UMASS EXTENSION

Vegetable Notes

For Vegetable Farmers in Massachusetts

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CROP CONDITIONS

Summer crops including tomatoes, peppers and eggplants are doing well. Wholesale prices have remained strong thus far, which is very welcome given the increases in production costs across the board. Retail markets are also strong. Violent thunderstorms continued to cause hail and wind damage this week. This was heavier in the Connecticut River Valley, and spotty in other areas. The whole state received a generous share of rain last week. Eastern Massachusetts no longer faces drought conditions, and crops are yielding well. Western Massachusetts is facing some serious disease outbreaks including late blight of potato and tomato (see article) as well as Phytophthora capsici in cucurbits and peppers (see cucurbit update). For crops which suffered hail damage, consider removing injured fruit if the plant still has the capacity to produce new fruit, and apply fungicide to protect wounds from infection as the plant recovers. Corn earworm is moving in, and for once the numbers are not necessarily highest in the coastal areas.

CUCURBIT DISEASE UPDATE

Downy Mildew: The NCSU downy mildew forecast reports that we've been at low to moderate risk of having downy transported to our area since the last update. We were at high risk on several occasions last week, and the disease has been confirmed as close as NJ. This makes it very possible that downy will be showing up in your fields soon. We would recommend spraying fields with a protectant fungicide such as clorothalonil or maneb at this point (this will also offer some protection against powdery mildew and plectosporium), and then switching to a material that is specific for downy mildew as soon as it's confirmed in your field. This is a time when it is CRITICAL that you scout your fields to catch the disease as soon as it appears. Protectants will help, but the most effective way to control this disease is to apply your most effective material immediately after the disease appears in your field and then follow a recommended spray schedule (consult the NE Vegetable Management guide or see June26 2008 VegNotes at: http://www.umassvegetable.org/newsletters/documents/June262008_000.pdf for spray recomendations).

Powdery Mildew: We have started to see powdery mildew in summer squash, winter squash, and pumpkin crops. Conditions are ripe for the development of this disease. See powdery mildew article for more information. Many of the fungicides recommended for powdery mildew will also be effective against plectosporium and black rot, consult the NE Vegetable Management Guide for details.

Angular and Bacterial Leaf Spot: The hot and wet weather in some parts of the state through most of July have led to an outbreak of these diseases in some areas. While they are generally not major problems in cucurbit crops, bacterial leaf spot can affect the fruit. Applications of copper compounds during early fruit set can reduce the risk to fruit in some vine crops.

Phytophthora: The heavy rains experienced in many parts of the state, combined with warm temperatures, are ideal for the development of this disease. We've seen phytophthora blight in a number of places already this summer. This is a destructive disease that can be very difficult to manage. The most effective management technique for this disease is to manage standing water in the field. Anything you can do to reduce ponding and pooling of rain or irrigation water will

help to reduce the spread of this disease. Removing infected material, along with a border of healthy-looking plants, may slow its spread. Be careful of moving soil from infected fields to healthy fields on boots or equipment. It is also possible that irrigation water can become contaminated by runoff from infected fields. This is likely to be a problem this year, when we're seeing a heavy load of phytophthora in the fields as a consequence of the rain and warm temperatures experience across much of the state this season. If you would like information about getting your irrigation water tested for phytophthora contamination, please contact Andy Cavanagh at 413-577-3976 or by email at acavanagh@psis.umass.edu.

As always, make sure you check the label before mixing fungicides. These recommendations are intended as guidelines only. No company or product endorsement is implied or intended. Disregard any information in this newsletter if it is in conflict with the label.

APPLICATION FOR SHELLED CORN FOR GREENHOUSE HEAT PROJECT

We would like to remind growers that the deadline for applying to be part of the Shelled Corn project for this winter is approaching. **Applications must be received by August 15**. We have funding to provide cost-share for purchase of one corn furnace or boiler per farm (up to 50% of the cost of a furnace and installation, maximum $3000 per farm) for a limited number of farms. Although we may not be able to provide cost-share funds for all growers who are interested, we will be able to provide useful information and contacts to all interested growers; as well as advising dairy farmers on switching to fuel production and finding markets for their product. Our goal is to foster a regional network of renewable energy producers and users, with a focus on grain corn but also including other types of renewable energy

To see how using corn for heat would compare to your current fuel source, you can use the following formulas. These are based on an average fuel use efficiency (AFUE) of 75%. Formulas are based on information provided by John Bartok, University of CT.

Multiply no. gallons of #2 fuel oil by 0.345 to get bushels of corn.

Multiply no. of ccf of natural gas by 0.25 to get bushels of corn.

Multiply no of gallons of propane by 0.229 to get bushels of corn.

For example, a 30' X 96' ft greenhouse used 2,500 gallons of heating oil last year. How much corn would you need to replace the oil? (2,500 gallons oil x 0.345 bu/gal = 862 bu).

How much would this cost? Bulk corn is generally priced by the ton, so first we have to convert bushels to tons. There are roughly 35.5 bushels in a ton, so if we divide the number of bushels by 35.5, we'll get the number of tons we need (862 bu / 35.5 bu/ton = ~24 tons). To see what this would cost, multiply the number of tons by the price per ton (24 tons x $230/ton = $5,520). If oil cost $4/gal, the same amount of heat from oil would cost you ($4 * 2,500 gal = $10,000). Using corn would save you ~$4,500 during next winters heating season.

How much acreage would you need to grow the corn yourself? Dividing the number of bushels you need from the above calculation by 160 bu/acre, the average in the U.S., will give you the approximate number of acres that have to be grown. Calculate the number of acres: 862 bu ÷ 160 bu/ac = ~5.4 ac. More information is available by clicking on the Corn Heat Project link on our website at www.umassvegetable.org, and there is a great factsheet online at http://www.umass.edu/umext/floriculture/fact_sheets/greenhouse_management/jb_corn_fuel.htm

Furnaces that yield 165,000 btu start at around $4,500. Those with higher BTU yield will cost more. Both boiler and hot air systems are available. Many corn furnaces will also burn wood or other biomass pellets, but this can vary.

We have posted an application for this project on our website, www.umassvegetable.org. If you are interested in applying to be a part of one of these regional networks and receiving cost share for the purchase of a biomass furnace please fill out the application and return to it the address listed on the application form.

- Andy Cavanagh, UMass Extension

LATE BLIGHT OF POTATO FOUND IN WESTERN MASSACHUSETTS: PROTECT POTATOES AND TOMATOES.

Late Blight on Potato. Photo: Dave Davidson

Late blight caused by *Phytophthora infestans* has been identified in potatoes in the Connecticut Valley this week. Late blight is the most famous and most important disease of potatoes world-wide. It is a threat wherever potatoes are grown, but is particularly important in rain fed and irrigated fields at moderate temperatures. Late blight also infects tomatoes and many different Solanum species including hairy nightshade, petunia, and bittersweet. The ideal conditions for an epidemic of late blight are when night temperatures drop to 50 to 60° F, daytime temperatures range from 60 to 75° F, along with fog, heavy dew, rain, and long periods of leaf wetness, and cloudy skies. Four to five continual days of such weather are an open invitation for an outbreak. This describes exactly what we had in the Connecticut Valley last week. With over 3,000 acres of potatoes, mostly centered in the Connecticut Valley, an outbreak of late blight is a serious concern. It's time to scout and spray!

Take action. Late blight spores are produced rapidly and are dispersed regionally by wind and rain. Growers in western and central Massachusetts and southern Vermont should consider their tomato and potato crops to be at risk of infection with late blight and should apply protectant fungicides. Scout your fields. If you suspect late blight in your field, it is important to confirm the diagnosis by contacting the UMass Diagnostic Lab at 413-577-3209. See symptoms listed below. It is important that farms within a few miles of your farm are aware of the risk.

Scouting and symptoms. Field scouting will help you to catch the disease early, which will reduce losses and increase your options for control. Check fields twice a week. Look at leaves and stems under the canopy, as this is where the disease gets established first. The first sign of infected tissue is a water-soaked appearance of the leaves, which, in dry weather, quickly turn dark brown and brittle. Very young lesions occur as irregularly shaped, small black areas, often with an adjacent area of light green and collapsed tissues. Under favorable environmental conditions, lesions enlarge rapidly resulting in the blighting of entire leaves and plants. Infected areas may be surrounded by a halo of chlorotic, or yellowed, tissue. Under moist conditions, the pathogen sporulates producing a white, cottony growth especially on the underside of the leaves. Infected stems and petioles will turn dark brown or black.

Symptoms first show up around low-lying areas, ponds or creeks, near center-pivot irrigation rigs, and in places protected from wind. Early-planted fields are likely to be affected first.

Tuber infections appear as brown, dry, granular lesions which can extend well into tubers. Late blight lesions on tubers allow secondary organisms like soft rot bacteria to develop. Tubers can be infected whenever they come in contact with sporangia, which can occur during tuber growth or during harvest. Spores may be washed into soil and through the soil to tubers. Cool wet soil conditions favor infection; higher soil temperatures (>65 F) apparently suppress infection. Tubers infected with late blight are highly susceptible to soft rot; store in cool, dry conditions.

Late Blight on Potato. Photo: Howard Schwartz, Colorado State University

Symptoms on tomato

Leaf symptoms are similar to potato. On green fruit, gray-green water-soaked spots form, enlarge, coalesce, and darken, resulting in large, firm,

Late Blight on Tomato. Photo: Dave Davidson

brown, leathery-appearing lesions. If conditions remain moist, cottony white mold will develop on the lesions, and secondary soft-rot bacteria may follow, resulting in a slimy wet rot of the entire fruit. On ripe fruit, lesions have cream-colored concentric zones which eventually coalesce and affect the entire fruit.

Life Cycle. Sources can include infected seed stocks and over-wintered infected plant material. The pathogen overwinters in volunteer host plants; potato (and tomato) cull piles, and may occur in both commercial fields and residential gardens. When moderate temperatures (50-80 ˚ F) and high humidity occur, sporangia are produced, released in the air, and blown onto susceptible crops. When cutting seed, infection can be spread from a few tubers to additional seed.

Unlike other Phytophthora species, *P. infestans* is not considered to be a soil borne pathogen, although this assumption may change if both mating types are present and sexual spores (Oospores) are formed which can persist in the soil. A notable feature of this disease is the speed of disease development and spread. Under conducive conditions, entire fields can become infected after only a few days.

Fungicides - conventional. Fungicides are the most important tool for managing late blight. Apply protectant fungicides prior to infection. If late blight is reported within a mile or two, begin applications of Previcur Flex or Curzate. Curzate should be applied in a tank mix with mancozeb, chlorothalonil, or metiram. Previcur Flex should be mixed with chlorothalonil. The pathogen has developed resistance to some fungicides such as metalaxyl and mefenoxam (Ridomil, Ridomil Gold), so these are no longer effective. If environmental conditions remain conducive for disease development, apply a fungicide from a different mode of action class every 5-7 days such as Ranman, Forum, Tanos, Gavel, Reason, or a phosphorous acid fungicide (ProPhyt, Fosphite, Phostrol). Plants with significant disease should be burned down or plowed under.

Fungicides – organic. Options for organic growers are extremely limited. Copper products may provide some protection. Currently in Massachusetts, there is one copper product that is allowed for organic use (OMRI listed) AND is currently registered in Massachusetts. This product is Basic Copper 53, sold by Albaugh, Inc. Ask your supplier to obtain it. Previously allowed copper products include Kocide formulations and

Champion have had their approval revoked due to inert ingredients. An additional product, Champ WP, has been approved by Baystate Certifiers but will likely be impossible to find in market channels. Hydrogen peroxide products (OxiDate) will kill the pathogen spores that it contacts, but has no residual (protective) or curative activity.

- Adapted from Bess Dicklow, UMass

SUMMER BEETLES ARE ON THE RISE

There are several key beetle pests that invade crops in spring or early summer, and then leave their offspring to feed and grow on roots or leaves of the host crop. After a pupal period in the soil, a new generation of adult beetles emerges ready to feed! If you are seeing flea beetles, cucumber beetles or Colorado potato beetle adults, they are most likely these “summer adults”. Some will produce more offspring, but many will not. After a period of feeding, they will leave fields for overwintering sites.

Colorado potato beetle. The summer generation of Colorado potato beetle adults is emerging (look for round holes in the ground where they came out from the soil, where the pupal stage hides out). Those that emerge before August 1 lay eggs and produce a second flush of larvae. Those that emerge after August 1 don’t lay eggs. All of the adults feed rather heavily, in eggplant and potato. After about August 15, CPB adults begin to leave the fields and move to field borders where they will overwinter.

Beetle eggs hatch quickly in the heat, and larvae feed and grow quickly. Try to control them before they are 2/3 grown; it is the final instar that does 85% of the feeding damage.

If potatoes are in the tuber bulking stage, they can tolerate quite a bit of feeding damage (>20%). Don't try to kill every beetle in the field. Food reserves in the foliage two weeks prior to senescence add little to final tuber bulking. Beetle adults can be particularly damaging in eggplant, where they clip flower buds as well as feeding on leaves. Scout for adults, eggs and larvae to determine which stages are in your crop and at what density.

For resistance management, given the famed and truly remarkable capability of CPB to develop resistance, it is critical to rotate among classes of insecticides. The most effective way to extend the useful life of an effective product is to use it on a single pest generation only, and then on the next generation, use a second pesticide with a different method of killing the pest (mode of action). For example, if you used Admire or Platinum as a furrow drench or Provado or Actara as a foliar spray on the first generation, DO NOT use them on the second generation.

Eggplant flea beetle. Eggplant leaves can become 'lacy' in short order when the flea beetles become active. Even large, healthy plants can be dessimated, losing their vigor and their ability to produce good yields. If you start to see the small, round holes that are a sign of flea beetles, look closely. These black, chunky flea beetles –less than 1/8 inch long – will be on upper leave surfaces. Apply controls to prevent further damage.

Crucifer and striped flea beetle on Brassicas. Fall brassica crops are still in the seedling or young plant stage and are highly attractive to flea beetles. Heavy feeding can slow down growth delay harvest, and reduce yield. Feeding studies that we conducted at UMass showed that this is the time of the season when flea beetles eat the most plant material on a per-beetle basis.

Striped cucumber beetles. Summer adults are especially attracted to flowers of cucurbit crops, and you will see them right in there with bees. You may also find them in foliage, and they can also do damage to fruit by scarring the rind of cucumbers and squash. It is preferable to avoid insecticides during the pollination period. Moderate numbers are not likely to reduce yield but high populations may. See articles in previous Vegetable Notes about insecticides that are least harmful to pollinators.

--R. Hazzard

BLACK ROT (GUMMY STEM BLIGHT)

Gummy stem blight caused by Didymella bryoniae is also called Black Rot when it occurs on the fruit. It affects the leaves, stems, and fruits of all cucurbit species.

Symptoms consist of circular, tan to dark brown spots, which enlarge rapidly blighting entire leaves. Lesions on stems result in cankers which exude a brown, gummy substance. Stems may be girdled and seedlings killed. On older plants, cankered vines wilt after mid-season and small, water soaked spots develop on infected fruit, enlarge, and also exude a gummy material. Small, black fruiting bodies appear as black specks in lesions, especially on fruit, resulting in the typical 'black rot' symptoms.

The pathogen survives between seasons on diseased crop debris and may be seed borne. Moisture is more important for disease development than temperature. The use of certified, disease free or treated (hot water or fungicide) seed should be a standard practice. Carefully examine transplants and remove diseased plants. Greenhouse production should include increased ventilation and reduced overhead irrigation. Crop rotation of at least two years is recommended. Avoid injuring fruit before or during harvest, as wounds enable the pathogen to invade fruit in the field and in storage.

Satisfactory chemical control can be obtained by regular applications of protectant fungicides. There are reports of control failure with strobilurin fungicides (Amistar, Cabrio, Flint) indicating that resistant isolates are present.

Gummy Stem Blight/Black Rot sprays should include:

- chlorothalonil or maneb alternated with
- Quadris (1X only) or thiophanate-methyl (Topsin M)
- Mancozeb (not for pumpkins or winter squash)

Sweet corn report

European corn borer second generation is here. We are seeing higher numbers in the E II (New York strain) across the state this week and are expecting to see some tassel damage as a result in the following days. The ZI (Iowa strain) catches have remained low this week. As the trap counts increase, scout corn that is tasseling for borer damage. When fields are 15% infested or over you know it is time to spray. When silking, 5 moths per night indicate a spray is needed.

Location	Z1	EII	Total	CEW	FAW
Southern Vermont					
Brandon, VT	-	-	-	0	-
Bershires/Champlain Valley					
Pittsfield	0	1	1	2	-
CT Valley					
South Deerfield	5	36	41	-	-
Sunderland (1)	3	1	4	7	0
Sunderland (2)	4	134	138	-	0
Whatley	1	3	4	8	0
Hadley (1)	2	8	10	19	0
Hadley (2)	2	18	20	8	0
Amherst (1)	0	4	4	16.5	0
Amherst (2)	0	0	0	2.5	0
Granby	0	1	1	-	0
Easthampton	0	0	0	8	0
Central & Eastern MA					
Still River	2	1	3	55	0
Concord	0	1	1	7	0
Leicester/Spencer	2	1	3	6	0
Tyngsboro	0	6	6	9	0
Lancaster	0	1	1	14	0
NH					
Litchfield, NH	0	6	6	31	1
Hollis, NH	0	7	7	27	1
Mason, NH	0	2	2	19	0

Corn earworm

As expected trap captures are on the rise this week. If you are catching more than 2 moths per week, a 6-7 day spray schedule is recommended (see table below). The recommended spray intervals for CEW should be adequate for ECB and FAW control. Because CEW lay their eggs directly on the silk, and eggs are difficult to find in the field unless the population is VERY high, we rely on pheromone trap catches rather than scouting to make CEW management decisions. Drop nozzles with high pressure directed at the silks are good for accurate coverage. Conventional materials such as Warrior will work well in heavily infested areas. Spintor is less toxic and can be used in fields with low to moderate infestations. Entrust is recommended for organic growers. With the high temperatures we are experiencing, newly hatched larvae will move down silk and into the ears rapidly. Check traps twice a week to catch an infestation before it catches you!

Corn Earworm Threshold		
Moths/Night	Moths/Week	Spray Interval
0-0.2	0-1.4	no spray
0.3-0.5	1.5-3.5	every 6 days
0.6-1	3.6-7	every 5 days
1.1-13.0	7.1-91	every 4 days
Over 13	Over 91	every 3 days

Fall armyworm trap captures are still low this week. No caterpillars have been seen in the field yet. Those of you in the southeast should keep an eye out for damage since the first activity is usually found in that region of the state.

- Amanda Brown & Courtney Huffman, UMass

Pepper report

The second generation of European corn borer flight is here. Trap captures were at 138 in Sunderland this week while captures in the central and eastern part of the state are still low where the flight is just beginning. Egg mass scouting has begun in peppers and one egg mass has been found so far. Although egg mass scouting is tedious, it gives us some evidence that eggs are being laid. Growers should be on a regular spray schedule if catching more than 7 moths per week as egg-laying is occurring and hatch is not far off. We have not seen any caterpillars feeding yet but given the heat we can expect hatch soon.

Choosing less toxic or microbial products to control ECB is recommended to preserve beneficial predators in the field. SpinTor 2SC and Entrust (both spinosad formulations) have proven to be good products to use for ECB control. They

Location	Z1	EII	Total ECB
CT Valley			
Granby	0	1	1
Holyoke	0	3	3
Sunderland	4	11	15
Amherst	1	4	5
Hadley	1	2	3

have low toxicity to mammals and are considered reduced risk materials. Both have the advantage of conserving beneficial insects such as ladybeetles which feed on aphids which can be a problem later in the season. Both products also have a one-day pre-harvest interval and a four-hour re-entry interval which make them particularly useful for farm stands and small plantings which are picked frequently. Bacillus thuringiensis kustaki (BT) can also be used on a 3-to-4 day scheduled throughout the 2nd generation.

Another way to control ECB in peppers is to release the parasitic wasp, Trichogramma ostriniae. The UMass Vegetable program is conducting release trials in four pepper fields in the Pioneer Valley. The project is similar to what was done in early sweet corn fields this year except we are releasing at a higher rate (120K per acre verses 60K in sweet corn) and releasing four times instead of three. For more information about methods associated with releasing Trichogramma ostriniae in your pepper fields contact the UMass Vegetable IPM Lab at 413-577-3976 or email Amanda Brown aduphily@ent.umass.edu

- Amanda Brown & Courtney Huffman, UMass

PLECTOSPORIUM BLIGHT OF CUCURBITS

Plectoporium blight (Microdochium blight) caused by *Plectosporium tabacinum* (*Microdochium tabacinum*) was first observed in Tennessee in 1988 and has since been reported throughout pumpkin growing regions of the United States. The most susceptible cucurbits to Plectosporium blight are pumpkin, yellow squash, and zucchini.

Plectosporium tabacinum is a common fungus in the soil and on decaying plant material and is favored by warm, wet weather. The spores are spread by rain-splash and wind. Plectosporium blight is known to cause damage to a variety of cucurbit crops in Europe and Asia, but the strain present in the U.S. seems to primarily damage pumpkins, summer squash, zucchini and a few varieties of gourds. Two years ago it showed up on Cucurbita moschata (butternut family) and Cucurbita maxima (hubbards, buttercup, giant pumpkins, etc), so it is possible that the US strains are jumping species and will become a threat to previously immune crops. In wet years, which favor disease development and spread, crop losses in no-spray and low-spray fields can range from 50 to 100%. Fortunately, this disease is easily recognized and can be effectively managed.

Description and Management

Plectosporium blight is favored by cool, rainy weather. The fungus can overwinter on crop residue and can persist in the soil for several years. Plectosporium has not been reported to be seed-borne. Tiny spores are formed in lesions on vines, stems, fruit, leaves and leaf petioles. Spores can be dispersed by wind over long distances. Lesions are small (<1/4 inch) and white. On vines, petioles and leaf veins, the lesions tend to be diamond to lens-shaped; on fruit and leaves lesions are usually round. The lesions increase in number and coalesce until most of the vines and leaf petioles turn white and the foliage dies. Severely infected vines become brittle and will shatter if stepped on. Early in the infection cycle, foliage tends to collapse in a circular pattern before damage becomes more universal throughout the field. These circular patterns can be easily detected when viewing an infected field from a distance. Numerous fruit lesions produce a white russeting on the surface and stems that render the fruit unmarketable. To scout for Plectosporium early in the season, part the leaves of the canopy and look at the main large vine of the plant that runs along the ground...that is where Plectosporium tends to show up first.

Important Things To Remember:

- When Plectosporium blight occurs, rotate away from summer squash and pumpkins for two years.
- Choose sunny, well drained sites for cucurbit production.
- No resistant cultivars of pumpkins have been reported.
- Scout for disease early and apply protectant fungicides when the disease first occurs. The disease is readily controlled by fungicide applications. Thorough coverage of foliage, vines, and fruit is necessary for good control.

Chemical Controls

Chlorothalonil (i.e. Bravo) and strobilurin fungicides (Pristine, Cabrio, Flint, Amistar = Quadris) are the most effective at controlling Plectosporium blight. However there are several other important factors that must be considered when designing spray recommendations such as, control of other important cucurbit diseases, resistance management, and spray coverage. The strobulurin fungicides are also usually the best weapon against powdery mildew, and should only be used once per season to delay resistance. With that in mind, it is best to hold off on spraying the stobulurin fungicides for plectosporium until such time as it can also be used as your first spray for powdery mildew. In addition, systemic fungicides should be combined with a contact fungicide like Bravo or Maneb to help delay resistance. The following materials are available for controlling plectosporium in cucurbit crops.

•azoxystrobin (Quadris): 11.0 to 15.4 fl oz/A (o dh, REI 4 h). Apply at the first sign of disease and repeat with a fungicide other than a strobilurin in 7-14 days. Do not rotate with Flint or Cabrio.

•chlorothalonil (Bravo): 1.8 to 2.7 lb/A (0 dh, REI 12 h). Apply when conditions are favorable for disease development. Repeat no sooner than a 7 day interval. Do not apply more than 19.1 lb/A per growing season.

•maneb/ mancozeb (Maneb, Penncozeb, Manzate Dithane): Rates vary depending on formulation. See label. (5 dh, REI 24 h).

•pyraclostobin (Cabrio EG 20 %): 12 to 16 oz/A (0 dh, REI 12 h). Apply at the first sign of disease and repeat with a fungicide other than a strobilurin in 7-14 days. Do not rotate with Flint or Quadris.

Where trade names or commercial products are used, no company or product endorsement is implied or intended. Always read the label before using any pesticide. The label is the legal document for product use. Disregard any information in this newsletter if it is in conflict with the label.

- T. Jude Boucher, University of Connecticut, Cooperative Extension System, M. Bess Dicklow, UMass Extension, Compiled by Andrew Cavanagh, Umass Extension

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