Insects and Other Arthropods of Economic Importance In Indiana During 1978[1]

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Introduction

A heavy snowfall at the end of November in 1977 was the start of a long, hard winter which included the coldest February in the recorded meteorological history of the state. While snow cover favors most insects in this area, the long winter, followed by a wet spring, was not so kind to overwintering crops. Winter wheat, with acreage already reduced for other reasons to 900,000 acres, suffered winter damage to the extent that about 17% of even that small acreage was not harvested for grain. Alfalfa also suffered; two fields regularly surveyed lost more than half their stand due to the winter (and unwise cultural practices).

The large amount of volunteer corn in field corn and especially in soybean fields was reportedly weather-related: the kernels in the field that would ordinarily have sprouted and died or rotted during the freeze-thaw cycles were preserved intact to sprout at the proper time. Late planting of corn due to wet weather tended to favor weed control as well as the European corn borer and to inhibit corn rootworm numbers. The warm, and sometimes very warm summer with often spotty but usually adequate moisture speeded development of most crops, and nearly ideal harvest conditions in the fall combined to produce corn yields better than anticipated earlier in the year.

Corn and Small Grains

The western corn rootworm (*Diabrotica virgifera* LeConte) was not the problem in corn that it was last year. The first adult appeared later, (Table II gives available developmental data on this and other insects), populations peaked later (by more than a month as indicated by sticky trap catches) and at lower levels than in 1977. Beetles/trap/day from mid-July to 31 Aug. were 2.0, 3.2, 2.8, 15, 12.9 and 12.7 (weekly means) in an untreated Tippecanoe Co. corn field. From counts of adults made from 7-18 Aug., the following figures are means/stalk/district of both the northern (*D. longicornis* (Say)) and western corn rootworm adults: (The percent that were westerns is given in parentheses) NW—0.78 (71); NC—0.72 (97); NE—0.71 (95); WC—0.51 (52); C—0.84 (36); and EC—0.81 (48).

Economic damage to silks by adults was probably rare; and because climatic conditions for the corn were favorable, economic losses due to larval feeding, even when relatively severe, were difficult to demonstrate. (Table I records the new counties which this and other insects invaded during the year.)

The European corn borer (*Ostrinia nubilalis* (Hübner)), however, reached larval numbers this year nearly double the highest recorded since the 1961

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TABLE I *New County Records for 1978*

Insect	New County Distribution
Bathyplectes anurus (Thomson)	Morgan
Bathyplectes curculionis (Thomson)	Pulaski, Whitley, Allen, Huntington, Wells, Adams, Fountain
Diabrotica virgifera LeConte	Orange, Washington, Bartholomew, Jefferson, Jennings
Diaparsis, sp. n.	Shelby, Union, Lawrence, Jefferson
Lemophagus curtus Townes	Huntington
Microctonus aethiopoides Loan	Warren, Jay
Tetrastichus julis (Walker)	Marshall, Decatur, Randolph, Union, Rush, Fayette, Dubois, Perry, Crawford, Floyd, Clark, Jefferson, Ohio, Scott, Switzerland

TABLE II *Date of 1st appearance and/or peak population of some insects*

Insect	Stage	First	Peak(s)	County	Data Source
Apple maggot	Adult	27 Jun		Tippecanoe	NJ mosq. tr.
	Adult		20-26 Jul	Knox	Bait trap
Armyworm	Adult	8 Apr		Lawrence	BL trap
	Ad. 1st flight		18-24 May	Tippecanoe	BL trap
	Ad. 2nd flight		6-12 Jul	Tippecanoe	BL trap
	Ad. 3rd flight		24-30 Aug	Tippecanoe	BL trap
Black cutworm	Adult	13 Apr	6-12 Jul	Lawrence	BL trap
Chrysopa carnea	Adult	7 Apr		Tippecanoe	NJ mosq. tr.
C. oculata	Adult	30 May		Tippecanoe	NJ mosq. tr.
C. rufilabris	Adult	31 May		Tippecanoe	NJ mosq. tr.
C. nigricornis	Adult	1 Jun		Tippecanoe	NJ mosq. tr.
Chrysops callidus	Adult	31 May		Vermillion	Bait
C. cincticornis	Adult	27 May		Tippecanoe	Bait
C. niger	Adult	31 May		Vermillion	Bait
Codling moth	Ad. 1st flight	11-17 May	18-24 May	Knox	Pheromone
	Ad. 2nd flight		23-28 Jun	Knox	Pheromone
	Ad. 3rd flight		24-30 Aug	Knox	Pheromone
Corn earworm	Adult	17 Jun		Lawrence	BL trap
European corn borer	Adult	24 May		Knox	BL trap
	Ad. 1st flight		1-7 Jun	Tippecanoe	BL trap
	Ad. 2nd flight		10-16 Aug	Tippecanoe	BL trap
	Ad. 3rd flight		7-13 Sep	Tippecanoe	BL trap
Meadow spittlebug	1st instar	11 Apr		Harrison	Observed
Mexican bean beetle	Adult	17 May		Jackson	Observed
	Egg	7 Jun		Lawrence	Trap crop
N. corn rootworm	Adult	2-12 Jul	10-17 Aug	Tippecanoe	Sticky tr.
Obliquebanded leafroller	Ad. 1st flight		18-24 May	Knox	Pheromone
	Ad. 2nd flight		1-6 Sep	Knox	Pheromone
Spotted lady beetle	Ad. 1st flight		20-26 Jul	Tippecanoe	Sticky tr.
	Ad. 2nd flight		10-17 Aug	Tippecanoe	Sticky tr.
	Ad. 3rd flight		1-6 Sep	Tippecanoe	Sticky tr.
Variegated cutworm	Egg	25 Apr		Harrison	Ovip. trap
	Adult	5 May		Lawrence	BL trap
	Ad. 1st flight		1-12 Jul	Tippecanoe	BL trap
	Ad. 2nd flight		24-30 Aug	Tippecanoe	BL trap
W. corn rootworm	Adult	6 Jul	7-14 Sep	Tippecanoe	Sticky tr.
Yellowstriped army	Adult	4 Jun		Tippecanoe	BL trap
Zimmerman pine moth	Adult	17 Aug		Tippecanoe	Research

survey. The fall (overwintering) 1977 larval population was high (68/100 stalks). Apparently there was sufficient corn of sufficient maturity for the resultant females, although heavy damage was occasionally observed in some of the early planted fields as a result of the spring oviposition. And when this generation was ready to oviposit, there was much late-planted corn available. The summer flight was heavy, and large numbers were collected in light traps from the end of July to mid-September.

In the fall survey two counties, Pulaski and Marshall, averaged more than 6 larvae/stalk, nearly the entire northern half of the state averaged higher numbers than at any time in survey history, and the state averaged 199.6 larvae/100 stalks. Larvae were also collected from jimsonweed (*Datura stramonium* L.) and velvetleaf (*Abutilon theophrasti* Medic.), and in a field of oats in Randolph Co. about 5% of the stems were infested.

A few corn fields, in SW Indiana primarily, were damaged by the black cutworm (*Agrotis ipsilon* (Hufnagel)) although poor germination due to other causes was sometimes blamed on this species. And the northern border of the state formed the southern edge of an armyworm (*Pseudaletia unipuncta* (Haworth)) invasion of larger proportions more seriously affecting Michigan. Attacks by earworms were also minor; this year the corn earworm (*Heliothis zea* (Boddie)) was the more common in ears, whereas in 1977 the fall armyworm (*Spodoptera frugiperda* (J. E. Smith)) predominated.

Mention should also be made of a carabid beetle, *Geopinus incrassatus* Dejean, adults of which were associated with small areas in a field of corn where no corn came up. This burrowing has not been implicated in damage to crops before, and may not have been this time, but indications were rather strong.

Late-planted corn tends to harbor large corn leaf aphid (*Rhopalosiphum maidis* (Fitch)) populations, especially when contrasted with an early-planted year like the last. The totals this year were not greatly different from those of last year—32% infested in 1977 and 41 this year. Indeed infestations designated as light were actually more common in 1977 than in 1978. The real differences lay in the percent that was heavily infested—less than 1% in 1977 as against 8% in 1978, and moderately infested, 2% as against 11% in 1978. (Heavy infestations were those with tassels nearly totally blackened, light were those with only exuviae or living aphids at points other than the tassel.) Richard Shade, who maintains Kentucky 27 as a baseline indicator of aphid pressure, had such high numbers this year that many tassels failed to develop at all (Pers. comm.). And a single cross, Nebraska 28 x B37, averaged 163.52/plant, about 3 times the 1977 level.

A cooperative federal and state survey indicates that the Hessian fly (*Mayetiola destructor* (Say)) infestations in wheat were at their highest level on record, both in terms of percentage infestation and in number of puparia present. Even the cultivars resistant to the prevalent race of flies (Biotype B) were infested at a higher rate (6.3%), compared with less than 1% over the last 6 years. Those lacking this factor suffered a 20.6% rate, up from 2.5% last year. Puparia/100 stems averaged 14.5 in all cultivars, 11 in resistant and 37 in non-resistant.

A combination of greenbug (*Schizaphis graminum* (Rondani)) and oat

bird-cherry aphid (*Rhopalosiphum padi* (Linnaeus)) was present in both wheat and oats, sometimes in large numbers and occasionally associated with barley yellow dwarf at least in the central districts.

The fall 1977 chinch bug (*Blissus leucopterus* (Say)) survey noted no infestations with potential economic consequences. Numbers in the EC side of the state have been increasing in the past years, and adults were observed in both August and September; their presence in August in the tassels and in September under leaf sheathes and husks of corn in that area was unusual.

Forage Legumes and Soybeans

The Mexican bean beetle (*Epilachna varivestis* Mulsant) was the only insect of significance in soybeans in 1978, and except for isolated fields in the SE and C districts, even it was of relatively little importance. This insect, present throughout the state on garden beans, is an economic pest of soybeans only south of Indianapolis and a few extensions further north (Parke and Wayne counties). A conspicuously infested field of soybeans was observed in Miami Co. this year. Such infestations so far north (as Clinton Co. in a previous year) have not persisted. And an infested field 11 miles from the Illinois line is the nearest to that state to date. The Wabash River has so far proven a barrier.

Egg numbers of the alfalfa weevil (*Hypera postica* (Gyllenhal)) in December of 1977 per 15 cm. sq. averaged about 10 in NW district, 30 in WC and C, and 60 in SW and SC district alfalfa, roughly comparable to fall 1975 numbers. The fall 1975 egg population hatched in the spring into a serious problem for 1976 spring alfalfa. But the long, hard winter of 1977-1978 took a heavy toll either by mechanical injury or reduced egg viability. Spring oviposition began early in April (Harrison Co.) and reached 80/15 cm. sq. by 17 Apr. when alfalfa averaged 20 cm. with 42% infestation rate and 2.1 larvae/infested stem. About a third of the S district fields had been treated by 1 May, and because rain and corn planting interfered with harvesting, more were treated later. North of US 50, and through the C districts, although there was often considerable damage, treatment of alfalfa weevil larvae was uncommon, and probably generally unwarranted. In LaPorte Co. (NW), treatment was recommended for 15 to 50 regularly surveyed fields; a series of very warm days accelerated weevil development and conspicuous damage occurred in a very short time. Northern districts generally escape serious economic damage from the alfalfa weevil.

Fall oviposition in 1978 was first observed during the first week of Oct. (Warren Co.) and remained at low (1-2/15 cm. sq.) levels through the north.

Of 50 alfalfa fields in LaPorte Co., 25 had to be treated (3rd cutting) for potato leafhopper (*Empoasca fabae* (Harris)) in addition to those that were cut early. About one-fifth of the same fields, regularly surveyed, needed treatment to prevent damage to the 4th cutting. A similar situation prevailed over most of the state, although similar data are not available.

Vegetables

(Vegetable summary provided by ALAN C. YORK)

Aphid populations increased to damaging levels considerably earlier than

usual causing problems on pepper and leafy greens in late June, July and into August. Also the Colorado potato beetle (*Leptinotarsa decemlineata* (Say)) seemed unusually active as first generation adults in the northern and southern regions of the state. Vincennes area tomato plants were seriously damaged by both adults and larvae. Record snow cover may have increased overwintering adult survival.

Striped-(*Acalymma vittata* (Fabricius)) and spotted- (*Diabrotica undecimpunctata howardi* Barber) cucumber beetles continued to be serious pests of melons in the SW portion of the state. Some fields in which controls were less than satisfactory had plant losses as high as 25-30%. Tomato fruitworm (*Heliothis zea* (Boddie)) showed up so near to the completion of harvesting that in few fields were controls applied. Cabbage looper (*Trichoplusia ni* (Hübner)) was present in large numbers on potatoes, tomatoes, cole and cantaloupe. Severe feeding was seen on the latter as well as the cosmetic problem of their pupation on the fruit surface. The same insect caused some concern in tomato canning factories for similar reasons; the insect apparently does not cause significant damage by foliage or fruit feeding, but pupation on the tomato fruit causes inspectors concern.

The European corn borer was a severe problem in sweet corn both by the 1st and 2nd broods in the central and northern parts of the state. Reports of corn borer damage to snap beans and peppers were not as numerous as in the past. Corn earworms caused some damage to sweet corn in the southern part of the state in the 1st generation. Numbers were usually low however in August and September when damage is normally the most severe.

Potato leafhopper was present in damaging numbers in potatoes and garden beans in most of the state. As a rule good control was achieved with conventional methods.

Ornamentals, Forest and Shade Trees

Leaf feeders, including the linden looper (*Erannis tiliaria* (Harris)), fall cankerworm (*Alsophila pometaria* (Harris)), greenstriped mapleworm (*Dryocampa rubicunda* (Fabricius)) and several other species were especially abundant and destructive in trees south of Indianapolis. Bagworm (*Thyridopteryz ephemeraeformis* (Haworth)) was abundant in the same area. The forest tent caterpillar (*Malacosoma disstria* Hübner) which has been a serious pest in the past years, waned in numbers.

The most serious pest of lawns was the northern masked chafer (*Cyclocephala borealis* Arrow); larvae were also sometimes quite numerous in weedy cornfields, trashy gardens and the like in the late fall.

Man and Animals

The extension service received fewer inquiries concerning household pests than even last year. The Indian meal moth (*Plodia interpunctella* (Hübner)) was the most commonly reported stored grain pest; the foreign grain beetle (*Ahasverus advena* (Waltl)) remains high on the list and is the most commonly noted by pest control professionals. A heavy flight of pavement ants

(*Tetramorium caespitum* (Linnaeus)) was reported from Indianapolis on 24 July. And the carpenter bee (*Xylocopa virginica* (Linnaeus)) was more numerous there this year as well; it was often reported from the rest of the state, too. Another hymenopteran, *Vespula germanica* (Fabricius), is gaining prominence. By mid-November, only 2 cases each of LaCrosse encephalitis and St. Louis encephalitis had been confirmed for the state.

Beneficial Insects

The ratios (in % of total of these 4 species) between the spotted (*Coleomegilla maculata* DeGeer), the convergent (*Hippodamia convergens* Guerin-Meneville), the 13-spotted (*Hippodamia tredecimpunctata* (Say)) and *Cycloneda sanguinea* (Linnaeus) lady beetles as indicated by sticky trap collections in a Tippecanoe Co. corn field follow: 69:6:16:9. In 1977 ratios were 27:65:3:5. In numbers there was a three-fold increase in these traps as well as in cornfields through the state.

Parasitism of the alfalfa weevil by *Bathyplectes anurus* (Thomson) and *B. curculionis* (Thomson) together averaged 23% in the state in collections made between 15 May and 6 June. *B. anurus* was an important constituent of the parasite population in only 2 of the counties surveyed, Harrison and Washington. The WC district had the highest rate of parasitism (43%) followed by the NW and NC with about 25% each.