

GERMINATION RATE OF TYPES OF SUGAR-BEET SEED

UNDER DIFFERENT CONDITIONS

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In the northern intermountain areas where comparisons have been made under field conditions between regular whole seed and sheared seed, it has been observed that sprouts emerge from the sheared seed before they do from the whole seed. The following experiment was conducted to determine the rate of germination of five types of sugar-beet seed of the same variety under three controlled conditions. The five types of seed were: 1. Regular whole; 2. small whole seed obtained by screening the regular whole seed to recover the size 7/64 to 10/64; 3. sheared seed obtained by passing the whole seed through a California type of shearing machine and screening to recover the size 7/64 to 10/64 without improvement by air and gravity separation; 4. the above sheared seed severely polished for 15 minutes in a vertical cylindrical type polisher with metal agitator and screening to recover size 7/64 to 10/64; 5. embryos covered only by the thin inner seed coat obtained by screening the waste from the shearing machine.

Four replications of these five types were germinated in towels in a Minnesota germinator at 30° C. or 86° F. continuous temperature for 14 days. Two of the replicates were placed in the germinator dry and the other two were soaked in tap water as follows: Embryo - 1/4 hour; sheared and polished - 1 hour; sheared - 1 1/2 hours; small whole - 1 1/2 hours; regular whole - 2 hours. More of the soaked seed germinated than the dry seed during the first 2 days, but they were equalized by the third day and therefore the results are shown as the average of all four replications. The data were analyzed and it was found that for odds of 19 to 1 the difference for significance was 7 percent.

Five replications of the five types were planted in soil in greenhouse benches and lightly covered with soil not to exceed 1/2 inch in depth. The mean temperature for the greenhouse during the 14 days was 72° F., the extremes being 68° and 82° F. for very short periods of time. Dry seed was planted and then watered thoroughly. Emergence occurred on the fourth day. The data were analyzed and it was found that for odds of 19 to 1 the difference for significance was 6 percent.

Two replications of soaked seed of the five types were placed in towels on trays and placed in our beet-root storage cellar. The seed was soaked according to the schedule given for the soaked seed placed in the germinator. The mean temperature of the root cellar was 41° F., the extremes being 40° and 42° F. The relative humidity was maintained at 98 percent. Germination began the third day for three types and on the eleventh day for

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the other two types. The results are shown in detail for the first 14 days and then by weeks for the next 4 weeks. The experiment is being continued to obtain final germination.

The results show that under all three conditions the severely polished sheared seed had a higher percentage germination than the sheared seed. This is not the case with commercially prepared seed where air and gravity separations are made and severe polishing is not used.

In the germinator all five types started germinating in varying amounts at the end of 1 day. The majority of the viable seed was germinated by the third day. At the end of 14 days the order by total percentage germination was embryo, whole, small whole, sheared and polished, and sheared.

In the greenhouse soil all five types emerged on the fourth day and the majority of the viable seed was germinated by the seventh day. At the end of 14 days the order by total percentage germination was whole, sheared and polished, sheared, small whole, and embryo.

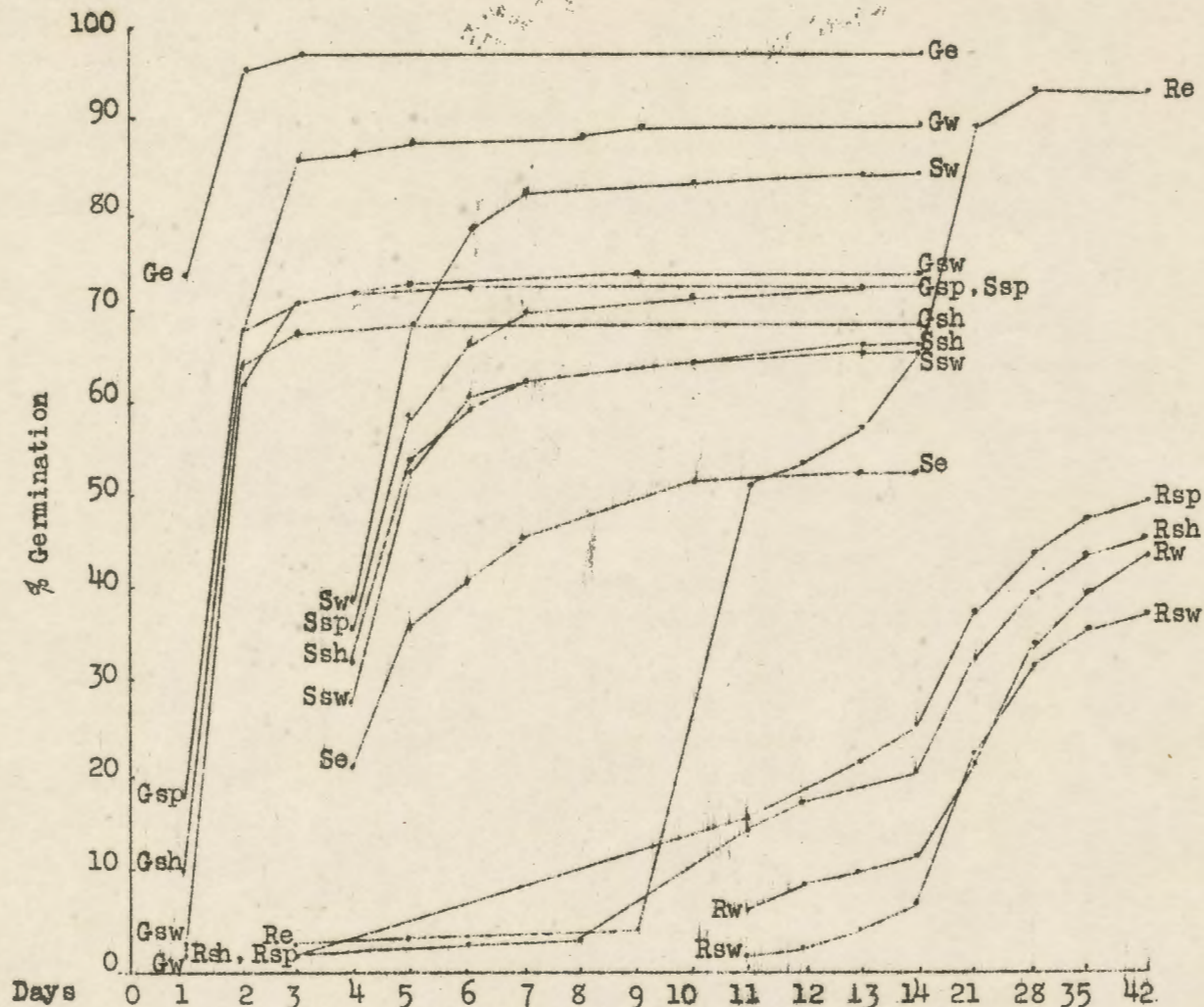
In the root cellar all three types having part or all of the outer seed coat removed began germinating on the third day, whereas the two types of whole seed began 8 days later or on the eleventh day. At the end of 42 days the order by total percentage germination was embryo, sheared and polished, sheared, whole, and small whole.

It is of interest to note how close together the germinations are for sheared and small whole seed under each of the three conditions. This suggests the possibility of using the 7/64 to 10/64 size of whole seed from a given lot as an index of what the same size sheared seed would germinate when not modified by air and gravity separations. This procedure may be of value when our interest in whole seed germinations becomes confined to what the sheared product would be.

In the germinator at 86° F. the sheared seed had a lower total percentage germination than the whole and small whole seed. In the greenhouse soil at 72° F. the sheared seed had a lower total percentage germination than the whole seed but a higher percentage than the small whole seed. In the root cellar at 41° F. the sheared seed had a higher total percentage germination than the whole and small whole seed. The embryos had the highest total percentage germination in the germinator and in the root cellar but the lowest in greenhouse soil.

The data show that temperature is an important factor affecting the rate and total germination of types of sugar-beet seed. The results obtained from the low-temperature germinations may explain, after proper allowances are made for differences in depth of planting, moisture conditions, and other environmental factors, the observed differences in emergence of sprouts from sheared and whole sugar-beet seed under field conditions, particularly in the northern areas where the spring weather is generally cool and damp.

Germination of 5 Types of Sugar Beet Seed
Under 3 Conditions



SYMBOL KEY

Condition:

- G = 4 replicates in Minnesota Germinator at 86°F
- S = 5 replicates in Greenhouse Soil at 72°F
- R = 2 replicates in Beet Root Storage Cellar at 41°F

Type of Seed:

- w = Regular whole seed
- sw = Small whole seed sized 7/64 to 10/64
- sh = Sheared seed sized 7/64 to 10/64
- sp = Severely polished sheared seed sized 7/64 to 10/64
- e = Embryo covered by thin inner seed coat only