YIELD ESTIMATION BASED ON MEASUREABLE PARAMETERS

S. KÖHNE
WESTFALIA ESTATES — DUIWELSKLOOF

OPSOMMING

Oesskattingvolgensdie "Bavendorf Model", soos virsagte vrugtegebruik word, is viravokadosgebruik. Drie basiese parameters wordbenodig, naamlikproduksiekapasitiet, digtheid vanoessseten vrugmassa teen oestyd. Die voorlopige resultate dui aan datgoeie skattíngsverkry sal kan word nadat die nodige parameters vir die onderskeie avokadokultivars bepaal is.

SUMMARY

Yield predictions according to the "Bavendorf Model" as used in deciduous fruit were tried for avocado crop estimation. Three basic parameters are required: yield capacity, fruitset density and fruit weigh at harvest. Preliminary results suggest that reliable estimates can be expected once these parameters have been established for the different avocado cultivars.

INTRODUCTION

Short term (seasonal) and long term (5 years and more) crop predictions are essential to any fruit industry, not only from a marketing point of view but also for precise planning for the producers themselves (Jooste 1980). The "Bavendorf Crop Estimation Model" developed by Prof. F. Winter at Hohenheim University (FR-Germany) is used successfully for apple and pear yield estimates in many fruit growing areas of Europe as well as in the Western Cape. First attempts to get the "Bavendorf Model" working for avocado yield prediction were started in 1984 at Westfalia Estates.

MATERIALS & METHODS

The Bavendorf crop estimation model is a computerized method of yield estimation based on measurable parameters. The yield of a fruit tree, an orchard or an entire fruit growing region is largely determined by 3 factors viz:

(i). Yield capacity,

(ii). Average fruitset density and

(iii). Average weight of the fruit at harvest (Winter, 1969, 1976)

Yield capacity per hectare (C) is expressed as average tree canopy area square meters (m^2) as influenced by tree size and number. For an individual tree C is calculated by multiplying the average canopy diameter (d) with the average canopy height (h): C = d x h (Fig. 1).

Yield capacity of an orchard follows a sigmoid curve as the fruit bearing canopy of the trees grows bigger.

Annual changes in yield are mainly caused by alternating Fruit Set Density (FSD) as influenced by flower formation, pollination, fruit set, fruit drop etc. Therefore FSD calculations need to be done every year.

Rather than counting the entire crop of any tree, FSD can be determined for standardized canopy areas by using Prof. Winter's counting binoculars. Fruit counts on a representative sample of trees together with the total yield capacity allow the calculation of the production of that specific orchard (Fig. 2).
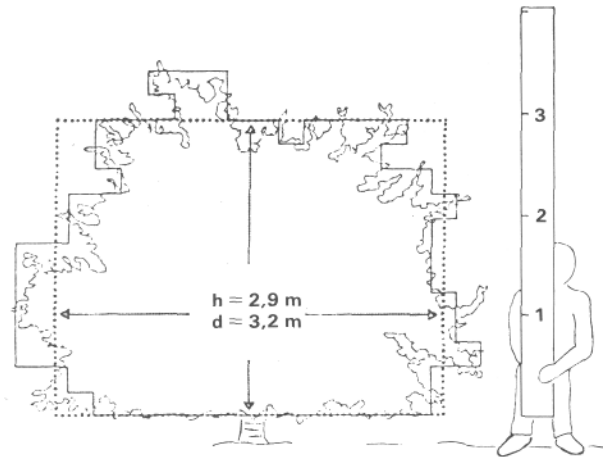

Fig. 1: Measuring Tree Capacity (C)
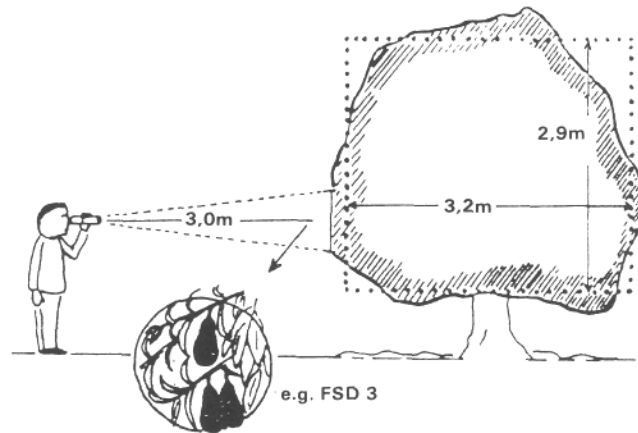
$C = d \times h = 3.2\ m \times 2,9\ m = 9,28 m^2$

Fig. 2: Taking Fruitset Density counts with Prof. Winter's binoculars

Example:

Using the binoculars 30 fruits were counted in 10 fields (0,36 m^2/field) well distributed over the fruit bearing canopy of the tree. With a tree capacity of 9.28m^2 (3.2 x 2, 9) the approximate number of fruits on this tree comes to 278 (9.28 x 30 = 278).

In order to predict expected Average Weight or size of the fruit at picking date, fruit growth curves are required. The distribution of fruit diameters after fruit drop is used to forecast final fruit size and probable range of counts at packing time.

RESULTS & CONCLUSIONS

Preliminary crop estimates with the Bavendorf Model in two commercial orchards gave results that exceded the actual crop in both cases (+14% and +16%). There is a good possibility of finding a correction factor once enough data is available. The number of sample trees necessary for reliable yield

estimation must be established. Because of the alternate bearing character of individual avocado trees, FSD-counts must be taken from a larger sample than that required for more uniformly bearing deciduous fruit trees. Average FSD for avocados was often between 2 and 3.

Prior to further evaluation of this method, the necessary parameters will have to be adjusted to the specific properties of the major avocado cultivars.

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