

# Insects and Other Arthropods of Economic Importance in Indiana During 1970<sup>1</sup>

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## *Abstract*

A summary of arthropod activity in major economic crops in Indiana in 1970 is presented together with notes on the presence and/or abundance of arthropods on other crops, ornamentals, shade and fruit trees, records of insects new to the state or not previously recorded, and their present distribution.

A general description of climatic conditions which possibly influenced the size of insect populations and the severity of their attacks directly as well as indirectly through their influence on food crops and cultural practices follows.

During the winter of 1969-1970, Indiana temperatures averaged 4°F below normal in December, 11°F below in January, and 3°F below in February and in March, with less than normal precipitation and above normal snowfall. A warming trend beginning in April kept the growing degree days in the northern portion of the state above normal, and in the southern, much above normal until the end of July. Alfalfa, which averaged 2 inches during the last week in March in southern districts, reached 15 inches by mid-April. Adequate to more than adequate surface and subsoil moisture, however, delayed field work so that plowing for corn and soybeans was behind until April 20; only 10% of the corn was planted by the eighth of May as against 20% in normal years. Planting was rapid after that and by the 22nd of May reached the normal of 60% complete. The first flight of European corn borer females peaked in the week following.

During May, the northwestern third of the state had above normal rainfall while the southeast had less than normal; soil and air temperatures averaged above normal elsewhere. Rain deficits began to develop in the central, eastern, and northeastern parts of the state by June 19, but rains in the next 2 weeks somewhat alleviated the stresses that might have come with the high temperature and evaporation rates, though central and southeastern areas suffered. Corn growth during this time was normal; it averaged 39 inches by July 13, and

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10% of the crop was silking. By the end of July southern corn leaf blight had appeared in some southern counties, and most of the southern counties were short on rain until the last week. Temperatures also declined from the middle of July, so that the growing degree days dropped below average by July 27 and remained there till the end of August. Weekly rainfall totals were also below average during August over much of the state, including most of the flight time for second generation borer oviposition period; peak flight time occurred during the first few days in August in the south, and mid-August in the north. The period between April 1 and October 1 provided 200-400 more growing degree days than average. This, coupled with the effects of the blight, with droughty conditions especially in the central and southern and northeastern areas and with high temperatures in late June and early July, prepared the corn for an early harvest; 30% of the crop was harvested by October 9, against a 10% average for that date.

### Corn and Small Grains

**Corn earworm (*Heliothis zea* [Boddie]).** Larvae were observed as early as June 15 in a few whorls of corn in Decatur County, and moths were taken on June 17 in the SW district (Fig. 2) black-light trap. However, economic infestations were roughly comparable to those of 1969; 5% of the sampled ears were attacked this year. The 12% figure for 1969 included attacks by the fall armyworm which was responsible for a major share of the damage in that year. Losses in 1969 amounted to 0.5% of the crop; in 1970, to 0.4%. A slight increase in loss was seen in the NE district—from 0.14% to 0.19%—and larger increases in the SSC (Fig. 1)—from 1.14% to 1.77%—and in the SEE—from 0.50% to 1.22%, above the 1969 levels. Peak flight activity occurred over most of the state from September 20-26, with weekly totals of 614 (SC) (Fig. 2), 386 (SE), and 158 (NW).

**Armyworm (*Pseudaletia unipuncta* [Haworth]).** First generation larvae were reported damaging corn in Putnam and Dubois counties in late May, and by June 5 larvae were occasionally present in economic numbers over the state. They clipped barley heads in the Vincennes area and damaged replanted corn in the NW district. The second generation, so conspicuous in 1969, failed to develop into a problem. Peak flight activity occurred during the week from June 21-27, with catches in excess of 2000 per week in NW, SW, and SC traps. A week later catches averaged 650 elsewhere in the state.

**Cutworms.** Because of locally favorable conditions, cutworms became problems in isolated areas, but their frequency and distribution did not warrant their being called anything but minor pests in 1970. Flight activity is recorded for those that were included in BL-trap surveys, but the catch for some species was so light that the designation of peaks is misleading (Abbreviations are those of Fig. 2).

**Variiegated cutworm (*Peridroma saucia* [Hübner]).** The catches were in the southern half of the state, with a peak of 158 from June 21-27

in the SC and 98 in the SW traps. An EC peak was reached 2 weeks later (67) and in the NW 3 weeks later (40).



FIGURE 1. Regional districting (12 districts) of Indiana counties as used in studies of economic entomology during 1970.



FIGURE 2. Regional districting (9 districts) of Indiana counties as used in studies of economic entomology during 1970.

**Black cutworm (*Agrotis ipsilon* [Hufnagel]).** The SW trap took 302 moths during the week from June 21-27, and 222 during the week from August 9-15. The catch in the rest of the state was less than 50 in any week with the exception of the EC trap, which took 67 during the week from July 5-11.

**Bristly cutworm (*Lacinipolia renigera* [Stephens]).** The SW trap took 373 during the week from May 24-30, and the NW and EC traps took a few over 140 during the next week.

**Dingy cutworm (*Feltia subgothica* [Haworth]).** The SW trap took 300 during the week from September 13-19, the NW 319 a week earlier and the SC 234 a week later.

**Spotted cutworm (*Amathes c-nigrum* (Linnaeus)).** All catches were under 100 moths per week, the preponderance of the catch in the

cooler northern and eastern portions of the state. The NW trap took 40 from May 31-June 6, and the EC trap 71.

**European corn borer (*Ostrinia nubilalis* [Hübner]).** Egg laying was observed by May 27 on 30-inch corn grown for grain in the SW district and eggs were found by June 12 in the NE district. In corn 30 or more inches tall in the southern districts 55% of the plants observed showed leaf damage attributable to the borer and averaged two borers/infested stalk by June 19, mostly early instars. In the northern districts 29% of the corn 30 or more inches tall was infested by July 3, averaged one borer per stalk, 1.7 borers in the northeast and in the north central. Most of the larvae were in early instars with only occasional whorl penetration. Adults had by this time disappeared from light trap catches. A summer, first-generation, survey showed the heaviest infestation in the SSC (Fig. 1) district—28% with 57 borers/100 stalks, and in the NNC—30%—with 20 borers/100 stalks, followed closely by the NNE district. The percent of infestation was reduced in the southern districts by the late planting and slow development of the corn there, for nearly half the corn was still unsuitable for oviposition by first generation moths even by July 10, where peak flight activity as indicated by light traps occurred before the end of May. By July 31, emergence from first generation pupae was nearly complete in the southern districts.

The infestation by second generation borers was down from 1969 levels, the state average for 1969 being 48%, that for 1970, 41%. The decrease was due primarily to the large decrease in infestation in the southern districts which are traditionally heavily infested. The unevenness in the development of the corn played a part in the reduction, enhanced by the advent of the southern corn leaf blight which made some corn uninviting for oviposition and in some cases dried it out too soon for the larvae to develop. The average number of borers per stalk increased somewhat on a state-wide basis, from 39.76 borers/100 stalks in 1969 to 47.28 in 1970. The increase was in large part due to the increase in the NNC district, which rose from the 1969 level of 43.91 borers to the 1970 level of 162.33 borers per 100 stalks.

The SW (Fig. 2) district BL-trap had a first generation peak of 542 adults from May 24-30, and a second generation peak of 6697 from August 23-29. Other traps had poorly defined peaks either because of generally poor catches or because of consistently high catches for several weeks, as in the case of the NW trap during most of August.

**Western corn rootworm (*Diabrotica virgifera* [LeConte]).** First found in Indiana in 1968, it was not found outside Newton county until this year. New county records for 1970 include LaPorte, Porter, Lake, Kosciusko, Fulton, Jasper, Starke, and Marshall, all in the NW and NC districts, extending its range  $\frac{2}{3}$  of the way across the state. As a measure of its 1970 abundance, 300 adults were collected from corn silks on a LaPorte county farm in 1 $\frac{1}{2}$  man-hours on August

11. It took 9 man-hours to collect 480 beetles on two Porter county farms on August 25, and 6 man-hours for 600 beetles on a third farm. There was no evidence of economic damage in Indiana in 1970.

**Northern corn rootworm (*Diabrotica longicornis* [Say]).** Eggs began to hatch in Tippecanoe county about June 10, and second instar larvae were taken there on the seventeenth. Adults were seen by July 7 on green silks in Orange county, and all over the central and north central districts by July 17. Fewer fields were infested than in 1969, and these were generally more lightly infested, though heavily infested fields could be found in nearly every county north of Indianapolis. One field, seriously damaged, had 50+larvae/root system (NE), and another (NC) had every ear tip with 5 or more beetles, running to 15 or more. Goose-necking due to serious root damage was uncommon.

**Cereal leaf beetle (*Oulema melanopus* [Linnaeus]).** Developmental data are all from the New Carlisle area, the area in which records have been kept for the longest time on this insect in this state. By June 5 eggs on oats ranged from 22-60/linear foot; larvae of all ages and the year's first pupa were also present at the rate of 2-3/stem, and treatment would have been profitable in some fields. By June 19, larvae were primarily 3rd and 4th instar and averaged 1-2/stem. Larvae were virtually gone by July 3, and adult emergence  $\frac{1}{2}$  complete. A week later emergence was past its peak, and was completed by July 17. Treatment farther south would generally not have been profitable both because the infestations were lighter and because the oats were farther along.

Population levels in the NW counties south of Lake Michigan have remained static over the last 3 years. West-central counties since 1969 have experienced a 9.5-fold increase from an average of 0.55 larvae/100 stems to 5.24. Central counties have increased 2-fold, from 6.5 to 13.5 larva per 100 stems. And SE counties have gone from 7.7 to 26.4/100 in the last year. None of these averages is of economic importance, but they are illustrative of the direction of movement of the beetle. Economic populations occur as far east as western Pennsylvania, while a relatively short distance southward from the original source there are no important populations.

**Corn flea beetle (*Chaetocnema pulicaria* [Melsheimer]).** Beetles were present, but not economic.

**Japanese beetle (*Popillia japonica* [Newman]).** Adults were reported in large numbers from soybeans and corn in Newton, Starke, and Benton counties, and on corn in LaPorte county. They were also heavy in an area of some 22 square miles in Jackson and Washington counties, where controls were applied on both corn and soybeans, at least in the former county. New county records include Washington, Dearborn, and Ohio counties; they were caught in unusually large numbers (for newly invaded territories) in Dearborn and Ohio counties, as well as in Orange and Washington counties. Urban populations

also increased; Logansport, once with a noticeable population only in the eastern half of the city, is now entirely infested, and with a heavier population.

**Grape colaspis** (*Colaspis flavida* [Say]). Adults caused severe damage in the whorls of corn on a single farm in Jackson county, an unusual occurrence.

**Chinch bug** (*Blissus leucopterus* [Say]). Populations of this insect appear to be at maintenance levels only, as they have been since 1966. Surveys in March and November detected no significant economic numbers.

**Corn leaf aphid** (*Rhopalosiphum maidis* [Fitch]). On a state-wide basis, 13.76% of the corn seen in the annual corn insect survey was lightly infested, 5.87 was moderately, and 0.40 heavily so, for a total of 20.3%. This compares with 1969 figures of 21.24, 4.65, 0.07, and 25.95 respectively. There were increases in the NC, the SC, and the SE and SSE districts. The infestations in neither year were of consequence economically, in 1970 especially so because of their lateness.

**English grain aphid** (*Macrosiphum avenae* [Fabricius]). Frequently reported in 1970, the symptoms which brought the wheat to the attention of the farmer were probably more commonly due to wheat scab, which was abundant this year, than to the presence of aphids, though these may also have been more abundant, but seldom economic.

**Hessian fly** (*Mayetiola destructor* [Say]). Over-all there was a decrease in the number of fields infested: 49% of the fields sampled in 1969 were infested, compared with 22% for this year. The average infestation of W38 wheats, *i.e.*, wheats that the prevailing Race B of the Hessian fly is capable of infesting, remained about the same, 3.4% in 1969 and 3.7% in 1970. Wheats having Race B resistance remained relatively fly-free, 0.8 in 1970 versus 0.4 in 1969. The decrease in fields that were infested, and the little change in infestation that occurred in W38 wheats is interesting in view of the fact that much more of this type of wheat was grown; 73.6% of the crop had W38 resistance in 1969, 94% in 1970. In fields that were infested, the average number of puparia increased, rising from an average of 3.6 puparia/100 stems to 4.8/100. Counties with above-average numbers of puparia in W38 wheats include eight of the northern counties (St. Joseph, Elkhart, Jasper, Starke, Kosciusko, Fulton\*, Noble\*, and Steuben\*); six in the Terre Haute, Vincennes, Bedford triangle (Vigo\*, Sullivan, Knox\*, Daviess\*, Dubois, and Lawrence); and a cluster south and east of Indianapolis (Johnson, Shelby, Hancock, and Henry); (starred counties had 10 or more puparia/100 stems). Surveys made in December in a few fields of Arthur wheat (resistant to Race B) seedlings indicated infestations averaging from 11-41%. Of the 54 samples of 50 seedlings, each in the field showing 41% infestation, the range of infestation was from 0 to 80% and infested seedlings averaged 2 puparia/seedling.

**Garden symphylan (*Scutigera* sp.).** Symphylans were not reported during the year nor were they present in fields known to have populations in 1969, at least not in noticeable numbers.

#### Forage Legumes and Soybeans

**Alfalfa weevil (*Hypera postica* [Gyllenhal]).** Carry-over of 1969 eggs was comparatively light, especially in the western third of the state, where the averages ranged from 5-30 eggs/ft<sup>2</sup>. Separate surveys also gave averages from 23-50/ft<sup>2</sup> in the NC, C, and SC districts, and from 16-45/ft<sup>2</sup> in the EC and NE districts. Numbers of eggs varied widely from field to field and even within fields, and individual counts ranged from 0-220 eggs/ft<sup>2</sup>—in the latter case the consequent population killed the alfalfa by mid-summer. Viability was believed to be lower than in the previous seasons as indicated by hatching in blender-extracted eggs, running from 1/3 to 1/2 of the eggs hatching. Larval hatching did not begin until after mid-March in the southern districts; by March 31, 6 out of 17 fields had larvae, including some third instars, in alfalfa that averaged 2 inches. By April 13, larval populations in the same districts averaged 28/100 terminals, and by the 17th adults were taken in daytime sweeps up to 1/2 sweeps. By May 4, these districts had reached a peak of an average of 305 larvae/100 terminals (30/sweep) in alfalfa that averaged 15 inches. Weather prevented the harvesting at this time that would have greatly reduced losses. Populations peaked a week to 10 days after the southern in the central districts, averaged 185 larvae/100 terminals. Peaks in the northern part of the state came a week to 10 days later and averaged 270 larvae/100 terminals. Feeding damage tended to be less severe in the north than in the south, partly because the alfalfa in the northern areas was 3 to 5 inches taller when populations peaked. In both 1969 and 1970, populations were heaviest in the SC district, followed by NC and NE. Heavier populations were found in the eastern than in the western parts of the state, correlating—negatively—with populations of *Bathyplectes curculionis*, our most important parasite of the weevil.

**Grasshoppers.** Both the long-horn and the short-horn (mostly *Melanoplus femurrubrum* [DeGeer]) were more abundant this year, but were seldom responsible for economic damage. Central district populations reached an average of 220/100 sweeps in alfalfa (R = 0-700/100 sweeps) early in August.

**Pea aphid (*Acyrtosiphon pisum* [Harris]).** Populations remained at non-economic numbers in alfalfa. In the southern districts the mean per 100 sweeps was 288 on August 19, in the central 209 on August 26, in the northern 455 by September 2. The NE district had the highest populations.

**Meadow spittlebug (*Philaenus spumarius* [Linnaeus]).** Immatures were present in all southern districts by April 14 at the rate of 5/100 terminals, and peak populations appeared during May—a mean of 18.5 nymphs/100 terminals in the southern districts, 12.3/100 in the

central and 19.2/100 in the northern. Adult populations were high in some fields by the first of June: a mean of 3900/100 sweeps taken in the EC district in early June, with populations of up to 15000/100 in some fields. By mid-August southern districts averaged 66, central a week later 209 and northern 2 weeks later 155/100 sweeps.

**Tarnished plant bug** (*Lygus lineolaris* [Palisot de Beauvois]). By the middle of May adult populations averaged 25/100 sweeps in the southern % of the state in alfalfa. In the southern districts bugs of all ages averaged 228/100 sweeps in mid-August; 67% were nymphs. The SC population was the highest in the state. Central districts averaged 100/100 sweeps, 24% nymphal. Northern districts averaged 82/100, (131/100 in the NE), 40% nymphal, on September 2. Infestations were below those of 1969 and non-economic. No significant populations developed in soybeans.

**Alfalfa plant bug** (*Adelphocoris lineolatus* [Goeze]). Heaviest in the northern districts, they averaged 223/100 sweeps by September 2 (447/100 sweeps in the NW); 38% were nymphs. Central districts averaged 87/100, 57% nymphal a week before, and in mid-August southern counties averaged 67/100, 67% nymphal.

**Rapid plant bug** (*Adelphocoris rapidus* [Say]). This was the least important plant bug and averaged 38, 33, and 26/100 sweeps in the southern, central, and northern districts, respectively, during the last weeks in August. About half were nymphs except in the southern populations, which were 67% nymphal.

**Garden fleahopper** (*Halticus bracteatus* [Say]). Adults averaged 145/100 sweeps in the southern districts by mid-August, 219 in the northern (550/100 in the NC), on September 2, on alfalfa.

**Green cloverworm** (*Plathypena scabra* [Fabricius]). Of little consequence in alfalfa in 1970, larvae averaged 19, 52, and 14 in the southern, central, and northern districts, respectively, per 100 sweeps, during the last weeks of August. They were more numerous on the western than on the eastern side of the state.

**Alfalfa caterpillar** (*Colias eurytheme* [Boisduval]). Larvae averaged 9/100 sweeps through the state in August, were nowhere a problem in alfalfa.

**Mexican bean beetle** (*Epilachna varivestis* [Mulsant]). Attacks were confined to the traditional areas in the SC and SE districts and were if anything less widespread and slightly less severe than in 1969.

**Bean leaf beetle** (*Cerotoma trifurcata* [Forster]). Adults were somewhat more numerous and more ubiquitous than in 1969. They damaged a few central district soybean fields at the end of May, but were otherwise seldom numerous enough at critical times to be considered economic.

**Potato leaf hopper** (*Empoasca fabae* [Harris]). Populations were slow in building and rarely became great enough to discolor alfalfa or

become harmful to soybeans. The southern district average was 360/100 sweeps in mid-August, 223/100 sweeps in the central areas, and 464/100 in the northern counties.

**Spotted alfalfa aphid** (*Therioaphis maculata* [Buckton]). Adults were observed only occasionally and in small numbers not exceeding 2/sweep.

### Fruits

**Strawberry leaf roller** (*Ancylis comptana fragariae* [Walsh and Riley]). This was the most commonly reported pest of small fruits in 1970.

**Periodical cicada** (*Magicicada* sp.). Brood X was destructive in some orchards in the southern third of Indiana. Adults began emergence in mid-May. This complex was the 12th most frequently reported arthropod during nursery inspections, as judged by the damage it caused.

### Ornamentals, Forest, and Shade Trees

Of the nearly 50 galls sent to Purdue Extension personnel, the following could be determined accurately either from the gall or the organism. County, month, and host are given in that order. Common names are those approved by the Entomological Society of America where available; in other instances Felt is followed (1, 2). Felt's scientific names are also used except among the Hymenoptera, and among the Diptera, where Muesebeck *et al.* (3) and Stone *et al.* (4) are preferred.

#### Galls caused by mites

*Eriophyes fraxiniflora* felt. Ash flower gall mite.

Dearborn, June, ash.

*Vasates acris-crumena* (Riley). Maple spindle gall mite.

Cass, May, Orange, July, maple.

*Vasates quadripes* (Shimer). Maple bladder-gall mite.

Bartholomew, May, maple; Tippecanoe, May, silver maple; Lake, Noble, June, maple. This species was the fifth most frequently observed arthropod during nursery inspections.

#### Galls caused by Homoptera

*Pachypsylla celtidismamma* (Riley). Hackberry-nipple-gall maker.

Henry, July, hackberry; Fayette, August, hackberry; adults were in addition sent in from Cass, Jackson, Shelby, and Tippecanoe counties in October.

*Chermes cooleyi* Gillette. Cooley spruce gall aphid.

Allen, July, host not given; Cass, September, blue spruce. Reported as common in Marion county where they were hardly known earlier, and as heavier than usual in northern areas. This species was the eighth most frequently observed arthropod during nursery inspections.

*Colopha ulmicola* (Fitch). Elm cockscomb-gall aphid.

Wells, June, elm.

*Phylloxera caryaecaulis* Fitch. Hickory pouch gall.

Henry, May, hickory; Tippecanoe, May, shagbark hickory; Allen, Delaware, Montgomery, June, hickory. (Galls were present by May 22 in Tippecanoe county.)

*Phylloxera vitifoliae* Fitch. Grape phylloxera.

Vanderburgh, August, Owen, Tippecanoe, September, grape.

**Galls caused by Diptera**

- Dasineura communis* Felt. Gouty vein gall midge.  
Dearborn, May, hard maple; Daviess, June, maple.
- Dasineura glanditshiae* (Osten Sacken). Honey locust pod gall midge.  
Allen, Porter, July, sunburst and honey locust.
- Dasineura rhodophaga* (Coquillet). Rose-bud midge.  
Allen, July, rose.
- Mayetiola rigidae* (Osten Sacken). Beaked willow gall midge.  
St. Joseph, March, pussy willow; Porter, Tippecanoe, April, pussy willow.
- Caryomyia caryae* Osten Sacken. Hickory leaf gall midge.  
Madison, August, hickory.
- Caryomyia tubicola* (Osten Sacken). Hickory tube gall midge.  
Madison, August, hickory.
- Parellelodiplosis florida* (Felt.). (No common name).  
Dubois, Gibson, July, oak.
- Cecidomyia citrina* Osten Sacken. Linden twig gall midge.  
Ripley, April, basswood.

**Galls caused by Hymenoptera**

- Diplolepis bicolor* (Harris). Spiny rose-gall wasp.  
Lawrence, June, rose.
- Neuroterus noxiosus* (Bassett). Noxious oak gall wasp.  
Not sent in for identification, but reported as more common than usual in central Indiana.
- Neuroterus papillosus* Beutenmueller. Oak blister gall wasp.  
Lake, June, red oak.
- Neuroterus saltarius* Weld. Flea seeds.  
Fayette, June (reported from grass, but probably had fallen from trees.)  
Delaware, September, white oak.
- Xanthoteras eburneum* (Bassett.)  
Porter, August, oak.
- Alderia strobilana* (Osten Sacken). Oak filbert wall wasp.  
Huntington, September, oak.
- Dryocosmus palustris* (Ashmead). Succulent oak gall wasp.  
Jackson, April, pin oak; Floyd, Madison, Tippecanoe, May, pin oak;  
Allen, Marion, June, pin oak.
- Callirhytis lanata* (Gillette). Woolly oak gall wasp.  
Porter, August, oak.

**Other pests of ornamentals**

**Spruce spider mite** (*Oligonychus ununguis* [Jacobi]). The most frequently reported of evergreen pests; it was reported from Delaware, Fayette, Putnam, Ripley, Wells, and Whitley counties. It was apparently more numerous this year than in past years. Mites, among which this species predominated, were the number one pests of nurseries in 1970.

**Oystershell scale** (*Lepidosaphes ulmi* [Linnaeus]). This was the most reported of the scales; it was sent in from Fayette, Bartholomew, and Grant from maples and from Fountain on red twig dogwood. The gray race was the 14th and the brown 15th, among the top 20 pests of nurseries.

*Anormenis septentrionalis* Spinola was more abundant this year than in past years.

**Bronze birch borer** (*Agrilus anxius* [Gory]). This was the seventh most commonly observed arthropod during nursery inspections.

**Twig girdler** (*Oncideres cingulata* [Say]). This was the most reported coleopteran of trees in 1970.

**Locust borer** (*Megacyllene robiniae* [Forster]), the **white-pine weevil** (*Pissodes strobi* [Peck]), and **Pales weevil** (*Hylobius pales* [Herbst]) were all more common in 1970 than in 1969.

**White-marked tussock moth** (*Hemerocampa leucostigma* [J. E. Smith]) was the most reported lepidopteran pest of forest and shade trees, followed by the **oak skeletonizer** (*Buccularix ainliella* [Murtfeldt]).

**Spruce budworm** (*Choristoneura fumiferana* [Clemens]). This insect was taken in Lake county in May for the first time in Indiana since 1928.

**Virginia pine sawfly** (*Neodiprion pratti pratti* [Dyar]). Larvae of this species attacked some 5000 acres of short leaf and Virginia pine in the Hoosier National Forest, seriously defoliating some 200 acres.

**European pine sawfly** (*Neodiprion sertifer* [Geoffroy]). Populations of this sawfly seem to be building in much of the state.

Most of the perennial pests in this category remained at normal or less than normal levels:

**Eastern tent caterpillar** (*Malacosoma americanum* [Fabricius]). Populations were about normal except for some heavy populations in the SW district.

**Fall webworm** (*Hyphantria cunea* [Drury]). Infestations generally light. This species was the fourth most frequently observed arthropod during nursery inspections.

**Mimosa webworm** (*Homadaula anisocentra* [Meyrick]). Populations appear to be building up slightly. This was the eleventh most frequently reported arthropod during nursery inspections.

**Elm leaf beetle** (*Pyrrhalta luteola* [Muller]). The first generation was light, the second normal.

**Locust leaf miner** (*Xenochalepus dorsalis* [Thunberg]). Populations appeared to have been normal.

**Bagworm** (*Thyridopteryx ephemeraeformis* [Haworth]). Populations about normal. This species was the second most frequently observed during nursery inspections.

Remaining pests among the 20 most frequently observed arthropods during nursery inspections follow; they were left out either because complexes of insects were represented, or because they were only infrequently found, and are included here only for the sake of completeness:

- Number 3: Mealybugs.  
Number 6: Lecanium scales.  
Number 9: European pine shoot moth (*Rhyacionia buoliana* [Schiffermüller]).  
Number 10: Tuliptree aphid (*Macrosiphum liriodendri* [Monell]).  
Number 13: Whitefly.  
Number 16: Green apple aphids.  
Number 17: Oriental fruit moth (*Grapholitha molesta* [Busch]).  
Number 18: Yellow necked caterpillar (*Datana ministra* [Drury]).  
Number 19: Iris borer (*Macronoctua onusta* Grote).  
Number 20: Juniper tip midge (*Oligotrophus apicis* Appleby and Neiswander).

### Man and Animals

A **biting midge** (*Culicoides variipennis* [Coquillett]), was abundant enough in areas in Grant county to be of annoyance to both man and livestock. Although probably present, no other reports of annoyance were received.

**Deer flies** appeared to be somewhat more common than ordinarily, and some were very abundant locally. *Chrysops moechus* Osten Sacken, for instance, was numerous enough to be taken by the hundreds along some streams in Tippecanoe county, by net. *C. vittatus* Wiedemann was also quite common. Other species sent in for identification were: *C. aberrans* Philip, *C. aestuans* Wulp, *C. callidus* Osten Sacken, *C. cincticornis* Walker, *C. daene* Philip, *C. montanus* Osten Sacken, *C. niger* Macquart, *C. pikei* Whitney, *C. striatus* Osten Sacken, and *C. univittatus* Macquart.

**Horse flies** (*Tabanus* sp.) were sometimes observed in good numbers, but only once were some taken for determination: *Tabanus sulcifrons* Macquart was numerous at homes near Solsberry in Greene county.

**Face fly** (*Musca autumnalis* [De Geer]). Numbers peaked at the end of July; the fly was more common this year than in 1969.

**Horn fly** (*Haematobia irritans* [Linnaeus]). Numbers were lower in 1970 than in the previous year.

**Spiders** were again the most frequently submitted arthropods from homes and yards; this was again because of the presence in some parts of the state of the brown recluse spider, for which there were no new county records.

Of the **stored product pests**, the larder beetle (*Dermestes lardarius* [Linnaeus]) was most frequently reported; last year's top beetle, the saw-toothed grain beetle (*Oryzaephilus surinamensis* [Linnaeus]) was reported but once, and spider beetles not at all, although they were the second most reported last year. Stored product moths were infrequently reported, as were cockroaches, of which the German cockroach (*Blattella germanica* [Linnaeus]) was foremost. Reports of termites (*Reticulitermes* sp.) remained the same as in 1969.

**Giant hornet** (*Vespa crabro germana* [Christ]). Adults were taken in Hendricks county for a new county record.

**Northern mole cricket** (*Gryllotalpa hexadactyla* [Perty]). This insect was reported from homes and swimming pools more frequently than in the past.

#### Beneficial Insects

One female of *Sandalus niger* Knoch, a rhipicerid beetle which is possibly a parasite of the periodical cicada (*Magicicada* sp.), was taken on October 1, 1970, in Bloomington by Dr. F. N. Young, the first record for that insect there since 1954 (5).

*Bathyplectes curculionis* (Thomson). A general build-up of this parasite has had a marked effect on the suppression in 1970 of the alfalfa weevil (*Hypera postica* [Gyllenhal]), in the state, particularly in the western counties. Weevil larvae were found to be parasitized at the following rates: Harrison county (SC)—8.8%; Knox (SW)—50.7%; Tippecanoe (WC)—63.1%; Steuben (NE)—34.9%.

*Bathyplectes anurus* (Thomson). Populations of this parasite, the second in importance on the alfalfa weevil, remained low and confined as far as is known to a single county, Harrison, where they were found in 60% of the sampled fields, and where they parasitized 1.7% of the larvae.

A lady beetle, *Coleomegilla maculata* (De Geer), a general predator of importance especially in oats infested by the cereal leaf beetle, was taken at the rate of 39 adults/100 sweeps, on the average, in early May, in alfalfa, and averaged 14 adults/100 sweeps in late August. The central portions of the state were most heavily populated. This species was more heavily parasitized than in the past. Parasitized specimens were seen only in corn fields, probably because they are more easily seen there than elsewhere. All parasites reared were the braconid *Perilitus coccinellae* (Schrank).

*Hippodamia parenthesis* (Say), another coccinellid predator, was seldom seen in alfalfa until late summer. It averaged 11 adults/100 sweeps in late August.

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