Vine Crop

Tuesday afternoon 2:00 pm

Where: Gallery Overlook Room A-B (upper level)

Summary: Pest management, variety selection and other crop management topics are included on this popular program.

Recertification credits: 1 (Private, 1A, 1B)

CCA Credits: IPM(1) CM(1)

Moderator: Michael Brewer, IPM Programs, Michigan State University

2:00 p.m. Disease Management in Vine Crops

- Mary K. Hausbeck, Michigan State University

2:40 p.m. Pollination for Vine Crops

- Zachary Huang, Michigan State University

3:00 p.m. Pumpkin Variety Trials in Ohio

- Robert Precheur, Ohio State University

3:40 p.m. Weed Management in Vine Crops

- Bernard H. Zandstra, Michigan State University

Disease Management in Vine Crops

Mary K. Hausbeck
Michigan State University, Department of Plant Pathology
(517) 355-4534

Powdery Mildew

Powdery mildew is a major foliar disease of cucurbits, easy to identify because of the whitish, talcum-like, powdery growth. It develops first on close-set plants on the shaded lower leaves and can infect leaf surfaces, petioles, and stems. Infected leaves usually whither and die. Premature loss of foliage often reduces the size or number of fruit and the length of the harvest period. The fungus can multiply and spread quickly under favorable conditions, because the length of time between infection and symptom appearance is usually only three to seven days. A large number of spores that can infect healthy tissue can be produced in a relatively short time. Spores may be transported rapidly over long distances by air currents.

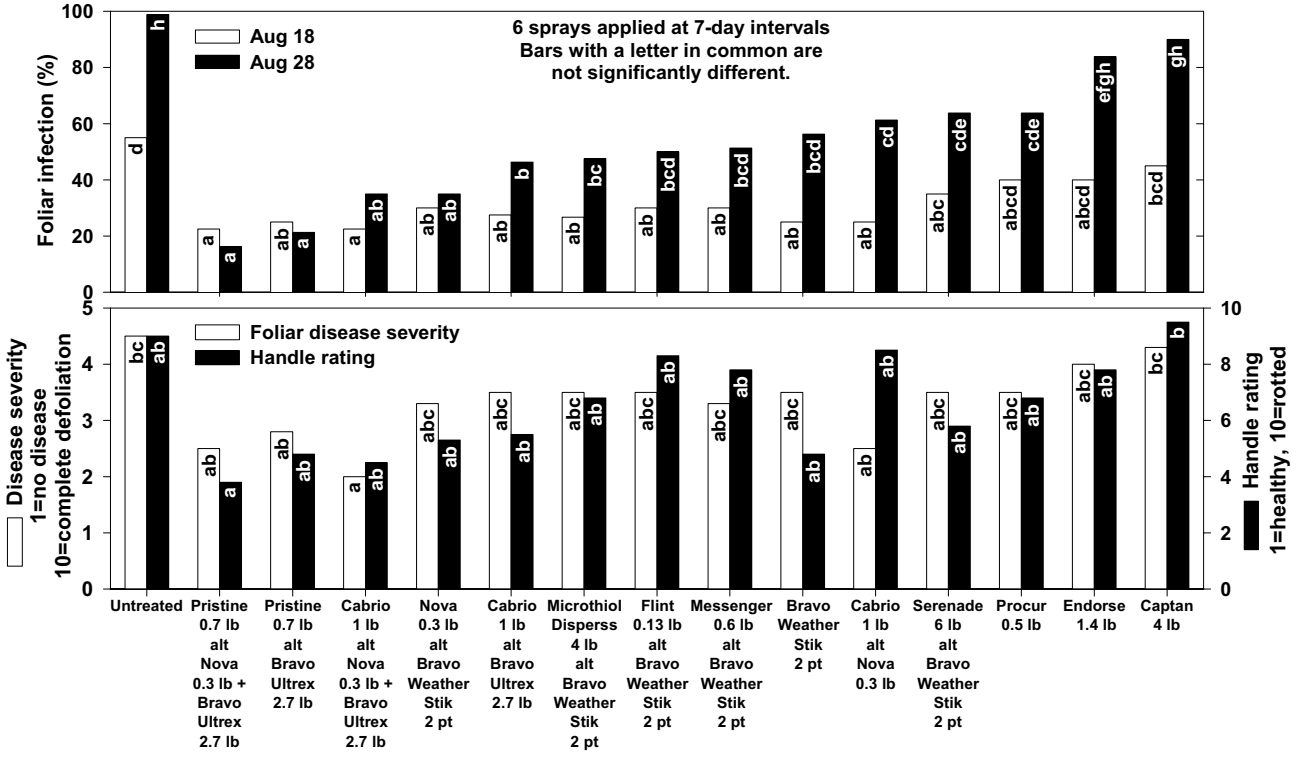
Market quality can also be reduced because of sunburning of the fruit and premature or incomplete ripening, resulting in poor flavor or rind color (pumpkin). In addition, powdery mildew infection predisposes plants to other diseases, such as gummy stem blight. Resistant cultivars are commercially available only for cucumber, cantaloupe, and some pumpkins. Currently, fungicides are the primary control practice for this disease.

Table 1. Products used in fungicide trial.

Product	Active ingredient	Labeled	Company
Bravo Ultrex 82.5WDG	chlorothalonil	yes	Syngenta Crop Protection, Inc.
Bravo Weather Stik 6SC	chlorothalonil	yes	Syngenta Crop Protection, Inc.
Cabrio 20WG	pyraclostrobin (strobilurin)	yes	BASF Ag Products
Captan 50WP	captan	no	Arvesta Corporation USA
Endorse 2.5WP	polyoxin D zinc salt	no	Arvesta Corporation USA
Flint 50WG	trifloxystrobin (strobilurin)	yes	Bayer CropScience
Messenger 3WDG	harpin protein	yes	Eden Bioscience
Microthiol Disperss 80WG	sulfur	yes	Cerexagri, Inc.
Nova 40WP	myclobutanil	yes	Dow AgroSciences LLC
Pristine 38WG	pyraclostrobin + boscalid (strobilurin)	yes	BASF Ag Products
Procur 50WP	triflumizole	yes	Crompton/Uniroyal Chemical
Serenade 10WP	*Bacillus subtilis*	yes	AgraQuest, Inc.

Many products were tested in 2003 for their ability to control powdery mildew (see Table 1). To avoid the development of fungicide resistance in the pathogen, fungicides (especially the strobulirins) should be used in alternation. Disease pressure was severe in this trial, with the untreated control having 98.8% of the foliage infected on the last rating date (Figure 1). Treatments that included Pristine in alternation with Bravo Ultrex and/or Nova were very effective and limited foliar infection to <25%. Treatments that limited foliar infection to <50% included Bravo Weather Stik alternated with either Microthiol Disperss, Flint or Nova. Disease was also limited by Cabrio alternated with either Bravo Ultrex alone or Bravo Ultrex + Nova. All other treatments with the exceptions of Captan and Endorse significantly reduced infection compared to the untreated control. Only Cabrio alternated with Nova + Bravo Ultrex (rating=2.0) received a disease rating (1=no disease, 10=complete defoliation) significantly better than the untreated control (rating=4.5). Treatments of Pristine, and Cabrio alternated with Nova limited disease severity to <3.0. Since pumpkin handles are important to the fresh market, treatments were evaluated for their ability to keep the handles healthy. Although no treatments were significantly better than the untreated control (handle rating of 9.0), Pristine alternated with Bravo and/or Nova, and Cabrio alternated with Nova reduced handle rot severity to <5.0. No phytotoxicity was observed by any treatment in this trial.

Figure 1. Evaluation of Fundicides for Control of Powdery Mildew of Pumpkin



Phytophthora Blight

Phytophthora crown, root, and fruit rot is a complex disease caused by the fungus, *Phytophthora capsici*. There are many factors to this disease which makes it a serious threat to the production of many vegetable crops in Michigan (Table 2). Recognizing disease due to *Phytophthora capsici* is not always easy; often the only visible symptom of infection, especially for cucumber plants, is stunting. Because the disease often occurs in the low areas of a field where water accumulates, many growers assume that the stunting is due to the 'water logging' of the roots. Squash and pumpkin plants may have more obvious symptoms, with plants permanently wilted or collapsed prior to dying. Infected plants often have brown to black discolored roots and crowns. The disease is more easily seen on infected fruit, initially as dark,

water-soaked lesions which may develop a distinctive white 'powdered sugar' layer of spores on the surface of the fruit. Fruit infection is especially troublesome because the infection may occur days before the symptoms become visible.

Table 2. 10 Reasons why Phytophthora blight threatens the Michigan's vegetable industry.

1.	Oospores of the fungus are long-lasting (10 years or more) in Michigan soils. Once soils become infested with the fungus they are taken out of production.
2.	*Phytophthora* has been found in irrigation ponds, a creek and a river, and may be spread readily by water.
3.	*Phytophthora* is favored by warm temperatures and rain, common weather for Michigan.
4.	On many farms, *Phytophthora* has become resistant to a key fungicide used for control.
5.	There are few registered fungicides that can be used. They offer only limited help and add considerable cost.
6.	*Phytophthora* has successfully colonized a number of geographical locations in the state.
7.	Crop resistance has not been identified. Over 200 varieties have been tested.
8.	Methyl bromide, used by fresh market growers for disease control, is scheduled to be phased out in 2005.
9.	Fruit that appear healthy at harvest can break down during transit or on the grocers' shelves.
10.	Growers for the processing industry cannot invest in high cost management practices.

Many growers report major crop losses. Integrated control strategies are recommended (Table 3). Fungicides are most effective used with appropriate rotation among products with differing modes of action. Fungicides that may be helpful in protecting plants against crown and fruit rot include Aliette 80WDG, Ridomil Gold/Bravo 76.5WP, Acrobat 50WP, and Gavel 75WP (Gavel is labeled for cucumber, melon, summer squash, watermelon). If the *Phytophthora* has become resistant to Ridomil-based fungicides, than growers should use the other products suggested. Studies have indicated that Acrobat and Gavel can be helpful against fruit rot but should be applied early and frequently, especially when conditions favor disease development (rainy and humid conditions). Excellent coverage of the fruit is critical to ensure maximum disease control. When using Acrobat or Gavel, add in a full rate of copper hydroxide to enhance disease protection. Planting any of the susceptible vegetable crops into a field with a history of *Phytophthora* is risky.

Table 3. Recommended control strategies for Phytophthora blight.

Preplant
Consider a pre-plant banded fungicide application for fields with known problems with *Phytophthora capsici*.
Plant susceptible crops in well drained fields.
Utilize raised beds (6" minimum) whenever possible.
Do not plant in low-lying areas of the field.
Do not irrigate a field with water that contains runoff from fields with a history of *Phytophthora* disease.
Production
Monitor fields for disease, including damping off, plant stunting, root and crown rot.
Irrigate conservatively and, if possible, do not irrigate prior to harvest.
Plow under portions of the field with diseased plants, including healthy plants that border diseased areas.
Remove diseased fruit from the field.
Never dump culls or diseased fruit from other fields or farms into production fields. Once *Phytophthora capsici* is introduced, it may remain indefinitely.
Apply fungicide preventively, especially for known problem fields.
Rotate the types of fungicides used.
Postharvest
Harvest fruit as soon as possible from problem fields.
Keep harvested fruit dry and cool.

Cucurbit Yellow Vine Decline

Cucurbit yellow vine decline was diagnosed on Michigan-grown hubbard squash this field season. This disease has been reported on pumpkin, watermelon, squash and muskmelon in other states. Symptoms include a yellowing at the crown of the plant followed quickly by plant wilting, usually just before fruit are harvested. The youngest leaves often stand up in a vertical position and curl inward at the leaf margins. The disease can be fairly easily identified in the field by cutting straight across the crown (the white part of the root, not the green stem). The phloem tissue of the stem will be discolored, appearing as a honey-brown arc or ring surrounding the central core of the stem.

This “new” disease is caused by the bacterium, *Serratia marcescens*, which may be vectored by squash bugs. Squash bugs overwinter as adults in Michigan, so could be a source of inoculum for the next growing season. Control of squash bugs is difficult, but a season-long program aimed at limiting squash bug populations could be an important management option. Row covers and trap crops (squash bugs prefer summer squashes over pumpkins and melons) may have promise as a cultural control method for small growers.

Pollination of Vine Crops

Zachary Huang (517-353-8136, bees@msu.edu, http://cyberbeemsu.edu) and
Walt Pett, Department of Entomology, Michigan State University, East Lansing, MI 48824

All of the vine crops (cucurbit family) such as cucumber, squash, zuchini, gourd, pumpkin, watermelon and muskmelon require insect pollination The majority of these crops have male and female flowers as separate flowers, but usually on the same plant. Some have complete flowers (both female and male parts are in the same flower), such as honey dew melons, but even then insects are needed to transfer the pollen resulting in pollination, because all vine crops have sticky and heavy pollen grains that would not move without the aid of insects.

Move in bees early

Most vine crop flowers are open for only one day, and unpollinated female flowers will abort and drop off if pollen is not received on that one day. Due to pesticide use and habitat destruction, native bees are usually not of sufficient quanitity to ensure adequate pollination. In these cases, honey bees are introduced to help ensure a fruitful crop, better quality, and also an earlier crop. Honey bee colonies should be moved into the field or on its border as soon as male flowers appear. Female flowers usually will bloom in 2-5 days, so the early introduction of bees will ensure that adequate pollination and fruit set will occur as soon as female flowers open and avoid abortion of female flowers due to lack of pollination.

Hive density

For pickles, we recommend 1 colony per acre for hand harvested fields and 2-3 colonies per acre for machine harvested fields. Hand harvested fields require fewer colonies because of the lower number of flowers open in the field at any given time and that the field is harvested several times. More honey bee colonies are required for a machine harvested field because there is a limited time for pollination to occur to ensure that the fruit is of a uniform size when harvested. For most other vine crops 1 colony per acre is adequate. If you are not sure whether there are enough bees in your field providing pollination, use the following table. This table was developed for pickle cucumbers but should also work for most other vine crops.

To use the numbers in the table, you must observe 10 flowers for 10 minutes in three different locations (30 flowers/30 minutes) and compare your findings to the table for the particular time of day you do your counts. If your bee counts are less than those found in the table you need more colonies.

Number of honey bee visits for time of day Eastern Daylight Time	Minimum number of bees per 30 flowers per 30 minutes
8-9 AM	1
9-10 AM	3
10-11 AM	9
11 AM - Noon	13
Noon - 1 PM	16
1-2 PM	13
2-3 PM	11
3-4 PM	7
4-5 PM	5

Irrigation and pollination

Daytime irrigation of vine crops will reduce yield by discouraging honey bee visits. Bees do not like to get web while in flight, they also will avoid visiting flowers filled with water. In addition, too much water getting into the flowers will also disrupt pollen germination. For these reasons it is better to irrigate the crops at night o early in the morning before honey bees are actively foraging.

Update on Varroa Mites

Most varroa mite (Varroa jacobsoni) population has now become resistant to Apistan stripes(active ingridient: fluvalinate), which has been used for over 10 years. Unfortunately, Checkmite+, a coumaphos pesticide used the last 4 years as an emergency registration (section 18), is also seen resistance developing in mites. We now have Section 18 approved for a third chemical, Api Life Var for treating the mites. Api Life Var is composed mainly of Thymol and a few other essential oils, and its efficacy against the mites varies from 70% to over 90%. We encourage beekeepers to rotate pesticides (Apistan, CheckMite+, Api Life Var) as well as combining with other integrated pest management tactics (such as screened bottom boards, drone brood trapping of mites, etc) to both reduce the chance , or delay the onset, of resistance development in mites, as well as reduce chemical levels in honey bee colonies.

Pumpkin Variety Trials in Ohio

Robert J. Precheur, Department of Horticulture and Crop Science
The Ohio State University
2001 Fyffe Ct., Columbus, OH 43210
614-292-3857
email: precheur.1@osu.edu

Mac Riedel, Andy Wyenandt, Jim Jasinski, Celeste Welty.
Departments of Plant Pathology, Southwest Extension IPM, and Entomology, OSU Columbus.

Summary of Results at South Charleston

This project was supported in part by a research grant from the Ohio Vegetable and Small Fruit Research and Development Fund.

In South Charleston, 23 cultivars were evaluated for yield and quality and rated for possible disease resistance. Each cultivar was planted by direct seeding or transplants in plots 30 feet long with 10 feet between rows. All plots were sprayed with a standard chemical disease control program and received standard insecticide applications during the season.

In late August and early September, extremely cold and wet weather (5-8 Inches) caused rapid development of powdery and downy mildew. Only varieties HMX 2689 and HMX 0683 had a foliar infection rating of 25 to 50%. There was an early season outbreak of Anthracnose and varieties were rated for foliar infection (see the VegNet website).

The best large sized varieties in terms of tons per acre were: Harvest Time, RPX 0307, Dependable (ACX103), and Pro Gold 510. The largest average fruit size (> 27 lbs per fruit) was observed in varieties: Harvest Time, RPX 0307 and Dependable. The best medium sized pumpkins were Gold Medal, RPX 03509, HMX 2689, RPX 03517 and HMX0683.

New and appealing small varieties with an average fruit size from 1 to 4 pounds were HMX 2690, HMX 3693, HMX 5682 and RPX 03102. Features include dark green handles, good orange color and a hard fruit rind.

Additional information, individual pictures plus comparison views among varieties are available at the VegNet website:

http://vegnet.osu.edu

Table 1, 2003 Pumpkin Cultivar Evaluation, South Charleston, OH

ID #	Variety	Marketable Orange Fruit/A	Marketable Orange Tons/A	Average Fruit Size (lbs)	Fruit Diameter (in)	Foliar Powdery Mildew Rating[1]	Powdery Mildew on Handle[2]	Source
2	Harvest Time	2069	28.6	33	13	5	1.8	AC
10	RPX 03507	1416	23.3	33	14	5.3	1.3	RP
4	ACX 103 Dependable	1706	23.3	27	14	5.8	1.5	AC
22	HMX 3692	1207	14.6	23	12	5	2	HM
1	Pro Gold 510	2033	23.0	22	13	5.3	1	AC
16	Gold Gem	1815	19.7	21	13	5.8	1.5	RP
11	RPX 03509	1488	15.3	20	12	6	2	RP
3	ACX 102 (Reliable)	2251	22.1	19	11	4.7	2	AC
15	Gold Medal	1379	13.7	19	13	5.5	1.8	RP
20	HMX 2689	1525	14.6	19	13	3.8	1.8	HM
7	REX 1002	1125	9.9	18	12	5.3	1	RP
13	RPX 03517	1997	18.9	18	12	5	2	RP
6	13024469	2686	20.5	15	11	5.8	1.5	SEM
8	REX 1006	2033	15.6	15	12	5.8	1.5	RP
19	HMX 0683	2468	18.7	15	12	3.8	2	HM
12	RPX 03515	1742	11.5	13	10	4.8	1.8	RP
14	RPX 03516	2468	19.4	12	11	5	2	RP
5	1302442	1960	11.1	11	11	5.5	1.3	SEM
21	HMX 2690	4320	7.6	3.5	6.5	4.3	1.5	HM
23	HMX 3693	5590	7.0	2.5	6	4.3	2	HM
18	HMX 5682	9184	5.1	1.1	4.4	5.5	1.5	HM
9	RPX 03102	10128	5.1	1	5	5.3	1.3	RP
17	Wee-Be-Little	7696	2.2	0.5	3.6	4.3	2	RP
	LSD 0.05%	2473	7.6	4.5	1.3	0.8		

Key To Disease Ratings in Table 1.

1. Foliar Powdery Mildew: 1 = no or a trace of mildew, 2=1-25%, 3=26-50%, 4=51-75%, 5=76-100% foliage with fungal colonies and 6= necrotic leaves.
2. Powdery Mildew on:1 = presence of powdery mildew on handle. 2=. no powdery mildew on handle.

Key To Sources

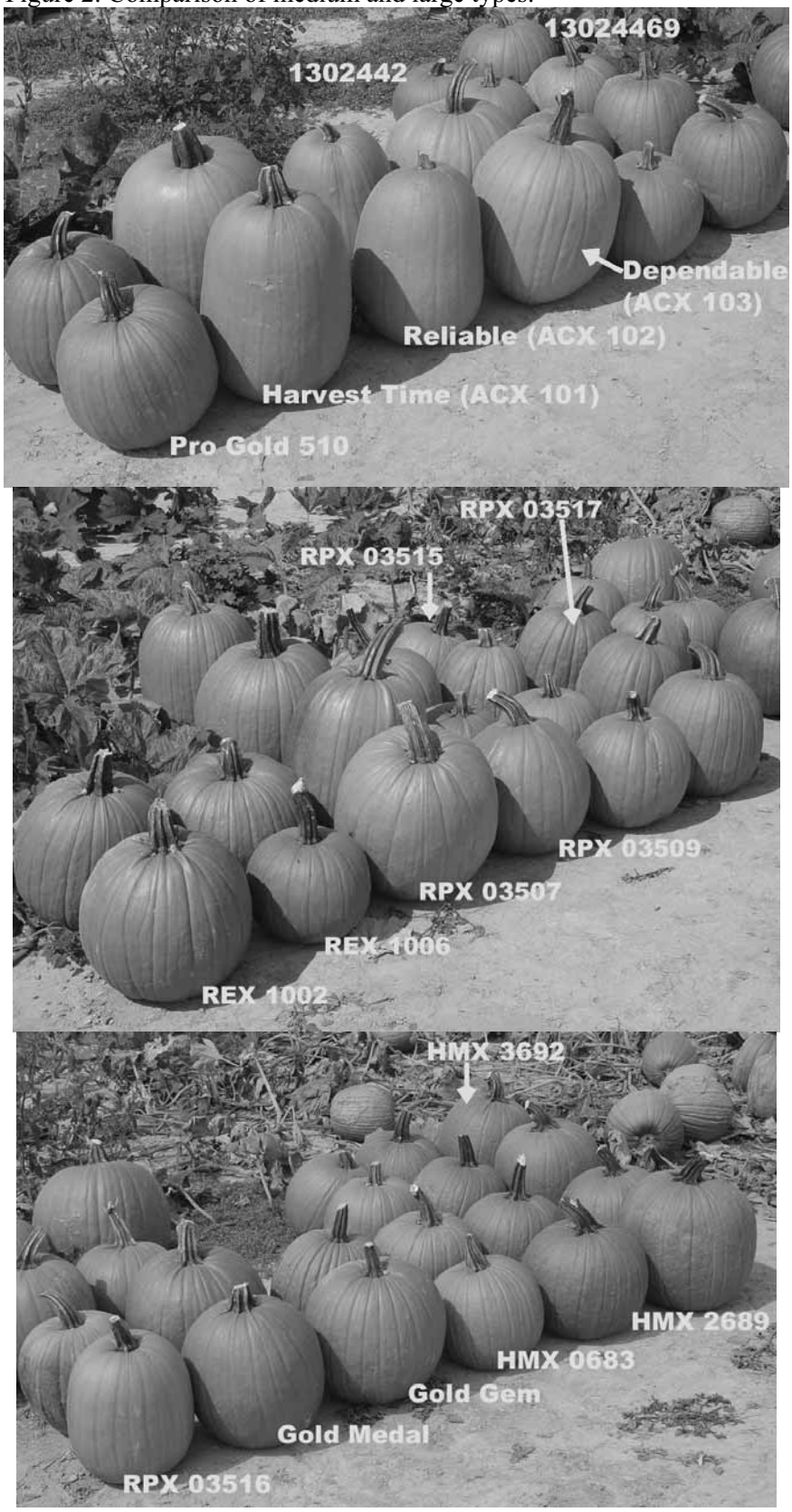
AC = Abbott Cobb; HM = Harris Moran; RP = Rupp Seeds, Wauseon, OH; SEM = Seminis

Brief Descriptions of Some Pumpkin Varieties, 2003, South Charleston, OH

1. Pro Gold 510, (AC) This variety has become a standard in OH and one of the most consistent performers over the years. Average fruit size is between 18- 20 lbs and usually yields 17 to 19 tons/A.
2. Harvest Time, (AC) Introduced last year. Fruits are elongated, large with a flattened tear drop shape. Good yields. Desirable for retail markets but maybe not wholesale because of elongated shape.
3. ACX 102 (Reliable), (AC) This is the first year in our trial. Fruit seems to be a thinner and smaller version of Harvest Time. Handles are very short or stubby. Color is lighter than Harvest Time.
4. ACX 103 (Dependable), (AC) Large round fruit with good yields and color. Handles are nice.
7. REX 1002, (RP) Medium to large fruit (~18lbs) nice color, handle and ribbing
10. RPX 03507, (RP) Larger Gold Medal type, average fruit size, ~33 lbs.
15. Gold Medal, (RP) Large Fruit with good color (~20-25 lbs) and yields around 15 to 20 tons per acre.
16. Gold Gem, (RP) Produces fruit of consistent size and shape around 15 to 18 lbs. Nice thick handles.
20. HMX 2689, (HM) Semi-bush. Medium size with large, well attached, dark green handle. Strong tolerance to PM. Nice dark color. Good, solid 2-3 inch handle.
22. HMX 3692, (HM) Large fruits on semi-bush. Blocky tall shape with thick attractive handles. Tolerant to PM. Big handles.

Figure 1. A comparative view of the five smaller size pumpkins. Note the soccer ball for a size reference.

Figure 2. Comparison of medium and large types.



Weed Control in Vine Crops

Bernard H. Zandstra and Michael G. Particka
Department of Horticulture, Michigan State University

Pumpkin and squash weed control trials were conducted at the MSU Horticulture Farm and MSU Muck Farm in 2003. The Hort Farm trial was on a sandy loam soil and the Muck Farm trial was on deep muck (80% OM).

At the Hort Farm trial, yields were somewhat erratic as a result of the dry summer. The following treatments had pumpkin yields that were not statistically different. Treatments indicated by * had the highest yields for buttercup squash.

Curbit 3 pt/acre preemergence
Curbit 2 pt plus Command .7 pt preemergence*
Strategy 4 pt plus Sandea 0.5 oz preemergence*
Strategy 3 pt preemergence followed by Sandea 0.5 oz plus Poast 1 pt plus NIS 1 pt postemergence
Strategy 3 pt plus Spartan 3 fl oz preemergence*
Treflan 1 qt preemergence
Dual Magnum 1.4 pt preemergence*

At the Muck Farm, Strategy 5 pt plus Sandea 0.5 oz preemergence, and Dual Magnum 1.7 pt preemergence had the largest pumpkin yield. Strategy preemergence plus Sandea postemergence, and Command preemergence followed by Sandea 0.5 oz plus Poast 1 pt plus NIS postemergence were slightly lower, but not significantly different from other treatments.

The highest squash yield was obtained with Strategy 5 pt plus Sandea 1 oz preemergence. Strategy preemergence followed by Sandea postemergence, Command preemergence followed by Sandea postemergence, and Dual Magnum preemergence also had good yields. Command preemergence followed by Sandea postemergence had slightly lower yield.

Sandea and Command are sufficiently active on muck soil for good weed control in pumpkin and squash production. Dual Magnum also was effective. However, it currently is not registered for vine crops. Curbit or Strategy alone will be less effective and more expensive, since the major active ingredient, ethalfluralin, is virtually inactive on muck.