doedycoides has nematode attracting substances (Monoson *et al.*[7]) Comparable capabilities of *M. bembicodes* can be explored.

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1. Booth, C. and Stover, R. H., *Trans. Britl. Mycol. Soc.*, 1974, 63, 503.
2. Govindankutty, M. P. and Vellaichamy, K., *International Symposium on Coconut Research and Development*, Abstracts of papers, 1976, p. 46.
3. Indira, P. and Ramadasan, A., *Curr. Sci.*, 1968, **37**, 290.
4. Koshy, P. K., Sosamma, V. K. and Nair, C. P. R., *Indian J. Nematol.*, 1975, **5**, 26.
5. Matuo, T. and Miyazawa, Y., *Trans. Mycol. Soc., Japan*, 1969, **9**, 109.
6. Menon, K. P. V. and Pandalai, K. M., *The Coconut Palm, A Monograph*, 1959, pp. 384.
7. Monoson, H. L., Galasky, A. G., Griffin, J. A. and McGrath, E. J., *Mycologia*, 1973, **11**, 78.
8. Nitzany, F. E., Joffee, A. Z. and Palti, J., *Phytopath. Z.*, 1973, 76, 314.
9. Shanta, P. and Menon, K. P. V., *Indian Coconut J.*, 1961, **15**, 36.
10. Subramanian, S. and Govindarajan, T. S., *Pl. Dis. Reptr.*, 1968, **52**, 773.
11. Subramanyam, P., Prabhakar, C. S. and Rao, A. S., *Curr. Sci.*, 1974, 43, 318.

CRITICAL SOIL WATER POTENTIAL AND SEED HYDRATION FOR GERMINATION OF GRAIN SORGHUM

IT has been reported that the occurrence and the rate of germination are considerably influenced by soil moisture matric potential and hydraulic conductivity (Collis–George and Hector[1], Sedgley[7], and Manohar and Hydecker[5]). Peters[6] seported that the seeds of peas, soybean, corn and wheat failed to germinate at or below the wilting coefficient. Doneen and MacGillwray[2] found that the germination of vegetable seeds in sand and soil would depend on its water content. In the present investigation, an attempt has been made to evaluate the critical soil moisture and seed hydration for the germination of various cultivars of sorghum.

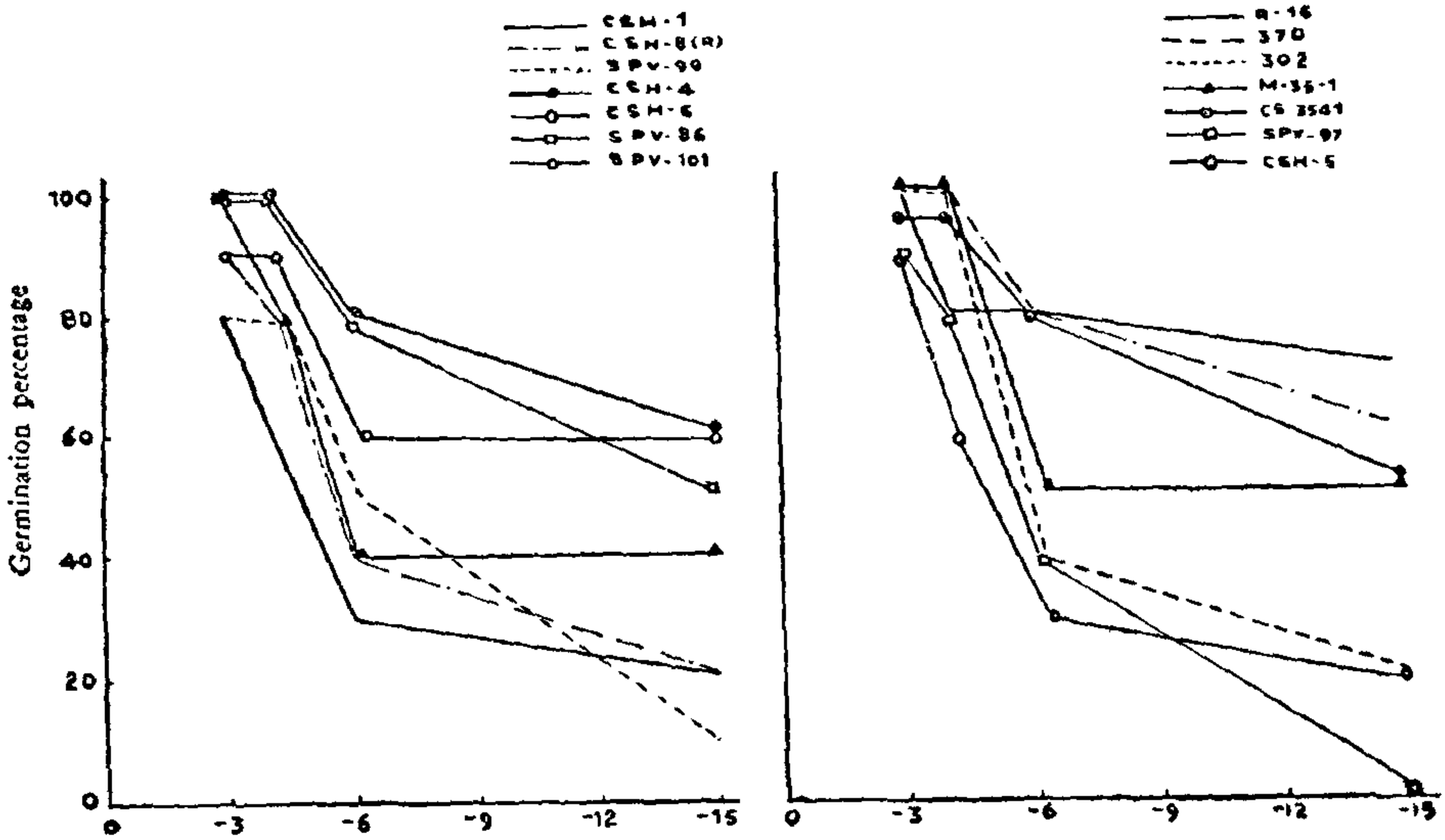
The invetigations were conducted on Parbhani clayey soil having pH 8·5, clay 55·2%, field capacity 36%, water holding capacity 62% and permanent wilting point 18%. Four lots of clayey soil (2 mm sieved) were moistened with a fine water spray to bring it to the desired moisture potentials (—15·0, —6·2, —4·2 and —3·0) bar and stored in closed cohtainers for the attainment of equilibrium. Ten healthy seeds of each of the 14 cultivars of sorghum were placed in Petri dishes containing 10 g of the soil at a depth of 10 mm at 28° ± 1° C. The experiment was replicated thrice. The germination was defined when 2 mm long radicle sprouted from the seed coat. The data on germination percentage were analysed statistically.

The data presented in Table I indicate the variation of critical seed hydration of the different varieties of sorghum. These observations suggest that there was a specific seed hydration level for each cultivar below which germination would not occur. This hydration level is governed by the internal water potential of the seed. As the seed imbibes water during the early stages of imbibition, its water potential increases and during the later stages some internal metabolic modifications may occur as was suggested from corn and cotton seed by Hadas and Stibbe[4]. When the seed attains that first 'Critical' hydration level, germination will occur. The seeds of CSH–6 and SPV–86, having lower critical hydration level, showed successful germination at — 6·2 bar soil moisture potential whereas CSH–1 and SPV–101 having similar critical seeds hydration germinated at — 4·2 bar. The seeds of C.S. 3541 having critical hydration similar to the seeds of CSH–1 and SPV–101 germinated at — 6·2 bar soil moisture

TABLE I

Critical soil water potential and seed hydration for germination of several cultivars of grain sorghum

Sr. No.	Cultivars	Time of germination (hours)	Critical soil water potential (bar)	Critical seed hydration (% water)
1.	CSH–5	60	—3·0	34·42
2.	302	52	—4·2	29·55
3.	CSH–8 (R)	56	—4·2	28·49
4.	SPV–97	64	—4·2	28·37
5.	M35–1	56	—4·2	26·96
6.	SPV–99	68	—4·2	26·66
7.	CSH–1	64	—3·0	25·86
8.	R–16	64	—6·2	25·00
9.	370	64	—6·2	23·44
10.	SPV–101	64	—4·2	22·72
11.	C.S. 3541	64	—6·2	22·58
12.	CSH–4	68	—4·2	22·52
13.	SPV–86	56*	—6·2	21·57
14.	CSH–6	64	—6·2	21·07



Soil water potential (bars)	Moisture	Varity	Interaction
SE ±	0·185	0·345	0·691
CD at 5%	0·511	0·957	1·914

FIG. 1. Germination of several cultivars or grain sorghum seeds as a function of soil water potential

potential. This may be due to the large seel surface area of C.S. 3541 (Mali *et al.*[4]).

The seeds of SPV–99 and M35–1 having medium critical seed hydration, germinated at –4·2 bar soil moisture potential whereas, the seeds of R–16 and CSH–1 having similar critical seed hydration germinated at — 6·2 and — 3·0 bar soil moisture potential respectively. This may be due to a comparatively lower critical seed hydration as well as variation in seed surface area. The cultivars having higher critical seed hydration germinated at — 4·2 bar soil moisture potential except the seeds of CSH–5 which germinated at — 3·0 bar. This may be attributed to the highest seed hydration level of CSH–5.

The percentage germination of the seeds of all the cultivars increased significahtly as the soil moisture potential was roised from — 15·0 to — 3·0 bars (Fig. 1). The seeds of the cultivars did not germinate successfully at—15·0 bar soil moisture potential. The seeds of CSH–6, C.S. 3541, SPV–86, R–16 and 370 germinated at — 6·2 bar. Therefore — 6·2 bar soil moisture potential can be considered as 'Critical' for the germination of these cultivars. Similarly for the germination of seeds of other varieties, — 4·2 bar soil moisture potential was 'Critical' except for CSH–1 and CSH–5, for which — 3·0 bar was found to be the 'Critical'. From this it is clear that these two varieties required highest percentage of water for germination.

Further investigations are necessary to determine the critical soil moisture level for seed emergence under the field conditions.

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1. Collis–George, N. and Hector, J. B., *Aust. J. Soil Res.*, 1966, 4, 145.
2. Doneen, L. D. and MacGillvray, J. H., *Pl. Physiol.*, 1943, 18, 524.
3. Hadas, A. and Stibbe, E., "Phlysical aspects of soil water and salts in ecosystems," *Ecological Studies*, Springer–Verlag, Heidelberg, 1973, 4, 97.
4. Mali, C. V., Varade, S. B. and Musande, V. G., Paper presented at 43rd Annual Convention of the ISSS held at Ludhiana on 25th Feb. 1978.
5. Manohar, M. S. and Heydecker, W., *Nature*, 1964, 202, 2.
6. Peters, R., *Trans. Kan. Univ. Sci., Bul.*, 1920, 13, 23.
7. Sedgley, R. H., *Austr. J. Res.* 1963, 14, 646.