

Great Lakes Fruit, Vegetable & Farm Market EXPO

December 9-11, 2008

DeVo Place Convention Center, Grand Rapids, MI



Vine Crops

Wednesday afternoon 2:00 pm

Where: Grand Gallery (lower level) Room A-B

Recertification credits: 1 (1B, PRIV OR COMM CORE)

CCA Credits: NM(0.5) PM(1.0) CM(0.5)

Moderator: Phil Tocco, Agriculture & Natural Resources Educator, Jackson Co. MSU Extension

2:00 p.m. Fertility and Food Safety Considerations When Using Manure in Vine Crops

- Natalie Rector, Nutrient Management Educator, MSU Extension

2:30 p.m. Mounting Challenges to Managing Cucurbit Powdery Mildew

- Margaret McGrath, Plant Pathology Dept., Cornell Univ.

3:00 p.m. Cucurbit Insect Update

- Richard A. Weinzierl, Crop Sciences Dept., Univ. of Illinois

3:30 p.m. Pumpkin Production Practices That Reduce Input Cost

- Joseph Heckman, Plant Biology & Pathology Dept., Rutgers Univ.
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Fertility and Food Safety Considerations When Using Manure in Vine Crops

Natalie Rector, Nutrient Management Educator, Michigan State University Extension

Manure is a valuable resource containing macro and micro nutrients and contributing to soil organic matter and overall soil properties that improve soil tilth. Manure needs to be land applied such that the nutrients are recycled into the soil and plants and does not produce off site runoff to waters of the state. There is also a concern for pathogens in manure that could pose a risk to human health when applied to crops that are consumed by people.

Applying manure to any land should follow the guidance of the Michigan Department of Agriculture's Generally Accepted Agriculture Management Practices (GAAMP) for Manure. Conformance to these standards will provide producers with nuisance protection from neighborhood complaints. A complete version of the Manure GAAMPs can be found at <http://www.michigan.gov/mda/> and then key word search "manure gaamp". Without reiterating the entire GAAMP, here are some of the basic principles that should be followed for manure applications:

- Have current soil tests of the fields that manure will be applied to; less than three years old and taken in less than 20 acre increments.
- Manure should never be applied beyond the crop's need for nitrogen.
- Phosphorous soil tests will determine the acceptable rate of manure based on these guidelines:
 - For soil testing <75 ppm Bray P1 (150 lbs. Bray P1), manure may be applied up to the nitrogen recommendation.
 - For soils testing between 75-149 ppm Bray P1 (150-299 lbs. Bray P1) apply manure at no more than 4 years of phosphorus crop removal. If you are conforming to any programs at the Natural Resource Conservation Service (NRCS), 2 years of phosphorus crop removal is the maximum rate. The above two guidelines will allow for some building of phosphorous soil levels.
 - Any soil testing greater than 150 ppm Bray P1 (300 lbs. Bray P1) cannot receive manure if the producer wants to receive nuisance protection under the Right to Farm guidelines.
- GAAMPs also state that the person providing the manure to you, if it is not your own, is to supply a nutrient analysis of the manure so that the above agronomic rates and phosphorus limits can be achieved.
- If the goal is to retain as much of the manure nitrogen as possible for crop production, then it is important to not only know the breakdown between organic and ammonium nitrogen but to also consider the manure application methods.
 - Different species of manure contain very different percentages of organic and ammonium N. For manures with a higher percentage of N in the ammonium form, any type of incorporation will aid in retaining the nitrogen. As with any form of surface applied fertilizer N, it is always best to apply when the temperatures are cool and the soil is not dry to decrease volatilization. The greater the nitrogen retention, the greater the economic benefit of the manure application.

- Pre-sidedress nitrate soil tests will provide a value of the plant available nitrate nitrogen in the soil in the late spring of the year. They are called pre-sidedress since they originated for corn. The “pre-sidedress” name is a guide to the proper time of year to take the sample, which is when corn is about 6-10 inches tall and coincides with the time that soils have warmed up and ammonium is being converted to nitrate. Even in a vegetable crop, the same time of year is appropriate for taking the soil test. The test will indicate the level of plant available nitrate nitrogen in the soil, including the nitrogen from the manure applications.

The conservation practices related to land application of manure are just as important as the agronomic practices. Fortunately, many of the same practices that conserve manure and its nutrients in the soil are also the same practices that prevent off site movement of the manure. To ensure that manure does not reach waters of the state consider these management practices:

- When land applying manure, stay back 150 feet from any surface waters or areas subject to flooding unless the manure is injected, incorporated within 48 hours or other conservation practices are in place to reduce runoff and erosion. These other practices might include, but are not limited to the planting of cover crops or permanent vegetative buffer areas along surface waters.
- Liquid manure should not be applied in such a manner that it creates ponding or runoff to adjacent property, drainage ditches, surface waters or through tile lines.
- If the soil is frozen or snow covered, solid manures can be applied to fields with less than a 6% slope and liquid manures on fields with <3% slope.
- For any land application of manure, irregardless of the season of year, always consider the risk of off site movement. Take into account such field conditions as slope and the proximity to surface waters. If there is existing or known past erosion in the field, this is an indication of what can happen to manure if applied prior to a heavy precipitation event or spring thaw.

Producers who utilize manure nutrients on vegetable crops need to consider and have in place, a system whereby the nutrients are recycled to the crop at agronomic rates, conservation practices ensure the manure and nutrients do not reach waters of the state and that the timing, rate and application of manure is such that human safety is achieved.

The basic components for utilizing manure safely on crops that will be consumed by humans includes applying manure at least 120 days ahead of plant harvest. Fall is the preferred time to apply manures to fields that will be planted to human consumables. Injecting and incorporating is always preferred. Composted manure is safer than non-composted manures.

Cucurbit Insect Update

Rick Weinzierl
University of Illinois

Great Lakes Expo, December, 2008

Insecticides Labeled for Use on Vine Crops

- Organochlorines
 - Thiodan, Kelthane
- Organophosphates
 - Dimethoate, Diazinon, Malathion, Metasystox-R (and Lorsban seed treatment)
- Carbamates
 - Furadan, Sevin, Lannate, Vydate
- Pyrethroids
 - Asana, Baythroid, Capture/Brigade, Danitol, Mustang-Max, Permethrin, Warrior
- Avermectins
 - Agri-Mek
- Neonicotinoids
 - Actara/Platinum, Admire, Assail, thiamethoxam as FarMore seed treatment
- Spinosyns and similar
 - SpinTor / Entrust, Radiant
- Others:
 - Beleaf, Fulfill, Knack, Oberon, Synapse, Coragen, Volium Express

Microbials / Botanicals / "Organics"

- *Bacillus thuringiensis*
- Kaolin (Surround)
- Neem
- Soaps (M-Pede)
- Rotenone
- Entrust
- Pyrethrins

Insecticides with a Broad Range of Effectiveness

- Sevin (carbaryl)
 - Effective against striped and spotted cucumber beetles and squash vine borer.
 - Sevin XLR Plus is less likely to kill bees.
 - Adios is effective only against cucumber beetles; very unlikely to kill bees
 - Not effective against aphids, squash bug, or mites
 - Wettable powder formulations are especially toxic to bees

Insecticides with a Broad Range of Effectiveness

- Pyrethroids
 - Effective against cucumber beetles, squash vine borer, and leafhoppers
 - Highly toxic to bees
 - Capture/Brigade is best against squash bug, also moderately effective against aphids and mites
 - Danitol (melons only) also is effective against mites

For Aphid Control

Insecticide applications that kill natural enemies of aphids but not the aphids trigger outbreaks.

- Endosulfan (Thiodan)
- Dimethoate (for melons only) and Metasystox-R (old and toxic organophosphates)
- Actara
- Beleaf and Fulfill (Movento not labeled for cucurbits)
- Capture/Brigade
- Malathion
- Diazinon (not for pumpkins)
- Insecticidal soaps or neem

- Aphid control will not prevent virus outbreaks

For Mite Control

- Oberon
- Kelthane
- Agri-Mek
- Dimethoate (melons only)
- Capture/**Brigade**
- Danitol (melons only)

- Insecticidal soaps

Systemics to Control Cucumber Beetles ... and ?

- **Furadan 4F: 24(c) label has expired in IL ... check for your state**
- Admire: 0.25 – 0.375 lb a.i. per acre
 - Same active ingredient formulated for foliar sprays as Provado but not labeled on cucurbits.
- Platinum: 5 – 8 oz per acre
 - Actara may be used as a foliar spray.
- **FarMore seed treatment -- thiamethoxam**

Systemics for cucumber beetle control



Applied at planting or on seed for systemic uptake to control insects feeding on seedlings.

Systemics for cucumber beetle control



Systemics – in furrow or as seed treatments – for cucumber beetle control

- 2 to 3 weeks of control of cucumber beetles; greater control of beetles feeding on cotyledons than later leaves.
- Cotyledons appeared to remain toxic to beetles longer than later new leaves.
- “Reactivation” of control possible with rainfall following drought.

Monitoring cucumber beetles

- Lam et al., Purdue, Vincennes:
 - 20 striped or spotted cucumber beetles per Pherocon AM trap per 48 hours = 1 beetle per plant – the threshold for control in cukes and muskmelons
 - Still necessary to distinguish cucumber beetles from western corn rootworms and bean leaf beetles, but easier, less subject to error than counting moving beetles on plants



Squash vine borer

- Pheromone traps available to monitor adult flight
 - Place at ground level, not higher
 - Begin monitoring as soon as vines begin to run
- Make a first spray 5 to 7 days after moths are first observed or as soon as tunneling is detected
- Make at least one more spray 7 days after the first or weekly for 3 to 5 weeks depending on continued adult activity
 - Pyrethroids are effective as are, Sevin and Thiodan



Squash bug

- Count egg masses to make control decisions
 - Threshold = 1 to 1.5 egg masses per plant
- Time insecticide applications to target newly hatched and young nymphs
 - Capture/Brigade is more effective than other registered insecticides



Aphids and viruses

- CMV, WMV, ZYMV
 - All are aphid-transmitted in a nonpersistent manner
 - Rapid uptake from hosts; transmission in the first few feeding probes on an uninfected plant; loss of virus after only a few feeding probes
 - Wide range of weed hosts
 - "Passers-through" are effective vectors
 - "Aerial plankton"
 - Prior to soybean aphid, vector numbers usually increased to high levels only in late season
 - Introduction of the soybean aphid dramatically increased the volume of aerial plankton – and vector numbers

Minimizing losses to viruses

- Use resistant varieties
- Plant early (before immigrant aphid species arrive from the south)
- Separate plantings over available space
- Stagger plantings over a range of dates
- Plant cucurbits in the center of weed-free border crops that are not virus hosts (corn, for example)
- Plant onto reflective mulches that reduce aphid landing

2009 Midwest Vegetable Production Guide

- Production and pest management information
- Updated annually
- Especially useful for listings of insecticides, fungicides, and herbicides
- <http://www.btny.purdue.edu/Pubs/ID/ID-56/>

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Identifying and Managing Cucurbit Pests: Insects, Diseases, and Weeds

- C1392, Published 2004, University of Illinois Extension
 - Babadoost, Weinzierl, and Masiunas
 - 48 pages, more than 100 color photos
 - <http://www.PublicationsPlus.uiuc.edu>
 - 1-800-345-6087
 - \$10.00

Pumpkin Production Practices that Reduce Cost

Joseph R. Heckman, Ph.D.
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Pumpkin growers looking for new cultural practices to improve production and fruit quality while reducing input cost may benefit from findings of research conducted at the Rutgers University, New Jersey Agricultural Experiment Station.

One of our experiments compared the influence of different types of liming materials to neutralize soil acidity and improve pumpkin plant health. Regular agricultural limestone, chemically referred to as calcium carbonate, was compared with calcium silicate in a field with an initial soil pH of 5.9. Calcium silicate is an alternative liming material that supplies the nutrient silicon in a plant available form. Silicon is now recognized as a quasi-essential nutrient with beneficial effects on disease suppression and stress tolerance on several crops. In cucurbits and wheat, for example, enhanced silicon nutrition has been shown to suppress or at least delay the on set of powdery mildew disease. Both calcium carbonate and calcium silicate liming materials have the same neutralizing ability, and they cost about the same amount per ton, but the calcium silicate product was found to have the advantage of suppressing powdery mildew disease and increasing yield of pumpkin. Using calcium silicate as a liming agent can also have long term benefits on rotation crops. For example, we later observed suppression of powdery mildew disease and increased yield of wheat on the same land area originally amended with calcium silicate. Thus, because it is recommended that pumpkin be grown in rotation with other crops, it useful to know that enhanced silicon nutrition may benefit them as well. Although amending soil with calcium silicate suppresses powdery mildew disease, it may not completely prevent the disease, and therefore disease scouting and IPM should be a part of the overall pumpkin crop management. The potential savings of several fungicide applications during the season may reduce the cost of pumpkin production. Wollastonite is a naturally occurring mined source of calcium silicate that may be an acceptable Si fertilizer for organic production but check with your organic certifier to be sure it is allowed. The calcium silicate product used in our research was a by-product of the steel industry: www.excellminerals.com/about_excell.asp

Other field trials conducted over the last two decades have demonstrated that farms can benefit from leaves collected from city shade trees. Leaves have been found to be a valuable resource for building soil fertility and organic matter content. Leaves contain plant nutrients that are released slowly to crops over a period of several years after application. The material is especially rich in calcium and tends to cause a slight elevation in soil pH. The improvements in soil quality associated with the build up of soil organic matter content was found to increase soil water holding capacity and reduce drought stress of crops grown on land amended with shade tree leaves. Field trials with pumpkin found that when leaves are applied as surface mulch, the crop could be grown free of annual weeds without the need for herbicides. The leaf mulch was also found to improve pumpkin fruit quality and increase fruit size. Compared to bare soil, the leaf mulch was also observed to be very effective in controlling soil erosion. Using leaf mulch in place of herbicides to control weeds would save pumpkin growers approximately \$40 per acre. For U-pick operations, having accessible fields during wet conditions is critical. Because leaf

mulch can help produce a cleaner fruit, it can make field conditions more enjoyable for agritourism. The mulch also helps to prevent mud from adhering to customer shoes. In crops following pumpkin, the residual benefits of leaf application were exhibited in higher yields of sweet corn and rye straw.

For good pumpkin yields it is especially important to manage the crop for optimum nitrogen availability from the soil. When pumpkin is oversupplied with N, vegetative growth is encouraged and fewer flowers and fruit are produced. Soil nitrate testing just as vines (6 to 12 inches long) begin to run can be useful for predicting if sidedress N fertilizer is needed. Avoiding excess N application reduces cost of production and maintains pumpkin yield potential. Further information about how to perform soil nitrate testing is available on the web: <http://www.rcrc.rutgers.edu/pubs/publication.asp?pid=E285>

Heckman, J.R., S. Johnston, and W. Cowgill. 2003. Pumpkin Yield and Disease Response to Amending Soil with Silicon. *HortScience*. 38(4):552-554.

Wyenandt, A.C., J.R.Heckman, and N.L. Maxwell. 2008. Pumpkin Fruit Size and Quality Improves with Leaf Mulch. *HortTechnology*. 18:361-364.

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