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EFFECT OF TIMES OF FERTILIZER APPLICATION AND WEED MANAGEMENT ON IRRIGATED COTTON

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A field experiment was conducted at the Department of Agronomy, Tamil Nadu Agricultural University during the winter season of 1985 with a cotton *cv. MCU 5* to study the effect of time of application of fertilizers and weed management practices on seed cotton yield. The optimum dose of N for MCU 5 cotton was 60 kg/ha. Delaying the application of N (25%) P_2O_5 and K_2O (100%) to seedling stage (25 DAS) and subsequently top dressing of 50 per cent N at squaring and 25 per cent at flowering increased the seed cotton yield over the conventional basal application of N (50%) P_2O_5 and K_2O (100%) and top dressing 50% at squaring. Delayed application N, P_2O_5 and K_2O reduced the cost of weeding by Rs. 142/haowing to lesser weed growth. The above findings are also suited to the areas where cotton is dibbled in rice and ragi stubbles.

Among the many agro-techniques available to increase the productivity of cotton, nutrient application has been reported to be more productive and profitable.

In cotton, higher uptake of all the major nutrients occurs between 20th and 60th day with highest from the squaring stage onwards. Since the uptake and utilization of nutrients during early stages are less, the nutrients applied bassally are likely to be lost through leaching and uptake by weeds (Iruthayaraj, 1980). Application of nitrogen during flowering and boll setting stages increased the nitrogen metabolism, boll number and boll weight (Ni *et al.*, 1983 and Seshadri, 1985). The present study was taken up to determine the effect of different times of fertilizer application and weed management practices on winter irrigated cotton.

MATERIALS AND METHODS

A field experiment was conducted during the winter season at the Tamil Nadu Agricultural University, Coimbatore with a view to study the effect of different times of fertilizer application and two weed management practices. The treatments comprised of three levels of nitrogen (40, 60 and 80 kg N/ha) two weed management methods (cultural and integrated) and three times of application viz., (i) full dose P_2O_5 and K_2O and 50 per cent N as basal, the balance 50 per cent at squaring (45th day), (ii) delaying the basal dressing to seedling stage (25th day) and the balance 50 per cent at flowering (60th day), (iii) delaying

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the basal dressing of P_2O_5 and K_2O to the seedling stage with 25 per cent N at seedling, 50 per cent at squaring and 25 per cent at flowering stage. The treatments were tried in a split plot design and replicated thrice. A uniform dose of P_2O_5 at 22.5 kg and 25.0 kg K_2O/ha was applied. The cultural method involved two hand hoeings and weedings on 25 th and 40th day. The integrated weed management involved application flucholoralin at 0.75 kg a.i./ha and followed by a late hand weeding. The variety used in the study was MCU 5. The soil type of the experimental site was clay loam with low in available N, medium in available P and high in available K.

RESULTS AND DISCUSSION

Effect on growth components :

The data on plant height, leaf area index (LAI) and dry matter production (DMP) are presented in Table I. Application of higher doses of N favourably influenced the plant height LAI and DMP at maturity. None of the two weed management practices had any appre-

Table I. Effect of treatments on growth components of cotton

Treatments	Plant height (cm)	Leaf area index (LAI)	Dry Matter Production (DMP) (Kg ha^{-1})
Nitrogen level			
N1	96.4	3.61	5334
N2	99.5	3.94	5727
N3	102.1	4.44	6081
SED	1.9	0.27	133
CD (P=0.05)	4.2	0.60	340
Weed Management Method			
W1	99.3	3.80	5685
W2	99.4	4.19	5744
SED	1 5	0.22	125
CD (P=0.05)	N.S.	N.S.	N.S.
Time of application			
T1	95.1	3.69	5706
T2	98.2	4.01	5622
T3	104.7	4.29	5809
SED	1.0	0.19	89
CD (P=0 05)	2·2	0.39	184

N.S. = Not Significant
Interacrions not significant

Table II. Effect of treatments on yield components and yield of cotton.

Treatment	Number of fruiting points per plant	Boll number per plant	Boll setting percentage	Seed cotton yield (q ha-¹)
Nitrogen level				
N1	43 47	14.77	33.98	13 77
N2	47.80	16.44	34.46	16.30
N3	51.30	16.67	32.35	16.59
SED	0.39	0.16	0 33	0 20
CD (P=0.05)	0.87	0.36	0.74	0.45
Weed Management method				
W1	47.43	15 98	33.72	15.43
W2	47.55	15.95	33.58	15.69
SED	0.32	0 13	0.27	0.17
CD (P=0 05)	NS	NS	NS	NS
Time of application				
T1	47.86	15.87	32.98	15.37
T2	46.36	15.26	32.85	15.05
T3	48.35	16.75	34.71	16.25
SED	0.46	0.18	0.30	0.18
CD (P=0.05)	0.95	0.37	0.62	0.37

NS = Not significant
Interactions not significant

ciable effect on these growth components. Application of N in three splits .e. 25 per cent at seedling, 50 per cent at squaring and 25 percent at flowering promoted the growth components like plant height and dry matter production.

Yield Components (Table II) :

Maximum number of fruiting points were observed at 80 kg N/ha. Weed management methods did not increase the fruiting points. Increase in boll number was observed up to 60kg N/ha while it was not influenced by weed management practices. Three split application of nitrogen with delayed P_2O_5 and K_2O application had favourable effect on boll number. The boll setting per cent was fovourably influenced by nitrogen application up to 60 kg N/ha. Application of nitrogen in

Table III. Enonomics of Treatments

Treatments	Gross income Rs. ha^{-1}	Cost of cultivation Rs. ha^{-1}	Net income Rs. ha^{-1}	Gross return per rupee	Net return per rupee invested
Nitrogen level					
N1	6885	4252	2633	1.62	0.62
N2	8103	4409	3694	1.84	0.84
N3	8291	4615	3676	1.80	0.80
Weed Management Method					
W1	7708	4458	3250	1.73	0.73
W2	7811	4393	3418	1.78	0.78
Time of application					
T1	7635	4478	3157	1.70	0.70
T2	7524	4391	3133	1.71	0.71
T3	8121	4402	3719	1.84	0.84

three splits promoted boll setting per cent.

Seed Cotton Yield:

Application of 60 kg N/ha increased the seed cotton yield significantly over 40 kg N/ha and was on par with 80 kg N/ha (Table II). The increased seed cotton yield observed under higher levels of N was mainly due to increased production of yield components such as fruiting points, boll number per plant and boll weight. Mayilsamy (1978) observed 60kg N/ha was optimum for MCU 5 cotton under Coimbatore conditions.

The two weed management methods did not affect the seed cotton yield as observed by Muruganandam (1984) in his studies.

Times of application of nitrogen had significant effect on seed cotton yield. The treatment of delaying basal application of P_2O_5 and K_2O to seedling stage and applying 25 per cent N at seedling stage 50 per cent at squaring and 25 percent at flowering registered the highest seed cotton yield. Skipping the top dressing of N at squaring stage resulted in lower yield. The peak uptake of nitrogen by cotton occurs from early square to boll formation stage and application of 50 percent of N was found necessary for better development of squares and bolls. Shantha (1976) observed maximum

seed cotton yield when 25 per cent N at sowing, 50 per cent at squaring and 25 per cent at flowering was applied.

The results revealed that application of P_2O_5 and K_2O could be delayed to seedling stage and nitrogen to be applied in three splits with 50 per cent at squaring period. The results are applicable in areas where cotton is dibbled in ragi stubbles or farmers used to raise cotton with the help of rain during early stages and later converted to irrigated condition due to scarcity of water.

Economics (Table III) :

The net income and net return per rupee invested was higher under 60kg than 80kg N/ha. Application full dose of P_2O_5 and K_2O and 25 percent N at seedling stage followed by top dressings of N at squaring and flowering stage at 50 and 25 percent respectively resulted in higher net return and return per rupee invested. There was a saving in the cost of weeding under cultural method by Rs. 142/ha under delayed application of N, P_2O_5 and K_2O at seedling stage.

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