SOME OBSERVATIONS ON SEED QUALITY AND ITS RELATION TO MECHANICAL THINNING

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Some time ago I received a letter from Graham Howard, asking for a paper to be presented before this group on the subject of "Size of Seed and Its Relation to Distribution". The observations to be made in this paper would more accurately be regarding seed quality as related to mechanical thinning. The more comprehensive term "Quality" is preferred over "Size" because it may be construed to include seed size as a part physical quality and also include germination quality.

Physical quality refers to the size, shape and density characteristics of the seed. It would involve, then, the size range to which the seed is screened; whether or not it has been scarified or decorticated; and any gravity separation that might have been made. Germination quality refers to the manner in which the seed germinates under optimum conditions. It would involve the percentage of seed units producing single plants, two plants, more than two plants, no plants, and those units germinating abnormally. The optimum point of physical quality would be to have a seed of absolutely uniform size, shape and density. The optimum point of germination quality would be to have 100 per cent of the seed units produce single plants with no abnormal germination.

It is not the purpose of this paper to discuss seed production problems, so without further comment, let us assume that it is possible to produce seed of any desired quality - both as regards physical and germination characteristics. At the same time it must be recognized that as quality is improved, additional processing is required and recovery is lowered with a resultant increase in the cost of the seed. It is also very probably that seed processing costs may reach a prohibitive point as perfect quality if approached.

From a standpoint of mechanizing the thinning job, the most desirable condition would be to have a pre-thinning stand of absolutely uniformly spaced single plants. In order to be able to mechanize the thinning completely, this perfect stand of beets must be free from weeds within the row. Hand labor becomes necessary as weeds are present and the value of the perfect stand is decreased accordingly.

A number of factors are involved in obtaining such a perfect stand; they may be placed in two broad groups: First, seed of adequate quality must be properly placed in the ground. Second, conditions must be favorable for the germination and continued growth of all the plants that can be germinated from these seeds. Although this paper is concerned principally with those factors in the first group, their value is so affected by subsequent conditions as to warrant a brief enumeration of the more important ones.

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First of all, seed bed conditions must be favorable for germination of the seed. This seems elementary in the production of sugar beets, yet very few fields are in condition, at planting time, to give maximum germination. Weather conditions, of course, are important and are certainly not always favorable for maximum field germination. From time to time a substantial loss of seedlings is encountered after emergence. Such a loss may result from frost or wind damage, insect attacks, seedling diseases, drouth, or even mechanical injury.

Planter performance is an exceedingly important consideration with regard to mechanical thinning. Good seed distribution is essential in obtaining stands which may be thinned mechanically. Likewise the planter must place the seed in the ground in the best manner possible.

Here are a number of factors which present hazards to mechanical thinning. All are commonly encountered and they may be found to a certain extent in most fields. They often act singly or in combination to create conditions more or less unfavorable for subsequent mechanical operation. Since so much loss is often sustained between the placement of the seed in the ground and thinning, it might be reasoned that seed quality need be no better than the combined result of these other factors. It might be logical to conclude that seed quality is not important for seed bed conditions that produce only 30 or 40 percent emergence or for field conditions where weeds within the row outnumber beets by several fold, or for use with mediocre planting equipment.

On the other hand, seed quality provides the foundation for the entire structure of mechanical thinning. This structure may be weak in places and strong in others, but as a whole it can be no stronger than the foundation on which it is built.

Physical quality of the seed is all important to planter performance. The metering device, regardless of type, is sensitive to seed size. Seed of one particular size is metered in the most efficient manner. Ordinarily as oversize seed is used, gaps are left and seed is broken. As undersize seed is used, two or more seeds are dropped at a time and again seed is broken. As the size range fluctuates, erratic performance results, giving variations in distribution and seeding rate. The shape and density of the seed are also important to the performance of the metering device. Uniform regular shape is essential to good metering. Uniform high density is important, especially as drill speeds become high.

Germination quality of the seed is all important in obtaining desirable stands. Planting seed high in doubles immediately places a difficult barrier in the path of spring mechanization. Likewise seed of low germination presents almost insurmountable difficulties, as regards mechanization.

Seed quality is the basis of plant distribution. Its potentialities are never improved by planter performance, seed bed conditions, climate or weed conditions. Any change created by these factors is always for the worse.

A strong structure may be constructed on a strong foundation, but regardless of what comes later, a weak foundation can leave only a weak structure.