Progress Report on the Commercial Control of Lygus on the Sugar Beet Seed Crop in Arizona and New Mexico

by

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DEVELOPMENT OF THE LYGUS CONTROL PROGRAM

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THE FIRST COMMERCIAL crop of sugar beet seed by the overwintering method was produced on a very small scale in New Mexico in 1927. Several areas are now producing the entire domestic demand of sugar beet seed and also the partial demands of some foreign countries. The production of uniformly high-quality seed has been a major problem because there has been widespread fluctuation in seed viability from year to year. During the early history of the crop, low germination was attributed either to improper irrigation or to unfavorable weather, such as extremely high temperatures accompanied by hot dry winds, during the seed-setting period. The presence of sucking insects such as Lygus and stink bugs was largely discounted and was not considered as being detrimental.

In 1938 the Bureau of Entomology and Plant Quarantine, recognizing the possible importance of insects, established a station at Phoenix, Arizona. Their objectives were (a) the identification of potentially economic insects found to occur in seed fields, (b) the determination of the effect on seed viability and seed yield of the feeding of these insects on sugar beets grown for seed, and (c) the development of control measures which could be utilized against insects found to be of economic importance. Beginning in 1938 cage studies were made and it was discovered that certain sucking insects such as various species of Lygus and stink bugs were capable of causing a great deal of injury to the crop. (1, 2, 3)[1] Germination was greatly reduced, due to the puncture of the seedballs by the insect. The result was low viability seed and its accompanying problems of reduced yields and further complications in the process of cleaning sugar beet seed.

Surveys were made in all areas producing sugar beet seed and every year Lygus were found to varying extent. Because of their widespread distribution and the knowledge that Lygus were capable of causing serious damage to the crop, a major problem was recognized and comprehensive tests were made, both in cages and under field conditions, to determine a satisfactory control that could be universally recommended. A great many materials were tested and certain insecticides such as sulphur, pyrethrum and Sabadilla showed some promise. However, it was not until DDT

[1]Numbers in parentheses refer to literature cited.

was made available that an entirely satisfactory control could be assured. (4) One application of 5-percent DDT at the rate of 30 pounds per acre applied at the early bloom stage gives a most effective control as the kill is complete and the residual effect carries through to harvest.

EFFECT OF COMMERCIAL LYGUS CONTROL ON SEED VIABILITY IN ARIZONA AND NEW MEXICO

W. B. MORROW

First attempts to control Lygus commercially in the Southwest were made in 1943, in fields having high Lygus counts. One treatment consisted of three to five applications of dusting sulphur applied by airplane at the rate of 40 to 50 pounds per acre. Another treatment consisted of two applications of pyrethrum sulphur. The pyrethrum sulphur showed superiority over the straight sulphur treatment and some increases in germination were obtained.

In 1944 Lygus populations in the Salt River Valley were low and the viability of the seed produced was correspondingly high. No large-scale control was undertaken during that year. However, limited quantities of DDT were available for testing in Arizona and New Mexico. In both areas outstanding results were obtained as Lygus populations were practically eliminated and the residual effect of the DDT held populations to a low level for the remainder of the season.

For the 1945 season Lygus populations were very high in the Phoenix, Arizona, area. Limited quantities of DDT were available for early bloom applications and 300 acres were treated at that time. This acreage remained free of Lygus for the balance of the season and germination averaged 82 percent. Untreated checks of these same fields averaged 54 percent. A difference of 28 percent could be attributed to treatment. During this same period in the Phoenix area a total of 956 acres were dusted with 10 percent sabadilla at the rate of 30 pounds per acre. Preliminary counts showed up to 75 percent mortality but due to the lack of residual effect of the sabadilla, the fields were soon reinfested with Lygus. Seed samples taken from these fields showed only a light increase in germination resulting from treatment.

In 1946 practically the entire sugar beet seed acreage in Arizona and New Mexico was treated with 5-percent DDT applied at the rate of 30 pounds per acre by airplane, or 20 pounds per acre by ground equipment. Lygus populations prior to dusting were not alarmingly high. However, there were sufficient Lygus to cause some reduction in seed viability. As in previous years, one application was sufficient as the residual effect carried through until harvest. The results of Lygus control for this year were outstanding since the average germination for the Arizona crop was 92 percent and for New Mexico 90 percent. The amount of seed produced during this year in the aforementioned areas was 12,397,386 pounds.

From observations made in April of 1947 it was indicated that unless controlled, Lygus populations would be the highest in the history of sugar beet seed production in Arizona and New Mexico. The entire acreage was treated with 30 pounds of 5-percent DDT per acre applied by airplane. Excellent control was obtained and the germination for seed produced in Arizona was 86 percent and in New Mexico 90 percent.

The average germination for Arizona and New Mexico sugar beet seed crops during the years that no effective Lygus control was obtained is compared to years of 1946 and 1947 in figure 1.

These outstanding increases in germination clearly indicate that effective Lygus control plays a major role in the production of uniformly high quality seed. From our experience we feel that even though Lygus populations are low, it is profitable in Arizona and New Mexico to carry on large-scale control programs, treating the entire acreage.

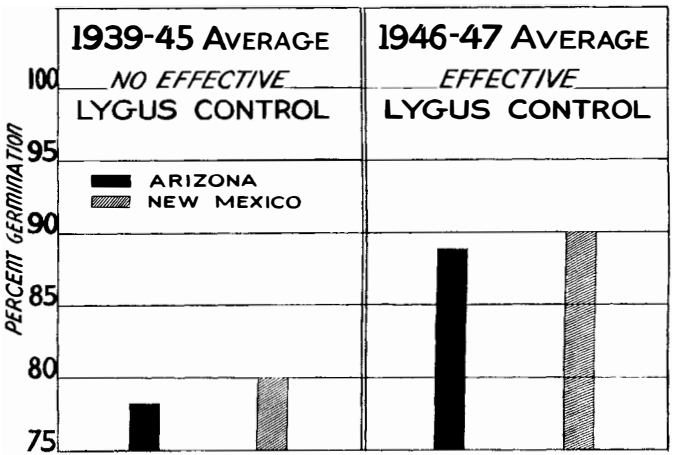

Figure 1.—Effect of lygus control on seed germination.

EFFECT OF LYGUS CONTROL ON SEED YIELDS IN ARIZONA AND NEW MEXICO

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Yield, like germination, has fluctuated widely throughout the history of sugar beet seed production in Arizona and New Mexico, and like germination, the fluctuations in yield were attributed to unfavorable weather

conditions until a relationship between Lygus and germination was known, and effective control was obtained.

Commercial methods of harvesting, threshing and cleaning make it very difficult to obtain yield data from small treated and untreated areas within the same field, therefore, no yield data from small replicated plots has been obtained. Consequently data presented to show a relationship between Lygus population and yield are based on an average for those years in which there was no effective control as compared to the years 1946-1947, in which effective control was obtained.

A comparison of Lygus populations and yields by years for the period 1939-1945 shows that the years of high Lygus populations were the years of lowest yield. The average number of Lygus per one hundred sweeps entering the fields in the Salt River Valley during April for the period 1939 through 1945 are shown in figure 2. The average yield per acre for that period and the same data for the years of effective Lygus control, 1946 1947 are also shown in figure 2. The average number of Lygus entering fields in April was 20 per one hundred sweeps for the years in which Lygus were not controlled and 32 per one hundred sweeps for the years of effective Lygus control. Average yield per acre for 1939-1945 was 1,625 pounds and for the Lygus control years, 1946-1947, 3,246 pounds per acre.

Although many factors other than Lygus effect beet seed production, the outstanding yields obtained under Lygus-free conditions indicate that Lygus control is an important factor affecting seed yields.

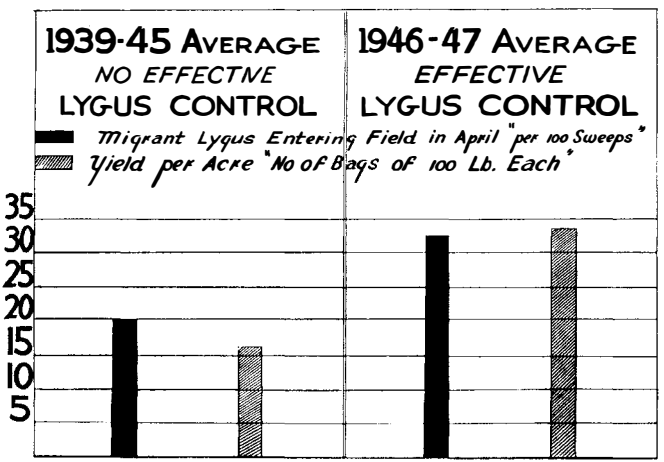

Figure 2.—Effect of lygus control on seed yield.

THE EFFECT OF LYGUS CONTROL ON SEED CLEANING

A. A. MAST

Since the beginning of the sugar beet seed industry in Arizona and New Mexico, it has been recognized that a direct correlation exists between the viability of field-run seed and the percentage of tare it contains. Figure 3 shows the average Lygus populations entering the beet seed fields in the Salt River Valley in April for the years 1939-45 during which there was no effective Lygus control and for the years of effective Lygus control (1946-47). The percentage tare for these two periods is also shown. From this chart it is apparent that had Lygus not been controlled the past two seasons, the average tare would have exceeded that of the 1939-45 period, whereas it was actually one-third less than for that period.

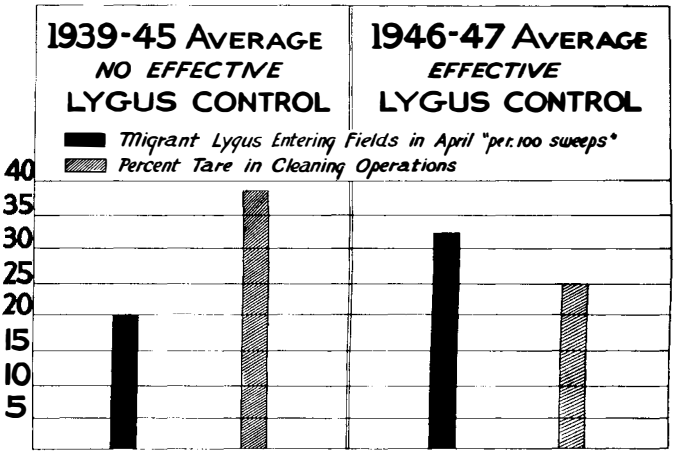

Figure 3.—Effect of lygus control on tare in field run seed.

In those years of low germination and accompanying high tare it has been necessary to reclean or blend large amounts of seed in order to bring the germination of the final product up to the acceptable point. For example, in 1945, a year of high Lygus populations, high tare and low germinations, over 1½ million pounds of seed were blended. Some blending was required every season prior to 1946, but during the past 2 years, owing to the improvement in germination resulting largely from the Lygus-control program, no blending has been necessary.

The improvement in germinations has been accompanied by an increase in weight per cubic foot of seed. In those years of high Lygus populations and no control, seed averaged 12 to 14 pounds per cubic foot. With Lygus control this has been increased to 15 to 18 pounds per cubic foot.

The control of Lygus has reduced the tare of field-run seed by one-third. It has also been responsible for the elimination of blending and an increase in weight of the seed, which has increased cleaning capacity by approximately 50 percent.

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