Wisconsin Pest Bulletin

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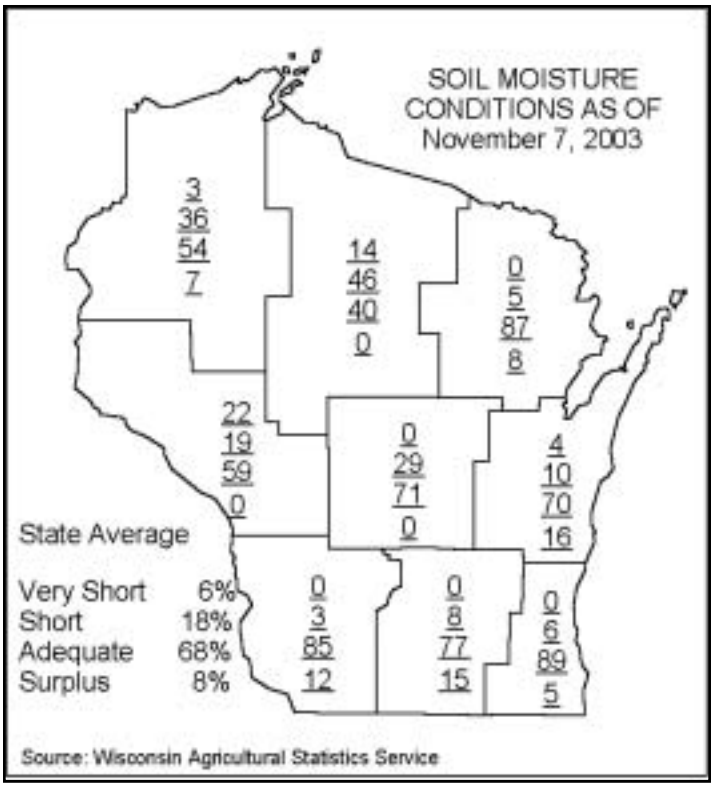
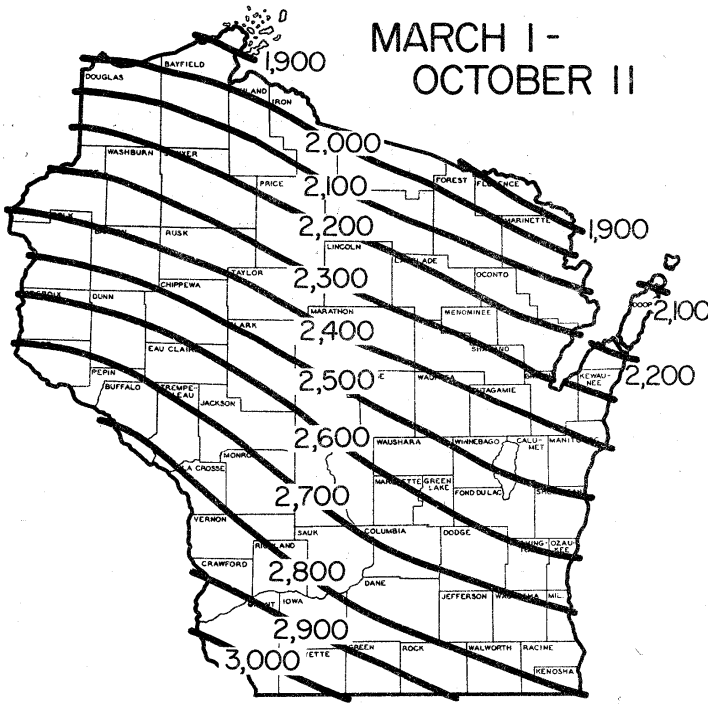
Wisconsin Department of Agriculture, Trade & Consumer Protection

PO Box 8911, Madison, WI 53708-8911 Phone: 1-800-462-2803 Fax: 608-224-4656

Website: www.datcp.state.wi.us E-mail: bulletin@datcp.state.wi.us





Historical Average Growing Degree-Days Accumulated Since March 1. (Wisconsin Agricultural Statistics Service)

Alerts

This is the final Pest Bulletin of the 2003 growing season. Most of the articles in this issue are summaries of pest survey efforts conducted throughout the season.

We would like to take a moment to thank the many people who contribute regularily to the Pest Bulletin, and the many more readers who give it purpose. As always, your comments and suggestions are invaluable. You may reach us anytime at *bulletin@datcp.state.wi.us*.

Have a safe and pleasant winter, and we'll contact you again when the ground starts to thaw next Spring.

Corn

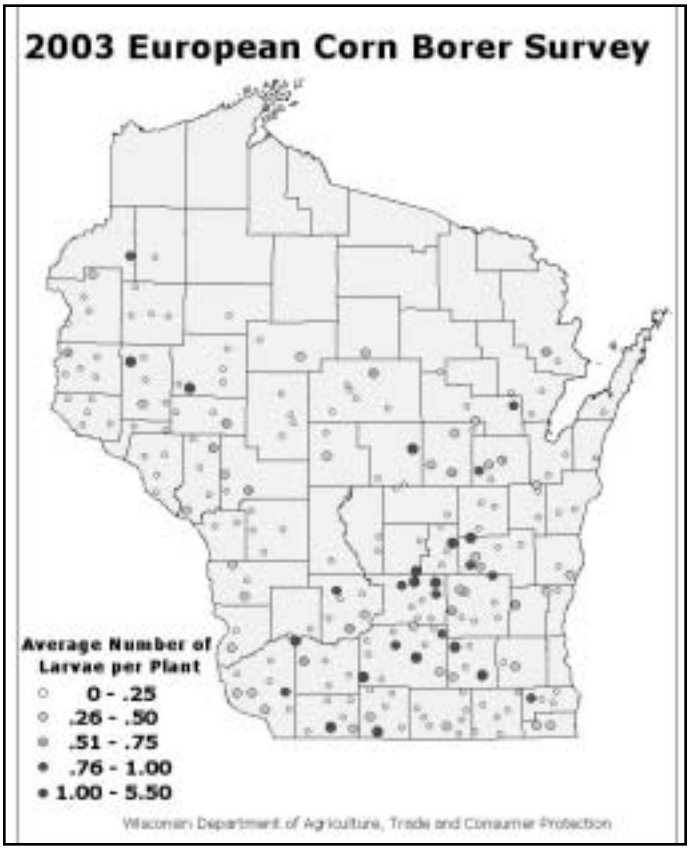
Corn earworm – Inconsequential numbers of corn earworm moths were reported until the week of August 29, when significant flights were registered at the Chippewa and New Richmond trapping sites. Just as the major flight of moths was getting underway during the last days of August, we found early-instar larvae in Dane Co. sweet corn. Larvae were present in untreated south central and southeastern sweet corn fields by early to mid-September, but counts were not particularly high throughout most of the south. Even fewer larvae were encountered during mid- to late September surveys in the central and northern districts.

European corn borer – The annual fall European corn borer survey, documenting the average number of corn borer larvae per plant at 218 survey sites across the state, found a statewide average of 0.30 corn borer larvae per plant in 2003. This compares to 0.66 per plant in 2002, and a ten-year average of 0.54 borers per plant.

European corn borer densities were substantially lower in all agricultural district statistics this fall compared to last year, and in most districts, the average number of borers per plant declined by more than 50%. The largest decreases in the average number of European corn borers per plant from 2002 to 2003 occurred in the central (1.21 to 0.44 borer per plant), west central (0.71 to 0.16 borers per plant) and northeast districts (0.75 to 0.23), though all districts showed some amount of decline. The highest average density was detected in the south central district (0.52 borers per plant), but even 0.52 borer per plant is not considered high.

The raw data, in contrast to district averages, shows that there were some scattered hotspots, particularly in Marquette, Green Lake, Columbia, Dodge and Fond du Lac Cos. The highest average larval infestation detected during the course of the survey was 5.5 borers/plant, in a Columbia Co. field. No other field had nearly as high a density. The next closest was 3.36 borers per plant in Marquette Co., then 2.2 per plant in Green Co. In total, 16 percent of the fields included in the survey had average densities at or above 0.60 borers per plant, while only seven percent of the fields surveyed had densities exceeding 1.0 borers per plant. As a reminder, densities in the range of 0.60 to 0.75 borer per plant or higher, are generally considered economically important. The summary map below shows the average density of borers per plant at each of the 218 survey sites. Forty-four percent of the fields averaged zero corn borers per plant.

The observed lower densities this fall were likely related



to the drought conditions which persisted over much of the state throughout August. Extremely dry weather during the period when the second flight of corn borer moths were laying eggs may have led to egg masses flaking off from corn leaves before larvae had hatched. Not only are corn borer egg masses susceptible to desiccation, but the newly-hatched, second-generation larvae are also highly vulnerable to the heat and lack of moisture, and some may have dehydrated from hot weather before they could crawl into the whorl. A statewide average of 0.30 corn borers per plant suggests we can expect a relatively light first flight of moths next spring.

Armyworm – Survey efforts detected the first armyworm moths on May 16, and the last moths of the season at the Dane Co. black light were captured during the first week of September, when trapping was discontinued. Adults and larvae, as well as feeding damage, were observed at low levels throughout the state during most of the season. No outbreaks were reported, although around the 18th of July adults were increasing in light trap catches and larvae were more commonly observed. Surveyors found larvae in most of the corn fields checked during general pest survey work being conducted from late July to early August, but the number of plants affected ranged only from 5% to 10%, falling well below the treatment threshold.

Forages

Potato leafhoppers – The first migrants were swept on May 6 from Walworth Co. alfalfa, but only low numbers were noted during the first few weeks following their arrival. Activity began to pick up in early June, and by June 13th nymph production was underway. Populations did not escalate to threshold levels in many fields until around June 22, and as a result of their slow start, much of the first crop of alfalfa remained free of leafhopper injury.

In early July, numbers were still fairly low in the southern districts, with fewer than two to four leafhoppers per sweep. In the northern and central districts a different situation was emerging. High potato leafhopper populations were developing and a few fields in the Marshfield area required treatment. Heavy rainfall early in the month helped to lessen hopperburn symptoms at some dry southern and central sites, but northern fields remained under heavy leafhopper pressure. Reports of 80%-90% hopperburn in second crop hay fields were received from Chippewa Co.

During the second week of July, populations began a consistent growth trend that lasted through August. Populations were high and increasing across the state, with counts of five to 14 adults and nymphs per sweep common in southwestern fields. Counts averaged 12 to 18 leafhoppers per sweep in the central district, while exceptional fields had counts in excess of 25 adults and nymphs per sweep. Growers treated several second crop hay fields in the north central, central and east central districts to reduce leafhopper pressure.

At the start of August, the hot, dry weather conditions that favor leafhopper development predominated. By mid-month, rare late-season spraying for leafhoppers occurred in the southwest, central and east central districts. Drought conditions persisted throughout August, greatly benefiting potato leafhopper survival and

reproduction. Numbers finally began a slow decline by the last week of August; however, some pockets of heavy populations persisted into early September.

Undoubtedly the heat and lack of rainfall in July and August permitted populations to escalate to above-threshold levels and persist until late in the season. Fortunately potato leafhoppers do not overwinter in Wisconsin, so this season's populations are not indicative of things to come.

Alfalfa weevil – Adults appeared in sweep nets by May 2, but cool conditions and rainfall shortly after overwintered eggs began hatching temporarily slowed development in the south. By May 16, low to moderate levels of larvae were being swept from fields in the southern districts, while only light amounts of injury from larval feeding had become visible. Between May 23 and 30, alfalfa weevil activity picked up considerably. Excessive levels of tip feeding, >65%, developed in a few Sauk, Richland and Vernon Co. fields; fields on sandier soils were most adversely affected.

Sweep net counts of larvae and estimates of tip feeding injury were highly variable during early to mid-June, and a few isolated heavy infestations cropped up; however, in most fields conditions did not deteriorate to levels justifying treatment. During the latter part of June counts of alfalfa weevil larvae declined substantially in the south, whereas fields in the northern two-thirds of the state were still under heavy feeding pressure. Fields in the east central district were also experiencing weevil pressure in second crop hay, and farmers were pressed to cut early to avoid additional injury.

By mid-July the alfalfa weevil had run its course, and little or no activity was observed during the remainder of the season. Aside from the few scattered outbreaks that occurred in late June and early July, it was not an especially noteworthy year for the alfalfa weevil. According to IPM Specialist Bryan Jensen, "Beneficial insects and earlier cutting schedules have done wonders for alfalfa weevil management. Gone are the days," he says, "when weevils are considered a key pest on alfalfa in Wisconsin."

Cowpea aphid – Cowpea aphids, *Aphis craccivora*, identified in Wisconsin hay fields for the first time in 2002, caused no known significant damage to alfalfa this season. Easily distinguished from other alfalfa-infesting aphids by their black coloration, cowpea aphids were first detected in Green Co. fields on April 28. Cowpea aphids are only an occasional pest in alfalfa; however, in years to come, producers may want to pay close attention to aphid counts at times when pressure from the complex of other alfalfa pests is high, and numbers are nearing threshold levels.

Soybeans

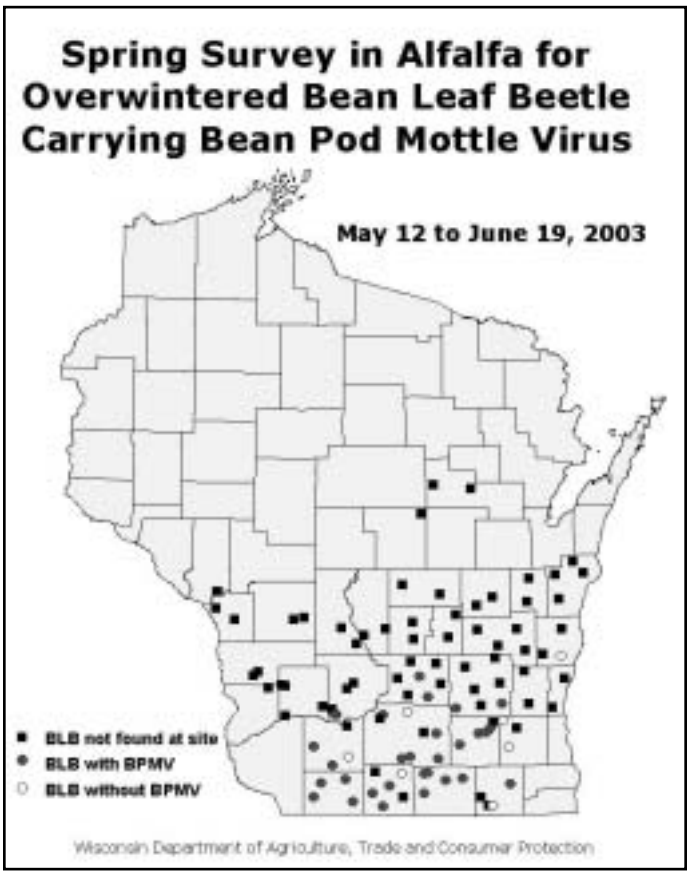
Bean leaf beetle – In 2002, bean leaf beetle populations in Wisconsin reached record high levels, rapidly elevating bean leaf beetle to one of the leading insect pests to soybean production. The current consensus is that mild winters and earlier planting dates probably had the greatest influence on the recent increase in abundance.

Although bean leaf beetles defoliate soybean leaves and feed on developing pods, the real concern about these beetles relates to their role in **bean pod mottle virus** (BPMV) transmission. Bean leaf beetles vector BPMV, a virus that can cause significant yield losses, and may contribute to green stem, a condition where plants retain green stems past the point of normal maturity, leading to delays and difficulties with harvesting. Losses associated with BPMV tend to increase the earlier that plants are infected with the virus. Plants that become infected in the seedling stage show the greatest yield loss.

Because bean leaf beetle transmits BPMV, and early infection leads to greater losses, growers wanted to know whether spraying to reduce beetle numbers just after soybean emergence would be the best strategy for minimizing loss. The problem with this strategy is that it is more costly, and we still knew very little about the relationship between BPMV and bean leaf beetle, not to mention the distribution of both in Wisconsin. Without knowing where beetles were distributed, how far north beetles and BPMV were likely to occur, and what proportion of overwintered beetles were transmitting BPMV, it was unclear if this strategy would benefit Wisconsin soybean growers.

Knowing that overwintered beetles carrying BPMV would be the first path of virus transmission to soybean seedlings, we developed and conducted the first-ever survey for overwintered beetles in Wisconsin. Although bean leaf beetle is a soybean pest, alfalfa fields were targeted because overwintered bean leaf beetles typically move to alfalfa in late April to early May to feed. They do not reproduce in alfalfa fields, but wait there for soybeans to emerge. On May 12 the first overwintered adults were swept from alfalfa fields in Rock and Walworth Cos., marking the beginning of the survey. The plan was to survey alfalfa fields throughout the southern two thirds of the state and test the overwintered beetles collected for BPMV, to determine what portion of the overwintered population were carriers of the virus. The survey was completed on June 19, just as soybean seedlings began emerging and the overwintered bean leaf beetle started migrating to soybean fields.

The survey found that a high percentage of the overwintered population carried BPMV, but overwintered



bean leaf beetle distribution was generally confined to the southernmost regions of the state. During the survey 107 alfalfa fields were assessed. Although the initial survey plan included more sites, surveyors stopped after the southern third was completed as no more beetles were being found in fields further north of Juneau and Adams Cos. A total of 152 overwintered beetles were collected from 41 of the 107 survey sites. Individual beetles were tested for BPMV and 72% of the beetles (109/152) tested positive. The beetles carrying BPMV were mostly distributed in Lafayette, Iowa, Dane Green, Rock, Walworth, and Jefferson Cos., but BPMV-positive beetles were also found at sites in Columbia, Dodge and Sauk Cos.

Our findings suggest a few things. First, the bean leaf beetle/BPMV complex is a larger concern in the southern Wisconsin. Bean leaf beetle distribution appeared to be confined to the southern third of the state, while within that area BPMV-positive beetles were mostly found in the southern two tiers of counties. Because the bean leaf beetle/BPMV complex is mainly a southern Wisconsin phenomenon, farmers in these counties might benefit from early season bean leaf beetle control to prevent or reduce early-season virus transmission. Since few bean leaf beetles overwinter in the central and northern parts of the state, early-season virus transmission probably isn't as big an issue in those regions. In counties north of the LaCrosse to Manitowoc line, an early season bean leaf beetle control strategy may not prove effective or even necessary. Instead, a strategy that focuses on late-season control of second generation beetles might be the best route to take.

Keep in mind that these results are based on a single survey. Although we are learning more about bean leaf beetle/BPMV complex with each passing season, we still have a long way to go. Also, as we learned in 2003 when we ended up finding only low numbers of beetles later in summer, bean leaf beetle populations can fluctuate substantially from one year to the next; therefore, a single strategy might not be effective every year. For now the best strategy may be to know your options and follow bean leaf beetle advisories in the April and May editions of the Wisconsin Pest Bulletin.

Grasshoppers – The hot, dry summer weather apparently supported the development of high grasshopper populations in Wisconsin's soybean fields. Hatching began in early June, but it was not until late July that their effects grew obvious. By August 1, nymphs of the redlegged species, *Melanoplus femurrubrum*, were maturing rapidly and consuming up to 30% of soybean foliage in southeastern fields. In the central district, the defoliation attributed to grasshopper feeding was far more extensive than defoliation from bean leaf beetles, Japanese beetle, or all of the soybean defoliators combined. Feeding was at the threshold levels in several central soybean fields by August 15, and by that time, nymphs were fully mature or almost fully mature. Grasshoppers continued to be the most severe defoliators in the central and east central parts of the state through late August and into September, but in the end, the drought's effect on soybean pod formation was a much larger concern to growers than grasshopper defoliation.

Japanese beetle – These beetles are now common enough in Wisconsin that their feeding is no longer just a concern to homeowners and the nursery and turfgrass industries. With each passing season, survey staff record more and more Japanese beetle activity in fields crops. These sightings suggest that it won't be long before we can expect these skeletonizers to affect field crops on a larger scale. For now the heaviest infestations in corn and soybeans are still confined to the southernmost tier of counties, but Japanese beetles are growing more prevalent in crops, especially in the central and east central districts.

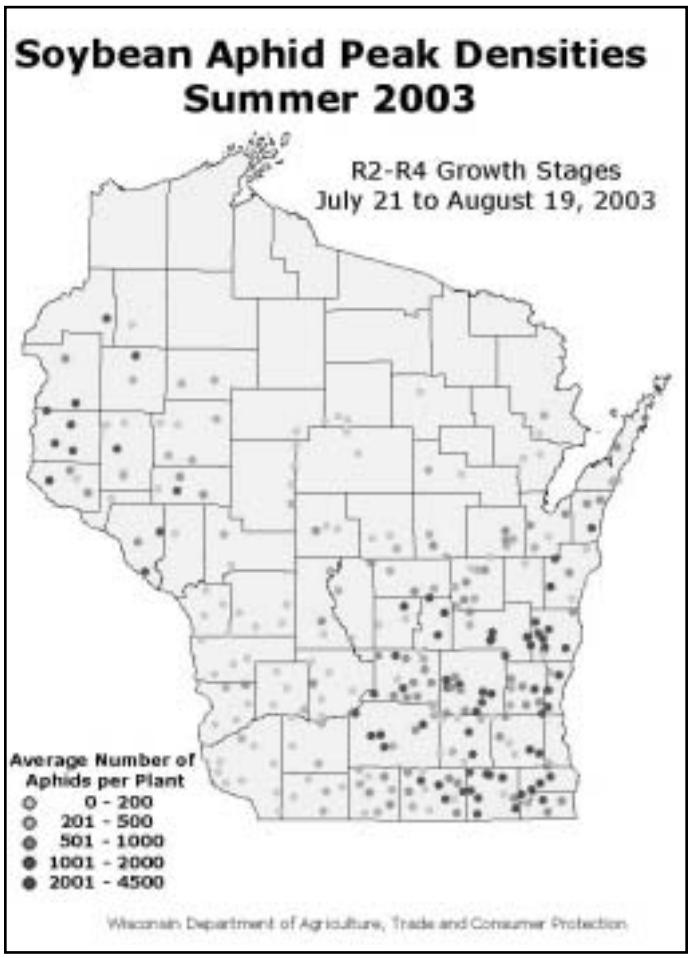
Soybean aphid – Perhaps the most unexpected insect event of 2003 was the exceptionally heavy soybean aphid occurrence that beset much of the state's soybean fields in July and August. After seeing mostly low-level aphid densities in 2002, few could have imagined we'd experience this magnitude of an aphid outbreak. Soybean aphids reappeared during the week of June 13

in Dane and Rock Cos. and quickly grew to the highest densities since first being detected in Wisconsin in 2000. Peak aphid densities were observed during the R2-R4 stages of soybean growth, between July 21 and August 19. The summary map below shows the average number of aphids per plant at 289 survey sites.

The highest peak average densities were observed in the south central (1006 aphids/plant) and southeast (1268 aphids/plant) districts, while the lowest were recorded from the north central (93 aphids/plant) and southwest (149 aphids/plant) districts. These numbers suggest that in theory, you could walk into any east central soybean field in late July to mid-August and find an average of 1268 aphid on a single plant! Also evident from the map below is that there was a wide swath of relatively low averages, less than 200 aphids per plant, stretching from the southwest to the northeast corner of the state. The reason for this trend is not apparent.

At this time, the specific number of aphids that a plant can sustain before losses will occur is unknown, but it's fairly safe to say that an average density exceeding 500 aphids per plant can be considered high. In our survey, 47% of the fields surveyed had average densities at or above 500 aphids per plant. A total of 27% of the fields surveyed had densities exceeding 1000 aphids per plant, while 11% of the fields surveyed had average densities exceeding 2000 aphids per plant.

On the positive side, in 2003 surveyors noted an increased prevalence of mummies in fields across the state, an encouraging sign that the presence of parasitoid populations may be expanding in the Midwest. Further, another season of extremely high aphid densities affords us the opportunity to increase our knowledge of this still relatively new pest, and revise or refine our current control strategies. For the latest recommendations on soybean aphid control in 2004, visit the Wisconsin Crop Manager web site at: http://ipcm.wisc.edu/wcm.



Vegetables

Powdery Scab on potato — In August of 2003, the first finds of **powdery scab** on Wisconsin potatoes were confirmed. Powdery scab causes a surface disorder similar to that of common scab. Infected tubers are also prone to storage dessication and decay. In addition, the fungus that causes the disease (*Spongospora subterranea* f. sp *subterranea*) is the vector of **potato mop top virus** (PMTV). Two fields (one in Waushara Co. and one in Adams Co.) were determined to have powdery scab based upon the presence of infected tubers. In order to determine the extent of the disease, DATCP began a field survey. Using a PCR (Polymerase Chain Reaction) method developed at Penn State, the DATCP Plant Industry Lab was able to test soil for the presence of the fungus. Soil was collected from 65 Wisconsin fields in eight counties. Fields were either growing potatoes in 2003 or had grown potatoes in 2002. Of the 65 fields sampled, three fields tested positive for S. subterranea by PCR. Of the three positive soil samples, two were collected from fields which had been identified as positive by tuber symptoms.

Late blight of potato — There were no confirmed occurrences of late blight in Wisconsin this growing season, according to UW-Madison Extension, though the disease was reported from other states in the Midwest. More information on vegetable diseases in Wisconsin is available at *http://www.plantpath.wisc.edu/wivegdis /index.htm.*

Apiary

Apiary Program Statistics

Imports into Wisconsin

Year	Imported Colonies & Nucs	Imported Queens & Packages
1996	37,594	26,700
1997	41,739	23,975
1998	39,795	42,995
1999	43,205	34,745
2000	44,796	25,569

2001	34,073	31,236
2002	38,813	30,127
2003	41,165	49,226

Annual Total of all Inspected and Surveyed Hives

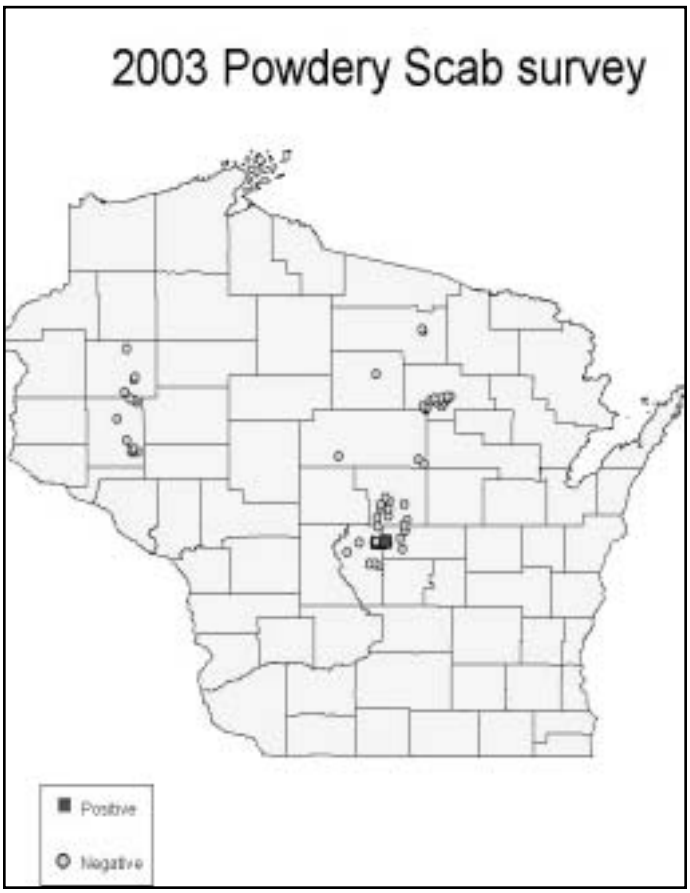
	2001	2002	2003
Total Colonies	1,364	861	1,518
Varroa Mite	33%	19%	54%
Small Hive Beetle	3.4%	4.5%	0.7%
American Foulbrood	2.3%	3.5%	1.2%
European Foulbrood	0.4%	0%	0.07%
Chalkbrood	5.5%	5.6%	6.1%

Prevalence of Honey Bee Diseases in Wisconsin in Fall

	2000	2001	2002	2003
Total Colonies Tested	137	216	247	267
<=1% Varroa:	67%	82%	73%	59%
>1% Varroa:	33%	18%	27%	41%
Positive for Varroa:	47%	27%	46%	58%
Average Mortality	55%	12%	37%	NA

Forest, Shade Trees, Ornamentals and Turf

Drought injury- Christmas tree field inspectors noted widespread light to moderate drought injury this fall in Christmas tree fields. Conifers of all species had browning needles, or green needles that were dropping from the tree.



Due to the late summer drought, we are anticipating some tree damage and death next spring and summer. Warm, dry winter weather and a lack of snow cover will further exacerbate moisture stress. On nursery stock, trees may leaf out late or not at all next spring. Frost cracks or radial cracks may appear on stressed deciduous trees. Conifers may have wilted current year shoots, or die back from the top down.

Seedlings and recently transplanted trees are at greatest risk because their root systems are less developed. If you are planting in spring, ensure transplants have a sufficient root structure and are planted at the right depth and not J-rooted. If the root balls of B&B trees contain a highly porous material, they will dry out even faster than the surrounding soil.

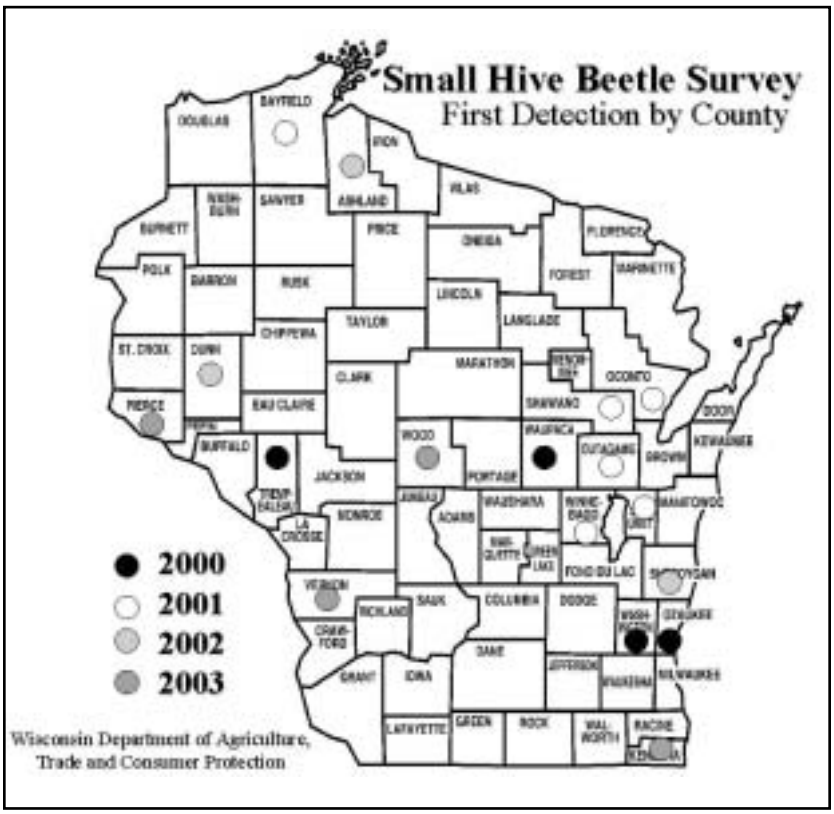
Fertilizing will not help water-stressed trees recover more quickly, and doing so may increase their rate of transpiration, leading to even more drought stress. Instead, give your trees a drink! Irrigate trees if possible this fall and next spring. Remove weeds around trees to reduce competition for water, and remove dead and dying trees as quickly as possible to discourage insects and diseases from moving in.

Christmas tree field inspections- We are still conducting our fall Christmas tree inspections. Please see the following insect and disease graphs for preliminary survey results. Keep in mind that these graphs show how many fields we find the pests in, but not how much damage pests cause. For example, in most fields we can find balsam twig aphid feeding injury on current year balsam fir needles, but rarely is this an economic concern.

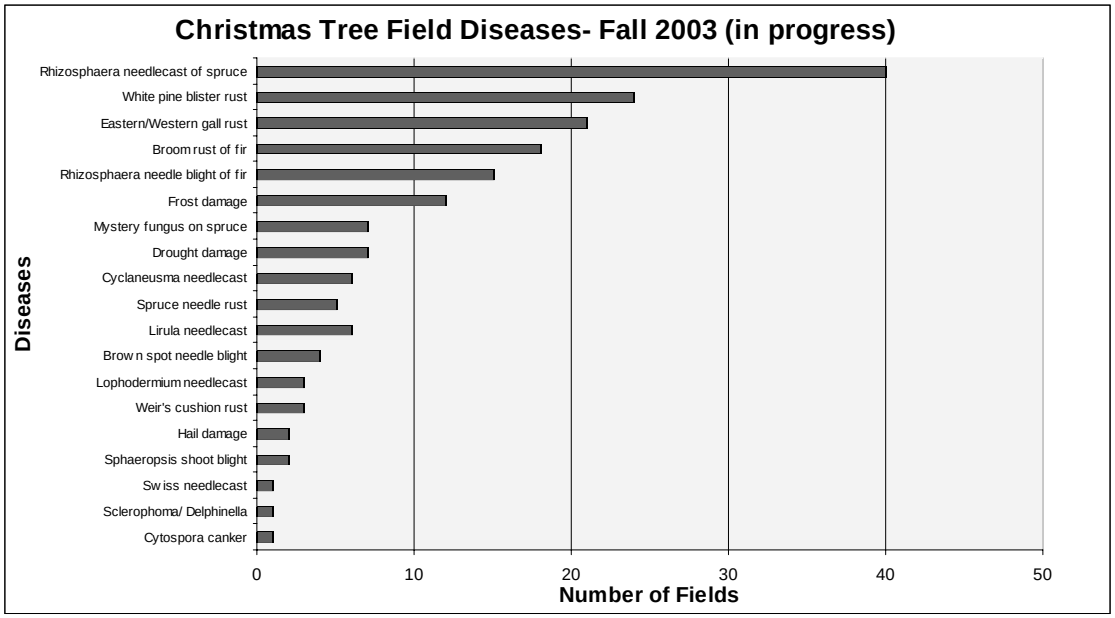
State/Federal Programs

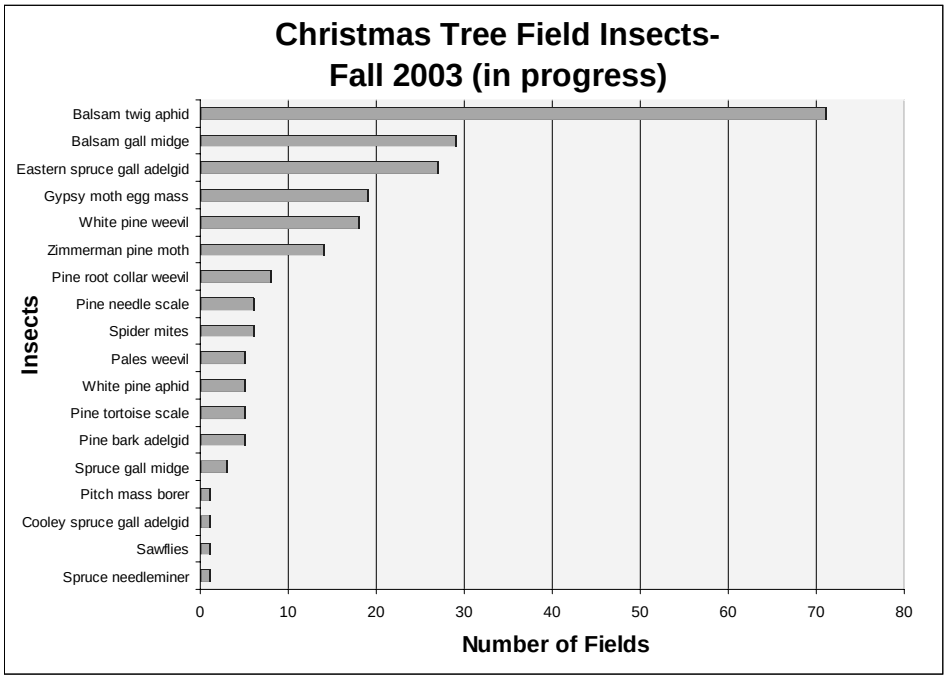
Gypsy moth trapping program - The trapping season has been completed for 2003. This year, as of 10/16/03, a total of 703,889 male gypsy moths were caught by trappers. We are now in the process of quality checking data and catch maps to make sure all data is correct. All counties except Pepin reported moth catches this year.

The egg mass survey part of our program will finish the week of November 10th. Egg mass surveyors have been doing follow-up surveys for the past three weeks. All delimitation and spray sites are given a high priority for surveys. High moth counts on the regular trapping grid are done after delimitations are complete. Generally, surveyors will check approximately 200 sites covering about 1000 acres within 34 non-regulated counties. The data from trapping and egg mass surveys will be used to help determine the proposed treatment sites for 2004. Information on next year's proposed treatment sites should be available in late January 2004.



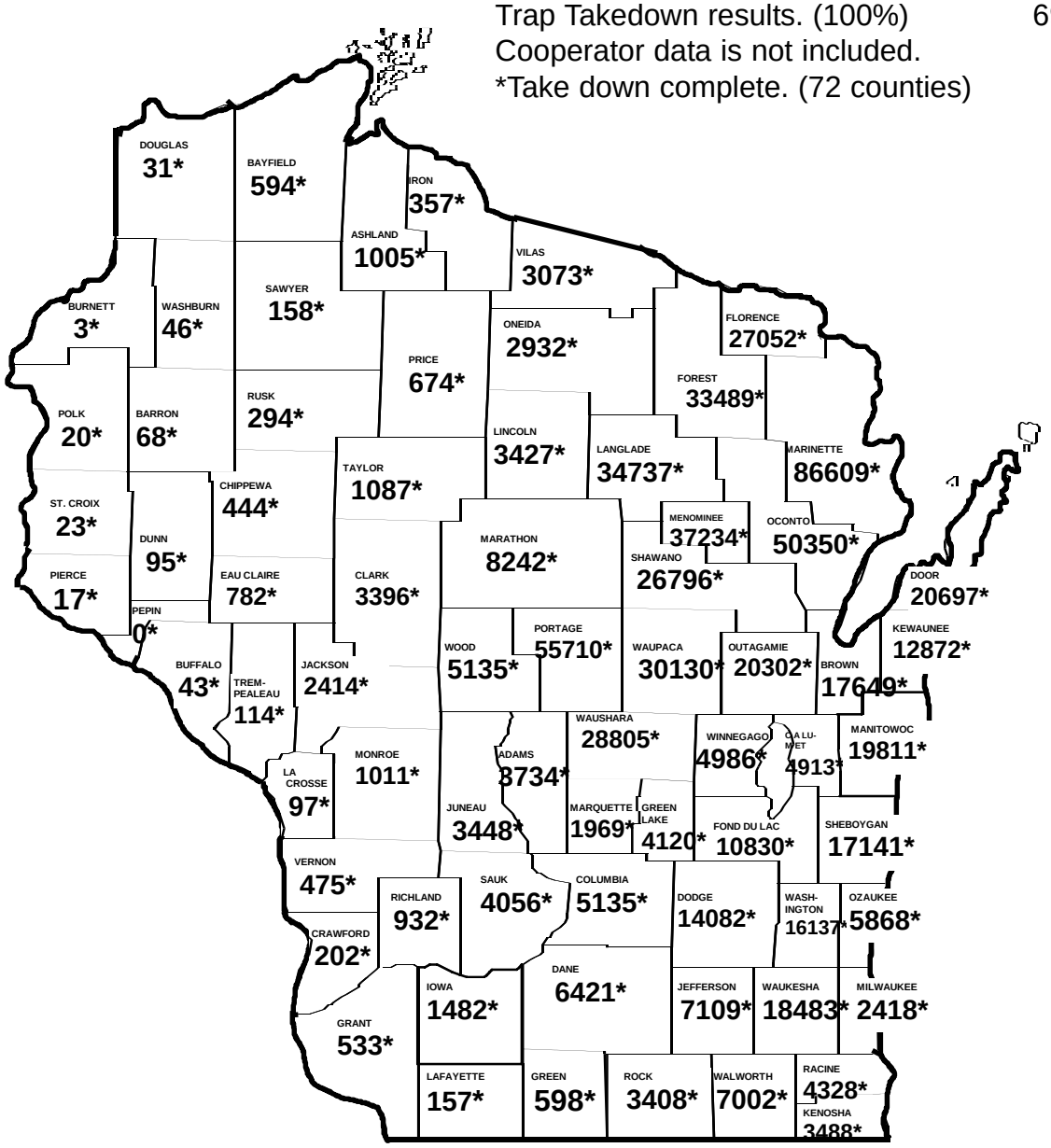
For more information on the gypsy moth program, please call our hotline at 1-800-642-MOTH.




Christmas Tree Field Insects-
Fall 2003 (in progress)
Insects
Balsam twig aphid
Balsam gall midge
Eastern spruce gall adelgid
Gypsy moth egg mass
White pine weevil
Zimmerman pine moth
Pine root collar weevil
Pine needle scale
Spider mites
Pales weevil
White pine aphid
Pine tortoise scale
Pine bark adelgid
Spruce gall midge
Pitch mass borer
Cooley spruce gall adelgid
Sawflies
Spruce needleminer
0
10
20
30
40
50
60
70
80
Number of Fields

Gypsy Moth Program
FINAL TRAP TAKEDOWN 2003 DATA (as of 11/11/03)

Trap Takedown results. (100%) 691,280 moths
Cooperator data is not included.
*Take down complete. (72 counties)



Department of Agriculture,
Trade & Consumer Protection
Division of Agricultural Resouces Management
PO Box 8911
Madison WI 53708-8911

Web Site of the Week

United Nations Food and Agriculture Organization

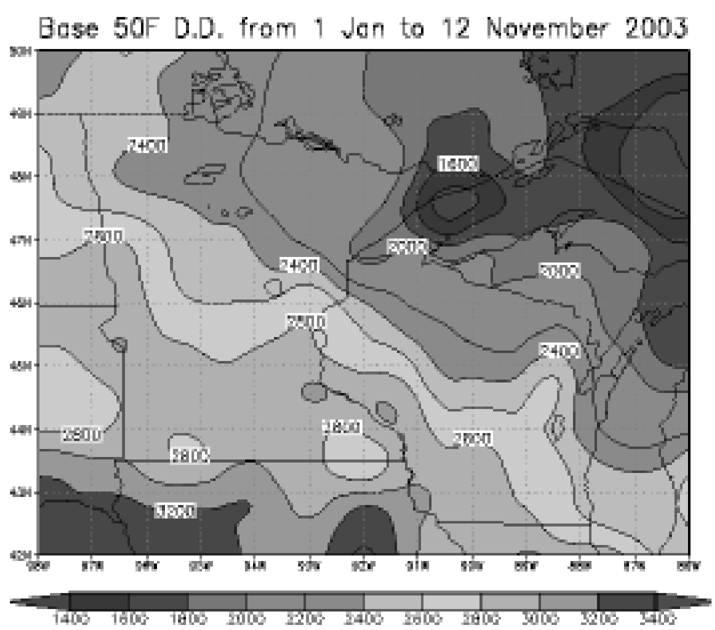
http://www.fao.org/

From the website: The Food and Agriculture Organization of the United Nations was founded in 1945 with a mandate to raise levels of nutrition and standards of living, to improve agricultural productivity, and to better the condition of rural populations.

Quote of the Week

For I have had too much
Of apple-picking: I am overtired
Of the great harvest I myself desired.
There were ten thousand thousand fruit to touch,
Cherish in hand, lift down, and not let fall.

From "After Apple-Picking", Robert Frost, 1874-1963



http://www.soils.wisc.edu/wimnext/tree/arbor.html