THE INSECT PEST SURVEY BULLETIN

A periodical review of entomological conditions throughout the United States issued on the first of each month from March to December, inclusive.

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INTRODUCTION

Following the policy introduced last year we are issuing a summary of the more important insect conditions throughout the United States and Canada during the year 1927. We are also introducing in this number a new feature in having special reviews of certain insects upon which special investigations are being carried on by the Bureau of Entomology, and for which we have not published reports in the monthly numbers of the Survey Bulletins.

GRASSHOPPERS.

The fall survey of 1926 showed enough grasshopper eggs in eastern Montana to produce a small outbreak. In California the grasshoppers in the fall of 1926 were scarce, so egg laying was slight. A decrease in the number of grasshoppers during the late summer of 1926 was reported from British Columbia. During 1927 the insects were distinctly below normal in the West-Central and East-Central States. Later in the season grasshoppers became numerous in central and southern Ohio. During July an unexpected outbreak was reported from the ranges of south-central British Columbia, a territory of 2,000 square miles being badly infested while in the Peace River region the grasshoppers, which during a number of seasons have been a serious pest, were almost completely wiped out by heavy rains in the spring. Some damage by grasshoppers was reported from southern Quebec. Late in the season (September 30) a terrific flight of the lesser migratory grasshopper (Melanoplus atlanis Riley) was reported from western Kansas.

MORMON CRICKET.

The mormon cricket (Anabrus simplex Hald.) in the fall of 1926 was infesting practically twice the territory of the previous season in Montana, some 250,000 acres. An unusual number of eggs were laid during the fall. During June of 1927 the crickets were reported as being more abundant than in 1926, but control measures were very effective and depredations were slight.

CORN EAR WORM.

During the winter and spring months up to May the corn ear worm (Heliothis obsoleta Fab.) was more abundant in the Fuerte Valley, Mexico, than it has been any season for the past four years. About the middle of February corn heavily infested was coming on the market at Brownsville, Tex. During the last week in April this insect appeared in injurious numbers in Louisiana and central Texas. First adults were ob-

served in Alabama on April 17. Eggs were very numerous by the 23d of May in the tomato plantations of that State and in Mississippi. By the first of July it was occurring in serious numbers in the South Atlantic and Gulf States as well as in southern California. During July sweet corn was more seriously injured than ever before recorded in Ohio. The insect was also more abundant than usual in Kansas. By September 1, reports of heavy damage had been received from practically the entire corn belt, the lower Mississippi Valley, and the East-Central States.

STALK BORER.

The stalk borer (Papaipema nebris nitela Guen.) was generally prevalent over the entire upper Mississippi Valley, reports of unusual abundance of the young larvae having been received from Indiana, Illinois, Kansas, Nebraska, and Minnesota. During July reports were received from New England, the Middle Atlantic, and the entire East-Central areas, westward to Nebraska, Kansas, Iowa, and South Dakota. A large number of these observations were made incident to the search for the European corn borer.

LESSER CORN STALK BORER.

A serious outbreak of the lesser corn stalk borer (Elasmopalpus lignosellus Zell.) developed early in May in the southern part of Mississippi. Previous outbreaks occurred in 1921 and 1924. Later in the season similar injury to corn was observed near Gulfport, La.

LINED CORN BORER.

The lined corn borer (Hadena fractilinea Grote) caused some injury during June in the upper corn belt from western New York to southeastern Minnesota.

CUTWORMS.

Early in the season (March) cutworms (Noctuidae) were unusually abundant and injurious in south-central Texas. In April the army cutworm was reported in damaging numbers from Kansas and Nebraska, where the insect was attacking wheat and alfalfa. In May similar damage extended into South Dakota. In Oregon cutworms were cutting alfalfa and were very numerous in the wheat fields. Cutworm damage was also reported from Utah and indications of an outbreak of the western army cutworm in southwestern Saskatchewan and southern Alberta were reported early in the season. By the first of June it was evident that cutworm injury was not so prevalent as during the last two years over the entire country, the damage being confined to restricted areas. During June, however, cutworms were very troublesome in the entire Mississippi River Valley and Great Plains States. In the Mississippi Delta these insects caused considerable damage on the lands which had been flooded early in the season. Cutworm injury continued in the flooded areas of Mississippi, and at several points in Indiana and Nebraska, through July.

FALL ARMYWORM.

About the middle of April the first record was received of the fall armyworm (Laphygma frugiperda S. & A.) when it was reported as injurious to young corn in Louisiana. During August it was generally prevalent in the Southeastern States and lower Mississippi Valley, damage being exceedingly bad in the Delta region. The first serious outbreak of this insect since 1920 developed in eastern Kansas and Oklahoma during September. Minor outbreaks were recorded from Indiana, Mississippi, and Alabama, and during October considerable damage was done in central Illinois, eastern Nebraska, and Kansas.

ARMYWORM.

The true armyworm (Cirphis unipuncta Haw.) adults were observed during the first week in April in Illinois. This is about a week earlier than these insects appeared last year. During May local outbreaks were reported from parts of Missouri and Nebraska. During June moderate numbers of these insects were observed in Illinois and Indiana. In July rather heavy outbreaks developed in Iowa and South Dakota, but not so serious as was anticipated.

WIREWORMS.

Increasing numbers of reports of damage by wireworms (Elateridae) have been received the past few years. Serious damage this year was reported from Virginia, North Carolina, South Carolina, Indiana, Missouri, Kansas, Nebraska, Minnesota, Montana, Quebec, Manitoba, Saskatchewan, Alberta, and Vancouver Island. These insects attack a great variety of crops, corn, garden vegetables, and tobacco, and a report from Maine on the feeding of the adult beetles on fruit buds is the first record of these insects doing this type of injury in the East. For several years this method of feeding has been observed in the Pacific Northwest.

WHITE GRUBS.

During June reports of rather severe damage by white grubs (Phyllophaga spp.) were received from the upper Great Plains region, damage being particularly severe in Iowa and southeastern Nebraska (brood A). Rather unusual numbers of these insects were also recorded from British Columbia and Manitoba. In the former province they were doing considerable damage to the roots of young fruit trees. Later in the season reports of damage were received from central and northern Indiana and Illinois. Late in August reports of damage were received from parts of Kansas.

SPOTTED CUCUMBER BEETLE.

A very intense infestation of corn by the spotted cucumber beetle (Diabrotica duodedimpunctata Fab.) occurred in the cotton belt from North Carolina to Louisiana, and in the corn belt in the southern part of

the East-Central States from southern Indiana westward to Iowa and southward to Missouri, damage being particularly prevalent in the overflow areas along the Missouri and Mississippi Rivers. In the area north of this region the corn root worm D. longicornis Say was destructively abundant and immediately west of this area in Colorado a new species, D. virgifera Lec. attacked corn seriously for the first time in that State.

HESSIAN FLY.

During the fall of 1926 the Hessian fly (Phytophaga destructor Say) was not appearing in threatening numbers east of Kansas, and the early spring situation over the Middle Atlantic and South-Central States indicated a very light infestation. In east-central Ohio there was an indication of possible damage. Owing to wet weather at harvest time in 1926 much grain shattered in Ohio, Indiana, and Illinois, and as a result there was much volunteer wheat in that region. In the North-Central States the fly was extremely scarce. The situation in Kansas was a very general infestation with indications of a decided increase this spring. This condition was also prevalent in Oklahoma. Light infestations were also reported from the California wheat belt. During May the fly progressed rapidly in Kansas and the infestation was found to be heavier than two years ago when a very serious outbreak occurred. Despite the favorable conditions early in the season there was but about 7 per cent infestation in central Illinois during May. During June the insect was reported as being negligible in Nebraska, but very serious in the 30 south-central counties of Kansas. In general, the Hessian fly did practically no damage to the wheat crop over the greater part of the wheat belt, with the exception of the very serious development in Kansas where a preliminary estimate showed a crop reduction of approximately 20,000,000 bushels. In the East-Central States, owing to the large quantity of volunteer wheat, the fly has built up a rather threatening infestation for 1928. The fall survey showed practically normal conditions in Illinois. The summer fly surveys over the Middle Atlantic States show a decidedly higher infestation than has prevailed for several years over most of this territory. Maryland has a rather high infestation of 21 per cent, most severe in the western part of the State. The fall survey in Nebraska indicated but little damage by the fall brood of flies. Indications are of a heavy infestation in Kansas. This insect was destructive for the first time in Sedgwick County, Colorado, where it was infesting as high as 10 per cent of the crop in some fields.

CHINCH BUG.

The chinch bug (Blissus leucopterus Say) was generally less abundant than usual in winter quarters from central Missouri eastward. In eastern Kansas and western Missouri, however, there were indications of chinch-bug trouble early in the season. Despite a very wet spring the insect passed the winter rather successfully in Illinois, but was not present in sufficient numbers to occasion alarm. Late in May reports of threatening numbers of these insects were received from Missouri and South Carolina. The continued wet weather of June practically put an end to chinch-bug

trouble in the East-Central States, and decidedly reduced the infestations in eastern Kansas and western Missouri. Destructive abundance in parts of eastern Nebraska developed during June. The North Carolina outbreak developed to be of some consequence, but not very serious. The Nebraska outbreak was much less serious than was originally anticipated. As a whole, the chinch-bug situation was not serious this year. A brood of chinch bugs is building up in the East-Central States which may cause trouble in 1928.

GREEN BUG.

During the winter and early spring months the green bug (Toxoptera graminum Rond.) was reported as unusually abundant in Louisiana and parts of Oklahoma and Texas, and in the Salt River Valley of Arizona. During March the Oklahoma infestation became more extensive, but no further developments were reported from other States. A small outbreak in North Carolina, with some damage, was reported late in April, after which date no further reports of this insect were received.

FALSE WIREWORMS.

Though generally not so prevalent as during the past few years, the plains false wireworm (Eleodes opaca Say) destroyed thousands of acres of wheat around Syracuse, Kans. It was also reported from Nebraska, and a species heretofore not known as a crop pest, Eleodes tricostata Say was recorded from the latter State. Later in the season considerable damage was done in eastern Idaho by E. hispilabris Say.

ALFALFA WEEVIL.
(Phytonomus posticus Gyll.)

Rather severe injury to the first crop was reported from Delta, Utah. The weevil is now about 8 miles west of the Nebraska line in Wyoming, the known infestation having extended 36 miles eastward. The outbreak in Idaho is the most destructive since that of 1921. (See also Special Review.)

CLOVER LEAF WEEVIL.

Owing to severe wet weather last fall but little damage was experienced this year by the clover leaf weevil (Hypera punctata Fab.) in Illinois. During April this insect became unusually troublesome to alfalfa in Kansas and damage would have been very severe had it not been for heavy rains late in April. The insect also appeared early in the season in menacing numbers in Missouri, but was controlled by prolonged cool, wet weather. During early June a few reports were received from Indiana.

LESSER CLOVER LEAF WEEVIL.

Severe damage by the lesser clover leaf weevil (Phytonomus nigrirostris Fab.) to clover buds and seed crops was expected in Illinois

this spring, as a large number of the adults passed the winter successfully. Late in April a flight of beetles was observed about Albany, N. Y. The outbreak evidently did not develop as anticipated, as no further reports were received during the season.

WHEAT JOINT WORM.

Towards the end of March the wheat joint worm (Harmolita tritici Fitch) was reported as seriously damaging wheat in Stanley County, North Carolina. In southern Illinois it was much less abundant than it has been for several years, the only records being from a very few western and southwestern counties of the State and a single infestation in Hancock County of 28 per cent.

WHEAT STEM SAWFLY.

The wheat stem sawfly (Cephus cinctus Nort.) which was the most serious pest of the year in Saskatchewan in 1926, when it caused a loss of $12,000,000, went into winter quarters in enormous numbers. During 1926 it spread westward until it now covers one-third of the wheat-growing areas of Alberta. A survey this year (1927) indicated that about 8 per cent of the grain was infested in Manitoba, and but little serious damage was done over the rest of the infested territory.

CODLING MOTH.

The codling moth (Carpocapsa pomonella L.) in the Middle West during April promised to be as serious as it was last year, a very high percentage of the larvae having passed the winter successfully. Pupation was generally later than normal from Pennsylvania westward across central Missouri. During June the situation was much more favorable, the insect being slightly more numerous than usual in the East-Central States and becoming less troublesome from Illinois westward.
In the Pacidic Northwest the situation at this time was very favorable. During August the infestations in the South Atlantic and East-Central States were serious enough to indicate heavy damage by the later broods. A similar situation prevailed in parts of Idaho and Colorado. Though comparatively well controlled in the Eastern States the codling moth was prevalent enough to occasion comment on the quantity of wormy fruit offered to the export trade. In many sections of the eastern part of the United States late frosts so reduced the apple crop that the initial codling-moth populations will be materially lower next spring.

ORIENTAL FRUIT MOTH.

The oriental fruit moth (Laspeyresia molesta Busck) appeared earlier than last year in the Fort Valley section of Georgia, and the first adult moth was observed on February 24. Twig injury became noticeable about the first of April and full-grown larvae of the first brood were observed on the 12th of the month. The peak of the second generation was reached during the first week in May, and during this month the pest was reported for the first time from Holly Springs, Miss. During June the insect was recorded for the first time from the west-central part of Georgia

in Meriwether County and it was observed to be plentiful in Connecticut and West Virginia.

"This insect is quite widely distributed in Ohio, having been found from the most southerly to the most northerly sections of the State. The area of concentration is in southern and central Ohio although at Sandusky Mr. Stearns found a rather heavy infestation. Fortunately, the insect has not become thoroughly established as yet in the great producing area of Ohio west of Sandusky. In some instances Mr. Stearns found as much as 56 per cent of the late peaches infested with the larvae of this species. One of the gratifying aspects of the situation is that parasites are already established and actively operating in Ohio. It has been determined that six species of larval parasites are present. The total parasitism of the season averaged 18.7 per cent." (J.S.Houser, Ohio Agricultural Experiment Station, Wooster, Ohio.) (See also Special Review.)

APPLE AND THORN SKELETONIZER.

The apple and thorn skeletonizer (Hemerophila pariana Clerck) was was decidedly below normal this year throughout the greater part of its range. It was reported for the first time from Maine during the past season, but even in badly infested orchardz in New York State and New England it was not serious.

PEACH BORER.

The peach borer (Aegeria exitiosa Say) is somewhat more abundant than usual over the Middle Atlantic and East-Central States, reports of unusually heavy damage having been received from Georgia, Ohio, Indiana, and Illinois. In Georgia more paradichlorobenzene has been used this year than was used during the last few years owing to the unusually heavy infestations of the Fort Valley section.

EASTERN TENT CATERPILLAR.

The eastern tent caterpillar (Malacosoma americana Fab.) appeared to be as numerous as it was in 1926 throughout New England and the Hudson River Valley region of New York State. In the Middle Atlantic States it was apparently more abundant than last year, while in the South Atlantic States the infestations had decidedly decreased.

PLUM CURCULIO.

Early in the season the situation of the plum curculio (Conotrachelus nenuphar Hbst.) was more serious than it had been since 1921 in the South Atlantic States. This insect also appeared unusually early in the East-Central States. During May the insect was reported as seriously attacking the crops in Missouri, and by June it became evident that it was more abundant in New England than last year. During July damage was very general over the entire seaboard.

Contrary to the conditions during March, 1926, when fruit-aphid eggs were so extremely scarce, eggs were reported normally abundant throughout the East-Central and South eastern States with the exception of New York State where they were still reported as less abundant than usual this past spring. Eggs began hatching in the Winchester section of Virginia about the middle of March. About the same time hatching was observed in Illinois and Missouri. During April these insects were reported as generally more prevalent than last year throughout New England and subnormal in the East-Central States. Towards the end of March hatching was observed quite generally throughout southern and central Pennsylvania. In the Willamette Valley, Oregon, hatching was somewhat later, occurring about the first week in April. The rosy apple aphid (Anuraphis roseus Baker) was not unusually abundant over the Middle Atlantic and East-Central States. Aphids, other than fruit aphids, were unusually abundant over a very wide territory, extending well into Canada. In most cases these outbreaks were associated with a delayed spring and cool, wet weather. During July the infestations of aphids on ornamentals were very conspicuous in the eastern part of the United States. By the first of August, the aphids had rather abated, and but little trouble was recorded the remainder of the summer.

SAN JOSE SCALE.

Throughout New England the prevalence of the San Jose scale (Aspidiotus perniciosus Comst.) during the winter of 1926-27 was not at all alarming. This condition also prevailed over the East-Central States. From Maryland southward to South Carolina a general increase was being observed. In Georgia this was very decidedly checked by the twice-stabbed lady beetle, which occurred in abnormally large numbers in 1926. In the East-Central States conditions remained about as they were in 1926. In the West-Central States the insect was not considered of much economic importance. These conditions of subnormal abundance of the scale prevailed throughout the season over the eastern fruit belt. Late in the season, however, extremely warm weather in southern Indiana caused a heavy increase in the scale populations in many orchards.

ANOMALA.

During the year no remarkable developments of the anomala (Anomala orientalis Waterh.) were recorded.

CITRICOLA SCALE.

The citricola scale (Pseudococcus citricola Quayle) increased rapidly in Tulare County, California.

MEALYBUGS.

Infestations of the mealybug, Pseudococcus gahani Green) have been

materially heavier during 1926 in the southern California citrus belt. During the fiscal year ended June 30, 1927, the Los Angelees County Insectary propagated and distributed over the mealybug-infested orchards of the county approximately 4,000,000 adult Cryptolaemus, an enemy of this pest. An area of 7,000 acres was covered, using ten adult beetles per tree. Unfortunately, field conditions were such this season that, while they permitted the normal development of the mealybug, the prolonged cool, damp weather materially delayed the activity of the liberated Cryptolaemus. However, they have made up in part for their spring delay by a late season of activity which is resulting in satisfactory seasonal control.

SPOTTED CUCUMBER BEETLE.

About the middle of April very serious infestations of Satsuma oranges by the spotted cucumber beetle (Diabrotica duodecimpunctata Fab.) occurred in southern Mississippi. The beetle did very considerable damage to both foliage and blossoms as well as to young fruit.

WHITEFLIES.

Whiteflies, Dialeurodes citri Ashm. and D. citrifolii Morgan were somewhat more abundant in Florida than for several years. This was due to the comparatively poor development of the entomogenous fungi, Aegerita webberi and Aschersonia aleyrodis caused by the abnormally dry summer. The citrus whitefly was found at San Benito and this is the first record of this insect in this valley of Texas.

AN ANT.

A species of Solenopsis is recorded for the first time as a serious pest of the citrus fruit in southern California. This year it practically ruined the entire first crop of tree citrons in the Lahabra Heights section east of Whittier.

SEED CORN MAGGOT.

Coincident with the late spring and continued cool, wet weather, outbreaks of the seed corn maggot (Hylemyia cilicrura Rond.) were reported early in April from North Carolina, Mississippi, and Arizona. In Arizona damage was observed during February and March. In May similar depredations were reported from Missouri. During June damage to seed potatoes was reported from Ohio, and melons and cucumbers were severely damaged in Iowa and Michigan. This insect made necessary replanting of many acres of beans in the Twin Falls District, Idaho, and did considerable damage to seed potatoes. During June similar damage was reported from Maryland, Indiana, Nebraska, Minnesota, South Dakota, and Montana.

CABBAGE MAGGOT.

Early in May the flies of the cabbage maggot (Hylemyia brassicae Bouche) were observed to be very abundant in the seed beds on Long Island,

and by the end of the month they were very prevalent throughout the northern part of New York State. In Massachusetts this insect appeared somewhat earlier than usual in the trucking district of Bristol County and late in May it was reported as doing much damage and necessitating much replanting in parts of Maryland. Scattered reports of damage were received throughout the spring from Indiana, Ohio, and Colorado. In the latter State it has increased rapidly during the last few years and is doing considerable damage. It has also spread to the western slope of the mountains in that State.

HARLEQUIN BUG.

Late in February reports of damage by the harlequin bug (Murgantia histrionica Hahn) were being received from many parts of Mississippi. Dur- During March and April reports came in from the entire southeastern region extending from Texas to North Carolina. This trouble continued throughout May. This trouble also continued throughout August in the upper part of its range and through September in the Gulf region. An unusual record was received from Texas where the bugs were destroying the blossoms of lilacs.

COLORADO POTATO BEETLE.

The first record of the season of the Colorado potato beetle (Leptinotarsa decemlineata Say) was received from Picayune, Miss., when adult beetles were observed in the field on February 21. Early in April the insects were reported as moderately abundant over Alabama and Louisiana, but the early potato crop in the Gulf region is usually produced without the need of poisoning. However, during May it was reported as doing considerable damage in parts of Alabama, necessitating control measures. Toward the latter part of May it developed in abnormal numbers in northwestern Nebraska, necessitating spraying. It was also observed in fields in Montana this month. Toward the end of April adult beetles were observed on Long Island, N. Y. The large commercial potato regions of southern Idaho are free from this pest and every effort is being made to eliminate the rather limited infestations in that State. An interesting situation has developed in regard to this insect in that in the originally infested areas of Colorado the insect rarely does severe damage. A similar condition has developed in the southern part of the Middle Atlantic States westward to Tennessee, where, though remedial measures are usually applied, whether the insedt is present or not, it does very little damage even in unsprayed fields, excepting sporadically.

Difficulty in controlling the beetle this season, owing to frequent rains, is reported from the maritime provinces and Ontario. In southern Manitoba it has very decidedly increased in numbers over last year. Heavy infestations are also reported from Alberta. Infestations in British Columbia are limited to the southeastern corner of the province in an area about Creston and another extending from Cranbrook to Fernie and the Crow's Nest down to the international boundary.

POTATO LEAFHOPPER.

Late in March the potato leafhopper (Empoasca fabae Harr.) was ob-

served to be very abundant in winter quarters in Missouri. During May hopperburn was very serious in the early potato districts of North Carolina, in which State this insect was also seriously attacking soybeans and peanuts. Late in June damage was reported from Indiana. In northern Illinois the leafhopper was much more abundant than usual, severely injuring potatoes and beans. Similar unusual infestations were reported from Iowa and moderate infestations in the northwest portions of Ohio and in parts of South Dakota. In Kansas this insect became extremely abundant in the alfalfa fields, where it did very considerable damage though this was not easily distinguished from that produced by root diseases. The insect was also abundant in Wisconsin.

SUGAR BEET LEAFHOPPER.

"The sugar beet leafhopper (Eutettix tenellus Baker) has been numerous in the beet fields of Utah since early spring, and considerable curly-top disease has resulted throughout most of the State. The first noticeable injury in the northern part of Utah occurred in some fields at Lehi, Farmington, Layton, North Ogden, and Willard. The disease developed rather slowly in most parts of the State in spite of the large number of leafhoppers present throughout the season. The beets in most areas had acquired good size before late-season injury became serious, damage starting toward the end of August in most parts of the State. Before the end of the season, the beets were nearly all severely curled at Lehi, North Farmington, Lynndyl, Leamington, Grantsville, Hooper, American Fork, and North Ogden, while considerable damage had resulted in many fields at Layton, Delta, Santaquin, northwest of Provo, Goshen, Cache Junction, Lakeview, Penrose, Bothwell, Thatcher, Bear River City, Plain City, North Garland, Honeyville, Draper, and scattered fields throughout the State. Damage was fairly light in Cache Valley in some parts of Boxelder, Salt Lake, and Davis Counties, and in most fields between Nephi and Manti. Considering the State as a whole, the damage from curly-top would be proportionately less in the territory north of Manti than in areas south of this point." (C. F. Knowlton, Logan Utah.) (See also Special Review.)

PEA APHID.

"The pea aphid (Illinoia pisi Kalt.) appeared very early in the season in threatening numbers in the alfalfa fields in parts of Oklahoma. About the middle of April reports were received of damage from parts of Kansas. The infestations in Kansas rapidly developed into an outbreak. Heavy rains, however, toward the last week in the month reduced the aphids to negligible numbers. During May reports of serious damage were received from Utah and southern California and during the latter part of that month and early June other serious damage to newly-seeded alfalfa was reported from Nebraska. The insect was also prevalent in parts of Illinois, Missouri, and Mississippi. Toward the end of June there were indications in the pea-canning districts of Wisconsin that this insect would be more than usually abundant during July. This condition prevailed up until about the middle of July when severe wind and rains reduced the outbreaks to a negligible factor. Early in the season an unusually severe infestation developed on alfalfa in Idaho. This outbreak developed while the plants were still very small and in many cases they completely elimi-

nated the first cutting. Parasites later in the season almost completely destroyed the aphids.

PEPPER WEEVIL.

Toward the end of March, the pepper weevil (Anthonomus eugenii Cano) did considerable damage in Santiago County, Calif. The late spring delayed the appearance of these weevils in Orange County. The first weevil to be observed was seen on July 1, and by the middle of the month the weevils were well distributed over the pepper fields of Orange County. Weevils were found this summer on a single place near Douglas and approximately 1 1/2 miles north of the United States-Mexico boundary. Infestations averaged 1 weevil or more per pepper plant. There were indications of weevil infestations on adjacent places north from Douglas in Sulphur Springs Valley.

RASPBERRY FRUIT WORM.

A very serious infestation of raspberries by the raspberry fruit worm (Byturus unicolor Say) developed in the raspberry and loganberry canning districts of Washington State. This infestation became so intense that the fruit was rejected at the canneries and many growers stopped picking.

COTTON FLEA HOPPER.

About the middle of February the cotton flea hopper (Psallus seriatus Reut.) began to emerge at College Station, Tex., and by the middle of March this insect was emerging in rather large numbers in this locality. During late March and April eggs were hatching throughout Louisiana and considerable injury was anticipated. During the latter month it was observed that there were practically no infestations in the lower Rio Grande Valley and very few around Corpus Christi, in Texas. During May these insects were observed to be hatching in moderately large numbers in the Piedmont section of South Carolina, and during June some injury was reported from parts of North Carolina. Late in June and early in July there was slight damage in South Carolina and similar light infestations were observed in North Carolina and Georgia at that time. A little more intense infestations were observed in parts of Tennessee, while over the remainder of the cotton belt no damage was reported.

COTTON LEAF WORM.

The cotton leaf worm (Alabama argillacea Hübn.) was decidedly later than usual in its invasion of the United States this year. It entered the cotton belt so late that very little damage resulted from the feeding of the larvae, and though a feeble northern flight was attempted, little damage was done to fruit in the northern States.

PERIODICAL CICADA.

Brood 1 of the periodical cicada (Tibicina septendecim L.) is the first of the series of well authenticated broods of this insect, and was due to appear this year. Well substantiated records for the occurrence of this insect in southeastern Pennsylvania, south-central Maryland, Virginia, West Virginia, and North Carolina were made in 1893 by Prof. C. V. Riley and several additional localities in West Virginia were added by Dr. Hopkins at that time; the doubtful records prior to 1893 were from Kansas and Colorado. The localities in Kansas received doubtful confirmation in 1893. Some scattering reports were also recorded in 1893 from southern Indiana, Illinois, and northern Kentucky. The Maryland, North Carolina, Virginia, and West Virginia records were confirmed in 1910 and a new record from South Huntington, Long Island, was made that year. The records from Indiana, Illinois, and Kentucky were not confirmed in that year nor were those from Kansas and Colorado. The Colorado record undoubtedly refers to another species of this insect. This year Brood 1 appeared in large numbers in Roanoke, Bedford, Boutetourt, Rockbridge, Rockingham, Russell, Scott, and Wood and Preston Counties, West Virginia. Though definite efforts were made to confirm the records from the East-Central States and Kansas, no records were obtained.

BAGWORM.

This year the bagworm (Thyridopteryx ephemeraeformis Haw.) was decidedly more prevalent and destructive than last year, particularly in the Mississippi Valley and east-central States, reports of unusual damage having been received from Delaware, Georgia, Ohio, Indiana, Missouri, Alabama, Nebraska, Kansas, and Mississippi.

WHITE-MARKED TUSSOCK MOTH.

Early in the season eggs of the white-marked tussock moth (Hemerocampa leucostigma S. & A.) were observed quite numerous in New York, southern Ohio, and Indiana. These eggs began hatching in Ohio and Indiana the first week in June and in central New York State the last of that month. Later in the season considerable damage especially in city parks was reported from the whole East-Central region westward to Nebraska, the insect being reported as much more numerous than usual in Ohio, Indiana, Illinois, Iowa, and Nebraska. Though slight damage was reported from Delaware, this insect is at an extremely low ebb throughout New England and the Middle Atlantic States.

BIRCH LEAF MINER.

The birch leaf miner (Fenusa pumila Klug.) was again abundant throughout Nova Scotia, eastern Massachusetts, Connecticut, Maine, and eastern New York State.

HEMLOCK SPANWORM.

The bad outbreak of the hemlock spanworm (Ellopia fiscellaria Guen.) reported last year from Wisconsin has practically died out. During the past season a severe but limited outbreak occurred in Maine and small outbreaks in northern New York State and several sections of Ontario.

MOUNTAIN PINE BEETLE.

The epidemic of the mountain pine beetle (Dendroctonus monticolae Hopk.) which has been under way for several years in Montana has now destroyed from 50 to 70 per cent of the timber on the infested area. During the past two years the infestations have spread into the Big Hole Basin and the Missoula National Forest, from the east fork drainage of the Bitter Root. Another epidemic of this insect has started throughout the white-pine stands of northern Idaho.

JEFFREY-PINE BEETLE.

The infestations of the Jeffrey-pine beetle (Dendroctonus jeffreyi Hopk.) in the Inyo National Forest have materially declined this year. In the Oregon-California Control Project area, however, the heaviest losses recorded in the past 10 years were observed this year and more than 350,000 board feet of timber were killed.

DOUGLAS FIR BEETLE.

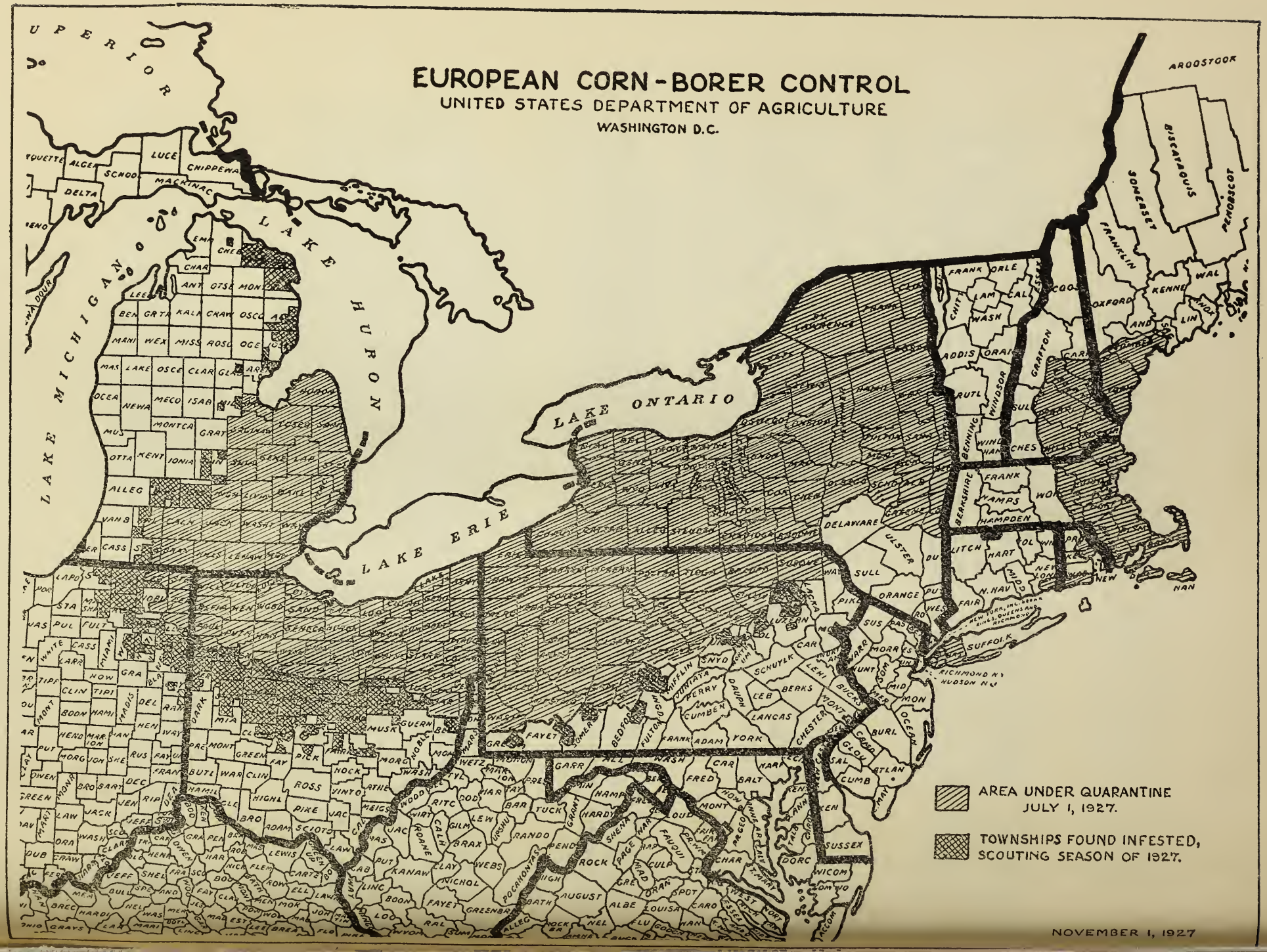
Throughout the western part of Montana the Douglas fir beetle (Dendroctonus pseudotsugae Hopk.) has been destroying rather alarming quantities of Douglas fir annually. The damage occurs in groups of trees scattered throughout the forested areas.

SPRUCE BUDWORM.

A slight outbreak of the spruce budworm (Harmologa fumiferana Clem.) in a nursery in Ohio was reported this season. Considerable damage was done along the eastern border of Michigan and 4,500 square miles north of Thor Lake in Ontario was badly infested. This latter outbreak has been in progress since 1922 and has resulted in the death of most of the first and decidedly retarded the growth of the spruce. On the mainland east of Moose Island in the vicinity of Lake Winnipeg, Manitoba, it has entirely killed out the mature balsam and has decidedly weakened white spruce. An infestation which has been under way in the southern half of Cape Breton Island has decidedly abated during the past season.

LARCH SAWFLY.

The outbreak of the larch sawfly (Nematus erichsonii Hartig) in the Spruce Woods Reserve in Manitoba has been very effectively reduced by the introduced parasite Mesolieus tenthredinus Morl., 88 per cent of the cocoons being found parasitised.


EUROPEAN CORN-BORER CONTROL
UNITED STATES DEPARTMENT OF AGRICULTURE
WASHINGTON D.C.
LAKE SUPERIOR
LAKE MICHIGAN
LAKE HURON
LAKE ERIE
LAKE ONTARIO
AREA UNDER QUARANTINE JULY 1, 1927.
TOWNSHIPS FOUND INFESTED, SCOUTING SEASON OF 1927.
NOVEMBER 1, 1927

SPECIAL REVIEWS

EUROPEAN CORN BORER

The fall survey in New England was completed about the middle of November. This work included a comparative survey of the known infested territory and a survey to determine new infestation bordering on the known infested area. The single-generation infestation is spreading from New York eastward into New England while the two-generation infestation in New England shows a normal fluctuation.

Perhaps the most outstanding development in the corn-borer work during the past season was the $10,000,000 corn-borer clean-up experiment. The two main objects of this campaign were to demonstrate (1) whether it was possible to retard further spread of the pest by a thorough farm clean-up of corn, stalks, etc., over the western and southern area then known to be infested with the borer and, (2) whether such a clean-up would result in the prevention of increase and, possibly, in the actual reduction of the number of borers in infested territory for the following year and thus demonstrate the practicability of control as a continuing farm practice.

The results of the 1927 campaign indicate that:

(1) It is improbable, under existing conditions governing State cooperation in such effort, that the natural spread of the borer to new territory can be retarded materially, although it is appreciated that the volume of such spread may be reduced by the thorough clean-up of the entire infested area, inclusive of the border counties and townships. Because of the inability of some States to include in the clean-up campaign the lightly infested border area, the normal spread of the pest in such areas occurred in 1927.

A total of 794 townships were added in 1927 to the area previously quarantined on account of the corn borer. The spread discovered in 1927 is shown roughly on the accompanying map.

(2) It is possible to keep down the number of borers and to prevent serious commercial damage to corn by a thorough concerted clean-up in infested territory. The infestation survey following the 1927 spring control campaign showed that the number of borers per 100 stalks in both Ohio and New York, representing two-thirds of the townships in the control area, had been reduced. The reduction in Ohio was from 6 borers per 100 stalks in 1926 to 5 borers per 100 stalks in 1927. The reduction in New York was from 12 borers per 100 stalks in 1926 to 10 borers per 100 stalks in 1927. In Michigan, however, owing to the existence of conditions decidedly favorable to the borer increase, particularly, as regards reinfestation from Canada, there was an increase in the number of borers. Pennsylvania also showed an increase. The increase in Michigan was from 12 borers per 100 stalks in 1926 to 27 borers per 100 stalks in 1927. In Pennsylvania the number increased from 7 borers per 100

stalks in 1926 to 24 borers per 100 stalks in 1927. In Indiana, the number of borers even in 1927 was less than 1 borer per 100 stalks. Over the whole area, due to conditions especially favorable to borer increase in Michigan in 1927, there were 1½ times as many borers in 1927 as there were in 1926. This showing, however, compares favorably with the increase to 4 times as many in 1926 as there were in 1925, when no such unified control effort was attempted. The figure for the whole area is 14 borers per 100 stalks in 1927 as compared with 9 borers per 100 stalks in 1926. Without any control effort, we probably would have had over the whole area 4 or 5 times as many borers in 1927 as in 1926 or from 35 to 45 borers per 100 stalks. This result is strongly encouraging to farmers in their efforts to control the borer in infested territory. It is thought that serious commercial injury by the corn borer can be largely prevented if farmers will adhere to the low-cutting, clean-plowing, poling, raking, and burning methods of control.

In addition to these two main objects of the campaign, the work of 1927 further supported and demonstrated conclusions which have come to be generally accepted relative to the corn borer, namely:

(1) It is possible to prevent, for the most part, long-distance spread of the borer by human agencies. The fact that no instance has been reported of a jump of one or two hundred miles by the borer that could be properly credited to transportation by human agency indicates the effectiveness of the maintenance of a strict quarantine as far as movement by human agencies is concerned.

(2) It is not possible to eradicate the borer, which fact has been repeatedly stated in the past. Repeated field tests made in the 1927 campaign demonstrated that it is impossible to eliminate every borer over any considerable area. (W. H. Larrimer, Bureau of Entomology, U. S. D. A.)

ALFALFA WEEVIL.

"The extensions of the territory infested by the alfalfa weevil (Phytonomus posticus Gyll.) have been inconspicuous, and have resulted in bringing in only two new counties, Douglas, in Nevada, and Niobrara in Wyoming. The borders of the infested territory are, for the most part, in mountainous regions where the spread of the insect can not be minutely followed because of the distance between fields. The damage inflicted by the alfalfa weevil has been slight, except in the vicinity of Rexburg, Idaho. The number of adult weevils present in the fields throughout the insect's range seems to be about normal." (G. I. Reeves, Bureau of Entomology, U. S. D. A.)

MEXICAN FRUIT WORM.

"In the spring of 1927 the Mexican fruit worm (Anastrepha ludens Loew) was discovered in the citrus plantings of the Rio Grande Valley of Texas, larvae occurring in small numbers in fruit from Mission to Brownsville. Scattered infestations, therefore, occurred throughout

the entire valley. The Federal Horticultural Board, as a result of this infestation, promulgated a quarantine restricting the movement of all host fruits from the infested territory. Eradication measures were at once undertaken, the Bureau, Board, and State Department cooperating. The measures were based on the maintenance of a host-free period, and the inspection of groves and the movement of fruit under certification. Volunteer committees were organized in the different valley towns to assist the Federal and State men, and all host fruits throughout the valley were collected and destroyed. The Mexican authorities in Matamoras cooperated in carrying into effect a similar program. As the next season's crop began to mature the valley was divided into inspection districts, each in charge of a district inspector who is held responsible for the careful inspection of all groves in his district every 30 days and the certification of groves found to be free from the fruit worm. All drops are destroyed and culls processed. The first 30-day inspection was completed on October 1, and car lots of grapefruit began moving out of the restricted area. While it is too early to predict the condition of this season's crop, the result to this writing (October 15) has been very promising, no fruit worms having been discovered since the clean-up in June." (A. C. Baker, Bureau of Entomology, U. S. D. A.)

ORIENTAL FRUIT MOTH.

"In sections where the oriental peach moth has been established for a number of years (five or more) the infestations this past season were light to moderate while in newly established areas they were generally severe. In the southern part of New Jersey and also in parts of Maryland the infestations were lighter than they have been for several years. In some orchards Elberta and later peaches showed less than 10 per cent injury while in previous seasons the injury has been 25 to 75 per cent. In Georgia, it appeared in the heaviest infestation ever recorded in that State." (Alvah Peterson, Bureau of Entomology, U. S. D. A.)

JAPANESE BEETLE.

"The spread of the Japanese beetle (Popillia japonica Newm.) during the summer of 1927 has been largely on the south and west of the infested area. To the north, approximately 80 beetles were found at Nyack, N. Y., on the west side of the Hudson River. This was the first infestation found thus far in Rockland County. No infestations were found north of the Croton River in Westchester County. On Long Island 31 beetles were found in Lindenhurst, a few miles northeast of the Nassau-Suffolk County line. In Connecticut a general infestation was found in Bridgeport and 1 beetle in New Canaan. On the west infestations were found in Pennsylvania at Weissport, Lehighton, Pottsville, Shenandoah, Sunbury, Milton, Bloomsburg, and Wilkes-Barre, 16 beetles were found in Gettysburg, 1 in York, and 2 in Mechanicsburg. In Maryland a small infestation was found in Chesapeake City. One beetle was found at Perryville, 1 at Ridgeley, 11 at Cambridge, and 30 distributed at several points in the city of Baltimore. Thirteen beetles were collected in the District of

Columbia. In Delaware 1 beetle was found at Dover, 24 at Clayton, 1 at Fort Penn, and 1 at Stanton. It is believed that the long, rainy period in August and early September did much to retard the general spread of the insect in 1927. Most of the infestations found outside of the known infested territory were located in towns and cities and were carried to those points, it is believed, largely through artificial channels, such as railroad trains, automobiles, and contraband produce." (L. B. Smith, Bureau of Entomology, U. S. D. A.)

MEXICAN BEAN BEETLE.

"In general, over the Southern and Eastern States, the Mexican bean beetle (Epilachna corrupta Muls.) has been more numerous and has done more damage than in 1925 and 1926. The dispersal into new territory has been the greatest in point of square miles, and about as great in point of distance, as in any year since 1920 when it was first discovered in northern Alabama. This spread has been chiefly to the east and northeast as in previous years, the beetle having reached seven counties in southwestern New York and at least five counties in Ontario, as far north as Toronto. The presence of the beetle in four southeastern counties of Michigan is very important. No predictions as to its seriousness to the large bean industry there are attempted, but it should be carefully watched. It has reached the coastal section in Virginia, occurring in injurious numbers at Norfolk. Reports from Alabama, Georgia, the Carolinas, Virginia, Tennessee, Indiana, and Mississippi state that the infestations are heavier than in 1926. In Kentucky fewer reports from growers were received at the Experiment Station, probably because of increased familiarity with the pest and the methods of control. In southern Ohio emergence from hibernation occurred a few days earlier than in 1926, the first adults being noted in the field May 23. Emergence proceeded rapidly and winter survival was higher than in 1926; 4 per cent of the beetles in large cages survived, as compared with less than 1 per cent in 1926. The spring and early summer infestation in southern Ohio was very heavy in many localities, but on account of the rapid emergence, and the scarcity of early beans due to wet weather, the egg-laying period was confined to a shorter period than usual. This resulted in a very distinct gap, after the disappearance of the overwintered beetles, and before the appearance of the first-generation beetles. Beans planted in the latter half of June had few eggs deposited on them and were not severely injured. Beans planted later were again heavily infested and in many instances were destroyed. Only the summer beans bore a normal or nearly normal crop without treatment. A large number of beetles went into hibernation, many earlier than usual, but the prolonged dry weather this fall in southern Ohio may seriously affect winter survival. In northern Alabama the survival in large cages was 16 per cent as compared with 10.8 per cent in 1926. The first beetle was noted in the field on March 31 which was 12 days earlier than in 1926. The infestations were heavier than in the preceding three years, but the yield of early beans was not much reduced, although the fields which were not plowed under immediately after picking were defoliated. Later beans and pole

beans were severely damaged. The fall crop was not severely damaged, the beetles going into hibernation earlier than usual and also probably migrating. The prolonged drought in that section may reduce winter survival." (N. F. Howard, Bureau of Entomology, U. S. D. A.)

VEGETABLE WEEVIL.

"Scouting for the vegetable weevil (Listroderes obliquus Gyll.) has been carried on during the past year, with the result that the known distribution has been considerably extended. Thirteen infestations in six counties of the San Francisco Bay region have been found at the following points: San Rafael, Vallejo, Martinez, Berkeley, Agnew, San Jose, Palo Alto, Menlo Park, Sweeney Station, Half Moon Bay, Millbrae, South San Francisco, and at a point about 2 miles south of Colma. In 1926 it was known only at Berkeley, San Jose, and Palo Alto. All of the other infestations have been added during the past year.

Most of the above infestations are very light and each covers a very limited area. Commercial damage has resulted in only four places, namely, at San Jose, Palo Alto, Martinez, and Agnew. The most severe infestation, which covered a single 13-acre truck farm in 1926, has spread to about four times that area in the course of one year. Some of the infestations, as the one at Palo Alto, were much lighter in 1927 than 1926, probably owing to the fact that but a single crop of tomatoes was grown during the year. Sufficient adults were not produced, owing to lack of food plants for larval development, to cause economic loss as was the case at this point in 1926. It is believed that infestations will not be heavy except in truck-crop areas where host plants are grown continuously throughout the year.

The weevil is known to occur in 32 counties in Mississippi, 7 in Alabama, 8 in Louisiana, and 2 in Florida. It has been more abundant the past year than before in southern Mississippi, and the indications are that it is moving north quite rapidly. When it was first found in southern Mississippi it was only in small infestations, and up to the present season it has been difficult to find during the summer months. However, during 1927 it has been found in the fields every month of the year to date, and in larger numbers than ever before. The weevil continued to be inactive during the summer months, but it was very active the other nine months of the year." (M. M. High and H. C. Lewis, Bureau of Entomology, U. S. D. A.)

SUGARBEET LEAFHOPPER.

"The only damage occurring in the Idaho area this year was due to a movement of summer-brood Eutettix tenellus which occurred about the 15th of June. The only places where seriously large populations existed were on the outskirts of the irrigated tract close to the bad breeding grounds. It so happened that these isolated fields were also late-planted or in poor cultural conditions for the most part. Where the cultural conditions were excellent, however, and the beets were planted

during the normal planting time, excellent crops were harvested and the highest yields in the history of the Twin Falls and Burley areas obtained. Conditions in east Idaho area were also excellent as far as freedom from Eutettix tenellus was concerned. An area in the west end of the Snake River Valley which was more or less experimental gave a yield of 22 tons to the acre on 300 acres planted. In the Sevier Valley, Utah, a very mixed condition holds. There was a considerable movement of insects into the valley early in May, though the populations were not uniform. Those areas where the populations were high suffered severely, but some sections gave fair averages. In both the Idaho and Sevier Valley areas the percentage of E. tenellus bearing the curly-top virus was very low." (Walter Carter, Bureau of Entomology, U. S. D. A.)

SUGARCANE BORER.

"The damage from the sugarcane borer (Diatraea saccharalis Fab.) was high in Louisiana in 1927. The winter of 1926-27 was rather dry and favored hibernation. The spring development was at least a month earlier than usual. By August 1 as much as 60 per cent of the stalks of sugarcane were infested in some fields, and the increase was rapid until at the time for cutting (October 1 and later) the stalk infestation over the sugar section of Louisiana averaged 82.8 per cent, with some fields having an infestation of 100 per cent. It is estimated in a preliminary way that there was a loss of 27 per cent of the sugar crop from the moth borer in 1927.

Examinations on the spread of the moth borer were not made in 1927, but it is known that little new territory is acquired from one year to another. Roughly, the territory occupied is in the southern half of Louisiana, the southern half of Florida, the coast of Texas, the coast of Mississippi, and a section around Woodville, Miss." (T. E. Holloway and W. E. Haley, Bureau of Entomology, U. S. D. A.)

GYPSY MOTH.

"As a result of the exterminative measures used by the Bureau of Entomology with the infested States cooperating, no additional territory has been found infested by the gypsy moth (Porthetria dispar L.) during the past year. There has been a decrease in the infested area in New Jersey and New York. Conditions in the barrier zone in western New England and eastern New York have improved and it has been possible to release from quarantine 13 towns in Vermont and 2 in Connecticut. East of this area the infestations were more severe than during the previous year, and the parasites and natural enemies have not been effective this season. In Massachusetts feeding was especially severe in Bristol, Plymouth, Norfolk, Middlesex, and Essex Counties. Large areas were almost entirely defoliated north of Lake Winnipesaukee in New Hampshire, and the acreage in the Lake Sebago section of Maine was the largest that has ever occurred in that State. In Rhode Island there were several heavily defoliated areas. A survey including the heaviest infested areas in all of the New England States showed partial to complete defoliation in 142,000 acres.

Considerably over one-half of this area showed from 75 to 100 per cent defoliation. The infestations have increased in the territory between the Connecticut River and the barrier zone and intensive work will be necessary to prevent reinfestation of the barrier zone." (A. F. Burgess, Bureau of Entomology, U. S. D. A.)

SATIN MOTH.

"The satin moth (Stilpnotia salicis L.) has continued to spread and increase in abundance. Willow and poplar trees have been entirely defoliated in many villages along the New England Coast from Yarmouth, on Cape Cod, to Biddeford, Maine, and as far west as Nashua, N. H., Leominster, Mass.,and Providence, R. I. In several cases the caterpillars have swarmed over and into dwellings after defoliating near-by shade trees. This insect has crossed the Connecticut River at Holyoke, Mass., and is present in most of the area east of a line drawn from Holyoke to Conway, N. H. In Maine it was found during the summer as far north as Skowhegan and Bangor, and east to the City of Ellsworth. The quarantine line has been extended to include 88 more towns in Maine, 4 more in New Hampshire, and 25 more in Massachusetts." (A. F. Burgess, Bureau of Entomology U. S. D. A.)

ORIENTAL MOTH:

"According to casual observations the oriental moth (Cnidocampa flavescens Walk.) was more abundant than usual during the summer of 1927 in the older infested area. Many of its favored food plants were entirely defoliated. It is most abundant in Boston and the surrounding towns and cities and has been found in Swampscott during the present season." (A.F. Burgess, Bureau of Entomology, U. S. D. A.)