Insects and Other Arthropods of Economic Importance in Indiana During 1975.

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Abstract

The abundance and economic impact of selected arthropods responsible for crop losses, annoyance to man and animals, destruction of food and fiber products as well as the abundance and activity of selected entomological parasites and predators of importance in their control in Indiana during 1975 are discussed.

Introduction

As a prelude to the discussion of major insect activity, the more important meterorological influences on both invertebrate and plant life are reviewed. The winter of the 1974-1975 season was mild, with above-normal temperatures and normal or near normal precipitation (though with less than normal snowfall). March was cooler than normal and soils were wet as usual, but April and May were especially kind to growers. Plowing and the planting of corn, soybeans and small grains were completed far in advance of normal, and the rains which did occur interfered but little with the care and harvesting of alfalfa. Wheat at first appeared to have been hurt by the cooler-than-normal spring months, but most recovered. And pastures ranged from only poor to fair during April, and fell to that level again during the dry July period. Both corn and soybeans were above average in rate of growth and in maturing.

Topsoil moisture ranged from adequate to surplus until the end of June over most of the state. After that the crops suffered some moisture stresses for much of July over most of the state, stresses that were more severe in the southern half of the state, especially in the SC (south central) area, where parts were dry even into September. Most of the corn and soybeans were but little affected, however, and record crops were expected. The warm winter favored the corn flea beetle, but little damage was experienced due to this insect, probably because of the nature of the rainfall. Rains tended to be rather spotty, often accompanied by winds and even occasionally hail, and heavy rather than drizzly. This may have been a factor in the reduction of the first generation of the European corn borer, whose second flight came during the dry period in July in most of the state.

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[1] Journal Paper No. 6109, Purdue University Agricultural Experiment Station. The following includes those who have made identifiable contributions to this summary: Leland Chandler (Hymenoptera, cattle and sheep insects), James Clark (Nurseries, parasite release data, Japanese beetle), Richard C. Dobson (Cattle insects), C. Richard Edwards (Soybeans, alfalfa), John Favinger (*Alphitobius*), Virgil Knapp (Identification of Aphids), Philip T. Marshall (Forest insects), David L. Matthew (Extension data), Darryl P. Sanders (Diptera of man and animals), Richard Schoenbohm (Black cutworms and their parasites), Donald L. Schuder (Ornamentals), Richard E. Shade (Aphids), John O. Sillings (Extension data), Omelio Sosa (Wheat), Walter L. Stirm (Weather and crop data), F. Thomas Turpin (Corn soil insects), Gordon Vanwoerkom (Corn rootworms), and Alan C. York (Vegetable insects).

Harvesting of crops ran far ahead of normal; the early wheat harvest made possible an increase in second-cropping, which resulted in extended feeding periods for the Mexican bean beetle.

Corn and Small Grains

In addition to favorable weather, corn growers enjoyed relative freedom from serious insect attack. The summer population of the European corn borer (*Ostrinia nubilalis* [Hübner]), for instance, was the lowest in the 5-year history of the survey. Only 4 of the 12 corn survey districts had more than 1 larva/100 plants—the extreme north portions of the NW (1 larva), the NC (4), the SW and south portions of the SE (1 each). The state average was 0.9 borer larvae/100 stalks, with but 2.5% of the stalks infested. The fall population averaged 33.9 larvae/100 plants, higher than 1974 but still below the 10-year average. Only the extreme north portions of the NE and the SW districts exceeded the 10-year average.

The corn leaf aphid (*Rhopalosiphum maidis* [Fitch]) probably arrived too late to heavily infest the corn; of the 2550 stalks examined over the state from 14-29 July only 7.1% were infested, the lowest number since 1972. (57% of the corn had reached the green-silk stage this year, as compared with 37% at the time of the survey in 1974). The aphid populations observed in the fall survey differed little from those of 1974; 26.49% of the 4700 plants examined in 1975 were infested as were 25.95 in 1974. There were several indications, however, that it was a favorable year for aphids on corn. Where corn of the appropriate age was available, numbers of aphids were much higher than last year. And when colonies were able to form, they persisted for longer periods of time than usual. The oat bird-cherry aphid, (*Rhopalosiphum padi* [Linnaeus]), was often present and sometimes in great numbers on corn in the NC and NE districts at the time of the fall survey. And almost every plant in a WC district corn field had a colony of the potato aphid (*Macrosiphum euphorbiae* [Thomas]), during the summer.

Besides the kernel feeding that was done by the European corn borer, kernel feeding by the corn earworm (*Heliothis zea* [Boddie]) and the fall armyworm (*Spodoptera frugiperda* [J. E. Smith]) was included in the fall, 4700-stalk survey. This was also less, probably because the corn matured before the arrival of the moths. Only 2.5% of the plants were infested (3.6 in 1974), with a loss of 0.028% of the crop (0.037% in 1974). Of the 58 larvae still present in the ear at the time of the survey, 93% were corn earworms (as were 62% in 1974). Feeding by birds on the kernels, which usually occurs in the milk stage, was also less than the ten-year average of 8.2%. Only 3.5% of the ears had been molested by birds, resulting in a loss of 0.117% of the crop (Average: 0.4%).

No concerted effort was made to follow the expansion of the area occupied in the state by the western corn rootworm (*Diabrotica virgifera* [LeContel]) during 1975, and little was expected. Over the years the pattern has been one of expansion 1 year, consolidation the

next, apparently because it takes about a year to cross a county. Nevertheless this year adults were taken in 3 new counties. The Knox county record possibly represents a new invasion from Illinois, as the nearest infested Indiana county was 80 miles away. The Delaware and Randolph county records likely represent eastward movements from contiguous Indiana counties. There were declines in the number of adults observed during the summer survey in the NW (the northern half of the NNW district), the NNE and NC, no change in the NNC and a slight increase in the NW (the southern half of the NW district). (There were none in the other districts).

Despite widespread appeals for information on rootworm-damaged fields, few were reported, nor were any observed with obvious symptoms during the fall corn survey.

The first adult of the season was observed on 7 July in Tippecanoe Co., and adults were still emerging from the ground through September in Porter County.

The northern corn rootworm (*Diabrotica longicornis* [Say]) caused only negligible injury to corn. Adults were found in a smaller percentage of the fields north of Indianapolis and a larger percentage south of that city, than in 1974, during the corn survey. The first adult taken in a BL (Blacklight) trap was taken 21 June in Vanderburgh Co.; the first adult seen in the field was observed 2 July in Tippecanoe County.

There was also a decline in the percentage of fields in which the southern corn rootworm (*Diabrotica undecimpunctata howardi* Barber) was observed except in the SSE district.

Appeals for information leading to fields of corn damaged by the black cutworm (*Agrotis ipsilon* [Hufnagel]) led to no more than 400 acres of possibly infested land spread over the state. The larvae of this species normally attack only in spots in a field, and in such spots, they can be devastating; probably no more than 100 acres were involved in such spots, with damage running from 10 to nearly 100%.

There were also some unusual infestations in corn grown for grain. In Jackson County a field of 13 acres was two-thirds destroyed by variegated cutworm (*Peridroma saucia* [Hübner]) larvae; the field had been in wheat in the spring of 1974, seeded to red clover after the harvest and planted no-till in 1975 to corn.

Damage to seedling corn by larvae of the redheaded flea beetle (*Systena frontalis* [Fabricius]) was confirmed for the first time in Indiana. From 5 to 40% of the plants in spots in a 90-acre field in Vanderburgh Co. were severely damaged, resulting in many instances in their death. The infested plants were most common in about 40 acres of the field and in these spots 30-40% of the plants were lost. Larvae entered the stem slightly below the surface of the soil and excavated the heart of the 5-6″ plants above and below that point, by 5 June. Up to 10 larvae were counted in and around the plants, but generally only 1-2 were present in and around each plant in the infested spots.

For a new state and a new county record, the southwestern corn borer (*Diatraea grandiosella* Dyar) was collected for the first time in

Indiana from corn growing in Vanderburgh County (Union Township). This pest has been present for years in the Kentucky counties south of Vanderburgh and Posey, and in Illinois west of the latter county. Its presence in a stalk usually means the loss of the ear the stalk bears; the larvae have a habit of girdling the stalk just before they enter their hibernation site at the tip of the tap root, so that a touch or a good wind will snap the stalk about a half-foot above the ground or lower. It is not expected to move much further north, as it hasn't done so in Illinois, and as yet has infested less than 1% of the stalks here.

Sorghum, which customarily attracts and can support large numbers of corn leaf aphids, was this year almost free of them in the sorghum seen in Vigo and Knox counties. The greenbug (*Schizaphis graminum* [Rondani]) appeared in the same area, almost always in small dime-to-dollar patches scattered mostly at the edges of the field, always in non-economic numbers, and often outnumbered by the yellow sugarcane aphid (*Sipha flava* [Forbes]).

No economic infestations by the cereal leaf beetle (*Oulema melanopus* [Linnaeus]) were observed on small grains, and specimens were generally hard to find. Chinch bugs (*Blissus leucopterus* [Say]) were absent or in negligible numbers, and the Hessian fly (*Mayetiola destructor* [Say]) remained at low levels in wheat. The state average percent infestation for all varieties was 0.9, the state average number of puparia/100 stems was 1.1. This year 14% of the fields had infestations as against 2% in 1974. Seven fields (of 307) had percentage levels greater than 10%, the highest being 24%. And although armyworms were found in roadside grasses, in wheat, and in grassy alfalfa in many areas of the state, they were rarely of economic importance anywhere.

Forage Legumes and Soybeans

Two insects were of major importance on Indiana alfalfa. Alfalfa weevil (*Hypera postica* [Gyllenhall]) larvae were present at the rate of 4.7/2.6″ stem (81% first instar) in 1 SW district field by 14 April. By 21 April (equivalent 1974 data in parentheses) seven SW district fields which averaged 4.7″ (8.0″) had 5.9 (4.5) larvae per stem. Thus this year's crop had more larvae on alfalfa little more than half as tall. As in past years treatment was necessary on early all SW, SC and SE fields. In the central districts treatment would have been economic on many fields south of Indianapolis; damage was often evident north of Indianapolis, but treatments were seldom warranted. In the northern districts most growers had the option of cutting early instead of treating, but some action was usually necessary; when the cutting option was exercised stubble sprays were sometimes necessary. The potato leafhopper (*Empoasca fabae* [Harris]) was again the more serious of the alfalfa pests, and throughout the state controls were generally necessary on every cutting but the first. Controls were recommended when populations reached 1/sweep, which is now believed to be somewhat above the economic level. The alfalfa caterpillar (*Colias eurytheme Boisduval*) was never economic by itself,

in alfalfa, but teamed with the potato leafhopper they together occasionally formed an economic aggregate in the northern districts. The same was true of the pea aphid (*Acyrthosiphon pisum* [Harris]), especially in conjunction with droughty periods.

The Mexican bean beetle (*Epilachna varivestis* Mulsant) sometimes caused conspicuous damage to alfalfa even when soybeans were available and were swept at the rate of 2 or more/sweep; they were of little consequence in that crop. They were much more common this year than for several years, and caused spotty damage all over Indiana south of US 40 except in the sandier areas near Illinois. As is typical of the insect, damage was usually more severe in fields near woods such as those tucked away in the hills in Clay and Owen counties: leaf loss ran to 35% in such fields, with patches that had 100% defoliation. There were important losses however even in large fields more distant from woods. Treatment was indicated in some situations, but probably a lot of insecticides were used more for insurance than need.

Unusual this year was the number of fields that were infested by the soybean thrips (*Sericothrips variabilis* [Beach]). The insect is usually present in small numbers, but this year it reached economic proportions, with up to 50% of the leaf surface affected in some SW district fields, and was evident by its numbers as far north as Clay and Owen counties, where numbers did not usually exceed 30/trifoliate. Unfortunately there was also a lot of herbicide damage about, and the thrips were often blamed when herbicides were at least partially responsible.

Little damage was attributable to the green cloverworm (*Plathypena scabra* [Fabricius]) in soybeans, but numbers were greater this year than last, and with little evidence of disease or parasitism, they appear to be building in numbers.

Wireworms (Unidentified species) caused such extensive damage to a 40-acre field of soybeans that replanting was necessary (Green Co.).

The Japanese beetle (*Popillia japonica* Newman) removed 25% of the leaves in a 5 square mile area in Kosciusko and Noble counties, resulting in near-economic defoliation. Adults of this species were collected in bait traps in Franklin, Ripley and Crawford counties, all new county records.

Vegetable Crops

Mexican bean beetles were even more of a pest in garden beans than in soybeans; and in a 45-acre commercial field of snap beans in Jackson Co., they were responsible for an average of more than one lesion/pod, rendering the field useless. The diamondback moth (*Plutella xylostella* [Linnaeus]), the imported cabbageworm (*Pieris rapae* [Linnaeus]), the cabbage looper *Trichoplusia ni* [Hübner]), and the striped flea beetle (*Phyllotreta striolata* [Fabricius]) (all as larvae except the last) were all present in a field of cabbages in Tippecanoe Co. in early July at the rate of about one each/cabbage. In other gardens in the same county the crossstriped cabbage worm (*Evergestis rimosalis* [Guenée]), in numbers equal to or greater than

those of the imported cabbageworm, together were causing extensive damage to collards, broccoli, cauliflower and cabbages. The crossstriped was also reported from Clay county gardens, but not in economic numbers; this insect has not been reported from this area very frequently, nor has the southern cabbageworm (*Pieris protodice* Boisduval and LeConte), larvae of which attacked a single cabbage in a field in Tippecanoe Co.

The striped cucumber beetle (*Acalymma vittata* [Fabricius]) was less of a pest in cucurbits this year than usual.

In a field in Johnson Co. in mid-August, 10 to 15 tomato hornworm (*Manduca quinquemaculata* [Haworth]) larvae/100 sq. ft. seriously damaged ripe tomatoes.

The absence of aphids in 3 commercial pepper fields in Floyd Co. in an aphid year is noteworthy. In 1974 control could not be obtained even with chemicals; this year there were few or none even though chemicals were not used.

Ornamentals, Forest and Shade Trees

Forest tent caterpillars (*Malacosoma disstria* Hübner) infested about 1000 acres of oak woods in the NW corner of Lawrence Co. and nearby areas, with defoliation of the upper story in patches of up to 100 acres.

A scolytid beetle (*Xylosandrus germanus* [Blandford]) infested 30-40% of 7000 30″ tall walnut trees in a Fountain Co. plantation. The species had been collected before, according to literature, from Jefferson Co., and there is a single specimen in the Purdue insect collection from Dubois Co.

The cypress twig gall (*Taxodiomyia cupressiananassa* [Osten Sacken]) was collected from cypress in Tippecanoe and Clay counties, both new county records. It had previously been taken only from a few counties bordering the Ohio River.

There is no evidence yet that the large numbers of adults of the spruce budworm (*Choristoneura fumiferana* [Clemens]) and the jack pine budworm (*C. pinus* Freeman) that were dumped by the winds in 1974 on northern Indiana succeeded in establishing colonies.

The fall cankerworm (*Alsophila pometaria* [Harris]) caused extensive damage to a variety of forest and shade trees north of South Bend, in St. Joseph County, early in June.

The fall webworm (*Hyphantrea cunea* [Drury]) population centered this year in the NC district.

Two other insects were reported this year which have seldom if ever been reported from the state before. The iris weevil (*Mononychus vulpeculus* [Fabricius]) from iris in Tippecanoe Co., and the red-backed cutworm (*Euxoa ochrogaster* [Guenee]), larvae of which were collected from petunias in Lawrence Co. in July.

The 11 most commonly reported arthropods as observed by nursery inspectors during 1975 are listed below:

1. Bagworm (*Thyridopteryx ephemeraeformis* [Haworth])

2. Maple bladdergall mite (*Vasates quadripedes* Shimer)
3. Fall webworm (*Hyphantria cunea* [Drury])
4. Bronze birch borer (*Agrilus anxius* Gory)
5. Oystershell scale (*Lepidosaphes ulmi* [Linnaeus])
6. Euonymus scale (*Unaspis euonymi* [Comstock]) and Fletcher scale (*Lecanium fletcheri* Cockerell), reported an equal number of times.
7. Cooley spruce gall aphid (*Adelges cooleyi* [Gillette])
8. Mimosa webworm (*Homadaula anisocentra* Meyrick)
9. Yellownecked caterpillar (*Datana ministra* [Drury])
10. Birch leafminer *Fenusa pusilla* [Lepeletier])

Man and Animals

Mosquitoes achieved prominence in 1975 due to their association with two strains of encephalitis, the St. Louis and the California. More Indiana citizens fell victim to these arthropod-borne viruses than in any previous year in which records have been kept.

This was also a year for deer flies (*Chrysops* sp.) which were so numerous, according to a Warren Co. source, that they drove cattle from the shelter of the woods, in mid-June. The American dog tick, (*Dermacentor variabilis* [Say]), on the other hand, returned to normal or subnormal numbers from last year's peak. Records for the months of July and August only put the face fly (*Musca autumnalis* De Geer) at peaks of about 15/face the last week of July and the first week of August, and the horn fly (*Haematobia irritans* [Linnaeus]) at about 200/animal during the month of August.

The first adult sheep bot fly (*Oestrus ovis* Linnaeus) was observed 2 July in Warren Co. The cattle biting louse (*Bovicola bovis* [Linnaeus]) was so numerous in a herd of brood cows in Warren Co. and another in Tippecanoe Co. that by 9 May the hosts had large hairless patches.

Biting midges (*Culicoides variipennis variipennis* [Coquillett]) were biting in Washington and Dubois Counties on 22 April. This group of insects is seldom reported and it is recorded here mainly for that reason.

The following is a resume of inquiries received by Purdue extension workers between 1 October 1974 and 30 September 1975.

Of the arthropods that accidentally invade homes, spiders (several species) were the most frequently reported, but only in their usual numbers. Collembola (several species) were the next most frequently reported, this year at 3 times their usual rate. Diplopods were reported an average number of times but they achieved considerable notoriety in Floyd's Knobs (Floyd Co., in August) and Aurora (Dearborn Co., in June). What appeared to be a single species (determination not possible due to lack of specialists) invaded these communities in very large numbers.

An invasion by European earwigs (*Forficula auricularia* Linnaeus) disconcerted the inhabitants of a mobile home park in St. Joseph Co. early in August. To have reached the population size involved must have involved several seasons, the first evidence that the insect has overwintered in this area.

A case of a synanthropic commensal turned casual invader occurred in Jennings Co. when the lesser mealworm (*Alphitobius diaperinus* [Panzer]), which had bred in enormous numbers in the manure pits of a local poultry operation, migrated. Adults entered homes in objectionable numbers for distances up to 2.5 miles from the source.

Of the insects that share man's prepared foods the Indian meal moth (*Plodia interpunctella* [Hübner]) remains the one most reported, this year about twice as often as average, followed by the sawtoothed grain beetle (*Oryzaephilus surinamensis* [Linnaeus]), also reported an above average number of times.

Of the insects that damage homes, termites (*Reticulitermes* sp.) led the list followed by carpenter ants (*Camponotus* sp.), both reported an average number of times. Carpenter bees (*Xylocopa virginica* [Linnaeus) were locally quite abundant.

Among the insects that attack man on occasion, yellow jackets (*Vespula* sp.) in 1975 held the place of prominence occupied in 1974 by the polistine wasps. And a case of a bite by the bloodsucking conenose (*Triatoma sanguisuga* [LeContel]) was reported from Jeffersonville (Clark Co.), the first in at least 6 years. The Purdue insect collection holds specimens from Lawrence, Orange, Crawford and Vanderburgh Counties, and it has been reported from Dubois Co. (1). Its reputed range covers the lower half of Indiana (1).

Beneficial Insects

The ichneumonid parasitoid *Bathyplectes curculionis* [Thomson] developed somewhat more slowly in 1975 than in the previous year. Eighty percent of the cocoons exposed to the environment in Knox Co. had pupated by 20 March, as compared with the same percent by the end of the first week in March, 1974. Only 10% had emerged as adults by 16 April in 1975, as against 50% by 12 April in 1974. Firm data are not yet available, but the rate of alfalfa weevil parasitization is certain to be much lower also than in 1974. Two adults of the mymarid egg parasite *Patasson luna* [Girault] were reared from a total of 1660 alfalfa weevil eggs held for hatching. The host eggs were from Randolph Co., and this represents a new county record. The eggs of the weevil were collected 24 March.

About 60% of the black cutworm larvae collected from corn and soybean fields between the end of May and early July were parasitized, mostly by the braconid *Meteorus leviventris* [Wesmael].

Perilitus coccinellae [Schrank] cocoons were observed in corn fields in Knox and Gibson counties on 10 June, the first of the season. Fresh cocoons were also present in corn fields in September. About 5% of the *Coleomegilla maculata* [De Geer] observed in corn fields in September were parasitized by this species, and 1 of the ten convergent lady beetles (*Hippodamia convergens* Guerin-Meneville).

The lady beetle *Coleomegilla maculata* was the most commonly collected lady beetle in alfalfa fields as well as corn fields. Adults appeared in 2 rotary traps throughout the summer in numbers no greater than 4 in one trap/48 hours except for the 48 hours ending on

19 September, when 27 were collected, on 29 September, when 210 were collected, and on 1 October, when 95 were taken; and in the other traps, no more than 6 except for 19 September, when 8 were collected, 84 on 29 September, 47 on 2 October, and 10 on 6 October. The traps were stopped on that date. No other coccinellid congregated in that manner between the end of May and the end of September, although one of the traps collected more on ordinary nights of both *Hippodamia convergens* and *H. parenthesis* Say than of *Coleomegilla maculata.*

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