

Insects and Other Arthropods of Economic Importance in Indiana in 1958¹

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For the second year in a row, similar, unusual weather prevailed in Indiana. A brief analysis of these cool, wet conditions is worthy of background consideration before discussing insect abundance. March was unusually cool in southern Indiana where the temperature averaged 6.3° F. below normal in a subnormally dry atmosphere. April was nearly normal, but May averaged more than 1° F. below normal throughout most of the state. June broke 50-year records with the northern two-thirds of the state averaging 6° below normal together with a rainfall 5 inches above normal. July followed a similar pattern throughout the state with -2.6° F. average and +3.7 inches rainfall average. Combining June and July rainfalls, this particular two months' average was about 7 inches above previous record rainfalls. August was a similar month but the deviations were about half those of July.

Considering these unusual conditions, it is natural that abnormal insect occurrence records should be reflected. Practically none of our insect-susceptible agricultural crops developed at usual time intervals and the early cool weather retarded insect emergence and/or development. The extremely wet conditions in mid-summer coupled with cool temperatures were unfavorable to many species and encouraged development of insect disease organisms. Of our normally very important economic insects and other arthropods, only the meadow spittlebug, cutworm and housefly occurred in normal numbers.

A review of the records on certain species follows:

Field and Crop Insects

Corn earworm (*Heliothis zea* (Boddie)). The fall survey for 1957 showed 6.5-43% of the ears infested. Both light trap and field records show low infestations this year, although a noticeable peak of adults was recorded in early September in north-central Indiana. The current fall survey on field corn revealed a range of 0-33% infestation; northern Indiana was very low.

European corn borer (*Pyrausta nubilalis* (Hbn.)). The fall survey made in 1957 indicated one of the sparsest infestations in recent years, the highest (in the NNW) being 95 borers per 100 plants and the lowest (in the SSW) being 3.2 borers per 100. This low carry-over combined with the inclement June weather resulted in sparse egg counts and a first generation infestation which was negligible. The fall survey of 1958 indicated, however, that favorable conditions existed in some regions for late borer development, because in spite of few moths, there

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were fall counts in the far north band, the NE and the SE areas, ranging from 55-93 borers per 100 plants.

Armyworm (*Pseudaletia unipuncta* (Haw.)). Heavy moth flights began in southern Indiana during the last week in April and in central Indiana the middle of May. Following a drop-off, counts went up again in late June and reached a high peak in north central Indiana in mid-July. Larval infestations threatened in early June, especially in corn planted in fields that had contained rank growth of grass prior to plowing. It never became excessively abundant or destructive even after the heavy July flights, probably due to temperatures that were more conducive to the development of parasites than to the armyworm. Barley was extensively but briefly damaged in some areas.

Fall armyworm (*Laphygma frugiperda* (J. E. Smith)). This insect was recorded as early as July 10 infesting corn in Starke and Porter counties. Scattered, light infestations were also noted in the south at that time. It did not appear at all in the fall on corn as is normally the case in southern Indiana.

Northern corn rootworm (*Diabrotica longicornis* (Say)). The adult of this insect was more abundant than usual through the central and northern parts of the state. Larval damage of significance was observed in Tippecanoe and Hamilton counties.

Cutworms—A considerable increase in cutworm populations was recorded universally this year. Moist conditions contributed to increases in southwestern and central Indiana with the black cutworm, *Agrotis ypsilon* (Rott.), being especially important. Moth flights of the variegated cutworm, *Peridroma margaritosa* (Haw.), reached rather high proportions in central Indiana in mid-July.

Wireworms were less important than usual, although muck and sand areas of Starke and Newton counties had significant infestations in corn.

Japanese beetle (*Popillia japonica* Newm.). In the area where records were carefully maintained (Newton County), winter mortality was high. Adults emerged late with a peak noted in early August. Eggs were found as late as October 1 and only 10% of previously hatched larvae had matured by that time. New infestations were found in the Lafayette area, Goshen, Huntington, Greenfield and Frankfort.

Four-spotted corn sap beetle (*Glischrochilus quadrisignatus* (Say)), Compared with 1957, the infestations of this insect have been very low.

A weevil (*Centrinus penicellus* (Hbst.)) was abundant for the first time in opening tassels of late planted field corn in Vanderburgh County.

Corn leaf aphid (*Rhopalosiphum maidis* (Fitch.)). This was not an economic problem on corn in 1958. It was noticeable on sorghum in the southern area and was abundant in the fall on both corn and sorghum suckers. Infestations in sorghum breeding nurseries was very severe on heads bagged for seed production in Tippecanoe County.

Sorghum webworm (*Celama sorghiella* (Riley)). This insect generally infested grain and forage sorghums in the southern third of

Indiana, with infestations as high as 150 per mature head in the Vincennes area.

Bean leaf beetle (*Cerotoma trifurcata* (Forst)). This insect continues to increase in abundance and importance on soybeans in this state with especially heavy infestations in Vanderburgh County. Considerable feeding was also recorded on garden beans early in the season.

European fruit lecanium (*Lecanium corni* Bouché) was found severely infesting 60 acres of soybeans in White County, where it moved from osage orange during the crawler stage.

Tomato fruitworm (*Heliothis zea* (Boddie)). For the second consecutive year, infestations of this pest in tomatoes was low, although it threatened early in September.

Fruit flies (*Drosophila melanogaster* Meig. and *D. hydei* Sturt.) were more numerous in tomato fields this season than at any time in recent years. Since fruit was generally sound, the great increase is attributed to constant environmental moisture and cooler temperatures, both important ecological factors for these flies.

Spotted cucumber beetle (*Diabrotica undecimpunctata howardi* Barber). Populations of this insect were higher than normal on beans, squash, melons and cucumbers.

Squash bug (*Anasa tristis* (DeG.)). Not economically important this season.

Onion maggot (*Hylemya antiqua* (Meig.)) was generally scarce in northern Indiana onion fields this year.

Potato leafhopper (*Empoasca fabae* Harris). Although initial entry into the state was reasonably normal, populations for the year were low and no serious problems developed on either potatoes or alfalfa. This is attributed to the cool, wet season and to the farming practice this season of having to remove first cutting hay much later than usual resulting in the destruction of many developing eggs.

Meadow spittlebug (*Philaenus leucophthalmus* (L.)). This insect continued to be economically very important in May and early June, especially in the southeastern part of the state. Counts were slightly lower than in 1957 but highs of 3-4 nymphs per stem were common. The adults have been numerous this fall in the normal spittlebug areas.

Spotted alfalfa aphid (*Therioaphis maculata* (Buckton)). The bridgehead of this insect in Indiana has apparently failed—at least temporarily. It did not overwinter into 1958 and no entry records have been recorded this fall. This situation is attributed to the naturally developing balance between the host and its parasites and predators, and to the cool, wet weather which is not conducive to spotted alfalfa aphid development.

Clover root borer (*Hylastinus obscurus* (Marsh.)). The low damage rating for this insect in 1958 is attributed to moist soil conditions which allowed roots to grow out of any damage.

Green cloverworm (*Plathypena scabra* (F.)). Compared with the frequency rating in 1957, the green cloverworm was scarce on soybeans and clover this year.

Clover head caterpillar (*Grapholitha interstinctana* (Clem.)). Although not reported last year, this insect was very abundant during the spring in southern Indiana. Infestations as high as 1-3 per stem were recorded on red clover.

Hessian fly (*Phytophaga destructor* (Say)). Infestations of this insect appeared to be low throughout the state, a situation which to a considerable extent is attributable to the adherence to the fly-free dates and the increased acceptance of Dual wheat. In early planted, susceptible wheat in the Muncie area, infestations were surprisingly high with a range of 72-96%.

Mint looper (*Rachiplusia ou* (Guerin)). Compared with the record breaking year of 1957, this insect was somewhat reduced this year but still was abundant. Mint growers were prepared for it, however, and by chemical controls, prevented it from becoming destructive.

Grasshoppers. The fall survey indicated a slight increase in grasshopper populations with 4-24 per square yard being recorded from a small geographical diagonal band extending from Hamilton County northwest to White County. As is normal, the principal species is the red-legged grasshopper, *Melanoplus femur-rubrum* (DeG.).

Plant bugs (principally *Lygus lineolaris* (P. de B.), *Adelphocoris rapidus* (Say), *Adelphocoris lineolatus* (Goeze)). Populations were again quite high, and this year more widespread in distribution.

Chinch bug (*Blissus leucopterus* (Say)). No economic damage was reported for this insect.

Honey bees (*Apis mellifera* L.) swarmed excessively this year as a result of weather-induced hive crowding. Frequent, also, were the calls for honey bee control in and around homes.

Two-spotted spider mite (*Tetranychus telarius* (L.)). Except as noted below, this mite was generally low throughout the season.

Fruit Insects

Codling moth (*Carpocapsa pomonella* (L.)). Populations of this insect were unusually low in 1958.

Oriental fruit moth (*Grapholitha molesta* (Busck)) was reported as generally severe in sub-standard orchards.

Apple maggot (*Rhagoletis pomonella* (Walsh)). This insect, often abundant in northern Indiana, was found in orchards as far south as Bloomington this year. Flies were easily caught by hand in certain northern orchards and infestations ranged from 2% of the fruit infested in treated orchards to 100% infested in untreated plantings.

Apple aphid (*Aphis pomi* DeG.). Of our two important apple aphids, this was the more abundant one this year, being economically important in southwestern Indiana where some orchards had 80% of their leaves infested with up to 50 aphids per leaf.

Rosy apple aphid (*Anuraphis roseus* Baker). In some areas of southern Indiana this aphid was abnormally abundant and serious enough to require treatment of the fruit.

Mite populations on fruit were generally subnormal this season because of weather conditions. It was interesting to note, however, that once populations of either the European red mite (*Metatetranychus ulmi* (Koch)) or the two-spotted mite were established, heavy rains did not quantitatively reduce the populations.

Tobacco Insects

Tobacco hornworm (*Protoparce sexta* (Johan.)) was less abundant than in 1957, fields in Jefferson County having plant infestations ranging from 17-30% with an average of 21%.

Tomato hornworm (*P. quinquemaculata* Haw.) in tobacco continued in its relative position to *P. sexta* (Johan.) of about 1 to 10.

Tobacco flea beetle (*Epitrix hirtipennis* (Melsh.)) was not economically important this year.

Tobacco aphid (*Myzus persicae* (Sulz.)) (green peach aphid) was less abundant than in 1957 and not economically important.

Cutworms were more abundant than usual throughout the season in tobacco fields.

Tree and Shrub Insects

Zimmerman pine moth (*Dioryctria zimmermani* (Grote)). This insect continues to be important in red and Scotch pines with some infestations as high as 30%. It now occurs in seven counties in northern Indiana.

European pine shoot moth (*Rhyacionia buoliana* (Schiff.)) continues to spread throughout the state where there are pine plantings. Infestations in the Bristol area ran to 100% and larvae were collected as far south as Bedford.

Nantucket pine moth (*Rhyacionia frustrana* (Comst.)) continues to be the limiting factor in pine production in southern Indiana.

Jack-pine sawfly (*Neodiprion pratti banksianae* Roh.) was unusually abundant in southern Indiana in mid-summer.

Bagworms (*Thyridopteryx ephemeraeformis* (Haw.)). Although not as severe as in 1957, the bagworm was abundant on evergreens and deciduous trees throughout the state.

Mimosa webworm (*Homadaula albizziae* Clarke). Population evident on honey locust trees in extreme southern Indiana. Population not as heavy as in 1957, although severe in Evansville.

Fall webworm (*Hyphantria cunea* (Drury)). Common on forest and ornamental trees throughout the state in August and September.

Elm leaf beetle (*Galerucella zanthomelaena* (Schr.)). Again common on Chinese elm from Lafayette southward.

Yellow-necked caterpillar (*Datana ministra* (Drury)) was abundant on apple, hawthorne and birch, and occurred throughout the state. A related species, *Datana angusii* G. & R., was destructive to pin oaks.

Catalpa sphinx (*Ceratonia catalpae* (Bdv.) larvae were abundant again in White and Fulton counties, where infested trees were stripped of foliage by mid-September.

Sycamore tussock moth (*Halisidota harrisii* Walsh). The larvae of this insect was abundant in the summer months especially in the northern half of the state where partial defoliation of sycamores occurred.

Man, Animal and Household Pests

German cockroach (*Blattella germanica* (L.)). This structural pest continues to increase both in numbers and importance due primarily to chlorinated hydrocarbon resistance and associated changes in its habits.

House fly (*Musca domestica* L.). This insect increased markedly this season due in part to moist conditions and only token attention to sanitation in many areas.

Mosquitoes of most common species were again very abundant due to the available water in a variety of environments. Especially striking were the large numbers of *Psorophora ciliata* (F.).

Subterranean termites (*Reticulitermes flavipes* (Kollar)) continue to be economically very important in spite of improved building methods.

American dog tick (*Dermacentor variabilis* (Say)) populations decreased some from last year's high. Three cases of Rocky Mountain Spotted Fever were reported from an area north of Knox and in Crothersville. More reports were received than usual, however, on the occurrence of the brown dog tick, *Rhipicephalus sanguineus* (Latr.).

Boxelder bug (*Leptocoris trivittatus* (Say)). Little change in the status of this insect.

Dog and cat fleas (*Ctenocephalides canis* (Curt.) and *C. felis* (Bouché)) have increased for the second consecutive year. This is attributed to favorable outdoor breeding conditions and nearly universal resistance to chlorinated hydrocarbons.

Ants of several species were troublesome this year as was evidenced by the large numbers submitted for identification. Especially frequent among these was the pavement ant, *Tetramorium caespitum* (L.).

Moth flies, in particular *Psychoda alternata* Say, were locally abundant in many areas.

The milliped, *Zinaria butleri* (McNeill) continues to be an important lawn and woodland pest, with especially heavy infestations reported in Bloomington and Delphi.

Although unusual climatic conditions again altered the situation in Indiana in 1958 by reducing the numbers of some important insects, it is obvious that problems were not lacking for economic entomologists to pursue.