

CROP TALK



COMMERCIAL VEGETABLE AND FRUIT CROPS NEWSLETTER

VOLUME 3, NUMBER 3 — NOV. 2007

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Calendar of Events

- Greenhouse Tomato Conference**—Nov. 13
9 AM—4:15 PM, Sturbridge Hotel, Sturbridge, MA
Contact: Leanne Pundt, 860-626-6240, leanne.pundt@uconn.edu
- Poinsettia Cultivar Trials**—Nov. 15, 10 AM—3 PM,
UConn Floriculture Greenhouses, Storrs, CT
Contact: Rich McAvoy, 860-486-0627 Richard.mcavoy@uconn.edu
- Farm Risk Management/Crop Ins. Workshop**
Nov. 30, Brooklyn/Windham Ext. Office
Dec. 3, Torrington-USDA Offices
Dec. 4, Windsor, CT Farm Bureau Office
Contact Norm Bender, 860-887-1608, norm.bender@uconn.edu
- CT Pomological Society**—Dec. 4
Annual Meeting, Gallery Restaurant, Glastonbury, CT
Contact: Lorraine Los, 860-648-6449, lorraine.los@uconn.edu
- New England Veg & Fruit Conference**, Dec. 11-13
Radisson Hotel, Manchester, NH
Contact: Jude Boucher, 860-875-3331, jude.boucher@uconn.edu
- Intro to Reduced-Till for Veg Crops**, Jan. 10,
10 AM—1PM Tolland Ag Ctr., Vernon, CT
Contact: Joan or Jude, 860-875-3331, jude.boucher@uconn.edu
- Bedding Plant Meetings** Jan. 11,
CAES, New Haven
Feb. 5, Tolland CES, Vernon
Feb. 28, Litchfield CES, Torrington
Contact: Leanne Pundt, 860-626-6240, leanne.pundt@uconn.edu
- CT Veg & Small Fruit Grower Conf.**, Jan. 24,
9 AM—3:15 PM Tolland Ag Ctr., Vernon, CT
Contact: Jude Boucher, 860-875-3331, jude.boucher@uconn.edu

THE LAST STRAW - WINTER MULCHES FOR STRAWBERRY CROPS

Cathy Heidenreich, Department of Horticulture, Cornell University

You are probably thinking July is much too early for an article on mulching strawberries, but there is method to my madness. Straw may be higher demand, shorter in supply, and higher in price this year as NY wheat and oat production is down by 21%.

Also, on occasion the supplier's ability to deliver product may change. One grower reported his straw supplier recently switched from round bales to squares, which would not fit his bale chopper. The grower was not aware of this change until he called to place his order earlier this month. He is searching for a new supplier.

Be sure to check now with your local supplier as to pricing and availability of straw for mulching your strawberries. It may be advisable to lock in your order/pricing soon to ensure sufficient straw at a reasonable price later on in the season.

Protecting Strawberries from Winter Injury

Strawberries are less cold-tolerant than other berries typically grown in the Northeast. Cold temperatures, coupled with desiccating winter winds, may cause cold injury to strawberries, especially those grown on raised beds.

Winter injury depends on several factors which may be categorized into 2 main groups: plant characteristics and environmental conditions. Plant characteristics include such things as cultivar, plant age, nutritional status, production method (i.e. raised bed vs. matted row vs. annual plasticulture production) and autumn hardening. Environmental factors include autumn hardening conditions (temperature, moisture, light), amount of snow cover, timing and severity of minimum temperatures, number of freeze events, and type and amount of mulch being used.

Strawberries begin their fall acclimation process in response to falling temperatures and shortening day lengths in autumn. This process occurs over a 6 to 8-week period. Injury occurs for most cultivars when crown temperature (*not air temperature*) reaches 23°F. Death may occur at crown temperatures of 4°F or below. Damage increases and yield decreases proportionally as the temperature falls.


Research has shown cultivars differ only slightly in hardiness; a matter of a few degrees in some instances. In some years, however, these few degrees may mean a substantial loss in yield.

Mulching is a common practice to protect strawberries during cold winter months in areas where snow cover is not sufficient to protect plants. Mulches protect strawberries from cold temperatures by providing insulation, protecting strawberries from desiccation, and preventing injuries associated with soil heaving which often occurs during severe temperature swings.

What's the Best Mulch for Strawberries?

Snow cover, of course is the best protection for strawberries. Snow depths over 6 to 8 inches keep crowns warm even to

Continued on page 4



University of Connecticut
College of Agriculture and Natural Resources

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CONNECTICUT VEGETABLE & SMALL FRUIT GROWERS CONFERENCE

Thursday, January 24, 2008

Tolland County Agricultural Center, 24 Hyde Avenue (Route 30), Vernon, CT

Sponsored by: University of Connecticut Cooperative Extension System & Plant Science Dept.

8:00 - 9:00 Registration \$25 at the door - Coffee & donuts/Trade Show (**lunch & coffee/donuts included in registration fee as a 4-H Club benefit**)

PROGRAM:

Morning Moderator - Lorraine Los, University of CT

9:00 *Welcome* - Roger Adams, Jr., University of CT

9:05 Updated New England Vegetable Management Guide Highlights – Jude Boucher, UConn

9:15 New Developments in Raspberry Production - Marvin Pritts, Cornell University

9:45 Are There Differences Among *Phytophthora* Tolerant Peppers for Yield, Quality and Tolerance? - Wesley Kline, Rutgers University

10:15-10:30 Break (Coffee & donuts/Trade Show)

10:30 Nutrient Management for Berry Crops - Marvin Pritts, Cornell University

11:00 “Sweet Corn Charlie”: Innovative Vegetable Production - Chuck Mohler, Syracuse, IN

11:45 Sharing the Harvest - Steve Slipchinsky, FoodShare

11:50 – 12:45 Lunch break/Trade Show

(Lunch included in registration fee as a 4-H Club benefit)

Afternoon moderator - Jude Boucher, University of Connecticut

12:45 Round Red and Heirloom Tomatoes for Early, Mid and Late Season Production - Wesley Kline, Rutgers University

1:15 Go Where the People Are: How to Set Up & Run Satellite Markets - Chuck & Tammy Mohler, Syracuse, IN

2:00-2:15 Break (Trade Show)

2:15 Vegetable Farmers and Their Innovative Tillage Systems - Vern Grubinger, UVM

2:45 The Ins & Outs of the H2A Foreign Worker Program - Joseph Young, NEAC

3:15 Re-certification Credits: 3 hours (pending DEP approval)

Directions: Take Exit 67 off I-84. Take Route 31 north to junction of Route 30 at first traffic light. Turn right on to Route 30. Tolland County Ag Center is on right just after Rockville Savings Bank.

The University of Connecticut is an equal opportunity program provider and employer. Please call three weeks prior to this event if special accommodations are needed.

Mulch for Strawberries continued from page 1

temperatures as low as -25°F. If you are located in an area where your snow cover consistently meets or exceeds this depth, all is well. Consider adding snow fence, however, to reduce drifting and prevent desiccation from prevailing winds. Unfortunately, snow cover is not dependable in most areas.

Straws are the most commonly used strawberry mulches. Straws are coarse-textured and do not weigh down plants like hay and other finer-textured materials. Wheat, oat, rye, rice, pine and Sudan grass straws have been used successfully as strawberry mulches. Straws more coarse than Sudan grass are not recommended. Both rye and Sudan straws are good, but wheat straw may be preferable as it is more resistant to compaction. Oat and barley straws break down more quickly and do not offer as much insulation. Straws should be clean, dry, weed seed free, and contain a minimum of grain seed.

How much mulch is typically needed? A 2-3 inch covering or 2 to 3 tons per acre minimum is recommended for areas with regular snow fall and moderate temperatures. On matted row plantings this is equivalent to approximately 300 avg. wt. small bales per acre. Raised beds, and windy, exposed sites may need twice that rate per acre (4 to 5 inches or 4 to 5 tons/acre) to achieve the same results.

Row covers may be used for winter protection in the Mid-Atlantic States and further south, but do not provide sufficient protection for strawberries in the Northeast. However, row covers are used in the Northeast in conjunction with straws to protect overwintering annual plasticulture strawberries.

Producing Straw Mulches on Farm

The ability to keep straw clean during harvest is one of the key steps in reducing weed problems in new or established plantings. Contaminated straw is often the source of Canada thistle, grain from straw, or difficult weed seeds in a planting.

Some growers may prefer to produce their own mulch on farm. Sufficient acreage and planting, harvesting, and baling equipment must be secured before undertaking straw production. Adequate storage to keep straw clean and dry until use will also be necessary.

The benefits of producing your own straw on farm may be substantial. Straw crop(s) of choice may be planted. For example, rye may be harvested prior to seeding stage or before persistent weeds set seed. Rye straw also contains substances that suppress germination of certain weed seeds. All straw crops may be harvested at stages where minimum contamination from grain or weed seeds can occur.

In addition, grain and/or extra straw can be sold to offset production costs. Remaining stubble is plowed under and adds organic matter to the soil.

Reprinted from New York Berry News Vol. 6, No. 7, July 20, 2007



NEVVF
New England Vegetable & Fruit
CONFERENCE '07

December 11, 12 & 13
Radisson Hotel, Manchester, N.H.

Includes 27 educational sessions
over 3 days, covering major vegetable,
berry and tree fruit crops

Extensive Trade Show with Over 100 exhibitors

Additional information, including downloadable
registration material, may be found at
www.newenglandvfc.org

Sponsored by the New England Vegetable & Berry Growers Association and the Massachusetts Fruit Grower's Association in conjunction with the Universities of Connecticut, Massachusetts, New Hampshire, Rhode Island, Vermont and Maine, as well as Cornell University and the Connecticut Agricultural Experiment Station – in cooperation with the U.S. Department of Agriculture

MANCHESTER, N.H. – **The New England Vegetable and Fruit Conference** will be held this December 11, 12, 13 at the Radisson Hotel in Manchester, NH and will include 27 educational sessions over 3 days, covering major vegetable, berry and tree fruit crops as well as various special topics. A Farmer to Farmer meeting after each morning and afternoon session will bring speakers and farmers together for informal, in-depth discussions on certain issues. This conference is put together with close collaboration between growers and Extension from across the region. The steering committee gathers the best speakers from within our region and across the country to let you know about the latest innovations and advances in the fruit and vegetable industry.

Twenty-seven educational sessions over three days will mix the best theory and practice regarding major fruit, berry and vegetable crops. Virtually every session – from “Organic Apple Production” on Tuesday morning to “Lettuce and Greens” on Thursday afternoon will include the perspective of farmers, Extension staff and researchers.

A “Farmer to Farmer” session will be held after each morning and afternoon session to allow speakers and farmers the opportunity for informal, in-depth discussion of the issues they find to be most critical. There is also an extensive **Trade Show** with over 100 exhibitors. We hope that you will enjoy your time here, and meet with fellow growers, advisors, researchers, and industry representatives. We want you to leave with new ideas and new information that will have a positive impact on your farm.

The event is sponsored by the New England Vegetable & Berry Growers Association and the Massachusetts Fruit Grower's Association in conjunction with the Universities of Connecticut, Massachusetts, New Hampshire, Rhode Island, Vermont and Maine, as well Cornell University and the Connecticut Agricultural Experiment Station – in cooperation with the U.S. Department of Agriculture.

The 3-day educational program offers 4 to 5 concurrent sessions each morning and afternoon. On Tuesday, December 11 the sessions are on tree fruit, peppers and eggplant, root crops, soil health, strawberries, cucurbits, urban food production, season extension, and stone fruit. On Wednesday, December 12 sessions are on tree fruit, blueberries, brambles, minor crops, renewable energy, organic production, tomatoes, and postharvest management. The sessions on Thursday, December 13 are on non-chemical weed control, ornamentals, sweet corn, viticulture, lettuce and greens, and pumpkins.

The pre-registration fee to attend any part or all of the conference or trade show is \$70 for the first member of the farm or business and \$40 for each additional member (family or employee) when pre-registered with first member. The pre-registration fee for students (high school or college) is \$30 each when pre-registered by the instructor. **Pre-registration must be received by November 30, 2007.** There is an additional fee of \$10 per person for late registration or walk-ins.

Additional information on the New England Vegetable and Fruit Conference, including downloadable registration material, may be found at <http://www.newenglandvfc.org> or contact: jude.boucher@uconn.edu, 860-875-3331.

2007 Greenhouse Tomato Conference Program

Tuesday, November 13, 2007
9:00 AM to 4:15 PM

Sturbridge Host Hotel

<http://www.sturbridgehosthotel.com/>

366 Main St., Sturbridge, MA

Sponsored by: University of Massachusetts-Amherst Extension, University of Connecticut Extension, University of Rhode Island Extension and Northeast SARE

Program

8:15 - 9:00 Registration *Coffee and Danish*

9:00 - 9:50 Choosing Varieties of Tomatoes for Greenhouse Production

Freek Knol, De Ruiter Seeds

9:50 - 10:50 Nutrient and Water Management

Richard McAvoy, Extension Specialist, Greenhouse Crops, University of Connecticut, Storrs, CT

10:50 - 11:00 Break

11:00 - 11:45 **Reading Your Plants: Managing Plant Vigor in Grafted Crops

Freek Knol, De Ruiter Seeds

What to look for in assessing plant development and vigor and tips for either increasing or decreasing plant vigor to improve plant quality and fruit production

11:45 - 1:00 Lunch

1:00 - 1:50 *Pest Management

Using Biological Control for Greenhouse Tomatoes

Carol Glenister, IPM Laboratories, Inc., Locke NY

1:50 - 2:00 Break

2:00 - 2:50 Concurrent Sessions

Session AHands-on Grafting Workshop

Rich McAvoy, Jude Boucher, University of Connecticut

Martin Gent, Connecticut Agricultural Experiment Station

Session B.....*Disease Identification and Management

Sharon Douglas, Connecticut Agricultural Experiment Station

3:00 - 3:30 **Cause and Management of Tomato Plant Disorders

John Howell, New England Vegetable Growers Association

3:30 - 4:15 Grower Panel

Ryan Voiland, Red Fire Farm, MA, Russ Holmberg, Holmberg Orchards, CT;

Dennis Fortin, Foster, RI

A pre-registration fee of \$35.00 is due by **November 7th**. If postmarked after November 7th, the fee is \$40.00 per person. Seating is limited, so please register early!

Please make checks payable to the University of Massachusetts and mail to: Greenhouse Tomato Program, Room 203 French Hall, University of Massachusetts, Amherst, MA 01003. Cost of admission includes: handouts, lunch, snacks and beverages during break. Three pesticide recertification credits will be offered for attendees from CT, RI, MA, ME, NH and VT (pending state approval).

For more information see:

http://www.umass.edu/umext/floriculture/upcoming_events.html or

Contact:

In Massachusetts: Tina Smith, University of Massachusetts, 413-545-5306, tsmith@umext.umass.edu

In Connecticut: Leanne Pundt, University of Connecticut, 860-626-6240, leanne.pundt@uconn.edu

Directions:

The Sturbridge Host Hotel and Conference Center is located on Route 20 West. From the North, East and West, take the Massachusetts Turnpike (Interstate 90) to Exit 9, Route 20 West. From the South, take either Interstate 84 or Route 131 to Route 20 West. The hotel is located less than one-quarter mile from the first set of traffic lights.

Pssssss! Secret Meeting. Shhhhhhh!

Did you know that every time you plow, harrow or cultivate, you oxidize away some of your soil's organic matter as CO₂? Do you have a compacted plow- or disk-pan 6 to 10 inches below the soil surface that restricts root growth and water penetration? Does water tend to pool on the surface of your fields leaving crops vulnerable to wilts and rots? Did you have trouble with soil erosion with all the rain in 2003, 2004 and 2006? Do you have trouble getting on your land to plant when it is too wet or planting on schedule when it is too dry? Did your sweet corn have dry tips this year? Are you spending too much for tractor fuel?

Have you ever thought about switching to reduced-till to alleviate some of these problems but just didn't know where to start? Here is your chance to find out more about it. This is an introductory workshop for growers who might seriously consider adopting a reduced-till system on their farm. It is meant to be an informal discussion with growers who are actually using strip-till and no-till systems on their farms. Seating restricted to the first 15 people to pre-register.

Call Jude or Joan to reserve your spot before sending money!

Workshop: Introduction to

Reduced-Till for Vegetable Crops

10:00 AM – 1:00 PM, January 10, Tolland County Ag Center, \$15 pre-registration required. *send check made out to "UConn", C/O Jude Boucher, UConn Cooperative Extension, 24 Hyde Ave, Vernon, CT 06066. For more information contact: Jude Boucher 860-875-3331, jude.boucher@uconn.edu. Call Jude or Joan (860 875-3331) to reserve your spot before sending money! Limited seating: 15 interested growers.*

Program

An Introduction to Reduced-Till – Anu Rangarajan, Cornell University, on DVD by Vern Grubinger and NE SARE.

Reduced-Till Systems in Connecticut – Jude Boucher, UConn Cooperative Extension

Deep Zone Tillage on the Cecarelli Farm – Nelson Cecarelli, Northford, CT

Grower Experiences with No-Till – Grower Panel: Pumpkins, Corn, Snap Beans

Open Round-Table Discussion/Questions & Answers

Fact Sheets/Equipment Sources/Food & Beverage/2 Recert. Credits

Directions: Take Exit 67 off I-84. Take Route 31 N to Rte 30 at 1st traffic light. turn right on to Route 30. Tolland County Ag Ctr is on right just after Rockville Bank.

RMA NEWS RELEASE

USDA Risk Management Agency • Raleigh Regional Office • 4407 Bland Road, Suite 160

Raleigh, NC 27609 • 919-875-4880 • rsonc@rma.usda.gov • <http://www.rma.usda.gov/go/ronc>

Contact: Scott Lucas (919) 875-4880

NOVEMBER IS DEADLINE FOR INSURANCE ON APPLES, PEACHES IN CONNECTICUT

FOR IMMEDIATE RELEASE The final date for Connecticut apple and peach growers to obtain crop insurance on next year's crop is November 20, 2007. Current policyholders likewise have until November 20 to make any changes to their existing contracts. Price elections for 2008 will be \$13.95 per bushel for fresh apples and \$30.75 per bushel for fresh peaches. Crop insurance provides coverage against production losses due to damage caused by natural perils and adverse weather conditions such as hail, wind, frost, and drought. Your actual amount of coverage will be determined from your actual yields and the protection level you select. Fruit producers should consider making crop insurance an essential part of their overall risk management plan to help protect their operations from financial loss. Growers are encouraged to contact a local crop insurance agent as soon as possible for more detailed information and premium quotes. For a list of crop insurance agents in your area, contact the local USDA Farm Service Agency office or log on to the following Risk Management Agency web site: <http://www3.rma.usda.gov/tools/agents/>

COVER CROPS FOR EARLY SUMMER

Summer may seem an odd time to use cover crops, because it is the time when the "real crops" are growing. But summer may be the right opportunity to improve fields with a cover crop. If the soil is wearing out, summer is when a soil-building crop can do a lot more work. Also, if the rotation leaves an opening in the summer, a short cycle cover crop will be much better than leaving the field open, to suffer erosion from rain and have weeds go to seed. Buckwheat sown in late May or early June, can be used before vegetables such as pumpkins, broccoli, and late cucumbers.

There is another opportunity for summer cover crop safter lettuce, peas, early beans, spinach or small grains. For planting in June, there are really only two choices. One is sudangrass, or sorghum-sudangrass, and the other is buckwheat. Both grow rapidly in the summer warmth.

The two cover crops have different properties, so the management goal and field condition will determine which is the right one.

Sudangrass is often chosen for improving soil organic matter. It produces a strong root system and lots of biomass. The deep root system is helpful for reducing subsurface hardness. It is also a good choice for reducing root-knot nematode pressure. Buckwheat is best known for weed suppression and mellowing the soil.

If weed suppression is the main purpose, buckwheat is preferred. It covers the ground earlier than sudangrass, especially in early June, and outcompetes weeds that may establish in sudangrass. Sudangrass requires a higher seeding rate for effective weed suppression.

The amount of time until the fall crop is to be planted is a significant decision factor. Buckwheat is in the ground for 35 to 40 days when used as a cover crop. It can be sown as early as May 20th. Sudangrass needs 60 to 70 days to be effective, and is best planted once June has become thoroughly warm. Both of these cover crops should be mowed after about 40 days. That is the end of the season for buckwheat, but the beginning of major root growth for sudangrass. Sudangrass needs a final flail mowing and immediate incorporation to suppress nematodes.

The condition of the field will determine which crop is suitable. If the soil is hard, or the field is prone to standing water, sudangrass is a good choice, while buckwheat will do poorly. However, if the field is low in nitrogen and phosphorous, buckwheat will do well without additional fertilizer, while sudangrass needs about 40 lb of N to give satisfactory performance.

If the crop to follow needs a fine seedbed, that will be easier to produce after buckwheat. It mellows the soil for easy working, and decomposes quickly after incorporation. Sudangrass crowns take some time to break down, so the following crop needs to be one that can be sown in a somewhat lumpy field. The main production risks with buckwheat are a failed stand and letting it go to seed. The failed stand usually follows a heavy rain around emergence. It will be obvious two weeks after planting.

If the seedlings are not doing well then, till them in and plant again. To avoid volunteer buckwheat seed, kill the crop before there are filled green seeds on the plant. That takes about 40 days from a July planting or 50 days from a June planting.

The main production risk with sudangrass is that the crop gets too big to mow or to incorporate after frost has killed it. This crop grows very fast, so keep an eye on it. Mow the first time at about 3 feet and the second time while the flail mower can still chop it well. If sudangrass gets too big to control, it will be killed by frost and make a nice winter mulch. However the biofumigant effect will be lost.

Buckwheat is available from some local farm seed retailers. The variety does not matter, and many suppliers don't identify any variety. Regional suppliers include The Birkett Mills in Penn Yan, Ernst Conservation Seed in Meadville, PA, AgriCulver in Trumansburg, and Lakeview Organic Grain in Penn Yan. A short crop in 2006 has raised the seed cost for this season, with prices ranging from \$15 to \$25 per 50 lb bag. A bag is enough to seed an acre.

Sorghum and sorghum-sudangrass are widely available. Varieties suitable for cover crops must be selected carefully. Grain types are inappropriate and some new forage varieties, described as sweet or with brown midrib are low in dhurrin, which is the biofumigant in sudangrass. Piper sudangrass is readily available, and has a similar composition to Trudan 8, the classic sudangrass for biofumigation. Sorghum-sudangrass hybrids are more vigorous, and will produce more biomass than sudangrass, but the seed is also more expensive. Appropriate varieties that are available locally include Sordan 79, Green Grazer and Special Effort. With a modest seeding rate of 30 lb/ac, sudangrass can cost as little as \$10 to \$20 per acre. Weed suppression requires 50 lb/ac. Regional suppliers include Seedway in Hall, AgriCulver in Trumansburg and UAP in Sodas.

Thomas Björkman, Department of Horticultural Sciences, NYS Agricultural Experiment Station, Cornell University, Geneva, NY 14456-0462

Reprinted from UMass Vegetable Notes, Vol. 18, No. 4, May 31st, 2007

EVALUATION OF HARD SQUASH VARIETIES FOR PRODUCTION IN MASSACHUSETTS

It is important that species and cultivars of crops are evaluated for their adaptation to local growing conditions before growing them commercially. Several studies in recent years conducted by researchers at the University of Massachusetts have evaluated ethnic crops for potential production in the Northeastern U.S.

These trials have evaluated calabaza, a popular type of squash in Latin America, ethnic herbs, and Asian Brassica crops, among many others. Researchers have found that the adaptation of specific pumpkin and squash cultivars vary dramatically from region to region in the U.S. Some cultivars that are adapted to the Northeastern U.S., for example, did not yield well in the much warmer and humid Southeastern U.S.

Abóbora, the name for “pumpkin” or “hard squash” in Portuguese, is a staple vegetable throughout most of Brazil. In the Brazilian state of Minas Gerais, the most popular kind of abóbora is a cultivar known by several names, including *abóbora moranga*, *abóbora japonesa*, *abóbora híbrida*, and *moranga híbrida*.

People use it to make salads, stews, soups, and as a side dish. This hybrid cultivar is an intra-species cross of *Cucurbita maxima* and *Cucurbita moschata* and was introduced to Brazil from Japan in 1960. Since the male flowers of this intra-species cultivar are sterile, it must be grown with another cucurbit species to provide pollen for pollination. It is recommended to plant 10-20% of the field with the “pollinator” cultivar. The most common cultivar used in Brazil for pollination is called *abóbora moranga*, an open-pollinated cultivar that was the most popular type of hard squash in states such as Minas Gerais before the introduction of *abóbora híbrida*. This cultivar is still sold in the markets where it is used in a similar way to *abóbora híbrida* and also to make a popular desert called *doce de abóbora*.

There are several cultivars of *Cucurbita moschata* that are important hard squashes in many parts of the Americas where they are known by many different names, including *calabaza* (Puerto Rico), *ayama* (Dominican Republic and Venezuela), *ayote* (parts of Central America), *zapallo* (parts of South America), and West Indian pumpkin in parts of the English speaking Caribbean. The fruit of *C. moschata* vary in size, shape, and color due to outcrossing and strain selection. Tropical lines of *C. moschata* can vine extensively, up to 50 feet long, and also produce fruit in excess of 50 pounds. These tropical lines are not well suited to production in the Northeast due to their vining nature and long time between planting and maturity. The majority of growers in Latin America save seed from harvest of these open-pollinated lines for the next planting.

The rind color of commercial cultivars of *C. moschata* ranges from green to light-orange. A mature fruit will lose the shine of an immature fruit and develop a yellow under-coloring as the fruit matures. The most important factor affecting consumer selection is the color of the flesh. It should be dark yellow to deep orange in color. The dark orange color is a sign of full maturity and consumers prefer it to the lighter colored pulp of young fruit. Because the color of the flesh is considered of primary importance, the fruits are often halved at the market, enabling the consumer to see the color of the flesh clearly.

Kabocha squash cultivars (*C. maxima*) have a very hard, darkgreen rind and yellow to bright-orange flesh. The flavor is very sweet, tasting like a cross between sweet potato and pumpkin.

Kabocha is a popular vegetable in Japan, used in soups, sushi, and tempura dishes. Kabocha was originally introduced to Japan by Portuguese traders in the mid 16th century. The word *kabocha* is thought to have originated from a Portuguese word for pumpkin, *calabasa*. Kabocha is a generic term for squash in Japan, whereas in North America, Kabocha is a specific type of winter squash. Japan has the highest consumption of Kabocha in the world.

Pipián (*C. mixta*) is originally from the Southern U.S. and Mexico and is very popular in El Salvador and other parts of Central America and Southern Mexico. There are two cultivars found in the main terminal market in San Salvador (La Tiendona), ‘Criollo’ and ‘Zimbrillo.’ The cultivar ‘Criollo’ is the most popular and was the variety used in this study. The fruit is harvested and used when immature, and the mature larger fruit is used for seed, both for propagation and for consumption.

The seed is open-pollinated, and thus, there is tremendous variation in phenotypes. In 1998, the government of El Salvador estimated that there were about 1,000 acres grown in El Salvador.

MATERIALS AND METHODS

Twelve tropical pumpkin cultivars in the *Cucurbita* genus were grown from seeds in transplant cells at the Harvest Farm greenhouse facilities based in Whatley, MA. Table 1 lists the cultivar names and seed sources. Each transplant cell was thinned to two plants. The ‘Abóbora Moranga’ was seeded on 27 April, the ‘Tetsukabuto’ and ‘Triunfo’ on 8 May, and the remaining 9 cultivars were seeded on 5 May. ‘Abóbora Moranga’ was seeded two weeks earlier than ‘Tetsukabuto’ and ‘Triunfo’ in order to synchronize flowering of the three cultivars and ensure cross pollination.

The experiment was implemented at the UMass Research Farm in South Deerfield, Massachusetts, on an Occum fine sandy loam (coarse-loamy, mixed, mesic Fluventic Dystrachrept) with a pH of 6.5 and a soil organic matter content of 2.4%. Lime and preplant fertilizer were applied according to soil test results (*New England Vegetable Management Guide 2006-2007*). One thousand pounds/acre of calcitic lime were applied on 4 May.

Muriate of potash (60% K) was applied on 4 May at a rate of 100 pounds/acre. Available phosphorus in the soil was high, so no preplant application was made. The soil was covered with a black polyethylene mulch to control weeds and conserve moisture. The experimental design consisted of four replicate blocks.

Plots were 28’ long by 19.5’ wide and transplants were set 4’ apart in the row, and three rows were 6.5’ apart for a total of 42 plants/plot, equivalent to a plant population of 3,350 plants/acre. Seedlings were transplanted to the UMass field in South Deerfield on 30 May. This arrangement of plants allowed for a border of plants to surround 10 central experimental (sample plants) plants for each plot. For the plots with the ‘Tetsukabuto’ and ‘Triunfo,’ the border rows were planted with the pollinator, ‘Abóbora Moranga.’



An intra-species of abo'bora japonesa (left) grown with a pollinator variety (right)



The Brazilian squash ‘Triunfo’

Fertilizer was applied through the drip irrigation in the form of a complete fertilizer (20%N-20%P2O5-20%K2O) and calcium nitrate (16%N-0%P2O5-20%K2O-19%Ca). The spring nitrate test was used to determine if the soil N levels were sufficient.

The total amount of fertilizer applied through the drip system during the experiment was (lbs/acre): 57 N, 13 P2O5, 13 K2O, and 45 Ca. Plants were irrigated using drip irrigation with tensiometers (Irrrometer Co. Riverside CA) used to time irrigation. Weeds in-between plastic were removed by hand, and striped cucumber beetle (*Acalymma vittatum* (Fabricius)) and spotted cucumber beetle (*Diabrotica undecimpunctata howardi* Barber) were controlled by one application of Admire 2F (8 ounces/acre; ai:imidacloprid) applied through the drip system on 1 June. *Phytophthora capsici* was identified in the field and two applications were made with Prophyte (active ingredient: phosphoric acid) at a rate of one gallon/acre on 7 and 14 August.

Harvest for Pipián began on 20 July when the fruit reached 5" in length, and took place once per week until 28 August. For each harvest, fruit between approximately 5" and 8" in length were harvested, since this size was considered the most desirable in the markets (Mancia 2006). On 22 August all other cultivars were considered to be mature and were harvested. For each harvest date, the fruit from the 10 middle plants were weighed and the length and width of each fruit was recorded. 'Ayote' was not harvested, since very few fruit produced, the largest of which was less than 2" long. Data were analyzed by analysis of variance using standard software (SAS Institute, Cary NC) with the means separated using Duncan's test.



Kabocha variety 'Delica'

RESULTS AND DISCUSSION

Figure 1 lists the yield of 11 of the 12 cultivars evaluated in this trial. The cultivar 'Ayote' was not included, since the plants did not produce mature fruit. 'Pipián' yielded higher than other cultivars; however, this is mostly due to the fact that some fruit were allowed to grow larger than the desired size. As described above, the market prefers 'Pipián' fruit that is approximately 5" to 8" in length. Even though harvest occurred weekly, there were fruit harvested that was much larger than 8" in length. The average fruit length of 'Pipián' for the trial was 10.7" (Table 1). Part of this problem occurred because fruit grew rapidly between the intervals of harvests; however, it is clear that some fruit that were the desired size at harvest were missed, perhaps due to the thick plant foliage early in the season. Test marketing of the 'Pipián' in selected Hispanic markets in Massachusetts demonstrated that consumers would buy fruit larger than 8" long; however, the sales were slower, and the markets sold them at lower prices/pound compared to the smaller fruit (data not shown). 'Tetsukabuto' and 'Triunfo', the two most popular hybrids in Brazil, yielded 24,932 and 20,277 pounds/acre, respectively.

The pollinator cultivar from Brazil evaluated in this experiment, 'Abóbora Moranga,' had good size fruit (Table 1) and also yielded well with 24,245 pounds/acre. 'La Estrella,' the hybrid calabaza, had the second highest yield, after 'Pipián,' with 31,815 pounds/ acre and had the largest fruit of the 12 cultivars evaluated (9.2 pounds). This large size of the fruit, typical of calabaza, requires that it is sold in wholesale markets in 50-pound bags and stored in bins instead of cases. Among the six kabocha cultivars, 'Sweet Mama' yielded the highest with 21,054 pounds/acre, followed by 'Thunder,' 'Eclipse,' 'Hokkori,' 'Delica,' and 'T-133.' 'Sweet Mama' also had the largest fruit of

the six kabocha cultivars evaluated with an average fruit size of 4.2 pounds and 'Hokkori' had the smallest fruit weight with 2.3 pounds (Table 1).

Due to the smaller size of the kabocha types compared to the calabaza, these cultivars are sold in wholesale markets in the United States in 1.1-bushel boxes, which are much more convenient to store than the 50 pound sacks in which calabaza is transported. Interviews with Hispanic store owners and Hispanic consumers in these stores in Massachusetts and New York City, found a strong demand for the kabocha cultivars where it is being used as substitute for calabaza. Ten Hispanic stores in the Washington Heights section of Manhattan in New York City, which has one of the largest concentrations of Dominicans in the United States, were canvassed in researching cultivars for this trial. All 10 stores had kabocha cultivars on their shelves, and all were labeled as either *calabaza* or *ayama*, the most common name for *C. moschata* in the Dominican Republic.

Only one of the ten stores visited in Washington Heights had *calabaza* (*C. moschata*). 'Kabocha' was also tested in the Boston Terminal Wholesale Market and buyers of Hispanic produce prefer counts of 6-8 fruit/1.1-bushel compared to counts of 10 per box. The larger cultivars, 'Sweet Mama,' 'Delica,' and 'Thunder,' would fit the desired size of 6-8 fruit/1.1-bushel boxes. These observations underscore the popularity of the kabocha cultivars in Hispanic stores that traditionally would carry calabaza. In addition, buyers of kabocha at the Boston Terminal Wholesale Market pay a premium for cultivars with larger fruit. Yield results suggest that these cultivars are commercially viable for production in Massachusetts. However, a thorough understanding of the preferences of the marketplace for characteristics such as size and shape of the different cultivars is critical for farmers to know before planting a specific cultivar.

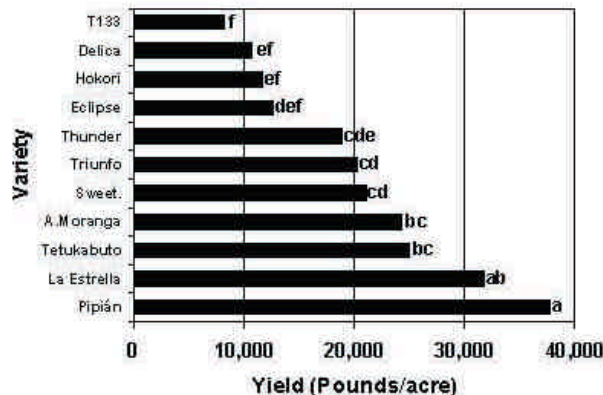


Figure 1. Yield of 11 hard squashes varieties grown at the UMass Research Farm in 2006. (Mean separation within columns by Duncan's multiple range test at P=0.05).

Cultivar	Latin name	Seed source ¹	Fruit length (in.)	Fruit width (in.)	Fruit wt. (lbs)	Fruit #/box
Tetsukabuto	<i>C. maxima</i> s.	SE	5.1 bc ²	7.2 bc	5.0 f	4,606 ab
Triunfo F1	<i>C. maxima</i> s.	AG	4.0 c	4.5 d	4.5 fcd	4,355 abc
Abóbora moranga	<i>C. moschata</i>	AG	4.3 u	9.3 s	6.6 b	4,000 abc
Delica	<i>C. maxima</i>	AT	4.0 c	7.3 bc	3.6 def	3,921 bc
Hokkori	<i>C. maxima</i>	JS	3.8 c	6.2 c	2.3 g	4,600 abc
Sweet Mama	<i>C. maxima</i>	AT	3.8 c	7.3 bc	4.2 cde	4,600 abc
Thunder	<i>C. maxima</i>	RF	3.9 c	7.3 bc	3.6 def	4,857 ab
Eclipse	<i>C. maxima</i>	RF	3.8 c	6.5 c	3.1 efg	3,796 abc
T-133	<i>C. maxima</i>	AT	4.1 c	7.0 c	2.9 fg	2,560 c
La Estrella	<i>C. moschata</i>	RS	6.2 b	8.4 ab	9.2 a	3,182 bc
Ayote	<i>C. moschata</i>	MA	—	—	—	—
Pipián	<i>C. maxima</i>	MA	10.7 a	4.0 d	3.0 efg	5,327 a

¹Seed source: SE = Semina (Brazil/Brazil); AG = Agrícola (Tetsukabuto Brazil); AT = Asentaria Takon Seed (Salem CA); JS = Jersey's Selected Seeds (Windsor ME); MA = Selvadora Ministry of Agriculture; RF = Rupp Seed (Waukesha WI).

²Fruit separation within columns by Duncan's multiple range test at P = 0.05.

This knowledge is part of a comprehensive marketing plan needed to sell tropical pumpkin cultivars to ethnic consumers in the Northeastern U.S.

Raquel Mendonça, Frank Mangan, Maria Moreira, Adam Criswell, Samanta del Vecchio Nunes, and Wesley R. Autio.

Dept. Plant, Soil & Insect Sciences, UMass **Fernando L. Finger.** *Dept. de Fitotecnia, Universidade Federal de Viçosa, Brazil.*

Gustavo C. Almeida. *CeasaMinas – Unidade Grande Belo Horizonte, Setor de Agroqualidade, MG, Brazil.*

P. Geoffrey Allen. *Dept. of Resource Economics, University of Massachusetts, Amherst, MA.*

Thomas G. Brashear. *Dept. of Marketing, Isenberg School of Management, University of Massachusetts, Amherst, MA.*

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Crop Talk Editors / Contributors

Jude Boucher, Commercial Vegetable Crops, UConn Cooperative Extension, (860)875-3331, jude.boucher@uconn.edu

Lorraine Los, Commercial Fruit Crops, UConn Department of Plant Science (860)486-6449, lorraine.los@uconn.edu

Lin Marino, Secretary I, Newsletter Layout

Administrative Officers

Kirklyn Kerr, Dean, College of Agriculture and Natural Resources

Cameron Faustman, Associate Dean for Academic Programs and Director, Ratcliffe Hicks School of Agriculture

Nancy Bull, Associate Dean for Outreach and Public Service and Associate Director, Connecticut Cooperative Extension System

Roger Adams, Head, Department of Cooperative Extension

Ian Hart, Associate Dean for Research and Advanced Studies and Associate Director, Storrs Agricultural Experiment Station

Mary Musgrave, Head, Department of Plant Science

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University of Connecticut
Cooperative Extension System
24 Hyde Avenue
Vernon, CT 06066