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Causes of Poor Viability in a few Grass Seeds

by

GIRIJA BALASUBRAMANYAM

and

D. DANIEL SUNDARARAJ

Agricultural Research Institute, Coimbatore

The seeds of South Indian grasses have in general low percentages of germination; many of these have less than 40% viability and some even less than 10% (Chandrasekharan *et al* 1950; Rajesekhara Mudaliar *et al* 1954). *Cenchrus ciliaris* and *Cenchrus setigerus* which are the notable species of grasses of the Kangayam tract and which are recommended for development and improvement of pastures, have very poor germination. To find out the causes of the poor germination capacity of important grass seeds, their dormancy periods were first studied; it was found that these grasses showed satisfactory germination only after about 12 to 15 months of dormancy. While *C. ciliaris* gave 10–20% germination after one year of storage, *C. setigerus* gave a maximum of only 8% (Rajasekhara Mudaliar *et al* 1953). To find out whether the involucre of bristles of the spikeletes in the *Cenchrus* sp. has anything to do as mechanical barrier in the germination of seeds, these investigations were carried out.

Cenchrus ciliaris, *Cenchrus setigerus* and Blou buffel (*Cenchrus* sp.) were taken as the material for study. Spiklets are generally considered as seed for sowing in grasses and these were collected at different seasons, viz., January 1952, January 1953, November 1954 and June 1954, and dissected to note the percentage of grain setting.

The dissected grains, both well developed and poorly developed were soaked in water for sixteen hours and then kept separately for germination in seed testing trays, with another set of whole spikelets kept as control.

1. Grain Setting: On dissecting the spikelets, it was found all the spikelets did not have grain setting. Further, in cases where there was grain setting, there were both fully developed and poorly developed grains. Table I shows the percentage of grain-setting in the three species of grasses taken up for study.

It is seen from the data presented in Table I that the grain-setting in the spikelets is only about 42% in *Cenchrus ciliaris*; 38% in *Cenchrus setigerus* and 35% in *Cenchrus* sp; (Blou buffel). Of these

the well-developed grains are only 24·4, 28·4 and 20 percentages respectively. There is no appreciable difference in the setting of grains in the different species and for each species in different seasons.

2. **Germination Trials:** In the germination tests conducted with the three sets viz., (a) well developed grains, (b) poorly developed grains and (c) the whole spikelets as such for each of the species of *Cenchrus*, well developed grains alone showed very good germination while the poorly developed grains failed to germinate.

The percentages of germination worked out on (a) the well-developed grains (b) the total number of germinated grains both well-developed and poorly developed out of 100 spikelets tested out and (c) the whole spikelets as such are presented in the table II.

The following are the observations that could be drawn from the data presented:

1. Whole spikelets have given the poorest germinations viz., 4·4% for *Cenchrus ciliaris;* 1% for *Cenchrus setigerus* and 6·8% for *Cenchrus* sp (Blou buffel) on an average.

2. The well-developed grains show good percentages of germinations of 87; 86·2 and 85·3 percentages respectively for the three species.

Discussion and Conclusion: Whole spikelets as such giving very low percentages of germination when compared to high percentage of germination obtained from well developed grains bring out that the involucre of bristles have some mechanical obstruction. This is further evident from the nature of the involucre in the three species under study. *Cenchrus setigerus* has the toughest involcure, *Cenchrus ciliaris* a medium tough and Blou buffel (*Cenchrus* sp) a soft involucre and the average percentages of germination are 1, 4·4 and 6·8 respectively for the whole spikelets of the above three species. When there is no appreciable difference in the setting of well-developed grains and the germination of the well-developed grains in the three species, the mechanical obstruction caused by the involucre of bristles appears to be responsible for the difference in the germination percentages of the whole spikelets of the three species. Such mechanical obstructions affecting germination have been recorded by Crocker 1906 and Shull (1911) in *Xanthium*.

TABLE I.

Percentage of grain-setting; Poorly developed and well developed seeds in *Cenchrus* sp. collected at different dates.

No.	Name of seeds	Jan. 1952		Jan. 1953		Nov. 1953		April 1954		June 1954		Average		Total
		Well developed	Poorly developed	Well developed	Poorly developed	Well developed	Poorly developed	Well developed	Poorly developed	Well developed	Poorly developed	Well developed	Poorly developed	
1	*Cenchrus ciliaris* (local) ..	25	29	26	23	19	12	29	7	23	15	24·4	17·2	41·6
2	*Cenchrus setigerus* ..	39	6	34	4	25	14	17	13	27	13	28·4	10·0	38·4
3	Blou buffel (cenchrus sp.) ..	18	27	16	15	23	13	12	9	31	12	20	15·2	35·2

TABLE II.

Percentage of Germination in developed grains and in spikelets as a whole, collected at different dates.

No.	Species	Jan. 1952		Jan. 1953		Nov. 1953		April 1954		June 1954		Average	
		In well developed grains	In spikelets as a whole	In well developed grains	In spikelets as a whole	In well developed grains	In spikelets as a whole	In well developed grains	In spikelets as a whole	In well developed grains	In spikelets as a whole	In well developed grains	In spikelets as a whole
1	*Cenchrus ciliaris* (local) ..	84	5	92	7	70	4	93	4	87	2	87	4·4
2	*Cenchrus setigerus* ..	64	0	91	2	92	1	95	2	89	0	86·2	1
3	Blou buffel (*Cenchrus* sp.) ..	56	5	87·5	11	91	16	92	6	100	6	85·3	6 8

It appears from the data presented that the low percentages in *Cenchrus* species are due to two causes: (1) the poor setting of grains in the spikelets (there are only 20 to 25% setting of well-developed grains) and (2) some mechanical obstruction caused by the involucre of bristles of the spikelets.

REFERENCES

1. Chandrasekharan, S. N. Daniel Sundararaj, D. (1950) Viability of some grasses. Mad. Agrl. J. *37*: 262—264.
2. Crocker, W. (1906) Role of seed coat in delayed germination' Bot. Gaz. *42*: 265—291.
3. Rajasekhara Mudaliar & Daniel Sundararaj, D. (1954) "Dormancy and germination of a few crop seeds" Mad. Agri. Jan. *41*.
4. Rajasekara Mudaliar, C. Daniel Sundararaj, D. & Girija Lakshman. (1953) "Dormancy or after ripening" of seeds of a few grasses. (Paper read at the Third Scientific Workers' Conference of the Madras Agri. Dept. 1953).
5. Shull, C. A. (1911) The oxygen minimum and the germination of Xanthium seeds. Bot. Gaz. *52*: 453–477.

A Review of the Soil Studies on Deccan Black Soils and the Effect of Irrigation on them

by

M. R. BALAKRISHNAN*
Lecturer in Chemistry, Agricultural College, Coimbatore

Introduction: The black soils of India have received attention from all soil workers for a long time. Probably on account of its colour, and its importance in cotton cultivation the black soil type was one of the earliest to be subjected to intensive study.

Objective: In this paper an attempt is made to present in a compact, cogent form, the results of voluminous pieces of work which have been done by several Agricultural Chemists at Madras in succession for well over 40 years now. The work has had a marked pedological emphasis, and is fundamental in perspective. None the less, its importance as the starting point for the solution of all soil problems cannot be over-emphasised.

Studies on Deccan Black Soils: (1) INVESTIGATIONS ON ORIGIN OF BLACK COLOUR: (a) Annett: (1910) attributed the colour

* Present Address: Agricultural Officer, F. A. O., Royal Irrigation Dept. Bangkok.