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The Study of Seed Dormancy and Viability in Rice

by

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Introduction : It is common knowledge that in rice, the short duration varieties readily germinate after harvest, while medium and long duration varieties possess varying periods of after ripening. This trait though advantageous to raise the second crop with the early varieties, cause severe damage, in those regions where the monsoon season synchronise with the time of harvest, by sprouting in the field itself. A period of dormancy, for a month or even 15 days in short duration varieties would help greatly to

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tide over this colossal waste. To achieve this end, a correct perspective on the extent of sprouting resistance, viability and their association with other characters would be necessary. In this paper 85 departmental strains were studied for their variation in the period of dormancy and viability.

Review of Literature: Ramaiah (1937), Narasinga Rao and Shanmugasundaram (1951) and Mudaliar and Sundararaj (1954) reported, with few exceptions, that short duration varieties readily germinate after harvest, while medium and long duration varieties require a period of dormancy. Chalam (1954) found that the period of dormancy lengthened with the duration. However, Dore (1955) and Roberts (1961) could not find any correlation with duration. Similarly, the period of viability is also connected with dormancy. Sahadevan (1953), Caldwell (1959), Karnich (1961) have suggested that more pronounced the period of dormancy the greater the period of viability, while Roberts (1963) disputed the association between dormancy and viability period.

Material and Methods: To evaluate the period of dormancy, the method suggested by Shanmugasundaram (1953) was adopted. Riped earheads were collected on the 35th day of flowering at random from the observational plots. The date of flowering was reckoned as the day on which 75 per cent of the plants flowered. The earheads were then immersed in half-an-inch of water in shallow galvanised iron trays. This would approximate the conditions prevailing in the field. Germination counts were taken daily for seven days and percentages worked out based on the number of grains in the panicle, exclusive of chaff. Six tests at weekly intervals were conducted in all, from the date of harvest.

The varieties that register less than 5 per cent germination are considered as dormant upto that period of the test, since germination upto 5 per cent could be the error due to environment.

Besides, germination tests at weekly intervals were conducted in germination trays with all the varieties, till the germination deteriorated below 100 per cent to assess the period of viability. The seeds were stored in cloth bags.

The strength of association between duration (from seed to seed) and period of dormancy and viability were estimated. The varieties with the duration of 125 days and below are considered as early maturing varieties, while those with more than 125 days as late maturing varieties.

Results and Discussion: The results of six dormancy tests presented in table I, (30 early and 55 late varieties) revealed that among the early varieties the period of dormancy was nil in eleven and in 14 strains it was

TABLE I

Viability days	EARLY				LATE							
	Dormancy in days				Dormancy in days							
	Nil	7	14	Nil	7	14	21	28	35	42		
200 — 300	Strain No. Co. 9 MTU. 15				Strain No. Co. 3 BAM. 3 GEB. 24 Co. 19 Co. 16 ADT. 10 ADT. 6 PLR. 1				Co. 7 Co. 30 ADT. 7 ADT. 17 ADT. 22 ASD. 5 PTB. 15 BCP. 1 White Puttu Black Puttu			
300 — 400	Co. 10 Co. 13 Co. 18 Co. 20 ADT. 3 ADT. 14 TKM. 5 PTB. 10 PTB. 28	ADT. 12 ADT. 15 ADT. 16 ADT. 18 ADT. 20 TKM. 3	ADT. 9 ADT. 19 ASD. 2 MTU. 9	Co. 20 ADT. 23	Co. 14 Co. 23 TKM. 1 TKM. 2	ASD. 4	Co. 12 ADT. 11 ADT. 21	Co. 2 Co. 5 Co. 8 WND. 1	Co. 27 ASD. 10	Co. 4 Co. 6 Co. 17 Co. 25 Co. 26 ADT. 1 ADT. 2 ADT. 5 ADT. 13 ADT. 25 ASD. 11 PTB. 16 SR. 26-B WND. 2 BCP. 2		
400 — 500 and above	ADT. 4 ASD. 1	Co. 22 ASD. 7 ASD. 8 ASD. 9 TKM. 4 TKM. 6 PLR. 2				Co. 15 Co. 19	ASD. 3	Co. 1	ADT. 6 ADT. 24			

7 days while in the remaining 5 strains it was extended to 14 days. Such variation in dormancy within the short duration varieties themselves were also recorded by Shanmugasundaram (1951). In the 55 late maturing varieties studied, the two varieties Co. 20 and ADT. 23 were dormant, and 7 varieties were dormant from 7 to 14 days, while the rest were dormant for 21 to 42 days.

Regarding viability, the early maturing varieties remained viable from 210 to 453 days while late maturing varieties were viable even upto 543 days. Sprouting in earheads in the early varieties, increased in a faster rate with every subsequent test than in the late varieties. But the difference in time taken to reach 100 per cent germination between the two groups was very little.

Though there were exceptions in the period of dormancy and viability under both groups they follow a definite pattern with the duration.

TABLE II
Correlation between duration, Dormancy and Viability.

Particulars	Dormancy	Viability	Duration
1. Duration in days	0.7022 **	—	—
2. Period of Dormancy in days	—	0.0116 N.S.	—
3. Period of Viability in days	—	—	0.3592 **

** Significant at 1 per cent level.

The correlation studies presented showed that the association between duration and dormancy is positive and high while the correlation between duration and viability is positive and moderate. This is in contrast to the findings of Dore (1955) and Roberts (1961). However, it should be remembered that they have reckoned the dormancy period as the number of weeks to attain 98 per cent and 50 per cent respectively, unlike in the present study and also have not studied varieties with such widely varying duration. The correlation between the period of viability and dormancy is very feeble and non-significant. This corroborates the view held by Roberts (1963).

Summary and Conclusion: Thirty early and fifty five late maturing varieties were studied. The period of dormancy and viability were recorded. The following conclusions were drawn :

1. Short duration varieties are generally non-dormant, the period of dormancy being nil to 7 days in most of the early varieties.

2. Long and medium duration varieties, with a few exceptions have longer dormancy period of 21 to 42 days.
3. Dormancy period is positively correlated with duration and it increased with duration.
4. The period of viability is moderately correlated with duration.
5. There is very little association between the period of dormancy and the period of viability of a variety.
6. There does not appear to be any appreciable difference in the time to reach 100 per cent germination between both early and late varieties.

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