

THE DETERMINATION OF AVOCADO FRUIT WEIGHT ON THE TREE

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While studying the effects of thinning, girdling, fertilization, irrigation and other practices on avocado fruit weight, it is important to compare the weight increase at various stages of the fruit's development. The determination of only the final fruit weight is insufficient, as the main factor influencing it is the actual yield on the tree (2). On the other hand, if some treated fruits are picked early, the remaining fruits on the tree will be affected.

A method for the determination of avocado fruit volume and surface area on the basis of three parameters was evolved by Erickson and Yoshio Kikuta in 1965 (1). The present paper deals with the determination of fruit weight on the basis of a single parameter.

As there is no easy way to determine the weight of the fruit while it is still on the tree, it is necessary to calculate the weight from fruit measurements. The reliability of weight calculations had to be evaluated indirectly by calculating fruit weight and comparing the latter with experimental determinations of the actual weight.

Five hundred Hass avocado fruits were picked from three plantations. The following parameters were measured:

L – fruit length (mm)

C – fruit circumference (mm)

W – fruit weight (gr)

From L and C, the additional parameter $V' = LC^2$ was calculated.

Assuming that all fruits have the same geometrical form, V' is equal to the fruit volume (V) multiplied by a constant.

Correlation coefficients between fruit weight (W) and other parameters were determined (Table 1).

TABLE 1 CORRELATION COEFFICIENTS BETWEEN HASS FRUIT WEIGHT AND OTHER FRUIT PARAMETERS

Parameter Orchard	Length L	Circumference C	Volume parameter* V'
A	0.79	0.93	0.97
B	0.59	0.96	0.92
C	0.79	0.93	0.99
Average	.073	0.94	0.96

*See text for explanation

The estimated regression equations were:

$$W = -109.7 + 3.07L$$

$$W = -370 + 2.79C$$

$$W = -16.68 + 0.000042V'$$

The estimated multiple regression equation of weight on length and circumference was $W = 376.5 + 1.6L + 2.0C$.

Correlation coefficients between fruit circumference and its weight were found to be much higher than between fruit length and its weight and only slightly lower than fruit volume, which includes both length and circumference.

Logarithmic calculations of the length, circumference and volume failed to show higher correlation coefficients than those reported here.

It may be concluded that the weight of Hass fruit shows a better correlation with fruit circumference than with fruit length. The accuracy added by the two-dimensional measurement is negligible and therefore not practical.

While a more precise analysis of fruit weight might be derived for other avocado varieties, the generalized formula presented here is flexible enough to fit most fruit. Asymmetry or curvature of the fruit introduces a variable error which has not been considered.

References

1. Erickson, L. C. and Klkuta, Yoshio. (1965) Determination of surface area and volume of avocado fruits. Yb. Calif., Avocado Soc. 49:103-106.
2. Lahav, E. (1970) Localization of fruit on the tree, branch girdling and fruit thinning. Report of the Division of Subtropical Horticulture, 1960-69, pp.60-68. Volcani Inst. Agric. Res., Bet Dagan, Israel.