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Selection of Suitable Indices for Determination of Earliness of Cotton Varieties under Rice Fallows Condition*

by

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Synopsis: The suitability of the various earliness indices now in vogue was studied under rice fallows condition at the Agricultural Research Station, Aduthurai in 1959. The earliness indices gathered on the basis of flowering, i. e. bud initiation period, square period, date of first flowering and node number did not markedly bring out the earliness of the type satisfying the conditions under rice fallows. But the earliness indices such as Bartletts' index and time of maturity, which are based on the productivity of *kapas*, appear to be more useful and practical for the purpose.

Introduction: The earliness in cotton generally constitutes the most important character not only directly affecting the yield and quality, but equally concerned in fitting in the cotton with the normal crop relations practised in a tract. This has become more so, for the cotton grown as an off-seasonal crop in the rice fallows of deltaic regions of Thanjavur and Tiruchirapalli districts in Madras State. The selection of an early variety of cotton, when sown immediately after the harvest of *samba* or second crop *(thaladi)* paddy (by middle of February), which completes its harvest by the middle of June is all that is required. For assessing the potential earliness of the varieties, pitching upon a suitable "Earliness index" is absolutely necessary.

With this objective, a study was made on the suitability of the various "earliness indices" that are being used at present by various cotton workers.

Materials and Methods: The work reported in this paper was conducted at the Agricultural Research Station, Aduturai (Thanjavur district) during 1959 summer. Three varieties viz. P. 216 F (a Punjab type), 1004–11 (a re-selection from P. 216 F) and D. P. L. 15–4–1 A (a reselection from U. S. A. type - Deltapine–15) were under study in the main strain trial. The following data were collected from this trial and they are utilised for the purpose of this study.

1. Bud initiation period.
2. Square period.
3. Number of days for the first flowering.
4. Number of days for the first boll bursting.
5. Daily flower count.

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6. Node number.
7. Time of maturity.
8. Bartletts' earliness index and
9. Yield of *kapas*.

The first six items referred to above were gathered during flowering phase of the crop while the time of maturity, Bartletts' index of earliness and yield of *kapas* were determined on the productivity basis of the crop. Bud initiation period was recorded as the mean number of days the initiation of the first incipient bud on 100 plants in each variety; while the mean values for square period and the number of days for first flowering were recorded by noting the date of first flowering on 100 selected plants in each variety. Similarly mean number of days for first boll bursting was calculated by recording the number of days taken from sowing to the first boll to burst on a population of 100 plants in each of the three varieties. The node number was assessed as the mean number of nodes, recorded on 100 selected plants, from the base on the main stem (excluding cotyledonary node) to the node on which the first sympodial branches appear. Time of maturity was determined (as prescribed by Hutchinson and Ramiah) as the percentage of the *kapas* obtained upto the third picking to the total yield, from six weekly pickings between 6th June and 11th July 1959. The Bartletts' index of earliness was calculated by using the formula:

$$\frac{(y_1 \times n)+(y_2 \times (n-1))+(y_3\,(n-2))+\ldots(yn+1)}{Y \times n}$$

where Y is the total yield of a variety, n is the total number of pickings and y^1, y^2, y^3, y^4... yn are the yields of individual pickings of 'n' pickings.

Results: The data gathered are summarised in the following table.

TABLE I.

Serial No.	Variety	Bud initiation period (Days)	Square period in days	Boll maturation period in days	No. of days for first flowering	No. of days for first boll bursting	Node number	Bartletts' index of earliness	Time of maturity
1	2	3	4	5	6	7	8	9	10
1.	DPL. 15.4.1A	39·7	31.9	37.5	71.6	109.1	4.4	0.578	52
2.	1004—11	39.8	32.1	32.4	71.9	104.3	4.9	0.649	66
3.	P. 216 F.	39.8	32.3	32.4	72.1	104.5	5.0	0.673	65

A scrutiny of the above data would indicate that all the three varieties take practically the same period for bud initiation, squaring and flowering and the differences between varieties are very negligible. However, DPL. 15–4–1A records lower node number than the other two varieties which indicate the comparative earliness of the variety. But DPL. 15–4–1A appears to take five more days than the other varieties. Consequently the number of days for first boll opening is recorded to be more for DPL. 15–4–1A than the other two varieties P. 216 F and 1004–11. The data on Bartletts' index and time of maturity indicate that the DPL. 15–4–1A is a late type.

Discussion: From the above one can infer that DPL. 15–4–1A though earlier in flowering, it is later in boll bursting because of longer boll maturation period than the other two varieties. This could be very clearly seen by the data presented in table II where weekly flower production and weekly progressive yields harvested are expressed as percentages to the total obtained.

TABLE II.

Variety	Mean flower production per plant	Progressive weekly flower production as percentage to the total								Progressive acre yield weekly pickings as percentage to the total						Percentage of shedding
		9th week	10th week	11th week	12th week	13th week	14th week	15th week	16th week	17th week	18th week	19th week	20th week	21st week	22nd week	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
DPL. 15–4–1A	14.4	0.1	1.8	8.5	28.5	65.1	85.9	96.7	100	4	24	52	75	91	100	55
1004–11	21.0	...	0.9	4.6	19.8	42.8	69.1	90.7	100	11	40	66	88	93	100	49
P. 216 F.	16.9	0.1	1.4	7.0	24.4	52.3	74.3	93.0	100	15	45	65	83	95	100	61

A study of this table would indicate that the percentage of flowers produced in the earlier weeks of the flowering phase of the crop (between 11th and 15th week) was greater for DPL. 15–4–1A than for other two varieties. Considering the lowest per plant flower production of this variety it may be presumed that such a high percentages of flower production may be due to quick succession of flowering which in turn indicate the earliness of this variety in flowering.

Lower node number for DPL. 15–4–1A also confirms this view. But when we scrutinise the progressive yield trend it would be seen very clearly that the varieties P. 216 F and 1004–11 have yielded higher percentages of yield in earlier pickings as compared to DPL. 15–4–1A inspite of higher shedding percentage for P. 216 F. Hence the longer boll maturation period for DPL. 15–4–1A can only be the reason for the late picking of this variety. So DPL. 15–4–1A proves itself to be a late type in production of *kapas* thought it was found to be earlier in flowering.

But as a practical interest, for the rice fallows condition, the period of cotton cultivation has to be limited to the extent when the maximum yield of *kapas* is obtained before releasing the field for next paddy crop irrespective of early or late in flower production of a type. Hence the effective earliness for this purpose can only be based more on the production of *kapas* than on the production of flowers. Flowering earliness is also important. But under rice fallows condition it may add to the information obtained by the production of *kapas* and it cannot singly satisfy the requirements of rice fallows. It would prove to be more of an academic interest here than of a practical one. It is said (Christidis and Harrison) that in Russia, earliness is usually determined as the percentage of absolute yield upto the time of frost in a given locality. In a limited sense, a similar problem exists for rice fallows cotton cultivation also. So using of Bartletts' index and time of maturity are the best and practical indices for estimating earliness of varieties to be tried under rice fallows condition.

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