PERCENTAGE protein and oil are important in evaluating breeding lines of soybeans. The chemical method now used is costly, and if it were used on single plants grown at ordinary spacings, little or no seed would remain for planting. A reliable, low-cost method for evaluating single plants for protein or oil content in a breeding program without destroying the seed for planting would have considerable value.

The density of soybean oil is approximately 0.93 gram per cc. and the density of the non-oil portion of the seed is estimated to be within the range of 1.3 to 1.4 grams per cc. The oil and protein together will usually make up 60 to 65% of the dry matter in the soybean seed. On the basis of the differences in density of the oil and non-oil portions of the seed, it appears that it might be possible to classify seed from single plants in a segregating population according to density and thereby select plants with seed high in oil or high in protein.

Laboratory studies have shown consistently that a lot of seed could be separated into density classes by subjecting the seed to a series of glycerol-water solutions with step-wise-increasing specific gravities. The various lots obtained differed in percentages of protein and oil. The lots of seed with high density had a protein percentage above the mean for the original seed lot and seed lots with low density had a higher-than-average oil percentage.

Seed of single plants from a segregating population can be ranked in order of increasing density by one solution of glycerol-water provided the specific gravity is adjusted to the proper range for density classification of the population. Since glycerol-water solutions do not damage the seed during the short time necessary to make density classifications, the samples can be washed, dried, and used for plantings.

It is recognized that in addition to genetic differences in protein and oil percentages of seed, environmental factors also influence composition of seed from a single plant. Field studies conducted in 1947 showed that seed produced on plants of the Roanoke variety from pods set on August 1 had 22.0% oil, whereas seed from pods set on August 14 had 20.5% oil. Collins and Carter (1) showed that seed from the top one-fourth of plants of the Lincoln variety were lower in oil and higher in protein than were seed from the bottom one-fourth. Thus, environmental factors play a considerable role in density separation of seed.

This study was conducted to determine whether density classification can be used as a selection technique in breeding for either high oil or high protein content in soybeans.

Yoshino et al. (4) studied the relation between density of the seed and some other attributes as well as the herit-