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Integrated weed management in rubber (*Hevea brasiliensis*)

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Weed management is an important and expensive agronomic input especially during the immature phase of rubber, which accounts for about 28% of the total cost of cultivation. Physical and chemical weeding are often used in rubber plantations for controlling weeds. Chemical weeding is more cost effective than manual weeding. But in view of the long term sustainable benefits and ecofriendly measures, an attempt was made to develop an integrated weed management which involves the deployment of both physical and chemical weed control measures for the management of weeds in the planting strips of rubber.

Methodology

A field experiment was conducted at Shaliacary Estate, Punalur from 1997 to 1999 to evaluate the efficacy of different weed management methods. Scraping the entire platform was kept as control and the other treatment were slashing the entire planting strip, spraying paraquat (gramoxone) 2.25 l + 2, ,4-D (fernoxone) 1.25 kg in the entire strip, spraying glyphosate (round up) 2 l in the entire strip scraping the plant basin and slashing the remaining area in the strip, spraying paraquat (gramoxone) 2.25 L + 2,4-D (Fernoxone) 1.25 kg in the plant basin and slashing the remaining area and applying glyphosate 2 l in the plant basin and slashing the remaining area. Leguminous cover crop *Mucuna bracteria* was established and maintained in the inter row spaces for the control of weeds in the inter row area in all treatments. The experimental design was randomized block with seven treatments and four replications. Plot size was 10 plants at a spacing of 22 × 11'. The girth of rubber was recorded annually. To study the effect of herbicides on soil micro organisms, soil samples were collected from all the plots at 0-15 cm depth 5 days after treatment imposition. Microbial population was enumerated by dilution plate technique. Economics of different treatments were worked out.

Table 1. Effect of weed control treatments on mean percent weed infestation (MPWI), mean weed dry matter production (MWDMP) of rubber, soil micro-organisms and economics

Treatment	MPWI (%) 1997-99	MWDMP (kg/ha) 1997-99	Girth (cm) (1999)	Bacteria ($x10^5$)	Actino mycetes ($x10^5$)	Fungi ($x10^3$)	Total cost (Rs)
Scraping entire platform	31.32	319	34	15	55	59	9000
Slashing entire platform	48.61	908	33	93	45	57	9375
Gramaxone fermoxone in the piatform	35.63	468	30	23	20	34	5092
Glyphosate in the platform	34.87	443	34	39	35	38	4300
Slash (interspaces) + scrap (plant basin)	40.59	623	33	77	22	51	7875
Slash (interspaces) + gram + Fer (plant basin)	39.20	523	33	48	65	55	5130
Slash (interspaces) + glypho (plant basin)	38.34	510	32	50	62	45	4469
CD (P=0.05)	3.50	141	NS	9	20	9	

Results

The weed control was most effective and significantly superior in scraped plots closely followed by glyphosate and gramoxone + fernoxone sprayed plots. (Table 1). The integrated approach of spraying glyphosate in the plant basin and slash weeding the remaining area also recorded a comparable percentage of weed infestation. Slash weeded plots were significantly inferior to all other treatments. The mean weed biomass accumulation at 45 days after treatment imposition also revealed that slashing was significantly inferior. The weed biomass was minimum in scraped plots followed by glyphosate treated plots which were comparable. The weed DMP in gramoxone + fernoxone sprayed plots and the treatments with herbicidal spray in the plant basin and slash weeding the interplant area were comparatively less and comparable.

The girth of rubber did not differ significantly among the treatments throughout the period under observation indicating that all the treatments were effective in controlling the weeds in the planting strips of rubber.

There was a significant reduction in the population of bacteria, actinomycetes and fungi following the application of herbicides. The treatments where herbicide application was restricted to the plant basin alone maintained a relatively higher population of all the soil micro-organisms studied. Scraping was found to reduce the bacterial population significantly. The slash weeded plots maintained a higher population of soil micro flora as expected. Glyphosate has been found to give long lasting control and hence it proved to be the most cost effective method among the different treatments. But the population of beneficial soil microorganisms was adversely affected by application of herbicides. The integrated weed control method of spraying either glyphosate or gramoxone + fernoxone in the plant basin and slash weeding the remaining area was found to be both cost effective and eco-friendly.

Conclusion

The application of glyphosate in the entire platform is the most cost-effective method. However, when we consider the long-term sustainable benefits, the integrated approach of spraying glyphosate in the plant basin and slash weeding the remaining area was found to be the best method for weed control in the planting strips of rubber, which is both cost effective and eco-friendly.

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Integrated weed management in turmeric (*Curcuma longa*)

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Turmeric (*Curcuma longa*) is one of the important cash crops of Maharashtra. It is grown in monsoon season and continues upto winter as the crop is of 9 months duration. The weeds are important enemy of the crop responsible to reduce the crop yield to considerable extent by competing for nutrient and moisture. In recent past the manual weeding has become costlier due to increase in labour wages and availability of labour in time is also a constraint.

Methodology

Field experimentation was carried out during *kharif* 1999-2000 and 2000-2001 with an objective to find out suitable economical integrated weed management technology for increasing the yield and economic returns. The experiment was laid out in randomized block design with eight treatments combinations. The treatments are, unweeded check, hand weeding at 3, 6, 9 and 12 week after planting. pre-emergence (PE) application atrizine @ 1.0 kg/ha followed by one hand weeding at 12 weeks after planting (T_3), PE-atrazine @ 0.75 kg/ha followed by two hand weeding at 9 and 12 weeks after planting (T_4), PE-pendimethalin @ 1.00 kg/ha followed by one