SUITABILITY OF SLOW RELEASE FERTILISER ON PLANTATION GROWN *AZADIRACHTA EXCELSA*

Ahmad Zuhaidi Yahya & Rosdi Koter

Forest Research Institute Malaysia, Kepong, 52109 Kuala Lumpur, Malaysia

One of the normal silvicultural practices to improve the growth of planted tree crops is fertiliser application. Continuous fertilising for a specified period from young to intermediate age will improve the growth performance (Mohd Yusoff 1994). Conventional inorganic fertiliser application at large plantations is often tedious, labour intensive and difficult to supervise due to the necessity of repeated applications. Therefore, there is a need to look into the possibility of using slow release fertiliser in future forest plantation programmes.

The advantages of using slow release fertiliser are obvious. These include continuous supply of nutrients to the trees and prevention of nutrient loss through surface runoff. In addition, weed competition is reduced as the fertilisers are not surface applied (Ong *et al.* 1992). Thus, a research on the suitability and efficiency of using a slow release fertiliser, "Kokei Field King", was designed and conducted.

The trial was established at a three-month-old plantation grown *Azadirachta excelsa* (sentang) stand in Field 44C, Bukit Hari, Bukit Lagong Forest Reserve, Selangor, Malaysia. The area is located at a latitude of 3° 14' N and longitude 101° 38' E. The mean daily temperature ranges from 27 to 30 °C. The annual rainfall is between 2000 to 2500 mm. Situated at an altitude of 105 m asl, the area has a slightly undulating terrain and eastern aspect. The soil is reddish loam, with underlying rock and granite belonging to the Palaeudult (locally named as Rengam series) (Wyatt-Smith 1963), with good drainage. The former vegetation consisted of pure *Pinus caribaea* stands, which were clear-felled before the semi-mechanical preparation of the site. The seedlings were planted at an initial spacing of 3 × 3 m. Upon commencement of the trial, the mean height of the seedlings was between 50 to 100 cm.

The trial consisted of twenty 0.03-ha^2 plots (36 plants per plot) with five treatments and four replications in a randomised block design. The treatments were:

(1) slow release fertiliser (Kokei Field King)
 (a) three tablets (45 g) – T1
 (b) five tablets (75 g) – T2
 (c) seven tablets (105 g) – T3
(2) 100 g NPK yellow – T4
(3) control – T5

Kokei Field King, consisted of 14 N: 8 P_2O_5: 6 K_2O_5:5 MgO + trace element, was applied in the planting hole while the NPK Yellow (15:15:6:4 + TE), an inorganic fertiliser, was applied at a radius of 50 cm surrounding the plants, three months after planting.

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Total height and root collar diameter of all plants, were measured every six months for two years (1997–1999).

The periodic annual height or diameter increment is the difference between the dimensions measured at the beginning of the growth period divided by the number of days in the period:

$$\Delta h = \frac{h_{t+k} - h_t}{k} \qquad \text{(equation 1)}$$

where,

h = periodic annual height or diameter increment (m or cm $year^{1}$),

h_{t+k}= height or diameter at the end of growth period (m),

h_t = height or diameter at the beginning of growth period,

k = length of growth period.

Statistical analysis of differences between plots was done using PROC GLM (Generalised Linear Model, SAS/STAT 1989). A repeated measure analysis was used for the analysis of the interaction between treatments, also using PROC GLM since two height and root collar diameter measurements were obtained on the same trees in 1997 and 1998. Duncan's multiple range test was used to determine the differences between means. Summary results of the periodical annual increments and mean annual increments for all treatments are shown in Table 1.

Compared with the control and inorganic fertiliser, application of three and five tablets of slow release fertiliser gave the highest increments for root collar diameter (2.1 and 2.3 cm respectively) and height (167.5 and 179.9 cm respectively) although they were not statistically significant. However, with seven tablets, the root collar diameter and height increments were less than the values obtained for three or five tablets. These results indicated that the possible optimal number of fertiliser tablets for sentang during this study period was between three (45 g) and five (75 g). Excess or less than these concentrations will not improve growth of the trees. Najib Lotfy and Ramli (1996) showed that five tablets of slow release fertiliser yield the highest girth increment in plantation- grown rubber for timber production.

Table 1 Mean root collar diameter and total height of *Azadirachta excelsa* after a two-year treatment with varying concentrations of slow release fertiliser and inorganic fertiliser at Bukit Lagong Forest Reserve

Treatment	Mean root collar diameter (cm)	Mean total height (cm)	Root collar increment (cm)	Height increment (cm)
T1 (3 tablets)	2.8	224.0	2.1 ab	167.5 ab
T2 (5 tablets)	2.9	236.2	2.3 a	179.9 a
T3 (7 tablets)	2.6	204.0	1.9 bc	147.8 bc
T4 (inorganic)	2.5	200.4	1.8 bc	139.7 c
T5 (control)	2.4	199.7	1.7 c	137.5 c

Values in each column with the same letters are not significantly different at $p < 0.05$ as determined by Duncan's multiple range tests.

This preliminary study showed that application of three to five tablets of slow release fertiliser was sufficient to produce normal or better growth of sentang throughout the 24-months period. In addition, there will be a definite saving on labour and cost compared with the traditional method of discriminatory fertiliser application. In a similar report on other species, Mohd Yusoff (1994) concluded that one round of slow release fertiliser for a period of 24 months against six to eight rounds of inorganic fertiliser application by conventional broadcast method has a definite saving in terms of labour and cost. Hence, in forest plantation activities, the use of slow release fertiliser may prove advantageous especially when minimising the cost of planting and management is critical.

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