

SEED AND SEED GERMINATION IN *DOLICHOS BIFLORUS* LINN.V. B. Kunure<sup>1#</sup>, V. R. Naik<sup>2</sup> and R. P. Jadhav<sup>3#</sup><sup>1</sup>Department of Botany, SH Kelkar College, Devgad, Sindhudurg – 416014, (MS) India<sup>2</sup> Director, Varadanjali Herbals Private Ltd. Malad Mumbai-400095 (MS) India<sup>3</sup>Department of Botany, GKG College, Kolhapur – 416014, (MS) India<sup>#</sup>Research Scholar, JJTU, Jhunjhunu-333001, (Rajasthan) India

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**Abstract:**

The present paper deals with seed attributes, seed storage, and dormancy, effect of temperature, pH and sowing depth on seed germination in *Dolichos biflorus* from an ayurvedic and highly nutritious leguminous herb have been described. Mature freshly collected air-dried seeds shows 71% germination. Mechanical scarification with needle, sand paper and mortar-pestle methods shows 82%, 94% and 63% germination respectively. The percentage of seed germination shows poor in acidic as well as basic condition.

**Keywords:** *Dolichos biflorus*, Seed attribute, Germination, Dormancy

**Introduction:**

*Dolichos biflorus*, native of India, is commonly used for food and fodder in Asia. Horse gram is a shrub grown and cultivated in the plain of Indian state like Maharashtra, Andrapradesh, Karnataka and Madhya Pradesh for its seed. Its whole seeds are consumed as sprouts or whole meal in some parts of India. Nutritionally the seeds are richer in lysine content when compared to gram pulse. The leaves of the herbs may be used in vitamin-c deficiency, due to the presence of ascorbic acid and calcium.

Horse gram is an excellent source of iron. It is an ayurvedic, highly nutritious leguminous herb used for the treatment of kidney, cough, asthma and piles.

Seed dormancy is a particular form of cessation of growth and is a cryptobiotic state (Amen 1966) regards seed dormancy as an adaptive mechanism of growth cessation which often confers a selective advantage in distribution and abundance.

Ecological studies of economically important species provided prerequisite information to bring them under cultivation. With this aim in mind studies were undertaken for seed attributes, seed germination and breaking dormancy.

**Materials and Methods:**

Mature pods containing seeds were collected from village Satose of Sindhudurg district. Seeds were separated from pods and cleaned, air dried and stored in glass stopped bottle under normal laboratory condition and used for various seed germination experiments. The seed index was calculated on the basis of observation of hundred seeds each. The percentage sterility was determined by flotation methods. The moisture percentage was calculated on the basis of oven dried weight at 110°C various temperature treatments were

given at low temperature in refrigerator and higher temperature in incubator. Germination tests were made in petriplates in between two sterile moist blotting sheets. Emergence of radical was taken as a criterion of seed germination. Mature air dried seeds were periodically tested for germination. Sowing depth experiments were done in 30 x 30 cm size pots containing uniform volume of soil. Each set was represented by three pots. Various pH effects on seed germination was studied by irrigating germination seeds with solution adjusted at different pH levels.

**Observation:****A. Seed attributes :**

The seeds of *Dolichos biflorus* are small, slightly elongated, whitish brown in colour and 5.2 mm in length and 3.3 mm in breadth. The average weight of hundred seeds is 22 gms to 24 gms. The percentage sterility of the seeds varies from 4-10%. Moisture content in air dried seeds varies from 10 to 12 percent.

**B. Seed germination :**

**a. Scarification:** Freshly collected mature air dried seeds shows 71% germination. Mechanical scarification with needle, sand paper method and mortar-pestle shows 82%, 94% and 63% germination respectively. Mechanical scarification with sand paper showed maximum percentage of germination. Chemical scarification with conc. H<sub>2</sub>SO<sub>4</sub> was carried for 15 sec, 30 sec, 1 min and 2 min. 47.3% germinated when treated with conc. H<sub>2</sub>SO<sub>4</sub> for 30 sec. While increase in time decrease the percentage germination.

**b. Temperature effect on germination:** Uncertified seeds showed less percentage of germination as compared to scarified seeds at all temperature treatment. The maximum percentage of seed germination was observed at

27°C followed by 32°C, while increase or decrease in temperature than optimum shows reduction in percentage germination. Lowest germination percentage was observed at low temperature.

**c. Imbibition:** The rate of imbibition of uncertified seeds was low as compared to scarified seeds but in case of uncertified seeds there was no significant change in the rate of seed imbibition.

**d. pH :**The maximum seed germination was observed at neutral pH while the germination percentage was low at acidic or basic pH. In general scarified seeds showed maximum percentage of germination compared to unscarified ones.

**e. Sowing depth:** The highest percentage of seed germination was observed when the seeds were sown at 1cm depth followed by seed spread superficially on the soil surface while low percentage germination was observed when the seeds were sown at 2 cm depth.

**f. Storage:** The highest percentage seed germination was observed in month of July followed by June for both scarified and unscarified seeds. In general the percentage germination was higher in scarified than unscarified ones in all months.

**Discussion:**

The mechanism of seed dormancy in *Dolichos biflorus* is associated with its impermeable seed coat. As in other cases of such kind of dormancy, it is easily removed either by mechanical or chemical scarification of the seeds. According to Hutchinson and Ashton (1979) the macroscleried layer of mature seed coat is mainly responsible for imparting impermeability to the seeds.

The importance of temperature in seed germination has been studied by several workers (Mayer and Poljakoff-Mayber 1979). *Dolichos biflorus* showed maximum germination percentage at room temperature and at 32°C of scarified seeds but rate of germination is reduced after increasing and decreasing temperature range. In number of species having impermeable, seed coat, a variety of high temperature treatment have been employed successfully to overcome the dormancy (Chatterji and Mohnot, 1968; Rolston 1978; Rao and Reddy, 1981). *Dolichos biflorus* showed good percentage of germination under wide range of pH varying from 4.1 to 10.3 but highest percentage germination

was observed at neutral pH. Similar observation was made by (Ramakrishna 1963; Agarwal and Prakash 1978 and Rao and Reddy 1981; Menon and Kulkarni 1987).

The ideal soil depth at which maximum germination varies with the species as in *Erigeron linifolius* (Ramkrishn, 1963) and *Euphorbia nivula* (Agarwal 1973). Superficially sown seeds showed maximum germination *Ambrosia trifida* Abul-faith and Bazzaz, 1979) and *Cleome viscosa* (Menon-Kulkarni, 1987) 2 cm depth was ideal. *Vigna capensis* showed 1 cm depth was ideal for seed germination similar observation were made by Smith 1972 in *Scolochaba festucacea*.

The airdried seeds of *Dolichos biflorus* could be stored successfully under dry storage condition for one academic year without loss in viability. Several workers have reported that many types of seed dormancies are overcome by dry storage for varying period of time (Mukherji 1966, Krishna and Tyagi 1976). Laboratory germination tests of unscarified stored seed of *Dolichos biflorus* at monthly interval showed that the percentage were increase in number while scarified seeds there is slightly increase in percentage germination. In scarified and unscarified seeds maximum percentage of germination was observed in month of July and June. Laboratory germination test of scarified stored seeds of *Dolichos biflorus* at monthly intervals showed that the germination improved during rainy season.

**Table: 1.** Effect of mechanical scarification on seed germination of *Dolichos biflorus*.

Method		% germination
Unscarified seeds		71
Scarifications with	Needle- pin	82
	Sand paper	94
	Mortar – pestle	63

**Table :2** .Effect of chemical scarification with dilute and conc. H<sub>2</sub>SO<sub>4</sub> on seed germination of *Dolichos biflorus*.

Method		% germination
Unscarified Seeds		71
Scarified with a. Dilute H <sub>2</sub> SO <sub>4</sub>	0.15 min	49
	0.30 min	56
	1.0 min	68
	2.0 min	58
b. Conc. H <sub>2</sub> SO <sub>4</sub>	0.15 min	54
	0.30 min	57.3
	1.0 min	47
	2.0 min	42.5

**Table : 3** Effect of pH on imbibition and seed germination of *Dolichos biflorus*.

Parameter	Seeds	pH values							
		4.1	5.1	6.1	6.5	D/W	8.1	9.2	10.3
%Imbibition	SC	39.39	38.31	37.59	35.43	30.51	32.13	24.21	27.17
	UnSC	15.83	15.31	17.91	16.83	17.91	16.78	14.78	13.61
% Germination	SC	71	75	81	90	95	71	78	70
	UnSC	41	48	45	60	73	56	40	42

**Table: 4** Effect of sowing depth on seed germination of *Dolichos biflorus*.

Sowing Depth	% germination	
Superficial	65	48
1 cm	94.66	53
2 cm	44	34

**Table 5** Effect of temperature on seed germination of *Dolichos biflorus*.

Temp °c	Seeds	% germination			
		1day	2day	3day	4day
5	Sc	-	6	11	5
	Un Sc	-	-	4	2
10	Sc	-	5	15	8
	Un Sc	-	1	5	3
27	Sc	-	22	49	6
	Un Sc	-	15	12	7
32	Sc	-	24	46	7
	Un Sc	-	13	14	6
40	Sc	-	23	25	4
	UnSc	-	13	14	3
50	Sc	-	11	10	3
	UnSc	-	8	10	2
60	Sc	-	10	9	1
	UnSc	-	8	7	2

**Table:6** Effect of storage on seed germination of *Dolichos biflorus*.

Months	% germination	
	Scarified seeds	Unscarified seeds
Oct.	93	68
Nov.	94	63
Dec	90	67
Jan.	94	64
Feb.	91	68
Mar.	88	61
Apr.	89	63
May	89.5	63
June	92	68
July	92	76
Aug.	91	60
Sept.	89	64

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