DATCP'S 2002 INSECT SURVEY RESULTS AND OUTLOOK FOR 2003

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European Corn Borer

DATCP's annual fall European corn borer survey measures the average number of corn borer larvae per plant in grain corn fields throughout Wisconsin. Survey results are used to estimate the density of the fall corn borer population and forecast the potential magnitude of the first flight of moths next spring. Establishing where heavy corn borer infestations occur in fall indicates where excessive populations may lead to economic loss next summer.

The corn borers present during the fall survey will pass the winter as full-grown (5th instar) larvae in corn residue, pupate once temperatures exceed 50°F next spring, then emerge as adults in late May of 2003. Each emerging female moth has, under favorable conditions, the potential to lay more than 400 eggs. Consequently, a sizeable fall population can translate into an economic threat in the following growing season.

Survey Protocol

To determine the fall population size, DATCP's pest survey staff visit a minimum of 221 fields in 60 counties from early September to mid-October, returning to approximately the same sites from year to year. At each site surveyors examine 25 consecutive plants for signs of infestation, including leaf feeding injury, entrance/exit holes, or frass, and record the percentage of infested plants. Next they dissect the last two infested plants, count the number of larvae found within the two stalks, and calculate the average number of borers per plant by multiplying the average number of borers per infested plant with the percentage of plants infested.

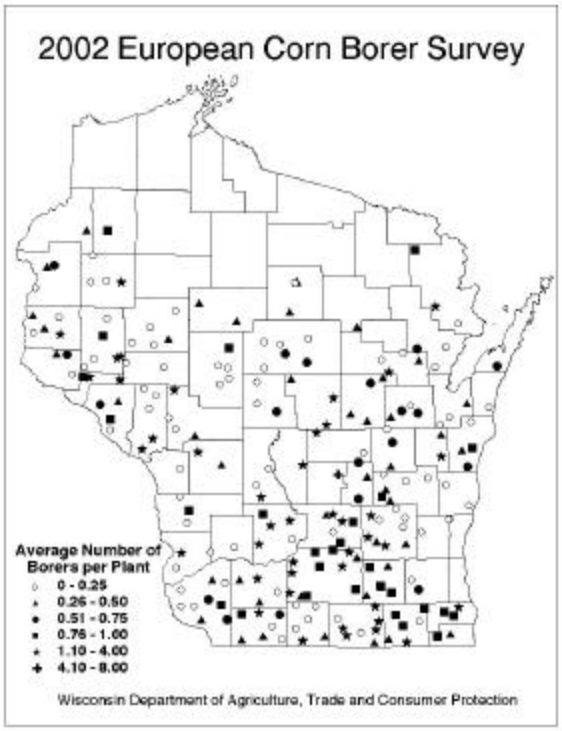

Figure 1. 2002 European corn borer fall survey results.

What can be considered a heavy infestation? The answer varies from state to state. Several other Midwestern states which conduct similar fall surveys use thresholds ranging from 0.60 to 1.0 borers per plant. University of Illinois-Extension maintains that 1.0 borer per plant may cause 4% to 6% yield loss, depending on the time of attack. Here in Wisconsin our estimate is slightly more conservative. Traditionally we have used 0.75 corn borer per plant as the threshold, meaning that a population in excess of 0.75 larvae per plant may result in economic loss.

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Survey Results
This year's survey documented a statewide average of 0.66 borers per plant, a 26% increase in comparison to fall larval densities last year. Results from the fall 2002 survey compare to 0.40 per plant in 2001, and a 10-year average of 0.53 borers per plant. In relation to 50 years of survey data, the 2002 overwintering population is 17% higher than average. With the exception of the southwest, all agricultural districts showed population increases. Noteworthy are the increases documented in the central (0.48 to 1.21 borers per plant), south central (0.48 to 0.86 borers per plant), and northeast (0.07 to 0.75 borers per plant) districts, where averages rose by 0.73, 0.38 and 0.69 borers per plant, respectively. Densities of overwintering corn borers fell just below average in the west central (0.71 per plant), southwest (0.65 per plant), and southeast (0.61 per plant) agricultural districts. The lowest densities were documented in the north central (0.26 borers per plant), northwest (0.44 borers per plant), and east central (0.44 borers per plant) districts.

Based on results of the fall larval abundance survey, 34% of the state's corn acreage had populations at or exceeding 0.75 borers per plant. In the south central district, where the second highest population (0.86 borers per plant) was documented, 21% of the sites had averages that more than doubled the threshold (1.5^{+} larvae per plant). Also notable was the substantial increase from 0.07 to 0.75 borers per plant in the northeast. Numerous heavy infestations were documented from the southeast district as well, where 56% of the sites surveyed had densities exceeding 0.75 borers per plant.

District	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	10 Yr. Ave
NW	.26	.20	.10	.32	.03	.02	.15	.24	.33	.44	.21
NC	.15	.08	.17	.41	.26	.01	.03	.04	.05	.26	.15
NE	.02	.10	.53	.47	.18	.01	.18	.03	.07	.75	.23
WC	.17	.45	1.21	.80	.15	.02	.30	.31	.67	.71	.48
C	.29	.92	1.23	1.02	.09	.02	.30	.41	.48	1.21	.60
EC	.13	.28	2.49	.65	.26	.03	.25	.19	.33	.44	.51
SW	.65	1.10	6.31	.51	.39	.17	.57	.39	.87	.65	1.16
SC	.14	1.01	2.65	.83	.35	.10	.61	.33	.48	.86	.74
SE	.40	1.07	3.08	.79	.35	.10	.31	.16	.36	.61	.72
State Ave.	.25	.58	1.97	.64	.23	.05	.30	.24	.40	.66	.53

Figure 2. European corn borer fall survey summary 1993-2002 (by district).
Average number of borers per plant

Outlook for 2003
A statewide average of 0.66 borers per plant suggests there are more larvae headed into the winter of 2002-2003 than have been documented in the past six years. In view of that, there exists a relatively high overwintering population that may eventually develop into next summer's first flight of moths.

This however, does not guarantee that the European corn borer will become an economic threat in 2003. Fall abundance survey results provide only a general forecast of the potential density of next summer's European corn borer population. Spring weather conditions will determine the fate of the first generation. If heavy precipitation, low humidity, low evening temperatures, and/or strong winds prevail during the period when corn borers are mating and reproducing, the first generation population could decline dramatically.

Growers in districts with averages near or exceeding 0.75 larvae per plant are encouraged to 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. Results of the 2002 fall European corn borer survey are presented in Figs. 1 and 2.

Corn Flea Beetle

Since the 1999 detection of Stewart's wilt in a Walworth Co. corn field, DATCP staff have conducted a fall survey for the corn flea beetle, the vector of Stewart's wilt. Corn flea beetles do not directly cause the disease; rather, they are carriers of *Pantoea* setwartii, the bacterium that causes Stewart's wilt. Thus, the spread of Stewart's disease is entirely dependent on the survivorship ability of its corn flea beetle host. Prior to 1999 Stewart's wilt had been absent from Wisconsin for 57 years. Its return was likely related to the consecutive mild winters preceding its detection.

Survey Protocol

The fall corn flea beetle survey is conducted at the same time as the European corn borer survey (September-early October), and at the same 221 sites. Once the corn borer infestation level has been assessed at each site, the surveyor sweeps for corn flea beetles in grasses adjacent to the field, and saves any corn flea beetles collected in the sweep net. The beetle samples collected during the fall survey are later processed to determine the percentage and distribution of beetles carrying *Pantoea stewartii*.

Survey Results

The 2002 fall corn flea beetle survey found corn flea beetles at 46 of the 221, roughly 21%, of the survey sites. More important that the number of positive sites, is the location of those sites. Corn flea beetles were collected almost exclusively from the southern 3 tiers of counties, meaning the range of potentially overwintering beetles extends from Vernon Co. on the western side of the state, to Ozaukee Co. on the east, and includes all counties south of that line. Two noteworthy exceptions to this trend were two sites, one in Marathon Co. and another in Lincoln Co., where beetles were collected. There are likely a few Be more small, isolated populations distributed north of the Vernon-Ozaukee Co. line, but these populations pose less of a threat because they are more susceptible to winter mortality.

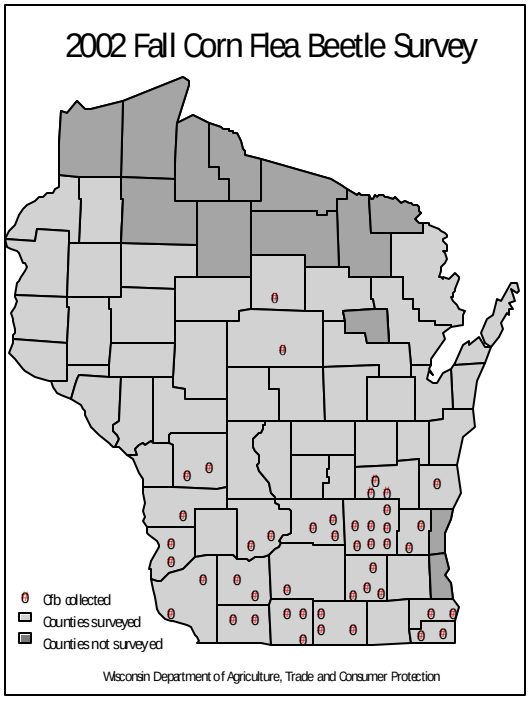

Figure 3. Corn flea beetle fall survey results.

Outlook for 2003

The fall survey results are not surprising. Similar findings from the previous three years of surveys have shown that we can expect to find beetles throughout the southern 1/3 of the state in fall. The range within the southern 1/3; however, may vary somewhat from season to season. For example, during our 2001 fall survey we collected beetles from only 8 sites in Green, Rock, Racine, Walworth, and Waukesha Cos.. Rarely, does the overwintering range of corn flea beetles extend north of the Vernon to Ozaukee Co. line. Recent surveys have shown if Stewart's

wilt turns up in Wisconsin, it is most likely to occur somewhere in the southern 1/3. Further, the counties most at-risk for Stewart's wilt within the southern 1/3 of the state are those in the far southeast, namely Racine, Kenosha and Walworth Cos., where winter temperatures are generally the most mild, and where the heaviest corn flea beetle populations occur. Based on the potential for beetles to overwinter, there is little risk for the disease to occur any farther north of the Vernon to Ozaukee line.

Next spring we'll be able to better tell the counties where corn flea beetles were likely to have persisted through the winter months, and where beetles carrying the Stewart's wilt bacterium, *Pantoea stewartii*, were distributed. This will allow us to forecast with more accuracy where Stewart's wilt could appear in 2003. For now it is clear that growers in the west central, central and east central districts and all districts further north, need not be too concerned about the return of Stewart's wilt in 2003 (though it is not impossible). Growers in the southwest, south central and southeast; however, should look to spring issues of DATCP's Cooperative Pest Survey Bulletin (http://datcp.state.wi.us/arm/environment/insects/pest-bulletin/) for additional forecasts for corn flea beetle/Stewart's wilt in their districts.

Soybean Aphid

The return of soybean aphids to soybean fields began in the southeast during the second week of June, and by the third week, low-level infestations were common in fields throughout the south. Infestations involving 5-15% of the plants, with fewer than 10 aphids per plant, were common in V_2-V_3 stage soybean fields. In centrally-located fields, no aphids were detected at this time. Surveyors continued to encounter only low-level infestations in V_3-V_4 stage fields throughout the south between June 24 and 27, but populations were slowly building. Fields with up to 35% of plants infested, still with fewer than 10 aphids per plant, were becoming more common.

Surprisingly, low aphid numbers continued into late July. Based on events from the two preceding years, we expected that a dramatic population increase might occur by the end of the month; however, by early August it became clear that soybean aphid populations were not likely to escalate to the levels experienced in 2000 and 2001. Population densities continued to increase in individual fields, but at a much slower rate than initially expected. Moderate to heavy infestations (100% plants with 200^+ aphids per plant) had grown more prevalent in the south, but populations in the north remained relatively low. In early August we received reports of fields saturated with aphids in the southern portion of the state, but these accounts were few and far between.

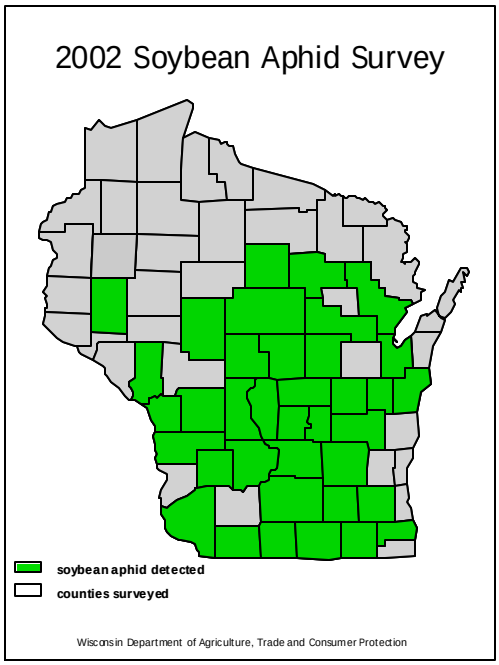

Figure 4. 2002 Soybean aphid summer survey results.

In 2002, soybean aphid populations did not reach the economically important levels they had reached during the two previous summers. Very few fields warranting treatment for this pest were encountered in any part of the state. Growers were prepared to treat, pending a population explosion, but control was rarely necessary. Some suggest the hot, dry weather we experienced early on may have been a factor, or

that natural enemies played a larger role this year. Whatever the case may be, this summer's soybean aphid situation was both unexpected and encouraging.

Bean Leaf Beetle

Many soybean growers who were previously unfamiliar with the bean leaf beetle and/or its characteristic foliar feeding, were unexpectedly introduced this summer. Bean leaf beetle is a relatively new pest of concern in Wisconsin, but it is fast becoming one of the leading threats to the state's soybean production.

Generally early-planted soybeans are highly vulnerable to defoliation by the overwintering generation of beetles; however, this early-season defoliation is usually less problematic than pod feeding and defoliation later in the season. The heaviest defoliation encountered this summer, caused by the first generation of beetles, wasn't observed until the latter part of July and the early part of August. At that time, severe bean leaf beetle defoliation was growing noticeable all across the state. Our staff began receiving reports of severe defoliation from surveyors, consultants and homeowners, mostly throughout the southern region of the state. By mid-August, fields that had escaped defoliation and low levels of pod damage were considered atypical. Though less severe than in the south, bean leaf beetle defoliation was observed as far north as Barron Co..

Feeding activity slowed in most regions by August 29, but fields continued to be at-risk for pod damage into September, as soybean foliage dried. Fortunately the second generation of beetles, occurring in late August/early September, were less detrimental to soybean stands than the first; often the economic yield losses associated with bean leaf beetles are the result of the second-generation feeding on pods in late summer.

The bean leaf beetle is just one of many pests that have benefited from recent mild winter temperatures. A harsh winter could effectively reduce populations, but another mild one will more than likely ensure future problems with this pest.