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SEED COLLECTION, STORAGE AND GERMINATION IN *Erythrina stricta*

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ABSTRACT

Erythrina stricta Roxb. (Leguminosae) contains alkaloids of insecticidal properties. Seeds were collected in May and stored in mud pot, plastic bottle, polythene bags with different gauges and in gada cloth bag. Seeds mixed with cowdung powder, leaf powders of neem and *Vitex* individually in storage, the higher percentage of germination was with neem leaf stored seeds (90%). Seed germination was upto 85-90% in 7-10 days when sown at a depth of 2-3 cm; in a mixture of sand+soil+humus (1:1:1) followed by other media. The root and shoot length of the seedlings was higher in neem leaf stored seeds followed by that in the control and in the mixture of*Vitex* and cowding. Seedling biomass was the highest (2.31 g/plant) with neem stored seeds.

KEY WORDS : Seed collection, Containers, Biocides, Biomass

The genus*Erythrina* Linn. (Leguminosae) is widely distributed in tropical and sub-tropical parts of the world. The plants are cultivated in gardens, on road sides, as marginal cultivation for ornamental and protective purposes, and as shade trees in tea and coffee gardens. The bark, roots and seeds of many species contain alkaloids which possess insecticidal properties. Crushed stems and roots of some species are used for stupefying fish. Wood is used for making ladders, sieve frames, drums, packing cases, plywood, matches and match boxes. Knowledge on seed handling will help in easy propagation of these plants. Seed collection, processing, storage in varied containers, mixing with biological produce for prevention from microorganisms, range of storage timing, viability of seed, nursery practices and evaluation of germination and seedling are important phenomena in the phase, "seed to seedling". The present study was conducted to elucidate information on seed collection, storage and germination in *E. stricta* Roxb.

MATERIALS AND METHODS

Seven to eight year old trees of *E. stricta* were identified at Coimbatore having an altitude of 428 m (MSL) with annual rainfall of about 660 mm. The trees grow in black cotton soil with a pH range of 8-8.5 and temperature of 27°C-30°C. Fruit fall was observed during April-May in these trees. Variations in the pod lenght and breadth for the above species were studied based on data from 50 pods and seeds with three replicates. Fruits on trees were collected, air-dried and with moisture 21 per cent stored in containers such as gada cloth bag, mud pot, plastic bottle and thin (60 gauge) and thick polythene (140 gauge) bags and maintained at room temperature (28±2°C). Seeds mixed with cowdung and leaf powders of neem, *Vitex* at 50 g/100 seeds. Seeds were at different depths ranging from 0.5 to 4.0 cm in different media such as sand, redsoil, black soil, sand + redsoil (1:1), sand + soil +humus (1:1:1) and sand + redsoil + blacksoil (1:1:1) and the germination process was observed. The germination test was conducted initially and at 30 day indervals for 9 months on the medium sand + soil + humus (1:1:1) and the seeds sown at a depth of 2-3 cm. For each experiments fifty seeds were sown in polythene bags (22x11 cm) filled with respective media. For each experiment, three replicates were used. The data were analysed for standard deviation and linear regression.

Seedling biomass was studied by using 30 Day stored seeds. Seeds were placted at 2-3 cm depth in

Table 1. Agrobotanical characters of *Erythrina stricta*

Characters	Results
Pod length (cm)	21.7 (± 1.08)
Pod breadth (cm)	1.8 (± 0.98)
Pod weight (g)	16.7 (± 1.36)
Number of seeds per pod	10-12 seeds
100 seeds weight (g)	68.4 (± 1.4)
Seed length (cm)	1.6 (± 0.98)
Seed breadth (cm)	1.1 (± 1.6)
Seed thickness	0.8 (± 0.76)
Seed size and colour	large, red
Germination days after sowing	7-10 days
Germination percentage	85-92

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Table 2. Effect of different storage containers on germination of *Erythrina stricta*

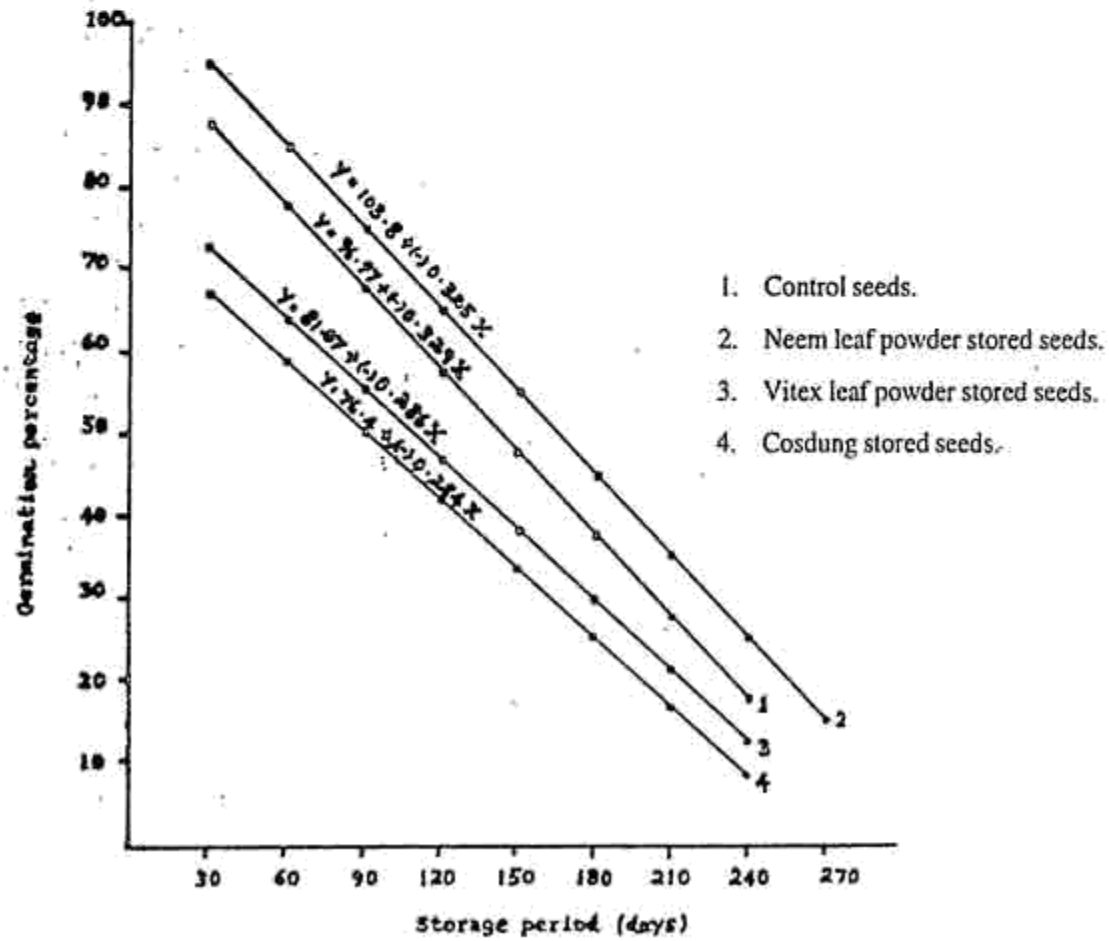
Different containers	Storage period (percentage germination)									
	Fresh seeds	30	60	90	120	150	180	210	240	270
	(Days)									
Plastic bottle	74 (±0.84)	71 (±1.08)	64 (±0.79)	52 (±1.16)	36 (±0.87)	22 (±0.84)	17 (±0.76)	12 (±1.08)	6 (±0.94)	–
Mud pot	78 (±1.34)	72 (±0.97)	67 (±0.74)	55 (±1.23)	38 (±1.23)	24 (±0.78)	16 (±1.14)	11 (±1.23)	5 (±1.14)	–
Gada cloth bag	92 (±0.84)	89 (±1.25)	77 (±1.34)	66 (±0.78)	52 (±1.18)	36 (±1.04)	21 (±1.23)	14 (±1.18)	9 (±0.97)	5 (±0.76)
Thin polythene bag (60 gauges)	81 (±1.17)	73 (±1.24)	61 (±0.87)	53 (±1.14)	39 (±0.87)	21 (±0.87)	13 (±0.84)	8 (±1.14)	4 (±0.73)	–
Thick polythene bag (140 gauges)	79 (±0.76)	72 (±0.85)	59 (±1.14)	51 (±1.23)	35 (±1.46)	16 (±1.08)	11 (±1.15)	7 (±0.87)	4 (±1.24)	–

(±) : Standard deviation

the mixture of sand+soil+humus. Five seedlings of each treatment were removed from the polythene bags and washed with water. The dry weight of seedling and their shoot and root lenghts were observed every 15 days from the date of germination upto 90 days.

RESULTS AND DISCUSSION

Variations in pod and seed characters are summarised in table 1. Similar studies were reported by Bagghi and Emmanuvel (1984) in *Albizia lebbek* and Athaya (1985) in some forest tree seeds. The seeds germinated between 7 and 10



1. Control seeds.
2. Neem leaf powder stored seeds.
3. Vitex leaf powder stored seeds.
4. Cosdung stored seeds.

Fig.1. Effect of different storage period on germination of *Erythorina stricta* Roxb

Table 3. Effect of various media and depths of sowing on germination of *Erythrina stricta*

Sowing methods	Germination (%)
Media	
Sand	92 (±0.94)
Red soil	62 (±1.24)
Black soil	47 (±1.28)
Sand+Red Soil (1:1)	71 (±0.85)
Sand+Blacksoil (1:1)	62 (±0.94)
Sand+soil+humus (1:1:1)	92 (±0.78)
Sand+Redsoil+Black soil (1:1:1)	74 (±1.12)
Depth	
0.5 cm	42 (±0.93)
1.0 cm	53 (±1.24)
1.5 cm	71 (±0.75)
2.0 cm	91 (±1.34)
2.5 cm	92 (±0.86)
3.0 cm	92 (±1.22)
3.5 cm	61 (±1.14)
4.0 cm	42 (±1.08)

(±) : Standard Deviation

days. The viability was retained for 9 months in neem leaf-stored seeds and 8 months in the control, cowdung and *Vitex* leaf-stored seeds. All the seeds were stored in gada cloth bag (Fig.1). Initially the germination was 92 per cent with neem leaf-stored seeds, 85 per cent in the control, 70 per cent in *Vitex* leaf and 65 per cent in cowdung powder (Fig. 1). The growth of the seedlings was rapid due to the presence of large quantity of nutrients in the seeds. Later the germination process decreased to 50 per cent after six months in neem leaf stored seeds, five months in the control and four months in *Vitex* leaf stored seeds and cowdung powder stored seeds. The seed germination was gradually reduced with an increase in the storage period. Similar studies were reported by Nagavani and Ananthapadmanabha (1986) in *Santalum album* Arya *et al.*, (1988) in *Salix spp.*, Venkatesh *et al.* (1990) in *Azadirachta indica* and Arjunan *et al.*, (1993) in *Pongamia pinnata.*

Seeds stored in gada cloth bag exhibited higher percentage (92%) of germination to other containers (Table 2). Seeds stored in gada cloth bag exhibited nearly 50 per cent germination even at 4 months and retained viability for 9 months. With other containers, it was 3 months and viability was totally lost at 8 months. Similar results were reported by Maithani *et al.*, (1988) in *Acacia nilotica,Albizia procera* and *Dalbergia sissoo* and Bahuguna *et al.*, (1987) in *Terminalia myriocarpa.*

The germination studies revealed that the seeds sown in a mixture of sand+soil+humus (1:1:1) and sand exhibited higher percentage germination (92%) than in other media (Table 3). Similar results were reported in *Tectona grandis* (Yadav *et al.*, 1982) and *Syzigium cumini* (Ponnammal *et al.*, 1992). Better germination was observed at depths below 2.0 cm - 3.0 cm (Table 3). Similar studies were reported for several forest tree species of the western lemlock (Don Minore,1985); Arjunan *et al.*,(1993) in *P. pinnata*

Seedling biomass studies were made with seeds stored (30 days) in different biocides, the rate of growth of seedlings was observed to be more in neem leaf-stored seeds followed by control, *Vitex* leaf stored seeds and cowdung powder stored seeds (Table 4). After 90 days of seed germination the highest biomass production was noticed in the seedlings of neem leaf-stored seeds (2.31 g/plant), less in the control (1.97 g/plant) and lowest biomass was observed in seedlings of *Vitex*

Table 4. Root and Shoot Length (cm) of *Erythrina stricta* seedlings at Different Durations after sowing

Seed storage after 30 days		Age in days					
		15	30	45	60	75	90
Control	Root	3.5 (±1.23)	4.4 (±1.57)	5.4 (±1.08)	6.1 (±1.46)	6.9 (±1.42)	8.5 (±1.04)
	Shoot	12.8 (±1.46)	14.9 (±0.97)	16.8 (±0.98)	18.5 (±0.84)	21.2 (±1.23)	26.6 (±0.87)
Neem leaf powder	Root	3.9 (±0.93)	5.1 (±0.84)	5.8 (±1.09)	6.4 (±1.23)	7.4 (±1.16)	9.6 (±1.34)
	Shoot	13.4 (±1.39)	15.6 (±1.16)	17.9 (±1.43)	20.3 (±1.62)	24.8 (±1.03)	30.1 (±1.43)
Vitex leaf powder	Root	3.3 (±1.08)	3.7 (±1.24)	4.8 (±1.16)	5.9 (±1.34)	6.3 (±1.43)	7.7 (±1.33)
	Shoot	12.1 (±1.23)	14.3 (±1.43)	16.7 (±0.87)	18.1 (±1.16)	19.7 (±0.98)	23.1 (±1.42)
Cowdung powder	Root	2.9 (±1.16)	3.5 (±1.09)	4.4 (±1.09)	5.4 (±1.82)	6.1 (±0.87)	6.9 (±1.24)
	Shoot	11.3 (±0.93)	13.7 (±1.24)	15.3 (±1.16)	16.8 (±1.32)	18.5 (±1.23)	20.9 (±1.63)

± : S.D.

Table 5. Biomass production of *Erythrina stricta* seedlings (d.wt. in g/plant) at different durations after sowing

Seed storage after 30 days	Age in days					
	15	30	45	60	75	90
Control	0.60 (±0.32)	0.67 (±0.48)	0.98 (±0.34)	1.38 (±0.47)	1.62 (±1.42)	1.97 (±1.32)
Neem leaf powder	0.66 (±0.47)	0.83 (±0.73)	1.21 (±0.83)	1.54 (±0.76)	1.87 (±0.68)	2.31 (±1.42)
Vitex leaf powder	0.54 (±0.74)	0.64 (±0.68)	0.83 (±1.32)	1.26 (±0.84)	1.56 (±0.76)	1.63 (±1.02)
Cowdung powder	0.46 (±0.53)	0.61 (±0.43)	0.87 (±0.78)	1.12 (±1.08)	1.26 (±0.64)	1.42 (±1.16)

(±) : S.D.

leaf-stored seeds (1.63 g/plant) and cowdung stored seeds (1.42 g/plant) (Table 5).

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KERNEL EXPOSURE AND MICROBIAL SPOILAGE IN PARBOILED RICE

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ABSTRACT

Kernel exposure due to husk opening in parboiling predisposes the parboiled paddy to microbial spoilage, heat development, breakage and loss in rice outturn during slow yard drying in humid rainy weather. When soaked paddy was steamed after addition of salt at 0.8 per cent (W/W) rice kernels were not exposed because the salt rendered closed grains to stay closed in parboiling. Salt treated closed grains offered protection to the rice kernel from mould invasion and withstood non-drying for seven days with superficial infection of moulds compared to the deeper infection in grains with exposed kernels. In a period of seven days of non-drying, parboiled paddy with exposed kernels sustained 51.2 per cent grain infection, yielded 57.8 per cent rice outturn with 55.2 per cent breakage, 18.6 per cent oil bran with a free fatty acid content of 34.9 per cent compared to 5.9 per cent grain infection, 67.5 per cent rice outturn with 11.4 per cent breakage, 28.9 per cent oil with 22.0 per cent free fatty acid in closed grains. Salt treatment to the opened grains at 0.6 per cent (W/W) level equivalent to the present in grains treated with 0.8 per cent salt offered only a slight protection indicating that it is the intactness of husk and non- exposure of kernels in closed grains that protect the rice kernel from spoilage than the protective action of salt.

KEY WORDS : Parboiled Rice, Kernel Ex osure S oila e