Bulletin 360 March, 1934

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THIRTY-THIRD REPORT
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CONNECTICUT STATE ENTOMOLOGIST

THIRTY-THIRD REPORT

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W. E. Britton

ENTOMOLOGICAL FEATURES OF 1933

The winter of 1932-33 like the preceding winter was not severe and temperatures were not very low. Snowfall was neither heavy nor frequent. Warm weather came on gradually in the spring and plants started into growth at about the normal time. The precipitation was considerably below normal for the months of May, June and July, and was much above normal for August and September.

There was more than the usual amount of injury by cutworms; and climbing cutworms, particularly the variegated cutworm, *Lycophotia margaritosa saucia* Hubn., caused severe injury to pepper and other vegetable and flowering plants. There was the usual injury by the striped cucumber beetle, *Diabrotica vittata* Fabr., the cabbage maggot, *Hylemyia brassicae* Bouché, the cabbage looper, *Autographa brassicae* Riley and the potato flea beetle, *Epitrix cucumeris* Harr.

Severe damage to early sweet corn by the European corn borer, *Pyrausta nubilalis* Hubn., occurred in the region around Hartford, and by the Mexican bean beetle, *Epilachna corrupta* Muls., throughout the state. In certain localities, defoliation of apple and grape was caused by the rose chafer, *Macrodactylus subspinosus* Fabr., and of grape by the light-loving grapevine beetle, *Pachystethus lucicola* Fabr. There was moderate damage throughout the state by the corn ear worm, *Heliothis obsoleta* Fabr. Rose leaves and pear fruit were injured by the rose leaf beetle, *Nodonota puncticollis* Say, and in Sharon, rose was partially defoliated by the green gold beetle, *Chrysochus auratus* Fabr. The Japanese weevil, *Pseudocneorrhinus setosus* Roelofs, reported last year, continued to injure hemlock and ornamental shrubs in West Haven and has caused similar damage in Westville.

The Japanese beetle, *Popillia japonica* Newm., has continued to increase and spread, and was found for the first time in Manchester, Middletown and Putnam. In Bridgeport the beetles were so abundant that grapevines, Virginia creeper, and roses were considerably injured. Injury

by the Asiatic beetle, *Anomala orientalis* Waterh., to untreated lawns has continued in the Westville region and has occurred at several other points in New Haven and West Haven. For the first time definite injury by the Asiatic or Japanese garden beetle, *Autoserica castanea* Arr., has been called to our attention, where the adults devoured the leaves of hardy chrysanthemum, heliotrope, lemon verbena and zinnia in a garden in New Haven.

The Oriental fruit moth, *Grapholitha molesta* Busck, was prevalent in about the same degree as last year, there being an increase in some orchards and a decrease in others. Peach orchards in the northern central portion of the state were the most heavily infested. The eastern tent caterpillar, *Malacosoma americana* Fabr., has increased enormously during the last four or five years. The elm leaf beetle, *Galerucella luteola* Mull., caused less damage than in 1932, but unsprayed trees were brown by August 1, in many localities. The European lesser elm bark beetle, *Scolytus multistriatus* Marsh., is now present in Connecticut at Darien, Greenwich and Stamford, and Federal scouts have recently discovered it in Fairfield, Meriden, Naugatuck and New Milford. In New Jersey this insect has been associated with the Dutch elm disease.

Severe damage has been caused to red, Scotch and Austrian pines by the European pine shoot moth, *Rhyacionia buoliana* Schiff., in Fairfield, Middlesex and New Haven counties. Attempts to control it have been made by cutting and burning severely injured trees, clipping off and burning the infested tips, and by spraying.

A large and scattered infestation of the gipsy moth, *Porthetria dispar* Linn., in woodland in Wolcott, required much time and attention in scouting and spraying. In July, just after the spraying season had ended, a large infestation was discovered near Groton Long Point where nearly 30 acres of oak and maple woodland were stripped. Here the number of egg-clusters will run into hundreds of thousands and the place is now being cleaned.

One of the most outstanding entomological events of the season has been the opportunity to take advantage of help from the United States Government in forest insect control by appropriations to furnish work for the unemployed through the Civilian Conservation Corps Camps, the Public Works Administration, and the Civil Works Administration. Weeviled white pine tips over large areas in state forests were cut and burned between June 25 and August 15. Considerable scouting has been done for gipsy moth, and red and Scotch pine tips infested with European pine shoot moth have been clipped off and burned. More of this work will be done during the next few months.

An insect pest survey of the season is given on the following pages, arranged in brief form to save space and expense in printing. Some of the more important items are treated in greater detail in the separate articles and notes printed elsewhere in this report.

INSECT RECORD FOR 1933

Fruit Insects

Name — Locality, host, date and remarks.

Aegeria exitiosa, peach borer. Usual amount of damage to peach trees throughout the state.

Agrilus ruficollis, red-necked cane borer. Injured raspberry, Middletown, Aug. 16.

Alsophila pometaria, fall canker worm. Apple trees at Montowese had been defoliated June 8. Locally abundant and destructive, particularly in the southwestern portion of the state. Stratford, June 17.

Ampelophaga myron, myron sphinx. Caterpillar on grape, Middletown, Aug. 9

Anuraphis roseus, rosy apple aphid. Scarce early in the season, but in June it became so abundant that severe injury occurred in several orchards particularly in New Haven County. Specimens from Bethel, May 31; Glenbrook, Oct. 7.

Aphis pomi, green apple aphid. Less prevalent throughout the season than usual.

Aspidiotus perniciosus, San José scale. Scarce for several years but now increasing. On apple, Milford, Oct. 19.

Byturus unicolor, raspberry fruit worm. Injured raspberries at New Canaan.

Cacoecia argyrospila, fruit tree leaf roller. Present in some localities, and caused considerable injury in two of the largest apple orchards in New Haven County. Also reported from Greenwich where it has caused considerable damage for several years.

Cacoecia rosaceana, oblique-banded leaf roller. Rather prevalent in apple orchards in 1933.

Carpocapsa pomonella, codling moth. Present in fully the usual numbers in all apple orchards of the state.

Conotrachelus nenuphar, plum curculio. Less abundant than usual, particularly in apple orchards. Injury on apple, Glenbrook, Mount Carmel, Oct. 7.

Eriocampoides limacina, pear slug. Skeletonized the leaves of pear and cherry throughout the state. Larvae on pear, Litchfield, Aug. 14.

Eriophyes pyri, pear leaf blister mite. On pear, New Haven, May 16; Bethany, June 20; Litchfield, Aug. 14.

Eriosoma lanigera, woolly apple aphid. On hawthorn, Ansonia, Aug. 23.

Erythroneura comes, grape leafhopper. Present in usual numbers.

Grapholitha molesta, Oriental fruit moth. Prevalent in about the same degree as in 1932; increased in some orchards and decreased in others. Peach orchards in the northern central portion of the state were the most heavily infested. About 27,000,000 Trichogramma and 4,500 Macrocentrus parasites were reared at this Station in 1933 and distributed to growers for the control of this insect.

Hemerophila pariana, apple and thorn skeletonizer. On hawthorn, Ansonia, Aug. 23.

Hyphantria cunea, fall webworm. Common locally on pear and apple but perhaps less so than in 1932.

Lasioptera vitis, tomato grapevine gall. On grape, Stratford, June 16.

Fruit Insects—(*Continued*)

Name — Locality, host, date and remarks.

Laspeyresia prunivora, lesser apple worm. Injury on apple fruit was evident at harvest time.

Macrodactylus subspinosus, rose chafer. Unusually common and injurious. Injured apples, Watertown, June 13; apple and grape, Jewett City, June 24; grape, Beacon Falls, June 29.

Malacosoma americana, eastern tent caterpillar. Increasingly abundant throughout the state on apple and wild cherry. Cocoon, Stamford, June 28.

Myzus cerasi, cherry aphid. Bethel, May 31.

Nodonota puncticollis, rose leaf beetle. Very abundant and disfigured pears in Hamden by eating into the growing fruit.

Pachystethus lucicola, light-loving grapevine beetle. Unusually abundant and defoliated vineyard of 1200 vines at Beacon Falls, June 29; Norwich, June 17; Norwalk, July 13; Bristol, July 18; Somers, July 24.

Paratetranychus pilosus, European red mite. Not as common as in some seasons, but was present on Baldwin in several localities.

Pelidnota punctata, spotted grapevine beetle. Less abundant than in 1931. Beacon Falls, June 29; Middletown, July 20; Somers, July 24.

Phyllophaga fusca, a May or June beetle. Two adults eating raspberry leaves, Orange, May 27.

Phyllophaga tristis, a small May or June beetle. Many adults feeding on raspberry leaves, Orange, May 27; Easton, June 7.

Phylloxera vitifoliae, grape phylloxera. Galls on grape leaves, Middletown, July 20.

Psyllia pyricola, pear psylla. Present but less abundant than in outbreak seasons.

Rhagoletis pomonella, apple maggot. Fully as prevalent as in 1932, and caused injury in many orchards. Infested fruit from Kensington, Jan. 7; Mount Carmel, Oct. 7.

Samia cecropia, cecropia moth. Cocoon on apple, Middletown, July 14.

Scolytus sulcatus. Adults in plum, Greenwich, July 22.

Tmetocera ocellana, bud moth. Not prevalent. Larva on apple, Woodbridge, June 1.

Typhlocyba pomaria, white apple leafhopper. Present but less injurious than in 1932.

Xylina sp., green fruit worms. Injury by green fruit worms was common in apple orchards.

Vegetable Insects

Anaphothrips striatus, grass thrips. On corn, Greenwich, June 27.

Anasa tristis, squash bug. New Haven, Aug. 1. Abundant throughout the state.

Aphis maidis, corn leaf aphid. On corn, Hamden, Aug. 9.

Vegetable Insects—(*Continued*)

Name — Locality, host, date and remarks.

Cirphis unipuncta, armyworm. Not generally prevalent. Injuring corn, Orange, June 28.

Crambus sp. (unidentified). Larva in corn, East Granby, May 27.

Cutworms, were fully as abundant as usual and troublesome throughout the state.

Deloyala clavata, clavate tortoise beetle. Adults on tomato, Essex, June 12.

Diabrotica vittata, striped cucumber beetle. Very common throughout the state.

Empoasca fabae, potato leafhopper. Some fields heavily infested resulting in severe tip burn particularly in central portion of state. On bean, New Haven, Aug. 3.

Epicauta cinerea var. *marginata*, margined blister beetle. Adults on Swiss chard and other vegetables, West Haven, July 18; New Milford, July 20.

Epicauta pennsylvanica, black blister beetle. Adults, West Haven, July 14.

Epilachna borealis, squash beetle. More abundant than usual.

Epilachna corrupta, **Mexican bean beetle.** Adults appeared earlier and were more prevalent than in 1932. Second generation delayed by cool wet weather, with injury somewhat less than last year. Commercial damage occurred throughout the state. **New Haven, July 20.**

Epitrix cucumeris, potato flea beetle. Adults appeared in large numbers May 19 and caused severe damage to potatoes in the Connecticut River Valley. Also more abundant on tobacco at East Hartford, West Granby, Windsor and Windsor Locks than in 1932.

Frankliniella fusca, tobacco thrips. Was more injurious than usual to tobacco in Windsor and East Hartford.

Glisrochilus quadriguttatus, four-spotted sap beetle. In corn injured by European corn borer, Milford, July 19, 27; Ellington, July 26.

Gryllus assimilis, field cricket. Injured tomatoes by eating into the green and ripe fruits, Windsor, Sept. 7.

Heliothis obsoleta, corn ear worm. Injured corn throughout the state. Saugatuck, Oct. 23.

Heliothis virescens, tobacco budworm. Injures tobacco by eating into the buds. Equally abundant as in 1932. Windsor, July and August.

Hylemyia brassicae, cabbage maggot. Very abundant and destructive to untreated plants throughout the state, particularly at Storrs, East Hartford, East Haven, North Haven, Milford, Orange, Cheshire, Windsor and Woodbury in June.

Hylemyia cilicrura, seed corn maggot. Spring injury to vegetable seeds about as usual. In germinating spinach, Branford, Sept. 21.

Leptinotarsa decemlineata, Colorado potato beetle. Somewhat less prevalent than usual at Mount Carmel.

Lycophotia margaritosa saucia, variegated cutworm. Injured pepper plants severely at Southington in June.

Vegetable Insects—(*Continued*)

Name — Locality, host, date and remarks

Melanotus communis, wireworm. Larvae in corn, Middletown, June 29.

Melittia satyriniformis, squash borer. Abundant in usual numbers, Woodbridge, July 31; Greenwich, Aug. 14.

Ormenis sp., mealy flata. On bean, Middletown, July 8.

Papaipema nitela, stalk borer. In bean, Middletown, July 8; in corn, East Windsor, July 11.

Phlegethontius sp., tomato or tobacco worm. Larva on tomato, Winsted, Aug. 10; Milford, Aug. 16.

Phyllophaga tristis, a May or June beetle. Adults injured beans, New Haven, May 12.

Phytonomus rumicis, sorrel weevil. Injured sour grass or sorrel grown for seed, Milford, June 1, 20.

Pyrausta nubilalis, **European corn borer.** Very abundant and destructive to corn in southern and central portions of the state. In late winter larvae were abundant in cornstalks in the field in New London and Middlesex Counties. Many had been removed from the stalks by birds. Larvae injured potatoes in East Hartford in June. In corn, East Windsor, July 11; Southport, July 19; Ellington, July 26; Hartford, July 28; Saugatuck, Oct. 23.

Rhopalosiphum pseudobrassicae, turnip aphid. Southington, Aug. 2.

Sibine stimulea, saddle-back caterpillar. Feeding on corn, New Haven, Aug. 14; Norwalk, Norwich, Sept. 23.

Thrips tabaci, **onion thrips.** Responsible for much damage to onions grown from seed and sets in the Connecticut River Valley. On garden peas, Milford, June 14.

Shade and Forest Tree Insects

Acrobasis sp.? (unidentified). Small brown larva, crushed in the mails, on butternut, Higganum, May 8.

Acrosternum hilare, green stink bug. On cut-leaf maple, Hartford, Sept. 20

Adelges abietis, **spruce gall aphid.** Common on Norway spruce, Norwalk, June 1, 30; Essex, June 20; Waterville, July 5; Greenfield Hill, July 17; Torrington, Sept. 16.

Adelges pinicorticis, pine bark aphid. Common everywhere on white pine. New Haven, May 24; Niantic, July 11; West Haven, Oct. 13.

Agrilus anxius, bronze birch borer. Injured white birch trees, Thompsonville, July 18.

Agrilus bilineatus, two-lined chestnut borer. Rather severe injury to beech branches, Greenwich, July 24, according to Dr. E. P. Felt.

Alsophila pometaria, fall canker worm. Defoliated trees locally in the southwestern portion of the state.

Shade and Forest Tree Insects—(*Continued*)

Name — Locality, host, date and remarks.

Anisota senatoria, orange-striped oak worm. Many trees wholly or partially stripped Sept. 22, in Griswold, Groton, Ledyard, Lisbon and Preston, according to J. V. Schaffner, Jr.

Aphids (unidentified). On spruce, Norwalk, June 30.

Argyresthia thuiella, arborvitae leaf miner. Severe injury, Watertown, June 23

Aspidiotus abietis, a circular armored scale. On hemlock, Cos Cob, Mar. 3.

Aspidiotus tsugae, a circular armored scale. On *Taxus*, Greenwich, Mar. 24.

Basilona imperialis, imperial moth. Adult, East Lyme, Sept. 20.

Battaristis vittella, a pine shoot moth. Simsbury, Nov. 5, 1932; Hartland, June 17; Brookfield, June 23; Wallingford, Aug. 21.

Biorhiza forticornis, oak fig gall. On white oak, New London, July 31

Bryobia praetiosa, clover mite. On red pine, West Haven, Feb. 28.

Buprestid beetle (unidentified). Mangled larva in oak twig, New Haven, Sept. 14.

Calaphis castaneae, a leaf aphid. On chestnut, Hamden, Sept. 27.

Callirhytis operator, a Cynipid gall. On pin oak, Bridgeport, June 17.

Cecidomyia nivipila, woolly fold gall. On pin oak, Litchfield, June 6.

Cecidomyia ocellaris, maple leaf spot gall. New Haven, June 3; South Norwalk, June 7.

Cecidomyia sp. (unidentified). A gall on pin oak, West Redding, July 7

Chionaspis pinifoliae, pine leaf scale. Watertown, Nov. 8, 1932; East Windsor Hill, Apr. 20; Farmington, June 17; Manchester, June 20; New York, N. Y., July 31; Rockville, Aug. 1; Greenwich, Aug. 10; Devon, Aug. 14; West Hartford, Oct. 27.

Chrysobothris sp., a flat-headed borer. Larva in hemlock, Branford, Nov. 15, 1932.

Cincticornia pilulae, oak pill gall. On scarlet or red oak, Old Lyme, Sept. 20.

Citheronia regalis, hickory horned devil; regal moth. Larvae, Portland, Aug. 23; Groton, Sept. 16; Waterbury, Sept. 18.

Clastoptera sp., a spittle bug. On juniper, Devon, July 14; Guilford, July 20.

Cnidocampa flavescens, Oriental moth. Empty cocoons on Norway maple, Winthrop, Mass., July 28.

Coleophora laricella, larch case bearer. Prevalent throughout the state, and was particularly destructive in Litchfield County. Litchfield, June 5.

Coleophora limosipennella, elm case bearer. Locally abundant from Branford westward, according to Dr. E. P. Felt.

Conophthorus coniperda, pine cone beetle. In white pine cones, Keene, N. H., June 24.

Shade and Forest Tree Insects—*(Continued)*

Name — Locality, host, date and remarks

Corythucha arcuatus, oak lacebug. On white oak, Cobalt, June 14.

Corythucha ciliata, sycamore lacebug. Very abundant throughout the state. Sycamore leaves brown in late summer from injury by this insect. Wallingford, Aug. 31.

Corythucha pallida ulmi, elm lacebug. Reported by Dr. E. P. Felt as being abundant on elm in the vicinity of Kent, Aug. 24.

Cryptorhynchus lapathi, poplar and willow curculio. Manchester, June 20.

Cynip galls (unidentified). On white oak, Cobalt, June 14.

Dasyneura communis, gouty vein gall. Union, June 17; South Glastonbury, June 22.

Dasyneura corticis, a gall on willow. West Hartford, May 24.

Diapheromera femorata, walkingstick. Hamden, Oct. 13.

Diaspis carueli, juniper scale. On juniper, Bridgeport, Sept. 26.

Dilachnus sp., an aphid on beech. Greenwich, July 21.

Dilachnus sp., an aphid on pine. Rockville, Aug. 1.

Diprion simile, introduced pine sawfly. Larvae and cocoons on stone pine, Ridgefield, Sept. 8.

Dryophanta lanata, an oak leaf gall. On pin oak, New Britain, Sept. 13; West Hartford, Sept. 22; Hamden, Sept. 30.

Eriophyes modesta, a mite gall. On sugar maple, Guilford, Sept. 13.

Eriophyes sp., mite galls, probably four different species. On maple, Mass., July 17; on poplar, Mass., July 17; on linden, Greenwich, June 15, July 11; on elm, Cos Cob, May 27.

Eucosma gloriola, pine tip moth. On white pine reported by Dr. E. P. Felt, Greenwich and Stamford.

Eulia pinatubana, pine tube moth. On white pine, Norwalk, July 7, Oct. 27; Hartford, Oct. 27.

Fenusa pumila, birch sawfly. Westfield, Mass., June 14.

Fiorinia japonica ? a scale insect on hemlock. Cos Cob, Mar. 3.

Galerucella luteola, elm leaf beetle. Fairly abundant throughout the state but perhaps less so than in 1931 and 1932. Adult beetles, Stamford, Dec. 6, 1932; West Haven, Apr. 28; Norwich, May 2; Greenwich, May 4; injured leaves, Gaylordsville, July 10; Rockville, July 19; Stamford, Aug. 25.

Gall mites, on pin oak, Litchfield, June 6.

Gelechia abietisella, hemlock webworm. Branford, June 21.

Gillettea cooleyi, blue spruce gall aphid. Waterbury, Feb. 9; Bethlehem, Apr. 10; Southington, Apr. 22; West Hartford, Apr. 27; Hamden, May 12; New Haven, July 21, 28, Aug. 10; Rockville, Aug. 1; Wethersfield, Aug. 3; Middletown, Aug. 5; Windsor, Aug. 31.

Shade and Forest Tree Insects—(*Continued*)

Name — Locality, host, date and remarks.

Glycobius speciosus, maple borer. Injury observed in East Haven, Sept. 21.

Haltica ulmi, green elm beetle. Occurred in great numbers at base of elm tree, Canaan, Mar. 14.

Hickory midge gall (unidentified). Cheshire, July 21.

Hormaphis hamamelidis, witch-hazel cone gall. On birch, Hamden, May 31.

Hypermallus villosum, twig pruner. Adult, Waterbury, June 16.

Itonida foliora, a marginal leaf fold gall. On black oak, Hartford, June 5.

Kermes sp. (unidentified), oak gall scale. On white oak, Hartford, June 13; on oak, New Haven, Aug. 8.

Lapara bombycoides, pine tree sphinx. Larvae, Woodbridge, Sept. 5.

Lecanium fletcheri, arborvitae scale. On arborvitae, Clinton, June 10; Darien, June 21.

Lepidopterous larvae (unidentified). On red pine, East Hampton, July 21; Austrian pine, Branford, Oct. 31.

Lepidosaphes ulmi, oyster-shell scale. On ash, Waterbury, June 28.

Leucaspis japonica, a Japanese armored scale. On Norway maple and California privet, New Haven, May 27, July 13.

Lithocolletis hamadryadella, white oak blotch leaf miner. On white oak, Cheshire, July 21.

Macrosiphum liriodendri, a leaf aphid. On tulip tree, East Haven, June 21.

Mites (unidentified). On oak, Bridgeport, Sept. 6.

Myzocallis walshi, a leaf aphid. On pin oak, Middletown, Aug. 29.

Neodiprion lecontei, red-headed pine sawfly. Larvae, New London, Aug. 19.

Neodiprion pinetum, Abbot's sawfly. Larvae, Columbia, June 19; Winsted, July 22.

Neolecanium cornuparvum, magnolia scale. Hamden, Aug. 8.

Nepticula sericopeza, Norway maple leaf-stalk borer. Litchfield, Redding Ridge, June 6.

Neuroterus batatus, oak potato gall. Bloomfield, June 2.

Paratetranychus ununguis, spruce mite. On hemlock, Cos Cob, Mar. 3; Putnam, June 29; West Hartford, July 5; New Canaan, July 13; Bridgeport, Sept. 26; on pine, New York, N. Y., July 31; on juniper and retinospora, Bridgeport, Oct. 31.

Philonix niger, a Cynipid oak gall. On pin oak, Westport, Aug. 29.

Phyllocoptes aceris-crumena, maple spindle gall. Mass., July 17.

Phyllocoptes quadripes, maple bladder gall. On silver maple, Manchester, May 22; Canaan, June 1; Darien, June 8; New Britain, June 22; Niantic, July 5.

Shade and Forest Tree Insects—(*Continued*)

Name — Locality, host, date and remarks.

Phylloxera caryaecaulis, hickory stem gall aphid. Bloomfield, June 12; South Glastonbury, Aug. 19.

Phylloxera caryaefallax, a stem gall on hickory. South Glastonbury, June 22.

Pissodes approximatus, a pine weevil. Woodbridge, Sept. 5; Bridgeport, Oct. 19; also the following may prove to be this species: larvae in red pine, Hartford, June 7; pupal cells in Douglas fir, Hartford, Sept. 6.

Pissodes strobi, white pine weevil. In white pine, Brookfield, June 23; in Norway spruce, Rockville, Aug. 1.

Plagiodera versicolora, imported willow leaf beetle. Adults, West Hartford, May 26; adults, larvae, pupae, and injured leaves, Stratford, June 31; larvae and injured leaves, West Haven, Aug. 8.

Porthetria dispar, gipsy moth. A stripped area of about 30 acres of oak and maple was discovered near Groton Long Point in July, and clean-up measures are now in progress. Hundreds of thousands of egg-clusters have been found and creosoted. Adults, Preston, Aug. 4.

Prionus laticollis, broad-horned prionus. Adult, Madison, July 17.

Priophorus acericaulis, maple leaf stem borer. Thompsonville, Hartford, May 29; New Haven, June 1; Middletown, June 10.

Pseudococcus comstocki, catalpa mealybug. On umbrella catalpa, New Britain, July 17.

Pulvinaria acericola, cottony maple leaf scale. On Cornus, Bridgeport, June 17.

Pulvinaria vitis, cottony maple scale. On Norway maple, Thompsonville, July 28.

Rhyacionia buoliana, European pine shoot moth. Very prevalent in southwestern portion of the state and has severely injured red pine in many forest plantings. Larvae in red pine, Farmington, Simsbury, Nov. 15, 1932, June 17; Hartford, June 7, 17; Brookfield, June 23; in mugho pine, Norwalk, July 7; in Scotch pine, Chelmsford, Mass., Oct. 19; Hempstead, N. Y., Oct. 23.

Rhyacionia comstockiana, a pine shoot moth. Larva in red pine, Nepaug, Nov. 15, 1932.

Rhyacionia frustrana, Nantucket pine moth. In short-leaf and loblolly pine, Durham, N. C., Sept. 18.

Rhyacionia rigidana, a pine shoot moth. Pupae in red pine, Simsbury, Nov. 15, 1932; West Greenwich, R. I., Oct. 24.

Samia cecropia, cecropia moth. Larva on maple, Hamden, Aug. 4.

Sawfly larvae, injury to red pine, Middletown, Oct. 27.

Scolytid beetle (unidentified). In arborvitae, Cheshire, Aug. 17.

Scolytus multistriatus, a European elm bark beetle. Present in dead and dying elm, Darien, Fairfield, Greenwich, Meriden, Naugatuck, New Milford and Stamford, according to Dr. E. P. Felt and Federal Scouts. This insect is associated with the Dutch elm disease.

Shade and Forest Tree Insects—(*Continued*)

Name — Locality, host, date and remarks.

Serica sericea, a Scarabaeid beetle. Adult, South Glastonbury, June 22.

Sesia acerni, maple sesian. Characteristic galls of this insect on maple branch, Brandon, Vt., July 24.

Stilpnotia salicis, satin moth. Adults and pupae on Carolina poplar, New Haven, June 30.

Symmerista albifrons, a Notodontid moth. Mr. J. V. Schaffner, Jr., reported the larvae as common on white oak in woodlands, Thompson and vicinity, Sept. 12 to 19.

Tetralopha robustella, a pine moth. Work on pine, Branford, Sept. 28; Hamden, Oct. 21; Danielson, Oct. 28.

Tetranychus bicolor, oak mite. On pin oak, New Britain, Sept. 13; on chestnut, Hamden, Sept. 29.

Thyridopteryx ephemeraeformis, bagworm. On arborvitae, West Point, N. Y., July 5; Greenwich, July 22; New Jersey, Aug. 4.

Toumeyella liriodendri, tulip tree scale. East Haven, June 21.

Xylotrechus quadrimaculatus, a Cerambycid borer. Reported by Dr. E. P. Felt as injuring a beech hedge, New Canaan, Apr. 24.

Zeuzera pyrina, leopard moth. Pupa in elm, Danbury, May 26; adult, New Haven, June 27; larva in sycamore, Hamden, Sept. 30.

Insects of Ornamental Shrubs and Vines

Agrilus communis ab. *rubicola,* rose stem girdler. On *Rosa hugonis,* Bolton, Dec. 9, 1932.

Aphis spiraecola, spiraea aphid. New Haven, June 23.

Archips rosana, rose leaf folder. On California privet, Hamden, May 25; Bridgeport, May 29.

Brachyrhinus ovatus, strawberry crown girdler. Adults associated with the black vine weevil from roots of injured *Taxus,* Hamden, June 14.

Brachyrhinus sulcatus, black vine weevil. Larvae on roots of injured *Taxus,* New Haven, Apr. 21; adults, Hamden, June 14.

Caliroa aëthiops, rose sawfly. Injured rose leaves, West Hartford, Aug. 24.

Chionaspis euonymi, euonymus scale. On *Pachysandra terminalis,* New Haven, Dec. 7, 1932; Bridgeport, Sept. 26; on bittersweet, Hamden, July 21; on euonymus, Centerbrook, Jan. 19; New Haven, Feb. 18, July 17, Oct. 13; Middlebury, Aug. 4; Manchester, Aug. 16; Bridgeport, Sept. 26.

Chrysochus auratus, green gold beetle. Adults, Hartford, June 28; Norfolk, Aug. 14; feeding on rose, Sharon, July 24.

Corthylus punctatissimus, pitted ambrosia beetle. Injury to rhododendron, Greenwich, Oct. 23.

Insects of Ornamental Shrubs and Vines—(*Continued*)

Name — Locality, host, date and remarks.

Corythucha cydoniae, quince lacebug. On *Pyracantha* or firethorn, Greenwich, Apr. 24, according to Dr. E. P. Felt.

Crabro sp. Adults boring in cut rose stems, Bristol, Sept. 16.

Eriococcus azaleae, azalea scale. Meriden, Aug. 14; New Haven, Sept. 29.

Euphoria inda, bumble flower beetle. North Haven, May 11; Hartford, Aug. 29, 31; Putnam, Sept. 1; on boxwood, Darien, Sept. 13.

Eurycyttarus confederata, a small moth. Larva lives in a case of leaves and stems and is found hanging from the under edge of shingles and clapboards. New Haven, July 31.

Gracilaria azaleella, azalea leaf miner. Injured azalea leaves, Greenwich, Mar. 24.

Leaf roller (unidentified). On rose, Branford, June 24; West Hartford, Aug. 24.

Lecanium excrescens, a scale insect. On wistaria, Greenwich, Feb. 23. Reported by Dr. E. P. Felt, the first record of this insect for Connecticut.

Lepidosaphes newsteadi, a scale insect. Injured umbrella pine, Greenwich, Mar. 24.

Lepidosaphes ulmi, oyster-shell scale. On lilac, Keene, N. H., Sept. 18.

Liosomaphis berberidis, barberry aphid. On Japanese barberry, New Haven, May 18.

Mamestra picta, zebra caterpillar. Larva on rose, Branford, June 24.

Mite injury (unidentified). On azalea, Wethersfield, Sept. 14; on lilac, Keene, N. H., Sept. 18.

Monarthropalpus buxi, boxwood leaf miner. Injured boxwood leaves. Maggots healthy in midwinter, Southport, Feb. 21.

Nodonota puncticollis, rose leaf beetle. Injuring rose, Southport, June 9.

Pemphredon tenax, a solitary wasp. Boring in cut rose stem, Bristol, Sept. 16.

Popillia japonica, Japanese beetle. Feeding on rose, Greenwich, Aug. 7.

Pseudocneorrhinus setosus, a Japanese weevil. Adults feeding on various shrubs, New Haven, June 7; West Haven, June 16.

Pyrausta nubilalis, European corn borer. Larva tunneling in rose stem, New Haven, Oct. 20.

Rhodites radicum, rose root gall. On *Rosa rugosa*, Thompsonville, May 1.

Saperda puncticollis, woodbine borer. Adult in house, New Haven, June 10.

Sphecodina abbotii, Abbot sphinx. Larva feeding on grape and woodbine, Norwich, July 28.

Stephanitis rhododendri, rhododendron lacebug. On rhododendron, Norwalk, Feb. 18; Wilton, Apr. 25; Hamden, Apr. 27, Sept. 5, Oct. 21; Newington, May 25; New Haven, July 27.

Typhlocyba rosae, rose leafhopper. On rose, West Hartford, Aug. 24.

Insects of Ornamental Shrubs and Vines—(*Continued*)

Name — Locality, host, date and remarks.

Vespa crabro, giant hornet. Adult, June 21; girdled arborvitae twigs, Cromwell, July 13.

Insects of Flowers and Greenhouse Plants

Agriolimax agrestis, garden slug. Injured canna, Funkia and violet, New Haven, Aug. 16.

Aphis (unidentified). On begonia, New Haven, Mar. 13.

Automeris io, io caterpillar. Feeds on many different kinds of plants. Hamden, Aug. 31.

Aylax glechomae, a gall on ground ivy. Hamden, June 6.

Deloyala clavata, clavate tortoise beetle. Adults feeding on Chinese lantern plant, New Haven, Sept. 14.

Epicauta cinerea var. *marginata*, margined blister beetle. Feeding on Nicotiana, New Haven, July 26.

Epicauta pennsylvanica, black blister beetle. Feeding on various flowers, New Haven, Aug. 29.

Hemichionaspis aspidistrae, fern scale. On fern, Mystic, Sept. 26.

Lycophotia margaritosa saucia, variegated cutworm. Larva feeding on Narcissus bud, Hartford, Feb. 9.

Macrodactylus subspinosus, rose chafer. Feeding on peony flower, New Haven, June 9.

Macronoctua onusta, iris borer. Larvae in rootstocks, Oxford, July 12; New Haven, Aug. 9.

Poecilocapsus lineatus, four-lined plant bug. On Veronica, Madison, June 29; on aster, verbena, chrysanthemum, coreopsis and gaillardia, West Hartford, July 8; on spearmint, Branford, July 11.

Pseudococcus sp. (unidentified), a mealybug. On Croton, New Haven, Mar. 13; on gladiolus, Orange, May 4.

Pyrausta nubilalis, European corn borer. Pupa in zinnia stem, Old Lyme, July 31; in dahlia, New Haven, Sept.

Rhizoglyphus hyacinthi, bulb mite. In narcissus bulbs, New Haven, Feb. 28; in Bermuda lily, North Haven, Mar. 29.

Saissetia hemisphaerica, hemispherical scale. On house plant, New Haven, Aug. 3.

Sibine stimulea, saddle-back caterpillar. Larvae on wild cherry, North Branford, Sept. 5; on iris, Bridgeport, Sept. 6; on hardy aster, New Haven, Sept. 18; on corn, Norwalk, Norwich, Sept. 23.

Sminthurus hortensis, garden springtail. From gladiolus field, Orange, May 23.

Sowbug (unidentified). Feeding on pansy and violet, Greenwich, May 26.

Insects of Flowers and Greenhouse Plants—(*Continued*)

Name — Locality, host, date and remarks.

Taeniothrips gladioli, gladiolus thrips. Somers, July 24; Seymour, Sept. 29; Yalesville, Oct. 13.

Tarsonemus pallidus, cyclamen mite. On snapdragon, Montowese, Jan. 19; on larkspur, New London, May 8; Yalesville, May 16; New Haven, May 16, 27; Middletown, May 25; Hamden, June 14.

Tetranychus telarius, common red spider. On English ivy, Bridgeport, Feb. 18; on phlox, Oxford, July 12.

Thrips (unidentified). On snapdragon, Plantsville, Mar. 4.

Insects of Soil and Lawn

Agapostemon virescens, nests in lawn and hard soil. South Manchester, July 14.

Amara sp. (unidentified), a small ground beetle. Adults in soil, Norwich, May 12.

Anomala orientalis, Asiatic beetle. Larvae, Westville, Apr. 29, May 12, 17, Sept. 22, Oct. 2; New Haven, May 25, Aug. 19, Oct. 10, 11; West Haven, Sept. 25, 27; adults, Westville, June 22.

Autoserica castanea, Asiatic or Japanese garden beetle. Larvae, New Haven, Sept. 27, Oct. 7. Adults from same garden collected in July, received Oct. 2.

Blissus leucopterus, chinch bug. Killed grass in spots, Hamden, June 29; Old Greenwich, July 14; Hartford, July 25; Bridgeport, Aug. 10.

Bolboceras farctum, a Scarabaeid beetle. Adult in soil, New Haven, June 6.

Bolboceras farctum var. *tumefactum*. Adult, Hamden, May 27.

Carabus nemoralis, a large ground beetle. Adult, Southport, Apr. 19.

Chlorion ichneumonium, a large solitary wasp. Adult, Hamden, Aug. 29.

Colletes aestivalis, a sand-nesting bee. Adult, Collinsville, May 16.

Crambus caliginosellus, sod webworm. From golf greens, Woodbridge, July 13, 25.

Eutrombidium locustarum, grasshopper mite. A brilliant scarlet mite in soil, East Norwalk, Apr. 11.

Gordius lineatus, hair snake. In soil, Fairfield, June 1.

Gryllotalpa hexadactyla, mole cricket. Adult, Guilford, May 23.

Lasius interjectus, a brown ant. New Haven, May 2.

Philanthus longicornis, a solitary wasp. West Hartford, Aug. 9.

Phyllophaga tristis, a small May or June beetle. Larvae injured grass, Willimantic, Apr. 21; adult on bean, New Haven, May 12.

Phyllophaga sp. (unidentified). Larva and adult, Woodbridge, May 23; larva, New Haven, Sept. 27.

Insects of Soil and Lawn—(*Continued*)

Name — Locality, host, date and remarks.

Popillia japonica, Japanese beetle. Larva in soil, New Haven, Sept. 27.

Silpha americana, a carrion beetle. Adult, Hamden, July 18.

Sphecius speciosus, cicada killer. Nests in hard ground, Ansonia, Aug. 24.

Insects of the Household and Stored Food Products

Anthrenus scrophulariae, carpet beetle. Larvae, New Haven, Nov. 8, 1932; Watertown, June 7; White Plains, N. Y., June 28; Hartford, Oct. 30.

Apis mellifera, honey bee. Swarm colonies in chimney or porch, Hamden, Aug. 24; New Haven, Sept. 18, 22.

Attagenus piceus, black carpet beetle. Larvae, Bridgeport, Nov. 10, 1932; Waterbury, Mar. 25; Meriden, June 9; Fairfield, July 12; White Plains, N. Y., Oct. 27.

Brachyrhinus ovatus, strawberry crown girdler. Adults in houses, Cheshire, July 10; West Haven, July 14; New Canaan, July 20; New Haven, July 25, Aug. 26.

Bryobia practiosa, clover mite. Young mites crawling on the walls of buildings, Madison, Apr. 21; Hamden, May 4.

Dermestes lardarius, larder beetle. Adult, Wilton, May 24.

Dermestes nidum, a Dermestid beetle. Adults, South Norwalk, Dec. 8, 1932; Bridgeport, Feb. 23.

Forficula auricularis, an earwig. New Bedford, Mass., June 22.

Lepisma saccharina, silverfish or bristletail. Hartford, July 28.

Mylabris quadrimaculatus, four-spotted bean weevil. Hartford, May 16.

Scutigera forceps, house centipede. Hartford, May 16.

Sitotroga cerealella, Angoumois grain moth. In popcorn, North Stonington, Jan. 23.

Thermobia domestica, fire brat. West Haven, Mar. 9.

Tinea granella, European grain moth. Adults, New Haven, Feb. 27.

Tineola biselliella, webbing clothes moth. Infesting mohair, Hamden, Mar. 2.

Insects Infesting Timbers and Wood Products

Alaus oculatus, eyed click beetle. Adult in dead stump, Hamden, Feb. 2; adults, Colchester, June 7; East Haven, June 7, 9.

Asilid larva (unidentified). In telephone pole, Sept. 11.

Camponotus pennsylvanicus, carpenter ant. Mount Carmel, July 10; New Haven, Aug. 10; Westbrook, Sept. 7.

Insects Infesting Timbers and Wood Products—(*Continued*)

Name — Locality, host, date and remarks.

Cyllene caryae, hickory borer. In houses, probably emerged from fuel wood, New Haven, Mar. 9; West Haven, Mar. 29; Danbury, Apr. 25; Hartford, May 20.

Bee (unidentified). Tunneling in decayed wood. New Haven, Oct. 31.

Diaperis maculata, a Tenebrionid beetle. In telephone pole, Sept. 11.

Dicerca divaricata, a Buprestid beetle. Adults, Hartford, July 28.

Elaterid (unidentified), a click beetle. Larva and pupa in telephone pole, Sept. 11.

Formica exsectoides, mound-building ant of the Alleghanies. In cedar cabin, Woodbridge, July 27.

Hylotrupes bajalus, a long-horned beetle. Adult in clapboard of house, Bristol, July 22.

Lyctus sp. (unidentified), a powder post beetle. Adults in hickory porch chairs, Salisbury, June 16.

Parandra brunnea, Parandra borer. Adult from telephone pole, Sept. 16.

Pelidnota punctata, spotted grapevine beetle. Larva in decaying wood, New Haven, Nov. 2, 1932; adults and larvae from telephone pole, New Haven, July 25.

Phymatodes variabilis, a long-horned beetle. Larva is a borer in dead and dying oak twigs. Adults in house, probably emerged from fuel wood, Hartford, May 16.

Reticulitermes flavipes, termites; white ants. Damaged buildings, Milford, June 6, 12, Aug. 28; Hartford, Apr. 13; New Haven, May 2; South Manchester, May 27; Clinton, June 28; in telephone pole, New Haven, July 25.

Tenebrionid beetle (unidentified). Larva in decaying telephone pole, New Haven, July 25.

Valgus sp. (unidentified), a Scarabaeid beetle. Larva in telephone pole, Sept. 11.

Xestobium rufovillosum, a Ptinid beetle. Oak timbers in an old house honeycombed by this insect, Bethany, Aug. 7.

Xylocopa virginica, carpenter bee. Tunneling in wood, Shelton, May 26.

Beneficial Insects

Adalia bipunctata, two-spotted ladybeetle. Adult, Ivoryton, May 29.

Anatis quindecimpunctata, fifteen-spotted ladybeetle. Adult, West Hartford, May 26.

Ceratomegilla fuscilabris, spotted ladybeetle. Adults, Hamden, May 18; West Haven, July 14.

Coccinella novemnotata, nine-spotted ladybeetle. Adults, Devon, June 1; Southington, Aug. 29.

Coccinella transversoguttata, five-spotted ladybeetle. Adults, Ivoryton, May 29; Southington, Aug. 29.

Beneficial Insects—(*Continued*)

Name — Locality, host, date and remarks.

Ladybeetle larvae (unidentified). On turnip, Milford, July 27.

Podisus sp. (unidentified). Nymphs on mountain ash, New Haven, May 12.

Tenodera sinensis, Chinese mantid. Adults, West Haven, Sept. 25; Bridgeport, Oct. 13.

Zanthogramma divisa, a Syrphid fly. Larva with aphids, Middletown, Aug. 29.

Miscellaneous Insects

Amphion nessus, nessus sphinx moth. Adult, New Haven, May 27.

Aphodius fimetarius, a Scarabaeid dung beetle. Adult on peach tree, New Britain, Sept. 28.

Armadillium vulgare, sowbug or pillbug. Milford, Aug. 2; Essex, Aug. 28; Madison, Oct. 12.

Balaninus caryae, hickory-nut weevil. Injured nuts, Cromwell, Nov. 25, 1932.

Bibio albipennis, march fly. Adults resting on tree foliage, New Canaan, May 25.

Ceutophilus gracilipes, a cave cricket. Adult on locust tree trunk, Norfolk, July 10.

Chauliodes pennsylvanicus, fish-fly. Adults, Middletown, Aug. 25.

Chrysops callidus, green head fly. Very abundant biting humans and livestock, along the coast, July 22.

Cingilia catenaria, chain-spotted geometer. Adults, Cape Cod, Mass., Sept. 27.

Coleophora unicolorella, a small moth. Larva on seeds of *Juncus gerardi*, on salt marsh, East Haven, June 30.

Corydalis cornuta, dobson, hellgrammite. Adult, Hartford, June 28.

Dipterous puparia in milk bottle, New Haven, Sept. 22.

Entylia bactriana, a tree hopper. Ivoryton, May 29.

Estigmene acrea, salt marsh caterpillar. Adult, Farmington, June 17.

Eumenes fraterna, potter wasp. Nest on maple twig, Thompson, July 1.

Geotrupes splendidus, a Scarabaeid beetle. Adult, Bristol, Aug. 3.

Gymnetron teter, a small weevil. Ivoryton, May 29.

Hemaris thysbe, a clear-wing sphinx moth. Adults, Plainfield, Aug. 9; Putnam, Sept. 1.

Lethocerus americanus, giant waterbug. Adult, Winchester, Apr. 27.

Lucanus capreolus, stag beetle. Adults, Middletown, July 22; New Haven, Aug. 11.

Melanotus communis, a click beetle. Adult, Waterbury, June 16.

Miscellaneous Insects—(*Continued*)

Name — Locality, host, date and remarks.

Melissodes bimaculata, a solitary bee. Adults, West Haven, July 14; Hartford, July 18.

Papilio glaucus var. *turnus,* tiger swallow-tail butterfly. Larva, Waterbury, Aug. 18.

Papilio polyxenes, black swallow-tail butterfly. Pupa, West Hartford, Aug. 3.

Papilio troilus, green swallow-tail butterfly. Adult, New Haven, Aug. 1.

Parcoblatta uhleriana, a native cockroach. South Glastonbury, June 22.

Phthirius pubis, crab louse. Woodbridge, May 8.

Pseudosphinx tetrio, a tropical sphinx moth. Probably transported from Panama or the West Indies. Adult, New Haven, Aug. 25.

Tremex columba, pigeon horntail. Adults from dead maple, Clinton, Aug. 22.

Utethisia bella, bella moth. Adults, on aster flowers, Meriden, Oct. 6.

CONFERENCE ON EUROPEAN PINE SHOOT MOTH

The damage of the European pine shoot moth, *Rhyacionia buoliana* Schiff., to red pine forest plantations in Connecticut has been so severe that the matter was brought before the Executive Committee of the Eastern Plant Board at a meeting in New York, April 7. It was voted to request the Federal Bureau of Plant Quarantine to hold a conference to discuss the whole matter, in the hope that some policy might be formulated that would aid in the solution of the problem.

At the time the request was made changes were taking place rapidly in Washington and no call was issued for the conference until later in the season. It was suggested that if possible the conference should be held within the infested region so that some of the injured trees could be seen. Consequently the Bureau of Plant Quarantine was invited to hold the conference at this Station, and in due course a notice was issued for such a meeting, September 19. About 28 were present, including representatives of Connecticut, Massachusetts, New York, Pennsylvania, Vermont, and the United States Department of Agriculture. In the afternoon there was a field trip to observe the damage to red and Scotch pine plantations caused by this insect.

CONFERENCE OF CONNECTICUT ENTOMOLOGISTS

The tenth annual conference of entomologists working in Connecticut was held in the Assembly Room at the Agricultural Experiment Station, New Haven, on Friday, October 27, 1933. Professor J. A. Manter was elected chairman and 60 were present. Luncheon was served at the Station. Director Slate, Dr. Glasgow and Mr. Worthley were unable to be present. Mr. Worthley sent a paper that was read by Mr. Johnson. In other respects the following program was carried out:

GREETING, Director William L. Slate, New Haven

ENTOMOLOGICAL FEATURES OF THE SEASON OF 1933, Dr. W. E. Britton, New Haven

RECENT TERMITE DEPREDATIONS IN CONNECTICUT, M. P. Zappe, New Haven

INSECT WORK IN CIVILIAN CONSERVATION CORPS CAMPS IN CONNECTICUT, G. H. Plumb, New Haven

RECENT DEVELOPMENTS ON THE GIPSY MOTH PROJECT, A. F. Burgess, Greenfield, Mass.

THE STATUS OF THE JAPANESE BEETLE IN THE UNITED STATES IN 1933, L. H. Worthley, Harrisburg, Pa.

THE JAPANESE BEETLE AND THE EUROPEAN CORN BORER IN CONNECTICUT IN 1933, J. P. Johnson, Shelton.

NOTES ON THE WHITE BIRCH LEAF MINER, *Phyllotoma nemorata* IN NEW YORK, Dr. R. D. Glasgow, Albany, N. Y.

INSPECTION OF SPECIAL EXHIBITS AND OF THE DEPARTMENT OF ENTOMOLOGY.

THE STRENGTH OF CATERPILLARS, Prof. J. A. Manter, Storrs.

ROUND TABLE DISCUSSION ON COLLECTING LEPIDOPTERA, John V. Schaffner, Melrose Highlands, Mass.; Otto H. Schroeter, Union, Conn.

NEW ANGLES IN RELATION TO SHADE TREE PESTS, Dr. E. P. Felt, Stamford

THE CONTROL OF FLEAS IN HOUSEHOLDS, B. H. Walden, New Haven

STUDIES ON THE POTATO FLEA BEETLE, Neely Turner, New Haven

EXPERIENCE WITH LEAD ARSENATE SUBSTITUTES, Dr. Philip Garman, New Haven

SPRAYS FOR THE CONTROL OF THE EUROPEAN PINE SHOOT MOTH, Dr. R. B. Friend, New Haven

INSPECTION OF NURSERIES, 1933

W. E. Britton and M. P. Zappe

The inspection of nurseries was commenced July 5. This work was in charge of Mr. Zappe, who was assisted by A. F. Clark, W. T. Rowe and R. J. Walker until September 2, and then in special cases by E. M. Stoddard, G. H. Plumb, Neely Turner, J. P. Johnson, R. C. Botsford and W. E. Britton. Most of the larger nurseries were inspected during July and August, and the others were completed October 11, except for one or two that registered after that date.

Number and Size of Nurseries

A constant increase in the number of nurseries each year in Connecticut is shown in Table 1 on this page. In 1933, the list contains 362 names, an increase of 11 over 1932. A classification on account of size may be indicated as follows:

Area	*Number*	*Percentage*
50 acres or more	19	5.5
10 acres to 50 acres	40	11
5 acres to 10 acres	37	10
2 acres to 5 acres	90	25
1 acre or less	176	48.5
	362	100.0

On the whole, the nurseries were in about as good condition as in 1932. There has been an increase of certain pests and a decrease of others. In 22 nurseries no pests were found. Altogether about 121 different insect pests and 69 different plant diseases were found in nurseries. These cannot all be mentioned here but some of the more important and common insect pests and plant diseases are shown in Table 1:

Table 1. Ten-Year Record of Certain Nursery Pests

Pest	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933
Oyster-shell scale	44	38	39	45	57	78	86	73	68	78
San José scale	32	32	19	16	30	22	8	11	10	13
Spruce gall aphids[1]	40	27	42	82	120	147	99	124	141	231
White pine weevil	5	5	8	17	19	37	66	74	70	61
Pine leaf scale	5	4	5	6	13	13	10	20	26	46
European pine shoot moth	0	0	0	1	7	7	17	32	77	137
Poplar canker	25	34	32	39	35	37	35	23	40	34
Pine blister rust	8	7	9	9	5	7	7	13	12	11
Nurseries uninfested	33	34	46	37	18	13	18	32	24	22
Number of nurseries	116	151	162	191	228	266	302	327	351	362

Undoubtedly the apparent increase in some of these pests is due to the increase in the number of nurseries, and although the number of infested nurseries has increased the actual percentage may have decreased.

[1]Includes both *Adelges abietis* and *Gillettea cooleyi*.

An examination of the foregoing table will show that the European pine shoot moth, *Rhyacionia buoliana* Schiff., has increased rapidly during the past seven years since it was first found in a nursery in 1927.

Additional Inspection Because of European Pine Shoot Moth

On account of the life history of this insect, its presence on nursery stock cannot be detected during July and August. This is because the adults emerge in June and July and lay eggs on the twigs. By September the larvae have reached a size sufficient to cause a noticeable injury to the tips. A conference to consider the shoot moth was held at the Station September 19, and in the discussion the point was made that nurseries should be kept clean.

It was decided, therefore, to re-inspect the pines in all nurseries that had been inspected in July and August, when the insect could not be detected except by injury of the preceding season. In doing this it was thought best to check also on nurseries inspected after September 1, and make sure that the infestation had all been removed; and if not, to see that it was done.

The following information, prepared by W. E. Britton and R. B. Friend, was mimeographed as an unnumbered special bulletin, and sent under date of October 20 to all nurseries in the state that grow pine.

Control of the European Pine Shoot Moth in Nurseries

A conference on the European pine shoot moth situation was held at this Station September 19, 1933, at which several state and federal entomologists were present. The states represented were Connecticut, Massachusetts, Vermont and New York. There were also present several members of the Bureau of Entomology, and of the Bureau of Plant Quarantine, of the United States Department of Agriculture, Washington, D. C. The subject was thoroughly discussed.

Briefly, the situation is this: The European pine shoot moth, *Rhyacionia buoliana* Schiff., has caused severe injury to red pine plantations in southwestern Connecticut, and several acres have already been cut and burned, in order to protect other plantations in the vicinity which have not as yet been injured. The infestation in the eastern half of the state is very light and an attempt is being made to eradicate the insect from forest plantations in this area. It is essential that the spread of the insect be restricted as much as possible.

Danger of Spread from Nurseries

One result of the conference of September 19 is an attempt to obtain a better control of the European pine shoot moth in nurseries.

Inasmuch as this insect is a pest of young pine trees there is great danger of it being transported on infested nursery stock. In the annual inspection of Connecticut nurseries in 1933, indications of the presence of the insect were found in about 19 per cent of the 360 or more nurseries of the state. Most of the infested nurseries are in the southwestern portion of the state where the heaviest infestation and the most severe injury in forest plantings has occurred. Instructions were given the owners to clip off and burn the infested tips. To make sure that this was done an additional inspection is now being made, and the inspectors have been instructed to make certain that infestations are eradicated. Nurseries must be kept clean.

Infested Forest and Ornamental Plantings

Most of the forest plantings of red and Scotch pine in Connecticut have already been examined and the heaviest infestations are in the southwestern portion of the

state. Measures have been taken in these areas to hold the pest in check. Ornamental plantings have not yet been systematically inspected, but many are known to be infested, particularly in Fairfield, Hartford and New Haven Counties, and no doubt such is the case in other sections of the state.

Description, Habits and Life History

The adult is a moth with wing spread of about two-thirds of an inch, forewings reddish-brown with irregular cross bands of silver near the tips and silvery blotches on the basal half. The hind wings are gray. There is only one generation each year, and the moths emerge and lay eggs on the tips of the twigs the latter part of June and during July. The larvae soon hatch and burrow into the sheaths of the needle clusters near the tips of the branches. Later in the summer they tunnel into the terminal buds where they pass the winter. In the spring the larvae burrow in the young shoots distorting or killing them. The larvae are brown with black head and when full grown are about five-eighths of an inch in length. They reach maturity in May and early June and pupate in their tunnels in the shoots. The adults emerge about eighteen days later, leaving the pupal skins projecting from the shoots.

The moths rest on the foliage during the day and fly around the trees at dusk. Apparently the moths fly only a short distance, and the insect seems to spread slowly unless transported on pine trees. It is primarily a pest of young trees, as trees 15 feet or more in height are seldom severely injured.

Indications of Infestation and Injury

The larva tunnels into the tip needle clusters and terminal and lateral buds in the summer and fall, and some of the needle clusters turn brown and masses of pitch are formed on the buds. These symptoms are readily seen from the first of September until the following spring. When the new growth starts in May the developing shoots are bored. These shoots curl over and die. Where all of the buds and shoots in a terminal cluster are killed by the insect, adventitious buds develop, resulting in a bushy tip. Sometimes an injured shoot bends over horizontally but later turns upward and assumes the position of the leader, resulting in a crooked stem called "posthorn" or "bayonet growth." Heavily infested trees may be unable to make any height growth and finally exhibit only dead tips at the top. Such trees are entirely worthless in forest or ornamental plantings and should be removed and burned.

Host Pines

The following species of pines that grow in Europe and North America have been recorded as host plants for this insect:

Austrian pine,	*Pinus nigra*	Loblolly pine	*Pinus taeda*
Bull pine	" *ponderosa*	Lodgepole pine	" *contorta*
Cluster pine	" *pineaster*	Long leaf pine	" *palustris*
Corsican pine	" *nigra* var. *poiretiana*	Mugho pine	" *montana* var. *mughus*
Digger pine	" *sabiniana*	Prickle-cone pine	" *muricata*
Jack pine	" *banksiana*	Red pine	" *resinosa*
Japanese black pine	" *thunbergi*	Scotch pine	" *sylvestris*
Japanese red pine	" *densiflora*	White pine	" *strobus*

Of the pines more commonly grown, the red pine is the most severely injured and the white pine is the least injured. Their susceptibility to injury by the European pine shoot moth is in about the following order: red, Scotch, mugho, Austrian and white. Thus far the white pine although occasionally infested has not been injured by this insect in Connecticut.

Control in Nurseries

The presence of the young larvae is not readily detected in July and August but by September and until the following June the dead needles and buds, and the pitch

masses and the curled tips in May are unmistakable evidence of infestation by the European pine shoot moth or one of three or four other closely related shoot moths. Particular attention should be given to red, Scotch and mugho pines, but the other kinds should also be inspected. All injured and suspicious buds should be clipped off and burned.

Infestation may be prevented in a marked degree by spraying three times about June 13, 23 and July 3 with one of the following formulas:

(1)	Lead arsenate	3 pounds
	Fish oil	1 quart
	Water	100 gallons
(2)	Nicotine sulfate (40%)	½ gallon
	Penetrol	½ gallon
	Lead arsenate	3 pounds
	Water	100 gallons

A drenching spray directed downward into the bud and needle clusters will probably prove more effective than a mist, or a horizontal spray directed against the sides of the needles.

Mr. Zappe and Mr. Turner began this additional inspection about October 15, and continued for the remainder of the year. For a few days they were assisted by J. F. Townsend and E. S. Peterson.

Many more nurseries at this later inspection were found infested than could be detected during July and August. In some of the nurseries this insect has been reported each year for several years and the owners have either done a poor job of cleaning up their pines or have done nothing. As a consequence a few of the nurseries have a heavy infestation and in some cases it was thought best to destroy the pines rather than to try to clip off the infested tips. Some of the nurseries have been visited three or four times to check on their clean-up work. In some cases the nurserymen did a fair job of cutting the infested tips and in others many infested tips were left. In the latter case the owners were told to go over their pines again and again until all infested tips were removed. When an honest effort had been made to remove infested tips and not too many had been missed, the inspectors finished the clipping. The water companies that have been in the habit of selling red pines were either refused a certificate outright or were refused certificates to sell susceptible varieties of pines. One regular nurseryman was refused a certificate to sell susceptible pines until all infested tips had been removed and the trees again inspected when dug for shipment.

Of the 362 nurseries, 7 new ones registered and were inspected before the spring shipping season and again in the fall. Two firms holding certificates in 1932 failed to register before July 1, and as provided in Section 2127 of the General Statutes, were required to pay the costs of inspection. Consequently the sum of $10 was collected from them and turned over to the Treasurer of the Station to be deposited in the State Treasury.

The area of Connecticut nurseries in 1933 is 4,645 acres, an increase of 155 acres over 1932. Altogether 30 new names have been added and 15 have discontinued business during the year. Twenty nurseries on the list for 1932 are now included under different firm names. The new

list contains 362 names, an increase of 11 over last year. The nursery firms granted certificates in 1933 are as follows:

CONNECTICUT NURSERY FIRMS CERTIFIED IN 1933

Name of firm	Address	Acreage	Certificate date	Certificate number
Abeling, R. W.	Torrington	1	Sept. 14	2302
Adamec, George	Foxon	1	Aug. 25	2202
Aldrich, Edward	Guilford	1	Aug. 25	2203
Aldrich, Inie E.	Thomaston	2	Oct. 17	2400
Allara, Emanuel	Hamden	1	Sept. 2	2241
Allen, Henry L.	Pawcatuck	1	Aug. 21	2170
Amelunxen & DeWyn	Yalesville	4	July 17	2101
Andover Gardens	Andover	1	Aug. 21	2171
Anstett, Louis	Norfolk	1	Sept. 25	2326
Artistree Nursery	Branford	3	Dec. 2	2429
Austin, M. E.	Clinton	1	Aug. 10	2146
Barnes Bros. Nursery Co., Inc.	Yalesville	190	Aug. 5	2130
Barnes Eastern Nurseries	Wallingford	15	Aug. 5	2131
Bartolotta, S.	Cromwell	1	Aug. 5	2134
Barton Nursery	Hamden	1	Aug. 7	2135
Beattie, W. H.	New Haven	1	Sept. 30	2346
Bedford Gardens	Plainville	1	Oct. 7	2373
Beers, H. P.	Southport	1	Nov. 22	2424
Belltown Nurseries	Stamford	4	Dec. 30	2443
Benbow, Abram	Norfolk	1	Sept. 15	2312
Beran, the Florist	New London	1	Aug. 21	2168
Berkshire Gate Nursery	Danbury	1	Oct. 2	2350
Bertana, Louis	Glenbrook	2	Oct. 10	2381
Bertolf Bros., Inc.	Old Greenwich	45	Aug. 30	2221
Blue Hills Nurseries	Hartford	18	Aug. 8	2234
Boggini, Louis	South Manchester	1	July 17	2095
Bollerer, Frederick G.	West Haven	1	Sept. 30	2347
Bolton Perennial Gardens (2)	South Manchester	1	July 17	2096
Bonnie Brook Gardens	Rowayton	2	Sept. 22	2325
Booy, H. W.	Yalesville	4	July 11	2088
Brainard Nursery & Seed Co.	Thompsonville	20	July 29	2121
Brandriff's Rock & Perennial Gardens	Branford	1	Nov. 3	2416
Branford Nurseries	Branford	6	Sept. 13	2290
Bretschneider, A.	Danielson	1	Aug. 28	2209
Bridgeport Hydraulic Co.	Bridgeport	15	Oct. 28	2412
Brimfield Gardens Nursery	Wethersfield	8	Aug. 19	2165
Bristol Nurseries, Inc.	Bristol	55	Aug. 9	2141
Brooklawn Conservatories, Inc.	Bridgeport	1	Aug. 24	2195
Brooklawn Nursery	Bridgeport	2	Oct. 17	2399
Brouwer's Nurseries	New London	20	Aug. 30	2220
Brouwer's Nursery, Peter	New London	2	Aug. 22	2176
Bruce Nurseries	Danielson	1	Aug. 19	2167
Bulpitt, Henry F.	Darien	4	Sept. 11	2274
Bureau of Trees	New Haven	7	Aug. 7	2136
Burke, the Florist	Rockville	1	July 17	2098
Burr & Co., Inc., C. R.	Manchester	500	July 28	2118
Burr, Morris L.	Westport	1	Sept. 15	2305

CONNECTICUT NURSERY FIRMS CERTIFIED IN 1933—(*Continued*)

Name of firm	Address	Acreage	Certificate date	Certificate number
Burwell, E. E.	New Haven	1	Sept. 5	2247
Byram Evergreen Nursery	East Port Chester	1	Sept. 16	2313
Candee Nursery, Hollis S.	Hartford	7	Oct. 9	2376
Cant, Alexander	Springdale	1	Oct. 9	2377
Cardarelli, E. J.	Cromwell	5	Aug. 18	2163
Carey, Alice L.	Cheshire	1	Sept. 2	2242
Carlson, John B.	Newington	1	Sept. 6	2259
Case, Mrs. Louis L.	Simsbury	1	Aug. 26	2207
Cherry Hill Nursery Co.	Rockfall	50	Aug. 23	2189
Chesman, Joseph	Foxon	1	Sept. 9	2271
Chiapperini, Michele	Groton	1	Aug. 22	2182
Chippendale Nurseries, Inc.	Old Lyme	2	Dec. 23	2439
Choate School, The	Wallingford	4	Nov. 4	2417
City Line Florist	Bridgeport	1	Sept. 13	2291
Civitello & Pinatello (2)	East Hartford	4	Sept. 11	2276
Clark, Raymond H.	Milford	1	July 12	2092
Cleary, Arthur L.	Bethel	1	Sept. 27	2334
Clinton Nurseries	Clinton	90	Sept. 5	2249
Clyne Nurseries	Waterbury	6	Dec. 13	2438
Cobb, Levi S.	Fairfield	1	Sept. 12	2286
Conine Nursery Co.	Stratford	75	July 12	2126
Conn. State College Prof. S. P. Hollister	Storrs	1	Dec. 1	2426
Conn. Agr. Expt. Sta. W. O. Filley, For.	New Haven	3	Oct. 6	2368
Conn. Forestry Nurseries	Deep River	18	Sept. 2	2239
Conn. State Highway Dept.	Hartford	13	Nov. 1	2413
Conn. Valley Nurseries	Burnside	1	Sept. 6	2255
Conn. Valley Nurseries	Manchester	39	July 18	2103
Corrigan's West Haven Nurseries	West Haven	1	Sept. 1	2235
Couture, E. R.	Westport	2	Oct. 2	2351
Covey, Mrs. Arthur (2)	Harwinton	1	Oct. 7	2371
Cragholme Nurseries, Inc.	Greenwich	5	Sept. 12	2284
Cromie, G. A.	New Haven	2	Aug. 18	2162
Cronamere Alpine Nurseries, Inc.	Greens Farms	3	Sept. 22	2323
Culver, W. B.	Suffield	1	July 19	2108
Curtiss, C. F.	Plantsville	2	Oct. 26	2409
Daisy Hill Gardens	Derby	1	July 12	2091
Dallas, Inc., Alexander	Waterbury	2	Nov. 9	2418
Damen, Peter J.	Foxon	2	Sept. 5	2250
Darien Nurseries	Darien	6	Aug. 15	2155
Dawson, Wm. A.	Willimantic	2	Aug. 23	2187
Daybreak Nurseries, Inc.	Westport	6	Sept. 16	2315
Dearden Bros.	East Hartford	4	Aug. 30	2225
De Cerbo, Meyer E.	Woodmont	1	Aug. 28	2211
Deepstrom, Leon E.	Bridgeport	2	Sept. 11	2281
De Mars, F. H.	Winsted	1	Sept. 23	2324
Devany, Charles	Pawcatuck	2	Aug. 25	2201
Devon Nursery	Devon	1	July 31	2123

CONNECTICUT NURSERY FIRMS CERTIFIED IN 1933—(*Continued*)

Name of firm	Address	Acreage	Certificate date	Certificate number
Dewey, V. E.	Groton	2	Dec. 11	2436
Dietrich & Son Nursery, B.	Greenwich	4	Sept. 13	2293
Di Giandomenico, Raffe	Middletown	1	Dec. 11	2435
Dingwall, Joseph N.	New Haven	1	Sept. 30	2348
Doane, David F.	Haddam	1	Aug. 10	2148
Doebeli, Charles A.	Bridgeport	1	Sept. 8	2268
Dowd, Inc., F. C.	Madison	1	Dec. 1	2427
Dunlap's Hydrangea Nursery	Cromwell	3	Aug. 29	2215
Dunn, James F.	Stamford	3	Oct. 2	2356
Eager, E. M.	Bridgeport	1	Aug. 29	2214
East Haven Nursery	East Haven	1	Sept. 5	2246
Edendale Gardens	Winsted	1	Sept. 14	2301
Edgewood Nurseries	New Haven	1	Aug. 25	2205
Eell's Sons Nursery	Manchester	1	July 17	2094
Elfgren Nurseries	East Killingly	2	Aug. 29	2216
Ellington Evergreen Nurseries	Ellington	10	July 18	2104
Elmgren, C. J.	Cromwell	1	Sept. 27	2333
Elm Grove Cemetery Association	Mystic	1	Sept. 7	2264
Emerson, C. M.	East Hartford	1	Mar. 1	2076
Evergreen Nursery Co.	Wilton	25	July 28	2120
Eyeberse Nursery	Norwich	1	Aug. 22	2179
Farmington Valley Nursery	Avon	5	Aug. 31	2226
Fletcher, Walter G.	Guilford	15	Sept. 9	2272
Flower City Rose Co.	Manchester	23	July 19	2105
Follett Nursery	Westport	10	Oct. 7	2369
Ford, George R.	Hartford	10	Sept. 18	2319
Frazer's Nurseries & Dahlia Gardens	Willimantic	3	Sept. 6	2254
Galligan, C. W.	New Haven	1	Sept. 30	2345
Gallup, Amos M.	Pawcatuck	1	Aug. 21	2169
Gardner's	Berlin	1	Sept. 15	2309
Gardner's Nurseries	Rocky Hill	250	Aug. 11	2152
Geduldig's Greenhouses	Norwich	6	Sept. 2	2240
Giant Valley Nursery	Mount Carmel	1	Aug. 18	2164
Gilbert, Henry G.	Danielson	2	Aug. 19	2166
Glastonbury Gardens	Glastonbury	3	Aug. 31	2231
Glen Terrace Nurseries	Hamden	60	Aug. 7	2138
Golden Hill Nurseries	Shelton	3	Oct. 2	2352
Goodwin Nurseries	Bloomfield	7	Aug. 30	2219
Goshen Nurseries	Goshen	5	Oct. 13	2388
Griswold, George	Old Lyme	1	Sept. 5	2245
Gunn, Mrs. Charles	Kent	1	Oct. 2	2357
Haas, Florist, E.	Milford	1	Aug. 8	2140
Hall, Henry A. L.	West Haven	1	Oct. 6	2367
Hamden Nursery	Hamden	1	Aug. 17	2159
Hammonassett Gardens	Madison	4	Nov. 3	2415
Hanford, R. G.	Norwalk	4	Dec. 4	2430
Hansen's Florist & Nursery	Fairfield	5	Aug. 30	2222

CONNECTICUT NURSERY FIRMS CERTIFIED IN 1933—(*Continued*)

Name of firm	Address	Acreage	Certificate date	Certificate number
Happy Days Farm Nursery	Norwalk	10	Sept. 28	2336
Hearn, Thomas H.	Washington	3	Oct. 18	2402
Heath & Co.	Manchester	25	July 19	2106
Henninger, Christ.	New Britain	1	Sept. 6	2260
Hildebrand's Nursery (2)	Norwich	1	Sept. 11	2273
Hillcrest Gardens	Woodbridge	3	Aug. 29	2218
Hilliard, H. J.	Sound View	1	Sept. 13	2289
Hill Top Nursery	Orange	2	July 17	2100
Hinckley Hill Nursery	Stonington	1	Aug. 21	2173
Hiti Nurseries	Pomfret Center	11	Aug. 24	2192
Hofman, Henry	Cromwell	2	Aug. 5	2133
Holcomb, Ernest L.	Granby	1	Sept. 6	2258
Holcomb, H. Parks	Winsted	4	Sept. 30	2344
Holcomb, Irving*	Granby	1	Sept. 6	2257
Holdridge & Son, S. E.	Norwich	5	Aug. 22	2178
Hope Street Nursery	Springdale	1	May 12	2086
Horan, James F.	Hartford	2	Dec. 5	2431
Horan, Kieran W. (2)	West Hartford	1	Sept. 14	2297
Houston's Nurseries	Mansfield Depot	15	Oct. 6	2366
Hoyt, Charles E.	Danbury	25	Oct. 4	2362
Hoyt's Sons Co., Inc., Stephen	New Canaan	500	Aug. 2	2128
Intravaia & Sons, J.	Middletown	1	Sept. 30	2349
Jennings, Mrs. George S.	Southport	2	Sept. 28	2339
Joel Nursery Co., The (2)	Yalesville	10	July 11	2087
Johnson's Nursery	South Meriden	1	Sept. 6	2262
Johnson, Tom	Stratford	1	Aug. 24	2193
Judd, T. H.	Danbury	1	Dec. 31	2444
Kateley, Milton M.	East River	1	Aug. 24	2198
Kelley & Son, James J.	New Canaan	6	Sept. 12	2287
Keogh, H. W.	Norwalk	2	Oct. 16	2396
Keystone Nurseries	Danbury	1	Sept. 29	2341
Knapp's Perennial Gardens	Plainville	1	Oct. 7	2374
Kosty's Perennial Garden Nurseries	North Haven	3	Oct. 14	2391
Lanedale Farm Nursery	New Canaan	9	Sept. 28	2338
Langstroth Nurseries	Danbury	10	Dec. 28	2442
Laviola Nursery	New Haven	1	Aug. 15	2158
Lawrence Greenhouses	Branford	1	Dec. 6	2434
Leghorn's Evergreen Nurseries	Cromwell	20	Aug. 11	2151
Lewis Gardening Service	Kensington	1	Sept. 12	2288
Lewis & Valentine	Darien	9	Sept. 7	2263
Loring Nursery Co., The Robert	Yalesville	7	July 21	2111
Luckner, Jr., Wm.	Stepney	1	Sept. 11	2277
Lynch, Mrs. John H.	Ridgefield	3	Oct. 14	2394
Main, Walter G.	North Stonington	1	Aug. 22	2181
Mallett, George A.	Bridgeport	6	Sept. 29	2340

* Deceased.

CONNECTICUT NURSERY FIRMS CERTIFIED IN 1933—(*Continued*)

Name of firm	Address	Acreage	Certificate date	Certificate number
Maplehurst Flower Gardens	Fairfield	1	Sept. 12	2285
Maplewood Nursery Co.	Norwich	2	Nov. 2	2414
Marigold Farm Nursery Co.	New Canaan	20	Sept. 8	2267
Mather Homestead	Darien	1	Sept. 14	2299
Mayapple Nursery	Stamford	1	Oct. 17	2401
McCarthy, John P.	Danbury	1	Oct. 13	2386
McConville, John	Manchester	2	July 20	2109
Meachen, Henrietta S.	Stratford	1	Aug. 24	2196
Meier, Adolf R.	West Hartford	1	Sept. 26	2332
Melville Nursery	Bridgeport	1	Sept. 14	2296
Merwin Lane Nursery	East Norwalk	3	Sept. 6	2253
Meyer, Carl H. H.	Riverside	10	Aug. 11	2153
Meyer, Ludwig	Bridgeport	4	Sept. 11	2282
Middeleer Nurseries, Inc.	Darien	28	Oct. 7	2375
Midvale Nursery	Manchester	1	Oct. 2	2355
Milford Nursery	Milford	2	July 12	2093
Millane Nurseries & Tree Experts Co.	Cromwell	35	Aug. 24	2191
Mill River Nursery	Fairfield	12	Sept. 12	2283
Millstone Garden	Terryville	1	Oct. 7	2372
Milton Flower Farm	Litchfield	1	Oct. 3	2359
Minge, G. H.	Rocky Hill	1	Aug. 11	2150
Montgomery Evergreen Nursery, Inc.	Cos Cob	5	Sept. 1	2232
Moraio Bros.	Stamford	5	Oct. 25	2408
Morgan, Wm. F.	North Stonington	2	Aug. 22	2185
Mountain Farm Nursery	West Hartford	2	Sept. 14	2300
Mountain Grove Cemetery Association	Bridgeport	1	Aug. 24	2197
Mount Airy Gardens	Stamford	1	Nov. 21	2422
Mount Carmel Nursery	Mount Carmel	1	Aug. 23	2190
Napolitano, Alfonso (2)	Cromwell	1	Oct. 13	2387
Newell Nurseries, The	Bloomfield	6	Sept. 15	2307
New England Nurseries	New Canaan	1	Nov. 21	2421
New Haven Park Commission	New Haven	10	Sept. 15	2308
Newington Gardens & Nurseries	Newington	1	Sept. 14	2298
New London Cemetery Association	New London	1	Aug. 26	2206
New London County Nurseries	New London	5	Sept. 16	2314
Newton, Edwin	West Granby	1	Oct. 9	2378
New York, New Haven & Hartford R. R.	Bridgeport	6	Sept. 29	2343
Niantic Bouquet Shoppe	Niantic	1	Aug. 22	2177
Nicolson & Thurston	Litchfield	1	Oct. 3	2360
North Avenue Nursery	Bridgeport	1	Aug. 30	2223
North-Eastern Forestry Co.	Cheshire	96	Aug. 10	2143
North Greenwich Nursery	Greenwich	1	Sept. 15	2310
Northville Gardens	New Milford	1	Aug. 10	2144
Norwood Nursery	Hamden	1	Oct. 13	2390
Nyveldt, Albert	New London	1	Aug. 22	2175

CONNECTICUT NURSERY FIRMS CERTIFIED IN 1933—(*Continued*)

Name of firm	Address	Acreage	Certificate date	Certificate number
Oakland Nurseries	Manchester	40	July 28	2119
Oakwood Novelty Gardens	East Hartford	1	Sept. 16	2317
Oldfield Nursery	Stratford	1	Oct. 4	2363
Old House Gardens, The	Yalesville	1	Sept. 28	2337
Ostergren, Herbert	Cromwell	2	Aug. 5	2132
Outpost Nurseries, Inc.	Ridgefield	635	Aug. 2	2129
Ouwerkerk, D. K.	Yalesville	10	July 11	2089
Ox Yoke Farm Nurseries	Bridgeport	1	Oct. 2	2354
Palmieri Nursery	New Haven	1	Sept. 26	2329
Parfitt, Mary T.	New Milford	1	July 28	2117
Park Gardens	Bridgeport	1	Dec. 13	2437
Paton, Wm. D.	Mount Carmel	2	Sept. 2	2244
Patrick, Charles	Bridgeport	2	Sept. 7	2266
Patterson, John	Old Saybrook	2	Aug. 31	2228
Peatt, Wm. T.	Ridgefield	1	Nov. 29	2425
Pedersen, Anthon	Stamford	3	Oct. 20	2406
Peschko, Robert	Danbury	1	Oct. 16	2397
Pestretto, Frank	West Hartford	1	Aug. 15	2157
Pestretto, Salvatore	West Hartford	1	Aug. 31	2229
Pflomm, Charles W.	Bridgeport	1	Sept. 11	2280
Phelps & V. T. Hammer Co., The J. W.	Branford	2	Sept. 14	2295
Piemontese, Dominick	Foxon	1	Sept. 5	2248
Pierson, Inc., A. N.	Cromwell	250	Aug. 11	2154
Pinchbeck Bros., Inc.	Ridgefield	15	Oct. 18	2405
Pinecrest Gardens	Wapping	1	Aug. 30	2224
Pine Plains Greenhouses, Inc.	Norwich	2	Sept. 16	2316
Plainville Gardens	Plainville	3	Dec. 5	2432
Polish Orphanage Farm	New Britain	1	Sept. 13	2294
Pomeroy Blue Spruce Gardens	New Milford	5	Aug. 1	2127
Powers, R. J.	Noroton	1	Aug. 29	2217
Pratt, Jr., George D.	Bridgewater	4	Sept. 28	2335
Prospect Nurseries, Inc.	Cromwell	30	Aug. 11	2149
Quinebaug Forestry Co.	Union	2	July 18	2102
Rabinak, Louis	Deep River	3	Aug. 10	2147
Race Brook Gardens, Inc.	Orange	1	July 12	2090
Reliable Nursery, The	East Hartford	2	July 20	2110
Rengerman's Garden	Granby	1	Oct. 9	2379
Reveley, Frank J.	Clinton	2	Nov. 10	2420
Reynold's Farm	South Norwalk	1	Sept. 7	2265
Richmond, Gordon L.	New Milford	8	July 31	2125
Rockfall Nursery Co.	Rockfall	30	Aug. 23	2188
Rose Hill Nursery	Gildersleeve	3	Aug. 15	2156
Rosery Rest, The	Bridgeport	5	Sept. 26	2331
Sachem Forest Landscape Service	New Haven	1	Aug. 22	2186
Sage, Hollister	North Woodbury	1	Sept. 11	2278
Sakson Nursery	Greenwich	1	Sept. 1	2237
Sandelli's Greenhouse	New Britain	1	Sept. 6	2261
Sarno, Jonah	Greens Farms	2	May 4	2084

CONNECTICUT NURSERY FIRMS CERTIFIED IN 1933—(*Continued*)

Name of firm	Address	Acreage	Certificate date	Certificate number
Sasco Hill Evergreen Nursery	Southport	1	Aug. 31	2230
Saxe & Floto	Waterbury	1	Oct. 5	2365
Scarano, Alphonso	Groton	1	Sept. 8	2269
Schaeffer Bros.	Norwich	4	Sept. 8	2270
Schleichert Nursery	Bridgeport	1	Aug. 24	2194
Schmidt, Walter A.	West Hartford	3	July 26	2115
Schneider, Godfrey	West Haven	1	Oct. 10	2382
Schulze, Edward E.	Bethel	3	Oct. 14	2392
Scott's Nurseries	Bloomfield	7	Sept. 18	2318
Selleck, Joel F.	Nichols	1	Dec. 26	2440
Seltsam's Pequonnock Gardens	Bridgeport	1	Sept. 6	2252
Seymour's Hemlock Nursery	Riverton	1	Sept. 14	2303
Sharon Valley Nursery	Sharon	1	Sept. 14	2304
Silver City Nursery	Meriden	3	Sept. 6	2256
Silver Lane Nursery Co.	Burnside	1	Aug. 8	2139
Silvermine Nurseries	Norwalk	1	Sept. 1	2236
Smith & Son, Edward A.	Mystic	1	Aug. 22	2183
Soltes Nursery, M. J.	Shelton	2	Sept. 20	2320
Southington Nursery Co.	Southington	5	Nov. 22	2423
Southport Nursery	Southport	28	Aug. 31	2227
South Wilton Nurseries	South Wilton	5	Aug. 9	2142
Spring Nursery	Bristol	3	Oct. 20	2407
Stack, Garrett M.	Guilford	1	Aug. 24	2199
Stack, Sr., Thomas M.	New Milford	1	Oct. 7	2370
Stafford Conservatories	Stafford Springs	2	July 29	2122
Stalzer & Son	Brooklyn	1	Aug. 22	2180
Stannard, E. H.	Wilton	2	Sept. 29	2342
State of Conn. Forestry Dept.	Hartford	4	Oct. 9	2380
State Street Nursery	New Haven	2	Aug. 10	2145
Steck, Jr., Charles A.	Bethel	4	Oct. 14	2393
Steck & Sons, Inc., C. A.	Newtown	12	Dec. 26	2441
Steck, Sarah B.	Bethel	1	Oct. 3	2358
Steele, Charles	Cos Cob	3	Dec. 1	2428
Stratfield Nurseries	Bridgeport	50	Oct. 28	2411
Strayer, Paul B.	Stratford	1	Sept. 11	2279
Thomas & Sons, Inc.	Hamden	1	Aug. 7	2137
Torchi, Nazareno	Woodmont	1	Aug. 28	2212
Torizzo, P. A.	West Hartford	5	Oct. 16	2398
Tower Crispette Co.	Guilford	1	Aug. 25	2204
Tow Path Gardens, Inc.	Hartford	15	Sept. 1	2233
Triangle Nursery	Yalesville	1	July 25	2114
Tryon, George W.	North Stonington	1	Aug. 22	2184
Uplands Flower Gardens	Woodbury	1	Apr. 28	2083
Upson, R. E.	Marion	2	Sept. 26	2328
Valentine Greenhouses	Pomfret Centre	1	Aug. 21	2172
Valley View Nursery	Southington	1	Sept. 15	2311
Van der Bom, F.	Bethel	5	Oct. 18	2403
Vanderbrook & Son, C.L.	Manchester	50	July 22	2112
Van Wilgen Nurseries	Branford	18	Oct. 2	2353
Van Wilgen, Wm.	Branford	1	Sept. 23	2322

CONNECTICUT NURSERY FIRMS CERTIFIED IN 1933—(*Continued*)

Name of firm	Address	Acreage	Certificate date	Certificate number
Vasileff, Nicholas	Greenwich	4	Sept. 15	2306
Verkade's Nurseries	New London	50	Sept. 6	2251
Vernick Nurseries	Bridgeport	2	Sept. 13	2292
Wallace Nursery	Wallingford	5	Sept. 2	2243
Wallingford Nurseries of the Barnes Nursery & Orchard Co.	Wallingford	75	Oct. 11	2385
Waltermire, Wm. H.	Guilford	2	Aug. 24	2200
Ward & Son, J. F.	Windsor	1	July 19	2107
Water Bureau, Metropolitan Dist. Com.	Hartford	50	Nov. 8	2419
Watertown Nurseries, Inc.	Watertown	1	Oct. 11	2384
Weinberger, Wm.	Ridgefield	2	Oct. 5	2364
Westville Nurseries, Inc.	New Haven	3	Dec. 6	2433
Westwood Nurseries	Newtown	1	Oct. 14	2395
Wethersfield Nursery	Wethersfield	2	Sept. 11	2275
Wheeler, Charles B.	Stonington	1	Aug. 21	2174
White Elm Nurseries	Talcottville	1	July 17	2097
Whittemore Co., J. H.	Naugatuck	3	Sept. 26	2330
Wild Flower Nursery, The	Brookfield	1	Oct. 18	2404
Wild's Nursery, Henry	Norwalk	30	Aug. 28	2208
Wilmaco Gardens	Manchester	5	July 17	2099
Wilridge Nurseries	Ridgefield	5	July 26	2116
Wilson & Co., C. E.	Manchester	125	Aug. 17	2160
Wilson, M. L.	Litchfield	3	Oct. 3	2361
Wood, Mrs. Pearl B.	Ridgefield	1	July 22	2113
Woodbridge Nursery Co.	New Haven	4	Aug. 28	2213
Woodcrythe	New Canaan	1	Sept. 21	2321
Woodmont Gardens	Woodmont	1	Aug. 28	2210
Woodmont Nurseries	Woodmont	83	Sept. 25	2327
Wyllie, David	Whitneyville	1	July 31	2124
Yacko, Stephen	Clinton	2	Oct. 27	2410
Yale University Forest School Nursery	New Haven	1	Oct. 10	2383
Yale University Landscape Department	New Haven	6	Aug. 18	2161
Young's Nurseries	Wilton	1	Oct. 13	2389
Zack Co., H. J.	Deep River	10	Sept. 2	2238
Total	362 nurseries	4,645 acres		

The cost of inspecting these nurseries in 1933, including additional inspection and rechecking on account of European pine shoot moth, was approximately $3,213.

Other Kinds of Certificates Issued

During 1933, 109 duplicate certificates were issued to Connecticut nurserymen to be filed in other states. Altogether 157 dealer's permits were issued to registered dealers who do not grow the stock that they

sell. The number of shipper's permits issued to nurserymen in other states, who wish to ship nursery stock into Connecticut, was 245. Altogether 167 parcels of nursery stock were inspected and certified for shipment to accommodate individuals.

In order to meet the requirements of Federal Quarantine No. 62, 125,000 narcissus bulbs were inspected in the field in May, and 30,000 inspected when dug for shipment, and 40 certificates issued. There were also issued 134 miscellaneous certificates and special permits. Certain shipments of shelled corn and other seeds were examined and 161 certificates issued. Altogether 385 certificates of freedom from European corn borer, and 162 blister rust control area permits were issued.

INSPECTION OF IMPORTED NURSERY STOCK

Less nursery stock entered Connecticut in 1933 from foreign countries than in 1932. It was entirely rose stocks for propagation. It entered the United States under specifications and permits of the Federal Bureau of Plant Quarantine, and at ports of entry was released for transit to destination points, where it was examined by state inspectors.

In 1932-1933, there were 14 shipments, containing 103 cases and 764,500 plants, all of which were manetti rose stocks and were inspected by Mr. Zappe. This stock was imported by four commercial rose growers: One had five shipments containing 654,500 plants; one had five shipments containing 90,000; one had three shipments of 20,000; and one had one shipment of 10,000. Twelve shipments containing 744,500 plants came from Holland, and two shipments containing 30,000 plants came from England.

The time required to inspect this imported rose stock was equivalent to one man working approximately 14 days, and together with the cost of travel 1155 miles, and other necessary expenses, made a total cost of approximately $225.

In addition to the shipments of rose stocks mentioned above, there were eight shipments of perennial and other plants including iris, peony, dahlia and gladiolus, altogether 513 plants, of new varieties, and six shipments containing 181 pounds of tree seeds, that were examined at the Bureau of Plant Quarantine, Washington, D. C., and were not inspected in Connecticut. Reports of the 14 shipments inspected, were sent to the Federal Bureau of Plant Quarantine.

Results of Inspection

Of the 14 shipments inspected, four shipments or 28.5 per cent were found infested with insects or plant diseases as follows:

Insects

Emphytus cinctus Linn. ..... 2 shipments

Plant Diseases

Crown gall ..... 2 shipments

INSPECTION OF APIARIES, 1933

W. E. Britton

Instead of $2,500 annually, the appropriation for inspecting apiaries was reduced to $2,000, beginning July 1, 1933, by the General Assembly of 1933. Consequently, a somewhat smaller number of apiaries was inspected than in 1932. Altogether, 1,342 apiaries containing 10,927 colonies were inspected in 1933, as against 1,397 apiaries and 11,459 colonies in 1932. These apiaries averaged 8.1 colonies each in 1933, and 8.2 each in 1932. As in former years, the inspection work was done by H. W. Coley, of Westport, and A. W. Yates of Hartford. It required 181 man days. The total cost of inspection of apiaries in 1933 was $2,276.50.

Table 2 shows the number of apiaries and colonies inspected, the average number of colonies per apiary, and the average cost of inspecting each apiary and colony for each year since inspection began in 1910.

TABLE 2. TWENTY-FOUR YEAR RECORD OF APIARY INSPECTION IN CONNECTICUT

Year	Number apiaries	Number colonies	Average No. colonies per apiary	Average cost of inspection	
				Per apiary	Per colony
1910	208	1,595	7.6	$2.40	.28
1911	162	1,571	9.7	1.99	.21
1912	153	1,431	9.3	1.96	.21
1913	189	1,500	7.9	1.63	.21
1914	463	3,882	8.38	1.62	.19
1915	494	4,241	8.58	1.51	.175
1916	467	3,898	8.34	1.61	.19
1917	473	4,506	9.52	1.58	.166
1918	395	3,047	7.8	1.97	.25
1919	723	6,070	11.2	2.45	.29
1920	762	4,797	6.5	2.565	.41
1921	751	6,972	9.2	2.638	.24
1922	797	8,007	10.04	2.60	.257
1923	725	6,802	9.38	2.55	.27
1924	953	8,929	9.4	2.42	.25
1925	766	8,257	10.7	2.45	.22
1926	814	7,923	9.7	2.35	.24
1927	803	8,133	10.1	2.37	.234
1928	852	8,023	9.41	2.12	.225
1929	990	9,559	9.55	2.19	.227
1930	1,059	10,335	9.76	2.01	.206
1931	1,232	10,678	8.66	1.83	.212
1932	1,397	11,459	8.2	1.60	.195
1933	1,342	10,927	8.1	1.69	.208

In 1933, apiaries were inspected in 149 towns. Inspections were made in 1933 in the following 18 towns not visited in 1932:

Fairfield County — Weston; New Haven County — North Haven; Tolland County — Tolland, Willington; Windham County — Ashford, Brooklyn, Canterbury, Chaplin, Eastford, Hampton, Killingly, Plainfield, Pomfret, Putnam, Scotland, Sterling, Thompson, Woodstock.

On the other hand, in the following 19 towns visited in 1932, no inspections were made in 1933:

Fairfield County — Weston; New Haven County — North Haven; sonia, Beacon Falls, North Branford, Seymour; Middlesex County —

Westbrook; Litchfield County — Kent, Sharon, Warren, Washington; Hartford County — East Hartford, East Windsor, Enfield, Manchester, Marlborough, South Windsor, Suffield, Windsor Locks.

There were na apiaries infested with European foul brood but there were 32 apiaries infested with American foul brood.

In 1933, American foul brood was discovered in the following 24 towns:

Fairfield County — Greenwich, New Canaan, Ridgefield; New Haven County — Cheshire, Madison, Meriden, Wallingford, Waterbury; Middlesex County — Middletown; New London County — East Lyme, Norwich; Litchfield County — Cornwall, New Milford, Thomaston, Torrington; Hartford County — Berlin, Bloomfield, Bristol, Farmington, Southington, Wethersfield, Windsor; Tolland County — Ellington, Mansfield.

Statistics of Inspection

The statistics of apiary inspection by towns and counties are given on the following pages, with summary on pages 424–5.

INSPECTION OF APIARIES, 1933

Town	Apiaries		Colonies	
	Inspected	Diseased (Am. f. b.)	Inspected	Diseased (Am. f. b.)
Fairfield County				
Bethel	11	—	91	—
Bridgeport	2	—	23	—
Danbury	9	—	92	—
Easton	5	—	82	—
Fairfield	9	—	116	—
Greenwich[1]	36	3	288	4
Monroe	10	—	125	—
New Canaan	5	1	34	1
New Fairfield	15	—	97	—
Newtown	5	—	89	—
Norwalk	6	—	48	—
Redding	8	—	97	—
Ridgefield	5	1	51	1
Shelton	1	—	17	—
Sherman	7	—	82	—
Stamford	31	—	213	—
Stratford	4	—	19	—
Trumbull	19	—	121	—
Weston	1	—	12	—
Westport	5	—	61	—
Wilton	15	—	235	—
	209	5	1,993	6
New Haven County				
Bethany	3	—	18	—
Branford	3	—	30	—
Cheshire	7	1	79	2
Derby	1	—	7	—

[1]One apiary inspected twice.

Town	Apiaries		Colonies	
	Inspected	Diseased (Am. f. b.)	Inspected	Diseased (Am. f. b.)
New Haven County—(*Continued*)				
East Haven	5	—	31	—
Guilford	5	—	61	—
Hamden	6	—	48	—
Madison	3	1	13	1
Meriden	17	1	187	1
Middlebury	3	—	35	—
Milford	8	—	76	—
Naugatuck	2	—	32	—
New Haven	2	—	23	—
North Haven	1	—	10	—
Orange	6	—	118	—
Oxford	2	—	28	—
Prospect[1]	3	—	15	—
Southbury	3	—	49	—
Wallingford	7	1	259	1
Waterbury	7	1	40	1
Wolcott	2	—	13	—
Woodbridge	2	—	29	—
	98	5	1,201	6
Middlesex County				
Chester	4	—	28	—
Clinton	4	—	33	—
Cromwell	10	—	64	—
Durham	9	—	59	—
East Haddam	20	—	164	—
East Hampton	14	—	98	—
Essex	6	—	28	—
Haddam	3	—	43	—
Killingworth	5	—	25	—
Middlefield	4	—	188	—
Middletown	11	1	105	1
Old Saybrook	6	—	41	—
Portland	9	—	72	—
Saybrook	1	—	3	—
	106	1	951	1
New London County				
Bozrah	1	—	12	—
Colchester	22	—	283	—
East Lyme	9	2	86	3
Franklin	2	—	23	—
Griswold	5	—	113	—
Groton	6	—	108	—
Lebanon	13	—	198	—
Ledyard	2	—	14	—
Lisbon	1	—	18	—
Lyme	2	—	90	—
Montville	2	—	50	—
New London	3	—	34	—
No. Stonington	1	—	34	—
Norwich	5	1	360	1

[1]One apiary with four colonies weak from poison spray.

Town	Apiaries Inspected	Apiaries Diseased (Am. f. b.)	Colonies Inspected	Colonies Diseased (Am. f. b.)
New London County—(*Continued*)				
Old Lyme	2	—	79	—
Preston	3	—	65	—
Salem	2	—	17	—
Sprague	6	—	52	—
Stonington	7	—	49	—
Voluntown	2	—	19	—
Waterford	9	—	96	—
	105	3	1,800	4
Litchfield County				
Barkhamsted	10	—	36	—
Bethlehem	11	—	93	—
Bridgewater	6	—	91	—
Canaan	3	—	29	—
Colebrook	6	—	30	—
Cornwall	7	1	45	4
Goshen	8	—	66	—
Harwinton	9	—	25	—
Litchfield	17	—	168	—
Morris	8	—	37	—
New Hartford	18	—	60	—
New Milford[1]	19	1	164	1
Norfolk	6	—	14	—
North Canaan	3	—	42	—
Plymouth	12	—	60	—
Roxbury	5	—	22	—
Salisbury	8	—	75	—
Thomaston	14	1	54	2
Torrington	17	2	87	4
Watertown	18	—	115	—
Winchester	14	—	52	—
Woodbury	12	—	87	—
	231	5	1,452	11
Hartford County				
Avon	11	—	38	—
Berlin[2]	19	3	78	4
Bloomfield	18	1	204	4
Bristol	21	1	108	1
Burlington	11	—	53	—
Canton	16	—	81	—
East Granby	12	—	34	—
Farmington	18	2	68	2
Glastonbury	24	1	135	1
Granby	13	—	96	—
Hartford	8	—	60	—
Hartland	5	—	84	—
New Britain	24	—	143	—
Newington	19	—	84	—
Plainville	9	—	42	—
Rocky Hill	4	—	34	—
Simsbury	13	—	54	—
Southington	20	1	182	1
West Hartford	19	—	98	—

[1]One apiary inspected twice.
[2]Two apiaries inspected twice.

Town	Apiaries Inspected	Apiaries Diseased (Am. f. b.)	Colonies Inspected	Colonies Diseased (Am. f. b.)
Hartford County—(*Continued*)				
Wethersfield	17	1	82	1
Windsor	20	1	172	1
	321	11	1,930	15
Tolland County				
Andover	3	—	5	—
Bolton	2	—	8	—
Columbia	9	—	55	—
Coventry	6	—	48	—
Ellington	10	1	68	1
Hebron	9	—	70	—
Mansfield	20	1	70	1
Somers	10	—	41	—
Stafford	12	—	53	—
Tolland	8	—	51	—
Union	2	—	8	—
Vernon	18	—	94	—
Willington	11	—	49	—
	120	2	620	2
Windham County				
Ashford	10	—	86	—
Brooklyn	10	—	137	—
Canterbury	6	—	31	—
Chaplin	3	—	18	—
Eastford	6	—	22	—
Hampton	12	—	56	—
Killingly	18	—	103	—
Plainfield	15	—	81	—
Pomfret	11	—	66	—
Putnam	4	—	62	—
Scotland	6	—	20	—
Sterling	4	—	10	—
Thompson	11	—	79	—
Windham	19	—	75	—
Woodstock	17	—	134	—
	152	0	980	0

SUMMARY

County	Number towns	Apiaries Inspected	Apiaries Diseased (Am. f. b.)	Colonies Inspected	Colonies Diseased (Am. f. b.)
Fairfield	21	209	5	1,993	6
New Haven[1]	22	98	5	1,201	6
Middlesex	14	106	1	951	1
New London	21	105	3	1,800	4
Litchfield	22	231	5	1,452	11
Hartford	21	321	11	1,930	15
Tolland	13	120	2	620	2
Windham	15	152	0	980	0
	149	1,342	32	10,927	45

[1]One apiary with four colonies weak from poison spray.

	Number apiaries	Number colonies
Inspected	1,342	10,927
Infested with American foul brood	32	45
Colonies treated		21
Colonies destroyed		24
Percentage infested	.023	.0041
Average number of colonies per apiary		8.1
Cost of inspection	$2,276.50	
Average cost per apiary	1.69	
Average cost per colony		$ .208

Financial Statement

RECEIPTS

Appropriation year ending June 30, 1933	$2,500.00
Balance on hand July 1, 1932	61.80
	$2,561.80

EXPENDITURES

Salaries	$1,194.00
Travel expense (outlying)	1,082.50
Miscellaneous supplies	36.75
Total	$2,313.25
*Balance on hand July 1, 1933	248.55
GRAND TOTAL	$2,561.80

Registration of Bees

Section 2129 of the General Statutes provides that each beekeeper shall register his bees on or before October 1, of each year, with the town clerk of the town in which the bees are kept, and that each town clerk on or before December 1, shall report to the State Entomologist whether or not any bees have been registered, and if so, to send a list of the names and number of colonies of each. In 1933, 1,342 apiaries containing 10,927 colonies were inspected. There were registered 771 apiaries and 5,376 colonies in 1933, and after checking the registrations and inspections, and deducting the duplications, the following figures show that at least this number of apiaries and colonies were kept in Connecticut in 1933:

	Apiaries	Colonies
Inspected	1,342	10,927
Registered but not inspected	392	1,946
Total	1,734	12,873

*Reverts to State Treasury.

GIPSY MOTH CONTROL IN CONNECTICUT, 1933

JOHN T. ASHWORTH AND W. E. BRITTON

This work has been continued in about the same manner as in former years, and the field organization has been in immediate charge of Mr. Ashworth. Altogether, 52 towns were covered and 115 infestations found, which is a larger number of towns and fewer infestations than in 1932. An unusual amount of work was necessary in scouting and spraying the infested woodland in Wolcott. Here 2,120 egg-clusters were found, 265 acres scouted and 7,845 pounds, or nearly 4 tons, of lead arsenate used in spraying.

In July just after the close of the spraying season a gipsy moth infestation was discovered in the town of Groton near Groton Long Point. At this infestation some 30 or more acres had been wholly or partially defoliated. The woodland trees were chiefly oak and red maple with a scattering of beech, birch and elm. The appearance of the stripped

FIGURE 70. View near Groton Long Point, where about 30 acres of woodland were stripped by gipsy moth caterpillars. Photographed July 10.

trees is shown in Figure 70. The trunks of some of the trees were literally plastered with pupa cases, egg-clusters and female moths laying eggs. Egg-clusters were also deposited on rocks, ledges, logs, stumps, and throughout a length of stone wall. Clean-up measures were begun soon after the moths finished laying eggs, and the eggs were creosoted and the brush cut and burned. Men are now at work at this infestation and the total number of egg-clusters has not been ascertained, but it runs into hundreds of thousands. Probably a complete report will be given next year. Since June 1, some help has been received from

men in the Civilian Conservation Corps Camps, which is gratefully acknowledged.

In November, work for the unemployed was commenced under the Civil Works Administration. The State Forester applied for a certain number of men for forest protection activities. This included a quota for gipsy moth work to be placed under the supervision of Mr. Ashworth and his gipsy moth organization. Progress is now being made and a full report will be given later. However, rather large infestations have already been discovered in Columbia, Groton, Killingly, Lebanon, Pomfret, Putnam, Stafford, Thompson and Woodstock, and extensive spraying operations next summer must be carried on if the gipsy moth is to be kept in check.

The State appropriation for gipsy moth control was reduced 20 per cent, from $50,000 to $40,000 annually, by the General Assembly of 1933.

Results of Scouting for Gipsy Moth

1932 - 1933

Windham County

27 infestations 4,675 egg-clusters

Work in Windham County this season consisted of a check-up scout around old infestations, and this work was carried on in five towns during the latter part of July and early August. In the towns of Thompson, Pomfret, Killingly, Brooklyn and Plainfield, several large colonies were found, the largest being one of 2,067 egg-clusters, on land owned by Herbert H. Robbins, just east of Quadic Reservoir, in Thompson. The largest colony discovered in Pomfret was in woodland owned by William Cheney, just north of Abington village, where 361 egg-clusters were found. One large colony of 557 egg-clusters was found on roadside trees on Mechanic Street, Danielson, in the town of Killingly, on property owned by H. A. Meyers and W. Young. In Brooklyn, two large white oaks and several smaller trees were totally defoliated and a crew of men was put to work there to clean up this infestation. They started work on July 6 and finished on July 20, altogether 45,331 larvae and pupae being found and destroyed. A similar condition was found in the town of Plainfield, near Bishop's Crossing, where 1,005 larvae and 7,611 pupae were destroyed. This work was really of a check-up nature and the results show that in some sections of the county large infestations are building up and unless money is made available for more intensive scouting work in the eastern section of the state, there will be more defoliation in the near future.

New London County

5 infestations 2,056 egg-clusters

The work done this year in New London County was similar to that done in Windham County with the exception of the town of Waterford,

which was completely scouted and two colonies of gipsy moth were found. One contained 107 egg-clusters and the other 10 egg-clusters, both on white oaks, in woodland owned by C. L. Nevins, a little east of Jordan Village. Check-up scouting was done in Norwich and Voluntown. In the town of Preston one large colony was found in a dooryard, on property owned by H. L. Haynes, in the west end of the town near the Norwich town line; 1,444 egg-clusters were found on oak and apple trees and on a pile of stone in this yard. In Norwich two colonies were found; one of 292 egg-clusters on land owned by the Norwich Gas Company, the other, containing 189 egg-clusters, on land of Sam Shinigo. Both colonies were on willow trees and situated on opposite sides of the Thames River. One small colony of 14 egg-clusters was discovered in Voluntown on land owned by C. Stenberg, in the southwestern corner of the town. It is also known that there are gipsy moth infestations in the towns of Stonington, Groton and New London. As the scouting force is small, there was not time to do any work in these towns. Conditions in this county are about the same as in Windham County.

Tolland County

5 infestations 118 egg-clusters

The work in Tolland County this year was carried on along the same lines as in Windham and New London counties; namely, check-up or larval scouting around old infestations, in the towns of Somers, Ellington and Union. Several small infestations were found in Somers. One of 24 egg-clusters was the largest, found on two large white oaks in a pasture owned by George Webster, in about the center of the town. Although the infestations were all small, this examination showed that the town was more generally infested than in preceding years. In Ellington two small colonies were discovered, the largest having 20 egg-clusters, on land owned by S. J. Lapchap, near the Somers and Stafford town lines. About the first of September the office was notified of an infestation in Union. Men were sent there and discovered a colony of 41 egg-clusters on land owned by Charles A. Downs, about one mile west of the Union Postoffice. The conditions in this county are about the same as those in Windham and New London counties.

Middlesex County

3 infestations 19 egg-clusters

Work was carried on in four towns in Middlesex County this year. The towns of Clinton and Saybrook were scouted and no trace of the gipsy moth found. In Chester one single egg-cluster was found on a maple tree owned by Thomas Flaherty, in the southeastern corner of the town, near the Saybrook line. In the town of Haddam the work was confined to the territory around last year's infestation. Two small colonies, one of 3 egg-clusters and another of 15 egg-clusters, were found in adjacent woodland near the 1931 infestation.

Hartford County

27 infestations 6,652 egg-clusters

The scouting was completed in six towns in Hartford County with results as follows: Avon and Bristol, no infestations; Burlington, 4 colonies, 157 egg-clusters; Hartland, 11 colonies, 478 egg-clusters; Simsbury, 7 colonies, 820 egg-clusters; and Wethersfield, 2 colonies, 5,087 egg-clusters. In Southington about four-fifths of the town was covered and one infestation containing 49 egg-clusters was found. In West Hartford, 107 acres of woodland were scouted and 2 infestations containing 61 egg-clusters were found. A check-up or larval scout was conducted in several towns with results as follows: Suffield, no larvae found; East Granby, 12; East Windsor, 3; Glastonbury, 436; Newington, 223, and New Britain, 75. The largest colony found in Hartford County was in Wethersfield on property owned by Edward Isaacson, bordering on the Connecticut River. This colony has been re-infested for several years, and 5,086 egg-clusters were treated at this place. The next largest colony was one of 559 egg-clusters, found in woodland on property owned by J. P. McLean, in the northwest corner of Simsbury. Another large colony of 193 egg-clusters was found in woodland about a mile east of West Simsbury Postoffice. The last colony of 100 or more egg-clusters found in this county was in the Tunxis state forest in East Hartland, near the Massachusetts state line. In addition to check-up scouting and regular roadside scouting, solid scouting was carried on in about 635 acres of woodland in this county. (By solid scouting, it is meant every tree and bush as well as fallen timber was carefully examined). If the table of statistics is consulted, it will be found that a number of smaller infestations were found scattered over this county.

New Haven County

12 infestations 2,459 egg-clusters

Part of the work in New Haven County was performed by Federal men. Work was confined to woodland scouting in the towns of Middlebury and Orange, where altogether 464 acres of woodland were examined and no trace of the gipsy moth was found. The three towns in this county where scouting was completed by state men were: Wolcott, Branford, and Meriden. In Branford one colony of 40 egg-clusters, and one single egg-cluster infestation, were found, both in the village of Branford. Four colonies were discovered in Wolcott. Three of them, containing 2,120 egg-clusters, were found in woodland on property owned by the New Britain Water Department, in the eastern portion of the town. The fourth colony was in woodland, on property owned by Wilfred and John Warner, about two miles west of the preceding infestations. In all, about 265 acres of woodland were scouted at these colonies. Considerable spraying was done in this town by a state crew, and about 7,845 pounds of arsenate of lead were used in this operation. State men scouted about 25 miles of road around the old North Branford infestation and found nothing. Part of this work fell in the town of North

Haven, as the infestation is practically on the line. State men scouted the town of Meriden and discovered six infestations containing 183 egg-clusters; 160 of these were in one colony, just north of West Peak, and about 219 acres of land were scouted in this section of the town.

Litchfield County

13 infestations 3,041 egg-clusters

Scouting in four towns in Litchfield County was done by state men. Barkhamsted was completely scouted, and 20 colonies were found. Three colonies of over 200 egg-clusters each occurred in the southeast corner of the town, two of them in apple trees in a field owned by Clinton LeGeyt and the Metropolitan Water Board. All infestations found in this town were in the eastern half of the town. In the towns of Colebrook, New Hartford and Harwinton, scouting was confined to areas known to have been previously infested. In Colebrook, one new egg-cluster and 31 old or hatched egg-clusters were found in the southwestern portion of the town, on land owned by Charles Lawrence and L. F. Phelps. One small infestation containing 17 egg-clusters was found in a pasture woodland about a mile and a half south of Bakerville Postoffice, in the town of New Hartford. No trace of the gipsy moth was found in the territory scouted in the town of Harwinton. Scouting done by Federal men in Litchfield County was carried on in 10 towns, with results as follows: Canaan, 5 colonies, 1,200 egg-clusters; Cornwall, 1 colony, 116 egg-clusters; Kent, no infestations; Litchfield, no infestations; Norfolk, 1 colony, 6 egg-clusters; North Canaan, 1 colony, 32 egg-clusters; Salisbury, 1 colony, 138 egg-clusters; Sharon, 1 colony, 8 egg-clusters; Warren, 3 colonies, 84 egg-clusters; and Washington, no infestations. Seven of these 10 towns were found infested. Altogether, 12,592 acres of woodland, and 56 miles of road were scouted. Thirteen infestations were found and around 12 of them, 1,140 acres of woodland were sprayed in June. Altogether, 20 tons of lead arsenate and 1,033 gallons of fish oil were used.

Fairfield County

No scouting was done in Fairfield County.

STATISTICS OF INFESTATIONS, 1932–1933

Towns	Infestations found	Egg-clusters creosoted	Colonies sprayed	Poison used (lbs)	Larvae and pupae killed	Roadside scouted (miles)	Woodland scouted (acres)
Windham County							
Brooklyn[1]	1	162	0	0	45,331	0	1
Killingly[1]	1	557	0	0	3,503	0	1
Plainfield[1]	0	0	0	0	8,616	0	1
Pomfret[1]	22	1,677	0	0	681	0	15
Thompson[1]	3	2,279	0	0	815	0	4
	27	4,675	0	0	58,946	0	22

[1]Scouted around old infestations

Towns	Infestations found	Egg-clusters creosoted	Colonies sprayed	Poison used (lbs)	Larvae and pupae killed	Roadside scouted (miles)	Woodland scouted (acres)
New London County							
Norwich[1]	2	481	0	0	144	0	1
Preston[1]	1	1,444	0	0	76	0	1
Voluntown[1]	1	14	0	0	52	0	2
Waterford	1	117	0	0	58	41	0
	5	2,056	0	0	330	41	4
Tolland County							
Ellington[1]	2	25	0	0	1,049	0	2
Somers[1]	2	52	0	0	1,278	0	5
Union[1]	1	41	0	0	0	0	1
	5	118	0	0	2,327	0	8
Middlesex County							
Chester	1	1	0	0	0	49	0
Clinton	0	0	0	0	0	56	0
Haddam[1]	2	18	1	6	0	12	0
Saybrook[1]	0	0	0	0	0	8	0
	3	19	1	6	0	125	0
Hartford County							
Avon	0	0	0	0	0	57	0
Bristol	0	0	0	0	0	91	0
Burlington	4	157	0	0	0	77	0
East Granby[1]	0	0	0	0	12	0	1
East Windsor[1]	0	0	0	0	3	0	1
Glastonbury[1]	0	0	0	0	436	0	2
Hartland	11	478	0	0	0	72	0
New Britain[1]	0	0	0	0	75	0	1
Newington[1]	0	0	0	0	223	0	2
Simsbury	7	820	0	0	0	84	522
Southington	1	49	0	0	0	80	0
Suffield[1]	0	0	0	0	0	0	1
West Hartford	2	61	0	0	0	0	107
Wethersfield	2	5,087	0	0	7,908	48	0
	27	6,652	0	0	8,657	509	637
New Haven County							
Branford	2	41	2	33	0	104	0
Meriden	6	183	0	0	0	81	0
Middlebury[2]	0	0	0	0	0	3	319
North Branford[1]	0	0	0	0	0	0	16
North Haven[1]	0	0	0	0	0	0	8
Orange[2]	0	0	0	0	0	3	145
Southbury[2]	0	0	0	0	0	4	691
Wolcott	4	2,235	2	7,845	0	0	265
	12	2,459	4	7,878	0	195	1,444

[1]Scouted around old infestations.
[2]Scouted by Federal men.

Towns	Infestations found	Egg-clusters creosoted	Colonies sprayed	Poison used (lbs)	Larvae and pupae killed	Roadside scouted (miles)	Woodland scouted (acres)
Litchfield County							
Barkhamsted	20	1,408	3	30	0	91	0
Canaan[2]	5	1,200	5	23,100	0	17	3,982
Colebrook	2	32	0	0	0	15	0
Cornwall[2]	1	116	1	3,545	0	3	608
Harwinton	0	0	0	0	0	3	0
Kent[2]	0	0	0	0	0	1	270
Litchfield[2]	0	0	0	0	0	5	767
New Hartford	1	17	0	0	0	0	8
Norfolk[2]	1	6	1	150	0	3	1,022
North Canaan[2]	1	32	1	1,830	0	6	942
Salisbury[2]	1	138	1	2,020	0	2	770
Sharon[2]	1	8	1	2,880	0	2	320
Warren[2]	3	84	2	6,480	0	5	2,816
Washington[2]	0	0	0	0	0	5	405
	36	3,041	15	40,035	0	158	11,910

Fairfield County

No work was done in Fairfield County.

[2]Scouted by Federal men.

There has been no change in the Federal or State gipsy moth quarantine during the year.

SUMMARY OF STATISTICS

County	Towns covered	Infestations found	Egg-clusters creosoted	Colonies sprayed	Poison used (lbs.)	Larvae and pupae killed	Roadside scouted (miles)	Woodland scouted (acres)
Windham	5	27	4,675	0	0	58,946	0	22
New London	4	5	2,056	0	0	330	41	4
Tolland	3	5	118	0	0	2,327	0	8
Middlesex	4	3	19	1	6	0	125	0
Hartford	14	27	6,652	0	0	8,657	509	637
New Haven	8	12	2,459	4	7,878	0	195	1,444
Litchfield	14	36	3,041	15	40,035	0	158	11,910
	52	115	19,020	20	47,919	70,260	1,028	14,025

Financial Statement

RECEIPTS

Appropriation year ending June 30, 1933	$50,000.00
Balance on hand July 1, 1932	290.72
	$50,290.72

EXPENDITURES

Salaries	$ 4,772.50
Labor	33,369.25
Stationery and office supplies	72.13
Scientific supplies (chemicals)	26.25
Insecticides	314.78

Small hardware	$ 1.61
Automobile oil	53.10
Medical supplies	15.40
Telephone	62.25
Travel expense (outlying)	247.99
" " (gasoline for automobiles)	853.92
Freight and express	4.37
Fuel	76.00
Electricity	17.64
Automobiles (new)	3,974.00
" (repairs)	262.44
Other equipment (new)	2,663.99
" " (repairs)	21.85
Rent of land, storehouse	454.75
Insurance	590.70
Miscellaneous contingent expenses	3.79
Total Disbursements	$47,858.71
*Balance on hand July 1, 1933	2,432.01
	$50,290.72

*Reverts to State Treasury.

THE EUROPEAN CORN BORER IN CONNECTICUT, 1933

W. E. Britton, M. P. Zappe and J. P. Johnson

This paper is a report on the compulsory clean-up, together with surveys of the degree of infestation of early and late sweet corn and injury caused by the borer.

Enforcing the Compulsory Clean-up

Pursuant to the provisions of Section 2125 of the General Statutes, Director Slate of this Station issued an order requiring that all cornstalks and stubble be satisfactorily disposed of on or before April 10, by feeding to live stock, plowing under cleanly, or burning, and that the larger weeds in and around the cornfields likewise be destroyed.

Consequently, on April 12, 22 men were sent out as inspectors to check on the clean-up work, and where it had not been done or done properly, to insist that it be done at once. In most cases where the official order had not been fulfilled, the reason was given as wet land, broken farm machinery, sick men or sick horses.

Following the system used in preceding seasons, the inspectors filled out order cards instructing each grower what to do, and obtained his signature agreeing to complete the work within a few days. Another addressed card was left for him to sign and send to the office as soon as the work had been completed. The order cards signed by the growers were brought to the Station by the inspectors, and when the report cards were received stating that the clean-up had been completed, these cards were matched up, clipped together and filed. In case the report cards were not received within a reasonable time, the inspectors visited each

delinquent to learn the reason. Altogether 5,369 order cards were issued by the inspectors, and 4,399 report cards, or 82 per cent, were returned to the office. Some cards had been lost or mislaid and in many such cases the inspectors found that the work had been done. Where report cards are not returned it makes more work for the inspectors, but on the whole there was very little trouble as most of the growers have now had some injury done to their corn by this insect and are willing to cooperate in holding the pest down to such a point that it will not cause severe damage.

In 1933, there were only three prosecutions of men who refused to clean up their premises. In all cases convictions were obtained, and the courts imposed fines and ordered the fields cleaned up.

Mr. Zappe and Mr. Johnson had general supervision of this work and the inspectors used automobiles borrowed from the Bureau of Plant Quarantine of the United States Department of Agriculture. The Station paid the cost of operating the motor cars, and the wages of the inspectors. This work was completed about June 1.

The total cost to the state in conducting this work was approximately $4,279.26, while $336.39 was expended in conducting a survey during the summer and fall seasons.

Summary of the European Corn Borer Survey, Summer and Fall of 1933

Reports were received by the writers during the month of June that early sweet corn was heavily infested by the first generation corn borer in Glastonbury and Stratford. Certain fields were checked in these towns and observations made which indicated that severe injury would occur. It was decided that one man should be assigned to make observations and collect data on the resulting losses. Mr. R. E. Kimport, formerly with the Bureau of Entomology, U. S. Department of Agriculture, was employed for this purpose.

Investigations were made in Glastonbury, East Hartford, Manchester, Southington, Plainville, Middletown, Durham, Branford, North Branford, Northford, Groton, Ledyard, New London, Stratford, Hamden, Milford, Westport, Salisbury, and New Milford. It was found that moderate damage occurred in the towns of Manchester, Middletown, Southington, Plainville, Branford, North Branford, Groton, Ledyard, New London and Hamden, while severe damage occurred in Glastonbury, East Hartford, Milford and Stratford.

The most severe damage during the past season by the first generation borer occurred in sweet corn planted during April and the first ten days of May and which is usually harvested the first twenty-five days of July. This damage was primarily caused by borers entering the marketable ears rendering them unsalable, and by injury near the junction of the ear-shanks and stalks causing improper development of ears.

The first corn harvested for market was heavily infested and damaged to such an extent that consumers bought less corn through the season and were so suspicious that practically all corn was examined closely before any was purchased. This condition resulted in a decrease of the

price of at least five cents a dozen on the market. Clean uninfested corn brought little if any more than the lightly infested corn. Heavily infested corn did not sell at wholesale or retail. The average price obtained for this early corn was approximately twenty cents a dozen.

Farms were visited when reports were received that infestations of the first generation borer were present. In all, thirty-nine such farms were visited and eleven farms were found uninfested, while others had damage as high as 100 per cent. Data were obtained from the growers concerning acreage of corn ground, and the amounts sold and left unsold. The

TABLE 3. DAMAGE TO EARLY SWEET CORN BY THE FIRST GENERATION CORN BORER

	Town	Acres	Estimated Number Doz. Ears in Field	Number Dozen Ears Sold	*Estimated Loss Due to Damage	†Loss due to Decreased Demand	Estimated Total Loss to Grower
1.	Glastonbury	15.	6,750	1,200	$ 1,170.00	$ 337.50	$ 1,507.50
2.	East Hartford	8.	3,600	1,600	600.00	180.00	780.00
3.	East Hartford	4.5	2,250	1,000	510.00	112.50	622.50
4.	Glastonbury	2.	900	0	180.00	45.00	225.00
5.	East Hartford	1.	500	200	90.00	25.00	115.00
6.	East Hartford	7.	4,000	0	800.00	200.00	1,000.00
7.	East Hartford	2.	900	100	165.00	45.00	210.00
8.	East Hartford	1.	450	100	75.00	22.50	97.50
9.	East Hartford	1.5	700	200	110.00	35.00	145.00
10.	East Hartford	1.	500	150	77.50	25.00	102.50
11.	East Hartford	2.	900	225	140.63	45.00	185.63
12.	Manchester	.5	200	20	38.00	10.00	48.00
13.	Manchester	2.	1,000	200	170.00	50.00	220.00
14.	Glastonbury	1.5	800	100	140.00	40.00	180.00
15.	Glastonbury	2.	1,100	200	190.00	55.00	245.00
16.	Southington	10.	4,500	4,200	20.00	225.00	245.00
17.	Plainville	15.	6,750	6,600	30.00	337.50	367.50
18.	Middletown	2.5	1,000	150	265.00	50.00	315.00
19.	Middletown	.7	400	50	105.00	20.00	125.00
20.	Durham	.5	200	Selling	No estimate	10.00	10.00
21.	Branford	1.5	700		No loss	35.00	35.00
22.	Branford	2.	1,000		No loss	50.00	50.00
23.	No. Branford	2.5	1,200		No loss	60.00	60.00
24.	No. Branford	2.5	1,200		No loss	60.00	60.00
25.	Northford	8.	4,000		No loss	200.00	200.00
26.	Groton	2.	900		No loss	45.00	45.00
27.	Ledyard	1.5	675	600	18.75	33.75	52.50
28.	Groton	1.	450	400	12.50	22.50	35.00
29.	New London	.5	300	250	10.00	15.00	25.00
30.	Stratford	12.	5,400	2,700	782.00	270.00	1,052.00
31.	Highwood	8.	3,600	2,200	418.00	180.00	598.00
32.	Hamden	12.	5,400	4,700	401.00	270.00	671.00
33.	Stratford	3.	1,350	700	267.50	67.50	335.00
34.	Woodmont	25.	12,500	Seed Corn	No estimate	625.00	625.00
35.	Westport	5.	2,500		No loss	125.00	125.00
36.	Westport	20.	9,000		No loss	450.00	450.00
37.	Salisbury	.3	135		No loss	6.75	6.75
38.	New Milford	2.	1,000		No loss	50.00	50.00
39.	New Milford	4.	2,000		No loss	100.00	100.00
		192.5	90,710	27,845	$6,785.88	$4,535.50	$11,321.38

* Average price, 20 cents per dozen. † Estimated loss at 5 cents a dozen due to decreased demand.

average yield was conservatively figured as 6,000 ears or 500 dozen to an acre. Twenty cents a dozen was used as an average price and from this basis the actual loss to thirty-nine farms was found to be $6,785.88 or an average loss of $34.73 an acre for 192.5 acres. Figuring five cents a dozen more, due to decreased demand, an additional loss of $4,535.50 occurred. By adding the actual and decreased demand losses, the total damage amounted to $11,321.38 or an average of $58.81 an acre. Additional figures will be found in Table 3.

Some growers, especially those that had roadside markets, kept records of their sales, and excellent figures were obtained. Damage was so severe

TABLE 4. DAMAGE TO LATE SWEET CORN BY THE SECOND GENERATION CORN BORER

	Town	Acres	Estimated Number Doz. Ears in Field	Number Dozen Ears Sold	Estimated Loss Due to Damage
1.	Milford	19.5		Seed Corn	
2.	Orange	4.		Seed Corn	No loss
3.	Orange	1.	600		No loss
4.	Orange	.5	300		No loss
5.	Orange	1.	500		No loss
6.	Glastonbury	.5	300	200	$ 15.00
7.	East Hartford	.7	400	350	45.00
8.	Highwood	.7	400	340	13.00
9.	Hamden	2.			No loss
10.	North Haven	.5			No loss
11.	North Haven	.5	300	230	14.00
12.	Branford	1.	600	450	22.50
13.	North Branford	2.	1,200	900	45.00
14.	Middletown	.5	300	250	7.50
15.	Glastonbury	2.	1,200	750	54.00
16.	North Branford	1.	500	400	15.00
17.	North Guilford	.5	300	250	7.50
18.	Windsor	3.		Seed	No estimate
19.	East Hartford	1.	600	300	60.00
20.	Glastonbury	1.	600	0	120.00
21.	East Hartford	2.	1,200	800	80.00
22.	East Hartford	.5	300	0	60.00
23.	Stratford	.5	300	250	12.50
24.	Stratford	.5	300	200	25.00
25.	Groton	1.	600	600	30.00
26.	Ledyard	1.	500	450	10.00
27.	Groton	.5	300		No loss
28.	Groton	.3	200		No loss
29.	Stonington	.5	200		No loss
30.	East Lyme	.3	150		No loss
31.	Old Lyme	.7	300		No loss
32.	Saybrook	.3	100		No loss
33.	Killingworth	.5	200		No loss
34.	Clinton	1.	600	400	40.00
35.	North Madison	1.	450	350	20.00
36.	Southington	.5	300	300	No loss
37.	Farmington	1.	500		No loss
38.	East Hartford	1.5	800	600	24.00
39.	Manchester	1.5	800	100	70.00
40.	Glastonbury	1.	600	0	60.00
		59.	16,800	8,470	$ 850.00

on several farms that certain pieces of corn were plowed under or used for ensilage and were figured as total losses.

The second generation borer caused damage to the late sweet corn, seed corn and dahlias. Heavy infestations occurred in fields of ensilage corn but very little breakage was found. Wind damage resulting from the tropical storm was more severe than the breakage caused by the corn borer.

The sweet corn cut for the markets in late August and early September was not much injured as the borers were just hatching. However, later corn was entered by the young larvae which developed rapidly. As the season progressed the damage became more apparent causing further losses to the growers. This loss was due primarily by direct injury to the salable ears. The ears had an opportunity to develop normally before the second generation borers were large enough to injure the stalks.

A large percentage of the late corn was marketed before the damage became evident and it was difficult to obtain figures for damage on any great amount of acreage. However, after approaching the growers in a manner similar to that during the early summer, figures were obtained from 37 growers having a total of 32.5 acres. Fourteen of the 37 growers did not have any loss. The losses for the late corn were obtained by estimating the number of ears left in the field and the prices obtained by the individual grower. The prices varied from ten to twenty-five cents a dozen. The loss for 32.5 acres amounted to $850.00 or an average of $26.15 an acre. This average includes the fourteen farms where no loss occurred. Table 4 will give additional information on damage caused by the second generation borer.

The seed corn industry was dealt severe losses by the corn borer. These losses were taken as a whole and no effort was made to distinguish the damage caused individually by the first or second generation borers. Estimates by the growers ranged from five to twenty-five per cent loss, and some of these are considered very conservative by the writer. The seed corn crop is fifty per cent short this year due to dry weather, Stewart's wilt, corn ear worm and the corn borer.

The seed corn industry centers around Milford and Wethersfield, and growers having a total of 309 acres were visited. Estimates of damage in the field due to non-development and spoilage of the ears, damage and spoilage of the kernels after harvesting and in some instances extra labor costs in cleaning and preparing the seed were used to figure the losses. Actual damage by the corn borer to 309 acres of seed corn amounted to $4,333.73 while additional labor charges (those obtainable) for extra hand work in cleaning totaled $861.00. The combined figures total $5,194.73, or an average of $16.81 an acre.

During the first generation it was found that the borer population in the early sweet corn was as high as 1,342.6 borers per hundred stalks or 259,464 borers to an acre, in one field in East Hartford. The fall borer population survey was made in Glastonbury, Wethersfield, Milford, Orange, Woodbridge, Groton, Ledyard, Montville, New London, Stonington and Waterford. All the towns with the exception of Ledyard indicated an increase of approximately one hundred per cent over the

1932 survey. The infestation increased slightly in Ledyard. This survey, shown in Table 3, was primarily made on the same farms as those surveyed in 1932. Sweet, Flint, Dent and Ensilage corn were the varieties grown in the fields.

While preliminary surveys were being made during the latter part of June and first part of July, reports were received that the corn borer was infesting the stalks of Irish Cobbler potatoes in East Hartford, and upon investigation it was found that several fields had considerable

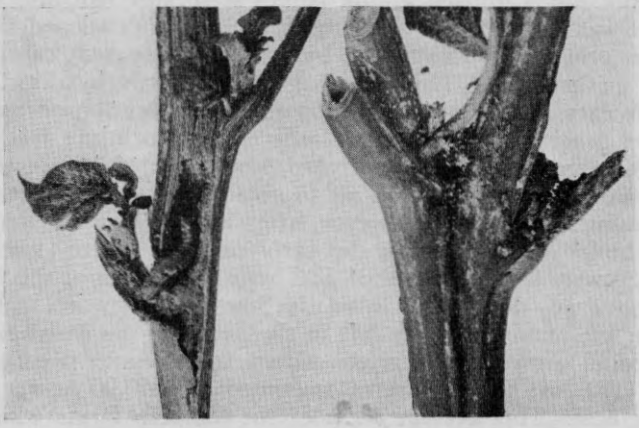

FIGURE 71. European corn borer in potato stalks in East Hartford. Natural size.

infestation. Infested stalks are shown in Figure 71. The potatoes were so far advanced that no ill effect could be noted. Green Mountain potatoes planted in adjacent fields at a later date had little or no infestation. It seemed feasible to believe that the Irish Cobblers were planted early, and corn borer eggs were deposited on the stalks, while very little if any other growth was present to serve as host plant. As the season advanced, especially during the period of the second generation, it was found that weed infestation was much more apparent than it had ever been before.

Damage to Seed Sweet Corn

In addition to the data shown in Tables 3, 4 and 5, an examination of dried sweet corn ears was made on certain farms in the seed growing regions in and around Milford and Wethersfield, by A. M. Vance and S. M. Dohanian of the Arlington, Mass., corn borer laboratory of the United States Bureau of Entomology. Some results of this seed damage survey are mentioned here by permission.

As might be expected, the degree of infestation varied with location of field and variety of sweet corn, but of 23 lots representing 15 varieties, only 4 lots showed less than 50 per cent of the ears damaged by the European corn borer. Three varieties had more than 90 per cent damaged; the highest was 99.3, and the average 58.2 per cent.

TABLE 5. COMPARATIVE CORN BORER CONDITIONS FOR THREE YEARS

FALL, 1933

Towns		Acres Surveyed	Per cent of Infestation	Average No. Borers per Inf. Plant	Maximum Borers per Plant	Borers per 100 Plants Inf. or Uninfested	Borers per Acre*
Hartford County							
Glastonbury	1933	4.59	49.8	7.8	26	388.4	75,349
	1932	6.6	42.4	5.47	13	231.93	44,994
Wethersfield	1933	25.6	83.	6.1	14	506.3	98,222
	1932	12.71	47.4	8.6	53	407.64	79,082
New Haven County							
Milford	1933	21.24	87.2	4.56	13	397.6	76,124
	1932	16.88	35.4	1.58	7	55.93	10,850
	1931	14.26	24.	3.	10	72.	13,967
Orange	1933	11.05	61.8	3.9	16	241.	46,754
	1932	14.38	20.8	2.04	8	42.43	8,231
	1931	2.33	4.88	1.74	8	8.49	1,643
Woodbridge	1933	13.39	13.6	1.82	8	24.75	4,792
	1932	9.	7.6	1.87	3	14.21	2,757
New London County							
Groton	1933	13.69	80.8	5.92	20	478.3	92,790
	1932	2.91	75.6	3.76	8	284.26	55,146
	1931	2.39	62.32	7.14	27	444.96	85,883
Ledyard	1933	2.52	39.	2.24	9	87.36	16,948
	1932	3.06	37.	2.08	6	76.96	14,930
	1931	6.	26.96	2.64	13	68.48	13,308
Montville	1933	3.83	35.6	2.44	9	86.86	16,851
	1932	2.82	24.8	1.6	4	39.68	7,698
	1931	6.5	17.52	3.58	20	62.72	12,158
New London	1933	† .15	100.	6.8	8	680.	131,920
	1932	Back Yard	60.	2.6	5	156.	30,264
	1931	1.04	69.84	7.5	17	523.8	101,738
Stonington	1933	3.37	70.6	3.3	11	232.98	45,188
	1932	4.09	46.8	2.28	12	106.7	20,700
	1931	6.57	44.08	5.48	35	241.56	46,841
Waterford	1933	7.49	89.6	4.08	8	365.5	70,907
	1932	4.85	63.	3.08	7	194.04	37,644
	1931	8.18	35.04	2.82	10	98.81	19,185

* Average based on 19,400 plants per acre. † 1 Back Yard.

This survey also took into account the damage to the tip kernels, the butt kernels and the middle kernels. The middle kernels are usually considered the most desirable for seed, and of the 27 lots representing 15 varieties, only 7 lots showed less than 50 per cent damage to the middle kernels. The greatest damage to middle kernels was 98 per cent, the least was 15.7, and the average 58.2 per cent. In estimating the financial loss

per acre to sweet corn grown for seed, it is necessary to consider not only the injury to the kernels, but also the cost of separating the good from the injured kernels. In the instance of greatest damage this exceeded $51.00 an acre. The least was $3.64, and the average for the 23 lots representing 15 varieties was $15.57 an acre.

THE JAPANESE BEETLE IN CONNECTICUT, 1933

J. PETER JOHNSON

Scouting

In scouting, fifteen men were employed and organized into three crews of four men each and one crew of three men. With the exception of one man, all were experienced scouts. Work was begun on July 10 and completed September 2, 1933. The scouts reported at New Haven for one day of field practice. The crew foremen were furnished their assignments, supplies and automobiles. All crews were engaged in scouting classified nursery and greenhouse premises. Crews of four men each were placed in Shelton, New Haven and Hartford, and the crew of three men was stationed in Willimantic. These towns were centers from which the crews covered their respective districts. The scouting itineraries were so arranged that each classified establishment would be scouted twice, but when the establishments were in close proximity to known infestations they were scouted three times.

Altogether 116 establishments were scouted and many of these were subdivided, meaning that considerably more than 116 areas were scouted within the state. The minimum distance scouted around each firm was 1,000 feet and where necessary, this distance was extended. Scouting for the abundance and spread of the beetles was incidental to the scouting of classified nurseries and greenhouses. Beetles were found in several localities, none of which constituted new infestations.

The first beetles were found in New Haven, July 10, and the last beetles were found by an inspector in Stamford, October 5, 1933.

Trapping

Traps were placed for the first time in Manchester, Middletown, Putnam and Winsted. Beetles were caught for the first time in Manchester, Middletown and Putnam as follows:

Locality	Date	No. of beetles
Manchester	July 7 - August 28	10
Middletown	July 10 - August 1	4
Putnam	August 2 - September 2	135
	Total beetles caught in traps	149

The infestation in Bridgeport has increased to such an extent that feeding was noted on grapevines, flower gardens and shrubs in many more localities than in 1932. Telephone calls and letters were received

which indicated that residents were carrying on control work. The Children's Museum, Farmington Avenue, Hartford, requested information on control measures because it had received many local calls for such information.

Inspection and Certification of Farm Products

Federal quarantine No. 48 as revised and effective January 1, 1933, was extended to include all of Massachusetts, the southern half of New Hampshire and Vermont and additional areas in New York. The extension included nearly all of the natural market areas for Connecticut farm products and very little inspection was necessary. Further, the lifting of the farm products quarantine on September 15 relieved the necessity of inspecting fruit shipments into Maine, as the peach crop was maturing at that time. The regular nursery district inspectors inspected and certified all the farm products shipments without much extra labor. Practically all shipments were made by non-commercial shippers. The quantity of each product inspected and certified is shown in Table 6:

TABLE 6

Product	Number of Packages
Corn	39
Beans	59
Apples	3
Peaches	19
Cut flowers	15
Total	135

The total number of plants certified for shipment into other states and foreign countries was 1,969,042. The number of certificates issued is shown in Table 7:

TABLE 7

Kind	Farm products	Cut flowers	Nursery and ornamental stock	Soil, sand	Total
'A'	81	12	268	1	362
'A' blks.			18,288		18,288
'B'		1	1,875	9	1,885
Total	81	13	20,431	10	20,535

The number of state certificates issued in 1933 for use on shipments of plant materials to the 30 states and Dominion of Canada that have placed quarantine regulations against infested states on account of the European corn borer, is shown in Table 8:

TABLE 8

No. of tags used	Products	Amount	Value
161	Shelled corn	120 bags)	$
6	Shelled beans	3 bags)	768.14
127	Chrysanthemums	3,606	431.87
5	Asters	19	5.20
20	Dahlias	344	544.00
319			$1,749.21

MOSQUITO CONTROL IN CONNECTICUT, 1933

R. C. Botsford

New ditching for mosquito elimination this season was limited to work done by the towns of Stratford, Fairfield, Bridgeport and Old Saybrook as a relief measure for unemployed labor. The work in Stratford and Old Saybrook was the ditching of salt marshes, and in Bridgeport and Fairfield was concerned with fresh water streams and swamps.

The following towns contain certain salt marsh areas that as yet are unditched: Bridgeport, Stratford, Milford, West Haven, New Haven, North Haven, East Haven, Clinton, Old Saybrook, East Lyme, Waterford and New London amounting to approximately 5,500 acres. Also there are brackish areas bordering the Connecticut River in the towns of Saybrook, Essex and Lyme.

Many of the tide gate structures, dikes, and culverts, serving as beach outlets which are depended upon in maintaining the areas protected, are greatly in need of repair. The tide gates on the Branford River at Montowese Street have long been a source of much annoyance on account of bad leakage under the sills. It seems almost impossible to remedy it without complete reconstruction. These gates must be removed from their hangings every autumn, brought ashore and stored, and replaced in the spring. These gates should be redesigned to overcome their present defects. The tide gate on Sybil Creek at Indian Neck has a sill that is too high to allow the necessary drainage of the marsh, back of Hotchkiss Grove. This condition should be corrected as soon as possible to eliminate mosquitoes breeding there. Tide gates near Branford Point on Harbor Street should be rebuilt. The tide gate on Stony Creek is in good condition, but the dike, which was repaired in 1923, has settled and should be completely rebuilt. The stone dike at Shell Beach, Guilford, leaks badly and should be rebuilt and raised about two feet. At Great Harbor the tide gate structure is at a point where the first severe storm may sweep it away. The old Shore Line Railroad embankment which has served as a dike there for about 15 years has weak points caused by the receding beach where a severe storm could break through, as there is no stone protection for the dirt bank.

A tide gate in the East River, Madison, should be replaced at the old site north of the Post Road. Also a tide gate is required in Clinton on the Indian River at the north end of the Post Road bridge.

An important improvement was made in an outlet in Westbrook on the Frederic P. Fisk property. An 18-inch corrugated iron pipe installed in 1924 was badly corroded and was replaced by 120 feet of 24-inch Atlas Cast Iron Lock Joint pipe, and placed on the east boundary of the Fisk property. The pipe was purchased and delivered to the job by Frederic P. Fisk. He also constructed a sea wall and a concrete manhole complete with tide gate and rubbish screen. This Station will furnish and install the same type of pipe to extend from the new sea wall through the beach to the low tide level. This job should be completed as soon as possible.

In Guilford the dike at the foot of Whitfield Street was rebuilt by a local contractor. This work was initiated by the salt meadow owners and the Experiment Station paid for half the total cost.

The pipe outlet and gate to the outlet of Oldfield Creek in West Haven installed jointly by the Town of West Haven and the Station in 1931 has proved a valuable improvement and functions satisfactorily.

Mosquito breeding places in West Haven still exist at Sandy Point, Cove River and Oyster River. These areas should be ditched.

Mosquito breeding places in West Haven still exist at Sandy Point, period since 1924. This was due to the frequent showers and generally cloudy and humid weather, which resulted in the formation of breeding spots in areas not previously requiring attention.

A large brood of mosquitoes developed and emerged in Westport at the Great Marsh where an outlet pipe became clogged and a severe storm broke through the beach and flooded the area. This produced ideal conditions for mosquito breeding.

In Guilford at Shell Beach at least two broods developed and infested the whole community. One length of corrugated iron pipe was so thoroughly rusted through that the leakage filled a grassy area of about 50 acres to a depth of 4 to 10 inches, producing ideal breeding conditions and making its discovery difficult.

The Morris Creek areas, both in New Haven and East Haven, have always been a source of mosquitoes to infest New Haven. It is impractical to ditch these areas until the tide gate sill on Morris Creek is lowered between 18 and 24 inches. Until this is done, ditching cannot be effective. The stream should also be dredged from Thompson Avenue to the beach.

The general maintenance work on ditched and accepted salt marsh areas was carried on as usual with three crews patrolling practically the entire coast line. The condition of the ditches has continued to improve and with the exception of the broods escaping in Westport and Guilford, no breeding of any importance was discovered on the salt marshes.

In New Canaan, Edwin C. Rae was again appointed State Deputy to carry on investigations and control work, and he submitted to Dr. W. E. Britton of this Station and to George T. Smith, First Selectman of New Canaan, a complete report of his work of the season.

More mosquito breeding places were found and reported in New Canaan this season than last year, and the same problems were confronted. Backyard breeding places seem to be the major problem in New Canaan, especially in the center of the town. An effective larvicide less destructive to vegetation and wild life is a necessity in this and similar towns. Much can be accomplished by ditching and draining swamps, grading streams and cleaning edges of ponds, and other permanent work.

Under the Civil Works Administration for the relief of unemployed, two mosquito control projects have been assigned for supervision by the Connecticut Agricultural Experiment Station staff. One is a Federal project that authorizes ditching of salt marshes and fresh water swamps, and the repair or construction of tide gates and dikes. The other is a State project for ditching salt marshes. With funds furnished under these two projects, it is planned to complete the ditching of the remaining unditched salt marsh areas in Connecticut, repair tide gates and dikes, and also accomplish some much-needed and permanent drainage work in many towns where malarial mosquitoes have been breeding unchecked.

TESTS OF MOSQUITO LIGHT TRAPS AND LARVICIDES, 1933

NEELY TURNER

Light Traps

The New Jersey light traps were used in Spring Glen, Morris Cove and New Haven for occasional collections. No effort was made to obtain a season's record, but the traps were used to collect a sample of the mosquitoes in the localities named. The number and species of mosquitoes caught are given below.

STATISTICS OF MOSQUITO TRAP COLLECTIONS

	June				August					September	Totals
	6	16	22	28	22	25	26	27	28	8	
New Haven											
Aedes sollicitans	1										1
Aedes cantator	5	2	2								9
Aedes vexans			1	1							2
Culex pipiens			1	1							2
Totals	6	2	4	2							
Morris Cove											
Aedes sollicitans			1		3						4
Aedes vexans			7								7
Culex territans					1						1
Totals			8		4						
Spring Glen											
Aedes sollicitans					1	7	4	2	3	1	18
Aedes vexans						3	2	1	2	4	12
Aedes taeniorhynchus						2					2
Culex pipiens						1					1
Anopheles punctipennis						1				1	2
Anopheles maculipennis							1				1
Uranotaenia sapphirina									2		2
Totals					1	14	7	3	7	6	

In New Haven and Spring Glen the salt water species *Aedes sollicitans, A. cantator* and *A. taeniorhynchus* were more abundant than the fresh-water species. In Morris Cove few specimens were obtained, but *Aedes vexans* was more abundant than *A. sollicitans*. The number caught in a single night varied from 1 to 14. The traps were placed in locations from which complaints of mosquito abundance had been received. The number caught in no case equalled the standard of 24 female mosquitoes set as the number that should cause annoyance to residents. However, the standard of 24 females a night was obtained by placing the traps some distance from houses. In all three locations the traps were within 100 feet of a dwelling and in thickly settled portions of the city.

Other Collections

During the season many specimens of adult mosquitoes were collected in the field. A summary of these collections is as follows:

Aedes cantator. Collected larvae April 24 in East River and Madison. Adults emerged May 1.

Collected larvae and pupae May 6 in West Haven. Adults emerged May 10.

Aedes canadensis. Collected larvae April 24 in Madison (associated with *A. cantator*). Adults emerged May 9.

COLLECTIONS OF ADULTS

Aedes sollicitans. Westport, August 14.
Aedes cantator. Milford, May 22.
New Canaan, September 8.
Aedes canadensis. New Canaan, September 8 and 20.
Aedes vexans. Westport, August 9 and 14.
New Canaan, September 8 and 20.
Branford, October 18.
Aedes abserratus. North Branford, May 25.
Aedes fitchii. Westport, August 14.
Aedes excrucians. Farmington, May 16.
New Canaan, September 8.
Aedes triseriatus. New Canaan, September 8 and 20.
Culex pipiens. Westport, August 9.
New Canaan, September 8 and 20.
Culex territans. New Canaan, September 8.
Hamden, October 10.

In one case *Aedes cantator* and *A. canadensis* were reared from a swamp near a salt marsh. One specimen of *Aedes cantator* was taken in New Canaan on September 8. The nearest possible breeding place is about twelve miles from the point of collection. About 25 specimens of *Aedes,* apparently fresh-water species, have not been identified. Some of these may represent new records for the state.

Larvicides

Due to pressure of other work very little was done with mosquito larvicides during 1933. E. C. Rae of New Canaan tested a pyrethrum dust made by diluting one pound of freshly ground flowers of pyrethrum with three pounds of marc from kerosene extraction of ground pyrethrum flowers. This material killed mosquito larvae in small pools, but in large pools tended to collect in the center of the pool rather than remain near the banks where the mosquitoes were breeding. The dust was sufficiently toxic and if the physical properties can be changed may become useful as a larvicide.

CONTROL OF THE POTATO FLEA BEETLE

Epitrix cucumeris Harris

NEELY TURNER

The toxicity of (1) lead arsenate 3 pounds, fish oil 1 quart, water 100 gallons, (2) 5–6–50 Bordeaux mixture, and (3) barium fluosilicate 1 pound and lime 5 pounds, applied as a dust to wet foliage was compared in the laboratory. Adult flea beetles were caged on plants, treated

with these materials, and a mortality count made six days later, with the results given in Table 9.

TABLE 9.

Treatment	Percentage dead
Barium fluosilicate 1 lb., lime 5 lbs.	89
Bordeaux mixture 5–6–50	26
Lead arsenate 3 lbs., fish oil 1 qt., water 100 gals.	15
No treatment	16

This test shows that barium fluosilicate was highly effective and the other materials were of little value in killing flea beetles, although they acted as excellent repellents.

On Irish Cobbler potatoes sprays were applied May 26, June 5, June 14 and July 1. The yield of potatoes is given in Table 10.

TABLE 10. IRISH COBBLER POTATOES

Treatment	Calculated acre yield bushels
Bordeaux mixture 4–4–50	260
Lead arsenate 3 lbs., fish oil 1 qt., water 100 gals.	268
Calcium arsenate 3 lbs., water 100 gals.	224
Barium fluosilicate 3 lbs., water 100 gals.	210
No treatment	226

These results show that lead arsenate and fish oil were more effective than Bordeaux mixture, and that calcium arsenate and barium fluosilicate sprays were ineffective.

On Green Mountain potatoes sprays were applied on June 5, June 14, July 19, July 29, August 7 and August 15. These sprays were 5–6–50 Bordeaux mixture, and lead arsenate 3 pounds, fish oil 1 quart, water 100 gallons. Barium fluosilicate 1 pound, with lime 3 pounds, was applied as a dust on June 5, June 14, July 22, July 31, August 8 and August 15. Tip burn was severe on all plots except the Bordeaux plots. Late blight occurred on all plots, but was less serious on the Bordeaux plots. The yields are given in Table 11.

TABLE 11. GREEN MOUNTAIN POTATOES

Treatment	Calculated acre yield bushels
Bordeaux mixture 5–6–50	650
Barium fluosilicate 1 lb., lime 3 lbs.	377
Lead arsenate 3 lbs., fish oil 1 qt., water 100 gals.	288
No treatment	294

These results show the excellent yield following use of Bordeaux mixture as compared with the other treatments. Much of this increase was due to control of the potato leafhopper, which causes tip burn. The barium fluosilicate dust did not control tip burn but decreased flea beetle injury and increased the yield. Lead arsenate was not effective on this variety.

TESTS OF VARIOUS APPLE SPRAYS

M. P. Zappe and E. M. Stoddard

The testing of several spray materials for control of apple insects and fungous diseases has been in progress for several years and was continued in 1933. Owing to the legislation and general agitation against arsenical and lead residues on fruit, it was thought advisable to substitute calcium arsenate for lead arsenate in some of the plots.

The young Experiment Station orchard was used in these tests. The following varieties are represented in this orchard: Baldwin, Greening, McIntosh, Sutton, King, Northern Spy, Stark, Fall Pippin, Russet, Hurlburt, and Gravenstein. The plots were so arranged that most of these varieties were included in each plot. The orchard is divided into 16 rows. Rows 1 and 16, being on the outside of the orchard, were considered barrier rows. They were sprayed regularly but no fruit was scored at harvest time from these rows.

The rest of the orchard was sprayed with the following materials to 100 gallons of water:

Row 2	Liquid lime-sulfur	2½	gals.	lead arsenate, 3 lbs.
Row 3	Dry lime-sulfur	6	lbs.	lead arsenate, 3 lbs.
Row 4, 5	Hydrated lime	10	lbs.	lead arsenate, 3 lbs., fish oil, 1 qt.
Row 6	Flotation sulfur	6	lbs.	lead arsenate, 3 lbs., after calyx, 5 lbs.
Row 7	Kolofog	6	lbs.	lead arsenate, 3 lbs.
Row 8	No spray			
Row 9	Liquid lime-sulfur	2½	gals.	calcium arsenate, 3 lbs.
Row 10	Dry lime-sulfur	6	lbs.	calcium arsenate, 3 lbs.
Row 11, 12	Hydrated lime	10	lbs.	calcium arsenate, 3 lbs., fish oil, 1 qt.
Row 13	Flotation sulfur	6	lbs.	calcium arsenate, 3 lbs., after calyx, 5 lbs.
Row 14	Kolofog	6	lbs.	calcium arsenate, 3 lbs., after calyx-lime, 8 lbs.
Row 15	No spray			

Treatments and Dates

Prepink spray	May 2	on McIntosh only
Pink spray	May 8	on McIntosh only
Calyx spray	May 22, 23	on all varieties
10-day spray	June 2	on all varieties
17-day spray	June 9, 10	on all varieties
Last spray	July 10	on all varieties

No fungicides were used in the last spray.

All spraying was done with a quad gun and the spray directed from a tower mounted over the spray tank.

At harvest time fruit from all trees was scored. All injuries were noted even though they were slight, so that all fruit classified as good was perfect without any blemishes caused by diseases or insects.

The fruit from this orchard was exceptionally free from insect and fungous troubles in 1933. Curculios are still responsible for most of the injuries to the apples in this orchard, but the injuries were much less than for several years. The lead-lime-fish oil treatment was again the best of the materials tested. This has been true for several years. Curculio injury

TABLE 12. RESULTS OF TREATMENT

	Ars. lead-lime fish oil	Flotation sulfur lead arsenate	Flotation sulfur calcium arsenate	Kolofog calcium arsenate	Dry lime and sulfur lead arsenate	Dry lime and sulfur calcium arsenate	Calcium arsenate lime, fish oil	Kolofog Lead arsenate	Liquid lime and sulfur Calcium arsenate	Liquid lime and sulfur Lead arsenate	Check—no spray
Good	95.05	92.68	90.86	90.02	90.	89.86	88.94	88.64	85.97	83.42	33.23
Curculio	3.14	6.06	6.33	7.49	7.78	7.48	7.36	7.82	12.85	13.85	34.8
Codling moth	.08	.02	.01	.02	.02	.07	.08	.03	.2	.01	3.34
Other chewing insects	1.11	1.03	2.34	2.09	1.85	2.52	3.32	1.47	.99	2.33	21.06
Scab	.69	.33	.41	.48	.49	.07	.4	2.04	0	.55	18.33
Sooty Blotch	0	0	0	0	0	0	0	0	0	0	45.
Arsenic (As_2O_3) grains per pound	.0029	.0032	.00045	.0002	.0034	.0005	.0011	.0029	0	.0018	Tr.
Lead (Pb) grains per pound	.014	.010	.006	.0035	.014	.008	.003	.013	.003	.008	

Legal tolerance for lead 1933—.02 grains per pound of fruit
Legal tolerance for arsenic 1933—.01 grains per pound of fruit

was about 3 per cent less than the next best treatment. The next four treatments in the table of results (Table 12) all produced good fruit and there would be little choice between them except in the cases where calcium arsenate was used. All plots where calcium arsenate was substituted for arsenate of lead showed considerable foliage injury fairly early in the season and increased as the season progressed. The old standard spray of liquid lime-sulfur and arsenate of lead was the poorest treatment of the lot, being just a little worse than liquid lime-sulfur with calcium arsenate, except that in the latter case there was considerable foliage injury. Sooty blotch was apparently controlled perfectly by all treatments even though no fungicides were used in the last spraying of July 10.

At the bottom of Table 12 are appended the amounts of arsenic and lead residue found on random samples of fruit taken from the several treatments at harvest time. The amounts are expressed in terms of grains of arsenic trioxide and lead per pound of fruit, these analyses being made by the Department of Analytical Chemistry. It will be noted in all the treatments either with lead arsenate or calcium arsenate, that the arsenic and lead are well under the legal tolerance.

Liquid lime-sulfur in combination with either insecticide showed less arsenic and lead residue than did the other treatments, which may account in part for the higher per cent of curculio damage on these plots. It is interesting to note that the fruit sprayed with either insecticide in combination with lime and fish oil did not show any excess of residue. The trace of arsenic found on the checks can be accounted for by the drift of the spray from adjacent sprayed trees.

CONTROL OF THE WHITE APPLE LEAFHOPPER[1], 1933

PHILIP GARMAN AND J. F. TOWNSEND

Trouble with the white apple leafhopper was considerably less than in 1932. It is doubtful at this time what the exact causes of the decrease were, but from orchard inspections it was apparently related in some way to the amount of rainfall occurring during periods when adult leafhoppers were emerging. Tables 14 and 15 give rainfall data for the last five years. Emergence of nymphs proceeded about as usual, both in the spring and fall of 1933, but the number of hoppers developing was not sufficient to cause trouble in most orchards. It is quite probable that insect enemies also played an important part in leafhopper reduction.

Observations were made in the MacDonald orchard, Wallingford, and in the Station orchard at Mount Carmel to determine whether delayed nymphal emergence occurred in the Wallingford locality. The emergence at that place and also at the Mount Carmel farm appeared to correspond with data secured in 1932 and reported in Bulletin 349, p. 430. Application of commercial sodium polysulfide combined with calcium arsenate was made at the MacDonald farm and counts were made to determine whether there was any advantage in this material over the standard lead arsenate-lime sulfur combination in preventing leafhopper nymphs from hatching. None was discovered.

Observations were continued during the summer and fall and spray applications for control were again made in two different orchards. An effort was made to determine just how many hopper nymphs per 100 leaves constitute a menace, with the following results. At the MacDonald orchard, trees averaging 144 per 100 leaves did not have enough to cause trouble or to warrant a spray in 1933. At the Bishop orchard 155 per 100 leaves was not enough, and at the Experiment Station farm 135 per 100 leaves was not enough. It appears that under similar conditions at least 200 per 100 leaves is necessary. The belief is, however, that a much smaller population at the time of the first generation emergence requires application of control measures; possibly 50 per 100 leaves, but this figure may be too low.

Life history work continued from 1932 indicated that the eggs of the second generation are deposited as might be expected in October, reaching a peak about the middle of the month. This data was secured from potted apple seedlings exposed to leafhoppers during the previous autumn.

The result of sprays for control are shown in Table 13. A number of pyrethrum products were tried at Mount Carmel with promising results. At the MacDonald Farm, G. L. Cass kindly applied a number of nicotine preparations (with and without soap), in comparison with anabasine sulfate containing no soap. Counts of leafhopper nymphs were made the day before and the day after the treatments and again at irregular intervals to learn if more developed after the sprays were applied. Few or no leafhoppers hatched after the spray dates in the treated plots. In the Mount Carmel farm orchard applications were made September 2 and at the Wallingford orchard, August 31. Of the pyrethrum products tried,

[1] *Typhlocyba pomaria* McAtee.

the Makepeace pyrethrum soap appeared to give the best kill, but other products are so close that the difference is doubtful in importance. In this orchard, pyrethrum products appeared to kill somewhat better than nicotine sulfate without soap.

In the MacDonald orchard there was very little difference between nicotine sulfate, and nicotine sulfate plus coconut oil soap, both giving a high percentage kill. Free nicotine without soap gave excellent results. Anabasine sulfate without soap gave as good results as nicotine sulfate without soap, and corresponded with results obtained with this material in 1932.

While no effort was made to check results of summer oils in commercial orchards, observations of the infestation in the Bishop orchard where a one per cent commercial oil was applied in midsummer lead to the belief that oils alone may be ineffective when applied during July.

TABLE 13. RESULT OF SPRAYS TO CONTROL THE WHITE APPLE LEAFHOPPER

Materials used	Nymph population per 100 leaves before application	Nymph population per 100 leaves after application	Percentage reduction
MacDonald Orchard, Wallingford			
Nicotine sulfate 1 pint Coconut oil soap 2 qts. Water 100 gals.	193	1.6	99.3
Free nicotine 1 pint Water 100 gals.	178	.4	99.8
Nicotine sulfate 1 pint Water 100 gals.	142	5.5	96.1
Anabasine sulfate 1 pint Water 100 gals.	164	2.4	98.5
Check—no treatment	145	144	.7
Experiment Station Orchard, Mount Carmel			
Pyagrol 1 pint Penetrol 2 pints Water 100 gals.	75	3.5	95.2
"Evergreen 20" 1 pint Coconut oil soap 3 qts. Water 100 gals.	85	4.0	95.3
Makepeace pyrethrum soap 6 lbs. Water 100 gals.	97	1.1	98.8
Nicotine sulfate 1 pint Water 100 gals.	68	6.7	90.1
Check—no treatment	89	135	00.0

TABLE 14. RAINFALL IN INCHES FOR NEW HAVEN COUNTY FOR THE YEARS 1928 TO 1933 INCLUSIVE

Year	May	June	July	August	September	October	Total
1928	2.26	6.09	7.86	3.51	3.85	1.38	24.95
1929	3.94	1.57	2.44	4.17	1.31	3.75	17.18
1930	5.45	2.43	1.65	1.35	1.35	2.50	14.73
1931	5.90	5.33	3.99	3.31	4.60	2.23	25.36
1932	2.00	2.12	2.79	4.40	3.65	5.51	20.47
1933	2.55	2.70	3.18	6.70	5.65	3.10	23.80

TABLE 15. SUM OF PRECIPITATION FOR JULY, AUGUST AND SEPTEMBER, AND AUGUST, SEPTEMBER AND OCTOBER

Rainfall in inches

July, August, September		August, September, October		Leafhopper abundance
1928	15.22	1928	8.74	moderate
1929	7.92	1929	9.13	"
1930	4.25	1930	5.10	severe
1931	11.81	1931	9.14	"
1932	10.84	1932	13.56	moderate
1933	15.53	1933	15.45	light

Recommendations

Nicotine or anabasine sulfate with regular fungicides may be applied within two weeks after calyx or petal fall spray for the first generation. In severe infestations two applications may be necessary to clean up. No application is recommended unless there are at least 50 nymphs per 100 leaves.

For the second generation, apply nicotine or anabasine sulfate with or without soap. Nicotine alkaloid (free nicotine) or pyrethrum sprays will give good results. Apply about the first of September. No application is recommended for populations of less than 200 per 100 leaves.

Spray from the inside of the tree covering all leaves thoroughly on the underside.

ORCHARD EXPERIMENTS WITH SUBSTITUTES FOR LEAD ARSENATE

PHILIP GARMAN

Great interest on the part of fruit growers in lead arsenate substitutes and the demand for information regarding calcium arsenates in particular, resulted in a series of field experiments in various orchards. Professor S. P. Hollister of the Connecticut State College kindly coöperated with this office and his men applied a full series of calcium arsenate sprays combined with different fungicides. Plots were also sprayed in the orchards of Elijah Rogers and Son, and S. H. MacDonald, through the kindness of the owners.

The following brief description of the experiments and the results obtained is given to show the general trend of the investigation.

Apples

(1) Experiment Station orchard at Mount Carmel in charge of E. M. Stoddard; received calcium arsenate on one-half, lead arsenate on the other. Calcium arsenate used in combination with dry and liquid lime-sulfur, flotation sulfur, Kolofog, and lime-fish oil; Calcium arsenate was used at the rate of 2 pounds per 100 gallons and lime was added only in

the lime-fish oil combination where it was used at 10 pounds per 100 gallons. Five sprays were applied, the last on July 10.

Results: Lime appeared to be necessary with calcium arsenate because all plots except those sprayed with lime-fish oil and calcium arsenate were injured within two weeks of the application, and showed much yellow leaf. Lead arsenate plots showed much less injury (Figure 72) but there was considerable leaf scorch and leaf drop later in the season. Much varietal difference was noted in regard to spray burn. Gravenstein trees were apparently not affected, whereas Greening was almost completely defoliated (Figure 73) toward the end of the season. Baldwin, Spy, Pippin and King were also injured. Insect control was very good with calcium arsenate but not quite as good as lead arsenate. From the

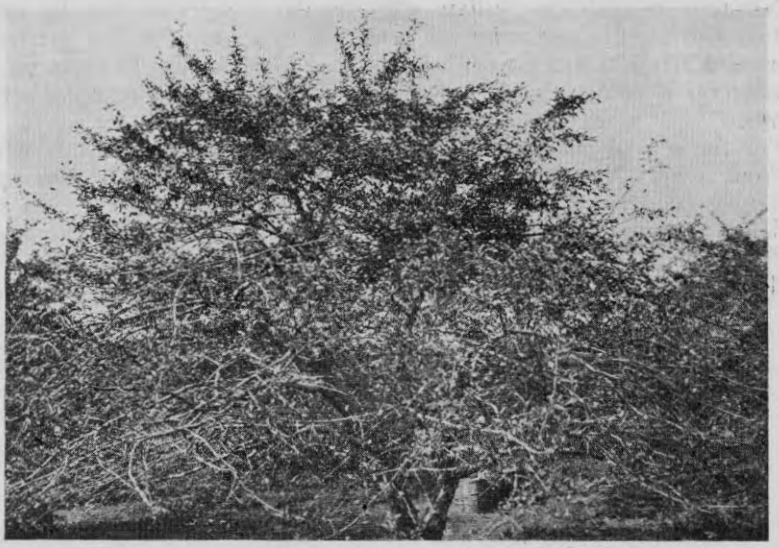

FIGURE 72. This Greening tree, sprayed with lead arsenate and lime-sulfur, showed considerable defoliation at picking time. Photographed in September.

commercial standpoint, however, insect control appeared to be satisfactory.

(2) Experiment Station orchard at Mount Carmel a short distance from No. 1. Four plots were sprayed six times with calcium arsenate (two brands) combined with dry lime-sulfur and flotation sulfur, 6 pounds lime added to each 100 gallons spray in all treatments. A third brand of calcium arsenate was used with flotation sulfur and lime. Synthetic cryolite was used in one plot with lime and flotation sulfur. Manganar and barium fluosilicate without lime in one plot, the barium fluosilicate being applied up until July, manganar after July 1. One plot with magnesium arsenate and dry lime-sulfur and a few trees with zinc arsenate. Six applications of all insecticides (except zinc arsenate and magnesium arsenate) were applied, the last on July 28.

Results: Foliage burn resulted from all sprays but was unimportant in the case of cryolite and barium fluosilicate. Manganar caused some yellow leaf shortly after application, but since only two applications with this material were made, it cannot be compared directly with calcium

FIGURE 73. The Greening tree (left) was almost completely defoliated by calcium arsenate sprays. (Right) A Gravenstein tree which received the same treatment with little or no defoliation. Photographed in September.

arsenate and others. Calcium arsenate caused some burn (Figure 74) in all cases but was considerably slower appearing in plots sprayed with flotation sulfur, lime and stabilized calcium arsenates than in other plots. Cryolite sprayed trees were in perfect condition at the end of the season. Control of curculio was good with calcium arsenates and cryolite. Cryo-

FIGURE 74. (Left) View of Baldwin trees in a plot which was given six sprays of calcium arsenate lime and dry lime-sulfur. (Right) Baldwin tree that received six sprays of synthetic cryolite, flotation sulfur and lime. Photographed in September.

lite did not control codling moth as well as calcium arsenate. Maggot control with cryolite appeared to be good but was very poor with manganar. Maggot control with calcium arsenate was fair to good, unsatisfactory in some plots, but more tests are needed for this material, as well as cryolite.

(3) Orchard of S. H. MacDonald, Wallingford, Conn. Plot of abou 70 Wagener trees was sprayed with "Sulfocide," calcium arsenate an casein-lime. Applications began with pink and continued until mid-June Only insect on which observations were made was the leafhopper, o which counts of emerging nymphs were made during the early part o the season.

Results: Direct comparison of leaf burn and drop with portions o the orchard sprayed with lead arsenate, indicated that lead arsenate wa superior because much less drop occurred. Dusts of lime and calciun arsenate which were applied in this block for maggot control also caused considerable injury indicating that the variety is quite susceptible t calcium arsenate burn. There was little indication that the special sprays prevented leafhopper nymphs from hatching since there was no advantage over the regular lead arsenate sprays. Abundance of the second brood leafhoppers appeared to be about the same in both plots.

(4) Orchard of Elijah Rogers and Son, Southington. Plot was sprayed with calcium arsenate, 2 pounds, flotation sulfur, and lime, 6 pounds, four sprays being applied during the season. No count was made of insect injuries, but from casual examination control appeared to be good. Direct comparison with trees sprayed with lead arsenate showed little or no difference as far as foliage condition was concerned. Trees were examined several times during the season and at picking time.

(5) Orchard of the Connecticut State College, Storrs. Sprayed with calcium arsenate in combination with lime-sulfur, dry lime-sulfur, flotation sulfur, Kolofog, and dry-mix. Calcium arsenate used at the rate of 2 pounds per 100 gallons, plots sprayed four and five times. Sprays were supervised by C. O. Dunbar.

Results: Differences in the various plots were quite marked early in the season and showed severe burn with liquid lime-sulfur, lime and calcium arsenate. This was traced to the liquid lime-sulfur. Dry lime-sulfur was substituted in these plots and reduced subsequent injury but did not eliminate it. Other combinations with various wettable sulfurs were not nearly so injurious as liquid lime-sulfur and were about the same as the trees in No. 4 at picking time. Little or no difference could be seen in the safety of the different brands used. Baldwin russeting appeared from counts of picked fruit to have been less severe on trees sprayed with dry-mix and calcium arsenate and most severe on trees sprayed with lime-sulfur and calcium arsenate. Insect control was very good, especially curculio. Apple maggot did not show up in the orchard in any great quantity.

Peaches

(6) Peach orchard at the Mount Carmel farm of the Agricultural Experiment Station. Orchard divided into 12 plots of about 24 trees each. Two check plots were left without treatment. Standard lead arsenate with zinc sulfate, basic lead arsenate, magnesium arsenate, barium fluosilicate and potassium fluosilicate were used as insecticides. Three different fungicides were used, all wettable sulfurs. Two applications, shuck fall and two weeks later, were made. The plots also received

one application in July with the same mixtures but without insecticides.

Results: Magnesium arsenate gave serious leaf burn, fruit drop and bark cankers. Potassium fluosilicate completely defoliated the trees and caused the fruit to drop, but did not cause injury to the bark and the trees recovered before the end of the season. Barium fluosilicate gave little or no injury. Standard lead arsenate (3 pounds to 100 gallons) gave slight to no injury. Basic lead arsenate (4 pounds to 100 gallons) gave no injury. Control of curculio was determined from examination of drops collected twice. The best control was obtained with standard lead arsenate and barium fluosilicate.

General conclusions covering the whole season's work are given below. It should be stated, however, that the conclusions are based on the work of only one year and much more work should be done with some of the materials before the data from this state will be of much value.

Residues

Examination of 43 samples submitted to the Chemistry Department of the Station by the Dairy and Food Commissioner, showed that none of them were above the tolerance for either lead or arsenic. Samples from the experimental plots likewise gave low arsenic and lead residues. It is apparent, however, that the methods of lead analysis developed during 1933 will be much more accurate than those hitherto employed and the very great saving in time should enable investigators to secure much more data in a single year than heretofore. Rainfall was slightly above normal this year, but it was apparent from analyses that 10 inches rainfall between the last spray and the picking date, reduced arsenic to tolerance. McIntosh apples sprayed with lead arsenate were in part above and in part below for lead residue after 51 days, all below tolerance after 75 days. In years of normal rainfall it is apparent that two to two and a half months between the last spray and picking dates should be allowed. This period will not occur with early varieties which should in our opinion be dusted with lead arsenate dusts or sprayed with calcium arsenate and lime. Dust will leave less residue.

Fluorine residues on Baldwin was determined by Dr. Fisher to be below the tolerance established (.01 grains per pound). The last spray was applied July 28.

TABLE 16. RESULTS OF BARIUM FLUOSILICATE AND LEAD ARSENATE SPRAYS ON PEACHES — MOUNT CARMEL, 1933.

Materials used	Total fruits examined	Number picked	Number drops	Number with curculio	Per cent curculio	Drops: per cent of total
(1) Barium fluosilicate	2,929	1,893	1,036	340	11.5	35
(2) Standard lead arsenate with zinc sulfate	2,745	1,315	1,430	304	11.0	52
(3) Basic lead arsenate	2,889	1,793	1,096	557	19.2	38
(4) Check—no treatment	5,094	2,720	2,374	1,169	22.9	46

Applications: May 26 and June 7

	Materials and dilutions	
(1) Barium fluosilicate	4 lbs.	
Wettable sulfur No. 1	4 lbs.	
Lime	4 lbs.	Repeated in another plot with wettable sulfur No. 2—5 lbs. per 100 gals.
Water	100 gals.	
(2) Standard lead arsenate	3 lbs.	
Zinc sulfate (crystalline, granular)	4 lbs.	Repeated in another plot with wettable sulfur No. 3—6 lbs. per 100 gallons added.
Lime	4 lbs.	
Water	100 gals.	
(3) Basic lead arsenate	4 lbs.	
Wettable sulfur No. 1	4 lbs.	
Lime	4 lbs.	Repeated in another plot with wettable sulfur No. 2—5 lbs. per 100 gallons.
Water	100 gals.	

TABLE 17. CONTROL OF APPLE INSECTS WITH CALCIUM ARSENATE AND SYNTHETIC CRYOLITE. MOUNT CARMEL, 1933

Materials	Total fruits examined	Per cent curculio	Per cent codling moth	Per cent other insects	Per cent free
Calcium arsenates	59,597	2.98	.32	4.6	92.1
Synthetic cryolite	13,946	2.98	2.14	4.8	90.0
Check—no treatment	13,164	12.38	4.32	9.4	71.0

Materials and dilutions

Calcium arsenates used in four plots at 3 lbs. per 100 gals. In one plot at 2 lbs. per 100 gals. Combined with flotation sulfur or dry or liquid lime-sulfur, and lime.

Cryolite used at 4 lbs. per 100 gals. with flotation sulfur and lime.

Applications

Six sprays were applied beginning with the pink spray May 9 to 11 and ending with maggot spray July 28.

TABLE 18. CONNECTICUT STATE COLLEGE, STORRS — 1933
CALCIUM ARSENATE SPRAYS: INSECT CONTROL
VARIETY — BALDWIN

Row	Total	Insect injuries	Per cent injured	Per cent free	Treatment
2	92	13	14.1		
4	104	5	4.8		
6	129	6	4.6		Lime-sulfur (liquid or dry), lime and calcium arsenate.
8	114	11	9.6		
10	116	1	.8		
Sum and average	555	36	6.49	93.5	
12	102	47	46.0	54.0	Lime-sulfur and lime, no calcium arsenate.
14	105	8	7.6		
16	117	10	8.5		Wettable sulfur (Kolofog, Flotation sulfur and dry-mix), lime and calcium arsenate.
18	127	11	8.6		
20	117	9	7.6		
22	108	6	5.5		
24	135	2	1.4		
26	134	19	14.1		
28	121	6	4.9		
30	97	1	1.0		
32	105	2	1.9		
Sum and average	1,166	74	6.3	93.7	

Materials and dilutions

Calcium arsenate used at 2 lbs. per 100 gals.
Hydrated lime added in all plots except two, at the rate of 6 lbs. per 100 gals.
The exceptions received 9 and 0 lbs. respectively. Dry-mix 25 lbs. per 100 gals. was used in these plots.
Liquid lime-sulfur 2½ gals. per 100 gals. water.
Dry lime-sulfur 6 lbs. per 100 gals.
Flotation sulfur 6 2/5 lbs. per 100 gals. (dry); paste 10 lbs. per 100 gals.
Kolofog 6 lbs. per 100 gals.

Applications

Pink about May 5. Calyx about May 24. First cover about June 2. Maggot about July 6. No sprays after July 6. Sprays were begun on the dates mentioned but required a day or so to complete in most cases.

Conclusions

Apples

I. Calcium arsenates.
1. Calcium arsenate controls insects commonly troublesome in Connecticut. It does not control quite as well as lead arsenate.
2. Calcium arsenate has a tendency to burn foliage if heavily applied, the injury becoming more apparent as the season advances. Certain varieties, notably Greening, are burned severely while others such as Gravenstein are not harmed.
3. In many commercial orchards applying calcium arsenate only in July maggot sprays, there was no appreciable injury. In others there was noticeable damage towards the end of the season.
4. Spray burn was of common occurrence in 1933 on trees sprayed with lead arsenate as well as those sprayed with calcium arsenate.
5. Residue from heavy applications of calcium arsenate was removed by rains in two months. It required 10 inches of rain to bring residues within tolerance for arsenic. Normal rainfall for July, August and September is 12 inches or about four inches per month.
6. Lime is necessary in the spray mixture when using calcium arsenate. It is believed not less than 6 pounds per 100 gallons should be employed.
7. Calcium arsenates containing stabilizers burned foliage as well as other brands. In one case, the damage was severe where a stabilized calcium arsenate was used without lime. Stabilizers retarded the foliage injury considerably in some plots.
8. The chemical analysis of water soluble arsenic gave little indication of the injurious nature of the brands tested this year.
9. Lime-sulfur solution either from liquid concentrates or dry powder should not be used with calcium arsenates as manufactured in 1933.
10. Russeted fruit in the Connecticut State College orchard was greatest in plots sprayed with lime-sulfur and calcium arsenate, and least in plots sprayed with dry-mix and calcium arsenate.

II. Lead arsenate.
1. There was considerable foliage burn from lead arsenate this year.
2. Arsenical residue and lead residues were below tolerance on McIntosh after 75 days. Some below some above tolerance after 51 days. All winter varieties were below tolerance in our experimental orchard at Mount Carmel. Only one tree approached tolerance in lead residues.
3. Oil used with lime and lead arsenate did not increase the residue at picking time. Analyses from other stations, however, indicate that where lime is not used there may be an increase in lead residue from the use of oil.

III. Cryolite (synthetic).
1. This material gives promise for insect control and has the advantage when combined with lime and flotation sulfur of giving no spray burn.

2. Residues of fluorine were below tolerance on Baldwin at picking time (last spray July 28).

IV. Barium fluosilicate and Manganar.
1. Tests are inconclusive but insect control was not good. Further tests are desirable.

V. Magnesium arsenate, zinc arsenate.
1. Foliage burn severe. Insect data not extensive enough to warrant conclusions.

Peaches

1. Trees sprayed with barium fluosilicate and wettable sulfur were not injured. Curculio larvae were less abundant in drop fruit from this plot than in drop fruit from unsprayed trees.
2. Trees sprayed with potassium fluosilicate were severely defoliated and most of the fruit dropped.
3. Zinc sulfate prevented spray burn from applications of standard lead arsenate (3 pounds to 100 gallons).
4. Basic lead arsenate (4 pounds to 100 gallons) did not injure foliage, but did not control as well as standard lead arsenate.
5. Magnesium arsenate caused severe defoliation, fruit drop and bark cankers.
6. Zinc arsenate caused severe foliage drop and bark cankers.
7. Judging from examinations of dropped fruit in June and July the best curculio controls were secured with barium fluosilicate and standard lead arsenate with zinc sulfate corrective.

STUDY OF APHICIDES

PHILIP GARMAN

Comparison of Ten Commercial Products

The number of commercial preparations for killing aphids has increased rapidly within the last five years. Many claims have been made for this or that product, but their comparative value has been difficult to judge because of changes of formulae and the fact that they have not all been available at one time. Tests reported herein were made entirely with the bean aphid, *Aphis rumicis* Linn., infesting nasturtium leaves. Laboratory sprays were applied under 10 pounds pressure, with a No. 29, DeVilbiss atomizer nozzle placed nine inches from the object to be sprayed. The leaves were placed on a revolving turn table while spraying was in progress. Afterwards they were kept under 6 by 8 inch glass battery jars containing a saturated salt solution which maintained humidity at about 70 per cent saturation. Room temperature averaged about 75° F. Counts were made after 24 hours.

Greenhouse tests were carried on with growing nasturtium plants infested with the same aphid. The nasturtiums were in flats 1 by 2 feet in size and were sprayed when the plants became two to three inches high. Results were based on the number of infested leaves before and after spraying. Applications were made with a quart hand sprayer, and the flats were protected against migration of aphids from one to another by metal tanglefooted collars. The main object of these experiments was to learn if there was any delayed action of the insecticides. All counts were made three days after applications. It was also considered desirable to compare laboratory and greenhouse results with the same materials.

The insecticides used involve several different classes of products. (1) Nicotine preparations; (2) preparations from derris or cubé containing rotenone or allied extractives; (3) those made from pyrethrum and containing pyrethrins; (4) anabasine sulfate and related compounds; and finally (5) those said to contain thiocyanates. There are also a number of commercial preparations containing both pyrethrum and rotenone.

Results in general show that most of the preparations do not afford quite as good toxicity for *Aphis rumicis* as nicotine sulfate. It is appar-

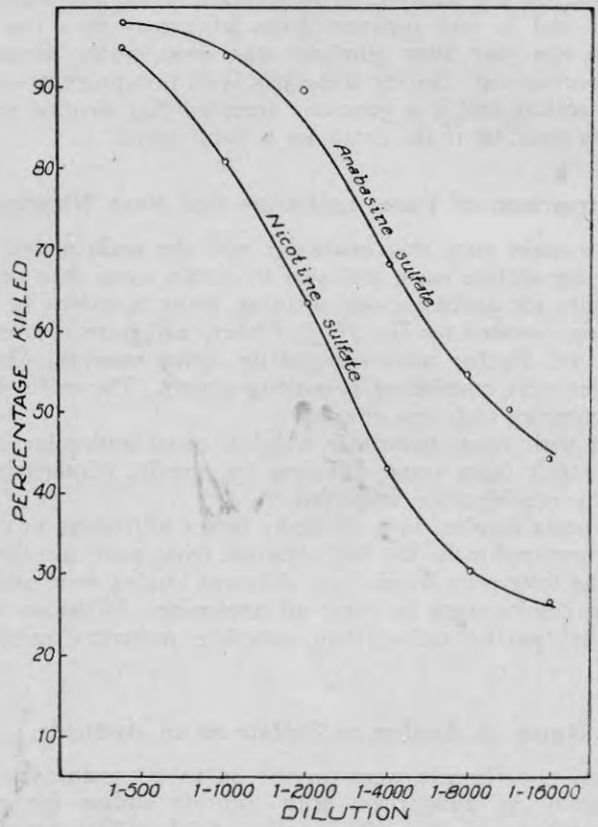

FIGURE 75. Comparison of the kill of *Aphis rumicis* obtained in laboratory tests with anabasine sulfate and nicotine sulfate. Dilution by weight in all tests.

ent, furthermore, that most of the aphicides tried aim at fairly good kills with dilutions of 1 to 800. They are supposed to compete with nicotine sulfate but apparently their manufacturers do not take into account the fact that nicotine sulfate has considerable reserve strength at 1 to 800. The differences are best shown at dilutions of 1 to 1600 with soap (6 grams 35–40 per cent coconut oil soap). In such a series none of the other materials equalled the clean-up obtained with nicotine and anabasine sulfate. At 1 to 3200 with the same amount of soap per cc. with each

insecticide, anabasine sulfate was superior to nicotine sulfate, thus corroborating the results of laboratory tests. Table 19 and Figure 75 include some of this data.

It is apparent that the rotenone and pyrethrum sprays tried are not strong enough in general and that the rotenone or pyrethrin contents should be increased if they are to compare favorably as aphicides with nicotine and anabasine products. The cost of some of the nicotine substitutes is considered prohibitive for large scale operations. Rotenone extracts in acetone are believed to deteriorate slowly on standing. It is quite possible and in fact apparent from laboratory tests that the same material used one year after purchase was considerably weaker than at the time of purchasing. So far there has been no apparent deterioration of anabasine sulfate and it is generally accepted that nicotine sulfate does not weaken on standing if the container is kept closed.

Comparison of Pure Anabasine and Pure Nicotine

In order to make sure that anabasine was the main active ingredient in the anabasine sulfate used, and also to obtain some data on the comparative toxicity for anabasine and nicotine, water solutions of chemically pure anabasine, isolated by Dr. H. J. Fisher, and pure nicotine alkaloid from Dr. G. W. Pucher were sprayed on *Aphis rumicis*. Only mature agamic females were considered in making counts. The method described above for laboratory tests was employed.

Because of their equal molecular weights, equal molecular volumes of the poisons result from equal dilutions by weight. Comparison of the two is thereby considerably simplified.

All experiments resulted in a decidedly better kill where anabasine was used when compared with the kill obtained from pure nicotine alkaloid. In some of the tests pure soaps (two different kinds) were added, but in each case the results were in favor of anabasine. Dilutions were great enough so that partial rather than complete mortality resulted in all experiments.

Notes on Anabasine Sulfate as an Aphicide

Several field experiments were carried on to determine the effects of anabasine sulfate in comparison with nicotine sulfate for rosy apple aphid (*Anuraphis roseus* Baker) control on apples. The sprays were applied too late to give control since the leaves had begun to curl. Plot comparisons at the farm of Emery Smith, Cheshire, indicated as good or better kills where the aphids were hit as were obtained with nicotine sulfate. The materials used were flake soap 4 pounds, anabasine or nicotine sulfate, 1 quart, and water, 200 gallons. In addition A. T. Henry, of Wallingford, kindly applied some of the materials at dilutions of 1 to 800, and 1 to 1600, with soap. The kill with 1 to 1600 appeared to be poor, but that with 1 to 800 was good and little difference could be seen between nicotine and anabasine sulfate at this dilution. Anabasine sulfate combined with lime-sulfur was also tried at the Mount Carmel farm of the Experiment Station. Results were favorable.

On May 15, 1933, 8 to 10 flats of peach seedlings infested by the green peach aphid (*Myzus persicae* Sulz.) were sprayed with anabasine sulfate, diluted 1 part in 1000 parts water by weight, with 1 part of a bead soap added, using a hand sprayer. A complete clean-up resulted and only a few aphids remained in the curled leaves. The following day four infested flats were sprayed with a commercial rotenone preparation, diluted 1 to 1000, with 1 gram bead soap added. This material gave relatively poor results and many live aphids remained not only in the curled leaves but on the stems of the peach seedlings as well.

It should be remarked at this point that anabasine sulfate has little value as an ovicide according to tests with Oriental fruit moth eggs, which may account for its failure in the hands of other investigators to control insects of this type. It is also believed that it has no stomach poison value and cannot compete with products containing rotenone in this respect.

TABLE 19. RESULTS OF SPRAY APPLICATIONS TO CONTROL *Aphis rumicis* ON NASTURTIUM LEAVES. FIGURES GIVE PERCENTAGE REDUCTION OF INFESTED LEAVES

Active principles	Material	Dilution			
		1-800*		1-1600†	
Anabasine	Anabasine sulfate	100	100	100	99
Nicotine	Nicotine sulfate	100	100	97	82
Rotenone	Commercial preparation No. (1)	95	24	40	54
	(2)	93	00	84	21
	(3)	56	30	53	65
	(4)	85	27	19	60
	(5)	62	00	00	00
Pyrethrum rotenone combinations	Commercial preparation No. (1)	34	00	23	00
	(2)	83	62	45	80
Thiocyanate	Commercial preparation No. (1)	44	23	00	00
	Soap	39	00	1	00
	Check—no spray	00	00	00	00

Notes: Temperature variations in house. Max. 92° F.; min. 52° F.

* 35 per cent coconut oil soap added—6 grams in 800 grams of mixture. This is about 6 lbs. per gallon.

†Soap added at rate of 3 grams in 800 grams of mixture. This is about 3 lbs. per 100 gallons.

REPORT ON FRUIT MOTH PARASITES

PHILIP GARMAN

Parasite distribution was continued in 1933 and the statistics are shown in Table 21. More than 28 million Trichogramma egg parasites were delivered or sent out and about 7,250 larval parasites. Of these 4,656 were *Macrocentrus ancylivorus* Roh., bred in the laboratory at New Haven. This year a total of 227 growers applied for the service as compared with 157 in 1932. Studies of several new species are in progress. Mr. Schread reports on one of these on page 463.

In the spring of 1933, information was received through the coöperation of county agents showing conditions in four of the most heavily infested counties. The results are given in Table 20. It will be noted that there is a reduction of about 21 per cent in the number of orchards placed in the heavily infested class which is apparently due to parasitic

TABLE 20. RESULTS OF REPORTS FROM GROWERS IN SEVERAL COUNTIES 1932 SEASON

Orchards receiving no parasites			Orchards receiving parasites in 1931 and 1932		
Total orchards	Heavily infested*	Per cent heavily infested	Total orchards	Heavily infested*	Per cent heavily infested
Hartford and Tolland Counties					
12	8	66	39	10	25
Fairfield County					
19	12	63	25	14	56
New London County					
15	6	40	10	2	20
Totals					
46	26	56	74	26	35

action. Experiments with Macrocentrus were continued and breeding has been successful throughout the entire year, although at critical times the conditions have not been entirely satisfactory in the breeding rooms. Some improvements have been made which should enable greater production in 1934. A change in methods of hibernation has also been made. Most of the data obtained in Macrocentrus work so far have been assembled and published in Bulletin 356.

Through coöperation with the Bureau of Entomology Laboratory at Moorestown, N. J., a number of foreign parasites were introduced by them into central Connecticut orchards. These are indicated in Table 21 as "other species supplied".

A check up of infested orchards continued to show the beneficial action of parasites, particularly Macrocentrus, which was found heavily parasitizing second brood larvae in several places. Continued liberation of Trichogramma in the orchard of the Connecticut State College at Storrs

*"Heavily infested" means in general an infestation of more than 25 per cent wormy fruit.

failed to control the fruit moth in late peaches although there was some reduction in early fruit compared with last year. The Macrocentrus population is not yet sufficient there to take care of any large number of fruit moth larvae but it is believed the combination will show results in the near future.

TABLE 21. STATISTICS OF PARASITE SHIPMENTS IN 1933
Arranged by Counties

County	Number peach growers applying for parasites	Number trees reported	Number shipments of parasites	Estimated number of Trichogramma supplied	Number Macrocentrus supplied	Number Ascogaster supplied	Number other species supplied
Fairfield	59	28,720	68	5,318,900	700	150	—
		17.6%		18.7%	15 %	15 %	
Hartford	55	58,720	77	10,454,000	1,535	310	550
		36.0%		37.0%	32.9%	31 %	34%
Litchfield	8	3,130	9	709,000	206	53	—
		1.9%		2.4%	4.4%	5.3%	
Middlesex	6	9,000	7	860,000	—	—	291
		5.5%		3.0%			18%
New Haven	49	40,960	48	4,711,700	—	200	567
		25.0%		16.5%		20 %	35%
New London	31	10,150	44	3,981,500	600	100	—
		6.2%		14.0%	12.9%	10 %	
Tolland	16	11,650	19	2,075,000	1,200	—	195
		7.1%		7.3%	25.7%		12%
Windham	3	450	2	190,000	415	178	—
		.2%		.6%	8.9%	18 %	
	227	162,780	274	28,300,100	4,656	991	1,603
	Total larval parasites — 7,250						

STUDIES ON A EUROPEAN SPECIES OF TRICHOGRAMMA

(Trichogramma euproctidis Girault)[1]

JOHN C. SCHREAD

This introduced species of European origin was obtained by the Connecticut Experiment Station from the laboratory of the United States Bureau of Entomology at Moorestown, N. J., where it had been reared and liberated since its importation in 1931. It was originally intended to make a thorough biological study of the species and a comparison with the species of Trichogramma native to the United States. However, on obtaining permission to make field liberations, large scale production of *T. euproctidis* and subsequent mass dissemination was undertaken as an adjunct to the Oriental fruit moth[2] parasite program. The results of this undertaking have been disappointing in field and laboratory. Data pertaining to the winter hardiness of *T. euproctidis* are unavailable from our records, as the parasite has been in the field but one season. However, due to the unsatisfactory response of *T. euproctidis* to laboratory treatment, it may be expected that the unusual low temperatures of this winter (1933-34)

[1]Described as *Pentarthron euproctidis* — Trans. Amer. Ent. Soc. Vol. XXXVII, pp. 43-55.
[2]*Grapholitha molesta* Busck.

followed by sudden rises in temperature will be deleterious, and virtually few, if any, of the parasites will survive. Although over 100,000 individuals of the species were liberated in peach orchards during the 1933 season, none were recovered, while both of the American species, *Trichogramma pretiosa* and *T. minutum* were taken in appreciable numbers in Oriental fruit moth eggs on trees in which *T. euproctidis* dispersed. This seems to be a fair indication of the potentiality of the parasite and future concentrated efforts on the use of Trichogramma species will be governed accordingly.

Fundamentally the life history for all species of Trichogramma is the same. The adult female wasps oviposit in host eggs in which the entire life cycle is passed. On emerging, gravid females are ready for action and may reproduce regardless of fecundation. With one exception unfertilized females gave rise to males only. However, a biological study of *T. euproctidis* reveals variations in the reaction of the parasite to treatment under controlled conditions which, in conjunction with related factors, give the species a unique place among the other members of the genus so far investigated at this Station.

T. euproctidis normally exceeds in size the two American species discussed in detail in Bulletin 353 of this Station. Due to the apparent inadequacy of Angoumois grain moth[1] eggs to supply a sufficiency of food material for *T. euproctidis,* the rate of increase of the latter on the former is practically nothing. For this reason adaptability of the parasite to mass production is impractical when Angoumois grain moth eggs are used as a laboratory host. From the standpoint of rearing tens of millions of Trichogramma in a restricted length of time, no other host has as yet been able to displace or equal the Angoumois grain moth in importance. Bagworm eggs (*Thyridopteryx ephemeraeformis* Haworth) being larger in size than Angoumois grain moth eggs are more acceptable to *T. euproctidis* and produce normal sized individuals. Because of the fact that *T. ephemeraeformis* is limited in its natural range and abundance and as no practical methods of mass production of the species have been worked out, large scale rearing of *T. euproctidis* on this host is difficult in regions having climatic conditions similar to those existing in Connecticut.

In an intensive study of *Trichogramma euproctidis* it revealed nothing in common with the two American species. It is slow in response to abundant host material, regardless of the stage of development attained by the latter. Gravid females, fecundated or otherwise, are loth to immediate and continuous oviposition in grain moth eggs. The longevity of the adults when reared on Angoumois grain moth eggs is no longer than its related American species while in most instances it is shorter. The life cycle of *Trichogramma euproctidis* is noticeably longer than that of *T. pretiosa* or *T. minutum.* The minimum period of development at 80° F. and 60 per cent relative humidity is seven and three-quarter days with a maximum of from twelve to thirteen days at the same temperature. The average duration of the combined immature stages was eight and one-half days when reared continuously for a number of successive generations. An interesting phenomenon relative to the duration of the

[1]*Sitotroga cerealella* Oliv.

T. euproctidis life cycle was observed in cultures of the species hibernated at 38° F. and 60 per cent relative humidity. Not only was there a marked retardation in initial emergence of the refrigerated material, but likewise a corresponding delay in emergence of the first generation removed from the hibernated generation.

TABLE 22. *Trichogramma euproctidis* HIBERNATED AT 38° F. AND 60 PER CENT R. H.

Days refrigerated	Average percentage of emergence	Sex ratio		1st generation from hibernated generation		2nd gen. from hib. gen.		3rd gen. from hib. gen.		4th gen. from hib. gen.	
		males	females	males	females	m.	f.	m.	f.	m.	f.
3	37	1	1	1	1	1.3	1	1.3	1	1	1
14	26	1	1	1	1	1.3	1	1.2	1	1	1
24	17	1.7	1	1.6	1	1.3	1	1.0	1	1	1
35	3	1.8	1	1.5	1	1.4	1	1.3	1	1	1
60	less than 1%	3.1	1	1.5	1	1.3	1	1.2	1	1	1

Inhibited cultures of *T. euproctidis* under the above stated conditions of 38° F. and 60 per cent R. H. have responded in a similar manner as did *T. minutum* and *T. pretiosa* to prolonged periods of detention (Table 22). However, there is a tendency for *T. euproctidis* to require a greater number of successively reared generations to revert to a normal sex ratio of 10 males to 15 females (Table 23). Furthermore under hibernating conditions *T. euproctidis* succumbed more rapidly than did either *minutum* or *pretiosa* as the period of refrigeration lengthened.

TABLE 23. *T. euproctidis* SEX RATIO

Males	females	Males	females
1	1.7	1	1.6
1	1.4	1	1.2
1	2.2	1	1.5
1	1.8	1	1.6
1	1.4	1	1.7
1	1.7	1	1.5
1	1.7	1	1.0

1.57 average

Wing deformity in *T. euproctidis* is more generally noticeable in cultures that have been subjected to variable periods of refrigeration than in material reared for successive generations at developmental temperatures. For a period of 15 days at 38° F. there was a 40 per cent cumulative wing deformity in males and 50 per cent in females. These data are comparable to the results of wing deformity obtained for *T. minutum* males (which for a like period was 48 per cent) but not for the females having a 28 per cent wing deformity. *T. pretiosa* is less subject to the deleterious effects of low temperatures on development; the average deformity for 15 days' hibernation at 38° F. was 11 per cent for the males and 17 per cent for the females.

Regarding the abundance of increase, *T. euproctidis* falls much below the American species in this respect. The average number of ovipositions per female was 12.5 with a minimum of 5 and a maximum of 18. These figures refer to *Sitotroga* eggs actually parasitized and not to the poten-

tiality of the species. Results on the use of bagworm eggs are questionable and therefore will not be presented. Most of the bagworm eggs exposed to Trichogramma collapsed before parasitism or during the development of the parasite providing oviposition was successful. On an average not more than 15 to 25 per cent of bagworm eggs produced adult Trichogramma. Occasionally 40 to 60 per cent of the eggs were productive. However, the usual parasitism of Angoumois grain moth eggs, from 90 to 100 per cent, was unrecorded for bagworm eggs.

A genetic study of *T. euproctidis* failed to produce successful fecundation of females of the species by males of either of the two American species, *T. minutum* and *T. pretiosa;* nor was it possible to obtain progeny of both sexes from females of the latter species that from all indications cohabited with males of the former species. Many combinations of males and females were employed without success, despite the fact that in a number of instances individuals of the different species showed affinity for one another.

DAMAGE BY THE ASIATIC OR JAPANESE GARDEN BEETLE

Autoserica castanea Arrow

W. E. Britton

Some 25 or 30 adults of this insect were brought to the Station on October 3, from a garden on Hillhouse Avenue, New Haven, with the statement that several kinds of plants in the garden had been wholly or partially defoliated by them. No beetles could be seen on the plants in the daytime, but by digging in the soil at the base of the plants plenty of them were found.

A visit was made to this garden on October 7. Leaves of several kinds of plants showed injury by the feeding of the beetles but no beetles were present so late in the season. I learned that the beetles submitted were collected in July and held until October 3, before sending them

Figure 76. The Asiatic or Japanese garden beetle, *Autoserica castanea* Arrow. Twice enlarged.

for identification. The plants that had been injured were heliotrope, hardy chrysanthemum, petunia and lemon verbena. By digging in the soil of the flower beds several larvae were obtained, and these were identified by Dr. Friend as some kind of *Serica* grubs. There had been no particular injury to the lawn and the gardener had not found any of the grubs in the turf.

Although an adult beetle was found in New Haven in the summer of 1928, and grubs of the same species were found in nursery diggings in Cromwell, Manchester, Mansfield, New Canaan and Southport in 1929, this is the first record for the state of plants having actually been injured by this insect. A short article was included in the Report of this Station for 1929, Bulletin 315, page 607, in which the species was called *Aserica castanea*. It has since been learned that the correct name is *Autoserica castanea*.

The adult beetle, shown in Figure 76, is about three-eighths of an inch in length, and dull cinnamon brown in color. The wing covers are marked lengthwise with shallow grooves or striae. The beetles feed and

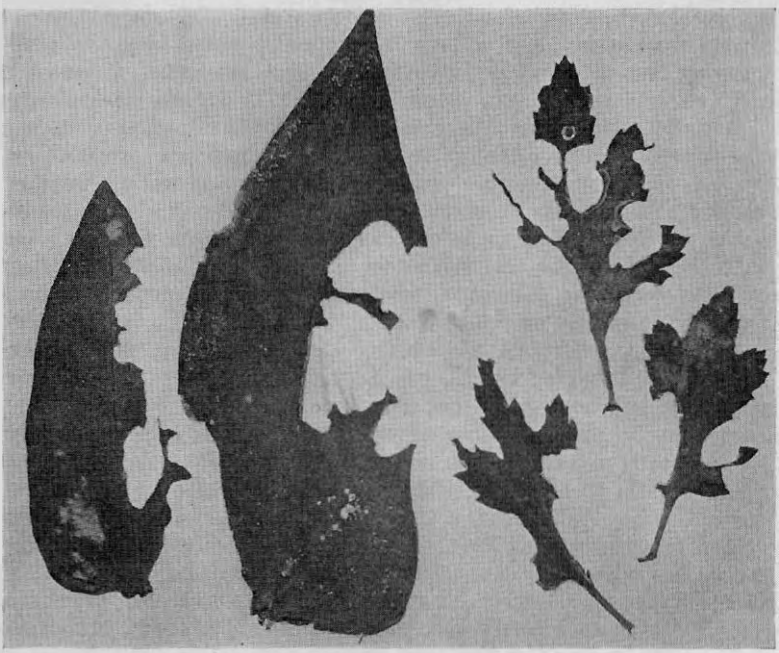

FIGURE 77. Zinnia and chrysanthemum leaves eaten by the Asiatic or Japanese garden beetle, *Autoserica castanea* Arrow. Somewhat reduced.

fly on warm nights and are attracted to electric lights. In the daytime they hide under rubbish and in the soil around the bases of the plants and in adjacent lawns and grassy fields. They feed upon many kinds of plants, including aster, barberry, bean, catalpa, cherry, chrysanthemum, currant, dahlia, geranium, hydrangea, rose, zinnia and coniferous seedlings. If any of these plants are in bloom during the beetle season, the beetles will eat the petals. Injured foliage is shown in Figure 77.

In densely infested localities the grubs may injure or even kill herbaceous plants in the flower borders by eating the roots. They also devour the roots of strawberry plants and those of beet, corn and onion in the vegetable garden, and the roots of yew seedlings in nurseries. The chief

damage by the grubs is to lawns and sod land and the roots have been eaten off and the grass killed in many areas around New York, varying from a few square inches to more than an acre in extent. The injury to lawns and sod land is about the same as that caused by the Japanese beetle, *Popillia japonica* Newm., and the Asiatic beetle, *Anomala orientalis* Waterh.

Autoserica castanea is a native of Japan and China and was first collected in the United States at Rutherford, N. J., in the summer of 1921, but was not recognized as a foreign insect until 1926. During this interim of five years it increased in numbers and became increasingly destructive in New Jersey and New York. It is now known to occur at a number of widely separated points in Connecticut, Delaware, Maryland, New Jersey, New York, Pennsylvania and Virginia.

Control measures: The foliage of preferred plants may be protected by spraying not later than July 10 with lead arsenate, 1 ounce, flour 1 ounce, water 1 gallon. In larger quantities, 3 pounds of lead arsenate and 2 pounds of flour may be used in 50 gallons of water. Such treatment will probably be effective in slight and moderate infestations, but in case of heavy infestations where there are enormous numbers of beetles much damage is sure to be done. The beetles feed readily on the poisoned foliage and therefore may ruin it before obtaining enough poison to be killed. In such instances, it may be possible to protect the flowers and even the foliage of choice plants by a netting cover. No good repellent has yet been developed.

There is a possibility of developing light traps that will collect and kill the beetles at night, but no satisfactory trap has yet been perfected. Consequently, this method is not recommended.

Lawns may be protected from grub injury in the same manner as for the Asiatic beetle and the Japanese beetle, by applications of lead arsenate, 3 pounds to 100 square feet. This may be spread over the surface in dry form or may be mixed with water and applied with a sprinkler. Directly after the application, the lawn should be well watered with a fine spray from the hose to wash the poison from the grass blades into the soil. There should be no run-off into the gutter. In some cases it may be advisable to mix the dry poison with sifted loam, and spread it evenly over the surface of the lawn as a top dressing.

In case the lawn needs to be rebuilt, the poison may be raked into or mixed with the upper three inches of soil. Germination of the ordinary varieties of grass seed is somewhat retarded by the application of poison. **In any case, careful watering is advisable.**

When properly applied, this lead arsenate treatment should protect the lawn for seven or eight years, and possibly longer.

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INJURY TO FRUIT BY ROSE LEAF BEETLE

Nodonota puncticollis Say

W. E. Britton

The rose leaf beetle was generally quite common in 1933, and was observed on roses at a number of localities. Mr. Johnson brought in several adults from Southport June 9, and the writer saw it in his own garden, and also in Essex, Mass., June 9, where it had injured rose leaves and buds.

This is a small, shining, metallic, green beetle, one-sixth of an inch in length. It is found throughout the state and is common in collections obtained by sweeping over alder and other low sprout growth on cut-over woodlands. The Station collection contains 55 specimens collected in various parts of the state, as follows: Cheshire, Cornwall, East Haven, Green's Farms, Greenwich, Hamden, Marlborough, Milford, Middletown, New Canaan, New Haven, North Branford, Orange, Portland, Ridgefield, Rockville, Salisbury, Scotland, Southington, Rainbow, Union and Wilton.

This beetle is recorded as feeding upon rose, blackberry, raspberry, strawberry, clover and chestnut, but it probably feeds also on many other kinds of food plants, because it is nearly always collected in the net when one sweeps over young sprouts where woodland areas have been cut.

Dr. Lugger[10] in Minnesota records this beetle as feeding upon the young shoots of willow.

Chittenden[5] records observing this beetle on wild roses at Ithaca, N. Y., and on blackberry, Staten Island, N. Y., in 1886, and on strawberry at Washington, D. C., in 1891. In 1891, Dr. Riley found it troublesome on cultivated roses near Washington, D. C.

From Baltimore, Md.,[6] in 1897, specimens of this insect were sent to the Bureau of Entomology at Washington with a statement that it was "consuming all the leaves from the trees". No particular kinds of trees were specified but Mr. Chittenden says that they were presumably fruit trees. In 1898, the species was abundant on the tender terminal leaves of ornamental willow near Washington and also occurred in smaller numbers on blackberry in the immediate vicinity. F. C. Pratt in 1898, collected a large series from blackberry and wild rose at Woodstock, Va.

The rose leaf beetle[7] was reported as injurious to roses in Maryland in 1902, and was also found feeding upon corn. In 1906[8] and 1908[4], it injured roses in the vicinity of the District of Columbia. Houghton[9] reports this insect as very abundant on blackberry in Delaware in 1904. A great variety of plants was eaten by the beetles but no list was kept. Eggs were obtained but no larvae could be found.

In 1908, *Nodonota puncticollis*[1] was received from Stamford, June 10, with a statement that the beetles were devouring the leaves and tender shoots of choice young Japanese chestnut trees. It was finally necessary to spray with poison in order to prevent further destruction. In 1909, Dr. Henry Skinner[11] reported it as very abundant and injurious to rose bushes at Ardmore, Pa., June 8. As many as 15 beetles were found feeding in one blossom, and the flowers were soon ruined.

In 1920, Stear[12] reported this insect as causing considerable injury to apples in several orchards in the vicinity of Chambersburg, Pa. The beetles fed upon both leaves and fruit. One orchard was injured to such an extent that it was sprayed with lead arsenate and Bordeaux mixture, but on account of the lateness of the application, the effectiveness of the spray could not be determined. Dr. Felt[8] reported injury to apple in Duchess and St. Lawrence counties, New York, in 1921. In one case from 10 to 20 per cent of the fruit had holes eaten in it.

On June 19, 1923,[2] specimens of the rose leaf beetle were received from Bridgeport, with a statement that they were eating the buds of roses.

In June, 1933, Mr. Zappe noticed that something had eaten into some of the fruit on a Bartlett pear tree in his garden. He kept watch and

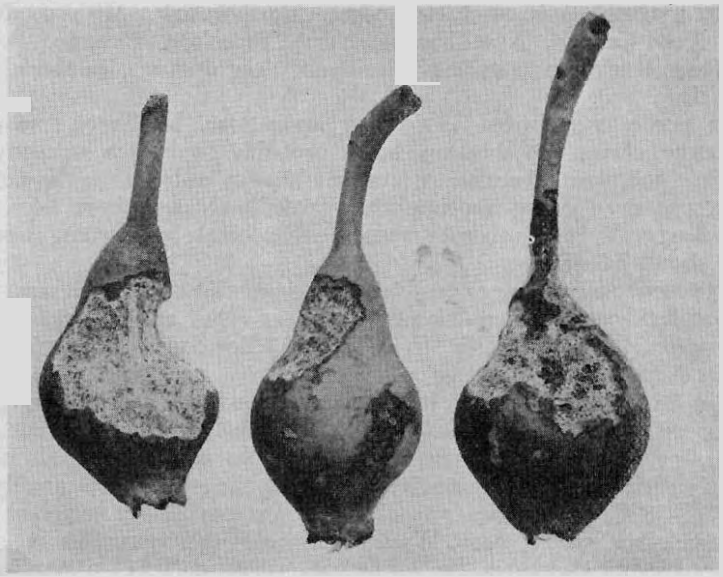

FIGURE 78. Pears eaten by the rose leaf beetle, *Nodonota puncticollis* Say. Natural size.

found that the rose leaf beetle was responsible for the injury, which is shown in Figure 78. In some instances holes had been eaten into the lobes near the calyx, and in others a ring encircling the fruit had been eaten. Altogether, nearly 50 per cent of the pears had been mutilated; some very badly, and others only slightly injured. The tree was not sprayed with poison because the owner was curious to learn how much injury the beetles would do if unmolested. Rose bushes in the garden had an occasional leaf somewhat eaten but there was no particular damage to them.

A similar and closely related species called the plum leaf beetle, *Nodonota tristis* Oliv., has been recorded as devouring the foliage of peach, plum, cherry and strawberry, but so far this beetle has not been found

in Connecticut. Both species can probably be controlled by spraying with lead arsenate.

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THE GREEN GOLD LEAF BEETLE AS A PEST OF ROSES

Chrysochus auratus Fabr.

W. E. Britton

On July 24, several adults of this beetle were received from Sharon, with the statement that they had caused considerable injury to roses by eating the leaves. They were also on some adjacent native shrubbery and fed upon adventitious plants of buckwheat, but as the owner did not care for these plants no damage was reported except to the roses. The owner sprayed the infested plants with a pyrethrum soap but doubted the effectiveness of the application. This beetle is often abundant on the spreading dogbane, *Apocynum androsaemifolium* L. on which it feeds. At the Station the records show that this beetle feeds upon dogbane and milkweed. In 1930, a specimen was received from Norwalk on tomato. Some persons observe these iridescent green beetles and think that they are Japanese beetles, although they are much smaller than that species.

Walsh and Riley[5], in 1869, identified this beetle for a correspondent in Alton. Ill., who found it plentiful amongst the standing wheat. No state-

ment is made regarding damage. G. H. French of Illinois is said to have reported it in the *Prairie Farmer* as feeding on corn, but I have not seen the published reference.

Lintner[3] published a record of *Chrysochus auratus* feeding on potato in Bayport, Suffolk County, New York, in 1887. It had "appeared only on a dozen or so plants in a field of two acres, but as many as 30 or 40 were found on a single plant."

J. L. Zabriskie[6], in 1895, published a description of the egg-capsules found near a patch of spreading dogbane on Long Island. Dr. Felt[2], in 1901, published an illustrated description of the egg-capsules and mentioned Zabriskie's description.

Newell and Smith[4], in 1904, reported that this beetle did much damage by defoliating the trees in a small pecan grove in northern Georgia.

E. M. Craighead[1], in 1923, published a brief note on the life history of this beetle, which he found feeding on dogbane, *Apocynum cannabinum,* at Chambersburg, Pa.

From an examination of the literature herein cited it may be seen that the eggs are deposited in small black conical capsules, usually on the under sides of the leaves of the host plant or on nearby objects. A capsule may contain three or four eggs. The eggs are yellowish white, and are about 1.5 mm. long and .5 mm. thick. On hatching from the eggs the larvae drop to the ground and feed on the bark of the larger roots of the dogbane from one to six inches beneath the surface of the ground. They hibernate in the larval stage and pupate in May. The adults begin to emerge in June, and may be found until August. There is one generation each year.

Although the beetles vary considerably in size the larger ones are about three-eighths of an inch in length and about half as broad as long. The under surface and legs are distinctly greenish blue and the upper surface shining, iridescent, coppery green. They glisten in the sunlight and are very beautiful and conspicuous. The species occurs throughout the state.

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THE GLADIOLUS THRIPS

B. H. WALDEN

Gladiolus plants in Connecticut were not as severely injured by thrips during 1933 as in 1932. In many gardens where the corms were treated and planted early most of the blooms were free from injury. Late blooms, although showing some spotting by the thrips, especially on dark colored varieties, were not entirely ruined as in the previous season. A few reports, however, were received to the effect that the thrips appeared rather suddenly during the last half of August and ruined the late flowers.

Another season's use of flake naphthalene indicated that this is one of the most satisfactory materials for the small grower to use for treating the corms. The corms should be cured and cleaned as usual and placed in tight paper bags. For each 100 corms scatter in one ounce (four tablespoonfuls) of the flakes and close the top of the bag. In the average cellar four to six weeks should be sufficient time to keep the bags closed in order to kill all the thrips. Although the writer has kept corms in the flakes for over 18 weeks without apparent injury, some growers claim that keeping them in the flakes until planting time retards the development of the corms and that they are slow and irregular in starting.

For controlling the thrips on the plants the following formula has proven to be one of the most satisfactory.

Paris green	1 rounded tablespoonful
Brown sugar	2 pounds
Water	3 gallons

Three-fourths of a pint of light molasses can be substituted for the sugar.

The material must be kept well agitated and all the foliage thoroughly wet with the spray. The plants should be watched carefully for the appearance of the thrips and as soon as any of the whitish spots on the leaves are seen the spraying should be started. Spray once a week until the blossom spikes develop.

Often the thrips appear to attack certain varieties first and the grower instead of cutting and destroying the injured spikes may leave them on the plants to dry up. The thrips will desert the dry flowers and may attack uninfested plants. The thrips undoubtedly increase much more rapidly in a field where the infested blossoms are not removed than they will where all the blossoms are cut and the infested blossoms destroyed.

MISCELLANEOUS INSECT NOTES

The Sorrel Weevil. In the Report of this Station for 1932, Bul. 349, page 455, there was published a note regarding the occurrence in Connecticut of the sorrel weevil, *Phytonomus rumicis* Linn., and the injury caused by it. In 1933, specimens of this weevil were received from two seed growers from Milford, May 20 and June 1, feeding upon sorrel or sour grass growing for seed. [W. E. Britton]

Another European Weevil in Connecticut. The Station collection now contains four specimens of *Polydrusus sericeus* Schall., a small blue-green weevil said to be common in Europe. All four were collected in nurseries by Mr. Zappe; one in Greenwich, June 6, 1928, one in Thompsonville, June 30, 1932, and two in New Canaan, July 8, 1932. This species has been recorded from the vicinity of Indianapolis, Ind., but had not previously been recorded from Connecticut. It is not listed in Leonard's Insects of New York. [W. E. Britton]

Injury to Raspberry Plants by June Beetles. On May 27, a report was received of injury to raspberry plants in Orange, and on June 7, similar damage was reported from Easton. The specimens submitted in each case were those of one of the smaller species of June beetles, *Phyllophaga tristis* Fabr. Doctor Friend visited the raspberry patch in Orange and although there had been some feeding, he did not consider the damage as severe. This beetle has rather prominent erect yellowish hairs on the thorax, abdomen, femora and base of the wing covers. It was received from grass land in Willimantic, April 21, and feeding on garden beans in New Haven, May 12. [W. E. Britton]

Severe Damage to Grapevines by the Light-loving Grapevine Beetle. On June 29, several adults of the light-loving grapevine beetle, *Pachystethus lucicola* Fabr., were brought to the Station from Beacon Falls. A vineyard of 1,200 vines had been almost completely defoliated in two or three days. (See Figure 79). Some rose chafers and spotted grapevine beetles were also present, but the light-loving grapevine beetles were much more abundant and were considered chiefly responsible for the injury. A neighboring vineyard of 5,000 vines only 1,000 feet away, had not been injured at that time, and a heavy spray of lead arsenate was recommended. [W. E. Britton]

Poplar Trees Defoliated by the Satin Moth. On June 30, pupae and adults of the satin moth, *Stilpnotia salicis* Linn., were brought to the Station from Waterside Park, New Haven, where some of the Carolina poplar trees had been partially defoliated by the larvae. Mr. Walden visited the park on July 5, and made the photograph shown in Figure 80. Some five or six of the trees, particularly those in sheltered situations near Water Street, were about three-fourths stripped. Other trees showed some feeding but no particular injury. On July 12, the writer examined the trees in Beaver Park Playgrounds, where six large Carolina poplars

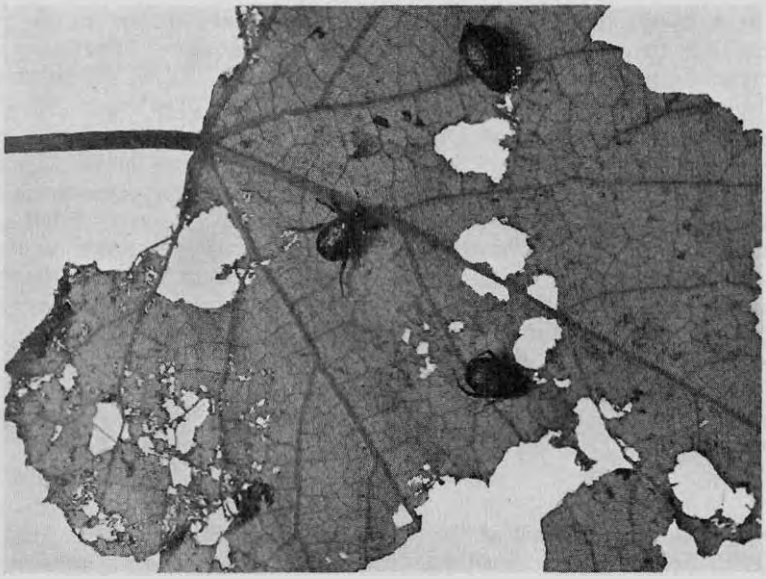

FIGURE 79. Grape leaf and adults of the light-loving grapevine beetle, *Pachystethus lucicola* Fabr. Natural size.

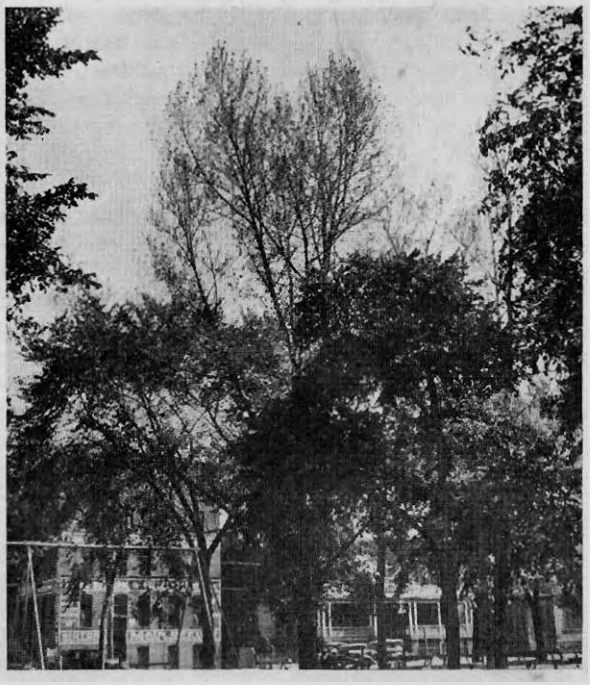

FIGURE 80. Poplar trees in Waterside Park, New Haven, partially stripped by satin moth caterpillars.

had been about half stripped. At this time, only a few moths were present but there were many egg-masses on the trees. Spraying with lead arsenate will prevent defoliation. [W. E. Britton]

Large Scale Breeding of Dibrachys Parasites. It may be of interest to note that in 1933 there was an unusual abundance of the supposed secondary parasite, *Dibrachys boucheanus* Ratz. This parasite became so numerous towards the latter part of the season in some of the grain moth units used for Trichogramma work that it was possible to collect them in large numbers. The insects were attracted to lights in the room and congregated beneath them. On one occasion nearly half a pint were scooped up. From estimates made by Mr. Schread, this lot alone contained about 112,000 individuals. It is well known that Dibrachys works both as a primary and a secondary parasite, and it is believed that, if the species ever proves to be of enough importance for control of such pests as codling moth or Oriental fruit moth, it can be produced in fairly large quantities. [Philip Garman]

Sprays for the Control of the European Pine Shoot Moth. In 1933, Dr. R. B. Friend and A. S. West, Jr., conducted experiments with sprays to control the European pine shoot moth in red pine plantations in Branford and Middletown. Four different mixtures were each applied three times, on June 13, 23 and July 3. The two mixtures that gave the highest percentages of control were (1) lead arsenate 3 pounds, fish oil 1 quart and water 100 gallons, and (2) nicotine sulfate .5 per cent, Penetrol .5 per cent, lead arsenate 3 pounds, and water 100 gallons. A paper read by Mr. West at the annual meeting of the American Association of Economic Entomologists, at Boston, December 28, 1933, giving the details of these tests, will be published in the Journal of Economic Entomology, Volume 27. [W. E. Britton]

Further Damage by Pseudocneorrhinus setosus Roelofs. In the report of this Station for 1932, page 434, there was published a brief account of definite injury to cultivated plants in Connecticut by this weevil from the Orient. Early in June 1933, a report was telephoned to my office regarding peculiar beetles that fed upon the foliage of forsythia, lilac, mountain laurel and weigela in a garden on Westwood Road in New Haven. I suggested that specimens be submitted and a large number were received June 7. Mr. Zappe visited this garden June 16. The shrubs had been sprayed with lead arsenate, and he could find no beetles either living or dead. Apparently the poison serves to repel the beetles but does not kill them, because they do not feed on it. Beetles in cages were given poisoned foliage but they would not eat it and soon hid away in the soil. Mr. Zappe then visited the place in West Haven where the beetles occurred last year, and he found plenty of them. They had eaten off nearly all of the new growth from young hemlock trees and the ground underneath was covered with severed tips. Thus far no one in the Department has been able to find the grubs of this weevil.

[W. E. Britton]

The Strawberry Root Weevil in Houses. Adults of the strawberry root weevil, *Brachyrhinus ovatus* Linn., have the habit of congregating in houses. They have no wings, so cannot fly. . The larvae feed upon the roots of strawberry plants, young conifers, grass and clover. Conifers in nurseries, particularly young plants of yew and hemlock, have had their roots damaged by this weevil. Larvae on yew roots, together with larvae of the black vine weevil, *Brachyrhinus sulcatus* Fabr., were received from Hamden, June 14. The adults are active at night and crawl into dark places and hide during the day. In 1933, three lots of adults collected in houses were received at the Station, as follows: Cheshire, July 10; West Haven, July 14; New Canaan, July 20. In all probability, these weevils came from the garden or adjacent fields where plants had been infested, and found their way into the back part of the house, where they found a convenient hiding place, usually in the kitchen. So far as is known these weevils do no harm in the house and probably leave it at the first opportunity, but sometimes they congregate there by the dozens or by the hundreds. Similar occurrences have been recorded from Maine and Montana. [W. E. Britton]

Lesser European Elm Bark Beetle. Dr. E. P. Felt at the ninth conference of Connecticut Entomologists held in New Haven, October 28, 1932, reported that the lesser European elm bark beetle, *Scolytus multistriatus* Marsh., was present in Connecticut at Stamford. During 1933, Dr. H. J. MacAloney and Mr. J. F. Knull of the Federal Bureau of Entomology found this insect in Darien, Fairfield, Greenwich, Meriden, Naugatuck and New Milford. This beetle was first discovered in the United States in Cambridge, Mass., in 1909, and reported by J. W. Chapman in *Psyche,* Vol. xvii, page 63, April, 1910. It infests weakened, dying and dead trees and branches, stumps, logs, and cut branches of elm. Recently it has been found in large numbers in connection with trees infested with the Dutch elm disease in New Jersey and in the vicinity of New York City. There is some question whether or not it ever injures perfectly healthy and vigorous trees. The inference is obvious. All choice trees should be kept as healthy and vigorous as possible. All dead wood and branches should be burned or otherwise disposed of, in order to prevent this species from multiplying and becoming abundant.
[W. E. Britton]

Injury to Tomatoes by the Common Field Cricket. On September 7, information was received that crickets had injured a field of tomatoes at Windsor. Although crickets are omnivorous feeders, it is unusual for them definitely to attack cultivated crops, and a visit was made to the place the same day, to observe the extent of the injury. Three acres of tomatoes were planted in a block on a large tract of former tobacco land. The piece bordered the Farmington river on one side and adjoined grass land on the other three sides. The large black field cricket, *Gryllus assimilis* Fabr., was very abundant in the grass and many were leaving it to attack the tomatoes. It was expected that most of the injury would be found on tomatoes that had cracked open or were over ripe, but this was

not the case. The tomatoes were being grown for a local cannery which required fruit well ripened and of good color, but due to the cricket injury the owner was obliged to pick the first of the crop before it had quite reached this condition. Much of the injury occurred on the ripest tomatoes, but crickets were seen feeding on those that were only partly colored and even on those that were entirely green. The crickets were well distributed over the field and probably about 20 per cent of the tomatoes had been injured, as shown in Figure 81. It was suggested that the owner try a poisoned bran mash such as is used in controlling grasshoppers. [B. H. Walden]

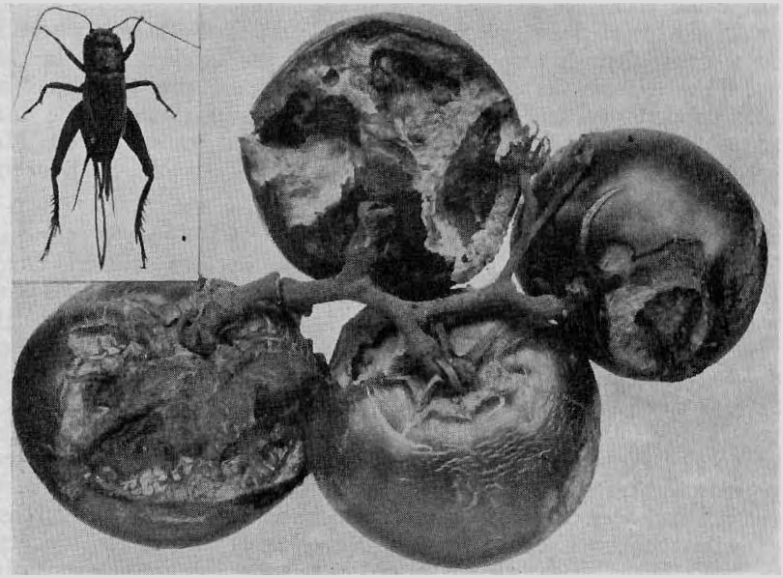

FIGURE 81. Tomatoes eaten by crickets. Insert—the black field cricket, *Gryllus assimilis* Fabr. Somewhat reduced.

A Tropical Moth in Connecticut. An unusual sphinx moth was brought to the Station August 25, by Mr. A. F. Hooghkirk, an attendant at a gasoline filling station in New Haven. He had never before seen one like it and wished to have it identified. It proved to be *Pseudosphinx tetrio* Linn., a species indigenous to Central and South America, the West Indies and southern Florida. It has a wing spread of five and one-fourth inches, and is marked with light and dark gray patches as shown in Figure 82. It is not known just how this moth reached Connecticut, but for two or three days before it was caught, there had been a heavy storm with strong southerly and easterly winds having a velocity of between 30 and 40 miles an hour. Wind-borne moths are apt to be broken and battered, particularly if brought from a great distance. Yet this specimen was fresh and nearly perfect. Moths are said to hide in cargoes of bananas, and thus may be transported long distances before

they leave the ship, and possibly this moth reached Connecticut in this manner. Dr. William Schaus of the United States National Museum states that so far as he knows, this moth has not before been recorded from a point so far north as Connecticut. [W. E. Britton]

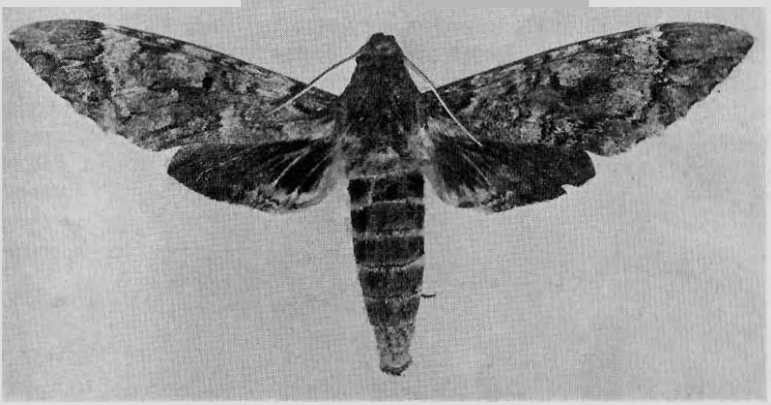

FIGURE 82. A tropical sphinx moth, *Pseudosphinx tetrio* Linn. Somewhat reduced.

Pepper Plants Severely Damaged by Variegated Cutworm. On June 22, Mr. Zappe and the writer visited the field of J. B. Lewis, Southington, where Mr. Turner and Mr. McFarland were engaged in making spray tests to control the Mexican bean beetle. An adjacent field of pepper plants had been severely damaged by climbing cutworms. The leaves were riddled, as shown in Figure 83, and some plants had lost all their leaves. No larvae could be found on the plants but by digging in the soil around the stems from one to three cutworms were found around each plant. On the ground and in the soil, there were many dead cutworms that had been killed by the poisoned bait placed on the ground around the injured plants. Yet there were also plenty of living cutworms. Some 25 or 30 were collected and brought to the laboratory, a portion of them were placed in preservative, and the others in cages for rearing. No adult moths were obtained. Although there may have been more than one species present, it is certain that some of them were the variegated cutworm, *Lycophotia margaritosa saucia* Hbn. Altogether, three applications of poisoned bait were required to control them. Although some of the plants lost nearly all of their leaves, they finally recovered and produced a fair crop. [W. E. Britton]

Control of Clothes Moths in Pianos. The webbing clothes moth, *Tineola biscelliella* Hummel, seriously damages the felt in pianos. Re-felting is an expensive process, and apparently no moth-proofed felts are available. A piano may be fumigated, using paradichlorobenzene and covering the piano with a tight tarpaulin. This fumigation will kill the moths present, but will not prevent re-infestation. Therefore an experiment

was performed in moth-proofing piano felts. An upright piano moderately infested with clothes moths was thoroughly cleaned by a piano tuner. A powerful vacuum cleaner was used for this purpose. The tuner removed the panels and keys so that all felt parts were accessible. All these felts were treated with a solution of rotenone in carbon tetrachloride at the rate of 1 part in 500. The solution was applied to the felts by means of a camel's hair brush. The piano was treated in June, 1932, and two subsequent examinations, the latter made in January, 1934, have disclosed no additional damage to the felts. Clothes moths are still present in the house but have not established an infestation in the piano. Rotenone is particularly suitable for this purpose because it is soluble in carbon tetrachloride. Aqueous solutions of moth-proofing materials might injure the piano. [Neely Turner and J. F. Townsend]

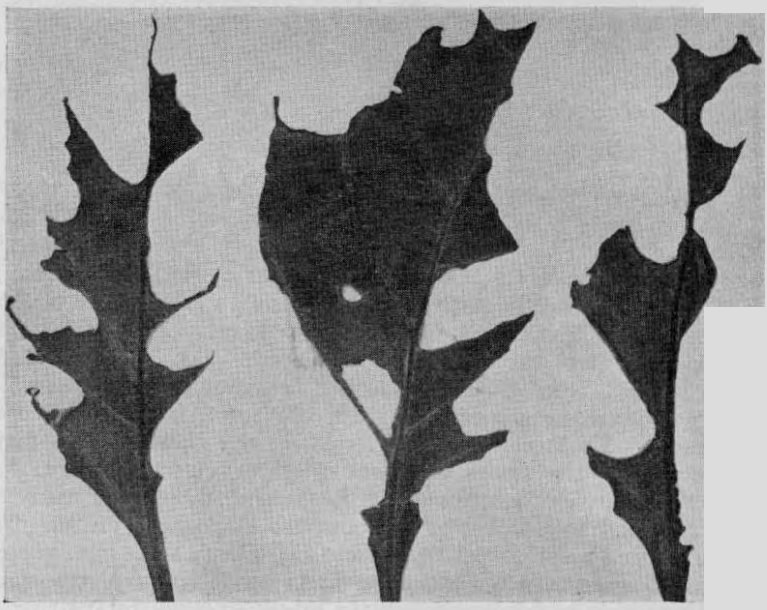

FIGURE 83. Pepper leaves injured by climbing cutworms at Southington. Natural size.

Control of Onion Thrips. The onion thrips, *Thrips tabaci* Lind., appeared on set onions during the period of May 17 to 25. No important injury was noted until June 8. The population increased steadily until the crop was mature. Sprays of nicotine sulfate (40 per cent) 1-800, pyrethrum soap 1-600 and rotenone solution, 1-400, all with .5 per cent dry soap reduced the population of the thrips, but failed to prevent serious injury after the tops of the onions went down. There was little difference in the efficiency of the three materials. The pyrethrum and rotenone products were diluted according to the manufacturer's directions. These sprays were applied by means of a garden tractor sprayer on June 9 and 20.

The yield of the sprayed plots was no better than the yield of untreated plots. In a second test, nicotine sulfate (40 per cent) 1-800, with .5 per cent dry soap, was applied June 2, 9, 19 and 28. These applications kept the population at a low level, but failed to give adequate protection after the tops went down. In view of the difficulty in obtaining a satisfactory sprayer and the relatively poor protection afforded by use of contact materials, spraying onions to control thrips does not seem advisable.

[Neely Turner and R. B. Friend]

Mexican Bean Beetle Investigations. The effect of spacing of bean plants on injury by the Mexican bean beetle, *Epilachna corrupta*. Muls., was studied in 1933. The results obtained were entirely different from the results of the 1932 experiments. In 1933, the maximum yield occurred on beans spaced two inches apart in the row, and the yield decreased sharply when the plants were 4, 6 and 8 inches apart. Spraying, according to the recommended schedule, reduced the percentage of in-

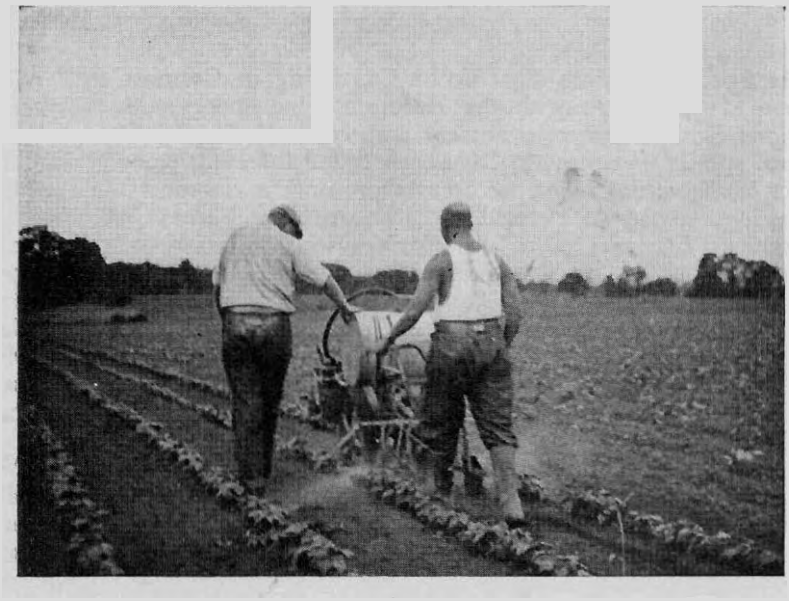

FIGURE 84. View of garden tractor spray outfit, spraying beans in Southington.

jured pods and increased the total yield. More beetle injury occurred on the plants spaced 2 inches apart, and relatively more egg-masses were deposited on these plants than on the plants spaced 4, 6 and 8 inches apart. Sprays were more effective when the plants were 4 or more inches apart. Experiments to determine relation between date of planting and bean beetle injury showed that beans planted May 11, May 20 and June 1, matured a marketable crop without spray applications. However, injury to pods was decreased by spraying. Beans planted June 10 required

one spray on June 22, and those planted June 20 required one spray on July 1. Plantings on June 30 required two sprays on July 29 and August 7. Those planted on July 10 required two sprays on August 7 and 22. July 21 plantings required one spray on August 30. No spray was necessary after the pods were formed. Tests of insecticides showed that copper-calcium arsenate dust (monohydrated copper sulfate, 19 per cent, calcium arsenate, 17 per cent, and lime, 64 per cent) was the most satisfactory dust. Magnesium arsenate, 3 pounds, casein-lime, 2 pounds, and water, 100 gallons, was very satisfactory as a spray. The use of pyrethrum and rotenone dusts following applications of arsenicals prevented beetle damage, and a higher percentage of marketable pods resulted. These non-poisonous dusts were also effective when used throughout the season. Lima and horticultural beans required spray applications on July 29 and August 7. These sprays did not apparently lessen foliage injury, but the yield was higher on sprayed plots. In a second test, sprays on June 9 and July 27 adequately controlled the larvae and left no residue on the pods. The sprays were applied with the cultivator tractor spray outfit shown in Figure 84. [Neely Turner and R. B. Friend]

Six Species of Pine Tip Moths Occurring in Connecticut. In the course of field work with the European pine shoot moth, *Rhyacionia buoliana* Schiff., and state nursery inspection during the last two years, several species of tip moths have been found infesting pines. In addition to *R. buoliana,* the following occur more or less commonly in the state: *Rhyacionia rigidana* Fernald, *R. comstockiana* Fernald, *R. frustrana* Comstock, *Eucosma gloriola* Heinrich, and *Battaristis vittella* Busck. Most of these are readily distinguished in the field by their appearance and habits. *Rhyacionia buoliana* is a serious pest of two-needle pines and is very abundant in the western half of Connecticut. It is particularly injurious to red pine, and mugho pine in ornamental plantings is usually infested. Although the insect occurs to a limited extent on white pine, it is of no economic importance to that tree. The larva tunnels in the bases of the needles in the summer, going into the buds the latter part of the season. It hibernates there and then enters a growing shoot in May. Pupation occurs in the injured shoot in May and June. *Rhyacionia rigidana* has been found commonly on red pine, particularly in the eastern half of the state. The larvae drill into the buds and continue downward into the twigs two or three inches. Hibernation occurs in the pupal stage in the twig, three to six pupae usually being found in one twig. There are two generations a year. This species may have been confused in the field with *R. frustrana* which is similar to it in appearance and habits. Our adult specimens agree in coloration and male genital characters with Heinrich's description of *rigidana* (U. S. Nat. Mus. Bul. 123, 1923). *Rhyacionia frustrana* has been found on pitch pine more frequently than on any other tree in Connecticut. It eats its way into the buds and tunnels two or three inches down the twig, pupating in the tunnel. Its life cycle and habits are similar to those of *rigidana. Rhyacionia comstockiana* is common on Austrian, Scotch and pitch pines. During the fall of 1933 this insect was frequently found on Scotch pine in northern Connecticut

and on Austrian and Scotch pines in nurseries throughout the state. The larva tunnels from one to six inches inside the twig, and its presence is indicated by a mass of pitch, often an inch in diameter. Hibernation occurs in the larval stage in the twig. *Eucosma gloriola* was described by Heinrich in 1931, from specimens collected in Connecticut by Dr. E. P. Felt. The larvae have been frequently found boring in the twigs of white pine in early summer. The terminal six or eight inches of the infested twig dies and is shown in Figure 85. Pupation occurs in the soil.

FIGURE 85. White pine twigs injured by the pine tip moth, *Eucosma gloriola*. Somewhat reduced.

Battaristis vittella has been found most frequently on red and mugho pines. The small yellowish larvae are borers in the tips in May and cause the terminal half inch to bend over sharply in a very characteristic manner. [R. B. Friend]

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Insects that Injure Cucumber, Melon, Pumpkin and Squash Plants in Connecticut. Circ. 93, 7 pp., 9 figs. July 6, 1933.

Edward H. Jenkins (Biographical Sketch). Dictionary of Biography (Scribner) X, p. 44, 1933.

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B. H. Walden

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M. P. Zappe

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M. P. Zappe and E. M. Stoddard

Tests of Various Apple Sprays in 1932. Proc. 42nd Ann. Meeting, Conn. Pomol. Soc., p. 15. May, 1933.

J. P. Johnson

Hints on Clean-up Measures for the European Corn Borer
1. Stalks and the Corn Borer. March, 1933.
2. Vegetables and Weeds. April, 1933.
3. Clean Plowing and Corn Stubble. May, 1933.
4. Cover Crops versus Clean-up Measures.
5. Cornstalks versus Barnyard Manure.
6. Corn on the Cob.

(This series of brief articles was printed in the monthly publication of the Farm Bureau in each county in the State.)

J. C. SCHREAD

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J. F. TOWNSEND

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D. S. LACROIX

Tobacco Insects in 1932. In Bul. 350, Rpt. of Tobacco Substation at Windsor, 488, 11 pp., 5 figs. June, 1933.

NEELY TURNER

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Mexican Bean Beetle Injuring Rye. Jour. Econ. Ent., 25, p. 1241. December, 1932. (Scientific note.)

Traps and Larvicides. Proc. 20th Ann. Meeting, New Jersey Mosq. Exterm. Assoc., p. 103. July, 1933.

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Cultural Practices in Relation to Mexican Bean Beetle Control. Jour. Econ. Ent., 26, p. 115; 6 pp., 2 plates. February, 1933.

R. C. BOTSFORD

New Developments in Mosquito Work in Connecticut. Proc. 20th Ann. Meeting, New Jersey Mosq. Exterm. Assoc., p. 102. July, 1933.

SUMMARY OF OFFICE AND INSPECTION WORK

Insects received for identification	569
Nurseries inspected	380
Regular nursery certificates granted (362 nurseries)	374
Duplicate nursery certificates for filing in other states	109
Miscellaneous certificates and special permits granted	134
Nursery dealer's permits issued	157
Shipper's permits issued to nurserymen in other states	245
Certification and inspection	
Parcels of nursery stock	167
Narcissus bulbs (in field 125,000) for sale (40 certificates)	30,000
Corn borer certificates	385
Packages of shelled corn and other seeds	161
Blister rust control area permits issued	162
Japanese beetle certificates issued for the shipment of nursery and floral stock and farm products	8,950
Japanese beetle certificates issued for the shipment of sand	9
Orchards and gardens examined	92
Shipments of imported nursery stock inspected	14
Number cases	103
Number plants	764,500
Apiaries inspected	1,342
Colonies inspected	10,927
Apiaries infested with American foul brood	32
Apiaries infested with European foul brood	0

Towns covered by gipsy moth scouts	52
Infestations found	115
Egg-clusters creosoted	19,020
Larvae and pupae killed by hand	68,260
Infestations sprayed	20
Lead arsenate used (pounds)	47,919
Miles of roadside scouted	1,028
Acres of woodland scouted	14,025
Letters written[1]	5,703
Circular letters issued	1,652
Bulletins and circulars mailed on request or to answer inquiries	3,832
Packages sent by mail and express	312
Lectures and addresses at meetings	68

FINANCIAL STATEMENT

The report of the receipts and expenditures of the State Entomologist (Insect Pest Appropriation) for the year ending June 30, 1933, may be found in the Report of the Treasurer, on the first few pages of the 57th Report of this Station for 1933.

ILLUSTRATIONS

Figure 75 was prepared by Philip Garman; Figure 84 is from a photograph by W. E. Britton; all others are from photographs by B. H. Walden.

[1]Includes 1,985 written from the Japanese beetle office and 110 from the gipsy moth office at Danielson.

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