Beet Seed Germination Technique Used By the Utah-Idaho Sugar Company

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In general the procedures used by the Utah-Idaho Sugar Company in laboratory germination tests of sugar beet seed are those recommended by the Committee on Standardization of Experimental Methods (/)[2] and of Tolman and Stout *(2)* and (3). We have done considerable experimental work on beet seed germination and have verified the results which led to these recommendations. All of our germinating is done in blotters (6 inches by 9t/2 inches, 120 pound) in a Minnesota Seed Germinalor at a temperature of 25° C. The washer which we built for washing the seeds consists of a rectangular galvanized iron container 18 inches by 6V2 inches by 2"% inches with a false bottom soldered 1 inch above the true bottom. On lV2-inch centers in the false bottom are drilled 1/16-inch holes. A %-inch inlet pipe is soldered in one end under the false bottom. The outlet consists of a spout or spillway 6 inches wide cut down %-inch from the top on the other end. The washer holds 40 small square wire baskets made from Tyler Ton-Cap screen similar to that used on the Koball sugar sifters. These baskets are 1% inches by 1% inches by 2 inches high and fit directly over the 1/16-inch holes in the false bottom. Water enters the inlet pipe and is forced through these holes in the form of a jet keeping the seed contained in the basket agitated during the washing. The amount of agitation may be regulated by the amount of water entering under the false bottom.

Whole Seed

The sample of seed is split in a riffle sampler (%-inch riffles) until 200+1 to 10 seedballs remain. A little practice will enable the operator to obtain very close to the requisite 200 seedballs. This, we believe, goes a long way toward eliminating the personal equation in selecting 200 seedballs from a lot. Two lots of 100 seedballs each are counted out, placed in the small wire baskets, and washed from 2 to 4 hours. At the end of this washing period the baskets are taken out of the washer and placed on a towel to absorb the excess water and the seeds are allowed to dry. Blotters are dipped in water and hung up until excess water has stopped dripping from them. One hundred washed and dried seeds are placed on each blotter, another blotter laid loosely over them, and the whole placed in the incubator. Counts are made at the end of 3, 7, and 14 days.

[1] General Chemist, Utah-Idaho Sugar Company.

[2] Italic numbers in parentheses refer to literature cited.

Sheared Seed

If the sample is large it is split in the riffle sampler used on whole seed until about 1 quart remains. This is further split in a small riffle sampler (5/16-inch riffles) until 100+1 to 5 seeds remain. One hundred seedballs are counted out, placed in the basket and washed for 2 hours. As with whole seed, the baskets are removed from the washer to a towel and the seeds allowed to dry. Each blotter is dipped in water and after dripping dry is placed on a small press. The press consists of two flat pieces of wood 5 inches by 6 inches hinged on the 6-inch side like the leaves of a book. On the inside surface of one of the leaves are 50 equally spaced upholsterer's tacks about $^1/_4$-inch in diameter and $^1/_8$-inch high. On the inside of the other leaf at points directly opposite each tack is a countersunk hole about 5/16-inch in diameter and $^1/_8$-inch deep. One end of the wet blotter is placed between the leaves and pressure applied. This molds 50 depressions on one half of the blotter. One washed and dried seed ball is placed in each of these depressions, the other half of the blotter is folded over to cover them, and the whole is placed in the incubator for 10 days. Counts are ordinarily taken on the third, sixth, and tenth days.

Ninety percent of our sheared seed is sized 7/64-inch to 9/64-inch. With seed of this size it is extremely rare that a seedball with triple sprouts is encountered. Therefore the normal double sprouts are discarded at each count. Also it is easy to determine by inspection whether a normal single might produce an additional sprout upon further germination. If this appears probable the normal single is saved for the full 10 days. Otherwise the normal singles are discarded at each count. Those seeds which germinate abnormally or about which there is a question are left on the blotter for the full 10 days. A seedball which germinates one sprout abnormally and one normal radicle is counted as a normal single.

Literature Cited

1. Report of Committee on Standardization of Experimental Methods. Proc. Amer. Soc. Sug. Beet Tech. 595-599. 1942.

2. Tolman, Bion and Stout. Myron. Toxic Effects of Germinating Sugar Beet Seed of Water Soluble Substances in the Seedball. Jour. Agr. Res., 61: 11. Dec. 1, 1940.

3. Tolman, Bion and Stout, Myron. Factors Affecting the Germination of Sugar Beet and Other Seeds, with Special Reference to the Toxic Effects of Ammonia. Jour. Agr. Res., 63: 12. Dec. 15, 1941.