bers have been found to be very small, and such fields apparently are not subject to subsequent infestations or additional injury. Fields with small beets after late October have been those more severely injured by the leafhopper, and especially those which remained with poor coverage throughout the winter months, since such fields often were found to receive additional leafhoppers at that time.

Progress Report on Investigations of Insects Affecting Sugar Beets Grown for Seed in Arizona and New Mexico

ORIN A. HILLS AND VAN E. ROMNEY[1]

Abstract

Insect-population studies have been carried on in fields of sugar beets grown for seed in the Salt River Valley of Arizona. These studies were commenced in 1938 and have been carried on throughout the entire growing season of the crop each year since then. Insofar as possible, studies have been extended to include also the beet-seed-producing areas in the Mesilla Valley, New Mexico, and the areas in the vicinity of Albuquerque. These studies have shown that several species of seed-feeding insects infest the seed-beet fields during the spring months. Of these insects, *Lygus* spp. are the most common, and in the Salt River Valley, where the more detailed studies have been conducted, a direct correlation was found between the numbers of *Lygus* present on the seedstalks in May and the percentage of non-viable seed produced. Three species of *Lygus* have been found to occur in the seed-beet fields of Arizona and New Mexico. The distribution of these species is not the same, however, for the various areas. In the Salt River Valley of Arizona *Lygus hesperus* (Knight) and *Lygus oblineatus* (Say) predominate, and *L. elisus* Van Duzee occurs only in small numbers. In the Mesilla Valley *Lygus oblineatus* and *L. elisus* predominate, with comparatively few *L. hesperus.* At Albuquerque, *L. elisus* occurs in the beet fields almost to the exclusion of the other species. Certain stinkbugs, particularly the Say stinkbug *(Chlorochroa sayi* Stal), also have been found in all the areas studied, but they are considered to be of minor importance except in outbreak years.

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Isolation-cage studies on *Lrygus* spp., the Say stinkbug, and the red-shouldered stinkbug *(Thyanta custator* F.) showed that these insects all were capable of reducing the percentage of viable seed produced. These studies also showed that the quantity of seed was not reduced but that the seed produced under insect conditions was somewhat lighter in weight, as well as reduced in viability. Other experiments with *Lygus,* however, indicate that where extremely large numbers are introduced reductions in yield will result.

Studies with individually caged specimens of males, females, and nymphs of *Lygus hesperus, Lygus oblincatus,* and *L. elisus* showed that the females and nymphs of these species were responsible for most of the damage. Since population studies showed that *Lygus* nymphs are the most numerous form of the insect present on the seedstalks at the season of the year when the developing seeds are most susceptible to injury, it can be concluded that the nymphs of these species are responsible for the greater portion of the damage. These studies further showed that *Lygus elisus* did somewhat less damage to the seed than did *L. hesperus* or *Lygus oblincatus.* This finding becomes of practical interest since it has been shown that the predominating species of *Lygus* varies with the locality. One series of cages containing Say's stinkbug adults, without respect to sex, also was included in this study. These insects were found to damage nearly twice as many seedballs as any of the *Lygus* species or forms.

Two seasons' data are now available from field tests of insecticides against *Lygus* on seed beets. A special technique involving a movable scaffold was devised to make possible the application of insecticides from above the plants to simulate airplane application. All insecticides were applied in quantities somewhat greater than may be practical in order better to determine those which may be of any possible value against *Lygus* and also the better to study the effect of the insecticide on the plants. In 1940 most of the materials used showed some reductions in *Lygus* populations which were accompanied by increases in the percentage of viable seed produced. In 1941, however, none of the materials showed significant increases in the germination of the seed produced. Insecticides giving the best results in 1940 were used again in 1941 and some new materials added. A slight change was made in the time of application of the materials in 1941 which may be responsible, at least in part, for the differences in results. Although there is not at present a satisfactory insecticide known for the control of these insects on seed beets, the results of 1940 indicate that, if *Lygus* can be controlled, an increase in the percentage of germinating seed produced will result. Dusting sulfur gave as good results as any of the materials tried and was by far the cheapest. A pyrethrum-in-oil spray was tried the first year and gave

greater reductions in *Lygus* populations than any of the other materials tried; however, some injury was caused to the seed. None of the other materials tried have caused any measurable damage to the plant or to the seed.

The Sequence of Infection of a Seedling Stand of Sugar Beets by Pythium Debaryanum Hesse and Aphanomyces Cochlioides Drechsler

W, F. BUCHHOLTZ[1]

Abstract

In greenhouse plantings of treated and untreated (5 percent ethyl mercuric phosphate, 5 to 7 ounces per 100 pounds seed) sugarbeet seed in (1) Clarion loam infested with *Pythium deharyanum,* Hesse, (2) Webster loam lightly infested with *P. deharyanum,* and (3) Webster loam infested with *Aphanomyces cochlioides* Drechsler and *P. deharyanum,* the following observations were made:

That *P. deharyanum* infected and killed up to 90 percent of the seedling stand quickly, within about 15 days after planting.

That *A. cochlioides,* when present, infected the remainder of the stand later, starting about 13 days after planting.

That seed treatment was an effective seedling protectant against *P. deharyanum,* not against *A. cochlioides.*

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