A SPECIFIC GRAVITY CALCULATOR

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ABSTRACT

A low cost, pocket size, specific gravity calculator has been developed that will convert weight in air and weight in water values directly to specific gravity. This calculator is eminently suitable for use in the field and has been developed for use by potato growers in a research project involving specific gravity determinations of developing tubers.

INTRODUCTION

The extent to which potatoes will slough when boiled, absorb excessive amounts of oil when fried or be soft and mealy when baked, may be estimated from a consideration of their specific gravities. There are various methods in use for determination of specific gravity of potato tubers. Young et al. (1) have reviewed and discussed the advantages and disadvantages of each method. They stated that the specific gravity of potato tubers can be determined by floating tubers in brine solution, by the use of a potato hydrometer, or by weighing the potatoes in air and in water. The flotation method is slow and messy, and although previously used with bulk lots, it is now used mainly to determine the specific gravity of individual tubers. The hydrometer offers a quick and inexpensive method for determining specific gravity and this instrument is widely used in research and in industry. In determining the specific gravity with a hydrometer it is necessary to use a sample of exact weight (8 or 10 lb). The selection of this fixed weight is time-consuming and excludes the use of the hydrometer where lesser amounts of potatoes are available. Measurement of the weight of potatoes in air and in water is fast and versatile. The specific gravity is calculated from the formula:

\[
S.G. = \frac{\text{weight in air}}{\text{weight in air} - \text{weight in water}}
\]

With this method it is not necessary to select a sample of fixed weight and the size of the sample is limited only by the capacity of the scales and baskets employed. However, a separate calculation is required for each determination.

Graphs have been developed which show the relationships of weight in air, weight in water and specific gravity. These graphs, to be accurate and to cover a sufficiently wide range, must be large and are, therefore, cumbersome. To overcome this problem, Young et al. (1) have developed a circular slide rule 11.5 inches in diameter which will convert weight in air and weight in water values directly to specific gravity. Though extremely accurate, the cost of this calculator prohibits its use in the proposed research project which will involve numerous potato growers in the Province of Alberta, Canada. This project will require growers to carry out specific gravity determinations on their developing crop at

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various times during the growing season. The authors, therefore, developed the low cost, pocket size, specific gravity calculator described in this paper.

**DESCRIPTION**

This specific gravity calculator is a slide rule 10.5 inches in length and 2.75 inches in width. It has logarithmic scales on both sides.

Fig. 1A. Weight in Air (lb., oz.) scale: 1 to 5 lbs. in increments of 1 oz., 5 to 10 lbs. in increments of 2 oz.

Weight in Water (oz.) scale: 1 to 10 oz. in increments of 0.1 oz.

Specific Gravity Scale: 1.060 to 1.120 in increments of 0.001.

Fig. 1B. Weight in Air (grams) scale: 50 to 250 grams in increments of 2.5 grams, 250 to 500 grams in increments of 5 grams.

Weight in Water (grams) scale: 5 to 25 grams in increments of 0.25 grams, 25 to 50 grams in increments of 0.5 grams.

Specific Gravity Scale: 1.060 to 1.120 in increments of 0.001.

The scales were first prepared by the Graphics Division of the University of Alberta from drawings supplied by the authors. They were then printed and assembled by Commercial Printers of Edmonton, Alberta, Canada.

During operation, the weight in water is set over the weight in air of the sample and the specific gravity is indicated by the arrow.