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Effect of Pre-treatment on Germination of Kolinji Seeds (*Tephrosia purpurea* Pers.)

by

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Introduction: *Tephrosia purpurea* Pers. (Kolinji) is an important green manure crop in South India especially in low rainfall areas. It has a special significance as green manure crop for Paddy, since it is not grazed by cattle and is drought resistant. As in most of the leguminous crops the seeds of kolinji have hard seeds, besides soft seeds. Due to the presence of hard seeds and other collection peculiarities, a good deal of variation has been observed in the germination behaviour of the seeds of kolinji grown in different localities. With a view to fixing the germination standard for this seed, tests were carried out at the Botany section, Agricultural College and Research Institute, Coimbatore, during 1962, with five samples of seeds collected from different localities of the State. From the germination tests conducted it was observed that different samples exhibited differential behaviour with regard to their germination. Two samples of seeds which recorded better and moderate germination were selected for pretreatment studies in order to improve the germination capacity. The results obtained are presented in this paper.

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Materials and Methods: Two samples of *Kolinji* (*Tephrosia purpurea* Pers.) collected during March, 1963 from Ramanathapuram and Watrap localities in Madras State were selected out of five samples under study in the Botany Section, Agricultural College and Research Institute, Coimbatore. The two samples selected were based on their performance as they were better in germination as compared to the other samples.

The first germination test was conducted on May 1963 with the following ten treatments. (1) Control without any pretreatment, (2) Scarification of seeds with sand, (3) Presoaking in hot water at 50°C, (4) 60°C, (5) 70°C, (6) 80°C and (7) 90°C for five minutes in each case separately, (8) Scarified with sand and then presoaked in hot water for five minutes at 50°C, (9) Presoaking in hot water at 80°C and (10) 90°C separately till such time the water cooled down to room temperature.

The fortnightly germination tests were conducted on filter paper medium in Zinc germination trays in duplicate sets of hundred seeds each at Laboratory temperature for a period of twelve months. The data gathered were analysed statistically after transforming the entire data into angular sines. (Table 1).

Results and Discussion: The analysis of variance showed that the 'F' test was highly significant (at 1% level) for all the source of variation as months, places, treatments and also the interaction between months and places, months and treatments, places and treatments and between places, treatments and months (Table 1).

TABLE 1. *Analysis of Variance*

Source of variation	D. F.	S. S.	M. S.	'F' Test
Replication	1	13.8856	13.8856	—
Months	11	765.6652	69.6052	5.749**
Places	1	16,773.2900	16,773.2900	1385.571**
Treatments	9	59,929.9113	6,658.2790	550.062**
Months×places	11	686.4482	62.4044	5.155**
Months×treatments	99	5,495.8820	55.5138	4.586**
Places×treatments	9	958.9567	106.5507	8.802**
Places×treatments×months	99	3,267.7046	33.0071	2.732**
Error	239	2,893.2575	12.1057	—
Total	479	90,785.001		

** Significant at 1% level.

Among the treatments, treatment-8 viz., scarification with sand and then presoaked in hot water for five minutes at 50°C is significantly superior to the

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rest with an increase of 47% germination over the untreated control which has recorded only 7.6% mean germination (Table 2). Next was the treatment-2 viz. 'Scarification with sand' followed by hot water treatments 90°C, 80°C and 70°C. Hot water treatments below 70°C and also the two treatments in which the seeds were kept in hot water for a longer period until the water gets cooled to room temperature were not quite effective in enhancing the germination. The percentages of increases over control presented in Table 2 show the treatment, scarification with sand and then presoaked in hot water for five minutes at 50°C has given the maximum increase in germination of 198.25% over control followed by treatment-2 i.e. 'Scarification with sand' showing 178.7% increase over control, the minimum being 12.7% increase only, in the case of the treatment, hot water soaking for 5 minutes at 50°C. As demonstrated by Venkataraman (1951) in *Prosopis juliflora*, a combination of scarification plus hot water treatment is very effective in breaking the seed coat of kolinji and making it permeable to water for easy germination.

TABLE 2. Treatment Means. (Transformed into angular sines)

Treatments	Mean values		% of increase over control	S.E.	C.D. (P 0.05)	'F' Test
	Actual %	Transformed values				
1. Control	7.6	15.9650	—			
2. Scarification	49.2	44.4987	178.70			
3. Hot water 50°C for 5 mts.	9.6	17.9971	12.70			
4. " 60°C "	14.5	22.3706	40.10			
5. " 70°C "	25.1	30.0456	88.20			Significant
6. " 80°C "	39.8	39.0989	144.90	0.5021	1.3920	at 1%
7. " 90°C "	43.5	41.2925	158.60			level
8. Scarification plus Hot water 50°C for 5 mts	64.6	47.6164	198.25			
9. Hot water 80°C & Cooled down to room temperature	3.8	21.8200	36.70			
10. Hot water 90°C & Cooled down to room temperature	14.9	22.7412	42.40			

Conclusion: 8, 2, 7, 6, 5, 10, 4, 9, 3, 1.

Out of the two samples of seeds used in this study, watrap sample was significantly superior in germination to Ramnad sample. In order to assess whether there is any differential response between the two samples for the various treatments, the interaction effect between places and treatments was considered. It was observed from Table 3 that the response of both the samples was more or less similar to the various treatments. In the case of Ramnad sample treatment-8 was significantly superior to the rest while the same treatment though superior to the rest of treatments in the case of watrap sample, is on a par with treatment-2. In both the samples,

according to the rankings, the four treatments viz. treatment-8, 2, 7 and 6 can be considered to be of greater value in increasing the germination capacity of kolinji seeds in their order of preference to the rest of the treatments tried, although negligible differences in response were noticed between the two samples.

TABLE 3. 'Treatments×Places'—Mean Values. (Transformed into angular sines)

Treatments	Mean values				S.E.	C.D. (P 0.05)	'F' Test
	Ramnad		Watrap				
	Actual %	Trans- formed values	Actual %	Trans- formed values			
1. Control	4.7	12.46	11.1	19.47			
2. Scarification	34.7	36.08	63.6	52.91			
3. Hot water 50°C for 5 mits.	5.2	13.19	14.9	22.70			
4. " 60°C "	9.2	17.63	20.8	27.11			
5. " 70°C "	16.8	24.23	34.3	35.86			
6. " 80°C "	28.4	32.23	61.7	45.96	0.7102	1.9663	Signifi- cant at 1% level
7. " 90°C "	35.2	36.33	52.1	46.20			
8. Scarified plus hot water 50°C for 5 mits.	42.9	40.91	66.0	54.32			
9. Hot water 80°C & Cooled down to room temperature	7.6	16.04	21.5	27.64			
10. Hot water 90°C & Cooled down to room temperature	6.8	15.17	25.5	30.31			

Conclusions: 1. Ramnad: 8, 7, 2, 6, 5, 4, 9, 10, 3, 1.

2. Watrap: 8, 2, 7, 6, 5, 10, 9, 4, 3, 1.

Summary: Out of the ten treatments tried, the treatment 'Scarification with sand then presoaking in hot water at 50°C for five minutes' is the best in improving the germination of kolinji seeds by 198.25% followed by the treatments 'Scarification' alone and hot water alone at 90°C and 80°C for five minutes. Pretreating the seeds in hot water at lower temperatures of 50°C, 60°C and 70°C for five minutes duration does not improve the germination considerably. Also keeping the seeds in hot water at 90°C and 80°C till the water gets cooled slowly to room temperature is found ineffective though it has been successfully tried elsewhere. The locality variation does not affect the response to different treatments though there is distinct difference in the germination behaviour of the seeds from the two localities tried in this experiment.

REFERENCE

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