

## EFFECT OF WEED MANAGEMENT ON GROWTH AND YIELD OF BANANA cv. NENDRAN *MUSA* (AAB)

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**Abstract:** A field experiment was conducted to study the effect of weed management on growth and yield of banana cv. Nendran and to identify the critical stages of weeding so as to get maximum returns. Reduction in growth parameters was observed in plots unweeded up to harvest and up to six months after planting compared to frequent monthly weeded plots. Conventional weeding and weeding up to late vegetative phase and bunch maturation phase resulted in more or less similar effect with respect to growth characters, duration and yield. Hence weeding during the first six months is critical for maximum growth and higher yield. Conventional weeding was found to be the most economical practice in banana.

**Key words:** Banana cultivar Nendran, phenological stages, weed control, weed management.

### INTRODUCTION

Banana is essentially a tropical fruit plant requiring a warm climate. For the successful cultivation of this crop, regular cultural operations are essential of which weeding has great importance. Usually Nendran is grown as an irrigated crop with heavy application of manures and fertilizers which causes weed problems during the crop growth especially during the early stages. The main effects of weed competition on banana plants are reported to be reduction in growth parameters, delay in flowering and harvesting and reduction in yield (Liu and Garcia, 1988; Savithri, 1990). The present investigation was carried out at the Banana Research Station, Kannara, Thrissur for three years (1989-92) to identify the critical stages of weeding so as to get maximum returns, to estimate the loss in yield due to weeds and to work out the economics of cultivation of banana.

### MATERIALS AND METHODS

The experiment was conducted for three consecutive years from 1989 in randomised block design. Weed free periods were imposed during different phenological stages of the crop such as early vegetative phase (evp) i.e., 1-3 months after planting, late vegetative phase (lvp) i.e., 3-6 months after planting, flowering and bunch maturation phase (bmp) i.e., 6-9 months after planting and harvesting phase (hp) i.e., 9 months after planting to harvest. The treatments consisted of an

unweeded control ( $T_1$ ), monthly weeding till harvest ( $T_2$ ), conventional weeding ( $T_3$ ), no weeding during evp and then weed free ( $T_4$ ), no weeding during evp and lvp and then weed free ( $T_5$ ), weeding during evp, no weeding during lvp and then weed free ( $T_6$ ), weeding during evp and lvp and no weeding at bmp and then weed free ( $T_7$ ) and weeding during evp, lvp, bmp and no weeding at hp ( $T_8$ ). In conventional weeding practice, weeds were removed by digging at the time of making irrigation channels and basins and fertilizer application two and four months after planting of banana.

The plots were 8 m x 6 m in size with 12 banana plants planted at a spacing of 2 m x 2 m. All the cultural operations except weed control were followed as per the package of practices of the Kerala Agricultural University (KAU, 1989). The weed flora in the treatment plots, the growth characters of the crop at evp, lvp and flowering, the number of days to commence flowering and harvesting, yield attributes like number of hands and fingers of banana and bunch yield were recorded. Economic analysis was conducted taking the labour cost at Rs 55 per man day and Rs 5.50 as the price per kg of banana.

### RESULTS AND DISCUSSION

#### Weed flora

The weed flora noticed in the experimental field were *Cynodon dactylon* Pers, *Ischaemum*

Table 1. Effect of weeding imposed at phenological stages of banana on growth and duration of the crop

Treatment	Height, m	Girth, m	Functional leaves	Rate of leaf emergence	Days to flowering	Total duration
T1	2.9	0.55	13.1	4.9	246	341
T2	3.3	0.64	15.4	5.2	212	303
T3	3.1	0.58	14.9	5.1	219	316
T4	3.2	0.61	15.0	5.1	234	329
T5	3.1	0.58	13.8	5.0	244	336
T6	3.2	0.60	14.9	5.1	228	321
T7	3.2	0.62	15.6	5.1	215	310
T8	3.2	0.61	15.3	5.2	215	309
SE	4.33	0.72	0.5	0.89	2.47	2.25
CD(0.5)	11.99	1.99	1.39	NS	6.84	5.11

Table 2. Effect of weeding imposed at phenological stages of banana on yield attributes, net return and cost-benefit ratio

Treatment	No. of hands	No. of fingers	Yield kg plant <sup>-1</sup>	% decrease in yield over T <sub>1</sub>	Net return Rs ha <sup>-1</sup>	Cost-benefit ratio
T1	4.03	40.06	8.73	0	41975	1.53
T2	6.10	62.60	12.63	-	68662	1.65
T3	5.01	53.31	11.50	9	71875	1.83
T4	5.40	52.50	11.00	12	55000	1.57
T5	4.85	49.32	9.25	26	39687	1.45
T6	5.64	56.75	10.85	14	52937	1.54
T7	5.75	60.07	11.85	6	62937	1.63
T8	6.00	61.30	12.00	5	62500	1.61
SE	0.15	1.42	0.09	-	-	-
CD(0.05)	0.45	3.93	0.80	-	-	-

*pilosum* Izack, *Panicum repens* Linn and *Themeda triandra* among grasses; *Cyperus rotundus* Linn and *Cyperus ma* Linn among sedges; *Cleome viscosa* Linn, *Commelina benghalensis* Linn, *Crotalaria retusa* Linn,

*Emilia sonchifolia* Linn, *Euphorbia hirta* Linn, *Phyllanthus niruri* Linn, *Sida acuta* Brum, *Urena lobata* Linn, *Vernonia cineria* Less and *Vicoa indica* (L) DC among broad leaved weeds. Among the different weeds observed,

*Cyperus rotundus*, *Cynodon dactylon* and *Panicum repens* were, the most important ones which constituted 40, 25 and 15 per cent of the total weeds, respectively.

### Growth attributes

Significant influence of weeding at different phenological stages was evident only at flowering (Table 1). The treatments receiving monthly weeding up to harvest ( $T_2$ ) and weeding during evp, lvp, bmp and no weeding up to harvest ( $T_8$ ) were significantly superior in height, girth and number of leaves. However, rate of leaf emergence was not influenced by the presence or absence of weeding. Frequent weeding at monthly interval done during the early stages of the development of the crop had resulted in enhanced vegetative growth at flowering compared to weeding withheld at the evp and lvp of the crop. Banana being a shallow rooted crop depends entirely on the surface soil for its nutrition and water requirements and weeds of any sort will have deleterious effect on the growth of the main crop (Shanmugavelu *et al.*, 1992). The nutgrass, *Cyperus rotundus* which is the dominant weed species is a heavy competitor for nutrients and water (Nair and Kunju, 1976).

Days to flowering and total duration of the crop were influenced by various treatments (Table 1) and ranged from 212 to 245 and 302 to 340 days, respectively. Flowering and harvesting were delayed by 33 and 38 days respectively in unweeded control plots compared to frequently weeded plots. In comparison to the plots which received frequent weeding, the plots kept unweeded during evp and lvp took 32 and 33 days, plots kept unweeded during evp took 22 and 26 days and plots kept unweeded during lvp took 16 and 18 days more for flowering and harvest, respectively. Early bearing in banana by clean weeding every month was reported earlier (Anon, 1969). Delayed shooting and maturity of banana in unweeded plots were observed by Seeyav and Philip (1970) and Savithri (1990) and are obviously due to severe crop weed competition for plant growth factors.

### Yield attributes and yield

The highest bunch yield was obtained from frequent monthly weeded plots till harvest ( $T_2$ ) which was on par with weeding up to lvp and weeding during hp ( $T_7$ ) and weeding up to bmp ( $T_8$ ) (Table 2). The difference in bunch weight observed under the different intervals of weeding was mainly due to difference in the yield components. Highest values for the number of hands and fingers were observed from frequent monthly weeded plots up to harvest and the values were lowest for unweeded control till harvest ( $T_1$ ).

In comparison with frequent monthly weeding ( $T_2$ ), unweeded control ( $T_1$ ), conventional weeding ( $T_3$ ), weeding withheld during evp ( $T_4$ ), weeding withheld during evp and lvp ( $T_5$ ), weeding withheld during lvp ( $T_6$ ), weeding withheld during bmp ( $T_7$ ) and weeding withheld during hp ( $T_8$ ) recorded reduction in yield to a tune of 30, 9, 26, 14, 6 and 5 per cent, respectively. Yield reduction to the extent of 42% was reported by Savithri (1990) due to crop weed competition in banana. Plots kept weeded by conventional weeding practice recorded higher yield than plot kept unweeded only during evp, evp combined with lvp, and lvp. The reduction in yield was more when weeding was withheld during evp and lvp compared to bmp and hp. So removal of weeds during the first six months period (evp and lvp) is more important than weeding carried out during bmp and hp for getting enhanced yields in banana.

### Economics

Economic analysis of cultivation (Table 2) revealed that the conventional method of weeding recorded the highest B/C ratio of 1.83. Plots monthly weeded till harvest showed a ratio of 1.65 followed by monthly weeding up to lvp combined with weeding during bmp (1.63) and weeding up to bmp, (1.61). In conventional weeding practice, cost of weeding operation is less with no perceptible yield reduction compared to monthly weeding till lvp combined with weeding during hp ( $T_7$ ) and weeding up to bmp ( $T_8$ ).

The high cost of labour required for manual weeding is the reason for the lesser profit realised from the frequent monthly weeded plots even though the returns were higher compared to conventional weeding practice.

Based on the results it can be concluded that weeding operation given within the six months period either by frequent monthly weeding or weeding during the first and second phenological stages or by the conventional weeding resulted in similar effect. Hence weeding during the first six months is critical in banana.

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