Volume 17, 2005

Berry Notes

Prepared by the University of Massachusetts Fruit Team

January 3, 2005, Vol. 17, No. 1

http://www.umass.edu/fruitadvisor/berrynotes/index.html

Massachusetts Berry Notes Underwriters:

Berry Notes is edited by Sonia Schloemann with articles written by other contributors with attribution; sources are cited. Publication is funded in part by the UMass Extension Agriculture & Landscape Program, subscription fees and corporate underwritting . Questions can be directed to Sonia Schloemann at 413-545-4347, sgs@umext.umass.edu. Please cite this source if reprinting information that originates here.

IN THIS ISSUE:

Message from the Editor:

Thanks to Nourse Farms, Inc. for underwriting Massachusetts Berry Notes: Nourse Farms, Inc. in Whately Massachusetts, a premier small fruits nursery, has generously offered to underwrite this publications in order to make it more accessible to berry growers. As a result, the annual subscription fee has been reduced to $10 and we have added an option for receiving the newsletter by fax.

Subscription Renewals, Second Notice: Subscriptions for Massachusetts Berry Notes for 2005 can be ordered by using the attached Subscription Renewal Form. As a result of the generous underwriting by Tim and Nathan Nourse at Nourse Farms (www.noursefarms.com), the subscription cost for this year will only be $10. We thank Nourse Farms for their support for our programming. Delivery of Berry Notes will continue to be via email distribution, but we will also offer fax delivery as an alternative, for those who would prefer it. Please note the mode of delivery you prefer on your subscription order form.

Meetings: Winter is a time to take advantage of some educational meetings and trainings. Check out the list in the Meetings section of this newsletter for some good opportunities to learn about some new advances, research results, or just brush up on some production basics. Contact information is provided for each event, but if you have difficulty finding out what you need to know about a particular meeting, contact me and I'll try to help.

Ag. Business Planning Opportunities: The Massachusetts Dept. of Agric. Resources (MDAR) plans a new round of Ag. Business Planning Courses to be offered **in Palmer later Janurary – March 2005, and on Martha's Vineyard February – April 2005.** For more information and to sign up for one of these courses, contact Rick Chandler as soon as possible at (413) 577-0459 or rchandler@umext.umass.edu. Space is limited.

Focus on Anthracnose: This issue of Massachusetts Berry Notes is devoted to an in depth look at one disease that presents itself in various berry crops. The causal organism may be different for each crop, but the symptoms are similar. Disease symptoms, life cycles and management recommendations are covered in each article.

STRAWBERRY

Strawberry Anthracnose

Bill Turecheck and Cathy Heidenreich, Cornell University

Introduction - The term anthracnose is a general term used to describe plant diseases. Strawberry anthracnose refers to several diseases of strawberry caused by members of the same group of fungi (Colletotrichum), all producing similar symptoms (Table 1). These pathogens are capable of infecting fruit, buds, blossoms, petioles, runners, crowns, and foliage. Though generally thought of as southern diseases (optimal development temperature is approx. 80˚ F), anthracnose is not limited to the south. Anthracnose crown rot (caused mainly by *C. fragariae*) is the most destructive disease of strawberry in the southeastern United States and on a global scale, anthracnose fruit rot (caused by all 3 species, but most often associated with *C. acutatum*) is a significant problem. Anthracnose fruit rot is especially severe in annual cropping systems where berries are grown on plastic-mulched raised beds. Fully open flowers and ripening fruit are very susceptible to infection. Under rainy, warm harvest season conditions the disease is able to spread very quickly and may destroy the entire crop. *C. acutatum* is considered to be most prevalent species in the Northeast.

Table 1: Colletotrichum species believed to be responsible for different anthracnose diseases on strawberry

Diseases	*C. acutatum*	*C. dematium*	*C. fragariae*	*C. gloeosporioides*
Anthracnose crown rot		X		
Anthracnose fruit rot (Black spot)	X	X	X	X
Anthracnose leaf spot (Black leaf spot)		X	X	
Irregular leaf spot	X			

Symptoms - Lesions first appear as small, dark spots on stolons and petioles (Figure 1). These enlarge to become dark, elongated, dry, sunken lesions, which often girdle the stem. When petioles or runners become girdled, individual leaves or entire daughter plants may wilt and die. Petiole infections occur at the base of the petiole, causing the leaf to bend sharply at the point of attachment and hang down.

Leaves: Anthracnose or black leaf spot is caused *by C. fragariae* or *C. gloeosporioides*. Lesions on leaves are small (<1/4"), round, and black (sometimes light gray) often resembling ink spots (Figure 2). Spots may become numerous on leaflets without causing leaf death and often appear first on expanding leaves of runner plants. While the fungi are not reported to sporulate in these leaf lesions, the presence of leaf spot may be a warning signal that abundant inoculum is present on other plant parts and fungicide applications are needed. Irregular leaf spot, caused by *C. acutatum*, has dark brown to black lesions forming on leaf margins and tips and extending along the margin and inward to the mid-rib. These lesions do not continue to develop in fully expanded leaves but infected leaves may persist on plants for 2-3 months. The fungus sporulates in these lesions and may serve as an inoculum source for flower blight and fruit rot.

Flower Parts: Flower blight may occur any time after the bud emerges from the crown (Figure 3). Fully open flowers are most susceptible to infection. Flower buds, sepals, pedicels, and peduncles may also become infected. Infected flowers dry quickly; dark lesions spread down the pedicel from the flower. Pedicels may be infected first; flower bud stems are girdled and buds die. Sepal infections occur as the bud is emerging from the crown. Sepals dry and turn brown;

the resulting tip burn resembles that caused by excessive fertilizer. When warm, humid conditions prevail during bloom, all parts of the flower truss may dies, giving plants a blighted appearance.

Fruit: Symptoms appear as whitish, water soaked lesions up to 3 mm in diameter. As lesions develop, they turn a light tan to dark brown and eventually become sunken and black with in 2 to 3 days (Figure 4). After several days, lesions may be covered with pink to orange to light salmon-colored spore masses. Infected fruit eventually dry down to form hard, black, shriveled mummies. Fruit can be infected at any stage of development. Both ripe and unripe fruit can be affected. Infected seeds (achenes) turn black and are slightly sunken. These single seed infections often occur on green fruit; a typical lesion devlops as the fruit ripens.

Crowns: The fungus moves into the crown from petiole or stolon cankers, or may start as an infection from spores washed by rain or irrigation into the center bud.

When crown tissue becomes infected, the entire plant grows normally for a while, then wilts and dies. The internal tissue of infected crowns will develop a firm, reddish brown rot (seen by slicing through the crowns). Crown tissue may be uniformly discolored or streaked with brown, and lesions may produce salmon-colored masses of spores.

Signs (visible presence of the pathogen) - Pink to orange to light salmon-colored spore masses on the surfaces of lesions form on most if not all plants parts. *C. gloeosporioides* also readily produces perithecia.

Disease cycle - Infected transplants and soil from infected transplants, appear to be the primary source of inoculum in most instances, especially in annual production systems. This may be especially true *for C. fragariae*, which has a limited host range and does not survive in soil over the summer. In perennial systems, the fungi may overseason in infected plants and debris, providing inoculum for the following fruiting season. Spores (conidia) may be dispersed in the field by wind-driven rain, splashing water, insects, movement of workers, equipment or animals. Disease development and spread is minimal in most cases under cool, dry conditions. Crown infections often occur in the nursery but do not appear until after planting. The fungus continues to develop in newly planted nursery infected plants, which may suddenly die during warm weather in the fall or early spring of the following year.

Conditions favoring Infection - Anthracnose is considered to be a warm-weather disease with an optimum temperature for plant infection by *C. fragariae* between 80 and 90°F. Therefore, the disease is generally not a problem in the Northeast unless warmer temperatures and rainfall prevail during fruit set and harvest. *C. acutatum* fruit infections occur at 68°F. Both fungi need nearly 100% relative humidity for spore germination and infection to occur.

Disease management - Since control is extremely difficult when favorable environmental conditions exist, measures should start at planting to reduce inoculum levels. This begins with anthracnose-free plants (Appendix of Strawberry Cultivar Disease Resistance). Use of drip irrigation and between row straw mulch will also help lessen the spread of disease within fields. Early season fruit with infections should be culled and removed from fields. Anthracnose fruit rot may be partly controlled with protective fungicide applications from flower bud emergence to harvest, however, fungicide programs have sometimes met with little to marginal success. For more information on fungicide programs see "Pest Management Guidelines for Commercial Small Fruit Production". [Ed. Note: consult the New England Small Fruit Pest Management Guide for recommended fungicide materials and rates.] Check product labels for timing and rates of application for products.

Reference List

1. Brooks, A. N. 1931. Anthracnose of strawberry caused by Colletotrichum fragariae, n. sp. Phytopathology 21:739-744
2. Dyko, B. J., and Mordue, J. E. M. 1979. Colletotrichum acutatum. C.M.I. Descriptions of Pathogenic Fungi and Bacteria, No. 630.
3. Gunnell, P. S., and Gubler, W. D. 1992. Taxonomy and morphology of Colletotrichum species pathogenic to strawberry. Mycologia 84:157-165.

4. Maas, J. L. 1998. Compendium of Strawberry Diseases, 2nd Ed., American Phytopathological Society, St. Paul, Minn., 98 pp.
5. Mordue, J. E. M. 1971. Glomerella cingulata. C.M.I. Descriptions of Pathogenic Fungi and Bacteria, No. 315.
6. Muñoz, J., Andrés, G., and Suárez, M. B. 2000. A physiological and biochemical approach to the systematics of Colletotrichum species pathogenic to strawberry. Mycologia 92:488-98.

(***Source**: Cornell Index of Tree Fruit and Small Fruit Fact Sheets,* http://www.nysaes.cornell.edu/pp/extension/tfabp/disindx.shtml)

RASPBERRY

Anthracnose in Bramble Fruits

Brian R. Smith, University of Wisconsin-River Falls

Anthracnose, commonly called "cane spot" or gray" bark," occurs in several species of Rubus. It is considered an extremely serious disease of black, purple and susceptible cultivars of red raspberry. Severe yield loss may result due to defoliation, wilting of lateral shoots, death of fruiting canes, and reduction in fruit size and quality.

Symptoms - Anthracnose symptoms are most conspicuous on canes but can also occur on leaves, petioles, flower buds, and fruit. In the spring, reddish purple spots appear on young canes. As the disease progresses, the spots enlarge and the centers become sunken. These early lesions on the cane are called pit lesions. By late summer or early fall, the typical "gray bark" symptom can be observed, especially on the red raspberry. Within these lesions spores are produced which are spread by running water, splashing rain, and wind. Canes weakened by anthracnose are more susceptible to winter injury and eventually may die. Cankered canes may also produce abnormal fruiting branches with malformed fruit, especially in seasons of drought. Fruit infections are not common unless there is a high level of anthracnose in the plantings. Infected fruit is typically dry and seedy.

Disease Cycle - Anthracnose is caused by the fungus Elsinoe veneta which overwinters on canes infected the previous season. In the spring, fungal spores are produced on these diseased canes. These spores are spread to very young green tissue and infection takes place. The primary damage to plants is caused by these early infections.

Disease Management - Control can be achieved by sanitation and spraying. Although sanitation is labor-intensive, it is an effective management practice for the control of anthracnose. The fungus can survive on dead canes that have been pruned off. If pruned canes are left in or near the planting, the disease can spread back into the planting. Removing the pruned canes reduces the potential for disease development.

It is important to plant clean, disease-free nursery stock. Cut out all diseased canes, cane "handles," and any infections observed on new plants. Good air movement through the planting should be provided by the removal of weeds and spindly canes. If possible, all noncultivated brambles within the vicinity should be rogued, for these wild plants will also harbor the pathogen. [Ed. Note: consult the New England Small Fruit Pest Management Guide for recommended fungicide materials and rates.] (***Source**: PennState Bramble Fact Sheet Series,* *www.cas.psu.edu/docs/CASDEPT/PLANT/fpath/Brambles/factlis.html*)

BLUEBERRY

Blueberry -- Ripe Rot (Anthracnose)

Jay W. Pscheidt, Oregon State University

Cause: *Colletotrichum gloeosporoides* (sexual: *Glomerella cingulata*) and *C. acutatum*, fungi. This disease appears on fruit before harvest (ripe rot) and as a postharvest fruit rot, but control tactics must be implemented earlier in the season. Warm, wet conditions favor disease spread and buildup. Spores are dispersed by splashing rain or irrigation. Infection can occur any time during bloom and berry development. About 12 hours of continual leaf wetness at 60-80oF is necessary to establish infections. Berry infections remain quiescent (latent) until fruit is nearly mature. The fungus overwinters in blighted twigs and fruit trusses. Pruning and the destruction of prunings from the field did not reduce primary inoculum and has little impact on the resulting disease.

Symptoms: First, blighting of shoot tips; then, a few flowers turn brown or black. Leaf spots, when they occur, are large or small and roughly circular. As infected berries ripen, the flower end may soften and pucker. Under warm

and rainy conditions, salmon-colored spore masses form on infected berries. After harvest, spore masses form rapidly on infected fruit when in cellophane-covered baskets or in plastic clamshell packs.

Note the sporulation of the fungus on the side of this berry.

Cultural control: A combination of cultural and chemical practices is most helpful in combating losses due to this disease.

1. Avoid overhead irrigation or apply such that plants are not wet for extended periods of time.
2. Lower the temperature of harvested fruit to 32°F as soon as possible after picking.
3. Prune bushes for adequate airflow and to reduce drying time after becoming wet.

Chemical control: Apply during bloom and use along with cultural practices. Applications may be needed after bloom in especially wet years. Exclusive use of some products, such as Funginex and Indar, for mummyberry control has resulted in elevated levels of anthracnose. Although this may be an artifact of fungicide testing trials, addition of broad spectrum fungicides in an overall program is recommended.

1. **Abound** at 6.2 to 15.4 fl oz/A. Do not apply more than 2 sequential applications or more than 3 applications per year. May be applied on the day of harvest. 4-hr reentry. [*Do not apply if drift to apple trees is possible or if same sprayer is used on apple trees.*]
2. **Cabrio EG** at 14 oz/A. Do not use more than 2 sequential applications or more than 4 applications per year. May be used at harvest. 24-hr reentry.
3. **Captan 80 WDG** at 1.25 to 3.1 lb/A plus spreader sticker. May be applied up to day of harvest. Moderately effective. 72-hr reentry.
4. **CaptEvate 68 WDG** at 3.5 to 4.7 lb/A Do not apply more than 2 consecutive application or more than 21 lb/A/season. Can be used day of harvest. 72-hr reentry.
5. **Ziram** products have a moderate to poor control ranking. 48-hr reentry.
   - **Ziram 76 DF** at 3 lb/A. Do not apply after 3 weeks from full bloom.
   - **Ziram Granuflo** at 3 lb/100 gal water. Do not apply after 3 weeks from full bloom.

Notes: Although Aliette is registered for use, it has been effective in only 3 of 9 trials.

Although chlorothalonil products (Bravo and Echo) are registered, their performance has been quite variable and more often ineffective than effective. Since it cannot be used after early bloom, it is not recommended for controlling this disease.

References:

Milholland, R.D. and J.R. Meyer. 1984. Diseases and Arthropod Pests of Blueberries. North Carolina Ag (***Source**: Oregon State University Research Service Bulletin 468*. http://plant-disease.ippc.orst.edu/disease.cfm?RecordID=185

Gooseberry and Currant

Gooseberry and Currant (Ribes sp.) -- Anthracnose

Jay W. Pscheidt, Oregon State University

Cause: Drepanopeziza ribis (asexual: Gloeosporidiella ribis), a fungus that overwinters on dead leaves. Small, mushroomlike fruiting bodies (apothecia) are on fallen leaves in spring. They produce airborne ascospores that infect newly developing leaves. Rainy weather favors spore release and infection. Different fruiting bodies (acervuli) are produced in 3 to 4 weeks after ascospore infection. Acervuli produce conidia which are rain splashed and infect healthy leaves. The disease is serious in wet seasons.

Symptoms: Small, dark brown, round or irregular leaf spots develop which, when abundant, may cause foliage to yellow and drop by midseason. Small, grayish bodies (acervuli) develop in leaf lesions. The disease reduces the plant's vitality, growth, and productiveness.

On currants, fruit as well as leaves may show spotting like fly specks. Severely infected berries crack open and drop.

Cultural control:

1. Remove and destroy dead leaves from under bushes.

2. Cultivate under and around bushes to bury leaves before budbreak in spring.
3. Prune and thin bushes to provide better air circulation and drying conditions.

Chemical control: Starting when the first leaf reaches full size, apply during wet spring conditions until dry weather prevails in summer.

1. Abound at 6.2 to 15.4 fl oz/A. Do not apply more than twice sequentially or more than three times per year. May be applied on the day of harvest. 4-hr reentry.
2. Bordeaux 8-8-100.
3. Cabrio EG at 14 oz/A. Do not apply more than twice sequentially or more than four times per year. May be used at harvest. 24-hr reentry.
4. Champ Formula 2 at 0.83 gal/A. 24-hr reentry.
5. Copper-Count-N at 5 to 10 quarts/A. 12-hr reentry.
6. Cuprofix Disperss at 13 lb/A. 24-hr reentry. O
7. Kocide DF at 10 lb/A. 48-hr reentry.
8. Lime sulfur (29%) at 3 pints/100 gal water. 48-hr reentry.
9. Nordox at 5 to 10 lb/A. 24-hr reentry.
10. Rally 40 W at 5 oz/A. Applications may be made up to the day of harvest. Do not apply more than 40 oz/A/season. 24-hr reentry.

References:
Booth, C. and J.M. Waller. 1979. Drepanopeziza ribis. CMI Descriptions of Pathogenic Fungi and Bacteria, No. 638. Surrey, England: Commonwealth Mycological Institute.

(***Source**: Oregon State University Plant Disease Control Fact Sheet,* http://plant-disease.ippc.orst.edu/disease.cfm?RecordID=509 *Revised January 1, 2004*)

Lesions with purple boarders and tan centers.

GRAPE

Anthracnose of Grape

Michael A. Ellis and Omer Erincik Ohio State University

Anthracnose of grape was first detected in the United States in the mid 1800s. The disease was probably introduced into this country by grape plant material imported from Europe. It quickly established in American vineyards and became a significant disease of grape in rainy, humid, and warm regions of the United States. The disease is not common in Ohio; however, it caused severe damage in a central Ohio vineyard on the cultivar 'Vidal' in 1993 and in a southern Ohio vineyard on the cultivars 'Vidal' and 'Reliance' in 1998. Anthracnose reduces the quality and quantity of fruit and weakens the vine. Once the disease is established in a vineyard, it can be very destructive.

Symptoms

All succulent parts of the plant, including fruit stems, leaves, petioles, tendrils, young shoots, and berries, can be attacked, but lesions on shoots and berries are most common and distinctive. Symptoms on young, succulent shoots first appear as numerous small, circular, and reddish spots. Spots then enlarge, become sunken, and produce lesions with gray centers and round or angular edges (Figure 1). Dark reddish-brown to violet-black margins eventually surround the lesions. Lesions may coalesce, causing a blighting or killing of the shoot. A slightly raised area may form around the edge of the lesion. Infected areas may crack, causing shoots to become brittle.

Anthracnose lesions on shoots may be confused with hail injury; however, unlike hail damage, the edges of the wounds caused by the anthracnose fungus are raised and black. In addition, hail damage generally appears on only one side of the shoot, whereas anthracnose is more generally distributed. Anthracnose on petioles appears similar to that on the shoots.

Leaf spots are often numerous and develop in a similar manner to those on shoots. Eventually, they become circular with gray centers and brown to black margins with round or angular edges. The necrotic center of the lesion often drops out, creating a shot-hole appearance (Figure 2). Young leaves are more susceptible to infection than older leaves. When veins are affected, especially on young leaves, the lesions prevent normal development, resulting in malformation or complete drying or burning of the leaf. Lesions may cover the entire leaf blade or appear mainly along the veins.

On berries, small, reddish circular spots initially develop. The spots then enlarge to an average diameter of 1/4 inch and may become slightly sunken. The centers of the spots turn whitish gray and are surrounded by narrow reddish-brown to black margins (Figure 3). This typical symptom on fruit often resembles a bird's eye, and the disease has been called bird's eye rot. Acervuli (fungal fruiting structures) eventually develop in the lesions. A pinkish mass of fungal spores (conidia) exudes from these structures during prolonged wet weather.

Figure 1. Anthracnose symptoms on grape cane.

Lesions may extend into the pulp and cause the fruit to crack. Lesions on the rachis and pedicels appear similar to those on shoots. Clusters are susceptible to infection before flowering and until *Véraison*.

Causal Organism

Anthracnose of grape is caused by the fungus *Elsinoe ampelina*. The fungus overwinters in the vineyards as sclerotia (fungal survival structures) on infected shoots. In the spring, sclerotia on infected shoots germinate to produce abundant spores (conidia) when they are wet for 24 hours or more and the temperature is above 36ºF. Conidia are spread by splashing rain to new growing tissues and are not carried by wind alone.

Figure 2. Anthracnose symptoms on grape leaf. Note the shot holes where infected tissues drop out.

Another type of spore, called an ascospore, is produced within sexual fruiting bodies and may also form on infected canes and berries left on the ground or in the trellis from the previous year. The importance of ascospores in disease development is not clearly understood.

Conidia are by far the most important source of primary inoculum in the spring. In early spring, when free moisture from rain or dew is present, conidia germinate and infect succulent tissue. Conidia germinate and infect at temperatures ranging from 36 to 90ºF. The higher the temperature, the faster disease develops. Disease symptoms start to develop approximately 13 days after infection occurs at 36ºF and at four days after infection occurs at 90ºF. Heavy rainfall and warm temperatures are ideal for disease development and spread.

Once the disease is established, asexual fruiting bodies called acervuli form on diseased areas. These acervuli produce conidia during periods of wet weather. These conidia are the secondary source of inoculum and are responsible for continued spread of the fungus and the disease throughout the growing season.

Disease Management

1. Sanitation is very important. Prune out and destroy (remove from the vineyard) diseased plant parts during the dormant season. This includes infected shoots, cluster stems, and berries. This should reduce the amount of primary inoculum for the disease in the vineyard.

2. Eliminate wild grapes near the vineyard. The disease can infect wild grapes, and infected wild grapes have been observed near diseased vineyards in Ohio. Wild grapes provide an excellent place for the disease to develop and serve as a reservoir for the disease. It is probably impossible to eradicate wild grapes from the woods, but serious efforts should be made to at least remove them from the fence rows and as far away from the vineyard as possible. Remember, the spores are spread over relatively short distances by splashing rain and should not be able to move over long distances by wind into the vineyard.

3. Varieties differ in their susceptibility. In Ohio the disease has been observed on 'Vidal' and 'Reliance.' Vinifera and French Hybrid cultivars may be more susceptible than American grapes, such as 'Concord' and 'Niagara.'

Figure 3. Typical symptoms of anthracnose on grape berry. Note the lesion resembles a bird's eye.

4. Canopy management can aid in disease control. Any practice that opens the canopy to improve air circulation and reduce drying time of susceptible tissue is beneficial for disease control. These practices include selection of the proper training system, shoot positioning, and leaf removal.

5. Fungicide use. Where the disease is established, especially in a commercial vineyard, the use of fungicides is recommended. Fungicide recommendations for anthracnose control consist of a dormant application of Liquid Lime Sulfur in early spring, followed by applications of foliar fungicides during the growing season.

For the most current spray recommendations, commercial growers are referred to Bulletin 506-B2, *Ohio Commercial Small Fruit and Grape Spray Guide,* and backyard growers are referred to Bulletin 780, *Controlling Diseases and Insects in Home Fruit Plantings*.

These publications can be obtained from your county Extension agent or the Extension Publications Office, The Ohio State University, 385 Kottman Hall, 2021 Coffey Road, Columbus, Ohio 43210-1044.

More information about plant diseases and online versions of Ohio State University Extension plant disease fact sheets and bulletins with color figures are available on the following websites:
http://www.ag.ohio-state.edu/~plantdoc/extension.php
http://ohioline.osu.edu/hyg-fact/3000/index.html
(***Source**: The Ohio State University Extension Fact Sheet HYG-3208-02* http://ohioline.osu.edu/hyg-fact/3000/pdf/3208.pdf)

General Information

Eight Tips for Transitioning to Organic Production

Elsa Sanchez, Penn State University

The transition phase can be difficult for growers transitioning to organic production. During the transition phase the farming system is undergoing many changes in physical, chemical and biological properties. The transition phase is typically accompanied by reduced yields until the farming system reaches a new equilibrium. Further, crops produced during the transition phase cannot be marketed as organic or transition organic. As a result growers must be prepared to operate with the reduced incomes typically accompanied with reduced yields during the transition phase. Below are some tips for the transition phase adapted from Zinati (2002). Keep in mind that factors such as location, soil type, pest pressure and environmental factors can affect the efficacy and implementation of these tips.

1. Select land with a high nutrient status, good soil structure and low pest pressure to transition first. A grower can transition separate fields at different times to organic production. A strategy for transitioning fields, particularly with high pest pressures may be to use a pre-transition phase (See tip 8).
2. Include legumes in the crop rotation to supply nitrogen to the soil and reduce pest pressure. Different legumes add different amounts of nitrogen to the soil. The Commercial Production Recommendations Guide for Pennsylvania [*and the New England Small Fruit Pest Management Guide*] includes a table with nitrogen values for different legumes used as green manures. Even when the legume is grown as a cash crop, incorporating the plant reside after harvest can add some nitrogen to the soil.
3. Start the transition by planting a crop with low nitrogen needs. This strategy will provide more time for adding nitrogen to the soil using other fertility management tools including green manures, manures and compost.
4. Use green manures, manures and compost to increase soil organic matter, water infiltration and reduce soil erosion. Green manures, manures and compost are already important tools for fertility management in organic systems.
5. Alternate cool season crops with warm season crops to break weed cycles. In surveys of organic growers, weeds typically are listed as the biggest pest problem in organic production. This is one strategy for their management.
6. Use timely disking and over-seeding as other strategies to manage weeds.
7. Experiment on a small-scale before adopting a pest management strategy on a large scale. This can reduce risks in the event the pest management strategy fails.
8. While a 3-year transition phase is required for certification, a pre-transition phase may help alleviate decreased yields during the transition phase. A pre-transition phase may be useful for fields with high pest pressure. During a pre-transition phase conventional pest management tactics are used along with organic tactics to reduce pest pressures. Once pest pressures are

reduced organic pest management tactics are used exclusively.

References

Zinati, G.M. 2002. Transition from conventional to organic farming systems: 1. Challenges, recommendations and guidelines for pest management. HortTechnology 12:606-610.

(***Source****: Vegetable and Small Fruit Gazette, Vol. 8 No. 2, February 2004 via : New York Berry News, Vol. 3, No. 1*)

Hardy Kiwifruit: Emerald Gems

Lee Reich, PhD., Garden and Orchard consultant, Illustrations by Vicki Herzfeld Arlein

Look at hardy kiwifruit plants and it is easy to see why, although introduced as ornamentals about a century ago, they have not been longer and more widely grown also for their fruits. The fruits of these cold-hardy cousins to the fuzzy, supermarket kiwifruit are smooth and green, so have usually gone unnoticed beneath the foliage. It is only the past two decades that the fruits have begun to be appreciated for themselves, but one

taste would have rescued them from obscurity sooner. The fruit are grape-size, borne in clusters, and can be eaten just like grapes, skin and all. They have the same sparkling, emerald-green flesh and similar flavor to supermarket kiwifruits, except that hardy kiwifruits are much sweeter and more flavorful.

The great market potential of hardy kiwifruit comes not only from its delectable flavor and convenience in eating, but also because this new fruit can ride on the established marketing coattails of the fuzzy kiwifruit. Fruit from commercial and experimental test plantings have fetched high prices and enthusiastic consumer reaction. Hardy kiwifruit have no significant pest problems, so also are well suited to "organic" or "sustainable" production and marketing.

Plant Description

In their native habitats within or along the margins of humid mountain forests in eastern Asia, the twining vines clamber up trees or sprawl over the ground. Hardy kiwifruits are represented by a number of species, but the two most prominent are *Actinidia arguta* and *A. kolomikta*, hardy to U.S.D.A. Zones 4 and 3, respectively. *A. arguta* needs about 150 frost-free days to ripen its fruit; *A. kolomikta* needs about 130 days. Of the two species, *A. arguta* is more vigorous and prolific. Other major differences between the two species are that *A. kolomikta* fruit are smaller and ripen earlier than those of *A. arguta*, and they sometimes drop when ripe.

A number of varieties of both species are available. 'Anna' (a Russian selection whose full name is 'Ananasnaja') is very reliable, although it just barely ripens in northern areas. 'Issai', from Japan, ripens similarly and is somewhat selffertile but not very cold hardy. Very tasty and earlier ripening are 'Geneva', 'MSU' ('Michigan State University'), and 'Dumbarton Oaks' (all three propagated

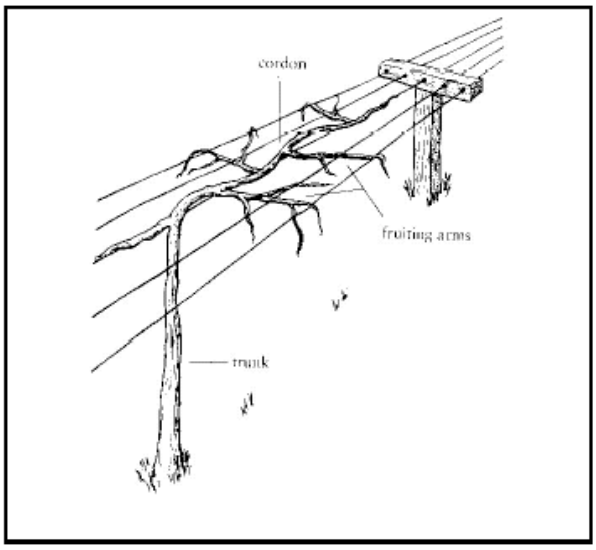
from old ornamental vines in the U.S.), and A. kolomikta varieties such as 'September Sun' and 'Krupnopladnaya'.

Cultivation

Plant the largest vines available, allowing one (nonfruiting) male per eight (fruiting) females. Soil drainage must be perfect. The vines are best supported on a T-trellis that is about six feet high and wide, with 3-5 wires strung between the arms of the T. Space posts sixteen feet apart, with plants at half that distance.

The goals in training and pruning are to make a potentially tangled mass of rampant shoots manageable and easy to harvest, and to keep stems bathed in enough light to remain fruitful. Pruning also stimulates new growth, important because fruits are borne only toward the bases of new shoots that grow from oneyear- old canes (similar to grapes).

An established vine consists of a trunk, permanent cordons, and fruiting arms. Train young plants to a single trunk up to the middle wire of the trellis, then train two horizontal cordons, running in opposite

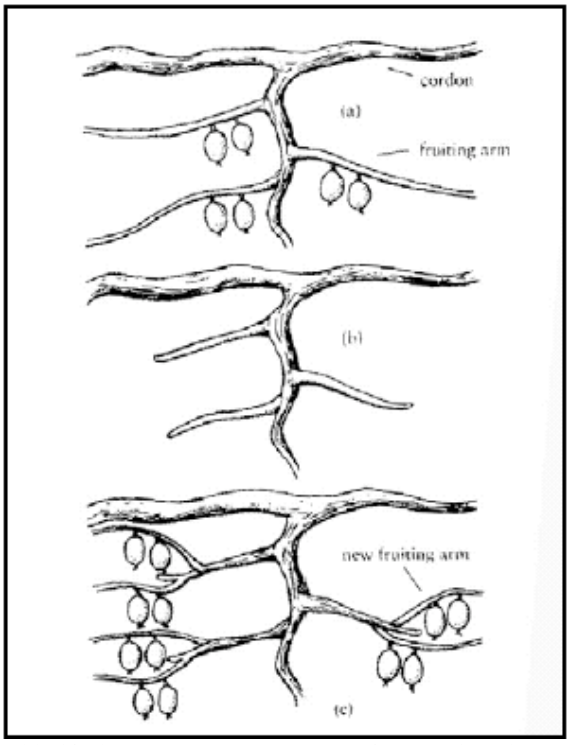


directions along that wire. Temporary fruiting arms, perpendicular to the wires, grow off the cordons.

Hardy kiwifruit vines require pruning in both winter and summer. In winter, cut back fruiting arms to within 18 inches of where growth began the previous season. Whenever a fruiting arm becomes too old and begins to originate too far from the cordon, renew it by cutting it almost back to the cordon. Go over the vines in summer and cut back any rampant stems as well as those that are tangled. Prune male vines drastically right after they finish flowering.

Pitfalls to Avoid

Although hardy kiwifruits are, as their name implies, cold hardy, this cold-hardiness comes only with age; young plants commonly freeze back, delaying production. For this reason, plant large vines and protect the developing trunks from winter sun and cold with 'Tree-Shelters', corn stalks, burlap, pipe insulation, or tree wrap material. Remember, the trunks



of hardy kiwifruits are rarely exposed to full sunlight in the wild.

Hardy kiwifruits are remarkably pest free plants. The greatest hazard is from crown rot. Avoid this disease by planting in well-drained soil or atop mounds.

Hardy kiwifruits ripen unevenly, and vine ripened fruits are easily damaged. Firm, nearly ripe fruits handle better, and can be refrigerated and ripened in "clamshell" containers that maintain high humidity. For good storage, harvest whole clusters of fruit when they are slightly under ripe, as indicated by the first fruits softening or by a refractometer reading of 10 to 14 degrees Brix. Under optimum conditions, yields of 23 tons/A, or about 200 pounds per vine, can be expected. Picked soft, with their stems attached, hardy kiwifruits keep for a couple of weeks; firm, they'll keep up to two months.

The Future

Interest in hardy kiwifruits continues to mount, setting breeders to work. Besides the usual goals of increased productivity and flavor, development of self-fertile varieties would eliminate the need for male pollinators. The variety 'Issai' is somewhat self-fertile, but this variety is not very cold hardy, the fruit ripens very late, and a male pollinator, in fact, does increase fruit size and production.

Watch for red hardy kiwifruits. The variety 'Ken's Red' is now available, with a mild flavor and questionable hardiness. Others are sure to follow.

Perhaps the greatest limitation to this wonderful fruit is its name. Something more euphonious than "hardy kiwifruit" is perhaps needed. Perhaps foreign names for this fruit -- *van*

zhou, tara, or *kishmish*, for example -- would be more appealing. "Grape kiwi" has been suggested, as has "Baby Kiwi" and "Wee-ki". "Kuwi" anyone?

Nicknames aside, pest resistance and delectable flavor make hardy kiwifruits an uncommon fruit to grow and sell.

Further Reading

Uncommon Fruits for Every Garden, by Lee Reich, Timber Press, 2004, $24.95.

(Note:The book can be ordered directly from the author by sending a check for $28 (which includes postage and tax) to: Lee Reich, 387 Springtown Road, New Paltz, NY 12561.*)* (***Source****: New York Berry News, Vol. 3, No. 12*)

Upcoming Meetings

For those who are willing to travel outside the New England regions, a comprehensive listing of upcoming meetings around the country which might be of interest to berry growers can be found at the National Sustainable Agriculture Information Service (http://attra.ncat.org/calendar/index.php/2005/01/).

January 7, 2005, New England Vegetable & Berry Growers' Association, Park Inn at the Parwick Centre, 450 Memorial Drive, Chicopee, MA (Next to Exit 5 off I-90) Registration: $10.00. Registration fee is waived for members of New England Vegetable & Berry Growers Assn. Four (4) pesticide recertification credits (contact hours) will be awarded for attending this meeting. For more information, contact: John Howell at 413-259-1203 or email to: howell@umext.umass.edu.

January 17-19, 2005. New York State Farmers' Direct Marketing Association Conference, Wyndham Hotel, Syracuse, New York. Sponsored by NYSFDMA, Farmers' Market Federation of New York, New York Small Scale Food Processors Association, and Cornell Cooperative Extension. **For information**, call the NYSFDMA office at (315) 475-1101.

January 18, 2005 Winter Flower Growers' Meeting sponsored by University of Massachusetts Extension and Massachusetts Flower Growers' Association. Time: 9:00 AM - 3:15 PM Place: D&D Farm and Greenhouses, 32 Hudson Rd., Stow, MA

Join us for a full-day educational program for greenhouse and flower growers and tour of D&D greenhouses. Topics will include "Creative Containers and Mixed Baskets", "Water Quality Issues for MA Growers", "Managing Your Advertising Dollars", "Sanitizing Greenhouses with Chlorine Dioxide" and "New Fungicides". The cost to register is $15 and lunch is available for $15.

D & D Farm and Greenhouses - What started as a way to make a few extra bucks for one man and his family, has grown into a three generation, family owned and operated wholesale flower business.

D & D Farms has over 140,000 sq. ft. of greenhouse growing area for pansies, perennials, annuals, mixed and flowering hanging baskets, 4" and 6" crops and flowering mums and asters. They just built a new Westbrook Skyline II gutter-connected, glass open roof designed greenhouse and plug operation/production facility. D&D sow all their own seedlings, from pansies to perennials to the ever-growing selection of flowering annuals. Their vegetative material and mums come from cuttings they root themselves.

For more information contact Tina Smith by phone at 413-545-5306, by email at tsmith@umext.umass.edu or visit: http://www.umass.edu/umext/floriculture/upcoming_events.html.

January 20 & 21, 2005 – Long Island Ag Forum 2005. The 2005 Long Island Agricultural Forum will be held on January 20 & 21 at Suffolk County Community College in Riverhead, NY. Sessions will include: Vegetable, Potato, **Viticulture**, Agricultural Issues, Pesticide Issues, etc. Programs will be mailed in late November/early December. Contact Linda Holm at Suffolk County Cooperative Extension, 631-727-7850, lml10@cornell.edu.

January 26, 1:00- 4:00, Vermont Vegetable and Berry Growers Association 2005 Farm Show Program, First Presbyterian Church, Barre, VT. Free and open to the public. Contact: Vern Grubinger, UVM Extension, (802) 257-7967 ext. 13, or E-mail: vernon.grubinger@uvm.edu

January 26-29, 2005 Virginia Grown Conference. Annual meeting of the Virginia Vineyard Association in Richmond, VA. In cooperation with Virginia Tech Cooperative Extension. Always a great program focusing on

practical viticulture with a small trade show. Visit their web site for more information at www.virginiavineyardsassociation.com/.

January 28-30, 2005. Organic Farming and Gardening Conference, Syracuse, New York. Call 607- 652-6632 or e-mail office@nofany.org.

February 1 – 3, 2005. Mid-Atlantic Fruit and Vegetable Conference. Hershey, PA. Contact: Bill Troxell at 717-694-3596 or email wt.pvga@tricountyi.net.

February 3 - 5, 2005, PASA Farming for the Future Conference, Penn State Conference Center and Hotel, State College, PA. Pennsylvania Association for Sustainable Agriculture's 14th annual conference. This years theme is Reclaiming Health: Nourishing Our Families and Farms. Keynote speakers are Allan Savory and Marian Nestle. To receive a full brochure, visit www.pasafarming.org or call 814-349-9856.

February 5, 2005 - New England Vegetable & Berry Growers Association Meeting, at the Eastern Massachusetts Extension Center, 240 Beaver St, Waltham MA. Registration is $10.00. The registration fee is waived for members of NEV&BGA. ONe (1) pesticide recertification credits (contact hours) will be awarded for attending this meeting. For more information, contact: John Howell at 413-259-1203 or email to: howell@umext.umass.edu.

February 10-12. North American Farmers' Direct Marketing Association Conference Park Plaza Hotel in Boston. The theme of the 20th annual North American Farmers' Direct Marketing Convention is "Start a Revolution." The convention is one of the premiere farm direct marketing events in the world. Past attendees have come from as far as England, Ireland, Japan and Australia. In addition to the conference, the convention will feature pre- and post-conference bus tours and a full-day workshop. The entire event runs from Feb. 7-14, 2005. A trade show with more than 80 vendors will be held in conjunction with the conference; it will be held across the street at the historic Castle at Park Plaza. For convention information, visit www.nafdma.com. Or, e-mail info@nafdma.com. CAll (413) 529-0386. Registration will be available on-line around Nov. 1. The pre-registration deadline is Jan. 6.

Feb. 12, 2005 - NOFA-VT Winter Conference. Randolph Center VT. Brochures will be ready to mail in January of 2005. Contact the office if you would like to receive a brochure. Contact: NOFA Office. Phone: 802-434-4122, info@nofavt.org. Workshop list at: http://www.nofavt.org/pdfs/wc-workshops.pdf, Registration info at: http://www.nofavt.org/pdfs/wc-registration.pdf

February 14-17, 2005. Empire State Fruit and Vegetable Expo, On Center, Syracuse, New York. Call: 315-687-5734 or e-mail mailto:nysvga@twcny.rr.com.

February 17-18, 2005, Ontario Fruit and Vegetable Conference/Ontario Berry Growers, at Brock University in St. Catherines, Ontario. Information and registration at http://fruitveggie.hortport.com/Dispstpg.htm?ID=3042.

February 16 – 19 2005 North American Berry Conference in Nashville, Tennessee. The 2005 North American Berry Conference will feature the most extensive program in its history and the run down of speakers reads like a list of "who's who" in the berry world.

Combining the power of the North American Strawberry Growers Association and the North American Bramble Growers Association we've created a "premier" event for berry growers . . . . four tracks with focused interest topics, general sessions that bring the interests of the berry world together, an extensive exhibit area, and a production and marketing tour to top it off. If you can only go to one event each year, this is the year to put the North American Berry Conference on your calendar.

If you have questions contact us at info@nasga.org. Conference Details at http://www.nasga.org/meetings/2005/berry_conference/reg_brochure.htm