

THE EFFECT OF A SEAWEED EXTRACT ON THE ALKALOID VARIATION IN A COMMERCIAL PLANTATION OF A *DUBOISIA* HYBRID

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ABSTRACT.—*Duboisia* hybrid plants of *D. myoporoides* R.Br. and *D. leichhardtii* F. Muell. were sprayed with a dilute solution of Maxicrop[®], a commercial aqueous seaweed extract, over a 15 month period. The control plants experienced the usual decline in hyoscyamine content between May and September. This typical decline in hyoscyamine did not occur in the treated plants.

In a previous communication the seasonal variation of hyoscyamine in plantations of a hybrid of *Duboisia myoporoides* R. Br and *D. leichhardtii* F. Muell. was reported (1). Under glasshouse conditions, a weak dilution (5 ml per liter) of a commercial seaweed extract, Maxicrop[®], was shown to increase significantly the total alkaloid of *Duboisia* hybrid plants (2). Aqueous seaweed extracts have been demonstrated to have cytokinin activity (3) which has been found to delay plant maturation and leaf senescence and has beneficial effects on crop yields (4). A preliminary investigation of the effect of Maxicrop[®] on field-grown hybrid plants over a two month period demonstrated a 16 percent increase in hyoscyamine concentration. The effect of Maxicrop[®] treatment over a 15 month period is now reported. Currently in commerce regrowth leaf material is continuously harvested throughout the entire year except during the cooler months, May to August, when the hyoscyamine content is at a minimum.

RESULTS AND DISCUSSION

Three adjacent *Duboisia* hybrid trees were sprayed with Maxicrop[®] (5 ml per liter). Leaf samples from the treated plants and also control plants located nearby were collected in monthly intervals from October 1978 to January 1980. The collections were made at the same time of day and on the same day of the month. The samples were analyzed for hyoscyamine and hyoscyamine by gas-liquid chromatography. The hyoscyamine profile of the control plants was as described, with the usual decline in hyoscyamine content between May and September. This typical decline in hyoscyamine did not occur in the Maxicrop[®] treated plants (figure 1). The hyoscyamine concentration was more stable but not significantly increased ($p=0.50-0.25$) compared to that of the control group. Unpublished data has recently shown that hyoscyamine undergoes rapid metabolism during translocation to the aerial parts. The effect of Maxicrop[®] may be that by delaying leaf senescence a high transpiration rate is maintained therefore reducing the time available for hyoscyamine degradation. During the test period the total alkaloid content was not significantly increased ($p=0.25-0.10$); however, there was variation in the samples. There was a significant increase in hyoscyamine ($p=0.05-0.025$) compared with the controls. Hyoscyamine levels in Maxicrop[®] treated plants were relatively stable ($p=0.10-0.05$).

The cessation of harvesting of the *Duboisia* hybrid in those months when the hyoscyamine content is below commercially acceptable levels demonstrates inefficient use of plant and labor. It appears that, if at least a portion of the plantation was treated with Maxicrop[®] in the manner described, then continual all-year harvesting could be realized.

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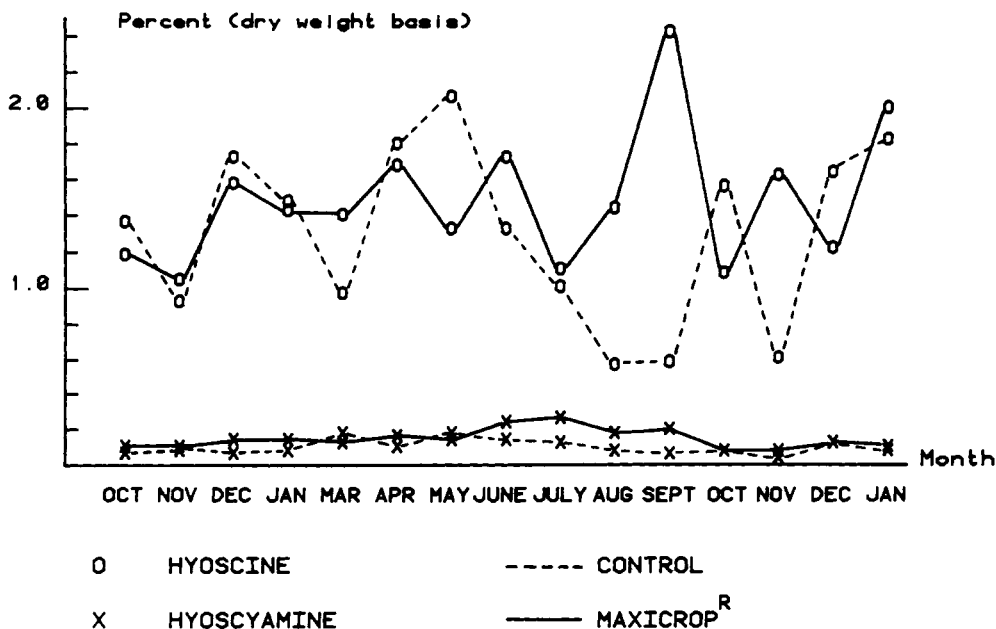


FIGURE 1

EXPERIMENTAL

PLANT MATERIAL.—A plantation of a hybrid^a cross between *Duboisia myoporoides* R.Br. and *D. leichhardtii* F. Muell., was established near Murgon, S.E. Queensland (1).

PLANT MATERIAL.—Three adjacent *Duboisia* hybrid trees were sprayed with a dilution of Maxicrop[®] (5 ml per liter) fortnightly. The spray solution contained 0.01 per cent Tween 80 to ensure wetting. The spraying was continued until all leaves were saturated, shown by dripping of the solution from the leaves. Leaf samples were collected randomly and pooled together from three treated plants and three control plants at approximately 30 day intervals. All samples were analyzed by gas liquid chromatography (5) and the data subjected to statistical analysis as described previously (2).

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^aA voucher specimen has been lodged with the Queensland Herbarium (BRI 237629).