The Vegetable & Small Fruit Gazette

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Quote for Thought from Pete Ferretti

There is nothing so useless as doing efficiently that which should not be done at all.
~ Peter F. Drucker from The Harper Book of Quotations

Growing Taro in a Pennsylvania High Tunnel

B.A. Kratky and S.C. Miyasaka, University of Hawaii, M.D. Orzolek and W.J. Lamont, PSU, Horticulture

Taro (*Colocasia esculenta*) is an important staple food crop for inhabitants of the Pacific region. Taro produces edible leaves which may be boiled or steamed and a starchy corm which may be boiled, steamed, baked, or made into poi, flour or chips. Taro corms and leaves have an acrid irritation property caused by a protease associated with calcium oxalate crystals. This protease is a protein which can be deactivated by heat. Before eating, corms or leaves with petioles must be boiled or steamed for 1 to 5 hours, depending on the variety.

Dr. S.C. Miyasaka of the University of Hawaii provided 19 vegetative propagules of 'Bun Long' Chinese taro which is known for its low acridity. Each one is called a *huli* and consists of a sucker with about a quarter-inch section of a corm and 6 to 12 inches of petiole. Propagules were planted in black plastic 3-gallon pots containing peat-perlite growing medium on June 26 and grown in a building until July 2 when they were planted in a 4 ft x 10 ft tank such that there were 2 rows with 2 ft spacing between pot centers within rows. The pots rested on 1-inch high soft nursery trays which were supported by a polyethylene-lined tank floor. A constant 2-inch level of water was maintained with a float valve such that the pots were watered by sub-irrigation. The nutrient solution was checked weekly with an electrical conductivity meter and replenished with equal amounts of 2 stock nutrient solutions to maintain an electrical conductivity level of 1.5 to 2.0 mS. One nutrient stock solution consisted of 1.0 lb soluble greenhouse grade calcium nitrate per gallon of water, and the other stock solution consisted of a mixture of 0.6 lbs magnesium sulfate and 1.0 lb Chem-Gro 8-15-36 Lettuce Formula (Hydro-Gardens, Colorado) per gallon of water. The Chem-Gro formulation also contained micronutrients. There were 13 fertilizer applications such that 0.5 lb of nitrogen plus the accompanying nutrients were applied. Growing tanks were covered with reflective aluminized plastic mulch which maintained a cool surface such that leaves did not burn when they contacted the mulch. All of the plants were growing by July 10.

Harvesting of the leaves began after the plants were about 2 ft tall and the modified arrow or heart-shaped leaves became 10 to 16 inches long. Then, starting with the fourth fully emerged leaf, every other leaf was harvested. The final harvest date decision was made by Mother Nature. On the early morning of October 29, 2007, the ambient temperature reached 22^{o}F causing the unheated high tunnel temperature to reach 30^{o}F. Visible frost damage was observed on the upper taro leaves which curled and then became necrotic, but no damage was evident to the root portion. The entire plants were harvested on October 31, 2007. The petiole of the mother plant was cut 1 inch above the corm-petiole intersection. Roots and any extraneous petiole tissue were removed from the corm. Edible leaves were defined as being at least 10 inches long and nearly blemish-free.

Plant height averaged 34 inches. The total edible leaf production from mother and daughter plants was about 1.05 lbs per plant. An average of 5.4 leaves per plant suffered frost damage. These were mostly upper leaves which would have otherwise been edible. The frost damage loss represents about 32 percent of the total edible leaf production which could have been saved by harvesting the day before the freezing temperatures. The trimmed weight of edible corms

averaged 0.50 lbs per mother plant. Taro normally requires a growing season of 6 to 13 months for optimum corm production and this crop was only about 4 months old at harvest time. Taro growers specializing in corm production would not harvest leaves, because this would depress corm yields and decrease the starch content. This experiment demonstrates that taro can produce a salable crop in a temperate location high tunnel, but the yields were much lower than are normally harvested in Hawaii. There was an average of 7.4 daughter plants per mother plant which can serve as propagules for a future crop. Experiments will be conducted to determine how long these plants may be stored and remain viable.

At about 2 months after planting, 3 plants appeared to have a bacterial infection and eventually died, but a total of 16 healthy daughter plants appeared unaffected from the 3 diseased mother plants. These plants were excluded from Table 1 data. At one point, taro was subjected to an aphid infestation, but this was corrected with an insecticide application. An active Integrated Pest Management program is recommended for taro production.

The frost-free growing season (90% probability) in central Pennsylvania's temperate climate is approximately 120 days and typically extends from May 15 through September 15. High tunnels typically increase both minimum and maximum temperatures by 5 to 8^{o}F over ambient temperatures, particularly when side coverings are lowered. This enables a high tunnel to extend the frost-free growing season by 30 to 60 days. It is suggested that taro should be planted at May 1 in an unheated high tunnel. This would add another 57 days of growing season during long day length hours and should greatly increase the yield potential of taro in Pennsylvania. There remains potential that taro can be a profitable niche market crop, especially if the growing season can be extended by several months in high tunnels.

Table 1. Plant height, number and fresh weight of frost damaged leaves, number and fresh weight of edible leaves and petioles from mother and daughter plants, fresh weight of inedible foliage from mother plants, fresh weight of corms, number and fresh weight of daughter plants of taro plants grown in sub-irrigated 3-gallon pots with peat-perlite growing medium[z].

Parameter	Average[y]	Range
Plant height (in)	34.0	26-41
Frost damaged leaves		
Number/plant	5.4	1-13
Fresh wt/plant (lb)	0.49	0.11-1.17
Edible leaves from mother plant		
Number/plant	4.6	4-6
Leaf blades/plant (lb)	0.42	0.19-0.76
Petioles/plant (lb)	0.26	0.08-0.54
Edible leaves from daughter plants		
Number/plant	6.3	0-13
Leaf blades/plant (lb)	0.19	0-0.43
Petioles/plant (lb)	0.18	0-0.43
Inedible foliage from mother plant (lb)	2.16	1.10-3.77
Corm trimmed weight/plant (lb)	0.50	0.21-0.89
Daughter plants per mother plant		
Number[x]	7.4	5-9
Fresh weight (lb)[xw]	3.2	1.3-5.0

[z] Planted June 26 and harvested on October 31, 2007.
[y] From 16 mother plants.
[x] From 13 mother plants.
[w] Does not include fresh weight from edible leaves

Availability of the Revised NRAES Bramble Production Guide

Submitted by Kathy Demchak, Penn State Horticulture

The following is adapted from NRAES information:
NRAES is preparing to publish *Raspberry and Blackberry Production Guide for the Northeast, Midwest, and Eastern Canada* (L. Bushway, M. Pritts, and D. Handley, eds)**.** The book provides information on all aspects of raspberry and blackberry culture from site selection and preparation, trellising and pruning, to nutrient management, to harvesting and marketing. It will be the only comprehensive resource for novice and experienced growers as well as crop advisors and educators. It will be available in March 2008.

Special pre-printing prices are available for single copies ($25 plus s+h) or bulk orders ($22 plus s+h, 25 copy minimum). The list price is expected to be $37. The book will be 156 pages and have 14 chapters, 134 color photos, 36 line drawings, 30 tables, 18 side bars, a glossary, and suggestions for further reading. The deadline for pre-press orders is February 15, 2008. After this date, copies can be ordered directly from NRAES at the list price. The book will be available in March 2008.

For more information, including a two-page flier, sample pages, and a table of contents, go to www.nraes.org. You can place your order for books on the NRAES secure web site.

For more information, contact the NRAES staff at:
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Calculating How Much Compost to Apply to Meet Nitrogen Needs of Vegetables: Another Method

Elsa Sánchez, Penn State Horticulture

This method is more accurate than the method presented in the last issue of the Gazette (January 2008) because it accounts for changes in the moisture content of the compost. Also, results are in pounds per cubic yard (lbs/yd^3) which could make applying the compost easier if you are using manure spreaders or front end loaders. This method requires determining the bulk density of the compost.

Bulk Density

Determining the bulk density of compost can be done a couple of ways. If you use Penn State's Agricultural Analytical Services Laboratory to analyze your compost, you can request the lab determine bulk density as an optional test. This currently costs $10.

You can also determine the bulk density before submitting the sample. This is more accurate than results from the lab because the lab uses less compost in its determination.

The materials needed to determine the bulk density are a shovel, 5-gal bucket and a scale (a bathroom scale will work). Fill the 5-gal bucket half full, taking compost from various depths of the pile. Then drop bucket 10 times from height of 6 inches. Fill the remaining portion of bucket approximately half full and repeat the dropping process. Next, fill bucket to brim and repeat then dropping process. Finally, fill bucket to brim one more time and do not drop.

Once that is done weigh the bucket with the compost in it and record the weight.

Weight of compost and bucket = _____ lb

Example:
Weight of compost and bucket = 40 lb

Subtract 2 lbs from the weight above to obtain the net sample weight.

Weight of compost and bucket = _____ lb – 2 lbs = _____ net lbs

Example:
Weight of compost and bucket = 40 lb – 2 lbs = 38 net lbs

Next, multiply the net sample weight by 40 to convert to pounds per cubic yard.

_____ net lbs x 40 = _____ lbs/yd^3 (bulk density)

Example:
38 net lbs x 40 = 1520 lbs/yd^3 (bulk density)

Lastly, insert the bulk density value on the compost submission form on the line that says *Producer-determined bulk density (lb/yd^3).*

When you get your compost analysis report it will have a third column called "volume basis". This is the column to use to calculate how much compost to apply.

Step 1 - Determine how much available nitrogen is in a ton of compost
Organic N is converted into inorganic nitrogen for plant uptake through mineralization. Commonly, mineralization rates between 10 and 20% are assumed. However, if conditions favor mineralization, for example 1) if soil temperatures are high because of the use of black plastic, 2) soil moisture is high from irrigation and/or rainfall, 3) soil is frequently tilled and/or 4) the organic matter content of the soil is high, consider assuming higher rates of mineralization. Multiply the amount of organic N given in the compost report by a mineralization rate. Then, add the amount of ammonium N given in the compost report.

_____ lbs organic N/yd^3 of compost (take value from compost report) x _____ percent mineralization rate = _____ lbs available N/yd^3 of compost

_____ lbs available N/yd^3 of compost + _____ lbs NH_4-N/yd^3 of compost (take value from compost report) = ____lbs available N/yd^3 of compost

Example:
16.7 lbs organic N/yd^3 (from compost report) x 0.20 (20%) assumed percent mineralization rate = 3.34 lbs available N/yd^3 of compost

3.34 lbs available N/yd^3 of compost + 0.185 lbs NH_4-N/yd^3 of compost (from compost report) = 3.525 lbs available N/yd^3 of compost

Step 2 - Determine the amount of compost to apply
For this step first determine the nitrogen needs of the crop in pounds per acre. This information can be found on soil test reports or in the Commercial Vegetable Production Recommendations guide for Pennsylvania. If you have residual nitrogen in the soil from previous nutrient applications or green manure crops, subtract that value from the recommended rate. Then, divide the remaining amount of nitrogen required by the pounds of available nitrogen per ton of compost.

_____ lbs N recommended/acre ÷ _____ lbs available N/yd^3 of compost = _____ _____ yd^3 of compost to apply per acre

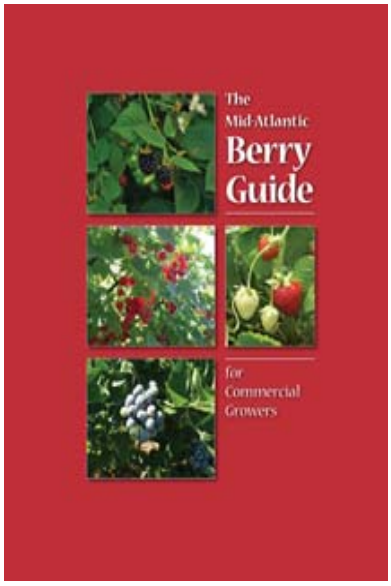
Example:
75 lbs N recommended/acre (from soil test recommendations or the Commercial Vegetable Production Recommendations guide and assuming no residual nitrogen) ÷ 3.525 lbs available N/yd^3 of compost = 21.3 yd^3 of compost to apply per acre

2008 Mid-Atlantic Berry Guide Now Available

Kathy Demchak, Penn State Horticulture

The new 2008 Mid-Atlantic Berry Guide is now available. The guide has 38 current contributors from Penn State University, Rutgers University, The University of Delaware, The University of Maryland, Virginia Tech, West Virginia University, and USDA-ARS, Beltsville. This version was expanded to 248 pages and includes new chapters on weed management and vertebrate pest control, in addition to updated information on site preparation and planning, production systems, cultivars, economics, and pest management (including current pesticides that can be used) for strawberries, blueberries, brambles, and gooseberries and currants. Appendices cover diagnostic services available within the region from University and private laboratories; sources of plants and production supplies, and sources of information that expand on various topics in the guide even more. The price is $18 plus tax where applicable.

Pennsylvania growers can obtain the guide through most County Extension offices (call ahead to make sure they have it in stock), or directly from the College of Agriculture's Publications Distribution Center (a $5 postage and handling fee will be added). Call 814-865-6713 or 877-345-0691 to obtain the correct total price. VISA and MasterCard orders are accepted. Growers in cooperating states (Maryland, New Jersey, Virginia, Delaware and West Virginia) should obtain the guides from your state's Extension services if available through them – you might want to call ahead to see if they will be stocking this version.



Upcoming Meetings

If you have a meeting you would like to announce, please send the meeting title, date, location and contact information to esanchez@psu.edu.

Local

- ✓ February 15, 2008. **Vegetable Growers Meeting**, Fleetwood, PA. For more information contact John Berry at (610) 391-9840 or jberry@psu.edu or Mena Hautau at (610) 378-1327 or mmh10@psu.edu.

- ✓ February 18, 2008. **Tri County Vegetable, Small Fruit and Greenhouse Growers' Meeting**, Shippensburg, PA. For more information contact Steve Bogash at (717) 263-9226 or smb13@psu.edu.

- ✓ February 14, 2008. **Vegetable Production Day**, Lebanon Expo Center, Lebanon, PA. For more information contact Ginger Pryor at (717) 270-4391 or gmp4@psu.edu.

- ✓ February 19, 2008. **Crops Conference**, Madisonburg, PA. For more information contact Tom Butzler at (570) 726-0022 or tmb124@psu.edu.

- ✓ February 21, 2008. **Crops Conference**, Warriors Mark, PA. For more information contact Tom Butzler at (570) 726-0022 or tmb124@psu.edu.

- ✓ February 25, 2008. **Central Pennsylvania Crops Conference**, Ramada Inn in Blair. For more information contact Tom Ford at (814) 940-5989 or tgf2@psu.edu.

- ✓ February 28, 2008. **Southeastern PA Potato Day**, Schnecksville, PA. For more information contact Bob Leiby at the Lehigh County Extension office 610-391-9840 or rel5@psu.edu.

- ✓ March 6, 2008. **KPA Study Circle**, Fleetwood, PA. For more information contact Mena Hautau at (610) 378-1327 or mmh10@psu.edu or John Berry at (610) 391-9840 or jberry@psu.edu.

- ✓ March 6, 2008. **Southeastern Pennsylvania Vegetable Day**. For more information contact Scott Guiser at (215) 345-3283 or sxg6@psu.edu.

- ✓ March 11 or 13, 2008. **Vegetable and Small Fruit Meeting**. Location TBA. For more information contact Andy Muza at (814) 725-4601 or ajm4@psu.edu.

- ✓ March 12, 2008. Meeting title TBA. Warren, PA. For more information contact Andy Muza at (814) 725-4601 or ajm4@psu.edu.

- ✓ July, 2008 (date TBD). **Summer Vegetable Growers Meeting,** Kutztown, PA. For more information contact Mena Hautau at (610) 378-1327 or mmh10@psu.edu.

- ✓ November 18, 2008 (tentative date). **Western Pennsylvania Vegetable & Berry Seminar**, Butler, PA. For more information contact Eric Oesterling at 724 837 1402 or reo1@psu.edu or Lee Young at (724) 228-6881 or ljs32@psu.edu.

Regional

- ✓ Feb 7-9, 2008. **Pennsylvania Association for Sustainable Agriculture (PASA) 17th Annual Farming for the Future Conference.** Penn Stater Conference Center, State College, PA. For more information visit www.pasafarming.org.

National

- ✓ March 4 – 7, 2008. **Greenhouse Tomato Short Course**; Eagle Ridge Conference Center, Raymond, Mississippi. For more information visit www.greenhousetomatosc.com or contact Dr. Rick Snyder at RickS@ra.mssate.edu.

International

- ✓ Sept. 7-10, 2008. **19th International Pepper Conference**; Sheraton Hotel and Conference Center, Atlantic City, New Jersey, USA; contact Dr. Wesley Kline by phone (856) 451-2800 or email wkline@aesop.rutgers.edu or Dr. Andy Wyenandt by phone (856-455-3100 X4144) or email wyenandt@aesop.rutgers.edu

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Again, no subject or message text is required.

The newsletter is also posted within three days on the Department of Horticulture Vegetable program website at: http://hortweb.cas.psu.edu/extension/vegcrops/newsletterlist.html.