

Insects and other Arthropods of Economic Importance in Indiana During 1981

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The period from 1 October 1980 to 31 March 1981 was the driest 6 months in 100 years (Weather data summarized from "Indiana weekly weather and crops"). Lafayette, for instance, had only 6.7 inches of precipitation during that time. This facilitated soil preparation to the point that by 13 April, 90% of the plowing was completed. Growers had little opportunity to take advantage of the excellent soil conditions, for it started to rain and continued through May and far into June, slowing planting of both corn and soybeans. Some of the rains were heavy. Vincennes, for instance, received 15.27 inches of rain during May, its wettest month since record keeping began in 1889. By 10 June, when in average years all of the corn is planted, only about 70% was. The rains slowed planting least in the SW (southwest) district, followed by sections of the northern districts. The EC (east central) district, which has heavier soils, was most affected. In addition to losses due to late planting, to inundation and to flooding, late planting put many acres at risk to fall freezing temperatures, and some frosts occurred early enough to damage immature corn. Soybean planting was also delayed, but that crop suffered less than the corn because of the delay. And wheat, often lush in growth as a result of the plentiful moisture, suffered an abundance of diseases, the most conspicuous of these being powdery mildew.

With the exception of alfalfa insects, field crop insects were generally less abundant than in previous years. Some of this was due to the late planting, some to the direct effects of the weather. These will be discussed in connection with the various crops, where relevant.

Corns and Small Grains

A first-stage larva of the western corn rootworm (*Diabrotica virgifera*) was taken from soil samples collected 30 May in Tippecanoe (WC) Co., the first of the season. The first adult emerged in the same county on 2 July. In Knox (SW) Co., much further south, adults were common by 25 June. Peak adult emergence in Tippecanoe Co. occurred 21 July (cage studies). Sticky trap data from the same field follow; first adult: 6-8 July; half the season's catch was collected by 12 August, and peak flight occurred during the week ending 5 August. Total catch in 10 sticky traps from 6 July to 23 October was 10,606 (1977-1980 catches; 5,374, 5,938, 16,142, 2,329.) Sticky trap data for the northern corn rootworm (*D. longicornis*) in the same Tippecanoe Co. field: first adult during the week ending 15 July; half the total year's catch by 19 August with peak flight the same week. Total catch 1977-1981: 12,096, 2,513, 1,318, 479, 719.

Western corn rootworm adult numbers were down from last year. The state averaged 0.34 adults/stalk in a survey of 254 fields conducted between 27 July and 12 August, about half last year's average. Only 4 counties (Lake, Kosciusko, LaGrange and Noble) had averages as high as 1/stalk. In 1980, 2 districts had averages that high. The northern corn rootworm averaged 0.06 adults/stalk. While

some of the decline in the species may be attributed to egg dessication during the dry winter, a major cause of decline was the late planting.

Pupation among overwintering European corn borer (*Ostrinia nubilalis*) larvae in a Daviess (SW) Co. field of upright corn stalks occurred as follows: 20% by 21 April, 30% by 28 April, and 80% by 5 May. In Grant (C) Co., 70% had pupated by 12 May. Adults were taken at both ends of the state (black light traps) by 24 May. First generation flight peaked about 8 June, second generation about 9 August in LaGrange (NE) Co. at the Michigan border. Eggs and first generation first instar larvae were present in all central districts by 9 June. Because susceptible corn was scarce due to late planting, adult females had to concentrate on the few that were sufficiently mature. Thus, there were a few, widely scattered fields with heavy infestations of first generation larvae. Thirty inch corn is usually considered sufficiently mature to support borer larvae, but several instances of heavy infestations on 12-inch corn were reported.

Pupae from this generation were observed as early as 7 July in the southern districts, 10 July in the central. Adult flight was almost continuous from 24 May to the end of August at least in the NE district, and yet the state average of 22.6 live borers/100 stalks at the time of the fall survey was the lowest since the beginning of the survey in 1961. Two factors may have led to this result. Late planting resulted in a lot of susceptible corn, diluting the effects of the numbers of gravid females. Also, frequent and/or heavy rains are detrimental to early stage larvae. The highest district averages were in the NC and NE, peaking at 51 live larvae/100 stalks. In spite of low infestation rates, at the time of the fall survey 90 (out of 7,500 stalks surveyed) ears were already lost to the harvest as a result of borer-initiated stalk breakage or shank cutting.

In average years the black cutworm (*Agrotis ipsilon*) attacks late planted corn, especially in low areas with weed problems. Since corn planting was delayed so long this year, more problems with this species were expected. The first report came from Posey (SW) Co. It was unusual because it was so early (last week in April) and because of most larvae were late instar. Reports of damaged fields increased later, reaching a peak by mid-June. An estimated 1,000 acres suffered economic damage or needed treatment, primarily in the central districts. The first pheromone trap catch in Tippecanoe (WC) Co. was on 1 April. Light and pheromone trap data were inconclusive as to flight peaks.

There were 3 unusual corn pests reported during the growing season. There were 2-4 Japanese beetle (*Popillia japonica*) larvae/row foot, nearly mature, in a 40 acre field of grain corn in Daviess (SW) Co. about mid-May. This insect was more common than usual this year and often appeared in corn fields during time of silking. No economic damage was reported as a result of clipping, however. About 4% of the corn in a Dubois (SW) Co. field was attacked by larvae of a sod webworm (*Nomophila nearctica*) (Determined by D. M. Weisman, Systematic Entomology Laboratory, USDA). This is the first time in the last 15 years that this species has been identified from corn, although it is a common insect. Lastly, the common stalk borer (*Papaipema nebris*), not in itself unusual since it attacks border rows, but this year about a third of the plants in a 90 acre field of corn in Fulton (NC) Co. were attacked, and from 15-20% of the plants in a no-till field in Steuben (NE) Co.

Again because of delayed planting, ear tip feeding in corn by the corn earworm (*Heliothis zea*) and the fall armyworm (*Spodoptera frugiperda*) was more common. About 9% of the 7500 plants seen during the fall corn insect survey had been attacked by 1 or the other of these species. At that time, of the larvae still present in

the ears, 310 were corn earworms, 44 fall armyworms. Last year only 2% of the ears were attacked, and 88 larvae were present. Fall armyworm whorl attacks were unusually numerous in the SW district earlier.

About 4% of the ears had been attacked by birds.

Fifty to 80% of the WC, SW, and SC corn fields visited between 6 and 8 July had corn leaf aphids (*Rhopalosiphum maidis*); infested fields had about a fourth of the plants with colonies, mostly small. By the time of the fall corn insect survey (Sept.-Oct.), 30% of the 7500 plants seen had at least some aphids. A total of 14% of the 7500 had colonies large enough to blacken all or a portion of the tassel, as compared with 6% the year before. Late planting probably contributed to the situation.

Two insects were involved with both corn and small grains. The oat bird-cherry aphid (*Rhopalosiphum padi*) was common on wheat in the SW and SC districts, less so in the central, by the end of April. A week later the populations had begun to dwindle. The mildewed condition of the wheat, fungus disease attacking the aphids, parasites and coccinellid predators probably all contributed to the reduction. The same species was present in 37% of the surveyed corn fields in the Sept.-Oct. survey, mostly in the northern districts. The insect seems to be more common in corn in fields with high plant populations or during wetter years. It was present in only 13% of the fields last year, a relatively dry year.

The other insect pest of both corn and small grains this year was the armyworm (*Pseudaletia unipuncta*). Centimeter-long larvae were reported as early as 5 May in Shelby (C) Co. in trace numbers. A corn field in Parke (WC) Co. had larvae up to 1 cm long on about half the plants by 20 May; larvae up to 2 cm could be obtained from roadsides all over the northern districts a week later. During the first week in June there were numerous reports of problems especially in no-till corn and in wheat; the latter was often lush in growth as a result of the abundant moisture. About 1000 acres, most of them wheat, required treatment for armyworm control. By mid June the problem virtually disappeared, the result of parasite activity. It was again in the NE district, as it was last year, that economically infested fields were most common.

Hessian fly (*Mayetiola destructor*) populations were up from last year, but in both resistant and non-resistant wheats nowhere nearly the 20% infestation rate considered economic. The mean infestation rate for all cultivars was 1.9%, nearly twice that of last year. H_5 gene resistant cultivars averaged 2.0%, H_3 , 1.6%. Only 3 of the surveyed fields had non-resistant strains, not enough for comparison purposes. Puparia/100 stems increased from 1.2 to 1.3. (The survey was conducted cooperatively by the Indiana Crop Improvement Association, the Agriculture Research Service of the USDA, and the Department of Entomology, Purdue, and involved 275 fields in 51 counties.

Forage Legumes and Soybeans

Blender extracted alfalfa weevil (*Hypera postica*) eggs in the SC district averaged 4/15 cm² on 24 February. 9 on 10 March, 10 on 23 March, 30 on 31 March and 50 on 7 April. Percent tip damage in the same district averaged (mean alfalfa height in cm in parentheses) trace (4) on 23 March, 9 (10) on 30 March, 22 (16) on 7 April and 64 (31) on 14 April. By 24 April, most SW fields visited had been treated, and most SC fields needed treatment as did many WC fields south of Indianapolis. A week later many EC fields south of Indianapolis were at economic levels. Except

for WC counties as far north as Fountain Co., a treatment for the alfalfa weevil north of Indianapolis was not necessary, or early cutting would have been a viable alternative.

The potato leafhopper (*Empoasca fabae*) was a persistent pest in alfalfa this year. Adults were present already before the first cutting. A LaPorte (NW) Co. alfalfa field was rated at 40 adults/100 sweeps as of 10 May, for example. The first cutting probably received no pesticide for the potato leafhopper, but all subsequent cuttings over much if not all of the state suffered severe damage if left untreated. (There are about 425,000 acres of alfalfa in the state.) Only 1 field was observed in which the regrowth following the first cutting was delayed by larvae of the variegated cutworm (*Peridroma saucia*), which were present in alfalfa fields, but as a rule did no noticeable damage. Eggs were first observed on 7 April, in Harrison (SC) Co.

The first Mexican bean beetle (*Epilachna varivestis*) adult of the season was collected from Union (EC) Co. alfalfa on 30 April, about the usual time for the species. The first eggs on trap crop snap beans were deposited 29 May, and adults were present on Parke (WC) Co. soybeans at that time. The 20th of June marked the beginning of the first generation, i.e., the most common stages on soybeans through most its range were eggs and small larvae. By 8 July, half the larvae had pupated in the southern districts, and by 15 August new adults were present as well as pupae and late instars.

In the past the insect has been confined to Indiana south of Indianapolis on soybeans, with the exception of northward extensions on either side of the state: to Winchester on the east and Veedersburg on the west. Elsewhere in the northern half of the state perhaps 1 or 2 isolated spots are infested each year, populations which do not usually reappear the next year. This year the isolated spots were numerous, and reached the Michigan border, including sightings in LaGrange, Whitley (several fields), Huntington (several fields) (NE), St. Joseph and Wabash (NC) counties.

Late in the season there were scattered fields in Clay, Owen (WC), Bartholomew (C), Union (EC) and Franklin (SE) counties with economic infestations, especially in maturity group 4 soybeans. An estimated 50,000 acres were treated, but only a small portion of that acreage needed it.

Bean leaf beetle (*Cerotoma trifurcata*) adults were collected as early as 15 April from alfalfa in Vigo (WC) and Sullivan (SW) counties. WC alfalfa fields often harbored large numbers—sometimes in excess of 1/sweep. Economic infestations feeding on soybean leaves occurred last year, and with such numbers so early in alfalfa problems were anticipated, but none was observed. Soybean root feeding by the larvae was not reported, although it might well have been present.

The green cloverworm (*Plathypena scabra*) was present through the season, rarely even approaching economic numbers, until about mid-August. It then virtually disappeared from soybeans as a result of disease and parasitism.

A leafminer (*Odontota horni*) was rarely numerous in a single Jasper (NW) Co. field of soybeans last year. Only trace numbers were in the vicinity this year, but adults were collected (in trace numbers) from the NW county of Benton, the NC counties of Elkhart, Fulton and St. Joseph, and the NE county of Whitley. In some instances the adults were reared from pupae within mines.

Ornamentals Forest, Shade and Fruit Trees

Data concerning fruit trees have been provided by Thomas Mouzin (USDA,

Vincennes), and are based on pheromone trap catches. Codling moth (*Cydia pomonella*) flight was about double that of last year, with a heavy flight from the end of April to mid-June and another from mid-July to mid-September. Oriental fruit moth (*Grapholitha molesta*) catches were 1.5 times those of 1980, with peaks about 1 May, mid-June, mid-July and all of September. Obliquebanded leafroller (*Choristoneura rosaceana*) flights were as last year abundant, with a peak flight the last week of May and a lesser flight from 7-27 September. Redbanded leafroller (*Argyrotaenia velutinana*) numbers were half those of last year, with large flights through most of April, the first half of June and most of September. Lesser peachtree borer (*Synanthedon pictipes*) numbers cannot be compared with those of the previous year, when live females were used as pheromone sources. This year synthetic substances were used. Peak flights were in early June and early September.

New county records for gypsy moth (*Lymantria dispar*) as detected in pheromone traps include LaPorte (NW), Tippecanoe (WC), Bartholomew and Boone (C). The first catch of the season: 6 July in Vigo (WC) Co.

First sod webworm catches in blacklight traps in W. Lafayette (Tippecanoe (WC) Co.): *Pediasia trisectus* 20 May; *Crambus mutabilis* 26 May; bluegrass webworm (*Crambus teterrellus*) 19 May.

Japanese beetles (*Popillia japonica*) effected severe damage to ornamentals over a wide area, especially in Indianapolis and Terre Haute. Likewise, the northern masked chafer (*Cyclocephala borealis*) was a wide-spread pest in both home and commercial turf. A Vermillion (WC) Co. football field was ruined by the larvae.

Man and Animals

First deer fly catches: *Chrysops niger*, 22 May in Tippecanoe (WC) and Harrison (SC) Counties; *C. callidus* and *C. cincticornis*, 2 June in Jackson (SC) Co.; *C. pikei*, 9 June, Johnson (C) and Union (EC) counties; *C. macquarti*, 9 June, Fayette (EC) Co. None of these catches falls outside published ranges.

Aedes vexans, the most commonly collected mosquito in a New Jersey mosquito trap in W. Lafayette (Tippecanoe Co.-WC), peaked in numbers in early June, late June and mid-September, but was present from mid-May to mid-October.

Beneficial Insects

Parasites played a conspicuous part in the control of at least 2 insects that might otherwise have become serious pests. Armyworm (*Pseudaletia unipuncta*) larvae were common especially in the NE district, and had effected damage to both wheat and no-till corn at scattered locations. By mid-June the cocoon masses of an undetermined parasite were abundant; in an Adams (NE) Co. field masses were counted at the rate of 1/30 cm², the highest level observed. The threat disappeared. The green cloverworm (*Plathypena scabra*) also began to build in soybeans, but by 25 August it had been replaced by the cocoons of *Protomicroplitis facetosa* and *Rogas noloophanae*, as well as diseased larvae attacked by *Nomuraea rileyi*. The few healthy larvae still present often bore evidence of attacks by the tachinid fly *Winthemia sinuata*.

Of 2,963 alfalfa weevil (*Hypera postica*) larvae collected between 13 April and 1 June and reared, 27% were parasitized by either *Bathyplectes amurus* or *B. curculionis*, the species appearing in about equal numbers, respectively (of the 27%) 14.2% and 12.6%. Of 730 from the northern districts 10% were parasitized, nearly all by *B. curculionis*. Of 891 from the southern districts 49% were parasitized, more

than 3 to 1 by *B. anurus*. The rate of parasitism did not change much over time in the WC district—the district most surveyed for parasites. Of 491 collected in April, 14.5% were parasitized. Of 488 collected in May, 15.2% were parasitized.

In order to speed the colonization of the northern half of the state by *B. anurus*, the USDA released that species in the following counties this year: Boone (C), Fulton (NC), LaPorte (NW), Lawrence (SC) and Wells (NE). The species has been slow in its spread following its initial release in Harrison (SC) Co. in 1965, Tippecanoe (WC) in 1967. It was first recovered in Harrison Co. in 1970, and has never been recovered from Tippecanoe Co. even though trace numbers have been collected as far north as LaPorte (NW) Co. (1980).

B. anurus was recovered this year from the following counties for the first time (The county name is followed in parentheses by the date of the collection of the host, and the city nearest the collection site. The author collected and identified the specimens). WC: Vigo (13 April, Prairieeton). C: Shelby (19 May, Ray's Crossing). EC: Fayette (6 May, Glenwood), Union (6 May, Liberty), Wayne (6 May, Abington). SW: Knox (20 April, Emison).

Of 338 adult alfalfa weevils collected between 13 April and 26 May, 102, or 30.2% were parasitized by *Microctonus aethiopoides*. The parasite appeared in numbers by 13 April; last year no parasite was reared from weevils collected before 5 May. Only overwintering adults were tested. *M. aethiopoides* was recovered this year from the following counties for the first time (the county name is followed in parentheses by the date of the collection of the host, and the city nearest the collection site. The author collected and identified the specimens). NW: Newton (11 May, Kentland), Pulaski (12 May, Winamac). NC: Marshall (26 May, Donaldson), Miami (20 May, Peru) and Wabash (20 May, Lagro).

Another alfalfa weevil parasite, *Tetrastichus incertus* was released in Lawrence (SW) Co. this year, again by the USDA. It had been released at various locations in 1966, 1967 and 1968, but has never been recovered.

A single New Jersey mosquito trap suspended in the branches of a lone apple tree in West Lafayette, (Tippecanoe Co., WC) collected 1,387 adult specimens of the green lacewing, *Chrysopa rufilabris*, an arboreal species, in 1981. This is nearly double the previous high of 710 collected in 1978. The first adult was collected 17 May, the last 21 October.

Counts of some beneficial insects were made during the annual corn insect damage survey. This year 276 adult *Coleomegilla maculata* were observed, the highest since counts were began in 1975. The figure represents 96% of all species of beneficial coccinellids seen in the 300 fields. Counts were also made of the same species collected on 10 sticky traps at a height of 1 meter in a Tippecanoe (WC) Co. corn field from mid-June to mid-October. This year 300 were collected, down from the 318 of last year and peak of 407 in 1979. This was 71% of all of the coccinellids collected on these traps. The convergent lady beetle (*Hippodamia convergens*) was at its lowest level in the 5 years of this trapping—18—or 4%, while *Cycloneda sanguinea*, the small immaculate lady beetle, was at 107, or 25% of the total catch. No *Hippodamia tredecimpunctata*—the 13-spotted lady beetle—was collected this year.