **If you have a product that you would like to include in the 2019-2020 biological product trial, please contact Travis Cranmer** at 519 826-4963 or E-mail travis.cranmer@ontario.ca as soon as possible as the trial will be seeded in late September to early October.

Thank you to Cora Loucks, Dennis Van Dyk, Ashleigh Ahrens, Jordan Elshof, Josh Mosiondz, and Laura Stoltz for their help throughout the trial. In kind contributions were made by Van Raay Farms and Northland Garlic. Support provided by the Garlic Grower Association of Ontario.

Vegetable Crops Summer Student Positions for OMAFRA in Guelph



Job Posting: Field Research Assistant – Pest Management Scout in Vegetable Crops
Organization: Ontario Ministry of Agriculture, Food and Rural Affairs
Division/Branch: Economic Development Division / Agriculture Development Branch
Position Title: Student – Field Research Assistants in Vegetable Crops
Job Term: Temporary (3 positions) for 16 weeks
Location: 1 Stone Road W, Guelph, Ontario
Salary: $14.85 / hour, based on a 36.25 hour work week

Closing Date: March 1st, 2019

The Ontario Ministry of Agriculture, Food and Rural Affairs – Agriculture Development Branch in Guelph Ontario is seeking a highly motivated, enthusiastic and energetic team player. This position will provide an excellent opportunity for those interested in a career in horticulture production, pest management, plant pathology, entomology, research or the agricultural service sector. This position will provide the opportunity to learn about plant diseases, insects and pest management in the horticulture crop sector within the province. The successful candidate will be responsible for both field and office duties. Field work includes setting up research plots, assessing pest populations, scouting for pest issues, recording insect trap data, conducting pest surveys, assisting in data collection and research plot maintenance in vegetable crops. Office duties will include data entry and literature reviews.

Duties may include some or all of the following:

- Assist with applied research and demonstration projects conducted by Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA).
- Projects will focus on plant pathology, entomology and pest management in vegetable crops.
- Field work includes setting up and maintaining (planting, weeding etc.) research plots, field scouting, pest monitoring and identification, production practices, pest management etc., collecting/entering of data and preparation of written reports. Training will be provided on research methods, technology transfer, and working in the public sector.
- Assist with the collection and analysis of on-farm samples and data from research projects.
- Assist with gathering existing information, conduct new literature reviews and develop written reports and presentation materials on key initiatives.
- Office work will include assisting with data entry into disease prediction models research, data entry and database management, assisting with the production of technical information such as newsletters, factsheets, web pages, blogs, etc.

Please review the qualifications for this position. What we are looking for:

- You work independently or as part of a team; you plan, organize and prioritize your work to meet competing deadlines.
- You are willing to travel to rural locations (frequently not accessible by public transportation).
- You are familiar with farming and interested in horticulture crop production.
- You enjoy working in an outdoor environment with physical activity involved.
- You apply your interpersonal skills to work within a multi-disciplinary team.
- You apply your observational skills and attention to detail to conduct research, field monitoring, data collection and entry.
- You are able to apply your written communication skills to prepare a variety of documents (e.g. reports, factsheets, and articles).
- You are familiar with computer based software applications including Word and Excel.

Vegetable Crops Summer Student Positions for OMAFRA in Guelph…con't

Requirements:

- You must have an **Ontario full G Driver's Licence** and a good driving record.
- You must demonstrate how you meet the eligibility criteria, skills and experience we are looking for clearly, completely and concisely. We rely on the information you provide to us.
- You must be a resident of Ontario.
- You must be eligible to work in Canada.
- You must be between 15-24 years of age (up to 29 with disability) on the first day of employment.
- You must be currently enrolled in a secondary or post-secondary school, or have completed all academic requirements for graduation within 6 months of first day of employment.

How to Apply:

- You must provide your cover letter and resume electronically in one file to travis.cranmer@ontario.ca in PDF or you could provide your cover letter and resume on paper to:

Travis Cranmer
Vegetable Crops Specialist
Ontario Ministry of Agriculture, Food and Rural Affairs
1 Stone Road West, 1st Floor NW
Guelph, Ontario, N1G 4Y2
(519) 826-4963

If you have a disability and require accommodation to apply please contact the supervisor above.

Closing Date: March 1st, 2019