Sweet Corn

**Wednesday morning 9:00 am**

*Where:* Grand Gallery (lower level) Room A-B  
*Recertification credits:* 1 (1B, PRIV OR COMM CORE)  
*CCA Credits:* PM(1.0) CM(1.0)

9:00 a.m.  **What Do Hundreds of Growers Say About Sweet Corn IPM?**

- Jim Jasinski, The Ohio State Univ. Extension
- Daniel Pavuk, Integrated Vegetable Extension Educator SE Michigan and NW Ohio

9:20 a.m.  **Strategies for Weed Control**

- Mark VanGessel, Plant Science Dept., Univ. of Delaware

9:40 a.m.  **2009 Variety Trials**

- Liz Maynard, Northwest Commercial Hort Program, Purdue Univ.

10:00 a.m.  **Sweet Corn, by George! A Grower Panel**

- George VanHoutte, Northern Farm Market, Bruce, MI
- George Hemmeter, Hemmeter’s Farm Market, Saginaw, MI

10:30 a.m.  **Review of Wildlfe Management Methods**

- Jonathon Cepek, USDA APHIS Wildlife Services
THE GREAT LAKES VEGETABLE WORKING GROUP
REGIONAL SWEET CORN IPM SURVEY:
What Are Hundreds Of Growers Saying About Ipm On This Crop?

Jim Jasinski¹, Dan Pavuk²
¹Ohio State University Extension, IPM Program, ²Ohio State University Extension and Michigan State University Extension, Integrated Vegetable Extension Educator NW Ohio and SE Michigan

Introduction
In October, 2004 a group of university researchers and Extension educators specializing in vegetable production and pest management from the North Central states including Ontario, Canada received a grant from the North Central IPM Center to form the Great Lakes Vegetable Working Group (GLVWG). The primary objectives of this group are to increase communication and collaboration between specialists throughout the region and to address priority vegetable production and pest management issues within the region.

One of the first priorities addressed by this group was to survey the level of IPM adoption used by growers in fresh market sweet corn production across the Great Lakes region. After the surveys were collected and analyzed, specialists could use this information to determine what Extension programs or research projects would be best suited to deal with any significant pest management deficiencies. The survey results would also document which practices growers are currently using the most, which is also valuable to know.

Methods
The IPM adoption survey questions were developed and revised by members of the GLVWG project committee, chiefly populated by university specialists and extension educators. The committee used Ohio State University’s Field Crop, Fruit, and Vegetable IPM Definitions (2001) and the University of Massachusetts IPM Guidelines: Crop Specific Definitions (1999) as a resource and framework for the survey design.

Each survey contained the following sections: Educational, Record keeping, Pre-plant, At-plant, In-season, Harvest, Post harvest, Training, and general Demographics. While the core questions of the surveys (Pre-plant through Post harvest) varied by crop, the remaining sections were nearly identical to other vegetable surveys developed at the same time.

From the fall of 2008 through the fall of 2009, the sweet corn IPM survey was available online for growers to take at their convenience. Hard copies of the electronic survey were also distributed at fall and winter vegetable educational meetings around the region. As an incentive and reward for their time, growers who filled out the online or a hard copy version of the survey were given a copy of the Sweet Corn Pest Identification and Management pocket guide.

Several university researchers and Extension educators have weighted each practice in terms of its approximate importance to pest management on this crop. This allows us to categorize growers into low, moderate, and high IPM adoption groups based on how many practices they currently use and how those
practices are weighted. A more detailed analysis of the data using SPSS will be forthcoming by the spring of 2010 and posted on the GLVWG website (http://glvwg.ag.ohio-state.edu/).

**Select Sweet Corn IPM Survey Results (respondents = 407)**

Due to space constraints, only select data from the sweet corn survey follows. Not all questions were answered by all respondents. This is a preliminary look at the data, full analysis of the data is pending. The full summary of the sweet corn IPM survey can be viewed at: http://www.surveymonkey.com/sr.aspx?sm=jhwbBSTXwnn1rfX5h4bCSgA8mmpMA1egY00A9D_2b8_3d

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**Which of the following are ways you use to maintain and update your pest management knowledge? Select all that apply.**

- Join state or provincial vegetable grower association(s): 40.8%
- Annually attend state or provincial vegetable meetings: 71.6%
- Attend field days during the growing season: 37.5%
- Annually obtain the latest state, provincial, or regional vegetable publications: 52.4%
- Update reference materials (books, manuals, bulletins, etc.) on crop production: 53.2%
- Experiment with new IPM practices on your farm (new varieties, new sc...: 42.0%
- Explore alternative markets that encourage less pesticide use (organic...: 23.5%
Please select as many of the following that apply to your farm operation in 2008.

- Use a pre-emergent herbicide to control annual and perennial weeds: 80.2%
- If planting into fields with insect pressure (caterpillars, wireworms, etc.): 52.2%
- Adjust planting date (earlier or later) to reduce risk of certain risks: 31.0%

Please select as many of the following that apply to your farm in 2008.

- Plow down or mow residue after harvest to reduce disease inoculum: 74.8%
- Plow down or mow residue after harvest to reduce overwintering insects: 73.8%
- Perform post-harvest operation to reduce weed seed production (e.g. fall tillage): 66.0%
- Identify and evaluate successful practices, incorporate them in future: 61.8%
- Establish cover crops for next year’s crop for soil erosion control or: 46.5%
- Control fall germinating annuals and perennials to eliminate potential: 20.0%
If you had to choose ONE area that causes you the MOST difficulty in producing sweet corn, what would it be?

- Insect Management (corn earworm, corn flies, beetles, cutworms, etc.) 42.9%
- Animal Damage (black birds, deer, raccoon, etc.) 26.1%
- Weed Management (Annual and perennial weeds) 10.0%
- Irrigation (water guns, trickle, etc.) 3.6%
- Other (please specify) 3.6%
- Disease Management (Damping off, rust, smut, etc.) 2.2%
- Equipment (sprayers, planters, transplanters, etc.) 1.6%
- Fertility (starter mixes, split applications, rates, etc.) 0.3%

My state or province is...

- IL 13.0%
- IN 14.3%
- KY 9.8%
- MI 20.4%
- MN 8.7%
- NY 0.3%
- OH 20.4%
- Ontario, CAN 9.8%
- PA 0.1%
- W 24.4%
The Great Lakes Vegetable Working Group (GLVWG)

Regional Sweet Corn IPM Survey: What Are Hundreds of Growers Saying About IPM on This Crop?

Jim Jasinski and Dan Pavuk

Ohio State University Extension, IPM Program
Michigan State University Extension and Ohio State Extension

The Origin of the Great Lakes Vegetable Working Group (GLVWG)

A group of university researchers and Extension educators specializing in vegetable production and pest management from the North Central United States and Ontario, Canada, received a North Central IPM Center to form the Great Lakes Vegetable Working Group (GLVWG)

Priorities of the GLVWG:

- Increase communication and collaboration among specialists in the region
- Address priority vegetable production and pest management issues within the region

One of the first priorities identified by The GLVWG: survey the level of IPM adoption by growers of fresh market sweet corn

- The results of this survey would allow extension and research specialists to:
  - 1) determine which research and extension programs are needed
  - 2) document management practices being used by growers

The Sweet Corn IPM Survey was developed by members of the GLVWG Project Committee

- Each survey contained the following sections:
  - Educational
  - Record Keeping
  - Pre-plant
  - At-plant
  - In-season
  - Post-harvest
  - Training
  - Demographics

From Fall, 2008 through Fall, 2009, The Sweet Corn IPM Survey was accessible online for growers to fill in

- Hard copies of the electronic survey were also administered at fall and winter vegetable educational meetings throughout the Great Lakes Region

- Growers who completed the Survey online or at a meeting were given a free copy of the Sweet Corn Pest Identification and Management Pocket Guide

A total of 407 sweet corn growers completed the survey

- The results of the Sweet Corn IPM Survey were compiled and analyzed by Jean Haley, Haley Consulting Services, LLC, Hayward, Wisconsin

- We will not have time this morning to look at all of the questions and the responses; we will examine a smaller subset of the total survey
Educational Considerations

Explore alternative markets that encourage less pesticide use (organic, eco, or IPM labels)
Attend field days during the growing season
Join state or provincial vegetable grower association(s)
Experiment with new IPM practices on your farm (new varieties, new scouting techniques, new reduced risk pesticides, etc.) and gauge their success
Annually obtain the latest state, provincial, or regional vegetable production guide
Update reference materials (books, manuals, bulletins, etc.) on crop pest management
Annually attend state or provincial vegetable meetings

Which of the following are ways you use to maintain and update your pest management knowledge? Select all that apply.

N = 395 respondents

Pre-Plant IPM Considerations

Calibrate pesticide sprayer(s) annually
Select herbicides and plan other weed management practices based on your knowledge of weeds present in the field
Fields are soil tested every 2-5 years; fertility and lime rates are adjusted according to state or provincial guidelines
Apply residual herbicide for control of annual grasses and broadleaves before, at, or after planting as directed by label
Select certified seed
Use fall or spring tillage to control established perennial weeds
Select hybrids well adapted for your growing area & time of planting, i.e., cool season vigor

Which pest management source for information on sweet corn do you seek first? Select only one.

N = 331 respondents
Fields are soil tested annually; fertility and lime rates are adjusted according to state or provincial guidelines.

Select cultivars with moderate to high genetic resistance to Stewart's wilt when appropriate.

Select cultivars that discourage bird damage (tight husks, husks extended above ear tip, narrow angle of ear on stalk).

Select Bt cultivars for insect management to reduce insecticide sprays.

Use fall or spring herbicide application to control established perennial weeds.

Use recommended seed treatments for disease control (damping off) in high risk situations.

Use recommended seed treatments for insect control (corn flea beetle, seed corn maggot, wireworms, white grubs, etc.) in high risk situations.

Avoid planting in last year’s cornfield to reduce corn rootworm injury.

Please select as many of the following that apply to your sweet corn operation in 2008. (Continued)

<table>
<thead>
<tr>
<th>Percentage</th>
<th>At Planting IPM Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>31%</td>
<td>Adjust planting date (earlier or later) to reduce risk of certain insect populations</td>
</tr>
<tr>
<td>52%</td>
<td>If planting into fields with insect pressure (rootworms, wireworms, white grubs), use a soil insecticide or systemic seed treatment</td>
</tr>
<tr>
<td>33%</td>
<td>Use a pre-emergent herbicide to control annual and perennial weeds</td>
</tr>
<tr>
<td>47%</td>
<td>Use a pre-emergent herbicide to control annual and perennial weeds</td>
</tr>
</tbody>
</table>

**In Season IPM Considerations**

Please select as many of the following that apply to your farm operation in 2008. (Continued)

<table>
<thead>
<tr>
<th>Percentage</th>
<th>In Season IPM Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>34%</td>
<td>Minimize non-target pesticide drift by NOT spraying during windy conditions</td>
</tr>
<tr>
<td>43%</td>
<td>Use a pre-emergent herbicide to control annual and perennial weeds</td>
</tr>
<tr>
<td>44%</td>
<td>Use cultivation to control weeds</td>
</tr>
<tr>
<td>59%</td>
<td>Apply postemergence herbicide to control annual and perennial weeds</td>
</tr>
<tr>
<td>62%</td>
<td>Mitigate non-target pesticide drift by being selective in application</td>
</tr>
<tr>
<td>49%</td>
<td>Near harvest, select pesticides with shorter pre-harvest interval restrictions</td>
</tr>
</tbody>
</table>

Please select as many of the following that apply to your farm operation in 2008. (Continued)

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Please select as many of the following that apply to your farm operation in 2008. (Continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td>32%</td>
<td>Scout seedling corn (up to 7-leaf stage) at least twice per week for corn flea beetles, treat if populations exceed threshold</td>
</tr>
<tr>
<td>34%</td>
<td>Spray silking sweet corn with insecticide based on Corn earworm and corn rootworm activity, treat if thresholds are exceeded</td>
</tr>
<tr>
<td>36%</td>
<td>Scout at least once per week for corn earworm, treat if threshold is exceeded</td>
</tr>
<tr>
<td>38%</td>
<td>Scout at least twice per week for corn earworm, treat if threshold is exceeded</td>
</tr>
</tbody>
</table>

Please select as many of the following that apply to your farm operation in 2008. (Continued)

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Please select as many of the following that apply to your farm operation in 2008. (Continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td>40%</td>
<td>Scout at least twice per week for corn earworm, treat if threshold is exceeded</td>
</tr>
<tr>
<td>36%</td>
<td>Scout at least once per week for corn earworm, treat if threshold is exceeded</td>
</tr>
<tr>
<td>34%</td>
<td>Minimize non-target pesticide drift by being selective in application</td>
</tr>
<tr>
<td>32%</td>
<td>Scout for corn earworm, treat if threshold is exceeded</td>
</tr>
<tr>
<td>28%</td>
<td>Scout at least once per week for corn earworm, treat if threshold is exceeded</td>
</tr>
<tr>
<td>28%</td>
<td>Minimize non-target pesticide drift by being selective in application</td>
</tr>
</tbody>
</table>
Post-Harvest IPM Considerations

- Control fall germinating annuals and perennials to eliminate potential cutworm egg-laying sites
- Establish cover crops for next year's crop for soil erosion control or nitrogen management
- Identify and evaluate successful practices, incorporate them in future years
- Perform post-harvest operation to reduce weed seed production (e.g., flail chop stalks, disk, plow, or apply postemergence herbicides)
- Plow down or mow residue after harvest to reduce overwintering insects
- Plow down or mow residue after harvest to reduce disease inoculum

Please select as many of the following that apply to your farm in 2008:

- Low IPM: 2%
- Medium IPM: 56%
- High IPM: 42%

How do you usually scout this crop? Select only one:

- Scout and monitor crop yourself: 77%
- A mixture of self-scouting and crop consultant: 16%
- Do not scout myself; Do not hire a crop consultant: 3%
- Hire a consultant to scout and monitor the crop: 5%

IPM Levels

- N = 407 respondents
- High IPM: 42%
- Medium IPM: 56%
- Low IPM: 2%

IPM Levels by State

- N = 250 respondents
- High IPM: 77%
- Medium IPM: 36%
- Low IPM: 5%
Conclusions from the GLVWG Sweet Corn IPM Survey

- This survey has provided us much useful information regarding application of IPM for sweet corn production in the Great Lakes Region
- We have identified a number of areas where we need more programming efforts (for example, ways of getting new information to sweet corn growers)
- The survey has also given us indications of areas where we have seen increasing grower adoption and awareness of IPM principles
Sweet corn for fresh market use is produced on about 80,500 acres in the Great Lakes States, with an estimated value of $212 million\(^1\). Seed companies maintain active breeding programs to develop cultivars suitable for the climate, production systems, and markets in this region. Cultivars and advanced breeding lines are regularly evaluated in field trials conducted by seed companies and universities. This paper reports results from two trials conducted in northern Indiana in 2009.

One trial included entries classified as sugar-enhanced (se) or synergistic. The second trial included entries classified as supersweet (sh2) or augmented supersweet. Both were located at the Pinney-Purdue Ag Center in Wanatah, Indiana, on a sandy loam soil. Corn was seeded on May 19\(^{th}\) and each variety was harvested at marketable stage between Aug. 2 and Aug. 17. Each variety was planted in a single row in each of three blocks. Characteristics of interest included emergence, yield, ear size, coverage of ear by the husk (husk cover and husk tightness), whether kernels were filled to the tip of the ear (tip fill), attractiveness of the ear, and flavor. A detailed description of the methods and results will be published in the Midwest Vegetable Trial Report for 2009 at www.hort.purdue.edu/fruitveg/reports.shtml.

The 2009 growing season was drier and cooler than normal. From May 18 to August 16, 1628 growing degree days (GDD) accumulated, 134 fewer than normal. Rainfall during that period totaled 7.27 inches, 4.43 inches below normal. The trials were supplied with supplemental water through overhead irrigation.

Results for the 15 se and synergistic entries are in Table 1. Among the four varieties harvested 75 to 77 days after planting (DAP), yield did not differ significantly whether measured in dozens or tons per acre. HMX 6358BES and Fastlane produced longer ears than Vitality and Trinity. Husk cover was judged acceptable for Trinity, not quite that good for HMX 6358BES and Vitality, and poor for Fastlane. Among the five entries harvested 79 to 81 DAP, yields tended to be lower for Navajo and Luscious, probably because they had low emergence (data not shown) and therefore reduced plant stands. Ear quality was generally acceptable to good. Among the four bicolor entries harvested 83 or more days after planting, yield in dozens per acre was similar. Montauk produced the greatest and BC 0822 the least yield in tons per acre. Montauk and Providence produced the longest, and BC 0822 the shortest ears in this maturity class. Ear quality was generally reasonable. Varieties that received flavor ratings of very good to excellent, or better, included BC 0822, CSYBF7-256, CSYBF7-257, GH 0851, and Providence. Fastlane consistently received a rating of very good.

Results for the 18 supersweet entries are in Table 2. Among the five bicolor varieties harvested 79 to 80 DAP, 2171 produced more marketable ears per acre than Fantastic or CSABF4-157; and 2170 and 274A produced ear numbers in between 2171 and Fantastic. Among these five varieties, 2170 and 274A had the longest ears and 2171 the shortest. Husk cover and tightness tended to be better for 2170 than for the other early varieties. Six bicolor varieties were harvested 81 to 83 DAP. The most productive, HMX 8343S, produced significantly more marketable ears per acre than the least productive, 2573. Awesome,

\(^1\) USDA NASS. 2009. Vegetables 2008 Summary, January, 2009. Great Lakes States include IN, IL, MI, NY, OH, PA and MN.
Bueno GFJ, 2673 and Optimum didn’t differ significantly from HMX 8343S. Ear length for this group ranged from 7.2 to 7.6 inches. Optimum, Bueno GFJ, and Awesome were judged to have better husk cover and tighter husks than the other three varieties in this maturity range. Of four bicolor varieties harvested 84 or more days after planting, Legion and BSS 0982 produced significantly more marketable ears per acre than Fusion, and Attraction was in the middle. Attraction had the shortest ears in this group at 6.9 inches; the other three had ears 7.3-7.5 inches long. Legion had the narrowest ears of this group. Fusion and BSS 0982 had good to very good husk cover and Attraction had acceptable husk cover. Husk cover for Legion was only fair. Three yellow varieties were harvested 80 to 84 DAP: Ravelin, HMX 8346S, and HMX 7368D. They didn’t differ significantly in number of marketable ears produced. Ears of Ravelin averaged nearly an inch longer than ears of the HMX lines. Husk cover was acceptable on all three varieties, but better on the HMX lines than on Ravelin. Varieties that consistently received flavor ratings of very good to excellent or better included 2573, Attraction, HMX 8346S and HMX 7368D. Varieties consistently noted to have a tough or very tough pericarp included Fusion, Legion, and Ravelin. Careful evaluation of results presented in Tables 1 and 2 combined with results from other locations and years should aid producers in selecting varieties best suited to their operations.
Table 1. Yield, ear size, and quality of synergistic and sugar-enhanced sweet corn in northern Indiana, 2009. Varieties listed in order of harvest date within color.

<table>
<thead>
<tr>
<th>Cultivar</th>
<th>Seed Source</th>
<th>Color</th>
<th>Days to Harvest</th>
<th>GDD to Harvest</th>
<th>Yield of Marketable Ears</th>
<th>Pred.</th>
<th>Actual</th>
<th>Avg. Ear Weight</th>
<th>Ear Length</th>
<th>Ear Dia.</th>
<th>Ear Ht.</th>
<th>Husk Cover</th>
<th>Husk Tightness</th>
<th>Tip Fill</th>
<th>Over-all</th>
<th>Flavor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fastlane</td>
<td>ST</td>
<td>BI</td>
<td>67</td>
<td>75</td>
<td>1305</td>
<td>1542</td>
<td>6.2</td>
<td>0.72</td>
<td>7.6</td>
<td>1.7</td>
<td>22.4</td>
<td>1.6</td>
<td>1.0</td>
<td>3.8</td>
<td>3.3</td>
<td>VG</td>
</tr>
<tr>
<td>HMX6358BES</td>
<td>HM</td>
<td>BI</td>
<td>66</td>
<td>77</td>
<td>1344</td>
<td>1565</td>
<td>6.0</td>
<td>0.64</td>
<td>7.9</td>
<td>1.8</td>
<td>20.4</td>
<td>2.3</td>
<td>1.1</td>
<td>4.8</td>
<td>5.0</td>
<td>VG-F</td>
</tr>
<tr>
<td>Vitality</td>
<td>RU</td>
<td>BI</td>
<td>67</td>
<td>77</td>
<td>1344</td>
<td>1565</td>
<td>5.7</td>
<td>0.61</td>
<td>7.3</td>
<td>1.8</td>
<td>21.6</td>
<td>2.8</td>
<td>1.7</td>
<td>4.4</td>
<td>5.7</td>
<td>VG-G</td>
</tr>
<tr>
<td>Trinity</td>
<td>CR</td>
<td>BI</td>
<td>75</td>
<td>77</td>
<td>1344</td>
<td>1581</td>
<td>6.3</td>
<td>0.66</td>
<td>7.3</td>
<td>1.8</td>
<td>19.7</td>
<td>3.4</td>
<td>1.8</td>
<td>4.0</td>
<td>4.0</td>
<td>E-G</td>
</tr>
<tr>
<td>Navajo</td>
<td>ST</td>
<td>BI</td>
<td>67</td>
<td>79</td>
<td>1379</td>
<td>1242</td>
<td>6.6</td>
<td>0.88</td>
<td>7.4</td>
<td>2.0</td>
<td>22.6</td>
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<td>4.3</td>
<td>7.0</td>
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<tr>
<td>CSQBF7-262</td>
<td>CR</td>
<td>BI</td>
<td>–</td>
<td>79</td>
<td>1379</td>
<td>1678</td>
<td>7.2</td>
<td>0.71</td>
<td>7.4</td>
<td>1.8</td>
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<td>3.7</td>
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<tr>
<td>CSYBF7-256</td>
<td>CR</td>
<td>BI</td>
<td>–</td>
<td>81</td>
<td>1410</td>
<td>1646</td>
<td>7.7</td>
<td>0.78</td>
<td>7.5</td>
<td>1.9</td>
<td>23.3</td>
<td>4.1</td>
<td>1.6</td>
<td>4.8</td>
<td>7.3</td>
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<tr>
<td>CSYBF7-257</td>
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<td>BI</td>
<td>–</td>
<td>81</td>
<td>1410</td>
<td>1662</td>
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<td>0.80</td>
<td>7.9</td>
<td>1.8</td>
<td>20.4</td>
<td>4.1</td>
<td>1.4</td>
<td>4.8</td>
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<td>E-VG</td>
</tr>
<tr>
<td>Luscious</td>
<td>RU</td>
<td>BI</td>
<td>75</td>
<td>81</td>
<td>1379</td>
<td>1210</td>
<td>7.1</td>
<td>0.98</td>
<td>7.6</td>
<td>2.1</td>
<td>26.6</td>
<td>4.0</td>
<td>1.1</td>
<td>4.1</td>
<td>7.7</td>
<td>F</td>
</tr>
<tr>
<td>CSEBF7-253</td>
<td>CR</td>
<td>BI</td>
<td>–</td>
<td>84</td>
<td>1490</td>
<td>1629</td>
<td>9.0</td>
<td>0.92</td>
<td>8.3</td>
<td>1.9</td>
<td>25.6</td>
<td>4.6</td>
<td>2.0</td>
<td>4.0</td>
<td>8.0</td>
<td>G</td>
</tr>
<tr>
<td>BC 0822</td>
<td>SY</td>
<td>BI</td>
<td>77</td>
<td>85</td>
<td>1508</td>
<td>1581</td>
<td>8.0</td>
<td>0.85</td>
<td>7.7</td>
<td>1.8</td>
<td>27.1</td>
<td>4.0</td>
<td>1.1</td>
<td>3.7</td>
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<td>VG-E</td>
</tr>
<tr>
<td>Montauk</td>
<td>ST</td>
<td>BI</td>
<td>78</td>
<td>86</td>
<td>1523</td>
<td>1646</td>
<td>10.8</td>
<td>1.09</td>
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<td>32.6</td>
<td>4.9</td>
<td>2.4</td>
<td>3.9</td>
<td>7.3</td>
<td>VG-E</td>
</tr>
<tr>
<td>Providence</td>
<td>RU</td>
<td>BI</td>
<td>82</td>
<td>88</td>
<td>1563</td>
<td>1662</td>
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*Seed Source: CR=Crookham. HM=Harris Moran. RU=Rupp. ST=Stokes. SY=Syngenta.

Days from planting to harvest. Predicted number is from seed supplier.

GDD=corn growing degree days.

Husk cover, tip fill: 1=worst. 5=best. Husk tightness: 1=loose. 3=very tight. Overall: 1=worst. 9=best.

Flavor: F=fair. G=good. VG=very good. E=excellent. Summary of ratings by one person for three ears per cultivar.

Means differing by more than this amount are significantly different at P≤.05 based on Fisher's Protected LSD. – AOV not performed.
Table 2. Yield, ear size, and quality of supersweet and augmented supersweet sweet corn in northern Indiana, 2009. Varieties listed in order of harvest date within color.

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<th>Cultivar</th>
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<th>Yield of Marketable Ears&lt;sup&gt;z&lt;/sup&gt;</th>
<th>Avg. Ear Weight&lt;sup&gt;l&lt;/sup&gt;</th>
<th>Ear Length&lt;sup&gt;i&lt;/sup&gt;</th>
<th>Ear Dia.&lt;sup&gt;i&lt;/sup&gt;</th>
<th>Ear Ht.&lt;sup&gt;i&lt;/sup&gt;</th>
<th>Husk Cover&lt;sup&gt;w&lt;/sup&gt;</th>
<th>Husk Tightness&lt;sup&gt;w&lt;/sup&gt;</th>
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<sup>a</sup>Seed Source: CR=Crookham. HM=Harris Moran. RU=Rupp. ST=Stokes. SW=Seedway. SY=Syngenta.
<sup>b</sup>Days from planting to harvest. Predicted number is from seed supplier.
<sup>c</sup>GDD=corn growing degree days.
<sup>d</sup>Husk cover, tip fill: 1=worst. 5=best. Husk tightness: 1=loose. 3=very tight. Overall: 1=worst. 9=best.
<sup>e</sup>Flavor: F=fair. G=good. VG=very good. E=excellent. Summary of ratings by one person for three ears per cultivar.
<sup>f</sup>Means differing by more than this amount are significantly different at $P\leq .05$ based on Fisher's Protected LSD. – AOV not performed.
Sweet corn variety trials have been conducted by Purdue in Northern Indiana for many years. Emphasis is placed on bicolor varieties for fresh market use. This presentation illustrates results of the 2009 trials.

We conducted separate trials for the two major ‘pollination groups’. One trial included se’s and synergistics. The other included sh2’s and augmented supersweets. Cross pollination within a group will result in palatable sweet corn. However, the full benefit of breeding for improved eating quality would be best assessed if a cultivar were only pollinated by itself.

Methods for the two pollination groups are similar, and summarized here. We grow on a sandy loam soil with overhead irrigation and follow university recommended production practices. A detailed description of the methods and results will be published in the Midwest Vegetable Trial Report for 2009 at www.hort.purdue.edu/fruitveg/reports.shtml
The 2009 growing season was drier and cooler than normal. From planting to the end of harvest we were 134 growing degree days behind normal. July was particularly cool. During the same period rainfall was almost 4.5 inches below normal.

We count and weigh marketable ears, measure length and width after husking, and take ratings on various ear and plant characteristics.

Good husk cover is desirable to protect the ear tip. This is our rating system:
- Best: 5 = more than 2 inches of husk beyond tip of cob
- 4 = 1.25 to 2 inches
- 3 = 0.75 to 1.25 inch
- 2 = less than .75 inch
- Worst: 1 = ear exposed

Husk tightness is also rated using a 1 to 3 scale, with 1 being loose and 3 tight.

Good tip fill makes an attractive ear. This is our rating system for tip fill:
- 5 = 0 in.
- 4 = 0 to 1/2 in.
- 3 = 1/2 to 1 in.
- 2 = > 1 in.
- 1 = > 2 in.
One person evaluated raw flavor at harvest. For sh2 types pericarp toughness was also noted.

The remainder of the slides summarize performance of the varieties and advanced lines, beginning with the bicolor se’s and synergistics, from earliest to latest maturity. Each slide shows the name or number, the days to harvest (average) for this trial, endosperm type, and yield, ear length and diameter, husk cover, tip fill, and early vigor ratings. Fastlane had emergence of 91% and 98%, 10 and 24 days after planting, respectively. Early vigor was rated 4 on a scale of 1 (low) to 9 (high). The final stand was 34 per plot. By harvest time, vigor was rated 3.0. Plant height was rated 2.0 (1 = less than 5 ft.; 3 = over 6 ft.), suckering was rated 1.0 (1 = none; 5 = much), and average ear height, measured to the middle of the ear, was 22 inches. This variety was harvested an average 75 days after seeding. Yield averaged 1452 dozen per acre and 6.2 tons per acre. Ears averaged 0.72 pound each, 7.6 inches long and 1.7 inches wide. Ear shanks averaged 5.1 inches from stalk to base of ear. Husk cover was rated 1.6, husk tightness 1.0, and tip fill 3.8. Flags leaves were short to long. Flavor was rated very good. Overall ear appearance was rated 3.3 on a scale of 1 (poor) to 9 (excellent). se Varieties 2009

HMX 6358BES had emergence of 92% and 91%, 10 and 24 days after planting, respectively. Early vigor was rated 7.3 on a scale of 1 (low) to 9 (high). The final stand was 35 per plot. By harvest time, vigor was rated 5.7. Plant height was rated 2.0 (1 = less than 5 ft.; 3 = over 6 ft.), suckering was rated 3.0 (1 = none; 5 = much), and average ear height, measured to the middle of the ear, was 20 inches. This variety was harvested an average 77 days after seeding. Yield averaged 1565 dozen per acre and 6.0 tons per acre. Ears averaged 0.64 pound each, 7.9 inches long and 1.8 inches wide. Ear shanks averaged 2.8 inches from stalk to base of ear. Husk cover was rated 2.3, husk tightness 1.1, and tip fill 4.8. Flags leaves were short to medium. Flavor was rated fair to very good. Overall ear appearance was rated 5.0 on a scale of 1 (poor) to 9 (excellent). se Varieties 2009

Vitality had emergence of 92% and 97%, 10 and 24 days after planting, respectively. Early vigor was rated 6.0 on a scale of 1 (low) to 9 (high). The final stand was 35 per plot. By harvest time, vigor was rated 4.0. Plant height was rated 2.0 (1 = less than 5 ft.; 3 = over 6 ft.), suckering was rated 3.7 (1 = none; 5 = much), and average ear height, measured to the middle of the ear, was 22 inches. This variety was harvested an average 77 days after seeding. Yield averaged 1565 dozen per acre and 5.7 tons per acre. Ears averaged 0.61 pound each, 7.3 inches long and 1.8 inches wide. Ear shanks averaged 2.8 inches from stalk to base of ear. Husk cover was rated 2.8, husk tightness 1.7, and tip fill 4.4. Flags leaves were short to medium. Flavor was rated very good to good. Overall ear appearance was rated 5.7 on a scale of 1 (poor) to 9 (excellent). se Varieties 2009

7405
7437
Trinity had emergence of 100% and 98%, 10 and 24 days after planting, respectively. Early vigor was rated 6.7 on a scale of 1 (low) to 9 (high). The final stand was 35 per plot. By harvest time, vigor was rated 4.0. Plant height was rated 2.0 (1 = less than 5 ft.; 3 = over 6 ft.), suckering was rated 1.3 (1 = none; 5 = much), and average ear height, measured to the middle of the ear, was 20 inches. This variety was harvested an average 77 days after seeding. Yield averaged 1581 dozen per acre and 6.3 tons per acre. Ears averaged 0.66 pound each, 7.3 inches long and 1.8 inches wide. Ear shanks averaged 3.3 inches from stalk to base of ear. Husk cover was rated 3.4, husk tightness 1.8, and tip fill 4.0. Flavor was rated good to excellent. Overall ear appearance was rated 4.0 on a scale of 1 (poor) to 9 (excellent).  

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Early se/syn varieties, 2009.

Among the four varieties harvested 75 to 77 days after planting (DAP), yield did not differ significantly whether measured in dozens or tons per acre. HMX 6358BES and Fastlane produced longer ears than Vitality and Trinity. Husk cover was judged acceptable for Trinity, not quite that good for HMX 6358BES and Vitality, and poor for Fastlane.

Navajo had emergence of 74% and 68%, 10 and 24 days after planting, respectively. Early vigor was rated 3 on a scale of 1 (low) to 9 (high). The final stand was 27 per plot. By harvest time, vigor was rated 4.7. Plant height was rated 2.0 (1 = less than 5 ft.; 3 = over 6 ft.), suckering was rated 2.3 (1 = none; 5 = much), and average ear height, measured to the middle of the ear, was 23 inches. This variety was harvested an average 79 days after seeding. Yield averaged 1242 dozen per acre and 6.6 tons per acre. Ears averaged 0.88 pound each, 7.4 inches long and 2.0 inches wide. Ear shanks averaged 3.7 inches from stalk to base of ear. Husk cover was rated 4.4, husk tightness 2.0, and tip fill 4.1. Flavor was rated fair. Overall ear appearance was rated 7.7 on a scale of 1 (poor) to 9 (excellent).  

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Luscious had emergence of 71% and 69%, 10 and 24 days after planting, respectively. Early vigor was rated 3 on a scale of 1 (low) to 9 (high). The final stand was 28 per plot. By harvest time, vigor was rated 6.7. Plant height was rated 2.7 (1 = less than 5 ft.; 3 = over 6 ft.), suckering was rated 2.0 (1 = none; 5 = much), and average ear height, measured to the middle of the ear, was 27 inches. This variety was harvested an average 81 days after seeding. Yield averaged 1210 dozen per acre and 7.1 tons per acre. Ears averaged 0.98 pound each, 7.6 inches long and 2.1 inches wide. Ear shanks averaged 4.0 inches from stalk to base of ear. Husk cover was rated 4.0, husk tightness 1.1, and tip fill 4.1. Flavor was rated fair. Overall ear appearance was rated 7.7 on a scale of 1 (poor) to 9 (excellent).  

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sweet corn 2009

Among the five entries harvested 79 to 81 DAP, yields tended to be lower for Navajo and Luscious, probably because they had low emergence (data not shown) and therefore reduced plant stands. Ear quality was generally acceptable to good. The two not shown in this photo were CSYBF7-256 and CSYBF7-257.

Montauk had emergence of 101% and 100%, 10 and 24 days after planting, respectively. Early vigor was rated 5.7 on a scale of 1 (low) to 9 (high). The final stand was 35 per plot. By harvest time, vigor was rated 8.0. Plant height was rated 3.0 (1=less than 5 ft.; 3 = over 6 ft.), suckering was rated 3.3 (1=none; 5 =much), and average ear height, measured to the middle of the ear, was 33 inches. This variety was harvested an average 86 days after planting. Yield averaged 1646 dozen per acre and 10.8 tons per acre. Ears averaged 1.09 pound each, 8.3 inches long and 2.1 inches wide. Ear shanks averaged 5.4 inches from stalk to base of ear. Husk cover was rated 4.9, husk tightness 2.4, and tip fill 3.9. Flags leaves were medium. Flavor was rated very good to excellent. Overall ear appearance was rated 7.3 on a scale of 1 (poor) to 9 (excellent). See Varieties 2009.

Providence had emergence of 101% and 102%, 10 and 24 days after planting, respectively. Early vigor was rated 4.7 on a scale of 1 (low) to 9 (high). The final stand was 35 per plot. By harvest time, vigor was rated 8.0. Plant height was rated 2.7 (1=less than 5 ft.; 3 = over 6 ft.), suckering was rated 2.0 (1=none; 5 =much), and average ear height, measured to the middle of the ear, was 29 inches. This variety was harvested an average 88 days after planting. Yield averaged 1662 dozen per acre and 9.8 tons per acre. Ears averaged 0.99 pound each, 8.5 inches long and 1.8 inches wide. Ear shanks averaged 5.2 inches from stalk to base of ear. Husk cover was rated 4.8, husk tightness 2.3, and tip fill 3.0. Flags leaves were short. Flavor was rated excellent to very good. Overall ear appearance was rated 5.0 on a scale of 1 (poor) to 9 (excellent). See Varieties 2009.

E. Maynard, Purdue University

January, 2006
GH 0851 had emergence of 102% and 103%, 10 and 24 days after planting, respectively. Early vigor was rated 7.3 on a scale of 1 (low) to 9 (high). The final stand was 35 per plot. By harvest time, vigor was rated 6.7. Plant height was rated 2.3 (1=less than 5 ft.; 3 = over 6 ft.), suckering was rated 3.3 (1=none; 5 =much), and average ear height, measured to the middle of the ear, was 27 inches. This variety was harvested an average 87 days after seeding. Yield averaged 1678 dozen per acre and 9.7 tons per acre. Ears averaged 0.97 pound each, 8.4 inches long and 1.8 inches wide. Ear shanks averaged 4.7 inches from stalk to base of ear. Husk cover was rated 4.2, husk tightness 2.7, and tip fill 4.6. Flags leaves were short. Flavor was rated excellent to very good. Overall ear appearance was rated 5.7 on a scale of 1 (poor) to 9 (excellent). se Varieties 2009

Among the four bicolor entries harvested 83 or more days after planting, yield in dozens per acre was similar. (BC0822 and CSEBF7-253 are not shown on this slide). Montauk produced the greatest and BC 0822 the least yield in tons per acre. Montauk and Providence produced the longest, and BC 0822 the shortest ears in this maturity class. Ear quality was generally reasonable. GH 0851 was the only named yellow variety in this trial. Across all maturity ranges, varieties in the se/synergistic pollination group that received flavor ratings of very good to excellent, or better, included BC 0822, CSYBF7-256, CSYBF7-257, GH 0851, and Providence. Fastlane consistently received a rating of very good.

2171 had emergence of 88% and 91%, 10 and 24 days after planting, respectively. Early vigor was rated 7.0 on a scale of 1 (low) to 9 (high). The final stand was 34.7 per plot (20,134 per acre). By harvest time, vigor was rated 4.7. Plant height was rated 2.0 (1=less than 5 ft.; 3 = over 6 ft.), suckering was rated 2.7 (1=none; 5 =much), and average ear height, measured to the middle of the ear, was 24 inches. This variety was harvested an average 79 days after seeding. Yield averaged 1516 dozen per acre and 6.9 tons per acre. Ears averaged 0.75 pound each, 7.1 inches long and 1.9 inches wide. Ear shanks averaged 3.8 inches from stalk to base of ear. Husk cover was rated 3.0 (1=poor, 5=excellent), husk tightness 1.7 (1=loose, 3=tight), and tip fill 4.9 (1=poor, 5=excellent). Flags leaves were short to medium. Flavor was rated very good to good, with tough to somewhat tough pericarp. Overall ear appearance was rated 6.3 on a scale of 1 (poor) to 9 (excellent). sh2 Varieties 2009
2170 had emergence of 85% and 86%, 10 and 24 days after planting, respectively. Early vigor was rated 6.3 on a scale of 1 (low) to 9 (high). The final stand was 33.7 per plot (19,554 per acre). By harvest time, vigor was rated 4.3. Plant height was rated 2.0 (1=less than 5 ft.; 3 = over 6 ft.), suckering was rated 3.0 (1=none; 5 =much), and average ear height, measured to the middle of the ear, was 25 inches. This variety was harvested an average 80 days after seeding. Yield averaged 1339 dozen per acre and 7.0 tons per acre. Ears averaged 0.87 pound each, 8.1 inches long and 1.9 inches wide. Ear shanks averaged 4.1 inches from stalk to base of ear. Husk cover was rated 4.1 (1=poor, 5=excellent), husk tightness 1.9 (1=loose, 3=tight), and tip fill 4.8 (1=poor, 5=excellent). Flags leaves were short to long. Flavor was rated very good. Overall ear appearance was rated 6.7 on a scale of 1 (poor) to 9 (excellent). sh2 Varieties 2009.

274A had emergence of 83% and 80%, 10 and 24 days after planting, respectively. Early vigor was rated 7.7 on a scale of 1 (low) to 9 (high). The final stand was 31.7 per plot (18,392 per acre). By harvest time, vigor was rated 5.0. Plant height was rated 1.7 (1=less than 5 ft.; 3 = over 6 ft.), suckering was rated 2.3 (1=none; 5 =much), and average ear height, measured to the middle of the ear, was 22 inches. This variety was harvested an average 80 days after seeding. Yield averaged 1355 dozen per acre and 7.7 tons per acre. Ears averaged 0.96 pound each, 7.9 inches long and 2.0 inches wide. Ear shanks averaged 4.0 inches from stalk to base of ear. Husk cover was rated 2.8 (1=poor, 5=excellent), husk tightness 1.3 (1=loose, 3=tight), and tip fill 5.0 (1=poor, 5=excellent). Flags leaves were medium to short. Flavor was rated very good to good. Overall ear appearance was rated 6.0 on a scale of 1 (poor) to 9 (excellent). sh2 Varieties 2009.

Fantastic had emergence of 68% and 69%, 10 and 24 days after planting, respectively. Early vigor was rated 5.7 on a scale of 1 (low) to 9 (high). The final stand was 27.7 per plot (16,069 per acre). By harvest time, vigor was rated 4.7. Plant height was rated 2.0 (1=less than 5 ft.; 3 = over 6 ft.), suckering was rated 3.3 (1=none; 5 =much), and average ear height, measured to the middle of the ear, was 24 inches. This variety was harvested an average 80 days after seeding. Yield averaged 1275 dozen per acre and 6.9 tons per acre. Ears averaged 0.91 pound each, 7.5 inches long and 1.9 inches wide. Ear shanks averaged 4.4 inches from stalk to base of ear. Husk cover was rated 2.7 (1=poor, 5=excellent), husk tightness 1.6 (1=loose, 3=tight), and tip fill 4.9 (1=poor, 5=excellent). Flags leaves were medium to long. Flavor was rated very good to good. Overall ear appearance was rated 6.7 on a scale of 1 (poor) to 9 (excellent). sh2 Varieties 2009.

2573 had emergence of 71% and 77%, 10 and 24 days after planting, respectively. Early vigor was rated 5.0 on a scale of 1 (low) to 9 (high). The final stand was 30.7 per plot (17,811 per acre). By harvest time, vigor was rated 5.0. Plant height was rated 2.0 (1=less than 5 ft.; 3 = over 6 ft.), suckering was rated 3.0 (1=none; 5 =much), and average ear height, measured to the middle of the ear, was 23 inches. This variety was harvested an average 81 days after seeding. Yield averaged 1355 dozen per acre and 6.5 tons per acre. Ears averaged 0.79 pound each, 7.3 inches long and 1.9 inches wide. Ear shanks averaged 4.5 inches from stalk to base of ear. Husk cover was rated 2.9 (1=poor, 5=excellent), husk tightness 1.4 (1=loose, 3=tight), and tip fill 5.0 (1=poor, 5=excellent). Flags leaves were medium to long. Flavor was rated very good to excellent. Overall ear appearance was rated 4.7 on a scale of 1 (poor) to 9 (excellent). sh2 Varieties 2009.
Optimum had emergence of 92% and 93%, 10 and 24 days after planting, respectively. Early vigor was rated 4.7 on a scale of 1 (low) to 9 (high). The final stand was 34.3 per plot (19,941 per acre). By harvest time, vigor was rated 5.0. Plant height was rated 2.7 (1=less than 5 ft.; 3 = over 6 ft.), suckering was rated 3.7 (1=none; 5 =much), and average ear height, measured to the middle of the ear, was 24 inches. This variety was harvested an average 81 days after seeding. Yield averaged 1468 dozen per acre and 6.7 tons per acre. Ears averaged 0.77 pound each, 7.6 inches long and 1.9 inches wide. Ear shanks averaged 4.1 inches from stalk to base of ear. Husk cover was rated 4.0 (1=poor, 5=excellent), husk tightness 2.2 (1=loose, 3=tight), and tip fill 4.9 (1=poor, 5=excellent). Flags leaves were short to long. Flavor was rated excellent. Overall ear appearance was rated 7.0 on a scale of 1 (poor) to 9 (excellent).

Bueno GFJ had emergence of 83% and 83%, 10 and 24 days after planting, respectively. Early vigor was rated 5.3 on a scale of 1 (low) to 9 (high). The final stand was 33.3 per plot (19,360 per acre). By harvest time, vigor was rated 4.7. Plant height was rated 3.0 (1=less than 5 ft.; 3 = over 6 ft.), suckering was rated 3.7 (1=none; 5 =much), and average ear height, measured to the middle of the ear, was 25 inches. This variety was harvested an average 82 days after seeding. Yield averaged 1533 dozen per acre and 7.3 tons per acre. Ears averaged 0.79 pound each, 7.5 inches long and 1.9 inches wide. Ear shanks averaged 3.6 inches from stalk to base of ear. Husk cover was rated 4.0 (1=poor, 5=excellent), husk tightness 2.2 (1=loose, 3=tight), and tip fill 4.8 (1=poor, 5=excellent). Flags leaves were short to long. Flavor was rated good to excellent, with variable pericarp toughness. Overall ear appearance was rated 6.7 on a scale of 1 (poor) to 9 (excellent).

Awesome had emergence of 88% and 90%, 10 and 24 days after planting, respectively. Early vigor was rated 5.7 on a scale of 1 (low) to 9 (high). The final stand was 34.3 per plot (19,941 per acre). By harvest time, vigor was rated 5.3. Plant height was rated 1.7 (1=less than 5 ft.; 3 = over 6 ft.), suckering was rated 2.7 (1=none; 5 =much), and average ear height, measured to the middle of the ear, was 23 inches. This variety was harvested an average 83 days after seeding. Yield averaged 1565 dozen per acre and 8.5 tons per acre. Ears averaged 0.91 pound each, 7.4 inches long and 2.1 inches wide. Ear shanks averaged 5.2 inches from stalk to base of ear. Husk cover was rated 3.7 (1=poor, 5=excellent), husk tightness 2.3 (1=loose, 3=tight), and tip fill 5.0 (1=poor, 5=excellent). Flags leaves were medium to long. Flavor was rated very good. Overall ear appearance was rated 7.0 on a scale of 1 (poor) to 9 (excellent).
January, 2006

**HMX 8343S** had emergence of 93% and 97% 10 and 24 days after planting, respectively. Early vigor was rated 5.3. Plant height was rated 2.3 (1=less than 5 ft.; 3 = over 6 ft.), suckering was rated 3.0 (1=none; 5 =much), and average ear height, measured to the middle of the ear, was 31 inches. This variety was harvested an average 83 days after planting. Yield averaged 1630 dozen per acre and 7.3 tons per acre. Ears averaged 0.75 pound each, 7.6 inches long and 1.8 inches wide. Ear shanks averaged 4.4 inches from stalk to base of ear. Husk cover was rated 2.4 (1=poor, 5=excellent), husk tightness 1.8 (1=loose, 3=tight), and tip fill 4.8 (1=poor, 5=excellent). Flags leaves were short to medium. Flavor was rated very good to good. Overall ear appearance was rated 5.0 on a scale of 1 (poor) to 9 (excellent).

E. Maynard, Purdue University

January, 2006

**Attraction** had emergence of 78% and 78% 10 and 24 days after planting, respectively. Early vigor was rated 5.3. Plant height was rated 1.7 (1=less than 5 ft.; 3 = over 6 ft.), suckering was rated 1.3 (1=none; 5 =much), and average ear height, measured to the middle of the ear, was 23 inches. This variety was harvested an average 84 days after planting. Yield averaged 1371 dozen per acre and 6.8 tons per acre. Ears averaged 0.82 pound each, 6.9 inches long and 2.0 inches wide. Ear shanks averaged 4.0 inches from stalk to base of ear. Husk cover was rated 3.2 (1=poor, 5=excellent), husk tightness 2.0 (1=loose, 3=tight), and tip fill 4.8 (1=poor, 5=excellent). Flags leaves were short to medium. Flavor was rated very good to excellent. Overall ear appearance was rated 5.0 on a scale of 1 (poor) to 9 (excellent).

E. Maynard, Purdue University

January, 2006

**BSS 0982** had emergence of 87% and 88% 10 and 24 days after planting, respectively. Early vigor was rated 5.3. Plant height was rated 3.0 (1=less than 5 ft.; 3 = over 6 ft.), suckering was rated 4.3 (1=none; 5 =much), and average ear height, measured to the middle of the ear, was 25 inches. This variety was harvested an average 84 days after planting. Yield averaged 1484 dozen per acre and 7.1 tons per acre. Ears averaged 0.80 pound each, 7.3 inches long and 2.0 inches wide. Ear shanks averaged 4.2 inches from stalk to base of ear. Husk cover was rated 4.1 (1=poor, 5=excellent), husk tightness 2.1 (1=loose, 3=tight), and tip fill 4.6 (1=poor, 5=excellent). Flags leaves were medium to long. Flavor was rated very good and pericarp somewhat tough to tough. Overall ear appearance was rated 6.0 on a scale of 1 (poor) to 9 (excellent).

E. Maynard, Purdue University

January, 2006

**Fusion** had emergence of 72% and 73% 10 and 24 days after planting, respectively. Early vigor was rated 3.0. Plant height was rated 2.7 (1=less than 5 ft.; 3 = over 6 ft.), suckering was rated 2.3 (1=none; 5 =much), and average ear height, measured to the middle of the ear, was 23 inches. This variety was harvested an average 85 days after planting. Yield averaged 1307 dozen per acre and 7.7 tons per acre. Ears averaged 0.98 pound each, 7.4 inches long and 2.0 inches wide. Ear shanks averaged 4.3 inches from stalk to base of ear. Husk cover was rated 4.7 (1=poor, 5=excellent), husk tightness 1.4 (1=loose, 3=tight), and tip fill 4.8 (1=poor, 5=excellent). Flags leaves were short to medium. Flavor was rated very good and pericarp tough to very tough. Overall ear appearance was rated 7.7 on a scale of 1 (poor) to 9 (excellent).

E. Maynard, Purdue University
Legion had emergence of 103% and 106%, 10 and 24 days after planting, respectively. Early vigor was rated 8.0 on a scale of 1 (low) to 9 (high). The final stand was 35.0 per plot (20,328 per acre). By harvest time, vigor was rated 5.7. Plant height was rated 3.0 (1=less than 5 ft.; 3 = over 6 ft.), suckering was rated 1.7 (1=none; 5 =much), and average ear height, measured to the middle of the ear, was 32 inches. This variety was harvested an average 87 days after seeding. Yield averaged 1646 dozen per acre and 7.4 tons per acre. Ears averaged 0.75 pound each, 7.5 inches long and 1.8 inches wide. Ear shanks averaged 5.0 inches from stalk to base of ear. Husk cover was rated 2.4 (1=poor, 5=excellent), husk tightness 1.3 (1=loose, 3=tight), and tip fill 4.3 (1=poor, 5=excellent). Flags leaves were short to medium. Flavor was rated good and pericarp very tough. Overall ear appearance was rated 6.7 on a scale of 1 (poor) to 9 (excellent).

HMX 7368D had emergence of 85% and 92%, 10 and 24 days after planting, respectively. Early vigor was rated 4.7 on a scale of 1 (low) to 9 (high). The final stand was 35.0 per plot (20,328 per acre). By harvest time, vigor was rated 5.7. Plant height was rated 2.3 (1=less than 5 ft.; 3 = over 6 ft.), suckering was rated 2.7 (1=none; 5 =much), and average ear height, measured to the middle of the ear, was 30 inches. This variety was harvested an average 84 days after seeding. Yield averaged 1630 dozen per acre and 7.2 tons per acre. Ears averaged 0.74 pound each, 6.8 inches long and 2.0 inches wide. Ear shanks averaged 3.3 inches from stalk to base of ear. Husk cover was rated 4.1 (1=poor, 5=excellent), husk tightness 1.9 (1=loose, 3=tight), and tip fill 4.9 (1=poor, 5=excellent). Flags leaves were short to medium. Flavor was rated excellent to very good. Overall ear appearance was rated 6.3 on a scale of 1 (poor) to 9 (excellent).
Among the five bicolor varieties harvested on average 79 to 80 DAP, 2171 (not shown on this slide) produced more marketable ears per acre than Fantastic or CSABF4-157 (not shown); and 2170 and 274A produced ear numbers in between 2171 and Fantastic. Among these five varieties, 2170 and 274A had the longest ears and 2171 the shortest. Husk cover and tightness tended to be better for 2170 than for the other early varieties.

(Note, varieties may have been harvested on more than one date.)

Among the five bicolor varieties harvested on average 81 to 83 DAP, the most productive, HMX 8343S (not shown on this slide), produced significantly more marketable ears per acre than the least productive, 2573 (previous slide). Awesome, Bueno GFJ (previous slide), 2673 (previous slide) and Optimum didn’t differ significantly from HMX 8343S. Ear length for this group ranged from 7.2 to 7.6 inches. Optimum, Bueno GFJ, and Awesome were judged to have better husk cover and tighter husks than the other three varieties in this maturity range.

Three yellow varieties were harvested 80 to 84 DAP: Ravelin, HMX 8346S, and HMX 7368D. They didn’t differ significantly in number of marketable ears produced. Ears of Ravelin averaged nearly an inch longer than ears of the HMX lines. Husk cover was acceptable on all three varieties, but better on the HMX lines than on Ravelin.

(Note, varieties may have been harvested on more than one date.)

Of four bicolor varieties harvested 84 or more days after planting, Legion and BSS 0982 produced significantly more marketable ears per acre than Fusion, and Attraction was in the middle. Attraction had the shortest ears in this group at 6.9 inches; the other three had ears 7.3–7.5 inches long. Legion had the narrowest ears of this group. Fusion and BSS 0982 had good to very good husk cover and Attraction had acceptable husk cover. Husk cover for Legion was only fair.

Across all harvest dates, Varieties that consistently received flavor ratings of very good to excellent or better included 2573, Attraction, HMX 8346S and HMX 7368D. Varieties consistently noted to have a tough or very tough pericarp included Fusion, Legion, and Ravelin.

It is risky to make major decisions about cultivars based on results from a single year’s trial at one location. The information from this trial should be combined with information about varieties from other locations and years and your own experience.
To manage wildlife damage one must first define the problem (Dolbeer et al. 1994). Crop damage may be obvious to producers, but management efforts must be focused on the species causing the damage. All too often, property owners suffering economic loss from wildlife damage make false assumptions as to what species is causing the damage. To successfully reduce wildlife damage, one must go beyond perception to positively identify the species responsible for the damage. For example, a study in Indiana found that corn producers perceived that deer damage was twice as high as raccoon damage; however, the study showed that raccoon damage to corn was actually 8 times higher than deer damage (MacGowan et al. 2006). Identification of the animal causing damage is accomplished using evidence, facts, and available references. There are numerous wildlife damage identification publications and many references on the internet to assist in identifying species responsible for damage. A critical point to consider is that the species most often observed in and around crops may not necessarily be the species causing the damage. Bite or beak marks from the animal’s actual feeding may be more critical to positive identification of the damaging species than just simply identifying an animal’s presence. When damage is occurring at times or in locations where direct observation is impossible, you may need to examine tracks or sign, which can include scat (droppings), feathers, or fur. Additionally, for mammals, sign such as crawl-unders, digging, runs, or slides in the area may assist in identification.

After positive identification, the next step is to identify the protected status of that species. This information is necessary to identify the legal aspects of management as well as for points of contact of agencies that may assist you. Most birds are federally protected under the Migratory Bird Treaty Act (Title 50, Code of Federal Regulations). Most mammals are protected by state law. There are, of course, exceptions to these generalities, but knowing if it is a bird or mammal makes a reasonable starting point. For most common species that cause damage, there are legal allowances to manage nuisance animals, such as depredation orders or nuisance permits. For example, blackbirds causing damage may fall under the Blackbird Depredation Order (Title 50, Code of Federal Regulations, Part 21.43) and potentially can be managed without a Federal permit. Most states allow mammals causing damage to be managed under either a permit system or by special nuisance, or damage laws. Landowners managing wildlife damage should pay particular attention to species that are considered threatened or endangered under Federal or state law, as these usually have specific guidance—if they can be managed at all. For information about what can be done to manage various wildlife species, start by contacting the respective state and federal wildlife offices in your area.

Because alleviating wildlife damage usually involves significant time, effort, and finances, there is an amount of damage that often must be tolerated. Considering that the cost associated with alleviating wildlife damage may exceed the actual monetary loss attributed to the damage, this tolerance level simply may be financially based (Dolbeer 1981). However, once that level of acceptable damage has been
exceeded and the threshold of tolerance has been breached, wildlife damage management options should be identified and clearly understood before they are implemented. There is rarely one method that will solve all wildlife damage, and spending significant amounts of money on the problem may not reduce the damage. Adapting or modifying available resources and combining those with other methods may reduce damage to a tolerable level without significant cost. Seldom will any damage management completely solve wildlife damage, but if damage can be reduced to tolerable levels a program can be deemed successful, especially if it can be done cheaply.

Most species that cause damage are those that have adapted to survive in varying environments. Thus, they will learn and adapt to any single non-lethal technique or tool used to reduce wildlife damage. For successful long term management of wildlife damage, it is often necessary to apply the principle of Integrated Wildlife Damage Management (IWDM). The concept to IWDM is that by using multiple tools and methods, it will create a synergistic effect to prevent wildlife from adapting or habituating to any single technique. Thus, integrating multiple management methods may prove effective where single methods fail, and may extend the period of effectiveness over any single technique.

Before putting significant cost into an expensive management tool or method, it may be beneficial to consider the basic principles behind wildlife damage management. Damage management methods can be grouped into the general categories of: cultural practices & habitat modification, harassment, repellants, exclusion, and population management. It is important to understand the theory behind each of these categories and the methods involved so that available tools or products can be adapted, modified, or incorporated into a successful IWDM program. Different management tools or methods may work in different situations, seasons or for different species. Again there is rarely a single “silver-bullet” technique that will work in every situation. Thus, if you have some positive but limited results from one method, then it may be worthwhile to either change or modify that method or to combine it with other techniques to get a more lasting or comprehensive effect.

Cultural practices and habitat modification that may help reduce wildlife damage include changing production methods or modifying the habitat that the wildlife causing damage is attracted to. When crops are being damaged, cultural practices will be limited by growing season and available resources. Planting an alternate crop that is less attractive to wildlife in your area may be an option. Planting earlier or later in the year when there may be other food sources around may also reduce the impact to crops (Dolbeer 1980). The location of crops in regard to wildlife habitat can be a significant factor in the amount of wildlife damage suffered. Deer and raccoon damage to crops can be significantly influenced by proximity to forested habitat (DeVault et al. 2007a). Proximity to marsh areas can affect blackbird damage to sweet corn (Dolbeer 1980). Habitat management to reduce wildlife damage can include planting buffer crops around the crop you are protecting, or using alternate food plots to draw wildlife away from your crops. There has been success with using decoy plots to reduce blackbird damage in North Dakota (Hagy et al. 2008). Habitat management also can include managing the nearby habitat or attractants that are influencing crop damage. For example, in North Dakota blackbird damage to agriculture has been reduced by using herbicides to remove cattails which caused the dispersal of nearby blackbird roosts (Linz et al. 1995).

Harassment, repellants and exclusion include using frightening techniques or repellants to scare wildlife away from an area, or methods to exclude wildlife from an area. Harassment techniques are generally visual or sound related. Visual harassment techniques frighten or deter wildlife by using such tools as lights, lasers, Mylar ribbon, balloons, or effigies. Effigies vary greatly and range from the common scarecrow or wildlife decoys, to motion-activated, inflatable effigies or remote-controlled devices. Sonic harassment techniques include pyrotechnics, propane exploders, and distress calls to frighten wildlife by sound. Harassment techniques are especially limited in the amount of time they work. Most wildlife species that regularly use an area will determine that visual deterrents offer no threat, and for some
Repellants may include chemical repellants that use taste aversion, or negative olfactory response, to keep wildlife away from a crop. Such repellants may help reduce bird damage; however, costs are often high to develop and register new repellents for agricultural use (Linz et al. 2006). Recent tests on anthraquinone as a blackbird repellant on seeded crops in North Dakota has shown promising results (Linz pers. comm., Werner et al. In press). Another type of repellant is one based on predator odors. For example, coyote hair has been shown to keep deer from a food source (Seamans et al. 2002). However, coyote or bobcat urine has not had the same effect (Belant et al. 1998). Exclusion is simply excluding the crop or attractant from access by the animal. Exclusion methods include various types of permanent or temporary fencing, grid wires, and netting. Exclusion may not be a cost-effective way to reduce damage to large expanses of some crops such as corn and soybeans (Conover 2002). Though permanent fencing can be expensive means to reduce deer damage to corn, temporary electrified fence may be a more cost beneficial method (Seamans and Vercauteren 2006).

Population management includes removing specific animals causing the damage or reducing the number of animals in the population identified as causing the damage. This may be a temporary solution if surrounding populations are high or other methods are not utilized to deter wildlife from the area. Population management can include the use of toxicants, trapping, or shooting. Toxicants usually require special training and licensing and should be used only as permitted under the label. Removal of raccoons and white-tailed deer through lethal means may help alleviate crop damage in areas where depredation by these species is particularly problematic (DeVault et al. 2007a). For raccoons, trapping can be beneficial to reduce damage, at least in the short term. In general, the harvest of species through hunting and trapping seasons can be the most economical way to reduce crop damage (DeVault et al. 2007b). Permits to remove deer outside of normal hunting seasons, or to remove other damaging species, may be permitted in certain circumstances. Using shooting to reduce large populations of birds may have little overall effect on reducing crop damage (Dolbeer 1998) but may be effective as a means to reinforce harassment with pyrotechnics or propane exploders (Dolbeer 1994).

Management to reduce wildlife damage to crops involves significant time and effort, as there is rarely a simple solution. Most wildlife damage issues can be managed effectively with an IWDM program that may consist of harassment, habitat management, and lethal reductions of wildlife populations (Conover 2002). However, management solutions can be complex and costly. Management of bird damage, for example, is difficult because the birds’ foraging patterns are somewhat unpredictable. Therefore, to reduce bird damage a complex IWDM program that includes habitat management to remove roost habitat, cultural practices such as synchronized planting, harassment with pyrotechnics and propane cannons, and decoy plots may have to be implemented (Hagy et al. 2008). Ultimately it is a choice between the tolerance level of the producer and the costs of financial loss of crops, versus the time, effort or financial investment in methods to protect those crops.
References


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planting buffer crops around the crop you are protecting, or using alternate food plots to draw wildlife
away from your crops. There has been success with using decoy plots to reduce blackbird damage in
North Dakota (Hagy et al. 2008). Habitat management also can include managing the nearby habitat or
attractants that are influencing crop damage. For example, in North Dakota blackbird damage to
agriculture has been reduced by using herbicides to remove cattails which caused the dispersal of nearby
blackbird roosts (Linz et al. 1995).

Harassment, repellants and exclusion include using frightening techniques or repellants to scare wildlife
away from an area, or methods to exclude wildlife from an area. Harassment techniques are generally
visual or sound related. Visual harassment techniques frighten or deter wildlife by using such tools as
lights, lasers, Mylar ribbon, balloons, or effigies. Effigies vary greatly and range from the common scare-
crow or wildlife decoys, to motion-activated, inflatable effigies or remote-controlled devices. Sonic
harassment techniques include pyrotechnics, propane exploders, and distress calls to frighten wildlife by
sound. Harassment techniques are especially limited in the amount of time they work. Most wildlife
species that regularly use an area will determine that visual deterrents offer no threat, and for some
species like raccoons they may not work at all (Boggess 1994). After time, with no other IWDM technique or reinforcement, wildlife will soon ignore visual deterrents. Sonic frightening devices may also be habituated to without some sort of reinforcement (Gilsdorf et al. 2004) or alterations. For example, propane exploders show greater effectiveness when they are moved, their timing is changed or when they are motion-activated (Belant et al 1996). Combining harassment techniques, or reinforcing them with lethal control, may increase the effectiveness of sonic harassment methods for some species.

Repellants may include chemical repellants that use taste aversion, or negative olfactory response, to keep wildlife away from a crop. Such repellents may help reduce bird damage; however, costs are often high to develop and register new repellents for agricultural use (Linz et al. 2006). Recent tests on anthraquinone as a blackbird repellent on seeded crops in North Dakota has shown promising results (Linz pers. comm., Werner et al. In press). Another type of repellent is one based on predator odors. For example, coyote hair has been shown to keep deer from a food source (Seamans et al. 2002). However, coyote or bobcat urine has not had the same effect (Belant et al. 1998). Exclusion is simply excluding the crop or attractant from access by the animal. Exclusion methods include various types of permanent or temporary fencing, grid wires, and netting. Exclusion may not be a cost-effective way to reduce damage to large expanses of some crops such as corn and soybeans (Conover 2002). Though permanent fencing can be expensive means to reduce deer damage to corn, temporary electrified fence may be a more cost beneficial method (Seamans and Vercauteren 2006).

Population management includes removing specific animals causing the damage or reducing the number of animals in the population identified as causing the damage. This may be a temporary solution if surrounding populations are high or other methods are not utilized to deter wildlife from the area. Population management can include the use of toxicants, trapping, or shooting. Toxicants usually require special training and licensing and should be used only as permitted under the label. Removal of raccoons and white-tailed deer through lethal means may help alleviate crop damage in areas where depredation by these species is particularly problematic (DeVault et al. 2007a). For raccoons, trapping can be beneficial to reduce damage, at least in the short term. In general, the harvest of species through hunting and trapping seasons can be the most economical way to reduce crop damage (DeVault et al. 2007b). Permits to remove deer outside of normal hunting seasons, or to remove other damaging species, may be permitted in certain circumstances. Using shooting to reduce large populations of birds may have little overall effect on reducing crop damage (Dolbeer 1998) but may be effective as a means to reinforce harassment with pyrotechnics or propane exploders (Dolbeer 1994).

Management to reduce wildlife damage to crops involves significant time and effort, as there is rarely a simple solution. Most wildlife damage issues can be managed effectively with an IWDM program that may consist of harassment, habitat management, and lethal reductions of wildlife populations (Conover 2002). However, management solutions can be complex and costly. Management of bird damage, for example, is difficult because the birds’ foraging patterns are somewhat unpredictable. Therefore, to reduce bird damage a complex IWDM program that includes habitat management to remove roost habitat, cultural practices such as synchronized planting, harassment with pyrotechnics and propane cannons, and decoy plots may have to be implemented (Hagy et al. 2008). Ultimately it is a choice between the tolerance level of the producer and the costs of financial loss of crops, versus the time, effort or financial investment in methods to protect those crops.
References


