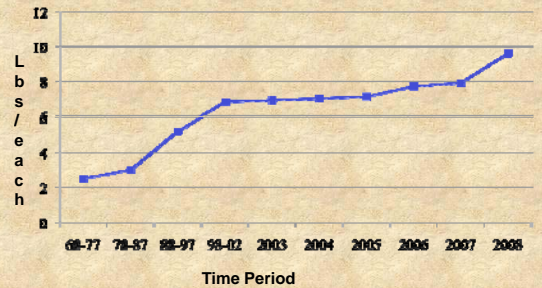


Midwest Bell Pepper Production

Great Plains Vegetable and Fruit Growers Conference
January 2011

By Henry Taber
Iowa State University

US Per Capita Consumption Sweet Bell Peppers

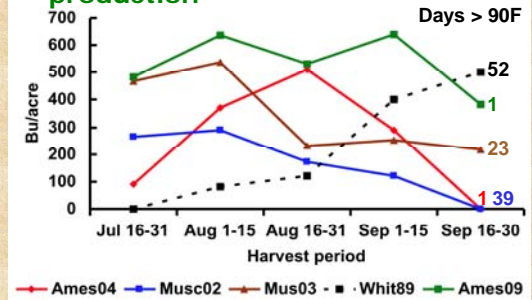


Source: USDA-ERS

15 acres of Iowa bell peppers



The problem = uneven production



Transplants set May 16 to 26, except Ames09 = June 8.

Difficult Crop to Produce

- Warm season, similar to tomato but needing higher temperature to set fruit.
 - need > 70F day and > 60F night
 - not set if > 93F day and < 60F night
- Shallow rooted, 90% of roots in top 12 inches, whereas tomato roots in 2 ½ feet.
- High water requirement whereas tomato is moderate drought tolerant.
- Irrigation system is a must!

Site Selection

(warm is the key)

- Sandy to clay loam
- Must be well-drained
- Ideal = sandy loam: dries out early and warms up faster in the spring.
- Slope = to the south. A 20 degree slope absorbs 6% more heat than level.
- Windbreaks = rye or winter wheat every 50-70 feet or row covers.

Flower Production Depends on Temp

Hot, dry, windy, low humidity = poor fruit production



Need Soil Temp > 65°F

Fruit set poor when:
Night < 60°F or > 72°F

Blossoms drop when
day temp > 93°F

The Solution:

1. Proper variety selection
2. Sequence Planting Dates
3. Avoid Stress
 - Irrigation (use scheduling for uniform rootzone moisture)
 - Plastic mulch (black or white ?)
 - Insect/Disease control

What to look for in a variety?

- Disease tolerance to BLS
1,2,3,4,5 TMV, Phytophthora



- High yield
- Blocky shape
- Large fruit size

Variety Selection

- Site adapted – run your own tests – 3 yrs
- Look for (retail/wholesale):
 - large, blocky, thick-walled fruit with 3-4 lobes. Width to Length ratio = 1.0.
 - Shape and size should hold up through the season
 - Set fruit under adverse weather conditions

Variety Trial Results - Iowa

Ames (central Iowa – loam soils)

- Best = Aristotle X3R, Lafayette, Commandant (elongated, but large size), Revolution

Muscatine (eastern Iowa – sandy soils)

- Best = Aristotle X3R, Patriot
- Lafayette = misshapen fruit

Other States:

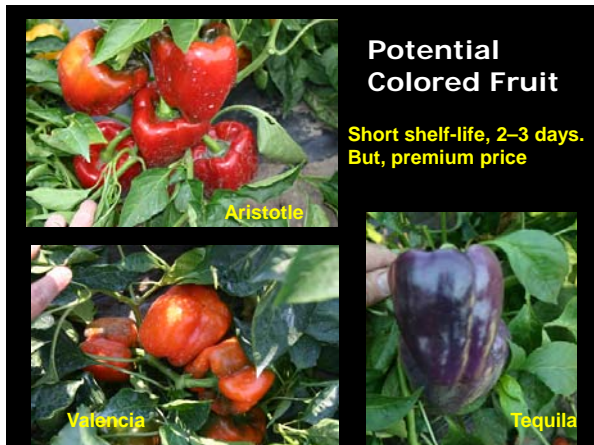
2005 - 2009 –SW MI, OH, IL, IN, IA):

Alliance
Aristotle X3R
Declaration
Intruder
Paladin
Revolution

Not Good:

Hunter (very low yields)
Plato (lack of uniformity)
Snapper (squatty shape)

Note: soil type makes a difference



**Recommend for New Growers:
Bell Peppers**

Early: Paladin
Revolution

Main: Aristotle X3R
Lafayette (not sandy soils)

Trial: Intruder
Archimedes

Red Colored:
Aristotle X3R

Above give high yields and quality with maximum disease tolerance



Intense Production System

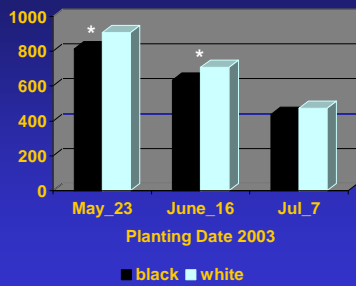
- Plant population increased from traditional 9,000/ac to 14-15,000/ac
- Using plastic mulch (white or black), twin rows per bed, trickle irrigation.
- Windbreaks and row covers for earliness and stand survival.
- Fertilizer management via soil test for P and K
- High rates of N required.

N Management System

- Similar to field corn (not tomatoes) at ~150 lbs N/acre for top yields of large fruit
- Prairie soils with organic matter of 3.1% 3-year rotation of soybeans or corn, oats, then peppers you can adjust N rate to only 50 lbs/acre to account for carryover.
- May need to inject N in trickle system at fruit bulking stage of growth.



Plastic Effect on pepper yield – Muscatine



* = significant difference between black and white plastic mulch

90°F temperature day after transplanting

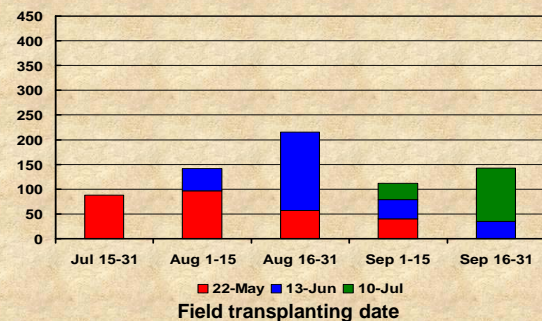


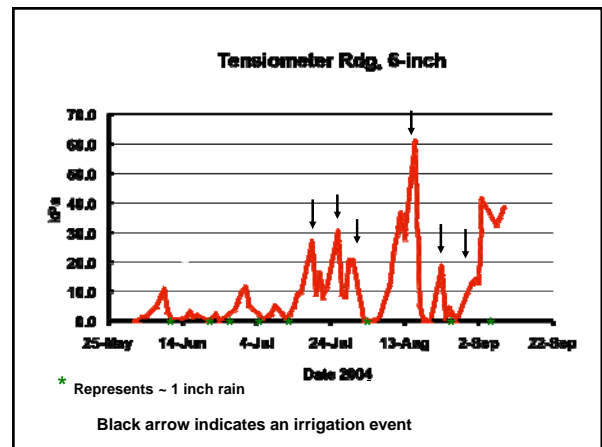
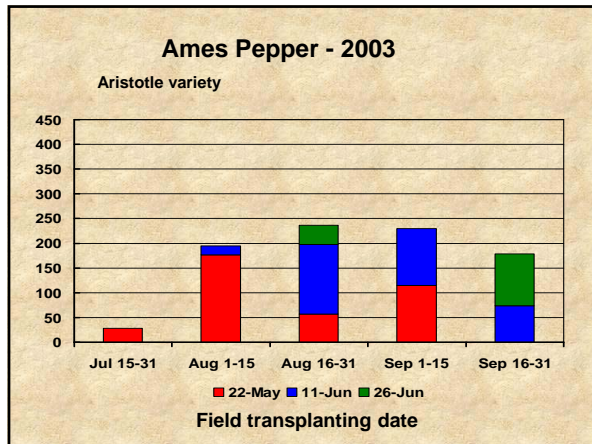
Consider 3 planting dates: (central Iowa)

1. mid-May (about 1 week after frost free date)
2. early June (3 weeks later)
3. late June

Muscatine Pepper - 2002

Bu/acre for each date avg across 12 varieties





Herbicides Cleared for Use ?

Nightshade Family

Product	Tomato	Pepper	Eggplant	Potato
Command	N	Y	N	N
Dacthal	Y	Y	Y	Y
Devrinol	Y	Y	Y	N
Dual Mag	Y, 90	Y, 60	N	Y, 40
Matrix	Y, 45	N	N	Y, 60
Prefar	N	Y	Y	N
Sandea	Y, 30	Y, 30	Y, 30	N
Prowl H ₂ O	Y, 70	Y, 70	N	Y
Sencor	Y, 7	N	N	Y, 60
Treflan	Y	Y	Y	Y

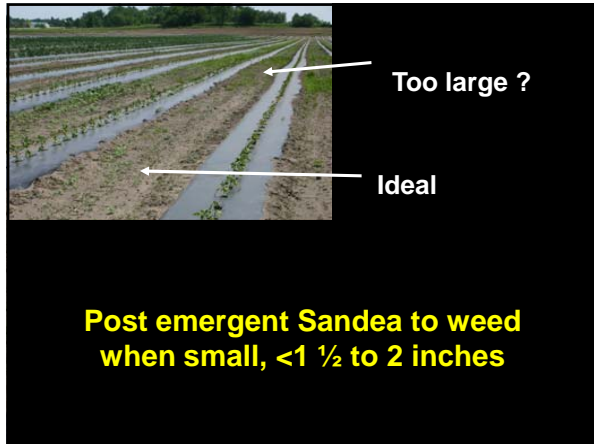
Post application to weeds by Roundup, Gramoxone, Aim, Poast, and Select Max cleared for all.

Weed Control for Peppers

Transplants + Plastic Mulch

All – apply Treflan PPI just before laying plastic mulch. Then, apply Dual + Sandea + Poast directed spray to row middles about 3-4 weeks after transplanting, but before weeds are 1 ½-inch high.

OR – substitute Command PRE for Treflan before laying plastic. However, not for use with banana peppers.



Weed Control for Peppers

Transplants + Plastic Mulch

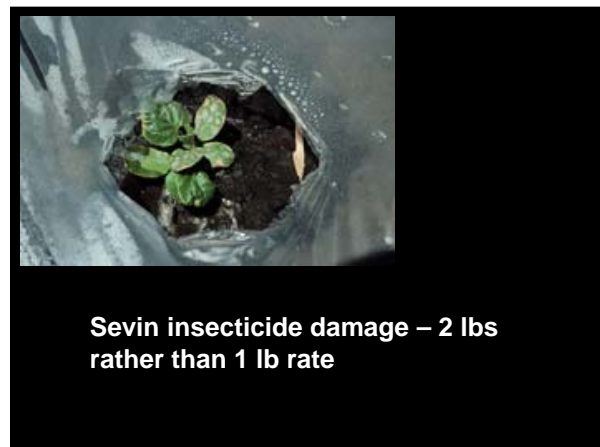
Notes:

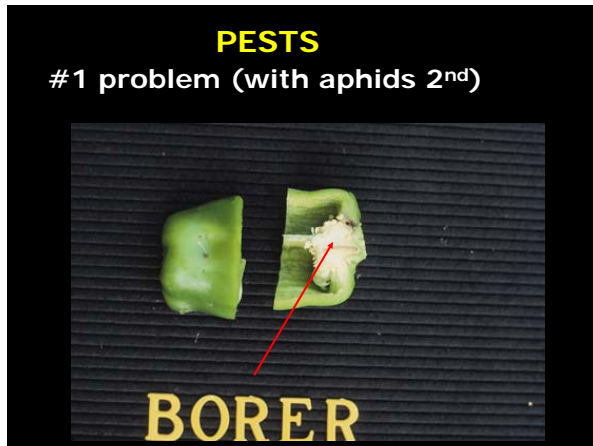
- * Treflan may cause crop stunting under cool, wet spring conditions and is not recommended for the early plantings.
- * May use Devrinol in place of Treflan, but quite expensive and only about 3 weeks of control.
- * **Use the lower rate of Dual Magnum with post directed spray. Note 60 day PHI**
- * Prowl can cause stunting under cool, wet conditions, should use with Dual or Command

Product Performance

	<u>Grass</u>	<u>Brdlwf</u>	<u>Exceptions</u>
Command	Exc	Fair	Lambsquarters, purslane, ragweed, smartweed, vegetable
Dacthal	Exc	None	
Devrinol	Exc	None	Purslane, pigweed
Dual Mag	Exc	Fair	Nightshade, pigweed, purslane
Prefar	Exc	None	
Prowl	Exc	Few	
Sandea *	Poor	Exc	Yellow-nutsedge, morningglory
Treflan	Exc	Poor	Pigweed, purslane, lambsquarters

* Has POST burndown effect on small weeds





Harvest

Maturity judged by:

- Size
- Color
- Firmness

Mature (still green) =

- thick walls
- firm
- shiny, dark green

Immature =

- thin walls
- soft texture

Maturity generally 55 – 80 days from transplanting or 45 to 55 days from flowering.

- At 1st main fork of stem = crown set which has a high % of large fruit.
- If harvest on a regular basis the plant will produce until frost – good for the homeowner. But commercial only 4 - 5 harvests – fruit high on plant and size reduction.

Grades:

- US Fancy = > 3" diam., > 3 1/2 " Lt.
- US #1 = > 2 1/2" diam., > 2 1/2" Lt.

Fruit Storage

- 45-50 °F, RH >70%. If ideal conditions, then about 2 weeks of storage.
- < 45 °F = chilling injury: black, sunken spots develop
- > 50 °F = continue to ripen (fastest color development > 65 °F)
- > 80 °F = a yellow cast

Storage (cont.)

- 'count' = a term produce managers use for size, i.e. very large = 65 count to a box.
- box = 1 1/9 carton holding 28 to 32 lbs
- Chili pepper postharvest handling
 - 45 to 55 °F, 90 to 95% RH
 - 2 to 3 weeks storage
 - never use 'top ice' = chilling injury, water soaked spots on fruit
 - generally, same requirements as: green beans, cucumber, eggplant, and summer squash

Sum Up

1. Select adaptable, proven varieties
 - resistant to BLS 1, 2, 3 (4, 5)
 - TMV, Phytophthora
2. Sequence plant
3. Irrigate (trickle)
4. Insect control – corn borer, aphids

Washer, Sizer, Grading line, GAP Plan



For additional information:

Refer to Midwest Vegetable Production
Guide for Commercial Growers, FG 600

<http://www.btny.purdue.edu/Pubs/ID/ID-56/>

Check Iowa's vegetable progress reports at this
website:

<http://www.public.iastate.edu/~taber/Extension/index.htm>

Google: [Midwest Vegetable Variety Trial Report](#)