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Identification of critical stages of weed competition and its effect on banana

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ABSTRACT

An experiment was conducted to study the effect of the most critical stage of weed competition in banana. The treatments consisted of different weeding schedules as well as an unweeded control. It was found that early vegetative phase of growth of banana especially up to 3rd/6th months after planting (MAP) and bunch development stages are the critical stages of banana at which yield is affected. Cost benefit ratio indicated that frequent weeding, during first three MAP as well as during 6 to 9 MAP is less economic compared to other treatments.

Key words: Banana, Critical stages, Weed competition

Among the various factors limiting the growth and yield of banana, weed competition is one of the most important one. Frequent weedings are carried out by farmers to control weeds especially during the initial phases of crop growth. Weeding during the vegetative phase (1 to 6 months after planting) is very important and weed control during this period enhances fertilizer use efficiency and yield (Chadha 1999). Hemeng *et al.* (1994) reported a significantly higher number of leaves, maximum pseudostem girth and bunch weight following weeding at 4-week intervals. Keeping the crop free of weeds throughout the crop period resulted in 47% increase in yield over unweeded plot (Badgujaret *et al.* 2003) Similar results have been reported by Patel *et al.* (1999) with respect to the influence of different weeding frequencies on growth and yield of the banana cultivar *'Basrai'*.

The scarcity and high cost of labour are problems faced by the farmers which in turn is affecting the net returns from banana cultivation. The present study was undertaken to identify the most critical period of weed competition

MATERIALS AND METHODS

The study was conducted at the Banana Research Station, Kannara, Thrissur of Kerala Agricultural University. The experiment was laid out in RBD with three replications.

The treatment details were as follows: T_1- No weeding, T-$_2$ Weed free frequent weeding, T_3 - Traditional weeding practice (weeding three to four times according to severity of weed infestation), T_4 - No weeding till 3rd month and then weed free, T_5 - No weeding till 6th month and then weed free, T_6 - Weeding till 3rd month, no weeding 3-6 months, then weed free, T_7 - Weed free till 6th month, no weeding 6-7 month, then weed free, T_8- Weeding till 9th month and no weeding thereafter.

RESULTS AND DISCUSSION

Growth parameters recorded at different stages of growth showed that weed competition influenced the vegetative growth of plants (Table 1). Significant difference between treatments could be observed from four months after planting (MAP). The data showed that plants were taller when plots were kept weeded at least up to 6 month after planting (MAP). At flowering, treatments which were weed free (T_2, T_3, T_7 and T_8) recorded comparable heights indicating that weed competition during initial stages of growth of banana affects vegetative growth of plants.

Though significant difference in girth of plant could be observed only at 4th and 6th MAP, the highest values were observed in treatments which were weed free throughout (T_2, T_3) or up to 6 MAP (T_7) and 9 MAP (T_8).

There was not much variation in number of leaves produced. However, as in the case of height and girth, a reduction in values could be observed due to weed competition. At four MAP, all the treatments in which weeding was not carried out (T_1, T_5 and T_4) recorded lower leaf number compared to others.

Flowering got significantly delayed due to weed competition (Table 2). The days of flowering varied from 274 to 320 days in different treatments. The duration was maximum in unweeded plots (T_1) and plots which were kept unweeded up to 6 months after planting (T_5) which

Table 1. Growth attributes of banana (variety Palayankodan) as influenced by different weeding schedules

Treatment	Plant height (cm) Month after planing (MAP)							Pseudostem girth (cm) Month after planing (MAP)							Number of leaves per plant Month after planing (MAP)						
	2	3	4	5	6	7	8	2	3	4	5	6	7	8	2	3	4	5	6	7	8
T_1	59.8	86.6	120.3	138.4	168.9	221.2	255.4	19.6	27.0	35.4	41.2	50.4	59.2	64.3	5.2	8.2	7.8	8.1	9.3	11.4	12.4
T_2	72.9	98.0	138.1	159.9	196.1	237.3	268.6	22.4	29.4	41.7	46.0	55.6	60.2	67.0	5.8	9.2	8.0	8.8	9.6	11.6	13.5
T_3	64.6	88.9	138.9	157.0	204.2	246.3	281.1	21.2	29.5	40.8	43.2	55.3	63.0	67.9	5.9	9.0	7.8	9.2	10.0	11.2	13.8
T_4	57.2	81.8	119.8	139.5	272.5	229.2	267.4	17.8	25.7	34.9	41.3	59.7	61.3	68.7	5.3	8.2	7.4	8.9	9.8	11.6	13.0
T_5	57.3	83.5	114.7	138.6	168.1	213.4	247.0	18.8	25.8	33.7	39.7	50.0	58.3	64.4	4.8	7.9	6.9	8.7	9.2	11.0	13.3
T_2	63.3	88.2	120.2	142.8	181.9	230.6	264.9	21.0	28.0	36.2	42.2	52.1	59.3	65.6	5.6	8.6	7.5	8.4	9.3	10.9	12.8
T_2	66.1	94.2	133.0	148.4	186.4	237.9	272.9	21.7	29.4	38.9	45.1	53.4	60.8	66.7	5.6	8.8	7.9	8.8	9.8	11.3	12.8
T_2	64.0	100.0	138.6	161.3	195.8	253.4	289.8	20.9	30.6	40.9	45.3	55.3	62.4	68.0	6.5	9.9	7.6	8.7	9.7	11.7	13.1
LSD(P=0.05)	-	-	12.8	17.6	24.1	20.6	22.2	-	-	3.6	-	4.3	-	-	-	-	0.5	0.7	-	-	-

* Treatments details are given in materials and methods

Table 2 Days to flowering and harvest, gross return and B:C ratio of banana as influenced by different weeding schedules

Treatments*	Days to flowering	Days to harvest	Yield (t/ha)	Gross returns (Rs/ha)	Cost of cultivation (Rs/ha)	B:C ratio
T_1	320	404	21.45	207856	158400	0.94
T_2	279	375	33.98	236896	199900	1.18
T_3	289	374	34.32	238920	185400	1.29
T_4	296	377	29.70	207900	178650	1.16
T_5	307	399	28.82	201740	171900	1.17
T_6	292	387	31.94	223608	178650	1.25
T_7	289	386	30.13	213752	185400	1.15
T_8	274	368	33.18	232100	192150	1.21
SE	10	8	-	-	-	0.04
LSD (P=0.05)	21	17	-	-	-	0.10

* Treatments details are given in materials and methods, B:C - Benefit-cost

Table 3. Yield and yield parameters of banana as influenced by different weeding schedules

Treatments*	Yield (kg/plant)	No. of hands/ bunch	No. of fingers/ bunch	Length of bunch (cm)	Fruit weight (g)	Fruit girth (cm)	Pulp : peel ratio
T_1	9.75	9.7	210.5	63.2	68.2	10.7	2.8
T_2	15.45	11.7	179.8	60.7	61.8	10.5	3.0
T_3	15.60	10.2	187.4	66.1	68.9	10.6	3.3
T_4	13.50	10.4	183.6	60.6	60.2	10.1	3.2
T_5	13.10	9.7	202.3	63.8	62.8	10.4	3.0
T_6	14.52	10.6	194.4	63.9	61.9	10.5	3.0
T_7	13.69	10.3	190.0	64.7	60.9	10.6	3.0
T_8	15.08	10.1	184.7	67.5	70.5	10.9	3.2
LSD (0.05)	1.26	NS	NS	NS	NS	NS	NS

*- Treatments details are given in materials and methods, NS - Not significant

were statistically at par. All other treatments except T_4 (no weeding till 3 MAP) were also at par, indicating that weed competition during early stages of growth (upto 6 months) delays flowerings of banana.

Days to harvest showed almost a similar trend as that of days to flowering (Table 2). The range in values was from 368 to 404 days. Competition from weeds delays flowering and this in turn affects the days to maturity also. Frequent weedings, traditional weeding and weeding up to $6^{th}/9^{th}$ month after planting recorded lower values which were statistically at par.

Significant variation between treatments could be observed in bunch weights. The highest yield of 15.6 kg/ plant was recorded in traditional weeding (T_3) which was comparable to that of frequent weeding (T_2) and weed free till 9^{th} month (T_8) (Table 3)

The lowest yield of 9.75 kg/plant was significantly inferior to all weeding schedules. No weeding during the initial three months as well as no weeding during the bunch formation stage also recorded lower yields. Hence it can be inferred that early vegetative phase of growth of banana especially up to $3^{rd}/6^{th}$ MAP and bunch development stage are the critical stages of banana at which yield is affected.

Out of the different yield parameters studied, only the number of hands per bunch showed statistically significant variation between treatments, where T_1 (control) and T_5 recorded lower values compared to others. Number of fingers per bunch, length of bunch, fruit weight, length and girth of the fruit, as well as pulp peel ratio did not differ significantly. Durgadevi and Sathiamoorthy (1996) studied the influence of weed infestation in banana and found 18% increase in bunch weight when the crop was weeded until the 9^{th} month, left without weeding until the 12^{th} month and then kept weed free. They reported a yield loss of 54.7% when the crop was not weeded.

Cost of cultivation ranged from Rs 1,58,400/ha for T_1 to Rs 1,99,900/ha for T_2 (Table 2). The gross return /ha was highest for T_3, closely followed by T_2 and T_8. The B:C ratio was the highest for treatment T_3 (1.29) which was comparable to T_6 and T_8. Hence, it can be inferred that frequent weeding, with holding weeding during the first three MAP as well as during first six MAP and no weeding during bunch development stage is less economical in banana cultivation.

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