

A METHOD OF TAKING SUGAR BEET SAMPLES IN THE FIELD*

By

M. PLAUT AND I. PRION (FRIEDBERG)

Though long obsolete, the practice of taking a small number (20 beet roots, or less, per experimental plot) of beets for polarization determinations is still widespread in Israel. As quoted by Plaut (3), Briem found a large variability between samples of 5 adjacent beet roots from a uniformly developed field, sown with the same seeding material, and concluded that results of tests made on a small number of beet roots may be misleading. He recommended 30—50 beet roots as the necessary minimum for determining the average sugar content of an experimental plot. According to Briem, the experimental plot should be *crossed diagonally* and beets used for control should be taken at equal intervals notwithstanding size, shape, leafage, etc. This method has been adopted in all important growing areas of sugar beet throughout the world. Plaut (3), Brykczynska (1), Silin (4) and others recommend that up to 100 beets be taken from one experimental plot.

However, due to the hot climate in Israel it is practically impossible to keep the beets fresh from the time they are harvested (summer) until determinations can be made. Sample beets picked in the Northern Negev partially dried out by the time they were loaded and transported from the fields to the Tel-Aviv laboratory. As a result, biological and physiological changes, influencing the correctness of determinations, were observed. Moreover, transportation and cold storage of large quantities of beets in the laboratory presented additional difficulties and costs.

To overcome these obstacles, we worked out a new method of taking samples. Instead of entire beets, weighing 400—600 g, only small cylindrical samples, weighing 18—24 g were taken from each root. For this purpose we used a special transportable "Borer" instrument. This device was made by B. Herring (Quedlinburg, Germany) and was the first of similar instruments later made for laboratory use. The "Borer" used in our experiments was sent to this country by Plaut (3) in 1924; Elazari and Piner (2) were the first to use this instrument in their laboratory determinations, about 30 years ago.

Publication of the Agricultural Research Station, Beit Dagan. 1958 Series, No. 266-E. Received June, 1958.

* A method worked out for the research work in fulfillment of Ph. D. degree by I. Prion (Friedberg) under the direction of Prof. M. Plaut, Hebrew University, Rehovot-Jerusalem.

Samples taken with the "Borer" are small cylinders of about 1.5 cm in diameter, and 10—15 cm long depending upon the size of root. As average weight was approximately 20 g, the weight of the 100 samples taken from 1 experimental plot was about 2.0 kg, as compared to the 40—60 kg obtained when whole beets were used.

To maintain freshness and avoid changes the 100 cylindrical samples from each plot were put into a compact plastic bag, containing a teaspoonful of paraformaldehyde. With the previously used metal containers, chemical reactions between the metal and the sample occurred. The plastic bags are also preferable to glass vessels as they are cheaper and easier to handle and transport. The paraformaldehyde stops the biological processes and enzyme activity that could influence the composition of the samples. To permit the paraformaldehyde vapors to penetrate into the samples, the plastic bags, after being closed and sealed, should be kept for about 2 hours in a cool shady place before placing them in cold storage, where low temperatures might prevent the necessary action.

These combined techniques of taking small samples directly in the field and preserving them in plastic bags with paraformaldehyde had 3 advantages:

1. Moisture loss in the samples was prevented. Our experiments showed that entire beet samples transported in summer from the fields in the Northern Negev to the laboratory in Tel-Aviv lost, in accordance with weather conditions, time of day, duration of transportation and way of placing them on the trucks, from 2% to 8% of their moisture. The investigations of samples in our method showed, under the same conditions, no statistical changes in moisture content.
2. Changes in the composition of beets due to physiological and microbiological processes were reduced to a minimum. In our experiments no considerable changes in sugar content were observed from the time of digging out the beets in the field until the laboratory tests. Under the same conditions samples of entire beets lost an average of 1.5% to 6% of their sugar content.
3. Haulage, storage and operation costs were considerably reduced.

REFERENCES

1. **Brykczynska, W.** (1947) Wskazowki do przeprowadzania badan i doswiadczen polowych. Warszawa, Nakl. Panstwowych Zakladow Hodowli Roslin.
2. **Elazari, M. and Piner, L.** (1927) Preliminary report on experiments with sugar beets in Palestine. First Report (1921—1926) of Agr. Exp. Sta. Rehovot, Israel.
3. **Plaut, M.** (1929) Erfahrungen mit den Methoden der Rübensaatuntersuchung und Ktirisches zum Rübenfeldversuch. Ztschr. Ver. Dtsch. Zuckerind.
4. **Silin, P. M.** (1949) Chimicheski Control Sweklo-Sacharnovo Prozwodstwa. Pistchepromizdat, Moscow.