LIBRARY OF THE
UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

no. 66 - 99

NATURAL HISTORY
SURVEY

The Literature of Arthropods Associated with Alfalfa

1. A BIBLIOGRAPHY OF THE SPOTTED ALFALFA APHID

Therioaphis maculata (Buckton)
(Homoptera: Aphidae)

D. W. DAVIS, Utah State University

M. P. NICHOLS · E. J. ARMBRUST

Biological Notes No. 87

ILLINOIS NATURAL HISTORY SURVEY
URBANA, ILLINOIS — FEBRUARY, 1974

STATE OF ILLINOIS
DEPARTMENT OF REGISTRATION AND EDUCATION
NATURAL HISTORY SURVEY DIVISION

This paper is a contribution of Principal Investigators of the Alfalfa Subproject supported by an International Biological Program (IBP) sponsored grant, NSF Grant No. GB-34718, "The Strategies, Principles, and Tactics of Pest Population and Regulation in Major Crop Ecosystems."

Subproject Director: E. J. Armbrust

Principal Investigators:

Illinois: E. J. ARMBRUST and W. G. RUESINK

Utah: D. W. DAVIS

Nebraska: D. G. HANWAY and E. A. DICKASON

New York: R. G. HELGESEN

Kentucky: B. C. PASS

Virginia: R. L. PIENKOWSKI

California: V. M. STERN

The authors are grateful for the assistance of Dr. Mervin Nielson, USDA, ARS, Tucson, Arizona, who loaned us his personal bibliography. The illustrations used in the cover design of this booklet were provided by Dr. G. F. Knowlton, Utah State University.

Distribution of Spotted Alfalfa Aphid

Therioaphis maculata

Prepared by Pest Survey and Technical Support Staff
Plant Protection and Quarantine Program
Animal and Plant Health Inspection Service, USDA
August 29, 1972

The Literature of Arthropods Associated with Alfalfa

I. A BIBLIOGRAPHY OF THE SPOTTED ALFALFA APHID

Therioaphis maculata (Buckton) (Homoptera: Aphidae)

THE ALFALFA ECOSYSTEM is unique among field-crop systems in that it represents a relatively long-lasting, well-established, perennial system that exists nationally over a variety of climatic, geographical, and edaphic conditions. Because of these many subsystems, the interactions with other specific agroecosystems or natural systems are equally as varied. Alfalfa supports a wide variety of insects. These include destructive insects, pollinating insects, species that inhabit the fields because of the lush habitat but have little effect on the crop, and many other associated predators and parasites. Because of the perennial growth habits of alfalfa, many pest and beneficial insect species of other crops overwinter or build up in alfalfa before migrating to neighboring crops systems.

Considerable laboratory and field data dealing with chemical, biological, and cultural methods of controlling alfalfa insects are available. These data need to be closely interpreted with respect to their implications for integrated control and then applied in integrated pest management programs in the field. The breadth and depth of research on alfalfa insect control and alfalfa production in general have been sufficiently productive to implement some programs now.

To facilitate better use of existing literature in developing pest management systems, bibliographies of the key pest species on alfalfa are being prepared in cooperation with the Soybean Insect Research and Information Center (SIRIC) at the Illinois Natural History Survey and University of Illinois. SIRIC has developed a set of computer programs for the IBM/360 at the University of Illinois, which makes possible the retrieval of literature citations associated with a subject or combination of subjects. The bibliographies of the key alfalfa pests, starting with *Therioaphis maculata* have been stored on magnetic tape and are retrievable using the SIRIC system.

Damage from the spotted alfalfa aphid was first recognized in the United States during 1954. When it was first reported, most of the workers believed that it was a form of the yellow clover aphid which had become adapted to alfalfa. Within a couple of years it was found that this was not the case. The spotted alfalfa aphid was apparently a new introduction into the United States from the Near East. The first reports were from New

D. W. Davis, M. P. Nichols, and E. J. Armbrust

Mexico, but it required only a couple of years for the aphid to spread throughout the southwestern part of the United States. Shortly thereafter it was widely distributed through most of the country. It is still considered essentially a warm-climate insect best adapted to the southern tier of states. It has the ability, however, to spread rapidly on wind currents, so by mid- or late season, it often spreads well into the colder areas of the Rocky Mountains and Midwest.

The spotted alfalfa aphid is much smaller than the pea aphid and can be readily distinguished both by size and color. It is yellowish with dark spots. It also produces much more honeydew and can usually be recognized by the sticky mess. When disturbed, these aphids actively jump from the plants. Summer winged forms are produced in much larger numbers than the pea aphid.

Damage to the alfalfa plant is of several types. The possibility of virus transmission has been discussed by several authors, but has never been verified. Many workers believe that the aphid is capable of producing a toxin which is injected into the alfalfa plants, helping to produce symptoms. Young plants of susceptible varieties can tolerate very few aphids without being killed. The tremendous amounts of honeydew produced have created problems such as clogging of harvesting equipment. Mold growing on this honeydew reduces livestock acceptance of the alfalfa. Stunted plants, poor seed set, and short stand life are typical symptoms.

The spotted alfalfa aphid is a one-host-plant aphid. It has a continuous life cycle on alfalfa and normally does not produce sexual forms in the fall. This means that the best survival of the aphid occurs in areas where there is alfalfa growth during the entire year. The adult aphids often crawl down around the base of the plant where they are capable of surviving during the winter unless the climate is too severe. In cold areas, there may be complete mortality. This is the basic reason that the spotted alfalfa aphid is a problem primarily in warmer climates. Starting about 3 years after its initial introduction into the United States, a few sexual forms were noted during the fall of the year. These sexual forms have never become numerous, but they are a prelude to egg laying on alfalfa stems. There is evidence that the spotted aphid populations in the northern areas, such as South Dakota and Minnesota, have been gradually selecting for larger numbers of these sexual forms. Even with these fall egg-laying aphids, *Medicago* spp.

This paper, in the Biological Notes series, is published with special project funds. Dr. D. W. Davis is a Professor of Entomology at Utah State University. M. P. Nichols is a Research Associate, International Programs and Studies, University of Illinois. Dr. E. J. Armbrust is an Associate Entomologist at the Illinois Natural History Survey and Associate Professor of Agricultural Entomology, Illinois Agricultural Experiment Station.

remain as the only hosts on which the insect can complete its full cycle. Occasional collections have been made from other legumes. The aphids multiply extremely rapidly during the summer, producing a large number of winged forms. These winged forms are carried by wind currents very readily and have been picked up at high elevations by aircraft. This summer distribution of winged forms can take place over several hundred miles.

Control measures have taken three major pathways. The first and probably most important of these has been the development of resistant alfalfa varieties. The resistant varieties are tolerant to the toxin of as well as the feeding damage by the aphids. Several very successful parasites have been introduced into the United States and unquestionably these have been instrumental in reducing the spotted alfalfa aphid damage in southwestern areas. In addition to the introduction of parasites, quite a number of the native predators also aid in biological control. The third major approach has been with insecticides. Initially, most of the work involved materials like parathion, but more recent chemical control has centered on the systemic insecticides.

An important aspect of the spotted alfalfa aphid biology is the rapidity in which it develops new biotypes or localized forms. These biotypes have developed in response both to insecticides and to overcoming the resistance of alfalfa varieties. In some of the areas, for example in Arizona, the location of these biotypes has been mapped, but in areas further north, which are reinfested by flights from the south, there has been considerable confusion. The aphids, which are blown northward to establish annual populations, do not always originate from the same source; thus the type of insecticidal resistance varies considerably from year to year.

Sources for the entries listed in this bibliography were *Index to the Literature of American Economic Entomology*, *Review of Applied Entomology, Series A*, *Science Citation Index*, *Zoological Record*, *Agricultural Index*, and references cited in the articles. All entries were examined by workers, either at Utah State University or the University of Illinois, except those preceded by the symbol #. The references are listed alphabetically by author(s) and numbered consecutively. A subject table containing the reference numbers appears on page 13. References are arranged according to subject and period of publication. The table is intended as a quick subject index to the references in the bibliography. More in-depth indexing was done for the SIRIC system, and is available to researchers.

References to *Therioaphis maculata* found in the USDA Cooperative Economic Insect Report, 1954-1972 are included as an appendix following the numbered references. Abbreviations and complete titles of the sources which appear in the bibliographic entries are to be found in a listing at the end of the paper.

Debra Lissac provided technical assistance, Mary L.

Rose and Mr. Raymond A. Kotek typed the manuscript, and O. F. Glissendorf edited it. Their collaboration is gratefully acknowledged.

BIBLIOGRAPHY

1. ANONYMOUS. 1956. Control spotted alfalfa aphids with malathion. American Cyanamid Co. Leaflet. 14 p. illus. maps.
2. ———. 1956. The newest threat to alfalfa; Spotted alfalfa aphid. Utah Agr. Ext. Serv. Leaflet. 8. [8 p.] illus.
3. ———. 1959. New Kansas alfalfa resists spotted aphid. Crops Soils Mag. 12(2):21. illus.
4. ———. 1961. Field crop varieties for Arizona 1960. Ariz. Coop. Ext. Serv. Agr. Exp. Sta. Bull. A-4. 16 p. illus. maps.
5. ———. 1970. Soybean virus disease vectors. Miss. Agr. Forest. Exp. Sta. Annu. Rep. 83:33.
6. ALLEN, W. A., M. L. BOBB, J. M. GRAYSON, J. E. ROBERTS, SR., W. H. ROBINSON, and J. A. WEIDHAAS. 1972. 1972 Virginia insect control guide. Va. Polytech. Inst. Ext. Div. Contr. Ser. 141. 118 p. illus. maps.
7. ANGALET, G. W. 1970. Population, parasites, and damage of the spotted alfalfa aphid in New Jersey, Delaware, and the eastern shore of Maryland. J. Econ. Entomol. 63(1):313-315. illus. refs.
8. BAKER, W. A. 1955. The yellow clover aphid on alfalfa. Agr. Chem. 10(9):60, 62, 122-123.
9. BALL, H. J. 1958. The effect of visible spectrum irradiation on growth and development in several species of insects. J. Econ. Entomol. 51(5): 573-578. illus. refs.
10. BARNES, O. L. 1960. Establishment of imported parasites of the spotted alfalfa aphid in Arizona. J. Econ. Entomol. 53(6):1094-1096. illus. refs.
11. ———. 1963. Resistance of Moapa alfalfa to the spotted alfalfa aphid in commercial-size fields in south-central Arizona. J. Econ. Entomol. 56(1):84-85. illus. refs.
12. BARTLETT, B. R. 1958. Laboratory studies on selective aphicides favoring natural enemies of the spotted alfalfa aphid. J. Econ. Entomol. 51(3):374-378. illus. refs.
13. BERATLIEF, Z. P. 1969. Combaterarea microbiologica a insectelor daunatoare din agricultura. Probl. Agr. 21(10):65-76.
14. BIEBERDORF, G. A., and D. E. BRYAN. 1956. Research on the spotted alfalfa aphid. Okla. Agr. Exp. Sta. Bull. B-469. 12 p. illus. refs.
15. ———, and ———. 1956. The spotted alfalfa aphid and possible control. Seed World 79(2):15-16.
16. BISHOP, J. L., and C. C. BURKHARDT. 1959. Effects of malathion and parathion on ejection of young from gravid female spotted alfalfa aphids. J. Kans. Entomol. Soc. 32(1):35-36. illus. refs.
17. ———, and ———. 1959. Seed treatment with systemic insecticides for control of spotted alfalfa aphids under Kansas conditions. J. Econ. Entomol. 52(4): 714-719. illus. refs.
18. ———, and D. CROCKETT. 1961. The spotted alfalfa aphid in Virginia. Va. Agr. Exp. Sta. Tech. Bull. 153. 22 p. illus. refs.
19. BURKHARDT, C. C. 1957. Chemical control of the spotted alfalfa aphid. Proc. N. Cent. Br. Entomol. Soc. Amer. 12:72-73.
20. ———. 1959. Effects of heavy fall infestations of

- spotted alfalfa aphids on subsequent spring growth of alfalfa in Kansas. J. Econ. Entomol. 52(4):642-643. illus. refs.
- #21. ———, and D. E. GATES. 1956. Control of spotted alfalfa aphid and pea aphid in alfalfa. Kans. Agr. Exp. Sta. Mimeo. Ser.
22. BUTLER, G. D., JR. 1968. Sugar for the survival of *Lygus hesperus* on alfalfa. J. Econ. Entomol. 61(3):854-855. illus. refs.
- #23. CAUBLE, F. 1956. Spotted aphids must go. ADM Archer 9(6):28-29.
24. CLAUSEN, C. P. 1955. Yellow clover aphid on alfalfa—biological control. Calif. Agr. 9(7):4.
25. CONRAD, M. S., and J. T. MEDLER. 1965. The spotted alfalfa aphid in Wisconsin. J. Econ. Entomol. 58(1):180-181. illus. refs.
26. CRAIG, W. S., J. L. HUGGANS, L. L. PETERS, and G. W. THOMAS. 1972. 1972 Missouri insect control recommendations for use in 1972 only. Univ. Mo. Coop. Ext. Serv. Handb. 153 p. illus.
27. DANIELS, N. E. 1956. Studies on the control of the spotted alfalfa aphid in the Texas Panhandle. Tex. Agr. Exp. Sta. Progr. Rep. 1908. 4 p. illus. refs.
28. DAVIS, C. S., et al. 1957. The spotted alfalfa aphid and its control in California. Calif. Agr. Ext. Serv. Manuscript. 44 p. illus. refs. maps.
29. DAVIS, D. W. 1955. The yellow clover aphid and its relation to the bee industry. Utah Agr. Exp. Sta. Mimeo. Ser. 418. 3 p.
30. DEAL, A. S., R. C. DICKSON, and H. T. REYNOLDS. 1954. Yellow clover aphid in state. Calif. Agr. 8(9):5. illus.
- #31. DEBACH, P. 1969. Uniparental, sibling and semi-species in relation to taxonomy and biological control. Israel J. Entomol. 4(1):11-28.
32. DENNIS, R. E., et al. 1961. Alfalfa for forage production in Arizona. Ariz. Coop. Ext. Serv. Agr. Exp. Sta. Bull. A-16. 36 p. illus. maps.
33. ———. 1966. Alfalfa for forage production in Arizona. Ariz. Coop. Ext. Serv. Agr. Exp. Sta. Bull. A-16 (Rev.). 40 p. illus. maps.
34. DEPEW, L. J. 1961. Field tests with insecticides to control spotted alfalfa aphid in southwestern Kansas, 1955-1960. J. Econ. Entomol. 54(6):1144-1147. illus. refs.
35. DICKSON, R. C. 1959. Aphid dispersal over southern California deserts. Ann. Entomol. Soc. Amer. 52(4):368-372. illus. refs.
36. ———. 1959. On the identity of the spotted alfalfa aphid in North America. Ann. Entomol. Soc. Amer. 52(1):63-68. illus. refs.
37. ———, E. F. LAIRD, JR., and M. M. JOHNSON. 1958. Sexuales and eggs of the spotted alfalfa aphid. Ann. Entomol. Soc. Amer. 51(4):346-350. illus. refs.
38. ———, and G. R. PESHO. 1955. The spotted alfalfa aphid. (Yellow clover aphid on alfalfa). Hilgardia 24(5):93-118. illus. refs.
39. ———, and H. T. REYNOLDS. 1955. The spotted alfalfa aphid can damage your alfalfa crop. Calif. Agr. Exp. Sta. Ext. Serv. Leaflet. 52. [6 p.] illus.
40. ———, and ———. 1955. Yellow clover aphid on alfalfa. Calif. Agr. 9(7):4, 15. illus.
41. ———, and L. M. RUSSELL. 1956. The spotted alfalfa aphid and related species. Proc. 10th Int. Congr. Entomol. (Montreal) 1:327.
42. DIEHL, S. G., and R. M. CHATTERS. 1956. Studies on the mechanics of feeding of the spotted alfalfa aphid on alfalfa. J. Econ. Entomol. 49(5):589-591. illus. refs.
43. DIETRICK, E. J., E. I. SCHLINGER, and M. J. GARBER. 1960. Vacuum cleaner principle applied in sampling insect populations in alfalfa fields by new machine methods. Calif. Agr. 14(1):9-11. illus.
44. ———, and R. VAN DEN BOSCH. 1959. A new method for sampling arthropods using a suction collecting machine and modified Berlese funnel separator. J. Econ. Entomol. 52(6):1085-1091. illus. refs.
45. DOBSON, R. C. 1958. The effect of spotted alfalfa aphid protection by systemic insecticides and varieties on alfalfa production the year following seedling protection. J. Econ. Entomol. 51(4):457-458. illus. refs.
46. ———. 1958. Granulated systemic insecticides on established stands of alfalfa for control of the spotted alfalfa aphid. J. Econ. Entomol. 51(2):122-125. illus. refs.
47. ———, and J. G. WATTS. 1957. Spotted alfalfa aphid occurrence on seedling alfalfa as influenced by systemic insecticides and varieties. J. Econ. Entomol. 50(2):132-135. illus.
48. DOGGER, J. R., and T. G. BOWERY. 1958. A study of residues of some commonly used insecticides on alfalfa. J. Econ. Entomol. 51(3):392-394. illus. refs.
49. ESSIG, E. O., R. C. DICKSON, R. F. SMITH, and J. E. SWIFT. 1955. The spotted alfalfa aphid and other common aphids found in alfalfa and clovers in California. Calif. Agr. Ext. Serv. Ident. Sheet. 3 p. illus.
50. FENTON, F. A., and D. E. HOWELL. 1957. A comparison of five methods of sampling alfalfa fields for arthropod populations. Ann. Entomol. Soc. Amer. 50(6):606-611. illus. refs.
51. FINNEY, G. L., B. PUTTLER, and L. DAWSON. 1960. Rearing of three spotted alfalfa aphid hymenopterous parasites for mass release. J. Econ. Entomol. 53(4):655-659. refs.
52. FORCE, D. C., and P. S. MESSENGER. 1964. Duration of development, generation time, and longevity of three hymenopterous parasites of *Therioaphis maculata*, reared at various constant temperatures. Ann. Entomol. Soc. Amer. 57(4):405-413. illus. refs.
53. ———, and ———. 1964. Fecundity, reproductive rates, and innate capacity for increase of three parasites of *Therioaphis maculata* (Buckton). Ecology 45(4):706-715. illus. refs.
54. ———, and ———. 1965. Laboratory studies on competition among three parasites of the spotted alfalfa aphid *Therioaphis maculata* (Buckton). Ecology 46(6):853-859. illus. refs.
55. ———, and ———. 1968. The use of laboratory studies of three hymenopterous parasites to evaluate their field potential. J. Econ. Entomol. 61(5):1374-1378. illus. refs.
56. FRANZ, J. 1958. Bibliographie über biologische Bekämpfung. Bibliographie concernant la lutte biologique. Bibliography of biological control. III. Entomophaga 3(4):333-364. refs.
57. GEORGIU, G. P. 1963. Comparative susceptibility to insecticides of two green peach aphid populations, collected 16 years apart. J. Econ. Entomol. 56(5):655-657. illus. refs.
58. GOODARZY, K. 1957. Biology of the spotted alfalfa aphid *Therioaphis maculata* (Buckton) in Utah with reference to its predators and parasites. Ph.D. Diss., Utah State University. 74 p. illus. refs.
59. ———, and D. W. DAVIS. 1958. Natural enemies of the spotted alfalfa aphid in Utah. J. Econ. Entomol. 51(5):612-616. illus. refs.

60. GRAHAM, H. M. 1959. Effects of temperature and humidity on the biology of *Therioaphis maculata* (Buckton). Univ. Calif. Publ. Entomol. 16(2):47-80. illus. refs.
- #61. GRAUMANN, H. O. 1956. Breeding for spotted alfalfa aphid resistance. S. Pasture Forage Crop Improv. Conf. Rep. 13:21-22.
62. GROSS, C. 1957. Alfalfa attacks aphids. Farm Manage. 6(7):30-31. illus.
63. HACKEROTT, H. L., and T. L. HARVEY. 1959. Effect of temperature on spotted alfalfa aphid reaction to resistance in alfalfa. J. Econ. Entomol. 52(5):949-953. illus. refs.
64. ———, ———, E. L. SORESENSEN, and R. H. PAINTER. 1958. Varietal differences in survival of alfalfa seedlings infested with spotted alfalfa aphids. Agron. J. 50(3):139-141. illus. refs.
65. ———, E. L. SORESENSEN, T. L. HARVEY, E. E. ORTMAN, and R. H. PAINTER. 1963. Reactions of alfalfa varieties to pea aphids in the field and greenhouse. Crop Sci. 3(4):298-301. illus. refs.
66. HAGEN, K. S., J. K. HOLLOWAY, F. E. SKINNER, and G. L. FINNEY. 1958. Aphid parasites established. Calif. Agr. 12(2):3, 15. maps.
67. ———, and R. F. SMITH. 1958. Chemical and biological methods of pest control. Agr. Chem. 13(7):30-32, 89-92. illus. refs.
68. HALL, I. M., and E. J. DIETRICK. 1955. Fungi on spotted alfalfa aphid. Calif. Agr. 9(12):5, 16. illus.
69. ———, and P. H. DUNN. 1957. Entomophthorous fungi parasitic on the spotted alfalfa aphid. Hilgardia 27(4):159-181. illus. refs.
70. ———, and ———. 1957. Fungi on spotted alfalfa aphid. Calif. Agr. 11(2):5, 14. illus.
71. ———, and ———. 1958. Artificial dissemination of entomophthorous fungi pathogenic to the spotted alfalfa aphid in California. J. Econ. Entomol. 51(3):341-344. illus. refs.
72. ———, and ———. 1959. The effect of certain insecticides and fungicides on fungi pathogenic to the spotted alfalfa aphid. J. Econ. Entomol. 52(1):28-29. illus. refs.
73. ———, and J. C. HALFHILL. 1959. The germination of resting spores of *Entomophthora virulenta* Hall and Dunn. J. Econ. Entomol. 52(1):30-35. illus. refs.
74. HANSON, C. H. 1961. Moapa alfalfa pays off. Crops Soils Mag. 13(7):11-12. illus.
75. ———. 1969. Registration of alfalfa germplasm. In: Registration of selected germplasm. Crop Sci. 9(4):526-527. illus. refs.
76. HARPAZ, I. 1955. Bionomics of *Therioaphis maculata* (Buckton) in Israel. J. Econ. Entomol. 48(6):668-671. illus. refs.
77. HARPER, A. M., and C. E. LILLY. 1966. Effects of the pea aphid on alfalfa in southern Alberta. J. Econ. Entomol. 59(6):1426-1427. illus. refs.
78. HARPER, R. W. 1956. Spotted alfalfa aphid. Agr. Chem. 11(6):44-45, 133. illus.
79. HARVEY, T. L., and H. L. HACKEROTT. 1956. Apparent resistance to the spotted alfalfa aphid selected from seedlings of susceptible alfalfa varieties. J. Econ. Entomol. 49(3):289-291. illus. refs.
80. ———, and ———. 1958. Spotted alfalfa aphid reaction and injury to resistant and susceptible alfalfa clones reciprocally grafted. J. Econ. Entomol. 51(6):760-762. illus. refs.
81. ———, ———, E. L. SORESENSEN, R. H. PAINTER, E. E. ORTMAN, and D. C. PETERS. 1960. The development and performance of Cody alfalfa, a spotted alfalfa aphid resistant variety. Kans. Agr. Exp. Sta. Tech. Bull. 114. 27 p. illus. refs. maps.
82. HILLE RIS LAMBERS, D., and R. VAN DEN BOSCH. 1964. On the genus *Therioaphis* Walker, 1870, with descriptions of new species (Homoptera, Aphididae). Zool. Verh. Rijksmus. Natuur. Hist. Leiden 68. 47 p. refs.
83. HINTZ, S. D. 1964. Correlation between insect populations, damage and yield for the spotted alfalfa aphid. Proc. N. Cent. Br. Entomol. Soc. Amer. 19:35-37. refs.
84. ———. 1966. The effect of photoperiod on *Therioaphis maculata*. Proc. N. Cent. Br. Entomol. Soc. Amer. 21:132-133. refs.
- #85. HOWE, W. L. 1957. Selection and testing for resistance in alfalfa to the spotted alfalfa aphid (*Therioaphis maculata*). Proc. Forage Insect Res. Conf. 7:12-13.
86. ———. 1958. Entomological problems associated with breeding alfalfa for resistance to the spotted alfalfa aphid. Rep. Alfalfa Impr. Conf. 16:99-103. illus. refs.
87. ———, W. R. KEHR, and C. O. CALKINS. 1965. Appraisal for combined pea aphid and spotted alfalfa aphid resistance in alfalfa. Nebr. Agr. Exp. Sta. Res. Bull. 221. 31 p. illus. refs.
88. ———, ———, M. E. MCKNIGHT, and G. R. MANGLITZ. 1963. Studies of the mechanisms and sources of spotted alfalfa aphid resistance in Ranger alfalfa. Nebr. Agr. Exp. Sta. Res. Bull. 210. 22 p. illus. refs. maps.
89. ———, and G. R. PESHO. 1960. Influence of plant age on the survival of alfalfa varieties differing in resistance to the spotted alfalfa aphid. J. Econ. Entomol. 53(1):142-144. illus. refs.
90. ———, and ———. 1960. Spotted alfalfa aphid resistance in mature growth of alfalfa varieties. J. Econ. Entomol. 53(2):234-238. illus. refs.
91. ———, and O. F. SMITH. 1956. Some characteristics of resistance in alfalfa to the spotted alfalfa aphid. Rep. Alfalfa Impr. Conf. 15:40-42. illus. refs.
92. ———, and ———. 1957. Resistance to the spotted alfalfa aphid in Lahontan alfalfa. J. Econ. Entomol. 50(3):320-324. illus. refs.
93. HUBER, R. T., and J. V. OSMUN. 1966. Insects and other arthropods of economic importance in Indiana during 1966. Proc. Indiana Acad. Sci. 76:291-307. illus.
94. HUNT, O. J., R. N. PEADEN, M. W. NIELSON, and C. H. HANSON. 1971. Development of two alfalfa populations with resistance to insect pests, nematodes, and diseases. I. Aphid resistance. Crop Sci. 11(1):73-75. illus. refs.
95. ISAAK, A. 1964. Pea aphid and spotted alfalfa aphid resistance in alfalfa under various temperature regimes. Proc. N. Cent. Br. Entomol. Soc. Amer. 19:65-66.
96. ———, E. L. SORESENSEN, and E. E. ORTMAN. 1963. Influence of temperature and humidity on resistance in alfalfa to the spotted alfalfa aphid and pea aphid. J. Econ. Entomol. 56(1):53-57. illus. refs.
97. ———, ———, and R. H. PAINTER. 1965. Stability of resistance to pea aphid and spotted alfalfa aphid in several alfalfa clones under various temperature regimes. J. Econ. Entomol. 58(1):140-143. illus. refs.
98. JASIENSKA-OBREBSKA, E. 1964. Występowanie mszyc na lucernie w świetle badań własnych. [The appearance of aphids on alfalfa plantations.] Biul. Inst. Ochr. Rosl. 26:35-48. illus. refs.
99. JONES, B. F., E. L. SORESENSEN, and R. H. PAINTER. 1968. Tolerance of alfalfa clones to the spotted alfalfa aphid. J. Econ. Entomol. 61(4):1046-1050. illus. refs.

100. KANTACK, B. H., and W. L. BERNDT. 1972. 1972 South Dakota insecticide recommendations. S. Dak. State Univ. Coop. Ext. Serv. Handb. EC-683. 119 p. illus.
101. KEHR, W. R., G. R. MANGLITZ, and R. L. OGDEN. 1968. Dawson alfalfa—A new variety resistant to aphids and bacterial wilt. Nebr. Agr. Exp. Sta. Bull. SB-497. 23 p. illus. refs.
102. KINDLER, D., and W. L. HOWE. 1961. The comparative feeding behavior of the spotted alfalfa aphid on resistant and susceptible alfalfa seedlings. Proc. N. Cent. Br. Entomol. Soc. Amer. 16:52.
103. KINDLER, S. D., W. R. KEHR, and R. L. OGDEN. 1971. Influence of pea aphids and spotted alfalfa aphids on the stand, yield of dry matter, and chemical composition of resistant and susceptible varieties of alfalfa. J. Econ. Entomol. 64(3):653-657. illus. refs.
104. ———, and R. STAPLES. 1968. Lack of cytoplasmic inheritance of alfalfa resistance to the spotted alfalfa aphid. J. Econ. Entomol. 61(5):1455-1456. illus. refs.
105. ———, and ———. 1969. Behavior of the spotted alfalfa aphid on resistant and susceptible alfalfas. J. Econ. Entomol. 62(2):474-478. illus. refs.
106. ———, and ———. 1970. The influence of fluctuating and constant temperatures, photoperiod, and soil moisture on the resistance of alfalfa to the spotted alfalfa aphid. J. Econ. Entomol. 63(4):1198-1201. illus. refs.
107. ———, and ———. 1970. Nutrients and the reaction of two alfalfa clones to the spotted alfalfa aphid. J. Econ. Entomol. 63(3):938-940. illus. refs.
108. KIRCHER, H. W., and F. V. LIEBERMAN. 1967. Toxicity of tobacco smoke to the spotted alfalfa aphid *Therioaphis maculata* (Buckton). Nature 215(5096):97-98. refs.
109. ———, R. L. MISIOROWSKI, and F. V. LIEBERMAN. 1970. Resistance of alfalfa to the spotted alfalfa aphid. J. Econ. Entomol. 63(3):964-969. illus. refs.
110. KISHABA, A. N., and G. R. MANGLITZ. 1965. Non-preference as a mechanism of sweetclover and alfalfa resistance to the sweetclover aphid and the spotted alfalfa aphid. J. Econ. Entomol. 58(3):566-569. illus. refs.
111. ———, and ———. 1968. Substances from alfalfa biologically active against the spotted alfalfa aphid. U.S. Dep. Agr. ARS 33-126. 12 p. illus. refs.
112. KLEMENT, W. J., and N. M. RANDOLPH. 1960. The evaluation of resistance of seedling alfalfa varieties and strains to the spotted alfalfa aphid, *Therioaphis maculata*. J. Econ. Entomol. 53(4):667-669. illus. refs.
113. KLETT, W. 1964. Integrierter und praktischer Pflanzenschutz. [Integrated and practical plant protection.] Mitt. Biol. Bundesanst. Land- Forstwirtschaft. Berlin-Dahlem. 115:4t.
114. KNEE, W. J., and J. W. APPLE. 1968. Biological observations on and distribution of the spotted alfalfa aphid in Wisconsin. Ann. Entomol. Soc. Amer. 61(6):1627-1629. illus. refs. maps.
115. KNOWLTON, G. F. 1955. The spotted alfalfa aphid in Utah—1955. Utah Agr. Ext. Serv. Mimeo. Ser. 143. 4 p. maps.
116. ———. 1955. The yellow clover aphid in Utah. Utah Agr. Ext. Serv. Mimeo. Ser. 146. 2 p.
117. ———. 1959. Alfalfa aphids—Control them. Utah Ext. Leaflet. 57. [6 p.] illus.
118. ———. 1966. Spotted alfalfa aphid. What can we do about it? Utah Agr. Ext. Serv. Entomol. Mimeo. Ser. 117. 3 p. illus.
119. ———, and K. GOODARZY. 1956. The spotted alfalfa aphid in Utah—1956. Utah Agr. Ext. Serv. Mimeo. Ser. 155. 7 p. maps.
120. LINQUIST, R. K., and E. L. SORESENSEN. 1970. Inter-relationships among aphids, tarnished plant bugs, and alfalfas. J. Econ. Entomol. 63(1):192-195. illus. refs.
121. LOCKWOOD, S. 1956. Special insect pest control problems. Calif. Dep. Agr. Quart. Bull. 45(2):160-162.
122. ———. 1957. Special insect pest control problems. Calif. Dep. Agr. Quart. Bull. 46(2):153-155. illus.
123. LOPER, G. M. 1968. Effect of aphid infestation on coumestrol content of alfalfa varieties differing in aphid resistance. Crop Sci. 8(1):101-106. illus. refs.
- #124. LUGIBILL, P., JR. 1969. Developing resistant plants—The ideal method of controlling insects. U.S. Dep. Agr. Agr. Res. Serv. Prod. Res. Rep. 111.
125. MCBRIDE, D. K. 1972. North Dakota insect control guide for safe use of pesticides. North Dakota State University Cooperative Extension Service, Fargo. 68 p. illus.
126. MCMURTRY, J. A. 1962. Resistance of alfalfa to spotted alfalfa aphid in relation to environmental factors. Hilgardia 32(12):501-539. illus. refs.
127. ———, and E. H. STANFORD. 1960. Observations of feeding habits of the spotted alfalfa aphid on resistant and susceptible alfalfa plants. J. Econ. Entomol. 53(5):714-717. illus. refs.
128. MANGLITZ, G. R., P. W. BERGMAN, W. L. HOWE, and C. O. CALKINS. 1962. Overwintering in the egg stage by the spotted alfalfa aphid in Nebraska. J. Econ. Entomol. 55(3):292-294. illus. refs.
129. ———, C. O. CALKINS, R. J. WALSTROM, S. D. HINTZ, S. D. KINDLER, and L. L. PETERS. 1966. Holocyclic strain of the spotted alfalfa aphid in Nebraska and adjacent states. J. Econ. Entomol. 59(3):636-639. illus. refs. maps.
130. ———, A. N. KISHABA, and C. O. CALKINS. 1962. Sexuales in the spotted alfalfa aphid and the overwintering of the species in Nebraska. Proc. N. Cent. Br. Entomol. Soc. Amer. 17:98-99.
131. ———, and J. M. SCHALK. 1968. Parasites of legume aphids, *Therioaphis* species. Proc. N. Cent. Br. Entomol. Soc. Amer. 23(1):40-41.
132. MARBLE, V. L., J. C. MELDEEN, H. C. MURRAY, and F. P. ZSCHEILE. 1959. Studies on free amino acids in the spotted alfalfa aphid, its honeydew, and several alfalfa selections, in relation to aphid resistance. Agron. J. 51(12):740-743. illus. refs.
133. MATHUR, S. B., and R. P. SRIVASTAVA. 1966. Study of entomogenous fungus *Entomophthora aphidis* Hoffman (Entomophthoraceae, Entomophthorales) parasitic on the spotted alfalfa aphid. Indian J. Entomol. 28(1):119-120. refs.
134. MAXWELL, F. G., and R. H. PAINTER. 1959. Factors affecting rate of honeydew deposition by *Therioaphis maculata* (Buck.) and *Toxoptera graminum* (Rond.). J. Econ. Entomol. 52(3):368-373. illus. refs.
135. ———, and ———. 1962. Auxin content of extracts of certain tolerant and susceptible host plants of *Toxoptera graminum*, *Macrosiphum pisi*, and *Therioaphis maculata* and relation to host plant resistance. J. Econ. Entomol. 55(1):46-56. illus. refs.
136. ———, and ———. 1962. Auxins in honeydew of *Toxoptera graminum*, *Therioaphis maculata*, and *Macrosiphum pisi*, and their relation to degree of tolerance in host plants. Ann. Entomol. Soc. Amer. 55(2):229-233. illus. refs.

137. MEDLER, J. T., and A. K. GHOSH. 1968. Apterous aphids in water, wind, and suction traps. J. Econ. Entomol. 61(1):267-270. illus. refs.
138. MESSENGER, P. S. 1964. The influence of rhythmically fluctuating temperatures on the development and reproduction of the spotted alfalfa aphid, *Therioaphis maculata*. J. Econ. Entomol. 57(1):71-76. illus. refs.
139. ———. 1964. The use of life tables in a bio-climatic study of an experimental aphid-braconid wasp host-parasite system. Ecology 45(1):119-131. illus. refs.
140. ———. 1968. Bioclimatic studies of the aphid parasite *Praon exsoletum*. 1. Effects of temperature on the functional response of females to varying host densities. Can. Entomol. 100(7):728-741. illus. refs.
141. ———. 1969. Bioclimatic studies of the aphid parasite *Praon exsoletum*. 2. Thermal limits to development and effects of temperature on rate of development and occurrence of diapause. Ann. Entomol. Soc. Amer. 62(5):1026-1031. illus. refs.
142. ———, and D. C. FORCE. 1963. An experimental host-parasite system: *Therioaphis maculata* (Buckton) — *Praon palitans* Muesebeck (Homoptera: Aphididae-Hymenoptera: Braconidae). Ecology 44(3):532-540. illus. refs.
143. MEYER, R. W., and J. V. OSMUND. 1970. Insects and other arthropods of economic importance in Indiana during 1970. Proc. Indiana Acad. Sci. 80:286-298. refs. maps.
144. MITTLER, T. E., and E. S. SYLVESTER. 1961. A comparison of the injury to alfalfa by the aphids, *Therioaphis maculata* and *Macrosiphum pisi*. J. Econ. Entomol. 54(4):615-622. illus. refs.
145. MUESEBECK, C. F. W. 1956. Two new parasites of the yellow clover aphid and the spotted alfalfa aphid (Hymenoptera: Braconidae). Bull. Brooklyn Entomol. Soc. 51(1):25-28. illus.
146. NICKEL, J. L., and E. S. SYLVESTER. 1959. Influence of feeding time, stylet penetration, and developmental instar on the toxic effect of the spotted alfalfa aphid. J. Econ. Entomol. 52(2):249-254. illus. refs.
147. NIELSON, M. W. 1957. Sampling technique studies on the spotted alfalfa aphid. J. Econ. Entomol. 50(4):385-389. illus. refs.
148. ———. 1958. Reaction of seedling alfalfa to the spotted alfalfa aphid in southern Arizona. J. Econ. Entomol. 51(5):601-603. illus. refs.
149. ———, and O. L. BARNES. 1957. Life history and abundance of the spotted alfalfa aphid in Arizona. J. Econ. Entomol. 50(6):805-807. illus. refs.
150. ———, and ———. 1961. Population studies of the spotted alfalfa aphid in Arizona in relation to temperature and rainfall. Ann. Entomol. Soc. Amer. 54(3):441-448. illus. refs.
151. ———, and W. E. CURIE. 1959. Effect of alfalfa variety on the biology of the spotted alfalfa aphid in Arizona. J. Econ. Entomol. 52(5):1023-1024. illus. refs.
152. ———, and ———. 1960. Biology of the convergent lady beetle when fed a spotted alfalfa aphid diet. J. Econ. Entomol. 53(2):257-259. illus. refs.
153. ———, H. DON, M. H. SCHONHORST, W. F. LEHMAN, and V. L. MARBLE. 1970. Biotypes of the spotted alfalfa aphid in western United States. J. Econ. Entomol. 63(6):1822-1825. illus. refs.
154. ———, and J. A. HENDERSON. 1959. Biology of *Collops vittatus* (Say) in Arizona, and feeding habits of seven predators of the spotted alfalfa aphid. J. Econ. Entomol. 52(1):159-162. illus. refs.
155. ———, W. F. LEHMAN, and V. L. MARBLE. 1970. A new severe strain of the spotted alfalfa aphid in California. J. Econ. Entomol. 63(5):1489-1491. illus. refs.
156. ———, and M. H. SCHONHORST. 1965. Screening alfalfas for resistance to some common insect pests in Arizona. J. Econ. Entomol. 58(1):147-150. illus. refs.
157. ———, and H. DON. 1969. Arizona alfalfas resist new strain of the spotted alfalfa aphid. Progr. Agr. Ariz. 21(3):18-20. illus.
158. ———, ———, W. F. LEHMAN, and V. L. MARBLE. 1971. Resistance in alfalfa to four biotypes of the spotted alfalfa aphid. J. Econ. Entomol. 64(2):506-510. illus. refs.
159. OBTEL, R. 1961. Účinky dvou insekticidů na mšicomara *Aphidius ervi* Hal. (Hym.: Braconidae). Effects of two insecticides on *Aphidius ervi* Hal. (Hym.: Braconidae), an internal parasite of *Acyrtosiphon obrychis* (Boyer). Zool. Listy 24(1):1-8. illus. refs.
160. OKUNO, T. 1967. On the syrphid larvae attacking the aphids in Japan (Diptera). Mushi 41(10):123-141. refs.
161. ORTMAN, E. E., E. L. SORESEN, T. L. HARVEY, and H. L. HACKEROTT. 1961. The development of aphid resistance. Proc. N. Cent. Br. Entomol. Soc. Amer. 16:53-54. illus.
162. OSMUN, J. V. 1957. Insects and other arthropods of economic importance in Indiana in 1957. Proc. Indiana Acad. Sci. 67:150-154.
163. ———. 1958. Insects and other arthropods of economic importance in Indiana in 1958. Proc. Indiana Acad. Sci. 68:190-195.
164. ———. 1959. Insects and other arthropods of economic importance in Indiana in 1959. Proc. Indiana Acad. Sci. 69:167-174.
165. PADILLA, A. R., and W. R. YOUNG. 1958. El pulgón manchado de la alfalfa en México, *Therioaphis (Pterocallidium) maculata* (Buckton). Mex. Secr. Agr. Ganad. Ofic. Estud. Espec. Foll. Tec. 25. 32 p. illus. refs. maps.
166. ———, and ———. 1958-1959. Parásitos del pulgón manchado de la alfalfa. Agr. Tec. Mex. 1(7):5, 42. illus. refs.
167. ———, and ———. 1959-1960. Insecticidas selectivos para el combate del pulgón manchado de la alfalfa. Agr. Tec. Mex. 1(9):36-39. illus. refs.
168. PAINTER, R. H. 1956. The study of resistance to aphids in crop plants. Proc. 10th Int. Congr. Entomol. (Montreal) 3:451-458. illus. refs.
169. ———. 1958. Resistance of plants to insects. Annu. Rev. Entomol. 3:267-290. illus. refs.
170. ———, E. L. SORESEN, T. L. HARVEY, and H. L. HACKEROTT. 1964. Selection for combined resistance in alfalfa, *Medicago sativa* L., to pea aphid, *Acyrtosiphon pisum* (Harris) and spotted alfalfa aphid, *Therioaphis maculata* (Buckton). Proc. 12th Int. Congr. Entomol. (London). p. 531. refs.
171. PARKER, R. V., V. E. BURTON, and R. F. SMITH. 1956. Aphid damage to alfalfa hay. Calif. Agr. 10(3):5, 12. illus.
172. PASCHKE, J. D. 1959. Production of the agamic alate form of the spotted alfalfa aphid, *Therioaphis maculata* (Buckton) (Homoptera: Aphididae). Univ. Calif. Publ. Entomol. 16(4):125-180. illus. refs. maps.
173. ———, and E. S. SYLVESTER. 1957. Laboratory studies on the toxic effects of *Therioaphis maculata* (Buckton). J. Econ. Entomol. 50(6):742-748. illus. refs.
174. PEEBLER, R. V. 1957. Spotted alfalfa aphid—Alfalfa's No. 1 killer! Capper's Farmer 68(3):47, 60, 62, 64. illus.

175. PESHO, G. R., F. V. LIEBERMAN, and W. F. LEHMAN. 1960. A biotype of the spotted alfalfa aphid on alfalfa. J. Econ. Entomol. 53(1):146-150. illus. refs.
176. PETERS, D. C., and R. H. PAINTER. 1957. A general classification of available small seeded legumes as hosts for three aphids of the "yellow clover aphid complex." J. Econ. Entomol. 50(3):231-235. illus. refs.
177. ———, and ———. 1958. Studies on the biologies of three related legume aphids in relation to their host plants. Kans. Agr. Exp. Sta. Tech. Bull. 93. 44 p. illus. refs.
178. PETTY, H. B. 1957. Keep out spotted alfalfa aphid. Hoard's Dairyman 102(11):585, 592. illus.
179. PIERCE, R. L. 1956. Alfalfa's destructive "sooty." Crops Soils Mag. 9(3):14-15. illus.
180. PRATT, R. 1971. Materials for insect control in Montana 1971. Mont. State Univ. Coop. Ext. Serv. Leaflet 101 (Rev.). 33 p.
181. RACE, S. R., and R. C. DOBSON. 1958. A method for studying the microenvironment of the spotted alfalfa aphid. J. Econ. Entomol. 51(3):397-400. illus.
182. RAMASESHIAH, G., and P. R. DHARMADHIKARI. 1969. Aphelinid parasites of aphids in India. Commonw. Inst. Biol. Contr. Tech. Bull. 11:156-164. illus. refs.
183. RANDOLPH, N. M. 1956. Control of the spotted alfalfa aphid. Tex. Agr. Exp. Sta. Progr. Rep. 1872. 5 p. illus.
184. ———. 1957. Control of the spotted alfalfa aphid on alfalfa. J. Econ. Entomol. 50(2):124-126. illus. refs.
185. RAY, S. K. 1967. Observations on the natural predators of the aphid pests in the Ranchi District with special reference to *Chilomenes sexmaculata* Fabr. Indian Agr. 11:117-120.
186. REMAUDIER, G., and F. LECLANT. 1968. Un *Therioaphis* nouveau du sud de la France (Hom. Aphididae). Ann. Soc. Entomol. Fr. 4(3):671-678. illus. refs.
187. REYNOLDS, H. T. 1960. Establishing levels of insecticide resistance with standardized laboratory detection methods in agricultural arthropod pests. Misc. Publ. Entomol. Soc. Amer. 2(1):103-111. refs.
188. ———, and L. D. ANDERSON. 1955. Control of the spotted alfalfa aphid on alfalfa in southern California. J. Econ. Entomol. 48(6):671-675. illus. refs.
189. ———, and R. C. DICKSON. 1955. Yellow clover aphid on alfalfa — Chemical control. Calif. Agr. 9(7):5, 15. illus.
190. ———, T. R. FUKUTO, R. L. METCALF, and R. B. MARCH. 1957. Seed treatment of field crops with systemic insecticides. J. Econ. Entomol. 50(5):527-539. illus. refs.
191. ———, R. F. SMITH, and J. E. SWIFT. 1956. Insecticides for alfalfa aphid. Calif. Agr. 10(5):11-12. illus.
192. RODGERS, B. J., and D. E. BRYAN. 1962. Control of the spotted alfalfa aphid *Therioaphis maculata* (Buckton) by seed treatment methods. Okla. Agr. Exp. Sta. Processed Ser. P-101. 16 p. illus. refs.
193. ROGERS, H. 1955. Alfalfa growers dig in for new aphid attack. Farm Manage. 4(11):22-24. illus.
194. ROTH, V. D. 1959. Alfalfa seed treatments for spotted alfalfa aphid control in southwestern Arizona. J. Econ. Entomol. 52(4):654-658. illus. refs.
195. SANDMEYER, E. E., O. J. HUNT, W. H. ARNETT, and C. R. HEISLER. 1971. Relative resistance of six selected alfalfa clones to the pea aphid and spotted alfalfa aphid. J. Econ. Entomol. 64(1):155-162. illus. refs.
196. SANGWAN, H. S. 1963. Varietal susceptibility of lucern (*Medicago sativa* Linn.) to spotted alfalfa aphid *Therioaphis maculata* (Buckton) infestations. Indian J. Entomol. 25(3):264-266. illus.
197. SCHALK, J. M. 1970. Biological and environmental factors influencing the production of sexuales of *Therioaphis maculata* (Buckton) and *T. richmi* (Börner). Ph.D. Diss., University of Nebraska. 78 p. illus. refs.
198. ———. 1971. Comparison of biology of anholocyclic and holocyclic strains of the spotted alfalfa aphid in Nebraska. J. Econ. Entomol. 64(6):1549-1550. illus. refs.
199. ———, S. D. KINDLER, and G. R. MANGLITZ. 1968. Spotted alfalfa aphid plant preference vs. temperature. Proc. N. Cent. Br. Entomol. Soc. Amer. 23(1):41.
200. ———, ———, and ———. 1969. Temperature and the preference of the spotted alfalfa aphid for resistant and susceptible alfalfa plants. J. Econ. Entomol. 62(5):1000-1003. illus. refs.
201. ———, and G. R. MANGLITZ. 1969. Migration of an anholocyclic strain of the spotted alfalfa aphid into Nebraska. J. Econ. Entomol. 62(4):946-947. illus. refs.
202. ———, and ———. 1972. Influence of light and temperature on the production of sexuales of *Therioaphis maculata* and *T. richmi*. Environ. Entomol. 1(2):209-213. illus. refs.
203. SCHLINGER, E. I., and E. J. DIETRICK. 1960. Biological control of insect pests aided by strip-farming alfalfa in experimental program. Calif. Agr. 14(1):8-9, 15. illus.
204. ———, and J. C. HALL. 1959. A synopsis of the biologies of three imported parasites of the spotted alfalfa aphid. J. Econ. Entomol. 52(1):154-157. refs.
205. ———, and ———. 1960. Biological notes on Pacific Coast aphid parasites, and lists of California parasites (Aphidinae) and their aphid hosts (Hymenoptera: Braconidae). Ann. Entomol. Soc. Amer. 53(3):404-415. refs.
206. ———, and ———. 1960. The biology, behavior, and morphology of *Praon palitans* Muesebeck, an internal parasite of the spotted alfalfa aphid, *Therioaphis maculata* (Buckton) (Hymenoptera: Braconidae, Aphidinae). Ann. Entomol. Soc. Amer. 53(2):144-160. illus. refs.
207. ———, and ———. 1961. The biology, behavior, and morphology of *Trioxys (Trioxys) utilis*, an internal parasite of the spotted alfalfa aphid, *Therioaphis maculata* (Hymenoptera: Braconidae, Aphidinae). Ann. Entomol. Soc. Amer. 54(1):34-45. illus. refs.
208. SHAW, B. T. 1956. Statement of B. T. Shaw, Administrator, Agricultural Research Service, before a special Commodity Subcommittee of the House Committee on Agriculture. Topic: Spotted alfalfa aphid. House Committee on Agriculture, Washington. 8 p.
209. SIFUENTES, J. A. 1967. Selección de fuentes de resistencia a la conchuela del frijol, pulgón manchado de la alfalfa y cogollero del maíz, en el invernadero. Folia Entomol. Mex. 15-16:34-35.
210. ———, and T. R. GARZA. 1966. Diferencias de resistencia al pulgón manchado en variedades y clones de alfalfa en condiciones de campo e invernadero. [Differences in the resistance to the spotted alfalfa aphid among varieties and clones of alfalfa in field and greenhouse conditions.] Agr. Tec. Mex. 2(6):274-276. illus.
211. ———, and W. R. YOUNG. 1959-1960. El pulgón manchado de la alfalfa y su combate en el Valle del Yaqui. Agr. Tec. Mex. 1(9):18-22. illus. refs.

212. SIMPSON, R. G., and C. C. BURKHARDT. 1960. Biology and evaluation of certain predators of *Therioaphis maculata* (Buckton). J. Econ. Entomol. 53(1):89-94. illus. refs.
213. ———, and ———. 1960. A three-year overwintering study of the spotted alfalfa aphid. J. Econ. Entomol. 53(2):220-222. illus. refs.
214. ———, ———, F. G. MAXWELL, and E. E. ORTMAN. 1959. A chalcid parasitizing spotted alfalfa aphids and greenbugs in Kansas. J. Econ. Entomol. 52(3):537-538. refs.
215. SMITH, O. F. 1958. Lahontan alfalfa. Nev. Agr. Exp. Sta. Circ. 14. 6 p. illus.
216. ———, R. N. PEADEN, and R. K. PETERSEN. 1958. Moapa alfalfa. Nev. Agr. Exp. Sta. Circ. 15. 6 p. illus.
217. SMITH, R. F. 1959. The spread of the spotted alfalfa aphid, *Therioaphis maculata* (Buckton), in California. Hilgardia 28(21):647-695. illus. refs. maps.
218. ———, and K. S. HAGEN. 1956. Enemies of spotted alfalfa aphid. Calif. Agr. 10(4):8-10. illus.
219. ———, ———, and ———. 1959. The integration of chemical and biological control of the spotted alfalfa aphid. Part III. Impact of commercial insecticide treatments. Hilgardia 29(2):131-154. illus. refs.
220. ———, ———, J. E. SWIFT, and J. DIBBLE. 1956. Rapid spread of alfalfa pest. Calif. Agr. 10(2):5. 15. illus. maps.
221. SOROKINA, A. P. 1970. Structure and development of the reproductive organs and potential fecundity in the females of some aphid parasites (Hymenoptera, Aphididae). Entomol. Rev. 49(1):27-31. illus. refs.
222. SPRAGUE, G. F., and R. G. DAHMS. 1972. Development of crop resistance to insects. J. Environ. Qual. 1(1):28-34. illus. refs.
223. STANFORD, E. H. 1955. Yellow clover aphid on alfalfa—Resistant plants. Calif. Agr. 9(7):5.
224. ———. 1956. Aphid resistant alfalfa plants. Calif. Agr. 10(7):3. illus.
225. ———, and J. A. McMURTRY. 1959. Indications of biotypes of the spotted alfalfa aphid. Agron. J. 51(7):430-431. illus. refs.
226. STARÝ, P. 1964. The foci of aphid parasites (Hymenoptera, Aphididae) in nature. Ekol. Pol. Ser. A. 12(30):529-554. illus. refs.
227. ———. 1968. The creation of artificial foci of parasites—A new method of aphid parasite release. Acta Entomol. Bohemoslov. 65(1):76-77. refs.
228. ———. 1968. Population dynamics of alfalfa pest aphids (Hom., Aphidoidea) in Czechoslovakia. Boll. Lab. Entomol. Agr. 'Filippo Silvestri' 26:271-292. illus. refs. maps.
229. STERN, V. M. 1961. Further studies of integrated control methods against the Egyptian alfalfa weevil in California. J. Econ. Entomol. 54(1):50-55. illus. refs.
230. ———. 1962. Increased resistance to organophosphorus insecticides in the parthenogenetic spotted alfalfa aphid, *Therioaphis maculata*, in California. J. Econ. Entomol. 55(6):900-904. illus. refs.
231. ———, and H. T. REYNOLDS. 1957. Aphid resistance to parathion. Calif. Agr. 11(2):4, 14. illus.
232. ———, and ———. 1957. Developments in chemical control of the spotted alfalfa aphid in California, 1955-56. J. Econ. Entomol. 50(6):817-821. illus. refs.
233. ———, and ———. 1958. Resistance of the spotted alfalfa aphid to certain organophosphorus insecticides in southern California. J. Econ. Entomol. 51(3):312-316. illus. refs.
234. ———, R. F. SMITH, R. VAN DEN BOSCH, and K. S. HAGEN. 1959. The integration of chemical and biological control of the spotted alfalfa aphid. The integrated control concept. Hilgardia 29(2):81-101. illus. refs. maps.
235. ———, and R. VAN DEN BOSCH. 1959. The integration of chemical and biological control of the spotted alfalfa aphid. Part II. Field experiments on the effects of insecticides. Hilgardia 29(2):103-130. illus. refs. maps.
236. ———, ———, and D. BORN. 1958. New control for alfalfa aphid. Calif. Agr. 12(1):4-5, 13. illus.
237. ———, ———, and W. R. BOWEN. 1962. Candidate materials to replace heptachlor as a selective control for the Egyptian alfalfa weevil in southern California. J. Econ. Entomol. 55(5):713-718. illus. refs.
238. ———, ———, and H. T. REYNOLDS. 1960. Effects of Dyllox and other insecticides on entomophagous insects attacking field crop pests in California. J. Econ. Entomol. 53(1):67-72. illus. refs.
239. TAMAOKI, G., J. E. HALFILL, and J. C. MATTLEN. 1969. The influence of UC-21149 and the aphidid parasite *Aphidius smithi* on populations of the pea aphid. J. Econ. Entomol. 62(3):678-682. illus. refs.
240. TANASIJEVIĆ, N., and V. F. EASTOP. 1963. Aphid records from Yugoslavia. Entomologist 96(1206):265-269. refs.
241. THOIZON, G. 1970. Spécificité du parasitisme des aphides par les entomophthorales. Ann. Soc. Entomol. Fr. 6(3):517-562. illus. refs.
242. THOMAS, J. G., and E. L. SORESENSEN. 1971. Effect of excision duration on spotted alfalfa aphid resistance in alfalfa cuttings. J. Econ. Entomol. 64(3):700-704. illus. refs.
243. ———, ———, and R. H. PAINTER. 1966. Attached vs. excised trifoliolates for evaluation of resistance in alfalfa to the spotted alfalfa aphid. J. Econ. Entomol. 59(2):444-448. illus. refs.
244. TOBA, H. H., J. D. PASCHKE, and S. FRIEDMAN. 1967. Crowding as the primary factor in the production of the agamic alate form of *Therioaphis maculata* (Homoptera: Aphididae). J. Insect Physiol. 13(3):381-396. illus. refs.
245. TUTTLE, D. M. 1956. The spotted alfalfa aphid. (A progress report). Ariz. Agr. Exp. Sta. Mimeo. Rep. 131. 3 p. illus.
246. ———, O. L. BARNES, M. W. NIELSON, V. D. ROTH, and M. H. SCHONHORST. 1958. The spotted alfalfa aphid in Arizona. Ariz. Agr. Exp. Sta. Bull. 294. 11 p. illus.
247. ———, and G. D. BUTLER, JR. 1954. The yellow clover aphid—A new alfalfa pest in the Southwest. J. Econ. Entomol. 47(6):1157. illus. refs.
248. UNIVERSITY OF ARIZONA COOPERATIVE EXTENSION SERVICE and AGRICULTURAL EXPERIMENT STATION. 1971/1972. Insect control in alfalfa and bermudagrass 171-72. Ariz. Coop. Ext. Serv. Agr. Exp. Sta. Fold. 147. 2 p.
249. USDA. 1955. The yellow clover aphid on alfalfa. U.S. Dep. Agr. ARS-33-11. 6 p.
250. ———. 1957. The spotted alfalfa aphid. U.S. Dep. Agr. ARS-22-39. 8 p. illus. maps.
251. ———. 1957. The spotted alfalfa aphid. How to control it. U.S. Dep. Agr. Leaflet 422. 8 p. illus.
252. ———. 1959. The spotted alfalfa aphid. How to control it. U.S. Dep. Agr. Leaflet 422 (Rev.). 8 p. illus.

253. _____. 1965. The spotted alfalfa aphid. How to control it. U.S. Dep. Agr. Leaflet 422 (Rev.). 8 p. illus.
254. _____. 1968. The spotted alfalfa aphid. How to control it. U.S. Dep. Agr. Leaflet 422 (Rev.). 8 p. illus.
255. USDA AGRICULTURAL RESEARCH SERVICE AND FOREST SERVICE. 1967. Suggested guide for the use of insecticides to control insects affecting crops, livestock, households, stored products, forests, and forest products—1967. U.S. Dep. Agr. Agr. Handb. 331. 273 p.
256. _____. 1968. Suggested guide for the use of insecticides to control insects affecting crops, livestock, households, stored products, forests, and forest products—1968. U.S. Dep. Agr. Agr. Handb. 331 (Rev.). 273 p.
257. VAN DEN BOSCH, R. 1956. Parasites of alfalfa aphid. Calif. Agr. 10(10): 7, 15. illus.
258. _____. 1957. The spotted alfalfa aphid and its parasites in the Mediterranean region, Middle East, and East Africa. J. Econ. Entomol. 50(3): 352-356. refs.
259. _____. H. T. REYNOLDS, and E. J. DIETRICK. 1956. Toxicity of widely used insecticides to beneficial insects in California cotton and alfalfa fields. J. Econ. Entomol. 49(3): 359-363. illus. refs.
260. _____. E. I. SCHLINGER, and E. J. DIETRICK. 1957. Imported parasites established. Calif. Agr. 11(7): 11-12. maps.
261. _____. _____. K. S. HAGEN, and J. K. HOLLOWAY. 1959. The colonization and establishment of imported parasites of the spotted alfalfa aphid in California. J. Econ. Entomol. 52(1): 136-141. illus. refs. maps.
262. _____. _____. and I. M. HALL. 1959. The role of imported parasites in the biological control of the spotted alfalfa aphid in southern California in 1957. J. Econ. Entomol. 52(1): 142-154. illus. refs.
263. _____. _____. J. C. HALL, and B. PUTTLER. 1964. Studies on succession, distribution, and phenology of imported parasites of *Therioaphis trifolii* (Monell) in southern California. Ecology 45(3): 602-621. illus. refs. maps.
264. _____. and V. M. STERN. 1962. The integration of chemical and biological control of arthropod pests. Annu. Rev. Entomol. 7: 367-386. refs.
265. WARREN, L. O., H. P. BOLES, J. E. ROBERTS, and C. LINCOLN. 1956. The spotted alfalfa aphid. Arkansas Farm Res. 5(2): 4. maps.
266. WECOREK, W., and T. GRELA. 1968. Virus diseases transmission of legume forage plants of aphids. (In Polish-English summary). Pr. Nauk. Inst. Ochr. Rosl. 10(2): 29-51. illus. refs.
267. _____. and M. RUSZKIEWICZ. 1968. Investigations upon the aphids fauna of legume forage plants. (In Polish-English summary). Pr. Nauk. Inst. Ochr. Rosl. 10(2): 7-27. illus. refs. maps.
268. WILSON, M. L., B. A. MELTON, and C. E. WATSON. 1959. Zia alfalfa. N. Mex. Agr. Exp. Sta. Bull. 435. 14 p. illus.
269. YOUNG, W. R., and R. A. PADILLA. 1957. The spotted alfalfa aphid, *Therioaphis (Pterocallidium) maculata* (Buckton) in Mexico. Bull. Entomol. Soc. Amer. 3(3): 31-32.
270. ZETTLER, F. W. 1967. Winged aphids caught on traps in bean fields in central New York. J. Econ. Entomol. 60(5): 1320-1323. illus. refs.
271. _____. and R. E. WILKINSON. 1965. Intraspecific abundance of aphid species trapped in an area where spread of bean common mosaic virus occurs. Phytopathology 55(10): 1085.

Appendix — USDA Cooperative Economic Insect Reports

1954. Vol. 4(24): 504; (25): 534; (26): 570; (27): 596; (29): 653; (30): 685; (31): 714; (34): 784; (37): 848; (42): 933; (43): 959; (44): 965; (48): 1041; (50): 1079; (51): 1097.
1955. Vol. 5(1): 3; (2): 23; (4): 61; (5): 90; (6): 107; (7): 131; (8): 153; (10): 186; (11): 223; (12): 250; (13): 279; (14): 291; (15): 318, 328; (16): 335; (18): 381; (19): 405; (20): 429; (21): 356, 456; (22): 483, 500; (23): 510; (24): 539; (25): 569; (26): 594, 612; (27): 621, 622; (28): 647; (29): 673, 674; (30): 707; (31): 737; (33): 793; (35): 839; (36): 861; (37): 884, 903, 904; (41): 957; (42): 974; (43): 987, 997; (44): 1004, 1005; (45): 1026, 1027; (46): 1032, 1033; (47): 1049, 1054; (48): 1070; (49): 1081; (50): 1093; (51): 1111, 1113, 1114, 1116.
1956. Vol. 6(1): 3, 11, 15, 22; (2): 20, 22, 28; (3): 37; (4): 53, 60, 66, 68; (5): 75, 79; (6): 93; (7): 114; (8): 141; (9): 170, 178; (10): 192; (11): 221, 231; (12): 245; (13): 266, 267; (14): 280; (15): 303, 304; (16): 324; (17): 343, 344, 360; (18): 367, 368, 378, 379; (19): 391, 406; (20): 413, 414; (21): 447, 448; (22): 481; (23): 512; (24): 561; (25): 576, 594; (26): 608; (27): 652; (28): 660, 672; (29): 688; (30): 721; (31): 753, 770; (32): 784, 785; (33): 814; (34): 847; (35): 869, 870, 881; (36): 889; (37): 906, 907; (38): 925, 926, 935, 936; (39): 946, 947; (40): 961, 962, 970; (41): 978, 979; (42): 993, 994, 999; (43): 1008, 1009, 1015; (44): 1024, 1025; (45): 1039, 1044; (46): 1055, 1061; (47): 1067, 1068; (48): 1079, 1084, 1088; (49): 1095; (50): 1107, 1114; (51): 1125, 1132; (52): 1141.
1957. Vol. 7(1): 3; (2): 15, 19; (3): 31, 36, 38, 40; (4): 55; (5): 75, 79, 80, 82; (6): 93, 97, 98, 101, 103, 104; (7): 113, 116; (8): 141, 145, 146; (9): 153, 158, 161, 165; (10): 171; (11): 191, 192, 204; (12): 211, 217; (13): 231, 238, 240, 241; (14): 251; (15): 269; (16): 304, 311; (17): 320; (19): 337, 353; (20): 394; (21): 406; (22): 418; (23): 437, 452; (24): 462; (25): 486, 498; (26): 506, 521; (27): 530; (29): 570; (30): 596; (31): 618, 630; (32): 638; (33): 661, 675; (34): 681, 696; (35): 704; (36): 723; (37): 741; (38): 756, 764; (39): 765, 775; (40): 791, 797; (41): 809, 817; (42): 821; (43): 837; (44): 848; (45): 860, 865; (46): 874; (47): 887, 890; (48): 895; (49): 907; (51): 929; (52): 941.
1958. Vol. 8(1): 3; (2): 15; (3): 29; (4): 53; (5): 72; (6): 89; (7): 104; (9): 144; (10): 165; (11): 185; (12): 210; (13): 234; (14): 257; (16): 294; (17): 318; (18): 339; (19): 363; (20): 383; (22): 447; (23): 479; (25): 535; (26): 559; (27): 582; (28): 607; (29): 630; (30): 650; (31): 671; (32): 691; (33): 715; (34): 738; (35): 758; (36): 780; (37): 798; (38): 813; (39): 831; (40): 847; (41): 862; (42): 878; (43): 891; (45): 928; (46): 939; (47): 953; (48): 963; (49): 980; (50): 993; (51): 1007; (52): 1021.
1959. Vol. 9(2): 9; (3): 13, 19; (5): 47; (6): 65; (7): 83; (8): 105; (9): 131; (10): 149; (11): 168; (12): 191; (13): 214; (14): 234; (15): 257; (16): 281; (17): 306; (18): 328; (19): 348; (20): 375; (21): 401; (22): 433; (23): 481; (21): 505; (25): 538; (26): 571; (27): 600; (28): 621; (29): 644; (30): 672; (31): 700; (32): 727; (33): 749; (34): 772; (35): 799; (36): 824; (37): 843; (38): 863; (39): 878; (40): 895; (41): 914; (42): 930; (43): 948; (44): 962; (45): 980; (46): 993; (47): 1006; (48): 1017; (49): 1030; (50): 1042; (51): 1049.
1960. Vol. 10(1): 3; (2): 13; (3): 25; (4): 41; (5): 53; (6): 71; (8): 95; (9): 115; (10): 131; (11): 155; (12): 183;

- (13):212; (14):231; (15):216; (16):283; (17):308; (18):328; (19):352; (20):376; (21):399; (22):457; (23):484; (24):513; (25):552; (26):584; (28):616; (29):644; (30):671; (31):702; (32):734; (33):759; (34):781; (35):802; (36):826; (37):850; (38):873; (39):893; (40):917; (41):944; (42):965; (43):992; (44):1036; (45):1052; (46):1076; (47):1088; (48):1099; (49):1111; (50):1123; (51):1133; (52):1144; (53):1153.
1961. Vol. 11(1):4; (2):15; (3):27; (4):35; (5):43; (6):55; (7):67; (8):75; (9):112; (10):143; (11):151; (12):193; (13):224; (14):261; (15):290; (16):318; (17):335; (18):350; (19):378; (20):396; (21):420; (22):447; (23):475; (24):500; (25):528; (26):564; (27):595; (28):621, 622; (29):655; (30):684; (31):715; (32):747; (33):774; (34):796; (35):820; (36):844; (37):863; (38):886; (39):910; (40):926; (41):946; (42):962; (43):986; (44):1016; (45):1031; (46):1043; (47):1055; (48):1085; (50):1106; (52):1129.
1962. Vol. 12(1):3; (3):29; (4):37; (6):69; (7):81; (8):102; (9):114; (10):162; (11):193; (13):278; (14):307; (15):343; (16):380; (17):407; (18):431; (19):455; (20):484; (21):512; (22):548; (23):587; (24):618; (25):651; (26):687; (27):723; (28):759; (29):789; (30):821; (31):851; (32):886; (33):917; (34):944; (35):967; (36):993; (37):1015; (38):1031; (39):1049; (40):1071; (41):1085; (42):1109; (43):1133; (44):1150; (45):1166; (46):1185; (47):1197; (49):1229; (50):1245; (51):1261; (52):1277.
1963. Vol. 13(2):11; (3):27; (4):43; (5):63; (6):87; (7):103; (8):115; (11):216; (12):252; (13):280; (14):317; (15):361; (16):390; (17):426; (18):454; (19):477; (20):510; (21):544; (22):574; (23):603; (24):639; (25):671; (26):708; (27):747; (28):783; (29):817; (30):851; (32):908; (33):945; (34):981; (35):1008; (36):1044; (37):1076; (38):1107; (39):1138; (40):1174; (41):1200; (42):1238; (43):1261; (41):1289; (45):1309; (47):1345; (48):1361; (49):1373; (50):1393; (51):1405; (52):1421.
1964. Vol. 14(2):11; (3):31; (4):49; (5):63; (6):75; (7):85; (8):93; (9):109; (10):142; (11):173; (12):210; (13):237; (14):273; (15):310; (16):330; (17):366; (18):398; (19):431; (20):463; (21):500; (22):539; (23):571; (24):608; (25):643; (26):679; (27):716; (28):755; (29):791, 792; (30):835; (31):867; (32):903; (33):934; (34):967; (35):992; (36):1014; (37):1012; (38):1065; (39):1083; (40):1118; (41):1126; (1133); (42):1141; (43):1161; (44):1185, 1195; (45):1205; (46):1221; (47):1237; (48):1253; (49):1269; (50):1281; (51):1293; (52):1306.
1965. Vol. 15(1):3; (3):31; (4):47; (5):59; (6):71; (7):83; (8):103; (9):123; (10):144; (11):172; (12):207; (13):210; (14):276; (15):300; (16):336; (17):376; (18):413; (19):441; (20):473; (21):501; (22):531; (23):565; (24):597; (25):632; (26):669; (28):750; (30):817; (31):853; (32):888, 889; (33):925; (34):960; (35):1016, 1017; (36):1032; (37):1064; (38):1093; (39):1117; (40):1137; (41):1157; (42):1185; (43):1205; (44):1220; (45):1239; (47):1276; (48):1289; (49):1300; (50):1312; (51):1324; (53):1343.
1966. Vol. 16(1):3; (2):15; (3):31; (4):48; (5):67; (7):99; (8):119; (9):143; (10):169; (11):197; (12):217; (13):237; (14):273; (15):301; (16):333; (17):357; (18):381; (19):405; (20):427; (21):450; (22):478; (23):506; (24):536; (25):568; (26):600; (27):628; (28):664; (29):692; (30):720; (31):748; (32):772; (33):800; (34):828; (35):856; (36):875; (37):899; (38):915; (39):935; (40):955; (41):971; (42):987; (43):1011; (44):1027; (45):1043; (46):1063; (47):1079; (49):1113; (51):1143; (52):1155.
1967. Vol. 17(1):3; (2):15; (3):29; (4):39; (5):59; (6):77; (7):89; (8):115; (9):131; (10):151; (11):173; (12):197; (13):217; (14):241; (15):275; (16):303; (17):339; (18):359; (19):379; (20):403; (21):435; (22):456; (23):477; (24):502; (25):530; (26):558; (27):586; (28):614; (29):642; (30):667; (31):696; (32):726; (33):754; (34):782; (35):806; (36):829; (37):848; (38):871; (39):889; (40):905; (41):921; (42):941; (43):955; (44):969; (45):985; (46):1011; (47):1023; (48):1031; (49):1043; (50):1053; (51):1065; (52):1081.
1968. Vol. 18(2):13; (3):32; (4):35; (5):51; (6):65; (7):75; (8):91, 97, 103; (10):149; (11):181; (12):206; (13):233; (14):254; (15):273; (16):305; (17):326; (18):353; (19):382; (20):410, 411; (21):434; (22):462; (23):486; (24):510, 533; (25):542; (26):574; (27):605; (28):630; (29):662; (30):690; (31):722; (32):755; (33):782; (34):808; (35):832; (36):856; (37):876; (38):895; (39):917; (40):941; (41):957; (42):977; (43):999; (44):1031; (45):1045; (46):1061; (47):1073; (48):1083; (49):1095; (50):1111; (51):1137; (52):1147.
1969. Vol. 19(1):3; (2):19; (4):41; (5):57; (6):69; (8):107; (10):147; (12):191; (13):211; (14):235; (15):265; (16):274; (17):290; (18):305; (20):341; (21):358; (22):373; (23):394; (24):422; (25):446; (26):464; (27):488; (28):516; (29):540; (31):593; (32):618; (33):639; (34):658; (35):678; (37):714; (38):734; (39):761; (41):777; (42):789; (43):801; (44):813; (45):825; (46):833; (47):845; (48):853; (49):861; (50):873; (52):905.
1970. Vol. 20(2):15; (4):39; (6):61; (7):69; (9):113, 114; (11):155; (12):171, 185; (13):191; (15):234; (16):245, 254; (18):293; (19):309; (20):321; (28):472; (30):512; (31):532; (32):553; (33):577; (34):604; (35):621; (36):638, 648; (37):653; (38):670; (39):683; (41):709; (42):719; (43):735; (44):745; (45):757; (46):771; (47):781; (48):789; (49):797; (50):823; (51):831; (52):839.
1971. Vol. 21(1):3; (3):23; (4):31; (5):43; (6):57; (7):67; (8):81; (9):97; (10):109; (11):131, 140, 141; (12):161; (13):185, 187; (14):209; (15):231; (16):250, 260; (17):292; (18):307; (19):319; (20):339; (21):355; (22):372; (23):390; (24):408; (25):426; (26):444; (27):462; (33):582; (35):614; (37):656; (38):669; (39):679; (40):693; (41):705; (42):719; (45-48):719; (49-53):777, 781.
1972. Vol. 22(1):3; (3):41; (8):59; (9):77; (10):107; (11):127; (12):145; (13):163; (14):189; (15):211; (16):227; (17):239; (18):251; (20):277; (21):302; (23):330; (24):339; (26):401; (27):422; (28):437; (29):454; (30):474; (31):495, 496; (32):519; (33):538; (34):555, 570; (35):574; (36):598; (37):611, 614; (38):634; (39):657; (41):693; (42):709; (43):721; (44):737; (45):749; (49-52):789.

TABLE OF REFERENCES BY SUBJECT AND PERIOD OF PUBLICATION

SUBJECT \ YEAR	1950-1954	1955-1959	1960-1964	1965-1969	1970-
TAXONOMY		36,38	82		
PHYSIOLOGY & MORPHOLOGY		9,36,37,49,132,134	18,82,135,136	22,108,111,141,186	197,202
LIFE HISTORY & BIOLOGY		8,14,15,28,37,38,40,42, 58,60,63,76,78,149,151, 163,166,177,178,225, 245,246	18,53,83,128,130,138, 139,175,213,263	25,84,87,114,129,137, 141,201,228,254,270	153,155,158,195,197, 198,202
BEHAVIOR		9,42,60,132,134,146,172, 173,176	102,127,135,138,144,150	84,105,110,123,199,200, 201,244	120
ECOLOGY		67,151,163,181,234	139,150,264	140,199,200,244,267	120,197
DISTRIBUTION	30	1,8,28,35,38,41,115,119, 121,149,162,164,172,188, 208,217,246,249,250,258	150	25,93,114,118,137,201, 270	
HOST PLANTS		14,15,38,177,251	18	253	
TRAPPING & SAMPLING		28,35,44,50,147,246,262	43	137	
ECONOMIC ROLE & DAMAGE	247	8,14,15,20,29,38,40,80, 115,116,117,119,121,122, 148,165,166,171,173, 174,178,179,193,208, 215,220,245,249,251,252, 265,269	11,18,32,74,83,144	33,77,87,99,253,254	7,103,143,195
DISEASE TRANSMISSION		146	98	266,271	5
PARASITES & PREDATORS		12,14,15,24,28,38,56,58, 59,62,66,67,119,145,154, 165,204,211,214,218, 219,246,250,257,258, 260,261,262	10,18,51,52,53,98,139, 142,152,159,203,205, 206,207,212,226,229, 240,263,264	54,55,118,131,133,140, 141,160,182,185,186, 227,239,254,267	7,221,241
NONINSECTICIDAL CONTROL METHODS		28,62,68,69,70,71,72,73, 246	18,98,203	254	
INSECTICIDAL CONTROL METHODS INCLUDING TOXICOLOGY	30,247	2,12,14,15,16,17,19,20, 27,39,45,46,47,48,67,78, 165,166,167,178,183,184, 188,189,190,191,194,219, 231,232,233,234,235,236, 246,251,259	18,34,57,159,187,192, 230,237,238,264	254,255,256	6,26,100,125,180,246, 253
PLANT RESISTANCE		3,14,45,47,63,64,79,80, 85,86,91,92,132,151,168, 169,176,177,208,215, 216,223,224,246,268	4,11,18,65,74,81,88,89, 90,95,96,102,112,126, 127,161,170,175,196	75,87,97,99,101,104, 105,110,111,123,124, 156,157,200,210,243	94,104,106,107,109,120, 153,155,158,195,222,242

PERIODICAL ABBREVIATIONS

- Acta Entomol. Bohemoslov. — Acta Entomologica Bohemoslo-
vacica.
- Agr. Chem. — Agricultural Chemicals.
- Agr. Tec. Mex. — Agricultura Tecnica en Mexico.
- Agron. J. — Agronomy Journal.
- American Cyanamid Co. Leaflet. — American Cyanamid Com-
pany Leaflet.
- Ann. Entomol. Soc. Amer. — Annals of the Entomological So-
ciety of America.
- Ann. Soc. Entomol. Fr. — Annales de la Société Entomologique
de France.
- Annu. Rev. Entomol. — Annual Review of Entomology.
- Ariz. Agr. Exp. Sta. Bull. — Arizona Agricultural Experiment
Station Bulletin.
- Ariz. Agr. Exp. Sta. Mimeo. Rep. — Arizona Agricultural Exper-
iment Station Mimeographed Report.
- Ariz. Coop. Ext. Serv. Agr. Exp. Sta. Bull. — Arizona Coopera-
tive Extension Service and Agricultural Experiment Station
Bulletin.
- Ariz. Coop. Ext. Serv. Agr. Exp. Sta. Fold. — Arizona Coopera-
tive Extension Service and Agricultural Experiment Station
Folder.
- Arkansas Farm Res. — Arkansas Farm Research.
- Biul. Inst. Ochr. Rosl. — Biuletyn Instytutu Ochrony Roslin.
- Boll. Lab. Entomol. Agr. 'Filippo Silvestri' — Bollettino del
Laboratorio di Entomologia Agraria 'Filippo Silvestri'.
- Bull. Brooklyn Entomol. Soc. — Bulletin of the Brooklyn En-
tomological Society.
- Bull. Entomol. Soc. Amer. — Bulletin of the Entomological So-
ciety of America.
- Calif. Agr. — California Agriculture.
- Calif. Agr. Exp. Sta. Ext. Serv. Leaflet. — California Agricultural
Experiment Station Extension Service Leaflet.
- Calif. Agr. Ext. Serv. Iden. Sheet — California Agricultural Ex-
tension Service Identification Sheet.
- Calif. Agr. Ext. Serv. Manuscript — California Agricultural Ex-
tension Service Manuscript.
- Calif. Dep. Agr. Quart. Bull. — California Department of Agri-
culture Quarterly Bulletin.
- Can. Entomol. — Canadian Entomologist.
- Commonw. Inst. Biol. Contr. Tech. Bull. — Technical Bulletin
of the Commonwealth Institute of Biological Control.
- Crop Sci. — Crop Science.
- Crops Soils Mag. — Crops and Soils Magazine.
- Ekol. Pol. Ser. A. — Ekologia Polska-Seria A.
- Entomol. Rev. — Entomological Review.
- Environ. Entomol. — Environmental Entomology.
- Farm Manage. — Farm Management.
- Folia Entomol. Mex. — Folia Entomologica Mexicana.
- Indian Agr. — Indian Agriculturist.
- Indian J. Entomol. — Indian Journal of Entomology.
- Israel J. Entomol. — Israel Journal of Entomology.
- J. Econ. Entomol. — Journal of Economic Entomology.
- J. Environ. Qual. — Journal of Environmental Quality.
- J. Insect Physiol. — Journal of Insect Physiology.
- J. Kans. Entomol. Soc. — Journal of the Kansas Entomological
Society.
- Kans. Agr. Exp. Sta. Mimeo. Ser. — Kansas Agricultural Exper-
iment Station Mimeograph Series.
- Kans. Agr. Exp. Sta. Tech. Bull. — Kansas Agricultural Exper-
iment Station Technical Bulletin.
- Mex. Secr. Agr. Ganad. Ofic. Estud. Espec. Foll. Tec. — Mexico
Secretaria de Agricultura y Ganaderia, Oficina de Estudios
Especiales, Folleto Tecnico.
- Misc. Publ. Entomol. Soc. Amer. — Miscellaneous Publications
of the Entomological Society of America.
- Miss. Agr. Forest. Exp. Sta. Annu. Rep. — Mississippi Agricul-
tural and Forestry Experiment Station Annual Report.
- Mitt. Biol. Bundesanst. Land-Forstwirtschaft. Berlin-Dahlem —
Mitteilungen aus der biologischen Bundesanstalt fuer Land-
und Forstwirtschaft Berlin-Dahlem.
- Mont. State Univ. Coop. Ext. Serv. Leaflet. — Montana State
University Cooperative Extension Service Leaflet.
- N. Mex. Agr. Exp. Sta. Bull. — New Mexico Agricultural Ex-
periment Station Bulletin.
- Nebr. Agr. Exp. Sta. Bull. — Nebraska Agricultural Experiment
Station Bulletin.
- Nebr. Agr. Exp. Sta. Res. Bull. — Nebraska Agricultural Exper-
iment Station Research Bulletin.
- Nev. Agr. Exp. Sta. Circ. — Nevada Agricultural Experiment
Station Circular.
- Okla. Agr. Exp. Sta. Bull. — Oklahoma Agricultural Exper-
iment Station Bulletin.
- Okla. Agr. Exp. Sta. Processed Ser. — Oklahoma Agricultural
Experiment Station Processed Series.
- Pr. Nauk. Inst. Ochr. Rosl. — Prace Naukowe Instytutu Och-
rony Roslin.
- Probl. Agr. — Probleme Agricole.
- Proc. 10th Int. Congr. Entomol. (Montreal) — Proceedings of
the 10th International Congress of Entomology (Montreal).
- Proc. 12th Int. Congr. Entomol. (London) — Proceedings of
the 12th International Congress of Entomology (London).
- Proc. Forage Insect Res. Conf. — Proceedings of the Forage
Insect Research Conference.
- Proc. Indiana Acad. Sci. — Proceedings of the Indiana Acad-
emy of Science.
- Proc. N. Cent. Br. Entomol. Soc. Amer. — Proceedings of the
North Central Branch, Entomological Society of America.
- Progr. Agr. Ariz. — Progressive Agriculture in Arizona.
- Rep. Alfalfa Impr. Conf. — Report of the Alfalfa Improvement
Conference.
- S. Dak. State Univ. Coop. Ext. Serv. Handb. — South Dakota
State University Cooperative Extension Service Handbook.
- S. Pasture Forage Crop Improv. Conf. Rep. — Southern Pasture
and Forage Crop Improvement Conference Report.
- Tex. Agr. Exp. Sta. Progr. Rep. — Texas Agricultural Exper-
iment Station Progress Report.
- U.S. Dep. Agr. Agr. Handb. — United States Department of
Agriculture, Agriculture Handbook.
- U.S. Dep. Agr. Res. Serv. Prod. Res. Rep. — United States
Department of Agriculture, Agricultural Research Service,
Production Research Report.
- U.S. Dep. Agr. ARS 22 — United States Department of Agri-
culture, Agricultural Research Service #22 Series.
- U.S. Dep. Agr. ARS 33 — United States Department of Agri-
culture, Agricultural Research Service #33 Series.
- U.S. Dep. Agr. Leaflet. — United States Department of Agricul-
ture Leaflet.
- Univ. Calif. Publ. Entomol. — University of California Publica-
tions in Entomology.
- Univ. Mo. Coop. Ext. Serv. Handb. — University of Missouri
Cooperative Extension Service Handbook.
- Utah Agr. Exp. Sta. Mimeo. Ser. — Utah Agricultural Exper-
iment Station Mimeograph Series.
- Utah Agr. Ext. Serv. Entomol. Mimeo Ser. — Utah Agricul-
tural Extension Service, Entomology Mimeo Series.
- Utah Agr. Ext. Serv. Leaflet. — Utah Agricultural Extension
Service Leaflet.
- Utah Agr. Ext. Serv. Mimeo. Ser. — Utah Agricultural Exten-
sion Service Mimeograph Series.
- Utah Ext. Leaflet. — Utah Extension Leaflet.
- Va. Agr. Exp. Sta. Tech. Bull. — Virginia Agricultural Exper-
iment Station Technical Bulletin.
- Va. Polytech. Inst. Ext. Div. Contr. Ser. — Virginia Polytechnic
Institute Extension Division Control Series.
- Zool. Listy — Zoologické Listy.
- Zool. Verh. Rijksmus. Natuur. Hist. Leiden — Zoologische Ver-
handelingen Rijksmuseum van Natuurlijke Historie Leiden.