

Influence of Weed Competition at Different Stages of Growth on the Yield of Rainfed Cotton MCU 6 in the Black Soils of Kovilpatti Tract

By

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ABSTRACT

Field experiments with MCU 6 cotton were laid out on black cotton soil at Kovilpatti during 1972—1973 to study the effect, on cotton yield, of keeping the field weedy or weed free at different stages of crop growth. In both years the critical period of weed competition was between 30 and 60 days, before and after which the presence of weeds did not produce adverse effects on cotton yields. A high negative correlation could also be established between weight of weeds and yield of cotton.

INTRODUCTION

In a long duration crop like cotton weed infestation causes severe reduction in yield if weeds were not controlled. In Rhodesia, Schewerzel and Thomas (1971) reported that in wet season, there was no yield reduction if the cotton crop remained unweeded for first six weeks; there was also no reduction in yield when it was weeded only for the first eight weeks and thereafter remained unweeded. Thus the critical period of weed crop competition was between six and eight weeks after seeding. Chokkey Singh *et al.* (1971) have reported that in the black soils of Indore weed control at 15th day and 55th day after emergence resulted in better crop growth and highest yield in cotton. Changule and Khare (1962) from Maharashtra have reported 39.8 per cent reduction of yield in rainfed cotton due to weed infestation. It will

not be economical to keep the fields completely free of weeds up to maturity, since the cost of 8–10 weedings will be very high. So it is essential to find out the optimum number of weedings required and the appropriate time during which only weeding should be done for getting maximum net returns. Hence, an experiment was conducted to determine the critical stages at which weeds must be removed to maximise cotton yields and also the periods when weeds may be allowed to grow without significant adverse effect on the yields.

MATERIALS AND METHODS

The experiment was laid out during Rabi 1972 and 1973 at Kovilpatti under rainfed conditions in the black soils. The treatments consisted of two distinct series, a weed-free series and a weed-infested

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one. During *Rabi* 1972, in the first series the crop was kept weed free for the first 10, 20, 30, 40 and 50 days after seedling emergence and the weeds were allowed to grow later on; in the second series the crop was kept weed infested for the first 10, 20, 30, 40 and 50 days after seedling emergence and thereafter free of weeds up to harvest. The control was free of weeds up to harvest in the first series and weed infested up to harvest in the second series. But during *Rabi* 1973 in addition to the above, the periods of treatments were extended to 60, 70, 80 and 90 days after seedling emergence in both weed free and weed infested series to cover a longer period of the growth cycle.

The above treatments were tested in randomised block design with three replications. Cotton cultivar MCU 6 (Bharathi) was sown at the commencement of north-east monsoon using a seed rate of 20 kg/ha adopting the standard spacing of 45 × 25 cm. Fertilisers at 40 kg N/ha and 20 kg P₂O₅/ha were applied. Both monocot and dicot weeds of different species germinated in abundance with the emergence of seedlings. The most abundant weed species found were *Panicum isachne*, *Cynodon dactylon* and *Setaria glauca* among monocots, and *Euphorbia hirta*, *Alysicarpus rugosus*, *Chrozophora rotthleri*, *Aristolochia bracteata*, *Phyllanthus maderaspetensis*, *Clitoria ternata*, *Cleome viscosa* and *Cyanotis cucullata*, among dicots. Weeds were removed by manual labour once in 10 days as per treatments. The yield of cotton kapas was used in the first instance as indicator of weed-crop

competition as suggested by Schewerzel and Thomas (1971) on cotton. The wet weight of weeds was recorded at each weeding. The rainfall during the crop period was above average. Annual rainfall was 1008 mm and 821 mm during 1972 and '73 respectively.

RESULTS AND DISCUSSION

The mean yield of cotton kapas as influenced by the weed competition was found to be significant (Table 1) in both the years. During *rabi* 1972 treatments weed free for first 50 days and upto maturity and weed infested for first 10, 20 and 30 days were statistically superior to the rest of the treatments, and the above treatments were on par with each other. Similar results were also obtained during *rabi* 1973, when weed free condition up to maturity was statistically superior to the rest of the treatments, and was on par with weed free conditions for the first 90, 80, 70 and 60 days of sowing and weed infested once for first 10, 20, and 30 days. But when the yields from weed infested plots for the first 30 days were compared with those of weed infested plots for the first 40 days, it was seen that for a short period of 10 days the reduction of yield was 38.3 and 23.1 per cent and the daily decline in yield for this period worked out to 0.24 and 0.16 q/ha per day during *rabi* 1972 and 1973 respectively. It is also interesting to note how the yield declined when weeds were allowed to grow during the first 40 days after which despite the fact that the plots in question were

TABLE 1. Mean yield of cotton kapas, wet weight of weeds and the percentage of reduction

Treatments	Rabi 1972-73				Rabi 1973-74			
	Yield in q/ha	Percentage of yield on the maximum	Percentage of reduction in yield over maximum	Wet weight of weeds in tonnes per ha	Yield in q/ha	Percentage of yield on the maximum	Percentage of reduction over the maximum	Wet weight of weeds in tonne/ha
(Freedom from weeds/days)								
First 10	1.49	17.1	82.9	11.14	1.81	26.3	73.7	9.75
" 20	2.67	30.6	69.4	11.44	2.22	32.3	67.7	8.34
" 30	3.27	37.5	62.5	10.96	3.45	50.2	49.8	8.56
" 40	3.31	37.9	62.1	9.66	3.80	55.2	44.8	7.15
" 50	6.47	74.1	25.9	9.64	4.06	59.0	41.0	5.26
" 60	—	—	—	—	5.73	83.3	16.7	3.75
" 70	—	—	—	—	5.84	84.9	15.1	3.85
" 80	—	—	—	—	6.16	89.5	10.5	1.76
" 90	—	—	—	—	6.24	90.7	9.3	1.28
Up to Maturity	8.73	100.0	—	3.53	6.88	100.0	—	0.96
Infested for								
First 10	8.71	99.8	0.2	3.86	6.12	89.0	11.0	1.06
" 20	8.35	95.7	4.3	7.66	6.10	88.7	11.3	1.80
" 30	7.76	88.9	11.1	9.17	5.95	86.5	13.5	1.88
" 40	4.41	50.5	49.5	12.13	4.36	63.4	66.6	3.22
" 50	3.03	34.7	65.3	13.52	4.11	59.7	60.3	4.69
" 60	—	—	—	—	3.02	43.9	56.1	—
" 70	—	—	—	—	2.81	40.8	59.2	7.30
" 80	—	—	—	—	3.12	45.4	54.6	8.20
" 90	—	—	—	—	2.08	30.2	69.8	9.25
Up to Maturity	1.54	17.6	82.4	13.34	1.51	22.1	77.9	—
S. E.	0.84	—	—	—	0.571	—	—	—
C. D.	2.45	—	—	—	2.147	—	—	—

kept weed free till maturity, the yield was not at optimum level; evidently the early weed growth had suppressed the growth of cotton. The production potential, once suppressed by the rank weed growth could not be made good by subsequent clean cultivation.

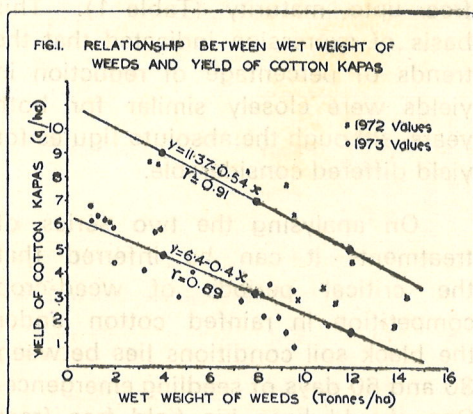
During *rabi* 1972 the plots kept free of weeds for the first 50 days recorded the mean kapas yield of 6.47 q/ha and it was on par with weed free condition up to maturity (8.73 kg/ha); however yield was reduced to an extent of 25.8 percent when compared to the treatment weed free upto maturity. In view of this high reduction it was felt that further weeding may be necessary to reduce this wide reduction. Subsequently, during *rabi* 1973 the periods of treatments were extended up to 90 days. The yield data of cotton kapas during *rabi* 1973 reveal that weed free condition for the first 60 days recorded a mean cotton kapas yield of 5.73 q/ha and it was statistically on par with the treatments weed free one for the first 70, 80, 90 and up to maturity. Hence the reduction in yield for the treatment weed free for the first 60 days is only 16.7 percent when compared to weed free condition up to maturity, thus clearly indicating that the cotton yield will not be much affect when the plots were not weeded beyond 60 days. Absolute yield figures for the same treatments differed considerably for the two years of study. To establish a uniform basis of comparison, the yield figures for the various treatments were expressed as percentage of the maximum yield, which was recorded in both years by the treatment Weed

free upto maturity (Table 1). This basis of expression indicated that the trends of percentage of reduction in yields were closely similar for both years, although the absolute figures for yield differed considerable.

On analysing the two series of treatments it can be inferred that the critical periods of weed-crop competition in rainfed cotton under the black soil conditions lies between 30 and 60 days of seedling emergence. One should keep his field free from weeds during these periods so as to get maximum yield of cotton kapas with minimum number of weedings. The present findings are in concordance with the result of Schewerzel and Thomas (1971).

Based on the above findings it can be concluded that three weedings given at 30th, 45th and 60th day of seedling emergence are sufficient to get economic yields in rainfed cambodia cotton under black soil conditions.

The wet weights of weeds from different weed free and weed infested treatments were recorded at each weeding. The total wet weight of weeds from different treatments was correlated with the respective yield of cotton kapas and it was found there was a high negative correlation with $r=0.89$ (Fig. 1). Thus indicating that the rank weed growth as indicated by the increase in wet weight of weeds at any one stage of crop growth suppresses the yield of cotton considerably and in a fairly predictable manner. Seven of the values pertaining to *rabi* 1972 were found to have a



different regression pattern. However, when a separate correlation was

worked out for these seven values, high correlation value of 0.91 was derived.

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