

Project: S-153. Biology, Ecology, and Control of Insects Affecting Tobacco.

Departments and Cooperating Agencies: Department of Entomology,
N.C. State College, Agr. Res. Ser., U.S.D.A.,
Oxford Laboratory.

Personnel: Leader-R.L.Rabb; Cooperators-F.E. Guthrie, Ernest Hodgson,
F.R. Lawson; Assistants-C.J. De Loach, Lawrence Pearce.

Progress of Principal Research Accomplishments of 1962:

Over 90% of diapausing Protoparce sexta (tobacco hornworm) were produced after July 30 in all categories of fields studied. Stalk destruction on August 20 (harvest completed in over 90% of fields) would have reduced the production of diapausing individuals by an estimated 80% in fields treated normally with insecticides and MH-30. The production of diapausing hornworms was 75-85% lower in fields receiving applications of MH-30, due to the depressing effect of this chemical on sucker production before and after harvest. Adults from overwintering hornworm pupae in field cages emerged in two distinct groups: (1) late May-early June and (2) mid-July. Whether an individual emerged in the first or second group did not seem to be related to the time of pupation the previous season. Adults present from mid-August to frost seemed to be predominantly from pupae produced earlier the same year. - Diapause was initiated in the tobacco hornworm when the larval stage was exposed to a 9-hour photoperiod, but was unobserved in individuals reared under a 15-hour photoperiod. Life and seasonal history data were obtained on Winthemia n.sp. The rate of parasitism of 5th-instar hornworms by this tachinid was usually from 3 to 10%. Three commercial formulations of Bacillus thuringiensis compared favorably to one another on a comparative spore basis and gave a satisfactory level of hornworm control.

Work Planned for Next Year:

Continuation of the study of the interrelationships among hornworm broods, diapause, and the effects of certain cultural practices on populations. Cooperation with U.S.D.A. in large-scale test of the effectiveness of early stalk destruction for the control of hornworms and burworms. Biological investigations of natural enemies, particularly Jalyus spinosus and tachinid parasites of hornworms. Insecticidal tests against wireworms, budworms, and hornworms, including phytotoxicity and residue evaluations.

Publications:

Rabb, R.L. 1962. Integration of biological and chemical control - Manipulation of the environment. Bull. Ent. Soc. Amer. 8(4):193-196.

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Rabb, R.L., and F.E. Guthrie. 1952. Sod webworm control on newly-set tobacco. Jour. Econ. Ent. 54(4): 561-562.

Guthrie, F.E., R.L. Rabb, and D.A. Mount. (In press.). Distribution and control of cyclodiene-resistant tobacco wireworms in North Carolina. Jour. Econ. Ent.

Turnipseed, S.G., and R.L. Rabb. (In press.) Some factors influencing oviposition by the tobacco wireworm, Conoderus vespertinus (F.) Ann. Ent. Soc. Amer.

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Project: HATCH H-47, Insecticidal Control of Insects Attacking Flue-Cured and Burley Tobacco.

Departments and Cooperating Agencies: Entomology, Agr. Eng., N.C. State College; Ent. Res. Ser. (Oxford)

Personnel: Leader- F.E. Guthrie; Cooperators- R.L. Rabb, T.G. Bowery, D.A. Mount, and W.E. Splinter.

Progress of Principal Research Accomplishments of 1962:

(1) Cyclodiene insecticides are no longer effective in the border, eastern, and middle tobacco belts for wireworm control, but certain phosphate insecticides and one chlorinated insecticide were found to be satisfactory substitutes. (2) Treatments for budworms may be delayed until three weeks after planting, and preventive applications of endrin must be made oftener than every 14 days. Zectran applied 3 and 5 weeks after planting gave season-long control but with slight phytotoxicity. (3) Zectran gave hornworm control equal to endrin, and residues dissipated more quickly during growth and curing. (4) Charged dust particles were found to be more effective than uncharged dusts. (5) Tobacco hornworms were found to excrete absorbed doses of nicotine within 30 minutes. Materials for the tobacco belt have been thoroughly investigated which will control resistant wireworms. Certain carbamate insecticides have considerable promise against tobacco insects with the hopeful goal of residue-free main stream smoke. Excretion of large quantities of absorbed insecticide as the parent compound is a previously unreported detoxication mechanism.

Work Planned for Next Year:

Study of the resistance of tobacco wireworm to cyclodiene insecticides by studying possible storage and detoxication mechanisms and to further examine the mechanisms enabling tobacco insects to tolerate nicotine.

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