The Effect of Lygus Control on the Production of Elite Seed

C. W. Doxtator[1]

Beet seed production in the Arkansas Valley of Colorado is confined to the increase of Breeders Stocks, and Elite seed—these being the first increases of improved varieties developed in the Breeding Program of the American Crystal Sugar Company. In order that such improved varieties be made commercially available in good quantity at an early date, it is extremely important that the first productions be obtained in maximum quantity, and of high germination percentage.

Difficulty in obtaining seed lots of high germination percentage has been generally experienced in this area, particularly with breeders stocks, where mother roots, in groups ranging from 15 to 750 beets, are planted in space isolation. Prior to 1940, a germination test of 70 percent on such seed lots was much higher than average, and occasionally seed lots would be obtained having germination tests below 25 percent. Such seed was not usable, and was recleaned to improve germination. Usually little improvement was possible, and so the small quantities of seed had to be planted at unusually high-seeding rates in order to insure the obtaining of a good stand. Further, seedlings from these low-quality productions were found to be very susceptible to damping-off organisms, and seed treatment was always necessary. Failure to obtain satisfactory seed production in the early years was attributed to many factors, such as storage rots in the replanted beets, low soil fertility, lack of irrigation, and unusual climatic conditions.

In 1940 and 1941, entomologists in the commercial beet seed production areas of Arizona and New Mexico (1)[2] were finding large numbers of *Lygus* species in beet seed fields, and had shown that a reduction in the viability of beet seed accompanied Lygus feeding.

Observations and Control Measures

A check was made for Lygus species on root group isolations in factory districts of the American Crystal Sugar Company in 1942. Lygus was found to be present in relatively small numbers at Oxnard and Clarksburg, California; Missoula, Montana; East Grand Forks and Chaska, Minnesota; and Mason City, Iowa, and in much greater numbers at Rocky Ford, Colorado.

Accordingly, in 1942, No. 10 Pyrocide[3] dust was applied to Elite seed acreages at Rocky Ford in late May, at the rate of 30 pounds per acre, but a

[1]Plant Breeder, American Crystal Sugar Company, Rocky Ford, Colorado.

[2]Numbers in parentheses refer to literature cited.

[3]A proprietary dust mixture containing 0.20 percent pyrethum as a petroleum oil extract impregnated into an inert dust base.

later application was impossible due to the height of the plants. However, all small root group isolations were dusted by hand, and two applications of No. 10 Pyrocide were made.

In 1943, No. 10 Pyrocide was again used, and in larger amounts, to all seed plots. DDT in small quantities was available in 1944 and was used, along with Pyrethrum dusts, to the extent of the supply.

Results of Lygus Control by DDT

Some DDT was available in 1945, but in 1946 and 1947 adequate amounts were obtainable. Applications of this insecticide in 1946 and 1947 have been made on all plantings of beets grown for seed production, in accordance with the recommendations of Hills, et al (2). On small isolated groups of mother beets, using hand dusters, 10 percent DDT at 50 pounds per acre, applied three times during the late bolting, and early flowering season, has given adequate control. On the larger and overwinter seed increases, one ground dusting of 10 percent DDT at 25 pounds per acre in the mid-season of bolting, and one airplane dusting in the early flowering stage at 40 pounds per acre, has given adequate control of most insects found in seed fields.

Table 1 gives the seed yield per beet and the germination percentage of seed from selected mother beets producing seed in space isolated groups. In table 2 is given the production record of an overwinter planting of Elite seed in 1943 without DDT insecticide control, compared to one in 1947, with one ground and one airplane dusting of DDT for insect control.

Table 1.—Average weight of seed produced per beet, and average percentage germination of space isoalted root groups (breeders stock), Rocky Ford, Colorado, 1939-47 inclusive.

Seed production year	Pounds seed per beet	Average germination percentage
1939	---	41.0
1940	0.14	---
1941	0.23	---
1942	0.15	53.9
1943	0.17	64.5
1944	0.14	76.4
1945	0.20	76.2
1946	0.21	87.8
1947	0.28	86.5

Table 2.—Comparison of elite seed production in 1943 without lygus control, and in 1947 with lygus control.

Description	1943	1947
Acreage planted	20	18
Winter season	Very mild	Very severe
Percentage winter kill of plants	25	85
Dust treatments	Pyrocide-Sulphur, once	10 percent DDT, twice
Yield per acre	1077.5 pounds	874.1 pounds
Percentage germination	39.5 percent	79.5 percent
Final yield of acceptible seed per acre	225.0 pounds[1]	874.1 pounds
Final germination	71.0 percent	79.5 percent
Weight per bushel, acceptible seed	17.5	21.0

[1]Recleaned five times on standard cleaners; once over gravity table.

Conclusions

Production of Elite beet seed has shown marked improvement in quality since control of Lygus has been obtained.

DDT in 5- or 10-percent strength and at rates per acre of 25 to 45 pounds, applied one to three times during the bolting and flowering season, has given effective control of this insect in the past 3 years at Rocky Ford, Colorado. As a result, the quantity and quality of seed of new improved varieties was almost double that obtained 10 years ago. The greatest hazard of recent times in this area for the rapid increase of seed from new varieties of sugar beets, appears to have been eliminated.

Literature Cited

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