

Comparison of growth regulators paclobutrazol and uniconazole on avocado

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ABSTRACT

Paclobutrazol and uniconazole were applied as foliar sprays (50, 100, 200, 400, 4000 ppm ai) to greenhouse-grown avocado seedlings. A significant reduction in shoot growth was recorded for all treatments and showed a concentration-dependent response. Uniconazole had a more inhibitory effect than paclobutrazol.

INTRODUCTION

Tree size control is a major problem confronting the avocado industry. Trees grow rapidly, thus making pest management, harvesting and other cultural methods both difficult and expensive. During spring shoot growth, large amounts of energy reserves are partitioned into vegetative growth, thereby potentially depleting reserves for fruit production. This characteristic probably contributes to irregular bearing, which is also a major production problem (Scholefield *et al*, 1985). Redirecting energy reserves to reproductive growth and reducing tree size, eg by applying growth regulators, may increase tree productivity and reduce irregular bearing. Triazole-type plant growth retardants such as paclobutrazol and uniconazole are effective on a wide spectrum of plants (Jung *et al*, 1986). Paclobutrazol has exhibited retardant effects in avocado (Köhne & Kremer-Köhne, 1987; Köhne, 1988a; Wolstenholme *et al*, 1988).

Uniconazole, an experimental compound, reduces vegetative growth on rice plants (Izumi *et al*, 1984) and various ornamental species (Noguchi, 1987); however, its influence and potential on avocado are currently unknown. This paper compares the effect of the plant growth retardants paclobutrazol and uniconazole, on the shoot growth of potted avocado seedlings.

MATERIALS AND METHODS

Edranol seedlings were grown in 1,0 litre polybags (filled with equal parts by volume of vermiculite, polystyrene granules and well-rotted sugar cane filter press) in a greenhouse until approximately 70cm in height. At the beginning of the experiment, each seedling consisted of a single terminal shoot. Paclobutrazol (PP333, Cultar®) and uniconazole (S-3307D) were evaluated at several rates (50, 100, 200, 400 and 4000 ppm ai) applied in November 1987 as a single foliar spray. Spraying was carried out with a motorised knapsack sprayer (Echo, model DM9); the seedlings were sprayed

until run-off. The control consisted of untreated seedlings. Shoot extension was determined by measuring from the foot collar to the shoot apex on date of treatment and 20 days after treatment. There were 30 replications (seedlings) in each treatment; the seedlings remained in the greenhouse until the experiment was terminated.

RESULTS AND DISCUSSION

All treatments significantly reduced shoot extension of greenhouse-grown avocado seedlings. With both growth retardants, the magnitude of the growth inhibitory effect increased as the rate of application increased. Uniconazole had a more inhibitory effect than paclobutrazol. With uniconazole, rates of 400 ppm were already extremely inhibitory, resulting in almost complete suppression of shoot growth. With paclobutrazol, a similar effect was only achieved with a 10-fold increased concentration (Figure 1).

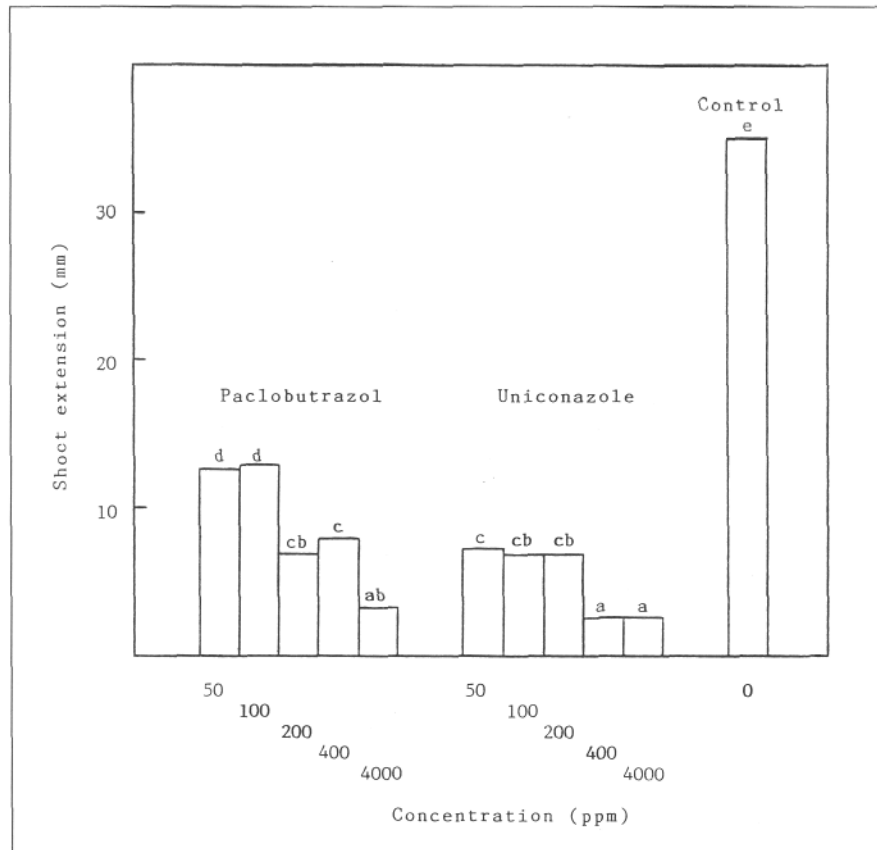


Fig 1 Shoot extension of potted avocado seedlings 20 days after foliar application of paclobutrazol and uniconazole. Mean separation between treatments by LSD, 5 per cent level.

Reduced shoot growth of avocado treated with paclobutrazol is well established (Köhne, 1988b). A reduction in spring flush shoot length and increased fruit-set in avocado, after application of paclobutrazol, have been reported from experiments using high concentrations (2500-5000 ppm ai) of this growth retardant (Köhne & Kremer-Köhne,

1987; Wolstenholme *et al*, 1988). Research now in progress is testing lower concentrations of paclobutrazol.

In previous work with paclobutrazol on avocado, foliar applications lower than 500 ppm resulted in only negligible growth control under orchard conditions. It is therefore expected that the lower concentrations reported here, will not perform equally well in the field.

Uniconazole has the same mode of action as paclobutrazol (Noguchi, 1987) and was proved in the above trial to be highly effective in reducing avocado shoot growth. Experimental use of uniconazole under orchard conditions will have to confirm the data obtained in this greenhouse experiment.

It seems that both paclobutrazol and uniconazole, could play a useful role in future management of avocado or chards. While the basic knowledge on the use of paclobutrazol in orchard crops is more advanced than in the case of uniconazole, there is undoubtedly a need for more research into the benefits and disadvantages of using these compounds in avocado production.

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