Insects and Other Arthropods of Economic Importance in Indiana in 1961

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Although there are many factors which influence the status of arthropod species during a given season, weather conditions tend to affect the greatest number of different kinds, either in a negative or positive way. The influence is both a direct one on the organism and an indirect one in that host plant, and often host-insect, development may reflect unusual periods in the weather. The growing season for 1961 was unusually cool for most of the season. From April to September, there were no periods with above normal maximum temperatures, and there were no periods with temperatures 10°F. below the normal maximum. The average deviations from the maximum normal for that part of the season were: north, —2.6°; central, —5.3°; and south, —4.0°. Solar radiation was considerably below normal. In general, host plants were about three weeks retarded in their early development. In September, there were four weeks with an above normal average of 5°. The latter helps account for the late surge in numbers of some insect species.

Rainfall during the growing season approached the normal average, but a rather dry period occurred during the six weeks beginning May 16. This condition, coupled with low temperatures, came at a time when many insects normally are in their early development or are commencing activity.

Field and Crop Insects

Armyworm (*Pseudaletia unipuncta* (Haw.)) infestations were below normal. A few small grain fields were sprayed in the Knox and Daviess County areas.

Fall armyworm (*Laphygma fruqiperda* (J. E. Smith)) appearance was the earliest record to date in Tippecanoe County (August 1), although few larval infestations were observed or reported in the northern half of the state. An estimate in the south was difficult because of similar corn earworm damage in the usual area of trouble. Light trap collections, however, indicated that the moths were more abundant than usual.

A billbug (thought to be *Sphenopharus callosa* (Olivier)) continued to be abundant in several fields of corn growing on a muck soil in Montgomery County. The adults killed some seedling corn plants in the early summer, but in general the harvest was excellent. Larvae were not found in corn plantings. The heavy population of billbugs was associated with the abundance of yellow nutgrass, *Cyperus esculentus* L., the most common host plant of this species.

Blister beetles (several species) increased in abundance on many truck and forest crops this season and were of special concern in home vegetable gardens. This increase, together with that of grasshoppers, suggests the possibility of another population rise during the next few seasons.

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1. Information for this summary has been provided by: W. L. Butts, H. O. Deay, R. C. Dobson, R. T. Everly, R. L. Giese, G. E. Gould, D. L. Hamilton, G. E. Marshall, D. L. Matthew, J. D. Paschke, D. L. Schuder, M. C. Wilson.

Both the imported cabbage worm (*Pieris rapae* (L.)) and the cabbage looper (*Trichoplusia ni* (Hbn.)) were abundant on cabbage and related crops in late August and September.

Chinch bug (*Blissus leucopterus* (Say)) populations remained at non-economic levels.

Corn earworm (*Heliothis zea* (Boddie)) populations declined in 1961. The southern half of the state had the heaviest infestations with a gradual decline northward where practically no losses were evident. It was mid-September before the corn earworm infested sweet corn in Tippecanoe County where infestations were momentarily high. The average state loss of field corn was 0.31% this year compared with 0.59% experienced in 1960. This situation was corroborated by light trap catches in which moths of this species were the lowest of the past five years.

Corn flea beetle (*Chaetocnema pulicaria* Melsh.) was more abundant than during 1960 and leaf damage to popcorn continued until mid-summer in central and east-central areas of the state.

The corn leaf aphid (*Rhopalosiphum maidis* (Fitch)) was by far the most injurious corn insect in 1961. Loss for the state averaged 4.0% compared with 3.7% in 1960, a heavy year. The outstanding characteristic of 1961 was the shift in population to the southern half of the state and very low populations in the northern half where the insect had been extremely abundant in 1959 and moderately numerous in 1960.

Southern corn rootworm (*Diabrotica undecimpunctata howardi* Barber) was rather abundant throughout the state. Damage from beetle feeding on cucurbits and some other vegetable crops was high.

Northern corn rootworm (*Diabrotica longicornis* (Say)) was generally distributed over the state and was more numerous than usual. Losses were low but widespread. The feeding of the beetles on corn silks in one field in Randolph County reduced pollination and caused a 50% reduction in yield.

Cucumber beetles. The striped cucumber beetle (*Acalymma vittata* (F.)) was more numerous than in the past several years. Damage was severe throughout the state and was caused mostly by the beetles feeding at the base of stems in early June when the weather was cold. In the latter part of the summer, the spotted cucumber beetle (*Diabrotica undecimpunctata howardi* Barber) was quite common on cucurbits, although cucurbit wilt was not more abundant than usual.

Cutworm populations were low due to climatic conditions which did not favor them this season.

European corn borer (*Ostrinia nubilalis* (Hbn.)) infestation was heaviest in the extreme southern fourth of the state. The northern half of the state showed high reductions in populations. The state average dropped from 61.9 in 1960 to 33.9 borers per 100 plants in 1961. The state loss in 1961 was 1.0%.

The potato flea beetle (*Epitrix cucumeris* (Harr.)) was a serious problem on potatoes throughout the season. In the past, damage from adult feeding has been serious in the spring, but such feeding was also abundant this year in August and early September. Growers complained that the beetle appeared to be more difficult to control with the usual chemical means.

An unusual infestation of garden fleahopper (*Halticus bracteatus* (Say)) with populations as high as 36 per sweep were found on alfalfa in Harrison County near Mauckport.

The fruit fly (*Drosophila melanogaster* Meig.) was not a serious problem in tomato fields until last September. Populations became heavy in October.

Grasshoppers (*Melanoplus* spp.) were more abundant and populations continue to increase over previous years. The two-striped grasshopper, *M. bivittatus* (Say), was not observed in the northern half of the state.

Hornworms on tomatoes (*Protoparce sexta* (Johan.) and *P. quinquemaculata* (Haw.)) were very abundant in some areas during July and again during the first half of September. The majority of the larvae, about 90%, were *P. sexta*. Parasitism was highly irratic.

Hornworm on tobacco (*Protoparce sexta* (Johan.) and *P. quinque maculata* (Haw.)) were important on tobacco in southern Indiana during the last of June. Several growers in Jefferson County applied insecticides for control at that time.

The Japanese beetle (*Popillia japonica* New.) continued to spread and is now known from most of the larger urban areas of the state. A new infestation, at Vincennes, was found in 1961. In general the population levels were low, although populations in Evansville were high. In the Newton County area, primarily rural, the numbers were low except for a two square mile area. Here some 200,000 larvae per acre were found in soybean land in the fall of 1960 and had a peak beetle population of 25,000 per acre in August of 1961. Losses to corn and soybeans were negligible.

Several species of legume caterpillars, the alfalfa caterpillar (*Colias philodice eurytheme* Bdv.), the clover looper (*Caenurgina crassiuscula* (Haw.)), green cloverworm (*Plathypena scabra* (F.)), and the garden webworm (*Loxostege similalis* (Guen.)) caused partial defoliation of legumes in southern Indiana during September and October.

Meadow spittlebug (*Philaenus spumaria* (L.)) was again the most serious insect pest on alfalfa and red clover. In addition to the expected heavy infestations in eastern Indiana, the build-up in the central part of the state was greater than was anticipated.

The mint looper (*Rachiplusia ou* (Gn.)) caused little damage to the mint crops this season. A light trap located at the edge of a peppermint field collected several species of loopers, including *Autographa precationis* (Gn.) and the celery looper, *Anagrapha falcifera* (Kirby).

Damage to alfalfa by the pea aphid (*Macrosiphum pisi* (Harr.)) was noted as far north as Tippecanoe County.

Potato leafhopper (*Empoasca fabae* Harris) was generally abundant, causing serious damage to alfalfa, but on other crops infestations were generally low and few complaints were received.

Spotted alfalfa aphid (*Therioaphis maculata* (Buckton)) was taken July 24 in Harrison County south of Mauckport on the Ohio River. Ten days later (August 3) it was found in Posey, Vanderburgh, and Perry counties. These are the earliest dates that it has been collected. Data on the development of this insect the past few years suggests that initial infestations are coming into Indiana directly from the south rather than

up the river valleys from the southwest. Consideration is being given to the possibility that a more hardy disjunct population is developing in Kentucky or Tennessee which may eventually select a strain adapted to winter survival in southern Indiana.

Common stalk borer (*Papaipema nebris* (Guen.)) infestations remained at the 1960 level. Larval damage was observed in early planted corn. Infestations were more common along weedy fence rows.

Tomato fruitworm (*Heliothis zea* (Boddie)) infestations in tomatoes were again relatively unimportant.

Fruit Insects

The codling moth (*Carpocapsa pomonella* (L.)) can be expected to need major consideration in 1962. The torrential rains during late bloom resulted in a serious scab problem in southern Indiana. The many lesions on the fruit provided easy entrance for young larvae with the result that some orchards experienced 20% infestation in spite of spray programs.

Two of the orchard mites, the European red mite (*Panonychus ulmi* (Koch)) and the two-spotted spider mite (*Tetranychus telarius* (L.)) were delayed in population development due to the cool, moist spring. Both species developed and maintained heavy fall population pressure into late October, and during the fruit season required miticide treatment, even on peaches, at 5 to 7 day intervals. The four-spotted spider mite (*T. canadensis* (McGregor)) was not numerous in 1961.

Red-banded leaf roller (*Argyrotaenia velutinana* (Walker)) populations were low and easily contained by regular spray schedules.

The rosy apple aphid (*Anuraphis roseus* Baker) appeared in relatively large numbers for the second successive year where control measures were marginal.

Stink bugs, including *Acrosternum hilare* (Say) and several species of *Euschistus*, were severe in catfacing in peaches. Some infestations were as high as 45% in the border rows.

The peach tree borer (*Sanninoidea exitiosa* (Say)) was relatively unimportant this season although the lesser peach tree borer (*Senanthedon pictipes* (G. and R.)) caused moderate to severe injury in a large number of orchards.

The grape cane gall maker (*Ampeloglypter sesostris* (Lec.)) caused considerable injury to many plantings of grapes as it did in 1960.

The lesser appleworm (*Grapholitha prunivora* (Walsh)) was important for the second consecutive year in some orchards. Normal spray schedules seem to exert little control of this insect.

Turf, Tree, Shrub and Forest Insects

Sod webworms (*Crambus* spp. and *Nomophila noctuella*) were unusually abundant in lawns in north-central area of the state.

Ash borer (*Podosesia syringae fraxini* (Lugger)) killed a large ash tree in Tippecanoe County.

Bagworm (*Thyridopteryx ephemeraeformis* (Haworth)) populations, although still evident on both deciduous and evergreen trees and shrubs, were not as abundant as in the past several seasons.

The Columbian timber beetle (*Corthylus columbianus* (Hopk.)) was discovered in six more counties in Indiana. The addition of Orange, Rush,

Ripley, Washington, Perry and Jackson counties indicates a nearly complete distribution in the southern one-half of the state. The development of this ambrosia beetle and its associated fungi in vigorous hosts results in excavations and dark staining in soft maple and is highly important economically.

Eastern tent caterpillar (*Malacosoma americanum* (Fabricius)) larvae were common on wild cherry in most areas of the state in May. Defoliation in many instances was quite extensive.

Elm leaf beetle (*Galerucella xanthomelaena* (Muller)) again caused heavy damage to Chinese elms in many areas of the state.

European pine sawfly (*Neodiprion sertifer* (Geoffroy)), now rather generally distributed in Indiana, caused especially heavy defoliation of pine trees in the northern third of the state.

European pine shoot moth (*Rhyacionia bouliana* (Schiffermuller)) continues to be serious in pine plantations throughout the northern part of the state. Larvae of this species were found in buds of Scotch pine in Jefferson and Spencer counties. The insect is now recorded along all four borders of the state.

Fall webworm (*Hyphantria cunea* (Drury)) was conspicuous on walnut, cherry and other deciduous trees in Green, DuBois, Spencer, Owen and Pike counties in early August.

Hackberry lacebug (*Corythucha celtidis* (O. and D.)) was unusually abundant in many areas of the state. Frequent requests for control measures were received in September.

Honeylocust mite (*Eotetranychus multidigitula* Garman) caused defoliation of ornamental thornless honeylocust trees in many areas of the state.

An undetermined lepidopterous leafminer attacked foliage of pyramidal English oak in Tippecanoe County.

A leafroller (*Tortrix pallorana* Rub.) appears to be an established, serious problem in young Christmas tree plantings. A three-year-old Christmas tree planting in Fulton County had an average infestation of 36 percent in early June.

Locust leafminer (*Chalepus dorsalis* (Thunberg)) caused leaves of black locust to turn brown in Knox and Greene counties and was reported to be abundant in southeastern Indiana.

Heavy infestations of the maple bladder gall (*Vasates quadripedes* (Shimer)), a pest of young silver maple trees, were reported in Crawfordsville, Ft. Wayne and Lebanon.

Mimosa webworm (*Homadaula albizziae* Clarke) was extremely heavy on honeylocust trees over the entire southern half of the state. Most honeylocusts were completely brown and covered with silk by mid-August. This insect was observed in Montgomery County for the first time.

Nantucket pine moth (*Rhyacionia frustrana* (Comstock)) is normally considered to be the most important pine pest in southern Indiana. Increasing evidence of parasitism indicates that a natural balance may eventually exist.

Oak kermes (*Kermes pubescens* Bogue) was heavy on several Burr oak trees in Lafayette; the crawlers were observed hatching in mid-July.

Oak skeletonizer (*Bucculatrix ainsliella* Murtf.) caused extensive damage to oak woods throughout the northern third of the state.

The brown race of oystershell scale (*Lepidosaphes ulmi* (L.)) was heavy on redbud trees in the Lafayette area.

A pine tortoise scale (*Toumeyella pini* King) was found infesting a Mugho pine in Madison County. This is the first report of this insect from the state.

Smaller European elm bark beetle (*Scolytus multistriatus* (Marsh)) continues to be a very important insect because of the continuing spread of Dutch elm disease, particularly in the northern quarter of the state.

Spruce bud scade (*Physokermes piceae* (Schr.)), a seldom detected pest of spruce, was unusually abundant at both Muncie and Valparaiso.

Sycamore tussock moth (*Halisidota harrisii* Walsh) defoliated many sycamore trees in Knox, Owen and Spencer counties in August.

The tulip tree callous borer (*Euzophera ostricolorella* Hulst) presents a serious problem in tulip-poplar timber trees in LaPorte County. In May, a 100% infestation of this insect was present in three timber stands, totaling about 100 acres. Previously known from states east and south of Indiana, this represents a new record for the state and poses a serious threat to the growing of this valuable tree. Later in the year, the same insect was recovered from DuBois County in southern Indiana. Although the borer restricts its activities to the root collar region of trees of all sizes, it is causing great concern among foresters because excavations under the bark enhance the invasion of secondary pathogens and insects into the plant tissue. The infestations in the two extreme locations have been present for at least several years.

The walkingstick (*Diapheromera femorata* (Say)) continued in epiphytotic proportions in Starke County in a second growth stand of black oaks. Major to complete defoliation had no apparent effect on the oak hosts; however, this species is a potential devastator of other hardwoods such as maple. Although numerous tachinid parasites were recovered both in 1960 and 1961, the population appeared to be as severe in 1961 as in the previous year.

Walnut caterpillar (*Datana integerrima* G. and R.) defoliated walnut trees in Madison County in late July.

Zimmerman pine moth (*Dioryctria zimmermani* Grote) was found for the first time in Fulton and Marion counties. This is a severe pest of pines grown in plantations and applied control in the form of spraying and sanitation is indicated.

Livestock Insects

Cattle grubs (*Hypodermis bovis* De Geer and *H. lineatum* (De Villiers)) continued to be serious on western calves shipped into Indiana but were only moderately important to native grown livestock.

Face fly (*Musca autumnalis* De Geer) continues to be the most important pest of livestock in Indiana. Populations of this insect built up to high levels in late June and remained numerous until fall. Counts were similar to those of 1960—up to 60 per face and 200 per total animal. This year the fly spread to the southern third of the state where it was present in non-economic numbers; the highest counts were 2 to 3 flies per animal. Pink eye incidence remained high in the area of heavy infestation of flies

and *apparent* correlations between pink eye incidence and face fly occurrence were observed.

Horn fly (*Siphona irritans* (L.)) was present in severe numbers on untreated cattle throughout the summer in the northern part of the state. In the southern half of the state, two peaks in population occurred, one in June and the other in the first part of September.

Horse flies (*Tabanus atratus* Fab. and *T. sucifrons* Marquart) were much less apparent this year than last year, even in the normally heavily infested northeastern part of the state.

House fly (*Musca domestica* L.) remained in second position in importance this year among the livestock pests. Populations throughout the state were apparently higher than in 1960.

Stable fly (*Stomoxys calcitrans* (L.)) was again a serious pest in barns with fouled bedding which was not changed with regular frequency.

Pests of Man and Households

Cat flea (*Ctenocephalides felis* (Bouche)) infestations were common wherever cats or dogs were kept indoors. Complaints have been common in late summer and early autumn.

Face fly (*Musca autumnalis* DeG.) occurred in small numbers in rural homes this year throughout the summer. The heavy fall invasions noted in some areas last year in September did not materialize until late October in 1961.

The German cockroach (*Blattella germanica* (Linnaeus)) has continued to be troublesome in homes and food-handling establishments. Of special interest was its occurrence in significant numbers outdoors in the Fort Wayne area.

Sap beetles, or picnic beetles as they are frequently called, (*Glischrochilus* spp.) were troublesome throughout the state, causing annoyance to picnickers and to people at other outdoor activities. Control practices now appear necessary and feasible.

Subterranean termites (*Reticulitermes* spp.) have been the most consistently encountered household pest. Questions received throughout the year indicate a definite interest in preventive treatment in new construction.

Complaints concerning the two ticks, *Rhipicephalus sanguineus* (Latrielle) and *Dermacentor variabilis* (Say), have been considerably less frequent than in 1960.

Mosquitoes were, in general, less troublesome throughout the early part of the year due primarily to the weather conditions. October infestations, however, were unusually annoying. Of particular interest was the isolation of St. Louis Encephalitis virus from *Psorophora* sp. collected by J. A. Dold in Holton, Ripley County. This is the first isolation of this virus from mosquitoes of this genus.

Biological Control Agents

Field collection of loopers (*Anagrapha falcifera* (Kirby), *Rachiplusia ou* (Gn.), *Trichoplusia ni* (Hbn.) and *Autographa precationis* (Gn.)) from commercially grown mint (Jasper County) yielded parasitic species in varying numbers. Both primary and secondary (hyperparasite) parasites were reared from the hosts. Members of the family Tachinidae, as

well as parasitic hymenoptera of the families Eulophidae, Braconidae and Ichneumonidae, were represented in these samples.

Other hymenopterous parasites, *Praon simulans* (Prov.) and *Aphidius pisivorus* Smith, as well as a species of *Aphelinus* Dalm, were reared from the pea aphid, *Macrosiphum pisi* (Harris).

Virus diseases, nuclear polyhedroses, were prevalent in the above mentioned looper species. The combination of virus diseases and numerous parasites maintained the looper populations at sub-economic densities which alleviated the need for the application of insecticides.

Importance Rating

A rating is given of the ten most important arthropod pests in Indiana in 1961. It is very difficult to choose only ten, and lacking quantitative data on most of them, the ranking within this group is a matter of judgment. The following criteria were used: damage or annoyance actually caused, the extent to which measures were taken to prevent economic loss, and newness of the situation requiring considerable investigation.

The rating is:

1. Subterranean termite
2. Face fly
3. Corn leaf aphid
4. Smaller European elm bark beetle
5. House fly
6. Grasshoppers
7. Orchard spider mites
8. Potato leafhopper
9. Columbian timber beetle
10. Fleas