Factors Influencing Sugar Beet Seed Production in Arizona and New Mexico

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Since the introduction of the sugar beet seed industry in southwestern United States, Arizona and New Mexico have produced nearly 73,000,000 pounds of sugar beet seed. This is approximately two-thirds of the total amount of beet seed grown in the United States and represents about a 5-year supply of seed based on pre-war planting requirements of the domestic beet sugar industry. Considering the limited amount of agronomic research work done on the overwintering method of beet seed production, it is remarkable that in the comparatively short period of 10 years so much progress has been made in increasing the production of seed per acre.

The present methods have evolved mainly from trial and error.-mercial beet seed producer, the personnel has not been available to carry out carefully controlled experimental work. However, the field force has consistently studied the crop through the years and from their experience and observation definite ideas have been developed as to the factors which affect seed production.

Land Selection

The following must be taken into consideration in selecting land suitable for production of sugar beet seed: Type of soil, levelness and drainage, previous cropping history, natural fertility, and location within the area.

Only loam soils should be chosen for production of beet seed, preferably silty clay loams or those approaching that texture. Land also should be quite level; a fall of about 4 feet to the mile is considered ideal. Though fields sufficiently flat to insure adequate intake of water are preferred, sufficient drainage is essential to best results.

A previous cropping history which includes truck crops is preferable in those areas where vegetables are grown, both from the standpoint of freedom from weeds and improved residual fertility due to heavy fertilizer applications normally made to those crops.

Natural fertility, of course, varies greatly between individual fields, and only those having high fertility should be chosen for beet seed production because no reasonable amount of commercial fertilizer can compensate for lack of inherent fertility.

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In each district where seed is grown certain areas have been found which constantly outperform others for a number of reasons. In the Phoenix district particularly, where temperatures are a greater factor than in any of the others, certain locations in the valley have been found which are subjected to lower winter temperatures. By confining beet seed growing to the colder areas, the percentage of bolting and the yields of seed have been materially improved. It is also true that certain areas will be subjected to influx of greater leafhopper populations because of their proximity to the natural breeding grounds and to the fact that migrating leafhoppers have a tendency to follow more or less fixed routes.

Date of Planting

The trend throughout the years has been toward earlier planting. Planting generally starts in all areas around August 15 and for the best results should be completed by September 10. Early planting appears to be just as important in the Salt River Valley (Phoenix district), which has an annual mean temperature of 69° as in Albuquerque, N. M., which has an annual mean temperature of 58°.

The main advantages of early planting are: First, an extension of the photoperiod; second, early and rapid development of foliage prior to the winter months; and third, increased root development.

It is generally recognized that the photoperiod is one of the chief factors influencing bolting. Early planting naturally increases the photoperiod by the plants being subjected to a longer period of sunlight prior to the bolting period.

Early and rapid development of foliage has a number of advantages. First, it provides an unfavorable environment for the sugar beet leafhopper native to all areas; second, it discourages the growth of fall and winter weeds; and third, it provides a good foliage cover during the winter months which tends to maintain a uniformly low soil temperature during the dormant period, which is also conducive to bolting.

Increased accumulation of food within the root prior to the bolting period will naturally result in a more vigorous plant at fruiting time.

Stand

The types of planters generally used throughout the areas do not permit positive spacing as is possible in some types of planters used in commercial beet planting. As a result, in order to insure uniform stands, more seed per acre must be applied than is desirable. The planting rate, however, has been constantly reduced during the years.

With good-quality, high-germinating seed, 10 to 12 pounds per acre rate is sufficient. A stand of 4 to 6 beeets per foot uniformly spaced in 20-inch average rows will give the highest yield and will produce seed most nearly like that planted. If the stand is too heavy, the competition between individual beets will smother out a certain percentage of the individual plants. Elimination of any plants has a tendency to change the genetic nature of the seed harvested. On the other hand, a stand too light to give complete shading will result in a condition which is favorable for harboring the beet leafhopper and will allow soil temperatures to rise above the point where complete bolting is obtained.

Fertility

Phosphatic fertilizers applied in a ribbon under the seed prior to planting is the recommended practice. From 40 to 60 pounds of $P_2 0_5$ per acre, depending on previous crop and individual field history, is considered adequate in most cases. A fall application of at least 40 pounds nitrogen has been proved necessary in order to obtain rapid development of root and foliage and to maintain foliage development during the period of dormancy. Should the crop, during the winter months, exhibit a nitrogen deficiency, as evidenced by yellowing of the foliage, a mid-winter application of 30 to 40 pounds per acre of nitrogen in nitrate form is applied. In order to initiate and hasten new growth in the spring a minimum of 40 pounds of nitrogen is again applied as soon as temperatures are favorable for growth. To prevent any slowing down of growth prior to maturity, another similar application of nitrogen is made about 6 weeks prior to harvest. Individual fields showing marked nitrogen deficiency are given still more nitrogen throughout the season. As much as 200 pounds of nitrogen has been applied during the season to fields in this category with highly satisfactory results. In the Phoenix area all spring applications of nitrogen are made in the irrigation water because heavy foliage growth does not permit mechanical application.

Weather

To obtain complete bolting of plants, it is essential that they have ample cold exposure and light. In Arizona, and the Phoenix district in particular, winter temperatures are not always sufficiently low to maintain a uniformly low soil temperature. The damage resulting from too high winter temperatures can be minimized by following the practices mentioned, these being early dates of planting and high fertility which assure rapid growth to provide complete shading early in fall. During a season in which humidity is extremely low and temperatures extremely high, these factors can be compensated for