A RAPID METHOD OF DETERMINING THE
OIL CONTENT OF THE SEED AND
IODINE VALUES OF THE OIL
FROM SMALL SAMPLES
OF FLAXSEED

ONE of the objectives of seedflax improvement is to increase the oil content of the seed. Greater progress could be made if the seed from individual plants in segregating generations could be analyzed for oil content and iodine value of the oil. In the past, the first test for oil was limited to advanced generations because of the large amount of seed required for conventional tests.

A method has been developed to determine the oil content and the iodine value from 1 g. of seed. A vigorous flax plant produces more than this, so that a remnant remains for sowing the following season. The method is inexpensive and sufficiently accurate for the purpose.

A measured volume of approximately 1 g. of cleaned flaxseed is placed in a 4-dram shell vial. Twenty vials of seed are arranged in a rack and placed in an oven at 85° to 90° C. The seed is weighed to the nearest milligram upon removal from the oven. Flaxseed absorbs moisture from the air very rapidly. Consequently it is necessary to stopper the vials except for the few moments when the seed is being weighed.

After weighing, the seed is placed in a 1½-inch diameter press cylinder and approximately 20,000 pounds pressure is applied to the seed by means of a laboratory press (figure 1). Approximately 70% of the oil in the seed is expelled by pressing and collects around the base plunger of the cylinder. The oil is run to one side to form a drop which is placed in a hand refractometer calibrated to read directly in units of iodine value.

The crushed seed is then removed from the vial by washing through a glass ‘Skellysolvent’ F, a petroleum naphtha with re- vapor pressure and a boiling point of 35° to 58° C. The vial is filled with the solvent, stoppered, and stand a day at 33° C. The solvent is decanted off again, the vials allowed to air dry for an hour, then placed in a drying oven for 2 days at 85° to 90° C.

After drying, the seed residue is weighed. The weight is attributed to the weight of oil removed and solvent extraction. The total time required for the analysis of a single sample is 6 days (two persons can analyze 125 to 150 samples daily) but approximately a week is needed for the analysis of a single sample.

This method is not as accurate as the more large-sample methods, due largely to sampling error. For varietal improvement, however, the method is accurate to separate a heterogeneous population into different oil content and iodine value classes. This method and two other methods commonly in use are compared in figure 2. Duplicate samples from 120 lots of seed were analyzed by each method. The analysis by the small-sample method was performed by the Grain Branch, Crops Research Division, U.S.D.A., Minneapolis, Minnesota. The means of the analyses by the small-sample method and two other methods commonly in use were highly correlated with those of the Soxhlet method (r = 0.96) and with the Steinlite Oil Tester method (r = 0.97). The Steinlite and Soxhlet methods are highly correlated (r = 0.98).

The error variances of the three methods were significantly different. There was a significant interaction between varieties and methods, although differences be...