

Approaches to Solving the Hass Small Fruit Problem: Progress Report

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ABSTRACT

The influence of Hass tree condition on the proportion of small fruit was evaluated over a period of three years. The percentage of small fruit increased when tree condition deteriorated. With regard to testing Ettinger as pollinator for Hass, no conclusive results have been obtained from the first year of this study. Foliar sprays of gibberellin and paclobutrazol increased total tree yield and the yield of export size Hass fruit when compared to the untreated control. These are preliminary results for one season only and the trial is to be continued. Five Hass-like selections have been top worked and the first crop is due in the 1995 season.

INTRODUCTION

On the overseas market, the cultivar Hass is very popular due to its excellent shelf life and eating quality. Best prices are fetched for Hass fruit in the count range 14 to 18. However, the major drawback of this cultivar is that it bears a large percentage of undersized fruit causing losses of millions of Rand every season.

The purpose of this paper is to give a progress report on four projects dealing with the Hass small fruit problem.

TREE CONDITION

Hass avocado trees on Duke 7 rootstock were used in this study. The trees were planted in 1982 at Westfalia Estate. At harvest in July 1991, June 1992 and July 1993, individual tree yields were recorded for 31 trees. From each tree, fruit were graded into two size categories, i.e. export size fruit (fruit exceeding 61 mm in diameter, corresponding to count 24 fruit and larger) and small fruit (fruit less than 61 mm in diameter, corresponding to count 26 fruit and smaller). The percentage of small fruit was calculated on a mass basis. Tree condition was rated in July, according to a disease index of zero (healthy) to 10 (dead) as described by Darvas *et al* (1984).

In healthy trees, the quantity of export size fruit (kg/tree) increased when total yield increased (Figure 1). Apart from the exportable yield, every Hass tree bears a proportion of small fruit in the order of 5-20%, independent of total yield, provided tree condition rating is zero (Figure 2). The percentage of small fruit increased when tree condition deteriorated. At a tree rating of 5 or 6, the entire crop may consist of small fruit

only.

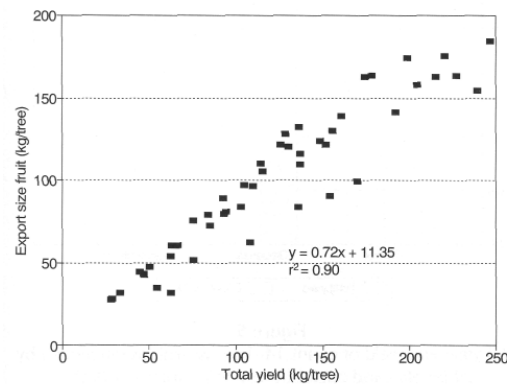


Figure 1
Total yield and yield of export size Hass fruit in healthy trees (1991–1993).

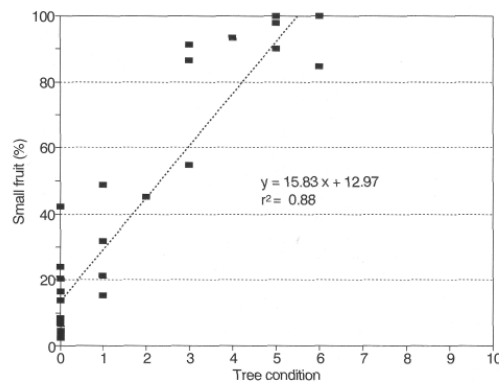


Figure 2
Percentage of small Hass fruit in relation to tree condition (0 = healthy, 10 = dead), 1992.

Due to a lack of irrigation water, tree condition in the trial orchard declined during the three years of the study. As a result, the percentage of small fruit increased significantly (Figure 3). For a high yield of export size fruit, good condition of Hass trees must therefore be ensured by the correct application of cultural measures, such as irrigation, fertilisation, root rot control and mulching.

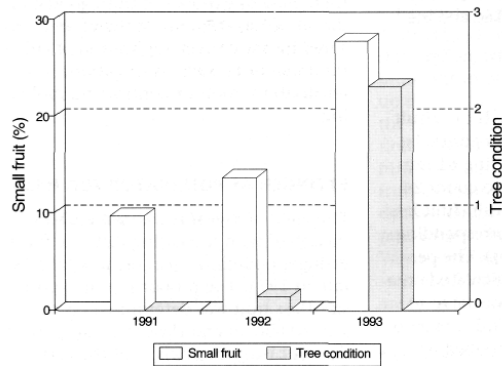


Figure 3
Mean percentage of small Hass fruit in relation to mean tree condition (1991–1993).

ETTINGER AS POLLINATOR FOR HASS

The yield of 8-year old Hass trees was measured with increasing distance from Ettinger pollinator trees on Westfalia Estate in 1994. The proportion of export size Hass fruit was determined (as described above) and Hass fruit samples underwent isozyme analysis at the ITSC (Nelspruit) to determine the pollen parentage, i.e. to determine whether cross pollination had occurred.

Hass yields with increasing distance from Ettinger trees and percentages of cross-pollination are shown in Figure 4. As can be seen in the graph, no conclusive results concerning the effect of Ettinger as pollinator for Hass have been obtained. The trial is to be continued.

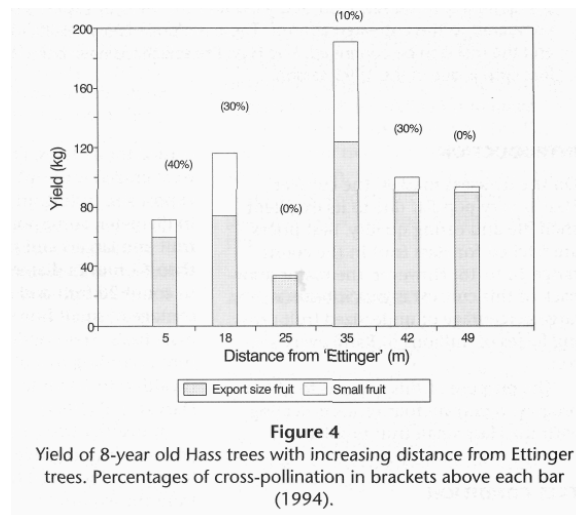
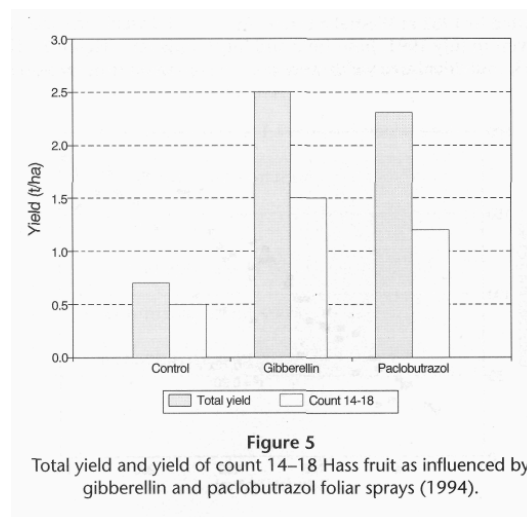


Figure 4
Yield of 8-year old Hass trees with increasing distance from Ettinger trees. Percentages of cross-pollination in brackets above each bar (1994).

PLANT GROWTH REGULATORS

Hass avocado trees on Duke 7 rootstock were used in this experiment. The trees were planted at a spacing of 5 x 5 m in 1991 at Westfalia Estate. Gibberellin (10 ppm a.i.) and

paclobutrazol (250 ppm a.i.), were applied as foliar sprays to 24 trees each in September 1993. The control trees were left untreated. At harvest 1994, individual tree yields were taken. Then fruit were pooled per treatment and sent over the mass sizer in the Westfalia packhouse to determine the proportion of fruit in the count range 14-18. In 1994, gibberellin and paclobutrazol treatments increased total tree yield and the yield of count 14-18 Hass fruit when compared to the control. The results are expressed as tonnes per hectare, based on a density of 400 trees per hectare (Figure 5). However, these are preliminary results for one season only and the trial is therefore to be continued.



NEW HASS-LIKE SELECTIONS

Five Hass-like selections (T142, Iriet, BL122, 1.14.2, 11.19) together with Hass as a standard have been top worked on 7-year old Hass trees on Duke 7 rootstock. Twenty trees were used per selection. Top working started in 1993 and was completed in 1994. In 1995, the first crop of top worked Hass-like selections will be harvested. The selections will be tested for their yield and fruit size, their harvest season, their susceptibility to diseases and physiological disorders, as well as their taste.

ACKNOWLEDGEMENT

The technical assistance of Mr. D. Mhlanga in the project dealing with Ettinger as pollinator for Hass is gratefully acknowledged.

REFERENCE

DARVAS, J.M., TOERIEN, J.C. & MILNE, D.L. 1984. Control of avocado root rot by trunk injection with phosethyl-Al. *Plant Disease* 68: 691 - 693.