



Impact of Crop-Weed Competition on Growth and Yield of Mulberry (*Morus indica* L.)

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An experiment was conducted to find out the effect of crop weed competition on growth and yield of mulberry during 2010-11 at Department of Sericulture, University of Agricultural Sciences, Bangalore. The pooled data of two crops revealed that weed free period of 75 days improved plant height (119.4 cm), number of shoots per plant (13.10), number of leaves per plant (138.8), leaf area per plant (4825cm²) and dry weight per plant (22.85g) significantly as compared to weed free period of either 60 days or less and weedy check. Consequently, leaf yield of mulberry was significantly higher in plot kept free up to 75 days after pruning (6446 kg/ha) as compared to other weed free period and weedy check. All the growth characters showed positive correlation with mulberry leaf yield.

Key words: Mulberry, crop-weed competition, growth, yield.

Mulberry leaf forms the basic food material for silkworm and bulk of the silk produced in the world comes from mulberry silkworm. Growing of mulberry is the first and foremost pre-requisite for successful mulberry silkworm rearing. Improved quality of leaf at most has a direct bearing on cocoon production which ultimately enhances the income of rural people. The weed competition in mulberry may cause considerable yield losses. Weeds are harmful, interfere with the agricultural operations, increase labour input, add to the cultivation cost and reduce the crop yields considerably, apart from lowering the quality of the produce. Weeds growing in mulberry garden leads to the competition to mulberry plant for uptake of nutrients which causes reduction in the yield and quality of mulberry leaf (Muniyappa *et al.* 2000). From the economic point of view, in mulberry plantation pose a serious problem, which affects to reduce the yield of leaf and automatically which affects on the production of cocoon and silk (Isaiarasu and Ganeshan, 2005; Setua *et al.*, 2008). So weeding is very essential every year, whereby their effect can be minimized in mulberry garden.

Materials and Methods

Field experiments in mulberry were conducted to find out the critical period of crop weed competition in the established mulberry garden at the Department of Sericulture, University of Agricultural Sciences, Gandhi Krishi Vignana Kendra, Bangalore during 2010-11. Ten years old M₅ mulberry variety under rainfed condition was used

during *kharif* 2010 to *summer* 2011. The observations were recorded on two crops. The soil was red sandy loam having 6.1 pH, electrical conductivity of 0.07 dSm⁻¹ and organic matter content of 0.40 per cent. The available N, P₂O₅ and K₂O were 193.1, 35.1 and 148.1 kg/ha respectively before the imposition of treatments.

Five treatments were arranged in a randomized complete block design (RCBD) with four replications. The treatments were T₁- Weedy check (no weeding up to 75 days after pruning), T₂- Weed free period up to 20 days after pruning (DAP), T₃ - Weed free period up to 40 DAP, T₄ - Weed free period up to 60 DAP and T₅ - Weed free period up to 75 DAP. Weed free periods were maintained by hand weeding. The gross plot sizes were 7.2m x 5.4m and net plot size was 3.6 x 3.6m respectively. A spacing of 90cm X 90cm and a common fertilizer dose of 300:120:120 kg/ha/yr was adopted for taking up the crop. The observations on plant height (cm), number of shoots per plant, number of leaves per plant, leaf area per plant (cm²) leaf yield per ha/crop (kg) and Leaf dry matter per plant at 60 DAP were recorded. Weed density (category wise *viz.*, sedges, grasses, broad leaf weed) at 60th DAP and weed dry weight (g/m²) (sedges, grasses, broad leaf weeds) at 60th DAP were recorded.

Results and Discussion

The density and dry weight of sedges, grasses, broad leaf weeds and total density of weeds differed significantly due to weed free periods at 60 days after pruning (Table 1 and 2). Among the different weed free periods, there was significant increase

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in growth parameters of mulberry due to increase in weed free up to 75 days (Table 3&4). The maximum plant height (119.4 cm), higher number of shoots per plant (13.10) and more number of leaves per

plant (138.8) at 60 DAP was recorded in mulberry kept weed free for 75 days. All these attributes helped in obtaining maximum leaf area per plant (4825cm²) and leaf dry weight per plant (22.85 g) at 60 DAP.

Table 1. Influence of weed free periods on weed density (no/m²) in mulberry at 60 days after pruning

Treatment	Sedges +			Grasses +			Broad leaf weeds #			Total weeds #		
	2010K	2011S	Pooled	2010K	2011S	Pooled	2010K	2011S	Pooled	2010K	2011S	Pooled
T1	6.4(40.0)	5.3(27.5)	1.9(83.0)	1.4(26.0)	1.65(54.5)	2.2(162.0)	1.9(77.0)	2.05(119.5)	5.86(33.7)	6.3(39.0)	4.9(23.5)	5.63(31.2)
T2	4.4(18.0)	3.7(12.5)	1.8(61.5)	1.1(19.0)	1.47(40.2)	2.0(94.0)	1.5(38.5)	1.76(66.2)	4.01(15.2)	3.9(14.5)	2.8(7.0)	3.32(10.7)
T3	4.1(15.5)	3.5(11.5)	1.3(21.0)	0.9(6.0)	1.10(13.5)	1.7(49.0)	1.5(27.2)	1.57(38.1)	3.80(13.5)	3.6(12.5)	3.1(9.75)	3.33(11.1)
T4	1.0(0.0)	1.0(0.0)	0.3(0.0)	0.3(0.0)	0.30(0.0)	0.3(0.0)	0.3(0.0)	0.30(0.0)	1.00(0.0)	1.0(0.0)	1.0(0.0)	1.00(0.0)
T5	1.0(0.0)	1.0(0.0)	0.3(0.0)	0.3(0.0)	0.30(0.0)	0.3(0.0)	0.3(0.0)	0.30(0.0)	1.00(0.0)	1.0(0.0)	1.0(0.0)	1.00(0.0)
SEm±	0.05	0.13	0.06	0.10	0.04	0.04	0.06	0.02	0.05	0.24	0.33	0.12
CD (P= 0.05)	0.16	0.41	0.19	0.29	0.12	0.12	0.18	0.07	0.13	0.74	1.00	0.35

Data in parentheses are original values, + = square root of (x+1)

T1- Weedy check (No weeding throughout crop growth period. i.e. up to 75 days after pruning) ; T2- Weed free period up to 20 days after pruning (DAP); T3- Weed free period up to 40 (DAP); T4- Weed free period up to 60 (DAP); T5- Weed free period up to 75 (DAP). K - *kharif*, S - *summer*

Thus, profound increase in plant height, more number of shoots, number of leaves per plant, leaf area per plant and leaf dry weight per plant due to increase in the weed free duration from 0 to 75 days was due to reduction in weed competition which favoured better growth of mulberry plant as explained

by Muniyappa and Shivakumar (1999). As the mulberry crop was raised with prolonged weed free duration, the competition for nutrient and their uptake by the weeds was less, due to reduction in the weed density and weed dry weight. The findings of Muniyappa and Shivakumar (1999) who have shown

Table 2. Influence of weed free periods on weed dry weight (g/m²) in mulberry at 60 days after pruning

Treatment	Sedges #			Grasses #		
	2010 K	2011 S	Pooled	2010 K	2011 S	Pooled
T1	1.94(84.8)	1.6(84.7)	1.81(53.0)	2.34(21.4)	1.92(82.5)	2.13(136.5)
T2	1.60(38.1)	1.3(62.1)	1.48(23.9)	1.89(81.2)	1.36(24.5)	1.63(50.8)
T3	1.54(32.8)	1.3(19.58)	1.44(20.5)	1.80(70.0)	1.43(34.1)	1.62(43.8)
T4	0.30(0.0)	0.30(0.0)	0.30(0.0)	0.30(0.0)	0.30(0.0)	0.30(0.0)
T5	0.30(0.0)	0.30(0.0)	0.30(0.0)	0.30(0.0)	0.30(0.0)	0.30(0.0)
SEm±	0.01	0.03	0.01	0.07	0.10	0.04
CD (P= 0.05)	0.03	0.08	0.03	0.21	0.31	0.11
Treatments	Broad leaf weeds #			Total weeds #		
	2010 K	2011 S	Pooled	2010 K	2011 S	Pooled
T1	3.35(224.1)	2.61(49.4)	2.98(140.1)	7.63(254.2)	6.22(623.0)	6.92(159.0)
T2	3.22(166.0)	2.34(36.1)	2.78(103.8)	6.72(177.8)	5.06(406.7)	5.89(111.2)
T3	2.69(567.0)	2.03(11.4)	2.36(35.4)	6.03(669.8)	4.79(167.6)	5.41(418.7)
T4	0.30(0.0)	0.30(0.0)	0.30(0.0)	0.90(0.0)	0.90(0.0)	0.90(0.0)
T5	0.30(0.0)	0.30(0.0)	0.30(0.0)	0.90(0.0)	0.90(0.0)	0.90(0.0)
SEm±	0.07	0.11	0.05	0.13	0.16	0.07
CD (P= 0.05)	0.22	0.33	0.13	0.41	0.48	0.20

Data in parenthesis are original values, +=square root of (x+1), #=Log (x+2).

that initial weed free period of 90-100 days in newly planted mulberry and weed free period of 35-45 days in pruned crop, are required for obtaining higher leaf yield with improvement in growth and support to the present findings. Further, leaf area per plant increased significantly from 996.7cm² in weedy check to 4825cm² in weed free period up to 75 days. As observed with number of leaves per plant, the

leaf area per plant increased significantly with successive increase in weed free periods as also evident from the positive correlation observed between two traits. (Table 5). As observed with leaf area per plant, leaf dry weight per plant also showed significant increase from 8.84 g in weed check to 22.85g in weed free up to 75 days after pruning. Thus, successive increase in weed free of 20 days

Table 3. Growth parameters of mulberry as influenced by weed free periods at 60 days after pruning

Weed free periods	Plant height, (cm)			No. of shoots per palnt			No. of leaves per plant		
	2010 Kharif	2011 Summer	Pooled	2010 Kharif	2011 Summer	Pooled	2010 Kharif	2011 Summer	Pooled
Weedy check	101.63	96.33	98.98	9.50	8.30	8.90	61.50	54.50	58.00
WF-20 DAP	102.35	94.40	99.14	10.50	10.00	10.30	86.80	80.50	83.60
WF-40 DAP	107.99	96.75	103.62	11.80	11.00	11.40	105.00	100.00	102.50
WF-60 DAP	113.98	102.00	107.99	12.50	12.00	12.30	125.80	117.80	121.80
WF-75 DAP	124.68	111.68	119.44	13.30	13.00	13.10	144.50	133.00	138.80
SEm±	2.61	5.05	1.98	0.41	0.25	0.20	1.59	0.89	0.60
CD (P= 0.05)	8.05	15.55	5.76	1.25	0.77	0.40	4.89	2.73	1.70

DAP-Days after pruning, WF-Weed free

Table 4. Leaf area per plant (cm²), leaf dry weight per plant (g) and leaf yield of mulberry as influenced by weed free periods at 60 days after pruning

Weed free periods	Leaf area per plant (cm ²)			Leaf dry weight per plant (g)			Yield per hectare (kg/crop)		
	2010Kharif	2011 Summer	Pooled	2010Kharif	2011 Summer	Pooled	2010 Kharif	2011 Summer	Pooled
Weedy check	1038	954	996	9.46	8.23	8.84	2005	1916	1961
WF-20 DAP	1894	1643	1768	13.09	10.35	11.72	3461	3305	3383
WF-40 DAP	2407	2153	2280	18.15	17.28	17.71	4615	4436	4526
WF-60 DAP	4129	3373	3751	20.92	19.96	20.44	5579	5401	5491
WF-75 DAP	5239	4410	4825	24.16	21.54	22.85	6526	6365	6446
SE \pm	73	173	65	0.44	0.66	0.26	142	151	67
CD(P= 0.05)	226	534	189	1.36	2.05	0.74	440	465	195

DAP-Days after pruning, WF-Weed free

increased the leaf area per plant, leaf dry weight per plant and number of leaves per plant in mulberry owing to less competition offered by weeds due to weed free period. Providing weed free period of first 20 days after pruning and above increased the leaf yield significantly as compared to weedy check (1961

kg/crop). Significantly higher leaf yield was obtained in plot with weed free period of 75 days after pruning (6446 kg/ha/crop) as compared to weedy check (1961kg/crop) (Table 4). Weed free period of 75 days in mulberry improved the growth parameters viz., plant height, number of shoots per plant, number of

Table 5. Correlation co-efficient between leaf yield of mulberry with growth parameters during kharif 2010 (60 days after pruning)

Variables	Leaf Yield	Plant height	Shoots/plant	Leaves/plant	Leaf area/ plant	Leaf dry wt/Plant
Leaf yield (kg/ha)	1	0.898*	1.000**	1.000**	0.970**	0.989**
plant height (cm)		1	0.885*	0.902*	0.956*	0.887*
Shoots per plant (No.)			1	0.999**	0.964**	0.989**
Leaves per plant (No.)				1	0.975**	0.987**
Leaf area per plant at 60 DAP (cm ²)					1	0.952*
Leaf dry weight per plant at 60 DAP (g)						1

(60 - Days after Pruning)

*Correlation is significant at the 0.05 level (2-tailed). **Correlation is significant at the 0.01 level (2-tailed). n=20.

leaves per plant, leaf area per plant and consequently favoured higher mulberry leaf yield, as a result of lack of weed competition, as explained by earlier studies of Das *et al.* (1971), Muniyappa and Shivakumar (1999) and Setua *et al.* (2005, 2007). Weed competition as observed in the unweeded control lowered the leaf yield owing to lower growth components (1961kg/ha/yr) in weedy check. The present study through correlation indicated that plant height, number of leaves per plant, leaf area per plant and leaf dry weight per plant showed positive and significant relationship with mulberry leaf yield. This suggested that weed free period resulting in better growth will directly influence the leaf yield of mulberry as indicated by Setua *et al.* (2005). Thus, mulberry crop under red sandy loam soil required a weed free period of 75 days to achieve higher leaf yield as a result of better yield parameters.

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