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## CANOPY MANAGEMENT OF KARUNGANNI COTTON UNDER RAINFED CONDITIONS

T.N. BALASUBRAMANIAN<sup>1</sup>,  
U.S. SREE RAMULU<sup>2</sup> and S. NALLAIAH DURAIRAJ<sup>3</sup>

### ABSTRACT

An experiment was conducted at Agricultural Research Station, Kovilpatti under rainfed during 1984 and 1985 rabi seasons to find out the effect of clipping Cotton terminal nodes as well as cycocel spray on the yield of seed cotton under different levels of spacing. The first year of the study was with normal rainfall during crop growth period, while it was deficit in the second year. The result revealed the suitability of the treatment 60 x 15 cm spacing with Cycocel spray on 65 DAS for both different rainfall situations.

Desi Cotton (*G. arboreum*) popularly known as Karuganni Cotton is very prominent for cultivation among dryland farmers of southern districts of Tamil Nadu. This is because, even under severe moisture stress condition, this Karuganni Cotton would yield seed

cotton satisfactorily. Further among different species of cotton under cultivation at this tract this cotton is also found suitable for late sowing during rabi season as well as highly suitable for submarginal black soils. Padaki et al (1977) observed that cultivation of ar-

1. Associated Professor(Agronomy), Agricultural Research Station, Kovilpatti P.O. 627 701, Tamil Nadu.
2. Professor and Head, Agricultural Research Station, Kovilpatti P.O. 627 701, Tamil Nadu.
3. Assistant Professor, Agricultural Research Station, Kovilpatti P.O. 627 701, Tamil Nadu.

boreum cotton still persists practically in all major cotton growing regions under rainfed conditions due to its hardiness and better tolerance to pests and diseases as compared to hirsutum cotton. Also it had a deep root system as reported by Dharmalingam et al (1979).

Eventhough this Karuganni Cotton is having these advantages, under heavy rainfall years, due to excessive soil moisture, this cotton tends to produce more vegetative growth, which results in poor boll setting even under the presently recommended spacing ie. 45 x 15 cm. Since cotton is with indeterminate crop growth behaviour, optimum plant canopy is required to produce higher seed cotton yield.

Under rainfed condition, rainfall distribution varies between years and hence it is necessary to optimise cotton plant canopy to harvest potential yield under different stress conditions. Previous results indicated the positive response of cotton to cycocel spray as well as to terminal node clipping. (Kulandaivelu, et al 1974., Singh and Singh, 1970., Damodaran et al 1974 and Annappan, 1969).

Hence a study was undertaken at Agricultural Research Station, Kovilpatti to findout a suitable agro-technique to optimise Karuganni Cotton plant canopy for getting higher seed cotton yield.

## MATERIALS AND METHODS

A study was carried out at Agricultural Research Station, Kovilpatti during

rabi 1984 and 1985 to findout the effect of clipping terminal nodes with and without cycocel spray on Karuganni cotton under different spacing levels. The soil is black clay with a solum more than 100 cm in depth. This soil is low in nitrogen, Phosphorus and high in potassium. Different spacing levels and growth arresting treatments were the factors studied under factorial RBD replicated thrice as detailed here under.

### Spacing (S)

S1. 45 x 15 cm

S2. 45 x 30 cm

S3. 60 x 15 cm

S4. 60 x 30 cm

### Growth arresting treatments (G)

G1. Clipping top nodes on 80th day.

G2. Spraying Cycocel (40 ppm) on 65th day.

G3. Clipping top nodes on 80th day and Cycocel spray (40 ppm) on 65th day.

G4. Control.

There were 16 treatmental combinations per replication. cycocel (Chloro choline chloride) was given through spray on 65 DAS and clipping of terminal nodes beyond 14th node was done on 80 DAS.

The gross plot size was 9 x 6 m with a net plot size of 8.4 x 5.7 m during 1984 rabi and it was 9 x 6 m with a net plot size of 8.1 x 5.4 m,

during 1985 rabi. The crop was sown on 29.9.84 and 11.10.1985 respectively for the first and second year of the study. Three pickings were done in the first year and two pickings were carried

out in the second year. K9 and K10 Cotton were the test crops during first and second year of the study.

The rainfall received during crop growth period is furnished in Table 1.

**TABLE 1 : Rainfall (mm) distribution during crop growth period**

Met. Std. Week	1984-85		1985-86	
	Rainfall (mm)	Rainy day	Rainfall (mm)	Rainyday
39	121.7	5	-	-
40	0.2	-	-	-
41	-	-	2.3	-
42	-	-	4.4	1
43	73.5	3	99.0	1
44	21.5	1	15.6	2
45	23.8	2	31.9	2
46	35.6	3	17.4	2
47	-	-	5.0	1
48	20.6	1	-	-
49	0.5	-	13.2	3
50	-	-	1.4	-
51	-	-	6.0	1
52	-	-	0.4	-
1	135.6	3	-	-
2	-	-	3.2	1
3	44.5	1	-	-
4	-	-	-	-
5	2.0	-	-	-
6	-	-	-	-
7	-	-	43.6	1
8	-	-	-	-
9	-	-	5.1	1
10	-	-	2.2	-
Total	479.5	19	250.7	16

The deviation from the normal (470 mm) for the crop growth period worked to (+) 9.5 mm for 1984-'85 (Normal) and (-) 219.3 mm for 1985-'86 (deficit)

## RESULT AND DISCUSSION

In respect of boll numbers per plant in both years of study, higher boll numbers per plant were observed with 60 x 30 cm spacing with and without different combinations of growth arresting treatments followed by 45 x 30 cm and 60 x 15 cm spacing levels. This might be due to more number of sympodial branches per plant under wider spacing of 60 x 30 cm.

There was no such significant difference between treatments studied in respect of boll weight. This might be attributed to the genetic nature of the test crop cotton.

The result on seed cotton yield indicated non significant difference between main effects studied (Table 2) during first year of the study. However interaction effect was found significant (Table 3). The interaction result indicated the necessity of growth arresting treatments for closer spacing level (45 x 15 cm) as well as to wider spacing levels of 60 x 15 cm and 60 x 30 cm in order to maintain optimum plant canopy. While under 45 x 30 cm spacing, the control itself resulted in higher seed cotton yield as compared to same spacing with growth arresting treatments. The cotton plants had profused growth both under closer spacing (45 x 15 cm) and wider spacing (60 x 15cm and 60 x 30cm), that warranted the application of growth

arresting treatments to maintain optimum plant canopy.

During second year of the study, between different levels of spacing studied, higher seed cotton yield was observed with the treatment 45 x 15cm and 60 x 15cm spacing levels as compared to other two spacing levels studied. No such significant difference was observed between different levels of growth arresting treatments studied. The interaction effect also revealed the superiority of the treatment 60 x 15 cm spacing with Cycocel spray in recording higher seed cotton yield and this treatment was comparable with the treatments 45 x 15cm + Cycocel, 40 x 15cm + Cycocel + Clipping, 45 x 15cm alone and 60 x 15cm alone.

Pooled analysis of two years seed cotton yield did not reveal any significant difference between treatments studied.

Even though under normal rainfall period of first year study, the treatment 45 x 30cm resulted in higher seed cotton yield, this treatment failed to register higher seed cotton yield during the second year of the study, where deficit rainfall was recorded. Under this situation the treatments 45 x 15cm and 60 x 15cm without any growth arresting treatments registered significantly higher seed cotton yield.

Since the rainfall differs between years, it is not possible to predict the rainfall distribution for the crop year at the time of sowing. Considering this

TABLE 2 : Effect of treatments on boll number, boll weight and seed cotton yield (kg/ha).

Treatment No.	Details of Treatments	1984-85			1985-86			Pooled mean seed cotton yield kg/ha
		Boll number/plant	Boll weight g/5 boll	Seed cotton yield kg/ha	Boll number/plant	Boll weight g/boll	Seed cotton yield kg/ha	
T1	45x15cm Clipping on 80th day	9.93	9.6(1.92)	1423	5.27	2.46	1132	1278
T2	-do- Spraying cycocel 40 ppm on 65th day	11.13	11.13(2.22)	1565	5.47	2.72	1364	1465
T3	-do- Clipping+Cycocel spray	8.80	9.83(1.96)	1182	6.14	2.61	1395	1289
T4	-do- Control	10.53	10.80(2.16)	1417	6.47	2.26	1292	1355
T5	45x30cm Clipping on 80th day	14.40	8.30(1.66)	1465	8.47	2.58	860	1163
T6	-do- Spraying cycocel 40ppm on 65th day	15.40	9.83(1.96)	1153	7.60	2.60	1079	1116
T7	-do- Clipping+cycocel spray	14.73	9.03(1.80)	893	7.94	2.65	991	942
T8	-do- Control	16.87	11.66(2.33)	2128	5.74	2.25	657	1393
T9	60x15cm Clipping on 80th day	11.20	9.46(1.89)	1363	5.14	2.34	889	1126
T10	-do- Spraying cycocel 40 ppm on 65th day	13.53	10.70(2.14)	1456	7.34	2.40	1419	1438
T11	-do- Clipping+cycocel spray	11.53	10.86(2.17)	1921	5.00	2.37	863	1392
T12	-do- Control	13.47	10.36(2.07)	1378	6.94	2.50	1217	1298
T13	60x30cm Clipping on 80th day	18.60	10.06(2.01)	1368	10.00	2.55	911	1140
T14	-do- Spraying cycocel 40 ppm on 65th day	23.33	11.05(2.21)	2018	9.00	2.34	967	1493
T15	-do- Clipping+Cycocel spray	19.73	9.20(1.84)	1059	5.20	2.60	638	849
T16	-do- Control	20.07	10.46(2.09)	1428	11.27	2.37	934	1181
	SED	2.35	1.41	225.6	0.62	0.15	184.25	321.77
	CD(p=0.05)	4.785	NS	NS	1.80	NS	376.28	NS
	Interaction: SED	-	-	225.6	1.23	0.10	106.99	160.88
	CD (p=0.05)	-	-	680.8	3.56	NS	218.54	NS

\* Figures in parentheses denoted boll weight/boll.

TABLE 3 : Cotton Yield (1984-'85) (kg/ha)

Canopy Treatment/Spacing	Clipping on 80th day	Cycocel spray on 65th day	Clipping +Cycocel	Control	Mean	SED	CD(p=0.05)
45x15cm	1423	1565	1182	1417	1397	Interaction effect 225.6	680.8
45x30cm	1465	1153	893	2128	1410		
60x15cm	1363	1456	1921	1378	1530		
60x30cm	1368	2018	1059	1428	1469		
Mean	1405	1548	1263	1588			
<b>Seed cotton yield (1985-'86) (kg/ha)</b>							
45x15cm	1132	1364	1395	1292	1296	Main effect 184.3	376.3
45x30cm	860	1079	991	657	897		
60x15cm	889	1419	863	1217	1097	Interaction effect	
60x30cm	911	967	638	934	863		
Mean	948	1207	972	1025		107.0	218.5
<b>Seed Cotton yield (Pooled data) (Kg/ha)</b>							
Canopy Treatment/Spacing	Clipping on 80th day	Cycocel spray on 65th day	Clipping +Cycocel	Control	Mean		
45x15cm	1278	1465	1289	1355	1347		
45x30cm	1163	1116	942	1393	1154		
60x15cm	1126	1438	1392	1298	1314		
60x30cm	1140	1493	849	1181	1166		
Mean	1177	1378	1118	1307			
Main Effect						SED	CD(p = 0.05)
Interaction Effect						321.8	NS
						160.9	NS

practical difficulty, from the results of the present investigation, it is inferred to recommend a spacing level of 60 x 15 cm for Karuganni cotton with Cycocel spray on 65 DAS. This treatment would remove the risk both under normal as well as under deficit rainfall period. Beneficial effect of CCC 40 g ai/ha on cotton was reported already by Sucha Singh et al 1973.

Even though this treatment (60 x 15cm + Cycocel spray) recorded lesser boll numbers per plant as compared to 60 x 30cm in the present study, due to higher plant population level of 1, 11111 plants/ha as compared to 55555 plants/ha under 60 x 30cm spacing it resulted in higher seed cotton yield.

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