DATCP's 2001 Insect Survey Results and Outlook for 2002

Krista Lambrecht [1/]

European Corn Borer

DATCP's annual fall abundance survey documented a statewide average of 40 European corn borer larvae per 100 plants (grain corn). This compares to 24 per 100 in 2000, and a 55-year average of 48 larvae per 100 plants. In a 10-year context, this year's average is low to moderate; then again, some unprecedented averages were recorded in the last decade. In fact, during the 1990's, the greatest fluctuations in overwintering populations in the 59-year history of this survey were documented. The 1995 survey found the highest statewide average of 197 borers per 100 plants, and the lowest average, 5 per 100, was recorded in 1998. Two hundred and twenty sites were included in this year's survey. The number of sites selected per county was based on the acreage of grain corn planted.

This year's low-moderate statewide average is not fully representative of population trends in all survey districts. A number of districts had fields with populations falling well below the state average, while others, including the West Central and Southwest, had fields with populations far exceeding the average. The lowest populations, averaging 5-7 borers per 100 plants, occurred in the North Central and Northeast districts. Conversely, a number of heavily infested fields were also detected in counties within these districts. Burnett County fields, for example, averaged 78 borers per 100 plants. Moderate larval counts, ranging from 33-48 borers per 100 plants, were found in Northwest, Central, East Central, South Central and Southeastern regions. The highest counts were detected in the West Central and Southwest districts, where populations increased considerably from last year. Crawford, Iowa, Grant, and Lafayette Counties all had averages exceeding 100 borers per 100 plants. Extensive stalk breakage and shank tunneling were encountered in the Southwest; however, only low amounts of subsequent ear drop were noted while the survey was in progress.

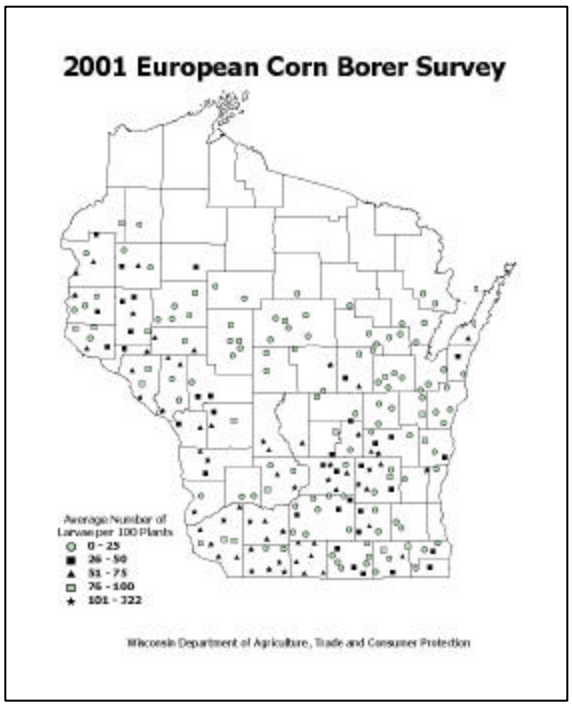

Figure 1. 2001 European Corn Borer Survey Results

Pupation of the 2000-2001 overwintering larvae began at 246 DD (base 50ºF), which occurred around May 9 throughout much of the state. The first moth detection of the season was recorded on May 15, in Calumet Co. Peak first flight moth activity, which typically occurs once 631 DD have been reached, occurred around June 13 in the Southernmost counties, and by June 20 farther north. The first flight of moths continued into the first week of July. A light first flight was expected, based on the relatively low larval average (24/100) documented during the 2000 survey. The earliest egg mass was detected on June 14 in Lafayette Co., and larval feeding became apparent the following week.

[1] Plant Pest and Disease Specialist, Wisconsin Department of Agriculture, Trade and Consumer Protection, P.O. Box 8911, Madison, WI 53718-6777

Moths of 2nd flight began emerging around July 18, and the peak of summer European corn borer activity occurred around the second and third weeks of August. Surveyors detected egg masses from the second flight of moths most frequently between August 1st and 14th. Moth activity slowed substantially by the end of August, and neared completion around mid-September.

Forecast for European Corn Borer in 2002

Based on the fall larval abundance survey results, 21% of the state's corn acreage had populations exceeding 75 borers per 100 plants. Unfortunately, there's no way to predict with certainty how heavy next summer's European corn borer population will be. Early planted corn, along with favorable spring weather conditions during the first flight of moths, often results in significant population increases from year to year. In recent years, populations have increased more than 6-fold from season to season (see Fig. 2), although doubling and tripling is more common. At any rate, we can expect a small fraction of the 40% of overwintering larvae to die this winter, or succumb to disease, predation, or parasitism before pupating. If spring weather conditions are favorable, a moderate first flight could lead to problems later in the season. Growers in districts with high averages (>60/100 plants) should pay particularly close attention to the first flight of moths, growing degree day accumulations, and scout for injury caused by 1st generation larvae next spring.

Figure 2. European Corn Borer Fall Survey Summary 1992-2001
Average Number of Larvae per 100 Plants.

Dist	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	10 Year Ave.
NW	8	26	20	10	32	3	2	15	24	33	18
NC	1	15	8	17	41	26	1	3	4	5	12
NE	37	2	10	53	47	18	1	18	3	7	20
WC	10	17	45	121	80	15	2	30	31	67	42
C	9	29	92	123	102	9	2	30	41	48	49
EC	9	13	28	249	65	26	3	25	19	33	47
SW	5	65	110	631	51	39	17	57	39	87	110
SC	13	14	101	265	83	35	10	61	33	48	66
SE	5	40	107	308	79	35	10	31	16	36	67
State Ave.	11	25	58	197	64	23	5	30	24	40	48

Corn Flea Beetle

Background

Corn flea beetle, *Chaetocnema pulicaria*, is an insect DATCP surveyors have monitored closely since the summer of 1999, after Stewart's Wilt was detected in Wisconsin for the first time in 57 years. Corn flea beetle is the overwintering host and vector of *Pantoea stewartii*, the bacterium that causes Stewart's Wilt in corn. The occurrence of Stewart's Wilt in a given season is influenced by a number of variables, including: 1) *the prevalence of Stewart's disease in 2000;* 2) *corn flea beetle populations at the end of the growing season,* 3) *the percentage of corn flea beetles infested with the Stewart's Wilt bacterium going into winter,* and 4) *the predicted risk for Stewart's disease*, based on temperature models of corn flea beetle survival. Determining whether Stewart's Wilt will appear in Wisconsin, where it might occur, and how severe it might be requires examining each of these variables.

The process of evaluating the risk of Stewart's Wilt for 2001 growing season began back in the fall of 2000. At that time staff surveyed for corn flea beetles preparing to overwinter, since the

prevalence of Stewart's Wilt is closely associated with the ability of corn flea beetle populations to survive the winter months.

The first factor considered was ***the prevalence of Stewart's disease in 2000***. In 2000, 57% (34 of 60) of the corn fields inspected for seed certification, totaling 834 acres, tested positive for the Stewart's Wilt pathogen. Infected fields were detected in Adams, Dane, Grant, Iowa, Lafayette, Marquette, Portage, Richland, Rock and Trempealeau Counties. Welty (1993), has shown that in areas where Stewart's Wilt was prevalent the previous summer, approximately 10-20% of the beetles emerging in spring carry *P. stewartii*.

The next factor, ***corn flea beetle populations at the end of the growing season***, was one that required a fall survey. Pest surveyors swept for corn flea beetles in grassy areas adjacent to corn fields during September and October, and found corn flea beetles were prevalent at the end of the 2000 growing season. Beetles were collected at 109 of the 220 sites (44 of 60 counties) included in the 2000 survey.

Next, we looked **at *the percentage of corn flea beetles infested with the Stewart's Wilt bacterium going into the winter of 2000-2001***. A total of 48% of the beetles collected during the fall 2000 survey carried *P. stewartii*.

The last factor reviewed was ***the predicted risk for Stewart's disease*** using Iowa State's Nutter Model. According to the Nutter Model, the risk of Stewart's Wilt during the summer of 2001 was low to moderate in Kenosha and Milwaukee Cos., moderate to high risk in Racine Co., and little or no risk throughout the remainder of the state. The Nutter model (Figure 3) uses mean monthly air temperatures for December, January and February. In contrast, the Stevens-Boewe system, a system we've used in previous years, uses the sum of the average air temperatures for December, January and February.

Figure 3. Nutter Model developed at Iowa State University.

0 month > 24°F = very low risk
1 month > 24°F = low to moderate risk
2 months > 24°F = moderate to high risk
3 months > 24°F = high risk

The maximum cumulative temperature record was 67.9ºF at a site in Milwaukee County. The cumulative mean temperature for the nine districts ranged from 37ºF in the Northwest to 59.7ºF in the Southeast. Despite differences in how risk is formulated, both models predicted little or no Stewart's Wilt throughout Wisconsin in 2001.

Neither of these models can forecast risk levels with complete accuracy. Both are based on ambient air temperatures, which may not be the actual temperatures to which overwintering corn flea beetles are exposed. December, the coldest month last winter, was also the month during which we received the heaviest amounts snowfall. The extent to which snow cover acts as an insulator is not clear. Based on the amount of snowfall received, ELISA test results, and knowledge of corn flea beetle distribution, we concluded that *if* the beetles survived the winter, there was a good possibility for Stewart's Wilt to be more prevalent in 2001 than it had been during the previous summer.

<u>2001 Survey Results</u>

No corn flea beetles were found during the spring survey for overwintering beetles, conducted from April 26 to May 15 of 2001. During the survey, staff returned to the same 52 sites where infected beetles had been collected during the previous fall survey. Any beetles found this early in spring were assumed to have overwintered, and based on ELISA test results, it appeared likely that some percentage of this overwintering population might carry the Stewart's Wilt bacterium. Our survey found no corn flea beetles during this survey. Failure to recover any beetles indicates 2000-2001 winter mortality rates may have been high.

Similarly, very few corn flea beetles were detected during the fall survey conducted in September and early October. Beetles were collected in Green, Rock, Racine, Walworth, and Waukesha Counties, from only 8 of the 220 sites included in the survey. No Stewart's Wilt was detected during summer corn disease survey or seed corn inspections.

Forecast for Corn Flea Beetle in 2002

Considering the factors that influence the risk of Stewart's Wilt, preliminary findings indicate the risk is low for 2002; however, a mild winter and high corn flea beetle survival rates could prove this forecast wrong. Further, although the risk appears low at this time, growers in the Southeast district and those who have experienced Stewart's Wilt in the past should continue to be alert to the possibility of future infection.

Soybean Aphid

Background

Like the corn flea beetle, soybean aphid is a relatively new pest to Wisconsin. It first turned up in soybean fields during July of 2000, but because it was so widely distributed throughout the Midwest it appeared soybean aphid had been in the U.S. for a few years prior to its detection. In China and throughout Asia, *Aphis glycines* is a major pest of soybeans. It is known to cause significant yield losses by reducing plant height, the number of pods and seeds produced, and through virus transmission. Additionally, soybean aphid indirectly injures plants with honeydew secretions, which promote the growth of sooty mold, and may inhibit the process of photosynthesis.

2001 Survey Results

The 2001 summer soybean aphid survey, conducted between June 6 and September 6, included 172 sites. In each field surveyed 30 plants were examined, their growth stages recorded, and plants were assigned a severity rating based on the number of aphids present (see Figure 6). Between June 6 and July 11 soybean aphids were detected in only 2 of the 42 fields surveyed. During that time soybean plants were just emerging, and soybean aphids were beginning their migration to soybean fields. The first aphids of the season were detected in Rock Co., on June 14, by a UW-Extension agent. A DATCP surveyor detected a single aphid in Columbia Co. that same week; however, it wasn't until approximately surveyors began finding more and more heavily infested field

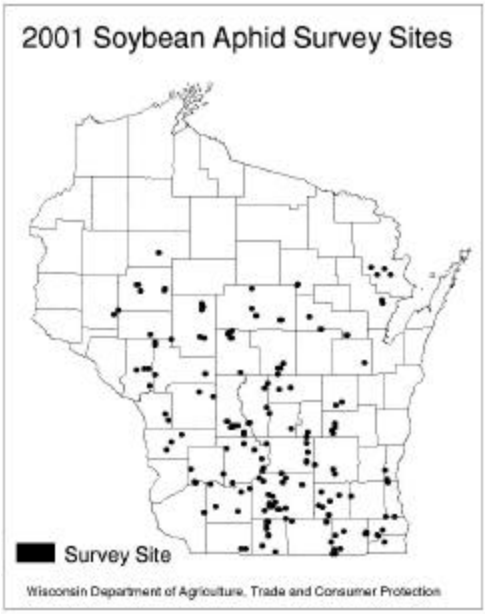

Figure 4. 2001 Soybean Aphid Survey Sites

variation in severity ratings was recorded. In the South more 2- and 3-rated fields were encountered, while further north most fields were still at a 0- or 1-rating. Things picked up substantially between July 26 and August 15, when 53 of the 73 (72.6%) fields surveyed were assigned 4-ratings (100+ aphids per plant). By mid-August, fewer and fewer 4-rated plants were observed. After August 20, staff surveyed only 10 fields, 80% of which were assigned either a 0- or a 1-rating.

Figure 5. Rating Scale for Soybean Aphid Severity.

Rating	Aphids observed on 1 plant (≤45 seconds)
0	0
1	1-10
2	11-25
3	26-99
4	100+

Our survey findings support what research has shown about soybean aphids' population dynamics and how they're correlated with soybean growth stage and development. Wedberg and Grau (2001), note that aphid populations increase most rapidly from V3-R5 growth stages, and reach their highest peak between seedling and bloom when colonies are concentrated on new trifoliate leaves. Near the end of July, when soybean growth ceases, aphids move from top, to middle or lower part of plant. Then, from late August to early September colonies begin multiplying once again; however, our survey did not document this resurgence during the 2001 season.

Forecast for Soybean Aphid in 2002

Currently there is no economic threshold available for soybean aphid. In looking at this year's survey results it's clear that no soybean field is immune to soybean aphid infestation, although late-planted fields appear to be most susceptible, especially under dry soil conditions. In 2002 soybean growers throughout the state need to monitor fields closely, beginning shortly after emergence. In the Wisconsin Crop Manager, a UW-Extension publication, John Wedberg listed some criteria used by Michigan State University Entomologist Chris DiFonzo, to decide when treating fields for soybean aphid is warranted. The criteria are:

- 1,000 or more aphids per plant
- aphids covering leaves and stems
- honeydew and sot mold visible on leaves
- dry conditions (plants water stressed)
- pathogenic fungus not observed killing aphids

Using these criteria may help in deciding whether control measures are necessary. Additionally, there are three important soybean aphid resources growers should consult throughout the season for weekly updates on soybean aphid activity. They are the Cooperative Pest Survey Bulletin (**http://datcp.state.wi.us/arm/environment/insects/pest-bulletin/**), the Wis. Crop Manager (**http://ipcm.wisc.edu/wcm/**), and the Soybean Health Web (**http://www.plantpath.wisc.edu/soyhealth/**).

References

Wedberg, J.L. 2001. Wisconsin Crop Manager. Soybean Aphid Update. Department of Agronomy-University of Wisconsin-Extension. 1 p.
http://ipcm.wisc.edu/wcm/pdfs/2001/01-21insect1.html

Wedberg, J.L., and Grau, C.R. 2001. Soybean Aphid 2001 – Biology and Management. UW Soybean Plant Health. 4 p.
http://www.plantpath.wisc.edu/soyhealth/soyaph01.htm.

Welty, C. 1993. Ohio State University Extension Fact Sheet. Entomology: Commercial Vegetable Series: Corn flea beetle on sweet corn. CV-1000-93. 5 p.