

EFFECT OF CPPU SPRAYS ON YIELD AND FRUIT SIZE IN AVOCADO CV HASS

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ABSTRACT

To increase fruit size in Hass avocado trees, a two-year spray trial was conducted with CPPU, a compound exhibiting high cytokinin activity. Over the two-year period, CPPU treated trees showed a decrease in cumulative yield and furthermore, alternate bearing was enhanced. An increase in Hass fruit size could not be attributed to the CPPU treatment due to considerable yield differences between CPPU sprayed trees and the control.

INTRODUCTION

The avocado cultivar Hass is known to be problematic in its fruit size. A large proportion of its fruits, up to 40% in some cases, tends to be too small and consequently of low economic value (Bergh, 1984; Zilkah & Klein, 1987). According to a preliminary study by Köhne & Schutte (1991), dipping Hass fruitlets in a CPPU solution increased fruit size. However, a dip treatment is impractical and not suitable for commercial application in the field.

The aim of this study was to investigate whether a spray application of CPPU would result in a similar increase in Hass fruit size as obtained with the dip application.

MATERIALS AND METHODS

Hass avocado trees on Duke 7 rootstock were used in this experiment. The trees were planted in 1982 at Westfalia Estate, situated in the north-eastern Transvaal. Sixteen single tree replicates were sprayed with a conventional, high volume applicator with hand lances. Approximately 70 litres of spraying solution were used per tree. CPPU (Forchlorfenuron) was applied at a concentration of 10 ppm active ingredient. Agral 90 was used as a wetting agent at 0.05 ml/l. The CPPU spray was applied in October 1990 and re-applied to the same trees in October 1991 when the majority of the fruitlets on the north-western side of the trees measured 3-5 mm in diameter. Sixteen control trees were left untreated.

At harvest in July 1991 and June 1992, single tree yields were recorded. 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). Export size fruit

from all trees in this trial were counted to determine the mean mass of exportable fruit. The percentage of small fruit was calculated on a mass basis.

RESULTS AND DISCUSSION

Spraying of CPPU increased total yield slightly in 1991 (Table 1). However, in 1992 the CPPU sprayed trees gave a reduced yield when compared with the control. The cumulative yield for 1991 and 1992 was therefore decreased considerably by the CPPU treatment. Alternate bearing was enhanced by the CPPU treatment.

The percentage of small fruit is presented in Table 1. The proportion of small fruit was in the order of 10%, and did not differ between years or treatments.

Yield, in terms of export size fruit (Table 2), followed the same pattern as the total yield. Over the two years, trees treated with CPPU produced considerably less exportable fruit than the untreated control trees. The mean mass of export size fruit for both the control and the CPPU treatment, was higher in 1991 than in 1992. In 1991, the mass of the fruit from CPPU treated trees was lower than that of the control trees. In 1992, the opposite was obtained, possibly due to the extremely low yield of the CPPU treated trees. Presuming that a negative relationship between yield and fruit mass exists, it is difficult to judge whether CPPU increased Hass fruit size in this study, as yield differed between the control and the CPPU treatment in both years.

TABLE 1 Total yield (kg/tree) of Hass trees and percentage of small fruit as influenced by CPPU sprays. Data are the means of 16 trees \pm S.E.

Treatment	Total yield (kg/tree)			Small fruit (%)*	
	1991	1992	1991+1992	1991	1992
Control	102.2 \pm 11.7	120.7 \pm 14.3	222.9 \pm 23.1	9.6 \pm 1.5	13.7 \pm 3.6
CPPU	128.7 \pm 11.1	48.5 \pm 10.1	177.2 \pm 13.6	12.2 \pm 1.6	9.1 \pm 3.3

*Mass of small fruit shown as percentage of total yield.

TABLE 2 Export size Hass fruit (kg/tree) and mean fruit mass as influenced by CPPU sprays. Data are the means of 16 trees \pm S.E.

Treatment	Export yield (kg/tree)			Fruit mass (g)	
	1991	1992	1991+1992	1991	1992
Control	91.8 \pm 10.3	103.1 \pm 12.2	194.9 \pm 19.8	254 \pm 3	216 \pm 5
CPPU	113.8 \pm 10.2	41.0 \pm 7.4	154.8 \pm 12.2	241 \pm 4	234 \pm 7

In the trial conducted by Köhne and Schutte (1991), fruit of uniform size (3-5 mm diameter) were selected for dipping in a CPPU solution. In the present study, the CPPU

spray treatment was applied when most fruit were of the same size as those used in the CPPU dip trial. However, fruit size differed considerably within trees as fruit set occurred over a period of several weeks. The CPPU spray treatment may have had different effects on avocado fruitlets that were either less or more advanced in their development than the target fruitlets. Fruit thinning may have been an unwanted CPPU effect, which could account for the considerable decrease in cumulative yield of Hass observed in this study.

In conclusion, contrary to the fruit size increase achieved with a CPPU dip application (Köhne & Schutte, 1991), spraying of CPPU did not bring about beneficial effects on Hass fruit size or yield over a period of two years. The effects of spraying Hass trees with CPPU will be evaluated for one more season.

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