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Studies on Seed Quality with Reference to Position of Bolls in Cotton Variety MCU 5*

C. P. THIAGARAJAN[1] and K. R. RAMASWAMY[2]

Experiments conducted during winter 1976 and summer 1975 seasons with the CV. MCU 5, revealed that the quality of seed differed significantly among the bolls in a plant. Based on the parameters like percentage of seed recovery, matured seed, seed index germination and vigour, it was concluded that the kapas (seed cotton) obtained from the first 7 sympodia can be earmarked for seed in both winter and summer seasons at Coimbatore conditions.

The cotton plant has an indeterminate growth habit. Its branching is sympodial and in each sympodium flowers are formed at the nodes. Depending upon the variety, season and cultivation practices, the pattern of flowering varies significantly and consequently the number of bolls. Therefore the seed from individual bolls is likely to vary in quality and quantity among each other. To estimate the extent of variation in seed quality due to season and position of bolls in a plant, studies were under taken with a popular variety extensively cultivated in the winter season in Tamil Nadu.

MATERIAL AND METHODS:

Two field trials were conducted with MCU 5 variety on during winter, 1975 and the other, summer, 1976. The trial was laid out in completely randomised design with 3 replications. Recommended package of practices was followed. Eighty plants were marked in each replication, so as to get at least 25 bolls per node sufficient enough to carry out all the observations. A total of 13 sympodia (S_1-S_{13}) per plant and 3 nodes (N) per sympodium was taken for the study. The bolls from each node from each sympodium were picked separately, immediately after bursting.

Number of matured seeds (well filled) was counted in each bolls for 10 bolls in each treatment and the average of 10 bolls was taken as the mean number of seeds per boll. All the bolls picked sympodium and nodewise were pooled together in each replication. and the weight of kapas was weighed and recorded in grams. Then the kapas in each replication was ginned separately and weight of seed was recorded. The seeds were then dried in the sun to a constant moisture content.

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1, 2. Department of Seed Technology, Tamil Nadu Agricultural University, Coimbatore-3.

The entire quantity of seed available in each treatment in each replication was sorted out into matured (well filled) and immature seeds (ill filled, shrivelled, pest infested and broken seed) and weighed separately. From this the percentage of seed recovery was calculated by dividing the weight of matured seed by weight of kapas and multiplying by 100. Then the percentage of matured seeds by weight was calculated by dividing the weight of matured seeds by the total weight of seed and multiplying by 100. Three samples of 100 seeds (matured seeds) were taken in each replication and weighed separately and the average value of three samples was taken as the mean weight of 100 seeds.

The germination and vigour tests were conducted following the methods detailed by ISTA (1966). Percentage values were converted into angular values wherever necessary before proceeding with the statistical analysis. To estimate the seasonal effects, pooled analysis was worked out by combining the data obtained during the winter and summer seasons. The method suggested by Panse and Sukhatme (1957) was followed.

RESULTS AND DISCUSSION:

The percentage of seed recovery varied significantly between seasons, sympodia and nodes in each sympodium. The mean seed recovery was 53. 40 and 56.89 per cent for winter and summer seasons, respectively. It was maximum in S1 and minimum in S13 in winter and maximum in S3 and minimum in S13 in summer. The mean recovery was the highest in N1 followed by N2 and N3 both the season. But a comparison of individual nodes in each sympodium revealed the superiority of N1 over N2 and N3 in winter whereas in summer, consistent relationship could not be observed.

The mean percentage of matured seeds was 73.1 and 85.2 in winter and summer respectively. Among the sympodia, the percentage of matured seed ranged from 92.8 (S4) to 45.7 (S13) in winter wherease in summer it ranged from 93.6 (S7) to 63.6 (S13). The maximum percentage of matured seed was recorded in N1 followed by N2 and N3 in both the seasons. The mean percentage of matured seeds was significantly more in summer than in winter. In summer, each sympodium and node recorded more percentage of matured seed than in winter. The seasonal effect was more in N3 than in N1 and N2.

The number of seeds per boll was 28.8 and 16.5 in winter and snmmer respectively. In winter, the number of seeds per boll was minimum in S2 which increased gradually upto S13. In summer also the trend was similar except at S4 and S5. The probable reason for the occurrence of more number of seeds from the bolls formed in the later sympodia may be due to that the boll retention depended on the presence of sufficient number of developing seeds to mobilise the assimilates required for continued growth (Johnson and Addicott 1967 and Walhood and Mcmeas 1964). In winter, the mean number of seeds per boll was maximum in N1 followed by N2 and N3, whereas the reverse was true in summer. Among the nodes, N1 and N3 recorded maximum number of seeds per boll in winter and summer respectively.

The seed weight varied significantly between seasons. The weight of seed was more in summer (8.90 g) than in winter (8.29 g). Among the sympodia, the seed index was generally maximum in S1 and minimum in S13 in both the seasons. Bozhkova (1973) reported 1000 seed weight was strongly influenced by position of boll on the plant The seed index decreased gradually from first to last sympodia in both the seasons. The seed index was highest in N1 followed by N2 and N3 in all the sympodia in winter whereas the reverse was true in summer. Kamalova and Polyantseva (1967) observed variations in seed size among seeds obtained from different positions of a plant. Weight of seed decreased when the seed number per boll increased in general. Kittock *et al.* (1975) reported similar results.

Significant variations were observed in seed germinability between seasons. In winter, the mean percentage of germination was more (79.2) than in summer (70.7). Among sympodia the percentage of germination ranged from 94 (S3) to 64 (S13) in winter and from 87 (S4) to 75 (S7) in summer. Ndegwee and Millburn (1974) observed that the seeds from the middle portion of the plant recorded higher germination than that from either the bottom or top one third of the plant.

The germination percentage increased from S1 to S3 in winter and from S1 to S4 in summer and then decreased. Bozhkova (1973) observed the viability of cotton seed being affected by position of boll in a plant. In general, seeds fromN1 recorded maximum germination both in winter and summer seasons. The vigour index was more in winter (2114) thanin summer(1969). Among the sympodia, the vigour index ranged from 2546 (S5) to 1614 (S13) in winter and from 2492 (S4) to 1439 (S13) in summer. In winter, the vigour index increased from S1 to S5 and then decreased where as in summer, the increase was from S1 to S4 only. In general, seeds from N1 recorded the highest vigour index values followed by N2 and N3 in both the seasons. The differential behaviour of the seeds obtained from the same sympodia during winter and summer seasons may indicate the significant role played by the micro as well as the macroclimatic factors influencing the seed quality.

Flowers initiated late in the early formed sympodia came to harvest along with those formed in the later formed sympodia. In such cases also, quality seeds from early formed sympodia are likely to get rejected since produce from later pickings are usually rejected for seed purposes (*Marappan et al.* 1966 and Simlote and Amirjit 1967). So it becomes evident that picking wise seed collection as recommended by Marappan *et al.* (1966) and many other workers may not be a well defined solution to harvest good quality seeds in cotton (Christidis, 1955). Harvesting of the produce sympodium-wise can ensure quality of the seed. Since, there is significant reduction in seed quality from S1 to S13, it should be possible to earmark the sympodia for each variety and in each season upto which the produce should be harvested for seed.

Bozhkova (1973) recommended first six sympodia for rainfed and first four sympodia for irrigated crops to be used for seed purposes. According to Khasanox (1976), seeds of higher germination and vigour were produced in bolls on the first and second places on the first six sympodial branches in Taskent-3 cultivar in the Northern region of Uzbeck S.S.R and on the first 8-9 branches in the Southern Region. Cardozier (1957) also suggested to avoid seeds from top bolls for sowing.

In MCU 5, the recovery of quality seeds was more than 50 per cent from first eight sympodia in the winter season and upto 10 sympodia in the summer season. The percentage of matured seeds was more than 70 from first seven and twelve sympodia in the winter and summer seasons, respectively. The seed index was optimum (8.0 g. and above) in the first seven and ten sympodia in winter and summer, respectively. The germination was also more than 70 per cent in the first nine and seven sympodia in the winter and summer seasons, respectively. The seed vigour also of the same pattern. Therefore based on the germination, vigour and other factors associated with quality, seed cotton from first 7 sympodia in both winter and summer seasons can be earmarked for seed production.

REFERENCES

BOZHKOVA, YU. 1973. Investigation of the germinability of the progeny produced from seed taken from different parts of the cotton plant. Rasteniev 'dni Nauki (1971) 8 : 85-91.

CHRISTIDIS, B. G. 1955. Dormancy in Cotton Seed. *Agron. J.*, 47: 400-403

ISTA, 1966 International Seed Rules for Seed Testing *Proc. Int. Seed Test. Assn.* 31 (1): 1-152

JOHNSON, R. L. and F. T. ADDICOTT. 1967. Boll retention in relation to leaf and boll development in cotton (*Gossypium hirsutum* L.) *Crop Sci.*, 7. 571.

KAMALOVA, G. V. and N. N. POLYANTSEVA. 1967. Differences in developing embryos of cotton plants depending on their posttion in the boll. Uzbec biolzh. 1967, 64-7.

KHASANOX, E. L. 1976. Formation of sowing quality of seeds of cotton cv. Tashkent-3. *Khlopkovodstvo* 1974 No. 10, 37-38.

KITTOCK, D. L. LEONARD and L. H. PINKAS, 1975. Relationship of seed/boll to other yield components and fibre quality of pima cotton. *Crop Sci.*, 15 (3): 316-19.

MARAPPAN, P. V., KAMALANATHAN, S., NARAYANAN, S.S. and P.K. RAMAKRISHNAN. 1966 A note on the Agricultural quality of cotton seed from various pickings *Madras agric. J.*, 53 : 379-381.

NDEGWEE, N.A. and T. R. MILLBURN. 1974 Germination performance of two Uganda cottons in relation to climatic conditions at harvesting, variety and some agronomic parctices. *E. Afri. Agric. For. J.* 39: 356-67.

PANSE, V. G. and P. V. SUKHATEME. 1975. Statistical methods for Agricultural Workers. *ICAR. Pub. New Delhi.*

SIMLOTE, K. M. and AMIRJIT RAMPAL. 1957. Influence of different picking on the quality of American cotton. *Indian J. agric. Sci.*, 37 : 83-90

WALHOOD, V. T. and J. L. MCMEAS. 1967. Seed number as a factor in fruit retention in cotton, *Ann. Cotton Defol. Physiol. Conf. Proc.*18 th 30-33.

Table 1 Influence of season (S) on seed characters in Cotton MCU-5. (Angular values).

Seasons		Winter				Summer			
Sympodia Node		N_1	N_2	N_3	Mean	N_1	N_2	N_3	Mean
S_1	a.	53.43	53.46	52.84	53.26	52.18	49.20	49.20	50.13
	b.	74.11	73.45	71.33	72.96	76.49	79.65	67.32	74.49
	c.	68 08	62.06	57.45	62.53	65.69	53.13	54.34	57.71
S_2	a.	53.20	50.24	50.11	51.18	51.42	52.54	50.07	51.34
	b.	74.84	69.85	63.60	69.43	73 11	77.19	72.78	74.38
	c.	64.91	60.69	64.94	63.51	62.03	61.35	61.35	61.58
S_3	a.	50.95	50.78	45 54	49.10	50 85	52.42	51.48	52.54
	b.	74.20	68.30	62.26	68.25	73.97	76.63	75.01	75.20
	c.	82.05	70.76	78.85	77 22	67.24	63.46	60.68	63.79
S_4	a.	50.83	49.14	48.04	49.34	50.19	50.71	52.18	51.03
	b.	85 48	75.03	68.15	76.22	70.77	74.76	80.86	75.46
	c.	71.70	68.09	71.70	70.49	70.45	71.62	58.70	69 9[illegible]
S_5	a.	50.95	49.85	47.99	49.59	48.10	50.53	53.37	50.6[illegible]
	b.	73.25	68.79	63.60	68.54	67.99	73.30	80.27	73.85
	c.	78.98	71.62	76.03	75.50	70.64	70.64	54.95	65.41
S_6	a.	50.95	49.55	47.18	49.59	47.29	52 00	54.09	51.1[illegible]
	b.	74 55	68.81	56.86	66.74	67.98	72.61	81.33	73.97
	c.	69.73	64.94	69.77	66.18	62.05	61.35	56.80	60.0[illegible]
S_7	a.	50.26	48.22	47.55	48.67	48.50	49.60	51.95	50.0[illegible]
	b.	69.60	65 67	54.94	63.40	64.19	71.74	75.85	70.5[illegible]
	c.	69.77	68.90	69.81	69.50	60.68	58.06	51.35	55.6[illegible]
S_8	a.	47.29	57.66	39.87	44.57	49.78	50.42	49.78	49.6[illegible]
	b.	65.60	62.53	34.32	54.15	61.87	70.75	73.11	68.5[illegible]
	c.	68.06	62.05	67.27	65.79	58.70	55.55	51.35	55.2[illegible]
S_9	a.	47.29	46.55	39.87	44.57	51.77	50.13	49.19	50.3[illegible]
	b.	67 56	58.32	35.37	53.74	76.76	70.13	68.90	71 9[illegible]
	c.	60 69	56.81	68 96	58.52	56.80	57.43	51.35	55.1[illegible]
S_{10}	a.	47.99	42.82	36.48	42.43	51.02	49.89	45.69	48.9[illegible]
	b.	66.56	56.80	32.70	51.98	74.43	67.08	53.73	65.0[illegible]
	c.	60.68	53.13	57.87	57.21	55.55	51.95	51.35	52.9[illegible]
S_{11}	a.	46.89	41.67	35.73	41.43	51.34	48.27	35.24	44 92
	b	60.21	55.74	31.55	49.17	90.84	60.54	43.05	61.48
	c.	56.80	51.95	54.07	54.27	55.56	50.77	50.18	52.17
S_{12}	a.	45.86	40.86	35.94	49.89	48.56	47.75	37.10	43.25
	b.	57.05	51.65	29 99	46.23	78.82	58.12	41.57	59.54
	c.	55.56	51.95	52.54	52.55	53.73	49.60	49.02	50 78
S_{13}	a.	49.36	45.84	33.36	39.62	47.81	45.11	33.52	42.17
	b	50.95	48.04	27.62	42.20	63.59	56.92	39.40	53.30
	c.	55.56	51.95	51.93	52.14	51.94	47.87	47.87	49.23
Mean	a.	49.36	45.84	43.57	45.60	49.93	49.89	46.87	48.90
	b.	68.76	63.30	48.64	60.23	71.50	69.96	65.64	69.05
	c.	66.37	61.19	63.86	63.80	61.54	57.90	52.79	57.74
	a.	Sy	N	SyxN	SxSy	SxN	S	SxSyxN	
	b.	Sy	N	SyxN	S	SxSy	SxN	SxSyxN	
	c.	Sy	N	SyxN	SxSyxN	S	SxSy SxN	SxSyxN	
CD (P=0.05)	a.	0.77	0.37	1.33	1.08	0.52	0.42	1.88	
	b.	0.90	0.43	1.56	0.35	1.27	0.61	2.20	
	c.	0.83	0.40	1.45	2.03	0.32	1.17	0.56	2.03

a. Seed recovery

b. Matured seeds

c. Mean percentage of germiniation

Table 2. Influence of season on the mean number of seeds per boll and 100 seed weight from individual sympodium (Sy) and Node (N) in MCU 5.

	Number of Seed/Boll				100 Seed Weight (g)			
Season/ Sympodia/ Node	N_1	N_2	N_3	Mean	N_1	N_2	N_3	Mean
W S_1	18.5	21.4	23.5	21.1	11.1	10.9	10.0	10.6
S ,,	18.7	21.9	21.9	20.8	10.7	10.5	10.0	10.2
W S_2	22.5	20.3	18.5	20.4	10.5	10.4	9.2	10.0
S ,,	21.5	21.7	21.7	21.6	10.5	11.0	11.1	11.0
W S_3	29.7	26.7	23.7	26.7	11.4	9.1	8.7	9.4
S ,,	22.9	24.3	24.5	23.9	9.0	9.3	10.7	9.7
W S_4	28.8	26.3	26.4	27.2	9.4	8.8	8.4	8.9
S ,,	20.5	21.9	25.6	22.7	9.7	10.2	10.3	10.1
W S_5	33.0	25.5	25.0	26.7	9.6	9.1	9.0	9.2
S ,,	21.0	23.5	24.1	22.0	9.0	9.7	10.2	9.6
W S_6	31.3	20.9	28.6	29.9	9.6	8.2	8.1	8.6
S ,,	21.9	25.0	26.5	24.5	9.1	9.3	10.1	9.5
W S_7	32.7	31.0	28.8	30.8	9.5	8.1	7.3	8.3
S ,,	19.3	27.5	32.0	26.3	9.7	8.7	9.0	8.3
W S_8	34.0	32.3	30.0	32.1	9.2	8.7	5.8	7.9
S ,,	25.7	26.4	26.5	26.2	8.0	8.7	9.4	8.8
W S_9	36.3	33.6	24.0	31.3	9.2	7.9	5.7	7.6
S ,,	29.4	-34.9	31.3	32.6	7.3	8.0	9.4	8.1
W S_{10}	38.0	28.5	36.5	31.0	8.9	6.9	5.1	7.0
S ,,	28.3	29.6	39.5	29.5	7.0	8.0	9.4	8.1
W S_{11}	38.0	30.0	26.9	31.6	8.9	6.5	5.1	6.6
S ,,	28.1	30.3	32.0	30.1	7.6	7.8	8.1	7.8
W S_{12}	38.1	30.9	27.0	32.0	8.3	6.1	5.1	6.5
S ,,	30.0	33.0	33.5	32.2	5.8	6.0	7.0	6.3
W S_{13}	38.2	31.9	28.0	32.7	7.8	6.0	5.1	6.3
S ,,	30.1	33.3	33.6	32.3	5.2	5.8	6.9	5.9
W Mean	32.2	28.3	25.9	28.8	9.4	8.2	7.1	8.2
S ,,	24.5	27.2	28.0	26.5	8.3	9.0	9.3	8.9
	Sy	N	Sy X N	S	Sy	N	Sy X N	S
CD (P=0.05)	0.447	0.214	0.7760	0.175	0.447	0.214	0.776	0.175
	S X Sy	S X N	SXSyXN		S X SY	S X N	SXSyXN	
CD (P=0.05)	0.635	0.303	0.303		0.633	0.303	1.098	

Table 3: Influence of season (s) on the mean vigour index from individual sympodium (Sy) and node (N) in MCU5.

Seasons/Sympodia/Nodes.	N_1	N_2	N_3	Mean
W S_1	2367.9	2144.2	1596.9	2036.3
S ,,	2540.2	1660.9	1782.6	1997.2
W S_2	2105.1	1952.9	2146.2	2066.1
S ,,	2129.3	2144.2	2109.9	2127.8
W S_3	2727.7	2477.2	2419.6	
S ,,	2439.1	2376.5	2260.7	2358.8
W S_4	2489.5	2530.8	2520.3	2546.8
S ,,	2764.1	2732.1	2081.1	2492.5
W S_5	2808.6	2403.4	2521.3	2546.8
S ,,	2692.1	2585.6	1882.4	2386.7
W S_6	2569.5	2110.6	2180.0	2186.7
S ,,	2083.1	21.09.6	1952.4	2048.4
W S_7	2628.0	24.02.4	2264.7	2186.7
S ,,	2181.0	2019.8	1454.7	1885.2
W S_8	2408.8	2153.7	2145.3	2431.7
S ,,	1985.3	1846·3	1684.3	1838.6
W S_9	1946.9	1736.0	1753.9	1812.3
S ,,	2329.4	2084.3	1591.7	1901.9
W S_{10}	2159.4	1774.2	1795.0	1909.8
S ,,	2101.1	1779.8	1532.4	1804.4
W S_{11}	2000.4	1667.1	1640.3	1769.3
S ,,	1914.3	1772.8	1440.6	1709.2
W $_{12}$	1903.1	1646.0	1463.6	1670.9
S ,,	1852.3	1647.0	1339.1	1612.8
W $_{13}$	1809.7	1585.3	1417.1	1614.1
S ,,	1643.1	1451.8	1223.5	1439.5
W Mean	2309.7	2045.1	1989.4	2114.5
S	2181.1	2009.1	1718.1	1969.5

	Sympodium	Node	SyN	S	SxSy	SxN	SxSyxN
CD(P=0.05)	44.5	21.4	77.1	17.1	63.0	30.2	109.1