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Post-emergence Management of *Cynodon dactylon* (L.) Pers. in Mulberry Plantation

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ABSTRACT

Perennial weed, *Cynodon dactylon* L. is one of the most troublesome weeds in mulberry plantations. Treatments comprising hand weeding and intercropping with cowpea recorded the lowest weed density and dry weight. The total weed control efficiency ranged between 76.6 and 52.6%, while the efficacy against *C. dactylon* ranged between 77.8 and 37.2%. The leguminous intercrop had a positive and significant influence on mulberry growth and yield.

Key words : Glyphosate, paraquat, mulberry, weed management, *Cynodon dactylon*

INTRODUCTION

Crop-weed competition is a limiting factor in the growth of mulberry plant and the crop yield loss is to the tune of 31.6%. *Cynodon dactylon* and *Cyperus rotundus* were the dominants among the most troublesome perennial weeds infesting mulberry field and both of them together accounted for 79% of the total weed population (Kasiviswanathan *et al.*, 1978).

To overcome the weed problem, different methods like manual weeding, inter-cultivation, physical, chemical and biological methods are being practised. The prohibitive labour cost makes manual weeding more expensive and time consuming. Herbicides may contribute significantly to a general impoverishment of the flora and fauna in the cultivated fields (Marshall *et al.*, 2003). In a system like sericulture spraying chemicals for weed control may be toxic to silkworm rearing. Hence, cultural-cum-biological method of weed control will be an alternative viable practice.

MATERIALS AND METHODS

Field experiments were conducted in the Department of Sericulture, Agricultural College and Research Institute, Tamil Nadu Agricultural University, Coimbatore to manage the perennial weed *C. dactylon* in mulberry garden. Experimental site was an established mulberry garden with VI variety (two years old). The texture of the soil in the experimental plot is sandy clay loam. The selected mulberry field was divided into 24 plots to accommodate eight treatments in three replications. Single plot size was 40 (8 x 5 m) square metre with spacing of 90 x 90 cm. Bunds and irrigation channels were formed using spade.

The experiments were conducted in a randomized block design (RBD) in three replications. The treatments imposed were hand weeding twice (one immediately after pruning and the second on 25th day of pruning), hand weeding and mulching (hand weeding immediately after pruning followed by mulching within a week with coir pith @ 12.5 t/ha), post-emergence application of glyphosate 10 ml+20 g ammonium sulphate+2 ml soap per litre of water, post-emergence application of glyphosate 10 ml+20 g ammonium sulphate+2 ml soap per litre of water and mulching with coir pith @ 12.5 t/ha, post-emergence application of paraquat 6 ml+2 ml of soap per litre of water, post-emergence application of paraquat 6 ml+2 ml of soap per litre of water and mulching with coir pith @ 12.5 t/ha, hand weeding after pruning and intercropping with cowpea and unweeded check. For the intercrop treatment, cowpea variety CO 1 was sown in between mulberry rows at spacing of 30 x 15 cm. Seeds were sown at the rate of 20 kg/ha. Three rows of intercrop were raised in between two rows of mulberry. Coir pith was applied at 12.5 t/ha in the inter row spacing after hand weeding and herbicide application in the respective treatments. Recommended package of practice was followed for the cultivation of mulberry.

In situ observations on weed population were

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assessed on 20, 40 and 60 days of pruning on weeds in each plot randomly at five different places and were expressed as mean number per square metre. Biometric characters of mulberry were recorded at harvest (60 days after pruning) from five randomly selected plants.

RESULTS AND DISCUSSION

Weed Flora of the Experiment

In the experimental site, a total of 13 species of weeds were recorded. This comprised three species of grassy weeds viz., *Cynodon dactylon, Aerva tomentosa* and *Chloris barbata*, one species of sedges viz., *Cyperus rotundus* and nine species of broad-leaved weeds viz., *Parthenium hysterophorus, Amaranthus viridis, Euphorbia hirta, Cleome viscosa, Corchorus capsularis, Mollugo lotoides, Gynandropsis pentaphylla, Tridax procumbens* and *Croton sparsiflorus.*

Weed Dry Weight

The dry weight of weeds recorded on 20, 40 and 60 days after pruning is presented in Table 1.

The comparative efficacy of different management practices was reflected in terms of weed dry weight. The total weed weight was the lowest (1.45 g/m^2) in hand weeding after pruning and intercropping with cowpea and was the highest (6.75 g/m^2) in unweeded check on 60 DAP. The dry weight of *C. dactylon* was reduced to 1.00 g per square metre in hand weeding after pruning and intercropping with cowpea treatment as against 4.60 g per square metre in unweeded check on 60 DAP.

Hand weeding and mulching with coir pith and hand weeding twice were not statistically different and uniform in their efficacy in reducing the dry matter production of total weeds and were ranked second.

Effect of Weed Management on Weed Control Efficacy

Weed control efficiency of different treatments on 60 DAP is presented in Table 2. The efficacy of controlling both total weeds and *C. dactylon* was similar. The effect of different weed management practices in reducing the dry matter production of weeds was worked out in terms of per cent efficiency. The efficiency varied between 74.35 and 52.60% on 60 DAP.

In *C. dactylon* control it ranged between 69.75 and 21.95%. The order of weed control efficiency was hand weeding and mulching (70.1%)>hand weeding twice (60.0%), glyphosate+mulching (55.8%), glyphosate (53.55%) and paraquat and paraquat+ mulching (52.60%).

Table 1. Pooled data of effect of weed management practices on weed dry matter production (I & II season)

Treatments	Weed dry matter (g/m^2)								
	Total weed			*Cynodon dactylon*			Other weeds		
	20 DAP	40 DAP	60 DAP	20 DAP	40 DAP	60 DAP	20 DAP	40 DAP	60 DAP
Unweeded check	6.75	6.4	6.75	4.4	4.65	4.6	2.35	1.75	2.15
Hand weeding twice	3.15	2.85	3.15	2.4	2.35	2.35	0.75	0.5	0.8
Hand weeding and mulching	2.8	2.5	2.45	1.8	1.8	1.7	1.00	0.7	0.75
Post-emergence application of glyphosate @ 10 ml+20 g ammonium sulphate+2 ml soap per litre of water	3.35	3.55	3.05	2.75	2.65	2.5	0.6	0.9	0.55
Mulching with coir pith @ 12.5 t/ha	3.3	3.00	3.45	2.55	2.35	2.45	0.75	0.65	1.00
Post-emergence application of paraquat 6 ml+2 ml of soap per litre of water	4.55	4.5	4.55	2.9	3.2	3.05	1.65	1.3	1.3
Mulching with coir pith @ 12.5 t/ha	4.00	4.3	3.55	2.75	3.1	2.95	0.75	1.2	1.1
Hand weeding after pruning and intercropping with cowpea	2.15	1.45	1.45	1.45	1.35	1.15	0.7	0.1	0.3
LSD (P=0.05)	0.035	0.045	0.035	0.055	0.05	0.55	0.095	0.095	0.435

Table 2. Weed control efficiency in different treatments (60 DAP) and their effect in mulberry growth parameters and yield

Treatments	Weed control efficiency (%)					Mulberry growth parameters and yield				
	Total weeds	*Cynodon dactylon*	Other grasses	Sedges	Broadleaf weeds	Shoot length (cm)	No. of branches/ plant	No. of leaves/ branch	100-leaf weight (g)	Leaf yield (kg/ha/ harvest)
T_1	-	-	-	-	-	87.65	8.3	21.16	258.50	8416-95
T_2	60.0	40.25	25	68.75	100	92.2	9.4	25.7	389.63	12122.45
T_3	70.1	56.65	100	28.3	100	96.9	9.45	26.15	405.18	12182.55
T_4	53.55	33.85	50	33.3	100	91.1	9.15	23.07	312.97	10222.25
T_5	55.8	37.75	15	78.3	100	91.80	9.35	24.04	352.93	10529.35
T_6	49.3	21.95	100	100	55.8	90.5	8.75	22.58	295.83	10087.7
T_7	52.6	23.9	100	33.3	55.35	91.91	9.05	23.73	347.23	10433.15
T_8	74.35	69.75	100	42.05	100	98.7	9.45	27.67	440.25	12608.85
LSD (P=0.05)	-	-	-	-	-	3.51	0.45	1.12	32.28	101.95

Treatment details are given in Table 1.

Hand weeding after pruning and intercropping with cowpea was the most efficient treatment in controlling both total weeds as well as *C. dactylon.* In the absence of in-crop herbicide application, intercropping seemed to be the most consistent crop treatment in terms of biomass production because it was the most productive treatment. Covering or mulching the soil surface can prevent weed seed germination or physically suppress seedling emergence but is not so effective against established perennial weeds, whereas living mulch consisting of a dense stand of low growing species can smother even the perennial weeds (Bond and Grundy, 2001).

The mulch suppressed the growth of bermudagrass tubers production by 49% and shoot population by more than 96% relative to non-mulch control in vegetable crop production.

Effect of Weed Management on Mulberry Growth and Yield

All the management practices had positive and significant influence on shoot length, number of branches per plant and number of leaves per branch. The increase in growth parameters might be due to the absence of competition for above ground and below ground factors of crop production. Sikdar *et al.* (1987) reported that the treatment with herbicide and hand weeding gave significantly longer shoots, more number of branches per plant and more number of leaves per plant than control. The influence of weed management practices on mulberry yield parameters was more conspicuous than mulberry growth parameters. The treatment, hand weeding after pruning and intercropped with cowpea was the most effective in increasing the leaf weight and leaf yield in both the seasons. Treatment involving hand weeding and mulching and treatment hand weeding twice were the next best treatments.

Shoot length, number of branches per plant and number of leaves per branch were maximum recorded on cowpea intercropped (98.70 cm, 9.45 and 27.67). Minimum were recorded on unweeded check (87.65 cm, 8.30 and 21.16).

In cowpea intercropped treatment recorded the highest 100 leaf weight of 440.25 g as compared to 258.50 g in unweeded check. The highest leaf yield of 12608.85 kg/ha/harvest was recorded in the treatment with intercropping against an yield of 8042.4 kg/ha/ harvest recorded in unweeded check (Table 2). Lei Gong *et al.* (1994) reported that when intercropping was followed in mulberry plantations, activities related to intercrop planting; managing and harvesting brought in an increased number of operations such as ploughing, weeding and irrigation to the field. All these operations not only promote growth of the intercrops, but also loosen the soil, increase organic matter of the field and improve soil fertility, making it favourable for mulberry growing. Therefore, mulberry leaf yield increases resulting in cocoon output also.

A collective analysis of different treatments showed that hand weeding after pruning and intercropping with cowpea was found to be the most effective in controlling weed dry matter production excising through the highest weed control efficiency.

It also increased the growth and yield of mulberry through reduced weed competition. From this study, it may be concluded that for the control of perennial weeds like *C. dactylon* cultural-cum-biological method of growing intercrop is more effective than other treatments.

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