UMASS EXTENSION

Vegetable Notes

For Vegetable Farmers in Massachusetts

Volume 22, Number 9 June 23, 2011

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CROP CONDITIONS

We are seeing some diseases appear that are linked to wet conditions in soil and on leaves, such as club root, early blight, fulvia leaf mold. Though the more serious threats associated with wet, cool conditions such as *Phytophthora capsici* or *P. infestans* (late blight) or sclerotinia white mold have not appeared, it is advisable to scout for these regularly. Overall, crops are doing pretty well. For early-planted crops: corn is silking, potatoes are blooming, winter squash and pumpkins are starting to vine, cabbage is starting to form heads. The news update for insect pests includes the arrival of potato leafhopper at significant levels in bean and potato fields as well as eggplant and certainly in alfalfa fields. This is a pest which is easy to miss when it first arrives, but a serious mistake to ignore (see article below).

Cumulative GDD starting Jan 1, 2001. Base 40 and 50 ºF

Base temp 40 ºF is for maggot flies; base temp 50 ºF is for most other insects.

Cumulative GDD are higher when base temp is 40 ºF.

Date	Location	GDD since Jan 1 Base 40 ºF	GDD since Jan 1 Base 50 ºF	Rainfall 7 days (inches)	7-day SV	SV -Season total
23-Jun	Pittsfield	1315.7	633.2	1.8	10	32
23-Jun	Ashfield	1344.0	627.8	3.4	8	45
23-Jun	S Deerfield	1477.6	762.6	N/A	12	35
23-Jun	Dracut	1445.0	684.5	2.5	5	23
23-Jun	Tyngsboro	1399.5	704.5	2.1	6	24
23-Jun	Bolton	1316.0	676.0	1.9	8	38
23-Jun	Northboro	1470.3	718.8	1.5	7	26
23-Jun	New Bedford	1638.5	794.5	1.5	7	22

Weather data from NEWA, other New England locations are available

http://newa.cornell.edu/index.php?page=degree-days

for details on using severity values to model risk for late blight see the June 16 Vegetable Notes

SV= Late Blight Severity Value, based on BLITECAST

SV Seasonal Total ASSUMES POTATO EMERGENCE MAY 20

(earlier emergence results in higher seasonal SV)

The Vegetable Program is co-sponsoring an exciting conference on July 14-15 on growing and using local grains. Why would grains be of interest for vegetable growers? As growers seek rotation crops to break up insect and disease cycles in their vegetables, cash grain crops show great potential. As an extension of the widespread enthusiasm for food grown close to home there is a burgeoning interest in local grains. Many growers are learning the skills and working on getting the tools and infrastructure for producing grains. Bvakers and malters are interested in how they can use grains for bread, malt, beer and other products. Grains can be grown on large or small scale. Heritage and landrace wheat varieties from around the world are being evaluated at UMass and on farms around New England for their adaptability and yield under our conditions. With farmers, breeders, researchers, bakers and malters from near and far giving workshops, this Local Grains Conference and Festival will provide a wealth of information about how to be part of rebuilding a local grain system in New England.

See Upcoming Meetings and attached flyer for details on program and registration.

Recognizing tomato blights

We're starting to see some of the common tomato diseases show up in fields and greenhouses. Early blight was confirmed in field tomato that had been transplanted on May 23. Fulvia leaf mold was found in high tunnel tomatoes. Early blight and Septoria blight are more common in field tomatoes, while Fulvia leaf mold and grey mold are more common in the greenhouse, especially under high humidity conditions. However, it is possible to see any of these in field, high tunnel or greenhouse tomatoes.

Late blight stem lesion

Conditions have been reasonably favorable for late blight development, but aside from a few isolated cases in greenhouses we haven't had any reports of the disease showing up in field crops in the northeast. No new finds have been reported since May 9. It's important to know if and when the disease shows up in our area and we have funds to cover disease diagnostics for this disease, so if you suspect that you might have late blight in your tomatoes please contact the vegetable program at 413-577-3976 or umassvegetable@umext.umass.edu.

Late Blight (*Phytophthora infestans*). Effective management of this disease is largely dependent on an accurate assessment of risk, and knowing where and when the disease is present is a key component in assessing the risk to your crops.

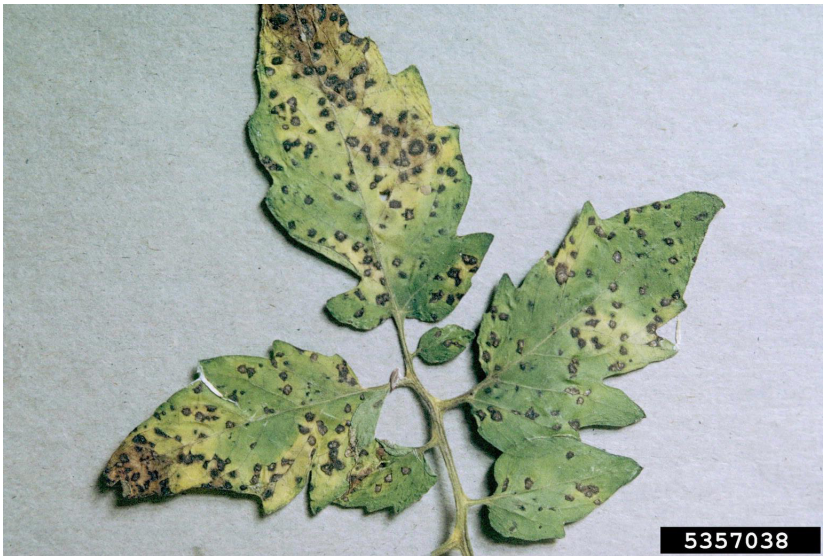
Late blight leaf lesion. Note the greyish, sunken area around the margin of the lesion

The danger with this disease is that, under the right weather conditions, the development and spread of the pathogen can be explosive. This explosive growth is what devastated tomato and potato crops in 2009. The 2009 growing season combined highly favorable weather for the disease (cool and moist) with numerous points of inoculation. Assessing the risk for this season depends on those two things – favorable weather conditions and the presence of the pathogen. We've helped deploy a system of weather monitoring stations across the state. These stations report local weather data to the NEWA website, where they are run through various models that help to predict the risk from this disease. We'll provide updates on the risk forecast weekly throughout the growing season. We're also trying to assess the presence of the pathogen by scouting fields, analyzing samples that come into the disease lab, and trying to catch the leading edge of the disease development here in Massachusetts.

Classic symptoms are large (at least nickel-sized) olive-green to brown spots on leaves with slightly fuzzy white fungal growth on the underside when conditions have been humid (early morning or after rain). Sometimes the lesion border is slightly yellow or has a water-soaked appearance. Leaf lesions begin as tiny, irregularly shaped brown spots and quickly grow larger – spots that are consistently small are most likely septoria leaf spot (see below). Brown to blackish lesions develop on upper stems and leaf petioles. These stem lesions are a fairly distinctive sign of late blight and should definitely raise a red flag. Firm, brown spots develop on tomato fruit.

If the lesion has a yellow border and is occurring on the bottom of the plant, it is likely due to infection of either early blight or Septoria leaf spot.

Septoria leaf spot (*Septoria lycopersici*). Septoria leaf spot is one of the most destructive diseases of tomato foliage and it occurs worldwide wherever tomatoes are grown. This disease can destroy most of a plant's foliage resulting in sunscald, failure of fruit to mature properly, and low yields. Once infections begin, they can spread rapidly from lower to upper tomato canopy.



Small, round lesions caused by Septoria blight

Symptoms consist of circular tan to grey lesions with a dark brown margin that appear on lower leaves first, after the first fruit set. If conditions are favorable, lesions can enlarge rapidly, form pycnidia (fruiting bodies that look like black specks) and turn infected leaves yellow then brown. With a 10X hand lens, these black specks can be seen in the center of the lesions. These fruiting bodies, plus the generally smaller size of the lesions, and the absence of target-like circular bands within the lesion distinguish this disease from early blight. The fruiting bodies, smaller lesion size, and associated yellowing of heavily infected foliage help to distinguish this disease from late blight.

Fruit infection is rare, but lesions occur on foliage, stems, petioles, and the calyx. The pathogen overwinters on infected tomato debris or infected solanaceous weed hosts, and can also survive on stakes and other equipment. Seed infection is possible, but rare. Once introduced, Septoria is spread by splashing water, insects, workers, and equipment.

Early blight (*Alternaria solani*). Early blight occurs on the foliage, stem, and fruit of tomato and also occurs worldwide. It first appears as small brown to black lesions on older foliage. The tissue surrounding the initial lesion may become yellow, and when lesions are numerous entire leaves may become chlorotic. As the lesions enlarge, they often develop concentric rings giving them a 'bull's eye' or 'target-spot' appearance. As the disease progresses, plants can become defoliated, reducing both fruit quantity and quality. Fruit can become infected either in the green or ripe stage through the stem attachment. Fruit lesions can become quite large, involve the whole fruit, and have characteristic concentric rings. Infected fruit often drop and losses of 30-50% of immature fruit may occur. On potato, foliar symptoms are quite similar though complete defoliation rarely results. The concentric rings in the lesions are fairly diagnostic for this disease, and help to distinguish it from either late blight or Septoria.

Alternaria blight on tomato. Note the concentric rings in the lesion.

Management of Septoria leaf spot & early blight. Some varieties of tomato with early blight resistance or tolerance are available, however most tomato cultivars are susceptible to Septoria leaf spot. Adequate nitrogen fertility throughout the season can help delay disease development; lower leaves become more susceptible as the nitrogen demand increases with fruit load and older leaves

decline in nitrogen. Protectant fungicide sprays at regular intervals (depending on weather conditions and disease pressure) will delay onset of the disease. Many of the systemic & contact fungicides that are labeled for the control of late blight will also provide control of early blight and Septoria leaf spot. See the New England Vegetable Management Guide for details and current recommendations.

Both pathogens survive between crops on infected plant debris, soil, and other solanaceous host weeds and can be carried on tomato seed. Early blight can be transmitted in infected potato tubers. Rotate out of tomato crops for at least two years, control susceptible weeds, and incorporate debris after harvest. Reduce the length of time that tomato foliage is wet by using trickle irrigation, wider plant spacing, and staking. Keep workers and equipment out of wet fields where possible.

Leaf Mold (*Fulvia fulva*). This disease occurs in both soil and hydoponic production and is most important in poorly ventilated plastic greenhouses. It can occur in the field but is most common in greenhouses. Symptoms look somewhat like late blight. The high temperatures in the greenhouse make late blight less likely, but growers on hyper-alert for late blight have been concerned. Infections begin on older leaves with yellow areas visible on the upper leaf surface. Corresponding to these, on the underside, are areas of olive-green to grayish-purple fuzzy growth where the fungus is making spores. Leaves turn yellow, then brown.

Fulvia leaf mold on tomato

The disease can spread rapidly as spores disperse throughout a greenhouse on air currents, water, insects, and workers.

Management: Start with certified disease free seed. Improve air circulation by adequate row/plant spacing and removal of lower leaves. Avoid the formation of water droplets on leaves by watering in the morning. Reduce relative humidity by a combination of heating and venting, especially at night. Avoid excessive nitrogen fertilization. Remove diseased leaves, place in plastic bag, and destroy. At the end of the crop cycle, remove all plant residue and destroy and disinfest the entire greenhouse.

Many fungicides are registered and effective against these diseases. For organic growers, copper hydroxide products are probably the best option for protectant fungicides. Please see the New England Vegetable Management Guide (www.nevegetable.org) for current management recommendations.

Botrytis grey mold, ghost spot (*Botrytis cinera*). Botrytis leaf spot, stem canker, blight, fruit rot, and ghost spot is caused by Botrytis cinera. Ghost spot results in pale white halo's or ring spots on the green tomato fruit. On ripe fruit, the ringspots may be yellow. Ghost spots develop when the fungus initiates infection, but disease progress is stopped by adverse environmental conditions. This spotting may adversely affect market quality. A change to favorable conditions allows Ghost Spot to proceed to fruit rot.

Botrytis grey mold and ghost spot. Note the light, circular white spots on the fruit and the grey fuz near the calx.

This pathogen is very important on greenhouse tomatoes or hydroponic systems. This pathogen is ubiquitous in the environment, has an extremely wide host range, and prefers to attack senescent and/or injured tissue. Botrytis can be controlled by management of environmental conditions, sound cultural practices, and fungicide applications. Control weeds and remove plant debris. Space plants to allow good air circulation, reduce humidity within the canopy, and minimize leaf wetness. Improve horizontal air flow with fans. Reduce humidity by a combination of heating and venting in the evening, particularly when warm days are followed by cool nights. Water in the morning if practical. Please see the New England Vegetable Management Guide (www.nevegetable.org) for current management recommendations. Always alternate fungicide applications between materials with different modes of action to prevent resistance development.

- Bess Dicklow, Andy Cavanagh, Ruth Hazzard. Information on ghost spot from UMass Floriculture.

WATCH FOR POTATO LEAFHOPPER IN POTATO, EGGPLANT, BEANS

Potato leafhoppers are building up in beans, potatoes and eggplant. Adults are about 1/4 inch long, light yellow-green, and fly up from foliage when it is disturbed or shaken. Nymphs are found on the underside of leaves, light green, wedge-shaped and very fast-moving. Damage can be severe on early-season varieties of potato and red potatoes, as well as in green beans. Beans are more susceptible when they are young than at later stages. Eggplant is also susceptible. Field crops such as alfalfa, clover, soybean, sunflower and tobacco are also hosts.

Adults and nymphs feed by inserting a needle-like beak into the plant and sucking out sap. They also inject a toxin into the plant, which causes yellowing, browning, and curling of leaves. In potato, leaf margins turn brown and brittle first, followed by death of entire leaves, a condition known as 'hopperburn'. In beans the leaf turns mottled brown as if infected with a disease before dying completely. Both adults and nymphs cause damage. Yield loss can be significant, with smaller potato tubers, and fewer bean pods that are smaller in size. In eggplant leaf margins and tips turn yellow and curl up. Feeding can reduce yield before damage is visible. Damage is often confused with Verticillium wilt, where leaves turn yellow and droop down. Damage is worse under drought conditions.

It is important to protect plants when leafhoppers first arrive, before nymphs build up. In potato, the threshold is based on insects per leaf: Nymphs can be monitored by visually inspecting lower leaf surfaces on lower leaves. Treat if more than 15 nymphs are found per 50 leaves. University of Connecticut has established a threshold of 1.5 leafhopper per leaf in eggplant. In potato and eggplant, some materials registered for Colorado potato beetle adults will also control leafhopper, including neonicotinoid foliar sprays such as Provado. These and several other carbamate, synthetic pyrethroid and organophosphate products are also registered for leafhopper in potato, eggplant and snap beans. Refer to the New England Vegetable Management Guide for registered products. An updated list can be found at www.nevegetable.org (search under crops).

On organic farms, pyrethrin (PyGanic EC5.0) has been shown to be the most effective product for reducing leafhopper numbers and damage. Good coverage is important. The residual period is short. Spraying late in the day or in the evening may provide better control than spraying early in the morning. Don't wait for numbers to build up. Row cover can be used to delay PLH infestation in snap beans until flowering, when plants are less susceptible to damage.

CLUBROOT OF CRUCIFERS

Clubroot caused by *Plasmodiophora brassicae* is a major disease of cruciferous crops worldwide and occurs on broccoli, Brussels sprouts, cabbage, cauliflower, turnip, rutabaga, Chinese cabbage, and radish. It can also infect cruciferous weeds (mustard family) as well as some genera of grasses. The disease can be well established before above ground symptoms become evident. Infected roots enlarge to form galls that differ in size and shape depending on host plant. On crops with fleshy roots such as radish and turnip, galls form on the taproot or secondary roots. Crops with fibrous roots such as cabbage and broccoli produce club-like, spindle-shaped swellings on individual roots. Infected roots are unable to absorb water and nutrients, top growth is stunted, and lower leaves may yellow and drop off. Affected plants may wilt during the day and recover at night. Root galls are often invaded by secondary organisms causing root decay and the death of the plants.

Plasmodiophora brassicae is a lower fungus that does not form true mycelium with cell walls. It produces a multinucleate mass of protoplasm called a plasmodium and reproduces by zoosporangia, motile zoospores and long lived resting

spores that persist in soil and plant debris. When susceptible roots are present, resting spores of the fungus germinate to produce zoospores that swim in free water and infect root hairs. Here the fungus develops into a plasmodium and zoosporangia which release secondary zoospores to initiate new infections. It is the presence of plasmodia in the roots that causes root cells to divide repeatedly and enlarge into galls. Mature plasmodia develop into masses of resting spores which are released into the soil following invasion of the galls by secondary organisms. The disease is usually more severe on cold, wet, acidic soils. It is spread by drainage water, infected transplants, and by infested soil on equipment, tools, or shoes,. Resting spores remain viable in the soil for up to eighteen years and the repeated production of cruciferous crops can lead to a rapid build-up of the pathogen. The disease is favored by soils with a pH less than 7.0.

Management:

- Maintain a high pH by regular applications of lime. Calcitic lime is preferred over dolomitic, except where magnesium levels are low.
- Maintain high levels of calcium and magnesium. High pH can lead to boron deficiency in coarse soils. Apply boron as needed as a foliar spray or in the transplanting water.
- Finely ground lime alters the pH more quickly than coarse granules.
- Long (5-7 years) rotations between cruciferous crops.
- Improve soil drainage.
- Control cruciferous weeds.
- Avoid the movement of infested soil into clean areas.
- Produce transplants in clean soil or soilless media. Do not transplant seedlings from a seedbed or greenhouse if even one plant shows symptoms, as others are sure to be infected. Soil-based media should be sterilized and compost-based media must be properly and fully composted if any substrates could include infected plant material or manure from animals that fed upon infected plant material.
- Do not use irrigation water that has been contaminated with resting spores by run-off from infested fields into irrigation ponds.

Chemical recommendations:

cyazofamid (Ranman): 12.9-25.75 fl oz/A. (0 dh, REI 12 h, Group 21). Tank mix with an organosilicone surfactant. Transplant soil drench or soil incorporation. See labels for details.

fluazinam (Omega 500 F): 6.45 fl oz/100gal, transplant drench at 3.4 fl oz solution per plant. 2.6 pts/A soil incorporation. (REI 48 h, Group 29).

PCNB (Terraclor 15 G): 9.6 lb/1000 feet of row (12-15 in band) or 200 lb/acre (broadcast). (REI 12 h). It is very important to thoroughly mix Terraclor with the soil. May be used on direct seeded crops. Do not exceed 30 lbs PCNB active ingredient per acre in any one season.

- M. Bess Dicklow, R. Hazzard, UMass Extension

Corn report

This week we saw a few fields with corn plants in fresh silk with fully emerged tassels. Corn earworm traps should be up in fields with fresh silk, two traps per fields are recommended. Despite the cooler temps and abundant rain this spring that put planting and corn growth back, some growers are still expecting to harvest for the fourth of July holiday. Most fields that we scout are pretassel or tasseling.

European corn borer flights have remained low into this week throughout the state with trap counts not even close to double digits. Infestation levels were above threshold in scouted fields. First sprays have been made where necessary. Continue to scout.

Bees, pollen and insecticides. Selective products for ECB provide good control while being somewhat easier on natural enemies present in the field. There are many beneficial insects in corn that feed on aphids, small larvae and pollen.

Location	Z1	EII	Total
CT Valley			
Sunderland	0	1	1
Hadley (1)	2	2	4
Hatfield	9	2	11
Central & Eastern MA			
Rehobeth	1	8	9
NH			
Litchfield, NH	0	1	1
Hollis, NH	1	0	1
Mason, NH	0	0	0

Honeybees move into corn when pollen is released. The following recommended ECB control materials are listed as 'highly toxic to bees' in the New England Vegetable Management Guide (Table 20, pg. 49) and should be avoided at pollen release to protect bees: Avaunt (indoxacarb), Lannate (methomyl) Warrior (and generic products with lamda-cyhalothrin) and Pounce (permethrin). In general, carbamates and synthetic pyrethroids are highly toxic to bees. Unfortunately, these are also very effective against caterpillars that invade corn during silking. However, there are alternative options that are easier on bees. The spinosyn group including the newer product Radiant (spinetoram) and Entrust (spinosad) has a toxicity rating of medium, while and Belt (flubendiamide), Intrepid (methosyfenozide) and Bt have low toxicity ratings. Belt is diamide, a newer class of insecticide chemistry. Diamide products work by activating insect ryanodine receptors that play a key role in calcium release during muscle contraction. Upon ingestion of treated plant tissue, the insect rapidly stops feeding, then becomes paralyzed and starves to death. This class is particularly effective against caterpillars, but some products also work against Colorado potato beetle and leafminers. Mammalian toxicity is low, making these products safer for applicators and field workers. Impact on beneficial insects and pollinators is also low. It is also labeled for fall armyworm. Intrepid (methoxyfenozide) is an insect growth regulator that causes a premature molt, which is lethal. It must be ingested and is labeled for corn borer. It is non toxic to bees and beneficials. Although you may not be too concerned about bee toxicity if your tassels are just emerging, beneficial toxicity is important to keep in mind regardless of plant stage.

Scout any corn where tassels are beginning to poke up out of the whorl. Look for feeding damage, frass, or the small black-headed larvae. If you pull out the tassel and its tightly-wrapped leaves you may see tiny feeding holes. Borer caterpillars are usually in one of the layers of whorl leaves, or inside feeding on the young tassel. When 15% of plants are infested, a spray is recommended. The best time to control ECB is as the green tassel pokes up out of the whorl. Borers are moving out of the tassel at that time, and easily reached by pesticides. Scout again 3-4 days after spraying. At high levels of infestation or where new eggs are still hatching, it often takes two sprays, 5-7 days apart to bring populations under control.

If your corn is silking, it's a good time to set up corn earworm traps. It's always better to find out about CEW flights before they get into the ear!

UPCOMING MEETINGS

Massachusetts Beekeeper's Association Field Day Meeting

Saturday June 25

UMASS Agronomy Farm, 89-91 River Road North ``South Deerfield, MA

Hosted by: Franklin County Beekeepers' Association

Admission free. Lunch requires preregistration. The menu will be pulled pork sandwich, beans, cole slaw or potato salad and corn bread, and bottled water. For more information see www.massbee.org

Mass. Farm to School Project Invites Distributors/Vendors to Discuss Institutional Demand for Locally Grown Foods

Wednesday June 29th, 2:00 - 3:30 pm

Rovezzi's Ristorante, 2 School St. Sturbridge, MA

Farmers with an interest in selling products to institutions are welcome to join a statewide "shoptalk" meeting with distributors, aggregators, and trucking operations. In preparation for Mass. Harvest for Students Week (Sept. 23-27), we'll

discuss procurement and promotion of locally grown products, transparency and traceability of food from the farm to the customer, recently-passed legislation mandating local food purchasing by state agencies, and more. Primarily intended for businesses interested in being a "go-to source" for local product for institutions, we will hear from the procurement director of a college about his local foods requirements.

This meeting is free and refreshments will be served. Please RSVP to info@massfarmtoschool.org or by calling 413-253-3844.

Mid New England Grain Conference and Festival: 'Bread, Beer & Biodiversity'

July 14 - 15, 2011 9:00 a.m. – 4:30 p.m.

Join us for our two day event to learn about the reintroduction of grains into NE farming systems and to celebrate the harvest with a festival on the second day. Come and listen to a variety of speakers whose expertise in grain breeding, production, marketing, and value-added products will have you planting your own field of grain in no time!

Day 1: July 14 – Growing Local Grains Conference

UMass Crops, Animal, Research and Education Farm, 89-91 River Rd, North of RT. 116, South Deerfield MA (Exit 24 on I-91)

If you have questions or would like to register by phone or email,Phone: 413-545-5221 Email: jcarleva@psis.umass.edu

See attached flier for details or visit: http://extension.umass.edu/vegetable/events/mid-new-england-grain-conference-and-festival-'bread-beer-biodiversity'-part-i

Fruit Growers Summer Meeting

Wednesday July 18, 9:00 - 2:00pm

Parlee Farm, Tyngsborough MA

For more information contact Fruit Growers Association, Wes Autio 413-545-2963 autio@pssci.umass.edu.

Workshops for Beginning and Established Farmers presented UMass Vegetable Program Extension Educators

Insecticide Application and Pesticide Safety - Ruth Hazzard, UMass Extension

Wednesday July 20 10:00am-12:00pm

Nuestras Raices Farm, 24 Jones Ferry Rd, Holyoke, MA

Vegetable Production Educator Participants will learn how to identify damaging pests, and the basics and safety of choosing an insecticide for application.

To register call Amy at 413-535-1789

UMass Vegetable Growers Field Day

August 3

UMASS Crops Research & Education Center

Stay tuned for details!

Vegetable Notes. Ruth Hazzard, editor and Amanda Brown and Andrew Cavanagh, assistant editors. Vegetable Notes is published weekly from May to September and at intervals during the off-season, and includes contributions from the faculty and staff of the UMass Extension Vegetable Program, other universities and USDA agencies, growers, and private IPM consultants. Authors of articles are noted; author and photographer is R. Hazzard if none is cited.