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November 11, 1966

Cooperative
**ECONOMIC INSECT
REPORT**

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U. S. DEPARTMENT OF AGRICULTURE
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PLANT PEST CONTROL DIVISION

AGRICULTURAL RESEARCH SERVICE

UNITED STATES DEPARTMENT OF AGRICULTURE

AGRICULTURAL RESEARCH SERVICE

PLANT PEST CONTROL DIVISION

SURVEY AND DETECTION OPERATIONS

The Cooperative Economic Insect Report is issued weekly as a service to American Agriculture. Its contents are compiled from information supplied by cooperating State, Federal, and industrial entomologists and other agricultural workers. In releasing this material the Division serves as a clearinghouse and does not assume responsibility for accuracy of the material.

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COOPERATIVE ECONOMIC INSECT REPORT

HIGHLIGHTS

Current Conditions

CORN EARWORM continues increase on unsprayed soybeans in Seminole County, Florida. Corn earworm and CABBAGE LOOPER damaging beans in Baldwin County, Alabama. (p. 1043).

An APHID very heavy on root systems of oats in Carter County, Oklahoma. (p. 1044).

THREE-CORNERED ALFALFA HOPPER heavy on alfalfa in Yuma and Maricopa Counties, Arizona. (p. 1045).

Severe freeze probably destroyed all BOLL WEEVIL larvae and pupae in northern Alabama. (p. 1045).

DOUGLAS-FIR BEETLE outbreak exceeds that of 1954 in Six Rivers National Forest, California. (p. 1047).

Prediction

FALL ARMYWORM, BLACK CUTWORM, ARMYWORM and YELLOW-STRIPED ARMYWORM should no longer be problem in Texas with onset of cold weather. (p. 1043, 1044). Outlook for CITRUS PEST situation in Florida. (p. 1046).

Detection

New State records include a CHERRY LEAF MINER from Michigan, a LEAF MINER FLY from Indiana and PAVEMENT ANT from Washington. (p. 1051). Also a BARK BEETLE from Hawaii (p. 1052), and a WEEVIL (p. 1048), and a parasitic TORYMID (p. 1049) from California.

For new county records see page 1051.

First Occurrence of Season

WINTER GRAIN MITE and SHORT-NOSED CATTLE LOUSE appearing in Oklahoma. (p. 1044, 1049).

Special Reports

Distribution of ELM LEAF BEETLE (Map). (p. 1054).

- Techniques to Determine Losses. Selected References 1960-1966. Part I. (pp. 1055-1059).

Reports in this issue are for week ending November 4 unless otherwise indicated.

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WEATHER OF THE WEEK ENDING NOVEMBER 7, 1966

HIGHLIGHTS: Last week was warm in the Far West and cold in the Central and East. Heavy snow fell from Michigan to Tennessee; record cold reached the Gulf of Mexico.

PRECIPITATION: A major storm system brought record cold weather and record early snows to central areas of the Country. By Tuesday, several inches of snow had fallen in Michigan and flurries over the northern and central Great Plains with rain from the snow area southward to the Gulf of Mexico. On Wednesday the storm center intensified over the southern Appalachians and piled up to a foot of snow in parts of Michigan, Indiana, Ohio, Kentucky and Tennessee. As the storm moved northeastward, rainfall totals exceeded 5 inches in parts of New England. In the storm's wake, rain persisted from Arkansas to New England while several inches of snow fell near the Great Lakes on Saturday. At weekend, the first general storm of the season brought moderate to heavy precipitation to the California area. Snow fell above 2,500 feet in the north and above 5,000 feet in the south. Snow also fell from the Cascades to the eastern slope of the northern Rocky Mountains. A large dry area extended from Nevada and Utah to the lower Rio Grande Valley. Much of the central and northern Great Plains received little or no precipitation.

Weather continued on page 1050.

SPECIAL INSECTS OF REGIONAL SIGNIFICANCE

ARMYWORM (Pseudaletia unipuncta) - TEXAS - This and yellow-striped armyworm heavy on rangeland and oats in Mason County October 13. Heaviest in eastern portion of county, up to 25-30 per square yard. Potential outbreak should no longer be problem with advent of recent cool weather. (Garrett).

CORN EARWORM (Heliothis zea) - FLORIDA - Continues to increase on unsprayed plots of soybeans in Sanford, Seminole County. (Greene, Oct. 21). ALABAMA - Larvae damaging 500 acres of beans in Baldwin County. (Turner, Smith et al.). ARIZONA - Severely damaged sweet corn, even with continued controls, in Yuma County. Scattered but heavy populations damaged lettuce in Maricopa County. (Ariz. Coop. Sur.).

CORN LEAF APHID (Rhopalosiphum maidis) - NEW MEXICO - Medium to heavy on fall barley in Dona Ana County. (Campbell).

GREENBUG (Schizaphis graminum) - OKLAHOMA - Very light on wheat in Murray and Carter Counties; ranged 0.25-4 per linear foot. None seen in other south central counties. (Okla. Coop. Sur.).

SPOTTED ALFALFA APHID (Therioaphis maculata) - VIRGINIA - Light, 2-8 per sweep, on alfalfa in Montgomery County. (Isakson). OKLAHOMA - Ranged 0-10 per 10 sweeps in south central area alfalfa. (Okla. Coop. Sur.). NEW MEXICO - Remains spotted and light on alfalfa in Chaves and Dona Ana Counties. (Mathews, Campbell).

POTATO LEAFHOPPER (Empoasca fabae) - VIRGINIA - Adults 1 per 10 sweeps on alfalfa in Montgomery County. (Isakson).

BEEF LEAFHOPPER (Circulifer tenellus) - CALIFORNIA - Fall treatment in southern and western San Joaquin Valley 80 percent complete. Approximately 80,000 acres treated by aircraft. (Cal. Coop. Rpt.).

CORN, SORGHUM, SUGARCANE

EUROPEAN CORN BORER (Ostrinia nubilalis) - ALABAMA - Larvae heavy in Jackson, Marshall and De Kalb Counties. Heavier in late corn than early corn. (Estes, Henderson et al.). ARKANSAS - Average number of borers per 100 plants for State, 75.4 compared with 32.4 last year; however, average percent stalk infestations less this year. (Boyer). NEBRASKA - Borers per 100 stalks averaged 48 in north-east and 210 in southeast districts. (Rhine). SOUTH DAKOTA - Fall abundance survey indicates increase in borers per 100 stalks in all but one district; averaged more than 1 per stalk in all districts. (Jones).

SOUTHWESTERN CORN BORER (Zeadiatraea grandiosella) - ALABAMA - Survey continued in Jackson, Marshall and De Kalb Counties. Several larvae taken from corn in northwest Marshall County. Also taken in Wilcox County. Marshall County new record. (Henderson, Estes et al.). ARKANSAS - Lodged stalks averaged 460 per acre compared with 417 last year. (Boyer). MISSOURI - Infestations low and widely scattered in 10 southwest counties. Average percent girdled plants ranged 0.8 in Dallas County to 13.6 in Barry County. (Munson). OKLAHOMA - Averaged one per stalk in 20 percent of cornstalks in Atoka County. Larvae in nonspotted winter form. (Okla. Coop. Sur.). NEW MEXICO - Generally light in southern counties. (Elson, Campbell).

DRIED-FRUIT BEETLE (Carpophilus hemipterus) - CALIFORNIA - Adults heavy in corn ears at Clovis, Fresno County. (Cal. Coop. Rpt.).

CHINCH BUG (Blissus leucopterus) - TEXAS - Burrowing roots of several Hegari grain sorghum fields in Cooke, Grayson, and Denton Counties. Averaged 8 adults and nymphs per 2-inch cube of sod. (Turney, Parker).

EASTERN SUBTERRANEAN TERMITE (Reticulitermes flavipes) - ALABAMA - Occurrence general in cornstalks in Jackson, Marshall, and De Kalb Counties. (Henderson, Estes et al.).

SMALL GRAINS

FALL ARMYWORM (Spodoptera frugiperda) - TEXAS - Light infestations noted on small grain near Abilene, Taylor County, October 24. Buildup should not continue. This and black cutworm no longer problem in Falls and Robertson Counties. Vast reduction in population probably due to recent cold, dry weather. (Stanley, Parker).

LESSER CORNSTALK BORER (Elasmopalpus lignosellus) - SOUTH CAROLINA - Heavy localized damage to oats in fields previously planted to millet in Orangeburg County. Presumably, partial larval development occurred on millet. (Nettles et al.).

APHIDS - OKLAHOMA - Rhopalosiphum padi averaged 450 per linear foot in wheat near Ardmore, Carter County. Feeding under surface of ground on base of stem and upper part of roots. Macrosiphum avenae light, 0-1 per linear foot, on wheat in Murray and Carter Counties. (Okla. Coop. Sur.).

WINTER GRAIN MITE (Penthaleus major) - OKLAHOMA - First of season noted in Carter County wheat; averaged 1 per linear foot. (Okla. Coop. Sur.).

TURF, PASTURES, RANGELAND

AMERICAN GRASSHOPPER (Schistocera americana) - FLORIDA - Severe on native grass adjacent to nursery at Avon Park, Highland County. Insecticide treatment failed to stop movement to nursery site. (Fla. Coop. Sur., Oct. 28).

SOUTHERN MOLE CRICKET (Scapteriscus acletus) - ALABAMA - Extremely heavy numbers destroying stand of young white clover and rye grass pasture in Mobile County. Similar conditions occurred previously in Baldwin and other southern counties. (Deakle, Turner et al.).

LESSER CORNSTALK BORER (Elasmopalpus lignosellus) - FLORIDA - Larvae infesting several pastures of young winter rye in Marion and Sumter Counties. (Strayer).

A SPITTLEBUG (Prosapia bicincta) - FLORIDA - Previously damaged pangolagrass pastures, but now decreasing in Bradenton area, Manatee County. (Kelsheimer, Oct. 21).

AN ANT (Formica perpilosa) - TEXAS - Heavy populations destroying vegetation throughout 200-acre soil bank field in Floyd County by constructing mounds. (Rummel).

A SPIDER MITE (Oligonychus stickneyi) - FLORIDA - Eggs, larvae and adults severe on 75 percent of 5,000 square feet of St. Augustine grass at Lake Worth, Palm Beach County. (Palmer, Murray, Oct. 23).

FORAGE LEGUMES

PEA APHID (Acyrtosiphon pisum) - VIRGINIA - Light, 10-30 per sweep on alfalfa in Craig and Roanoke Counties. (Isakson). MICHIGAN - Moderate to heavy in Lenawee and Monroe County alfalfa. (Dowdy). NEW MEXICO - Generally light on alfalfa over State; heavier populations noted near Roswell, Chaves County. (N. M. Coop. Rpt.).

LYGUS BUGS (Lygus spp). - VIRGINIA - Adults averaged 3-5 per 10 sweeps in alfalfa in Craig, Botetourt and Roanoke Counties. (Isakson). OKLAHOMA - L. lineolaris ranged 3-10 per 10 sweeps in south central area alfalfa. (Okla. Coop. Sur.).

THREE-CORNERED ALFALFA HOPPER (Spissistilus festinus) - OKLAHOMA - Ranged 2-8 per 10 sweeps on alfalfa in south central counties. (Okla. Coop. Sur.). TEXAS - This and green cloverworm averaged 3 per sweep in alfalfa throughout Cooke, Grayson and Denton Counties. No economic damage. (Turney, Parker). ARIZONA - Remains heavy on alfalfa; averaged 300 per 100 sweeps in Yuma County and 700 per 100 sweeps in Maricopa County. (Ariz. Coop. Sur.).

ALFALFA WEEVIL (Hypera postica) - VIRGINIA - Larvae, up to 5 per sweep on alfalfa in Craig, Botetourt and Roanoke Counties. (Isakson).

SOYBEANS

SOUTHERN GREEN STINK BUG (Nezara viridula) - TEXAS - Heavy populations damaging soybeans near Orange, Orange County. (Kachtik).

CABBAGE LOOPER (Trichoplusia ni) - FLORIDA - Continues to increase on unsprayed plots of soybeans in Sanford, Seminole County. (Greene, Oct. 21).

COTTON

BOLL WEEVIL (Anthonomus grandis) - ALABAMA - Adults and larvae abundant in Jackson, Marshall, De Kalb, and other northern county cotton. Severe freeze November 1 probably destroyed all larvae and pupae. (McQueen). MISSISSIPPI - Approximately 60-70 percent intermediate diapause stage and 30-40 percent in nondiapause stage in Oktibbeha County. (Dinkins).

SUGAR BEETS

BEEF ARMYWORM (Spodoptera exigua) - ARIZONA - Light on sugarbeets in Maricopa County. Infestations moderate in few fields, but damage appears light. (Ariz. Coop. Sur.).

A LEAFHOPPER (Empoasca sp.) - ARIZONA - Moderate to heavy in most sugarbeet fields in Chandler and Mesa areas of Maricopa County. (Ariz. Coop. Sur.).

POTATOES, TOMATOES, PEPPERS

BEEF ARMYWORM (Spodoptera exigua) - FLORIDA - Causing economic damage to 400-acre tomato field at Bradenton, Manatee County. (Kelsheimer, Oct. 21).

LOOPERS - FLORIDA - Trichoplusia ni and Pseudoplusia includens serious on 400 acres of tomatoes at Bradenton; requiring special treatment. (Kelsheimer, Oct. 21).

BEANS AND PEAS

CABBAGE LOOPER (Trichoplusia ni) - ALABAMA - Larvae damaging 500 acres of beans in Baldwin County. (Turner, Smith et al.).

BEAN LEAF ROLLER (Urbanus proteus) - FLORIDA - Adults less prevalent than previous week; 620 larvae and 498 eggs on 100 bean plants in Sanford, Seminole County. (Greene, Oct. 21).

GENERAL VEGETABLES

CABBAGE LOOPER (Trichoplusia ni) - ARIZONA - Heavy larval populations continue to damage lettuce in Maricopa County. Egg numbers high in Yuma County; required extensive control applications. (Ariz. Coop. Sur.).

SALT-MARSH CATERPILLAR (Estigmene acrea) - ARIZONA - Migrating larval populations damaging unprotected lettuce fields in Yuma and Maricopa Counties. (Ariz. Coop. Sur.).

DECIDUOUS FRUITS AND NUTS

A PSYCHID MOTH (Apterona crenulella) - UTAH - Very large numbers attached to apple twigs in orchard at North Ogden, Weber County. (Mathis, Knowlton).

TWIG GIRDLER (Oncideres cingulata) - MISSISSIPPI - Moderate girdling noted on pecan twigs and small branches in Oktibbeha County. (Dinkins). TEXAS - Moderate numbers girdling twigs of pecans and mimosa near Wharton, Wharton County. (Smith).

WALNUT CATERPILLAR (Datana integerrima) - TEXAS - Moderate to heavy on pecans in Eastland County October 17; causing complete defoliation in isolated cases. (Gordon).

CITRUS

Quarterly Citrus Insect and Mite Outlook in Florida - October through December - This outlook is based on the assumption that weather beyond the period of the current U. S. Weather Bureau's 30-day outlook will be normal. Therefore, the forecasts given below cannot be viewed with the same degree of confidence as those in the "Citrus Insect and Disease Summary" usually released twice each month.

CITRUS RUST MITE (Phyllocoptruta oleivora) expected to increase through mid-November followed by gradual decrease. Population will be at high level until early December with about 60 percent of groves having important infestations. CITRUS RED MITE (Panonychus citri) expected to be moderately numerous through November with scattered heavy infestations occurring until mid-December. TEXAS CITRUS MITE (Eutetranychus banksi) will be less common than citrus red mite and often occur in same grove. October and early November infestations will be fewer and lighter than in recent years. Scattered heavy infestations expected mid-November through December. GLOVER SCALE (Lepidosaphes gloverii) not expected to depart from current moderate level. YELLOW SCALE (Aonidiella citrina) will fluctuate near present moderate to high range. CHAFF SCALE (Parlatoria pergandii) will remain low and below average. WHITEFLIES expected to be near normal abundance and not of great importance. (W. A. Simanton).

Citrus Insect Situation in Florida - End of October - CITRUS RUST MITE infested 67 percent of groves (norm 65 percent); 54 percent economic (norm 43 percent). Population above average and in high range and appears to have reached fall peak. Gradual decrease expected after mid-November and will be more apparent on fruit than on leaves. Highest districts west, south, and north. CITRUS RED MITE infested 35 percent of groves (norm 35 percent); 12 percent economic (norm 10 percent). Population near average and in low range; further increase expected through November. Highest districts north, central and west. TEXAS CITRUS MITE infested 21 percent of groves (norm 32 percent); 5 percent economic (norm 11 percent). Population still below normal and in low range despite recent upward trend. Further increase will occur but heavy infestations not expected to be numerous. Highest districts north and east. YELLOW SCALE infested 67 percent of groves; 18 percent economic. Populations at record high level for October. Further increase expected. Highest districts east, central, west, north, south. GLOVER SCALE infested 57 percent of groves; 11 percent economic. Population average for October and in low to moderate range. Increase expected. Highest districts central, east and south. PURPLE SCALE (Lepidosaphes beckii) infested 60 percent of groves; 7 percent economic. Population slightly below average; in low to moderate range but infestations not expected to become much heavier than present. Highest districts central, south and east. CHAFF SCALE infested 39 percent of groves; 6 percent economic. Will continue below average abundance; although increase expected, population will not exceed moderate level. Highest districts east, central, south.

BLACK SCALE (Saissetia oleae) crawlers may become abundant in November but not likely to be important in winter. WHITEFLY population will remain low despite slight temporary increase in adult forms. (W. A. Simanton, (Citrus Expt. Sta., Lake Alfred)).

ARMORED SCALES - FLORIDA - All stages of Aonidiella citrina moderate to severe on stems, leaves and bark of 90 percent of 12,000 sweet orange plants at nursery in Howey, Lake County. (Bentley, Oct. 21). Unaspis citri eggs observed on grapefruit and orange in Orange County nurseries. Adults infested 50 percent of orange plants at nursery in Orange County. (Ware, Oct. 19).

BROWN SOFT SCALE (Coccus hesperidum) - ARIZONA - Heavy populations on grapefruit in Maricopa County area continue active. Considerable damage occurred during summer. (Ariz. Coop. Sur.).

TEXAS CITRUS MITE (Eutetranychus banksi) - FLORIDA - Adults moderate on 1,500 citrus plants in nursery at Ft. Lonesome, Hillsborough County. (Vaughn, Oct. 13).

ORANGE-DOG (Papilio cresphontes) - ARIZONA - Larvae damaging backyard citrus in Yuma and Maricopa Counties. (Ariz. Coop. Sur.).

ORNAMENTALS

A LEAF BEETLE (Eurypepla jamaicensis) - FLORIDA - Larvae and adults severe on 90 percent of Geiger-trees (Cordia sebestena) in nursery at Miami, Dade County. (Sloan, Oct. 11).

SHOT-HOLE BORER (Scolytus rugulosus) - CALIFORNIA - Adults medium in bark of Prunus carolinana in Bellflower, Los Angeles County. (Cal. Coop. Rpt.).

APHIDS - CALIFORNIA - Neophyllaphis podocarpi heavy on podocarpus nursery stock in Mill Valley, Marin County. (Cal. Coop. Rpt.). FLORIDA - Cinara tujafilina adults moderate to severe on stems and bark of arborvitae in Rockledge store, Brevard County. (Levan).

ARMORED SCALES - FLORIDA - All stages of Phenacaspis cockerelli moderate to severe on leaves of magnolia plants at nursery in Ft. McCoy, Marion County; adults infesting 75 percent of magnolia plants in nursery at Union Park, Orange County. (Holder, Crews, Oct. 31). All stages of Pseudaulacaspis pentagona infesting 50 percent of goldenrain trees in nursery in Longwood, Seminole County. (Kipp, Oct 20).

CHRYSANTHEMUM GALL MIDGE (Diarthronomyia chrysanthemi) - MARYLAND - Galls conspicuous on chrysanthemums at nursery near Rockville, Montgomery County. (U. Md., Ent. Dept.).

TWO-SPOTTED SPIDER MITE (Tetranychus urticae) - OKLAHOMA - All stages heavy and damaging chrysanthemums in greenhouse in Payne County. (Okla. Coop. Sur.).

FOREST AND SHADE TREES

BARK BEETLES - CALIFORNIA - Scolytus ventralis killed several trees in 10-acre stand of white fir in Barber Creek area. (Cal. Coop. Rpt.). Dendroctonus pseudo-tsugae caused over 100 fades in 30-acre stand of Douglas-fir in State Creek area, Six Rivers National Forest; infestation increasing. Between 1,000-2,000 Douglas-fir in Elk Creek and Indian Creek drainage and Salmon River district fading. This probably due to beetles, drought, snowdown timber and unusually warm summer. Approximately 14,000 Douglas-fir trees infested in 1,400 acres on Tish Tang Ridge and 1,800 on 3,000-acre stand in Cedar Creek in Six Rivers National Forest. This probably worst outbreak in State and far exceeds 1954 outbreak in same general area. (USFS). D. ponderosae and Ips spp. killing over 200 Jeffrey pines in 40-acre stand in Chrey Reservoir area, Modoc National Forest. Part of damage result

of thinning operations in Jeffrey pine stands. (Hunt). D. brevicomis and Ips spp. causing about 60 fades in 10-acre stand of ponderosa pine in Bowery Flat, Mendocino County. (Easter). Ips sp. working in green timber in Lassen National Forest; over 20 trees killed in 2-acre area. (Gauger). FLORIDA - Xylosandrus compactus larvae, pupae and adults abundant in dogwood stems, twig killing extensive on trees in Ocala area, Marion County. Severe on stems of 200 maple trees. Det. L. A. Hetrick. (Sands, Oct. 26).

SEQUOIA PITCH MOTH (Vespa mima sequoiae) - CALIFORNIA - Infesting 100 ponderosa pines in 25-acre stand in Rhodonite seed production area, Klamath National Forest. (DeGraff, USFS).

RED-HEADED PINE SAWFLY (Neodiprion lecontei) - VIRGINIA - Full-grown larvae observed on loblolly pine seedlings in Washington County. (Isakson).

ELM LEAF BEETLE (Pyrrhalta luteola) - CALIFORNIA - Adults heavy on Chinese elm trees in Coalinga, Fresno County. (Cal. Coop. Rpt.).

ASIATIC OAK WEEVIL (Cyrtepidomus castaneus) - NORTH CAROLINA - Collected in Asheville, Buncombe County, June 29, 1965, feeding on white oak. New county record. (Drooz).

A WEEVIL (Proctorus decipiens) - CALIFORNIA - Adults collected from leaf and flower of Sambucus racemosa (red elderberry) at Gasquet, Del Norte County, April 21, 1966, by T. Peacock and R. P. Allen. Det. R. E. Warner. New State record. (PPC).

ASH BORER (Podosesia syringae) - TEXAS - Heavy populations emerging from ash near Mason, Mason County. Averaging 30-40 per trunk with sawdust and frass evident on ground beneath emergence holes. (Garrett).

FALL CANKERWORM (Alsophila pometaria) - MINNESOTA - Female moths observed in Minneapolis area. Egg masses found on trees and some shrubs. Populations light in area this season. (Minn. Ins. Rpt., Oct. 31).

MIMOSA WEBWORM (Homadaula albizziae) - OKLAHOMA - Larvae collected on mimosa in Tulsa, Tulsa County, August 24. Det. by D. M. Weisman. Species believed present in several locations in northeast and east central areas. (Okla. Coop. Sur.).

SYCAMORE TUSSOCK MOTH (Halisidota harrisii) - TEXAS - Heavy populations on sycamore trees in San Angelo, Tom Green County. (Boyd).

MAN AND ANIMALS

MOSQUITOES - FLORIDA - Aedes taeniorhynchus adults light on several islands in Florida Keys. No larvae observed. (Mead, Oct. 27). LOUISIANA - Larval collections in Jefferson Parish contained: Anopheles quadrimaculatus, Culex pipiens quinquefasciatus, C. restuans, C. salinarius, C. territans, and Culiseta inornata. Adults averaged 37.8 per night with Culex salinarius dominant. Aedes sollicitans increasing in Grand Isle area. (Stokes). TEXAS - Light trap collections in Jefferson County for September showed: Psorophora confinnis most numerous; P. howardii taken in one light trap; P. ciliata not uncommon. Culex salinarius uncommon. C. pipiens quinquefasciatus plentiful throughout populated area. Aedes sollicitans occurred in small numbers in southern part of county; almost absent from northern part. Anopheles crucians occurred in small numbers in northern part of county. Uranotaenia spp. occurred in uncommonly large numbers in southern and central parts of county and in moderate numbers in north and airport area. Mansonia perturbans taken in Port Arthur area and in airport area; no specimens occurred in Beaumont area. (Thompson). CALIFORNIA - Populations persisting with some leveling off; breeding continues due to hot, dry fall. Records for Sacramento and Yolo County Mosquito Abatement District show this longest season in 18 years. (Umberger).

COMMON CATTLE GRUB (Hypoderma lineatum) - OKLAHOMA - Larvae appeared in backs of cattle in Payne County; ranged 3-4 per head on yearlings. (Okla. Coop. Sur.).

FACE FLY (Musca autumnalis) - WASHINGTON - Causing nuisance around homes at Newport, Pend Oreille County. New county record. Det. M. T. James. (Gilliam, Nov. 1).

HORN FLY (Haematobia irritans) - TEXAS - Moderate to heavy on cattle in Jackson County. Some relief expected with influx of recent cool weather. (Wilson).

SCREW-WORM (Cochliomyia hominivorax) - Total of 124 cases reported in U. S. October 30-November 5 as follows: TEXAS: Presidio 6, Medina 1, Maverick 5, Webb 5, Kenedy 1, Dimmit 22, Edwards 3, Zavala 2, Terrell 2, Pecos 4, Frio 2, La Salle 1, Val Verde 8, Brooks 1, Culberson 1, Burnet 1, Kendall 1, El Paso 2, McCulloch 3, Fayette 1, De Witt 1, Reeves 1, Brewster 1, Llano 2, Cameron 1, Gonzales 2, Zapata 1, Atascosa 1, Kimble 1, Jeff Davis 2, Menard 1, Mills 1. ARIZONA: Maricopa 20, Yuma 7, Graham 2, Yavapai 1, Pinal 2, Pima 1, Santa Cruz 1. NEW MEXICO: Eddy 1. CALIFORNIA: Imperial 1, San Diego 1. Total of 262 cases reported in portion of Barrier Zone in Republic of Mexico as follows: Baja California 24, Sonora 119, Chihuahua 45, Coahuila 51, Nuevo Leon 15, Tamaulipas 8. No cases reported from Mexico south of Barrier Zone. Barrier Zone area where eradication operations underway to prevent establishment of self-sustaining population in U. S. Sterile screw-worm flies released: Texas 59,306,250, New Mexico 1,216,000, Arizona 9,184,000, California 1,216,000, Mexico 45,624,000. (Animal Health Division).

SHORT-NOSED CATTLE LOUSE (Haematopinus eurysternus) - OKLAHOMA - First of season noted on cattle in Payne County; ranged 1-2 per hair part. (Okla. Coop. Sur.).

STORED PRODUCTS

Stored Product Pests in Delaware - Following collected from pint grain samples in Sussex County: CADELLE (Tenebroides mauritanicus) and SAW-TOOTHED GRAIN BEETLE (Oryzaephilus surinamensis) from wheat and barley; ANGOUMOIS GRAIN MOTH (Sitotroga cerealella) from corn; GRANARY WEEVIL (Sitophilus granarius) from wheat. (Levin, Burbutis).

FOREIGN GRAIN BEETLE (Ahasverus advena) - FLORIDA - Adults severe in truckload of hay in Haynes City, Marion County. (Roberson, Oct. 24).

SAW-TOOTHED GRAIN BEETLE (Oryzaephilus surinamensis) - UTAH - Infesting flour in several homes in Ft. Duchesne and White Rock area of Uintah County. (Knowlton).

INDIAN-MEAL MOTH (Plodia interpunctella) - NEW MEXICO - Larvae found in stored pecans in Dona Ana County. Previously thought to be pecan nut casebearer. (N. M. Coop. Rpt.).

BENEFICIAL INSECTS

LADY BEETLES - MISSISSIPPI - Hippodamia convergens continued at high level in alfalfa in Oktibbeha County. (Dinkins). FLORIDA - Hyperaspis sp. adults and nymphs present on 10 percent of 1,000 slash pines in nursery at Macclenny, Baker County. (Collins, Oct. 6).

A TORYMID (Ditropinotus aureoviridis) - CALIFORNIA - Female taken in Steiner trap at Hawthorne, Los Angeles County, by A. R. Gillogly on July 21, 1966. Det. by B. D. Burks. New State record. (PPC).

FEDERAL & STATE PLANT PROTECTION PROGRAMS

PINK BOLLWORM (Pectinophora gossypiella) - CALIFORNIA - Treatment in eradication area continued on 4-7 day interval in Imperial, Coachella and Borrego Valleys. Nearly 70,000 acres treated. Status so far this year as follows: Imperial County - Bard Valley 971 adults, 822 larvae; Imperial Valley 1,047 adults, 292 larvae, 1 pupa. Riverside County - Palo Verde Valley 2,787 adults, 5,649 larvae, 10 pupae; Coachella Valley 70 adults, 6 larvae. San Diego County - Borrego Valley 24 adults. San Bernardino County - Needles 145 adults, 9 larvae; Sandy Valley 1 adult. Los Angeles and Kern Counties - Antelope Valley 5 adults. First specimens collected October 14, 1966, at Lancaster, Los Angeles County, and October 18, 1966, at Cantil (near Mojave), Kern County. These new county records. (Cal. Coop. Rpt.). ARIZONA - New infestations continue throughout State. (Ariz. Coop. Sur.). NEW MEXICO - Lint cleaner inspections and boll inspections show high counts of larvae from Eddy, Dona Ana and Luna Counties. Boll checks in Hidalgo County indicate little or no infestation present. (N. M. Coop. Rpt.).

SWEETPOTATO WEEVIL (Cylas formicarius elegantulus) - FLORIDA - Adults infesting 100 percent of sweetpotato tubers on farm in Jefferson County. (Miller, Oct. 14). Adults severe on sweetpotato plants in Ft. Myers, Lee County. Larvae and adults infesting stems and roots of 6 acres of sweetpotato plants on farm in Quincy, Gadsden County. (Miller, Brown, Oct. 21).

CARIBBEAN FRUIT FLY (Anastrepha suspensa) - FLORIDA - Guava and other fruits examined in several counties, negative for larvae; adults trapped in Manatee, Sarasota, Okeechobee, and Orange Counties. One adult female caught in McPhail trap at Winter Garden, Orange County, October 28, 1966. This is new county record. (Grubbs).

CITRUS WHITEFLY (Dialeurodes citri) - CALIFORNIA - Reported from San Diego, San Diego County, in CEIR 16(43):1017. This first record for county and represents spread of 300 miles from nearest infestation in Fresno. Heavy on citrus and Texas umbrella-trees. (Harper).

GRASSHOPPERS - NEW MEXICO - Moderate to heavy in alfalfa fields adjacent to rangeland in Maxwell, Colfax County. (Heninger, Kloefer).

Weather continued from page 1042.

TEMPERATURE: The early season snow and rain storm brought record-breaking cold from the central Great Plains to the Deep South. On Thursday morning, Topeka, Kansas, registered 10°, a new early season record, and New Orleans, Louisiana, with 28° set a new November record. Mild temperatures retruned to the central Plains and South over the weekend with readings in the 70's over most of Kansas. As week ended, however, a new cold wave pushed across the Canadian border, accompanied by near zero temperatures in Montana and the Dakotas. On Tuesday, a desert wind pushed the mercury to record highs for so late in the season in the central and south coastal sections of California. Los Angeles with 101° broke an 82-year November record. San Diego broke a 95-year record with 97°. (Summary supplied by Environmental Data Service, ESSA).

INSECT DETECTION

New State Records

A CHERRY LEAF MINER (Nepticula slingerlandella) - MICHIGAN - Infestation observed in Oceana County week ending June 17. Adults and larvae collected July 15, 1966, by R. C. Hillman determined by D. R. Davis and D. M. Weisman. New State record. (Hillman).

A LEAF MINER FLY (Melanagromyza n. sp.) - INDIANA - Larvae found boring in ginseng roots on an herb farm in Salem area of Washington County in April, 1966. Det. by G. C. Steyskal. (Huber).

PAVEMENT ANT (Tetramorium caespitum) - WASHINGTON - Adult workers collected April 14, 1966, on north bank of drain ditch, tending two species of aphids at Toppenish, Yakima County. Det. by D. R. Smith. (Wallis).

A WEEVIL (Proctorus decipiens) - CALIFORNIA - Adults collected from Sambucus racemosa at Gasquet, Del Norte County, April 21, 1966, by T. Peacock and R. P. Allen. Det. R. E. Warner. (p. 1048).

A TORYMID (Ditropinotus aureoviridis) - CALIFORNIA - Collected at Hawthorne, Los Angeles County, by A. R. Gillogly on July 21, 1966. Det. by B. D. Burks. (p. 1049).

A BARK BEETLE (Hypothenemus vulgaris) - HAWAII - Collected from Sterculia at Lihue, Kauai, in October 1961, and from Gardenia jasminoides at Honolulu, Oahu, in May 1966. Det. S. L. Wood. (p. 1052).

New County Records

SOUTHWESTERN CORN BORER (Zeadiatraea grandiosella) - ALABAMA - Collected from corn in northwest Marshall County. (p. 1043).

ASIATIC OAK WEEVIL (Cyrtepistomus castaneus) - NORTH CAROLINA - Collected in Asheville, Buncombe County, June 29, 1965, on white oak. (p. 1048).

FACE FLY (Musca autumnalis) - WASHINGTON - Detected at Newport, Pend Oreille County. Det. M. T. James. (p. 1049).

PINK BOLLWORM (Pectinophora gossypiella) - CALIFORNIA - Collected October 14, 1966, at Lancaster, Los Angeles County, and October 18, 1966, at Cantil, Kern County. (p. 1050).

CARIBBEAN FRUIT FLY (Anastrepha suspensa) - FLORIDA - Collected at Winter Garden, Orange County, October 28, 1966. (p. 1050).

CITRUS WHITEFLY (Dialeurodes citri) - CALIFORNIA - Collected at San Diego, San Diego County, October 17, 1966. (p. 1050).

CORRECTIONS

CEIR 16(23):528 - SPOTTED ALFALFA APHID (Therioaphis maculata) - COLORADO - Not new record for Prowers County; first occurrence of year.

CEIR 16(42):992 - TEXAS - SOUTHERN PINE BEETLE (Dendroctonus frontalis) should be A BARK BEETLE (Ips calligraphus).

CEIR 16(42):995 - A Change of Name for Fuller Rose Beetle, Pantomorus godmani, Line 1 should read: "... , Vol. 2, 1965,..."

HAWAII INSECT REPORT

New State of Hawaii Insect Record - A BARK BEETLE (*Hypothenemus vulgaris*) - Collected from Sterculia twigs in Lihue, Kauai, October 1961, and heavy on *Gardenia jasminoides* twigs in Honolulu, Oahu, May 1966. Det. by S. L. Wood. (Chong).

Insects of Regional Significance - AN APHID (*Cerataphis orchidearum*) - Recently collected from cattleya orchids in Honolulu, Oahu; det. by L. M. Russell. Previously found on orchids and palms, referred to as *C. lataniae*. (Chong). On Oahu, larvae and adults of a LEAF MINER FLY (*Liriomyza* sp.) medium on cucumbers in Wai-alua and heavy in cataloup and honeydew melon in Kahuku. Also heavy on *Amaranthus spinosus* (a weed) adjacent to fields. (Yamamoto, Kim). Larvae of a CERAMBYCID BEETLE (*Lagocheirus obsoletus*) heavy in 2 large, healthy cassava or tapioca plants (*Manihot esculenta*) at Poamoho Experimental Farm, Oahu. New host record. Other recorded hosts include *Allamanda*, *Plumeria*, *Hibiscus*, *Euphorbia*, kukui (*Aleurites*), *Araucaria*, *Pseudopanax* and ceara-rubber. (Mitchell).

Corn - Nymphs and adults of a LONG-HORNED GRASSHOPPER (*Conocephalus saltator*) heavy on sweet corn and grassy area at Wailua Homestead, Kauai. (Crozier, Au).

Vegetables - GREEN PEACH APHID (*Myzus persicae*) medium and caused 20 percent blossom and fruit drop on acre of bell peppers in Kihei, Maui. Aphids observed feeding on flower buds and peduncles of freshly set fruits. (Miyahira). GREENHOUSE WHITEFLY (*Trialeurodes vaporariorum*) continues pest in bean-growing areas in Wai-anae and Waimanalo, Oahu. (Yamamoto, Sato).

Nuts - A FALSE SPIDER MITE (*Brevipalpus californicus*) light on macadamia nut trees at Poamoho Experimental Farm, Oahu. (Mitchell, Haramoto).

Citrus - RED WAX SCALE (*Ceroplastes rubens*) nymphs and adults heavy on tangerine trees in Hanapepe, Kauai; 60-75 percent of leaves and branches thickly covered with scales. (Au).

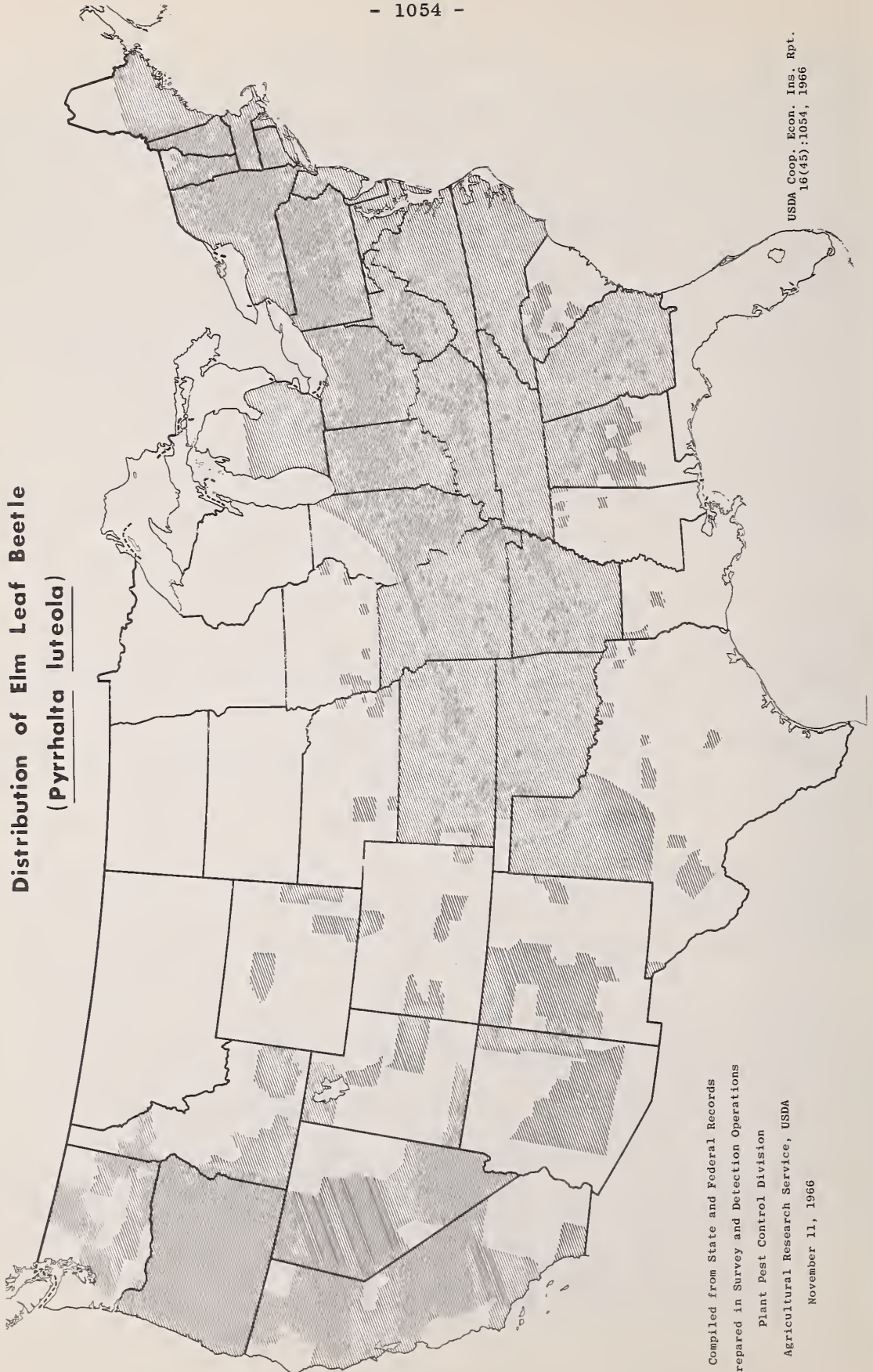
Ornamentals - Eggs, nymphs and adults of a LACE BUG (*Corythucha morrilli*) on *Wedelia trilobata* in Pawaa area of Honolulu, Oahu. Also breeds on cocklebur (*Xanthium* sp.) and sourbush (*Pluchea odorata*). (Davis).

Forest and Shade Trees - Foliar damage by a KOU MOTH (*Ethmia colonella*) noticeable on kou trees in Kailua-Kona, Hawaii Island. (Yoshioka).

Miscellaneous Pests - Large specimen of GIANT AFRICAN SNAIL (*Achatina fulica*) discovered in Holualoa, North Kona, Hawaii Island. No other specimens found. Poison bait scattered in area; close surveillance will be maintained. This snail not established on Kauai and Hawaii Islands, but small localized populations occasionally discovered. Prompt detection and eradication measures have prevented establishment on these islands. (Yoshioka, Funasaki).

Beneficial Insects - A TACHINA FLY (*Trichopoda pennipes*) - High density of adults of this stink bug parasite noted in weedy areas in Pulehu and Lahaina, Maui. (Ah Sam). Larvae of a CECIDOMYIID MIDGE (*Zeuxidiplosis giardi*) heavy on Klamath-weed on Mt. Hualalai, Hawaii Island; as many as 6 observed in single gall. (Yoshioka). A BRUCHID (*Bruchus atronotatus*) found established in Hookena, South Kona, Hawaii Island. This seed feeder introduced from Brazil in 1960. Nearest release point at Kiolakoa, Kau District, about 7 miles from Hookena. (Davis). A SCIOMYZID FLY (*Sepedon macropus*) - This liverfluke predator generally light throughout Hanapepe Valley, Kauai. Taro fields continue favorite habitat. (Au). A NOCTUID MOTH (*Catabena esula*) - Larvae of this defoliator light on lantana in Hilo, Hawaii Island. Usually active from November to February. Introduced from California in 1955. (Yoshioka).

Distribution of Elm Leaf Beetle
(Pyrrhalta luteola)



Compiled from State and Federal Records
Prepared in Survey and Detection Operations

Plant Pest Control Division

Agricultural Research Service, USDA

November 11, 1966

USDA Coop. Econ. Ins. Rpt.
16(45):1054, 1966

TECHNIQUES TO DETERMINE LOSSES

Selected References 1960-1966

Introduction

Part I

Interest in the need for scientific methods for determining losses caused by insects continues to increase. It is believed that a survey of the literature in this area will be helpful in establishing the present status of the work and provide an available reference source for further studies. The references below cover the period 1960-66. Additional lists will be issued as they are prepared. Separates of this list are available from Survey and Detection Operations.

References

ADKISSON, P. L. 1960. Effect of pink bollworm infestation on cotton produced under high moisture conditions. Tex. Agr. Expt. Sta. Progress Rpt. 2156, 7 pp.

ADKISSON, P. L., BAILEY, C. F. and HANNA, R. L. 1964. Effect of the bollworm, Heliothis zea, on yield and quality of cotton. J. Econ. Ent. 57(4):448-450.

ADKISSON, P. L., BRAZZEL, J. R. and GAINES, J. C. 1963. Yield and quality losses resulting from pink bollworm damage to cotton. Tex. Agr. Expt. Sta. MP-632, 8 pp.

ADKISSON, P. L., HANNA, R. L. and BAILEY, C. F. 1964. Estimates of the numbers of Heliothis larvae per acre in cotton and their relation to the fruiting cycle and yield of the host. J. Econ. Ent. 57(5):657-663.

AGRICULTURAL RESEARCH SERVICE. 1965. Losses in agriculture. U. S. Dept. Agr. Handb. No. 291, 120 pp.

ANDERSON, N. L. 1961. Seasonal losses in rangeland vegetation due to grasshoppers. J. Econ. Ent. 54(2):369-378.

ANGLADE, P. 1961. Tests on the application of an American method of judging varieties of maize by rating the damage caused by artificial infestation with the pyralid (Ostrinia (=Pyrausta) nubilalis Hubn.). Rev. Zool. Agr. 60(10/12):139-150. Refs. In Fr.

ANGLADE, P. 1961. The influence on the yield of maize of infestation of the stalks by the second generation of Sesamia nonagrioides Lef. (Lep. Noctuidae). Methods of comparison of hybrids by artificial infestation. Ann. Epiphyt. 12(4):357-372. Refs. In Fr.

BALOCK, J. W. and KOZUMA, T. T. 1964. Notes on the biology and economic importance of the mango weevil, Sternochetus mangiferae (Fabricius), in Hawaii (Coleoptera: Curculionidae). Hawaii Ent. Soc. Proc. 18(3):353-364. Refs.

BEGUM, A. and EDEN, W. G. 1965. Influence of defoliation on yield and quality of soybeans. J. Econ. Ent. 58(3):591-592.

BIGGER, M. 1966. The biology and control of termites damaging field crops in Tanganyika. Bul. Ent. Res. 56(3):417-444.

BLICKENSTAFF, C. C. 1960. Effect of sample location within fields on corn earworm and rice weevil infestation and damage. J. Econ. Ent. 53(5):745-747.

BOWDEN, J. 1965. Sorghum midge, Contarinia sorghicola (Coq.), and other causes of grain-sorghum loss in Ghana. Bul. Ent. Res. 56(1):169-189.

BOWLING, C. C. 1963. Cage tests to evaluate stink bug damage to rice. J. Econ. Ent. 56(2):197-200.

BRITISH DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH. 1963. The death-watch beetle. For. Prod. Res. Lab. Leaf. 4, 9 pp.

CANERDAY, T. D. and ARANT, F. S. 1964. The effect of spider mite populations on yield and quality of cotton. J. Econ. Ent. 57(4):553-556.

CARLSON, E. C. 1961. Lygus bug damage to table beet seed plants. J. Econ. Ent. 54(1):117-119.

CARLSON, E. C. 1962. Flower thrips damages safflower--buds bronzed and blasted. Calif. Agr. 16(4):4.

CARLSON, E. C. 1964. Damage to safflower plants by thrips and lygus bugs and a study of their control. J. Econ. Ent. 57(1):140-145.

CARLSON, E. C. 1964. Effect of flower thrips on onion seed plants and a study of their control. J. Econ. Ent. 57(5):735-741.

CHIANG, H. C. and HODSON, A. C. 1963. European corn borer damage to sweet corn as affected by the date of planting. J. Econ. Ent. 56(3):243-248.

CHIANG, H. C., HOLDAWAY, F. G., BRINDLEY, T. A. and NEISWANDER, C. R. 1960. European corn borer populations in relation to the estimation of crop loss. J. Econ. Ent. 53(4):517-522.

CLEARE, L. D. 1962. Damage and loss caused by insects to stored rice and paddy in British Guiana. Rice Storage Invest. Pub. (Br. Guiana) No. 4, 18 pp.

DAUGHERTY, D. M. and Coworkers. 1964. An evaluation of damage to soybeans by brown and green stink bugs. J. Econ. Ent. 57(5):719-722.

DAVIS, A. C., McEWEN, F. L. and ROBINSON, R. W. 1963. Preliminary studies on the effect of lygus bugs on the set and yield of tomatoes. J. Econ. Ent. 56(4):532-533.

DIVISION OF AGRICULTURAL SCIENCES, UNIVERSITY OF CALIFORNIA. 1965. Estimates of crop losses and disease-control costs in California, 1963, 102 pp.

DOERING, G. W. and RANDOLPH, N. M. 1960. Field methods to determine the infestation of the sorghum webworm and the damage by the sorghum midge in grain sorghum. J. Econ. Ent. 53(5):749-750.

ECKENRODE, C. J. and DITMAN, L. P. 1963. An evaluation of potato leafhopper damage to lima beans. J. Econ. Ent. 56(5):551-553.

EVERLY, R. T. 1960. Loss in corn yield associated with the abundance of the corn leaf aphid, Rhopalosiphum maidis, in Indiana. J. Econ. Ent. 53(5):924-932.

FLOYD, E. H., CLOWER, D. F. and MASON, L. F. 1960. Effect of sugarcane borer infestation on the yield and grade of corn. J. Econ. Ent. 53(5):935-937.

FRANSSSEN, C. J. H. 1960. The determination of damage caused by Contarinia pisi and the control of this insect. Tijdschr. PlZiekt. (Wageningen) 66(4):249-258. Refs. In Dutch, Engl. Sum.

GEORGE, K. S., LIGHT, W. I. ST. G. and GAIR, R. 1962. The effect of artificial defoliation of pea plants on the yield of shelled peas. *Plant Path.* 11(2):73-80. Refs.

GOULD, G. E. 1963. Japanese beetle damage to soybeans and corn. *J. Econ. Ent.* 56(6):776-781.

GRIGOROV, S. 1964. A study of the damage caused by the wheat-stalk fly in the Sofia region. *Rast. Vud. Nauki* 1(5):145-152. Refs. Sofia. In Bulg., Engl. and Rus. Sum. [Chlorops pumilionis.]

HARDING, J. A. 1960. Control of the lesser cornstalk borer attacking peanuts. *J. Econ. Ent.* 53(4):664-667.

HATCHER, R. J. 1964. Spruce budworm damage to balsam-fir in immature stands, Quebec. *Forest. Chron.* 40(3):372-383.

HOSNY, M. M. 1964. Damage threshold of Thrips tabaci Lind. on cotton seedlings. *Alexandria J. Agr. Res.* 12(1):245-246.

HURLOCK, E. T. 1965. Some observations on the loss in weight caused by Sitophilus granarius (L.) (Coleoptera, Curculionidae) to wheat under constant experimental conditions. *J. Stored Prod. Res.* 1(2):193-195. Refs.

JACOBSON, L. A. and PETERSON, L. K. 1965. Interrelations of damage to wheat and feeding by the pale western cutworm, Agrotis orthogonia Morrison (Lepidoptera: Noctuidae). *Canad. Ent.* 97(2):153-158.

KALRA, A. N. and CHAUDHARY, J. P. 1964. Assessment of losses by sugarcane pests--loss caused by top borer of sugarcane. *Indian J. Sugarcane Res. Develop.* 8(3):261-264. Refs. [Scirpophaga nivella.]

KORTING, A. 1963. Further studies on weight losses of wood by larval metabolism of old-house borer infestation. *Nachrbl. des Deut. Pflanzenschutzdienstes* 15(11):167-171. In Ger., Engl. Sum.

KULMAN, H. M. and HODSON, A. C. 1961. The jack-pine budworm as a pest of other conifers with special reference to red pine. *J. Econ. Ent.* 54(6):1221-1224.

LeROUX, E. J. 1961. Variation between samples of fruit, and of fruit damages mainly from insect pests, on apple in Quebec. *Canad. Ent.* 93(8):680-694. Refs.

LISCOMBE, E. A. R. 1962. Milling losses caused by insect infestation of wheat. *Cereal Chem.* 39(5):372-380. Refs.

LUKEFAHR, M. J. and MARTIN, D. F. 1963. Evaluation of damage to lint and seed of cotton caused by the pink bollworm. *J. Econ. Ent.* 56(5):710-713.

McKINLAY, K. S. 1965. Insect damage, crop formation and the yield of coconuts. *Bul. Ent. Res.* 56(1):67-78.

MITTLER, T. E. and SYLVESTER, E. S. 1961. A comparison of the injury to alfalfa by the aphids, Therioaphis maculata and Macrosiphum pisi. *J. Econ. Ent.* 54(4):615-622.

MÖLLERSTRÖM, G. 1963. Different kinds of injury to leaves of the sugar beets and their effect on yield. *Medd. Vaxtskyddsanst.* 12(95):299-309. Refs.

MOORE, S., III, PETTY, H. B., LUCKMANN, W. H. and BYERS, J. H. 1966. Losses caused by the Angoumois grain moth in dent corn. J. Econ. Ent. 59(4):880-882.

NERNEY, N. J. 1960. Grasshopper damage on short-grass rangeland of the San Carlos Apache Indian Reservation, Arizona. J. Econ. Ent. 53(4):640-646.

OATMAN, E. R. 1964. Bionomics of the destructive prune worm, Mineola scitulella, on sour cherry in Wisconsin. J. Econ. Ent. 57(1):100-102.

OATMAN, E. R. 1966. Insect injury to sour cherries in the absence of insecticide sprays. J. Econ. Ent. 59(1):30-32.

OATMAN, E. R., LEGNER, E. F. and BROOKS, R. F. 1966. An ecological study of arthropod populations on apple in northeastern Wisconsin: Species affecting the fruit. J. Econ. Ent. 59(1):165-168.

ORTMAN, E. E. and PAINTER, R. H. 1960. Quantitative measurements of damage by the green bug, Toxoptera graminum, to four wheat varieties. J. Econ. Ent. 53(5):798-802.

PERJU, T. 1966. The damaging degree of barley and oat crops following attacks by the dipterous insects Chlorops pumilionis Meig. and Oscinella frit L. under the Cluj region conditions. Probleme Agricole 18(2):22-30. In Roum., Engl. Sum.

PRASAD, S. K. 1960. The nature and extent of damage to potatoes in relation to density of potato flea beetles. Indian J. Ent. 22(3):231-232.

PRASAD, S. K. 1961. Quantitative estimation of damage to cabbage by cabbage worm, Pieris rapae (Linn.). Indian J. Ent. 23(1):54-61. Refs.

PRASAD, S. K. 1961. Quantitative estimation of damage to potatoes caused by potato leafhopper, Empoasca fabae (Harris). Indian Potato J. 3(2):105-107. Refs.

PRASAD, S. K. 1963. Quantitative estimation of damage to crucifers caused by cabbageworm, cabbage looper, diamondback moth and cabbage aphid. Indian J. Ent. 25(3):242-259. Refs.

PUTNAM, L. G. 1962. The damage potential of some grasshoppers (Orthoptera: Acrididae) of the native grasslands of British Columbia. Canad. J. Plant Science. 42(4):596-601. Refs.

SPACKMAN, E. W., HOUSE, V. W. and FRARY, R. F. 1966. Effects of grasshoppers on Wyoming rangeland. Wyo. Dept. Agr., 8 pp.

STARKS, K. J., COX, H. C., McMILLIAN, W. W. and BURTON, R. L. 1966. Damage to corn by the pink scavenger caterpillar and its relationship to corn earworm and rice weevil damage. J. Econ. Ent. 59(4):931-934.

STOJANOVIC, T. 1965. Effect of the initial population density of weevils on wheat damages under constant laboratory conditions at 25-26°C. Savremena Poljoprivreda 13(7/8):635-644. In Serb., Engl. Sum.

STRONG, F. E. 1960. Sampling alfalfa seed for clover seed chalcid damage. J. Econ. Ent. 53(4):611-615.

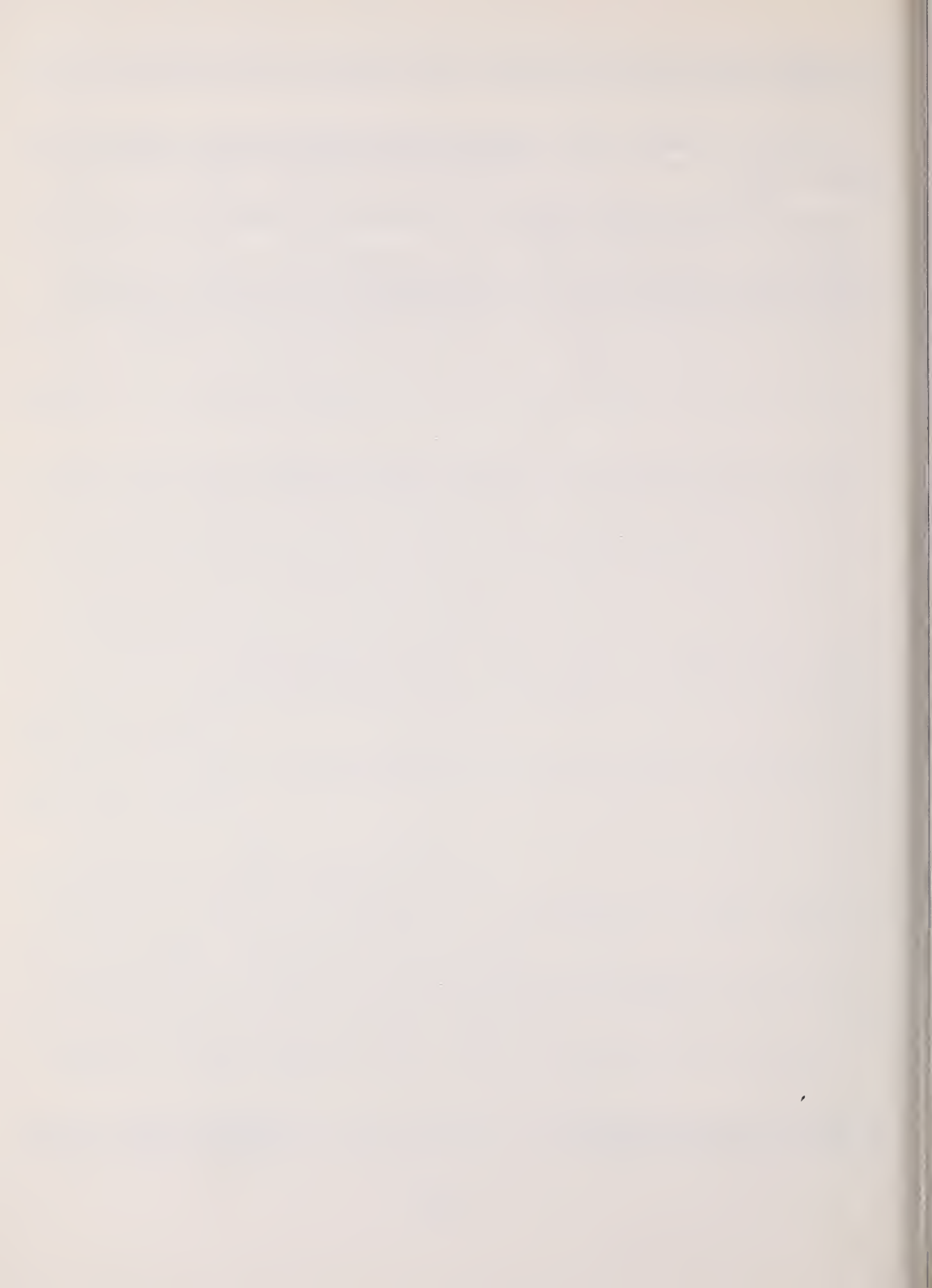
TSAO, C. H. and LOWRY, W. L. 1963. Control of the pink bollworm and a method for estimating losses in cotton yield. J. Econ. Ent. 56(2):158-160.

TURČEK, F. J. 1964. Investigations on the damaging of pine needles by Scythropus mustela Herbst (Coleoptera: Curculionidae). Beitr. Ent. 14(3/4):501-505. Refs. In Ger., Engl. Sum.

WATERS, N. D. 1964. Effects of Hypera nigrirostris, Hylastinus obscurus, and Sitona hispidula populations on red clover in southwestern Idaho. J. Econ. Ent. 57(6):907-910.

WERNER, R. A. 1964. White spruce seed loss caused by insects in interior Alaska. Canad. Ent. 96(11):1462-1464.

WOO, W. C. and TSAI, N. H. 1963. Effect of European corn borer on the yield loss of summer-sown field corn at ear--a preliminary report. Acta Phytophyl. Sinica 2(2):135-139. Refs. In Chin., Engl. Sum.



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