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PROSPECTS OF CHEMICAL WEEDING IN RUBBER PLANTATIONS

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Introduction

Weed control is one of the most important cultural practices in rubber plantations especially during the immature phase. Weeds compete with rubber for light in the initial years and for moisture and nutrients throughout the immaturity period. It has been reported that budded rubber under grass cover took upto seven months more and seedlings under *Mikania* sp took 11 months more to attain tappable girth compared to those under legume cover (1). Therefore, it is necessary to control weeds to reduce the immaturity period. Weeds may also serve as alternate host for pathogenic fungi and pests. They may cause fire hazard during the dry summer months. Uncontrolled growth of weeds will hinder cultural operations. Conventionally, manual weeding is adopted in rubber plantations. The cost of manually controlling weeds amounts upto 34% of the total cost of cultivation in the immature phase of rubber making it the most costly component. In fact, the weed control costs during the entire immaturity period (taken as 7 years) is upto 13% more than the entire cost of fertilizers and manures plus application charges and is 55% more than the plant protection costs during the same period. The present study was taken up to evaluate the possibilities of chemical weed control.

Strategy for weed control

Our objective is to integrate cultural, bilogical and chemical control measures to evolve an integrated weed management system which is cost effective cause reduction in immaturity, period and is ecologically safe.

To achieve the above goal a systematic research approach has been initiated at RRII. It involves research into screening of cost effective and environmentally safe herbicide combinations, more efficient and cheaper herbicide applicators, biological control of noxious weeds, cultural practices based on zero tillage and plastic mulches. A brief outline of the ongoing projects is enumerated here.

Herbicide Research

Currently we have screened 10 new herbicides of which three are pre-emergent and seven are post emergent. The pre-emergent herbicides are aimed for nursery weed control. Of the post emergent herbicides, Glyphosate has been found effective and hence recommended (2). Another herbicide Dicamba has been found to give excellent control of broadleaf weeds upto 3 months. Unfortunately this herbicide is not yet marketed in India. Research has been initiated into screening various herbicide combinations with different low cost additives to increase the efficiency in total weed control and in substantially reducing the costs. The effect of herbicides on beneficial soil microbes is also being investigated.

Applicator Research

Two new herbicide applicators have been tested and found to be superior in operational efficiency with Glyphosate and Dalapon compared to the conventional weedicide sprayers. Among these Aspee CDA, which is battery operated and currently available in India has been recommended with certain modifications and precautions for large plantations. Birky CDA which is manually operated was found suitable for small holders but is yet to be marketed in India (3). The CDA's require only 2.5 to 10% of water compared to the quantity used in common sprayers and they require only $\frac{1}{4}$th man days to spray one hectare whereas conventional sprayers need 2 or more man days. Thus there is a tremendous saving in water used for spraying especially in steep terrain where haulage is a problem and water is scarce.

Efforts are underway to fabricate a low cost direct contact applicator using the wiper

concept. These herbicide applicators are expected to cost only around Rs. 100/-. No drift hazard is expected with these sprayers and it will be possible to applying herbicides selectively even in areas with cover crop.

Spray shields have been found to be useful in reducing side drift hazard with the conventional sprayers thus minimising the risk to rubber plants and cover crop when non selective herbicides are used.

Bio-control research

The larvae of Parcuchaetus pseudoinsulatee was found to be promising for the control of *Chromoliane oderata* (Eupo orium). Further evaluations on large area are underway. If found effective these larvae could be used to check the spread of C. orderata.

Integration of weed, moisture and nutrient management in rubber seedling nurseries has been initiated with the use of plastic mulches and subsurface irrigation systems including perto-drip and leaky pipe techniques.

Recommendation

The strategy based on the results of field experimentation is to control weeds in the entire planting area and to establish legume cover crop which, by itself can smoother weeds. The plant basins are to be kept under mulch. These efforts will substantially reduce weed control costs. Clean weeding the planting strips by scraping with mammntty is to be avoided to reduce soil erosion and damage to the feeder roots of rubber. Slash weeding is not very effective in controlling weeds in the rainy season and since the fertilizer application coincides with this season, there will be considerable uptake of nutrients by the slashed weeds as their roots are intact.

An integrated weed management system based on zero tillage, using plant basin mulches, legume cover crops and judicious use of herbicides is therefore recommended. This integrated approach will help in soil moisture and nutrient conservation and reduce damage to feeder roots, thereby increasing the growth rate of rubber.

The herbicide combinations recommended are based on type of weed flora which is predominant.

Conclusions

A herbicide based integrated weed management system could replace the conventional manual weed control followed in rubber plantations. The adoption of this new system can save upto 28.6% of the weeding costs. Moreover, the fertilizer use efficiency could be substantially increased by keeping the fertilizer patches completely weed free with herbicide. This system may also help conserve soil and moisture in rubber plantations. However utmost caution is necessary while spraying young clearing with these herbicides against drift. It is also necessary to use trained workers. The workers should wear spray protectives. While it is a boon to labour short areas for effecting timely operations, the sudden shift to herbicide may cause some socioeconomic problems. The saving on labour on this account could utilised for much needed soil conservation practices like silt pit and contour bund maintenance.

The recommendations given are generalised and are only intended as guideline. The type of herbicide combinations for specific areas should be selected on the basis of specific weed species present.

References

1. 1977. Legume cover crops for Rubber small holdings, Pl. Bull. Rubb. Res. Inst. Malaysia. No. 150, 83-87.

2. 1987. Rubber Grower's Companion.

3. Mathew M & George C. M. 1975. The outlook and prospects of chemical weed control in Rubber plantations in India. Rubb. Board Bull. 12, 2;pp 69-73.

Programme for herbicide based weed control in the planting strips and manual weeding (slashing) in the inter-row areas : (Area of planting strips alone in 1 hectare of planted area = 0.20 hectare)

HERBICIDE COMBINATION (A)

	Planting strip = Area = 0.20 hectare				Interrow areas		Total Cost per ha. (1)+(2)	Cost of manual weeding alone -in planting strips & interrows	Saving in Rs when herbicide based weed control in planting strips and slashing in interrow areas for 1 ha. of rubber	% saving
Year of planting	Herbicide combination and rate	spray schedule	Target weeds	(1) Total cost per year Herbicide cost+application charge Conventional sprayer	(2)Manual weeding (*Slashing and mulching*) No. of workers	Cost				
1st year	Gramaxone 0.51+Fernoxone = 0.25 kg Tank mix in 120 l of water	First Round May-June Second Round July-Aug Third Round Sept-Oct Fourth Round Nov Dec.	Broad leaf dominated areas	Rs.73 per pound	10 10 10 10	250 250 250 250				
	Cost for Ist year			Rs 292.00	40	1,000	1292.00			
2nd to 7th year	Same as above			1,752.00	104	2,600	4352.00			
	TOTAL FOR 7 YEARS						Rs. 5644.00	7900.00	2256.00	28.6

HERBICIDE COMBINATION (B)

Year of planting	Herbicide combination and rate	spray schedule	Target weeds	(1) Total cost per year (Herbicide cost + application charge) Conventional sprayer	(2) Manual weeding (slashing and mulching) Interrow areas No. of workers	Cost	Total cost per ha. (1) + (2)	Cost of manual weeding alone in planting strips & interrows	Saving in Rs. when herbicide based weed control in planting strips and slashing in interrow areas for 1 ha. of rubber	% savings
	Planting strip = Area = 0.20 hectare									
Ist year	Dalapon = 1Kg followed after 10 days by Gramaxone = 0.41 in 1201. of water	1st Round May-June 2nd Round September 3rd Round (Optional) Nov-Dece.	Narrow leaf dominated areas	Rs. 130/- per pound	Ist round 10 2nd round 10 3rd round 10 4th round 10	250.00 250.00 250.00 250.00				
				390		1,000.00	1,390.00			
2nd year to 4th year	Same as above			2,340/-	104	2,600,00	4,940 00			
	TOTAL FOR 7 YEARS						6,330.00	7,900.00	1,570.00	20

HERBICIDE COMBINATION (C)

Planting strip – Area = 0.20 hectare					Interrow areas					
Year of planting	Herbicide combination and rate	Spray schedule	Target weeds	(1) Total cost per year (Herbicide cost application charge) conventional sprayer	(2) Manual weeding (slashing and mulching) No. of workers	cost	Total Cost per ha. (1)+(2)	Cost of manual weeding along in planting strips & interrows	saving in Rs. when herbicide based weed control in planting strips and slashing in interrow areas for I ha. of rubber	% saving
1st year	Glycel on weedaff 0.41 in solution of water Gramaxone 0.51+Fernoxone = 0.25 kg Tank mix in 96 lits. of water	Ist round May-June	Both broad-leaf & narrow leaf	150.00	4 rounds @ 10 workers per round	1,000				
		2nd round Aug-Sept.	Predominantly broad-leaf	75.00 per round						
	Glycel or weedaff 0.41 in 80 lits. of water	3rd round Nov-Dece.	Both broad leaf ond narrow leaf weeds	150.00						
	Cost in Ist year			373.00	40	1,000/-	1,373.00			
2nd year to 7th yr.	Same as above			2238.00	104	2,600/-	4,838.00			
	TOTAL FOR 7 YEARS						6,211.00	7,900.00	1,689.00	21

SYSTEM-1 Herbicide based weed control system in planting strips & manual weeding in the inter row areas	TOTAL COST FOR ENTIRE IMMATURITY PERIOD 7 YEARS	TOTAL COST OF MANUAL WEEDING ALONE IN PLANTING STRIPS + INTERROW AREAS	AMOUNT SAVED BY ADOPTING SYSTEM 1	% OF SAVINGS
BASED ON HERBICIDE COMBINATION–A	Rs. 5644.00	Rs. 7900.00	Rs. 2256.00	28.6
BASED ON HERBICIDE COMBINATION–B	Rs. 6330.00	Rs. 7900.00	Rs. 1570.00	20
BASED ON HERBICIDE COMBINATION-C	Rs. 6211.00	Rs. 7900.00	Rs. 1689.00	21