Effect of Temperature and Desiccation on Seed Viability of *Lepidium sativum* L.

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Abstract: *Lepidium sativum* L. is an important medicinal plant of India. Germination studies revealed that seeds do not exhibit dormancy as germination was fastest in 25^{0}C compared to 15, 20, 25, 20/30 (alternate temperature of 20and 30^{0}C, 20^{0}C for 16 hrs and 30^{0}C for 8 hrs) and 30^{0}C. No significant difference in germination percentage was observed in 15, 20, 25, 20/30^{0}C however germination percentage was significantly reduced when incubating temperature exceeded 30^{0}C, suggesting thermo inhibition of germination. Seeds with different moisture content viz. 2, 5, 8, 10 and 12% stored under ambient storage and tested for viability at 3 months interval revealed that seeds with 10 and 12% moisture content lost viability within 3 months while no reduction in germination was observed up to 6 months in seeds with moisture content 2, 5 and 8%. [New York Science Journal 2010;3(5):34-36]. (ISSN: 1554-0200).

Keywords: *Lepidium sativum*; germination; desiccation sensitivity; moisture content.

1 Introduction: *Lepidium sativum* is a fast-growing, edible herb that is botanically related to watercress and mustard, sharing their peppery, tangy flavor and aroma. In some regions, garden cress is known as garden pepper cress, pepper grass, pepperwort or poor man's pepper.[1][2] *Lepidium sativum* L. (Brassicaceae), commonly known as Chandrasur in Ayurveda is a Rabi crop predominantly grown in temperate region.[3] The seed of this crop is of medicinal importance and used to prevent post natal complications. The leaves are antiscorbutic, diuretic and stimulant. The plant is administered in cases of asthma, cough with expectoration and bleeding piles. The root is used in the treatment of secondary syphilis and tenesmus. The seeds are galactogogue. They have been boiled with milk and used to procure an abortion, they have been applied as a poultice to pains and hurts and have also been used as an aperients. The seeds are also used for treatment of bacterial and fungal infections. The seeds are reddish in colour and elliptic in shape with spatulate embryos and thousand seed weight varied from 1.545 gm – 1.752 gm.

The objective of the experiment was:

- To study dormancy and effect of different temperature on germination
- To study the effect of desiccation and storage period on seed viability.

Material and Methods: Freshly harvested seeds were procured from Directorate of Medicinal and Aromatic Plant Research (DMAPR) Anand on March 2009[Lot1] and Indian Institute of Horticultural Research (IIHR) Bangalore. [Lot2]. Moisture content was determined and seeds were germinated on top of the paper method in different temperatures. The temperatures used for germination studies were 15^{o}C, 20^{o}C, 25^{o}C, 15/35^{o}C (alternating temperature of 15/35^{o}C, 15^{o}C for 16hours and 35^{o}C for 8 hours) and 31-33^{o}C. Observations were recorded daily in all the temperatures. Germination was considered as development of seedlings from seeds with all its essential structures visible. Seeds with different targeted moisture content viz. 2, 5, 8, 10 and 12% were also prepared by keeping the seeds in salt solution with varying e-RH and stored under ambient laboratory condition in hermetically sealed containers. Germination tests were again conducted at 3 months intervals at 25^{0}C using TP method.

Results and Discussion: Perusal of the data reveals that seeds do not exhibit dormancy and germination was fastest in 25^{o}C. It was found that only 4 days were required for the final count in 25^{o}C whereas it was 8th, 6th, 8th and 7th days required for the final count at 15, 20, 30 and 15~35^{o}C temperature respectively. There is no significant difference in percent germination in 20, 25 and 15/35^{o}C. However thermo inhibition of germination was observed beyond 30^{o}C. First count was earliest in 25^{o}C on third day while second count was on fourth day. A delay in germination was observed in 15/35^{o}C, no significant difference in germination and vigour was observed due to desiccation as the germination percentage

varied from 88-94% in seeds with different moisture content i.e. 2, 5 and 8%. Subsequent viability test for seeds after 3and 6 months revealed that seeds with 10 and 12% moisture content (on fresh weight basis) lost viability after 3 months storage while seeds with 2, 5 and 8% moisture contents exhibiting no reduction in germination after 6 months. No significant germination was observed in seeds with 2, 5 and 8% moisture content.

Table 1. Germination and vigor at different temperature of *Lepidium sativum* L.

T (^{o}C)	Germination %		Days Taken to Germination		Root Length (cm)		Shoot Length (cm)		Seedling Dry Weight (gm)	
	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2
15	88	85	8	8	1.39	2.30	2.33	2.80	0.0050	0.0065
20	92	94	6	6	1.70	2.26	2.36	3.55	0.0057	0.0070
25	93	97	4	4	1.91	3.00	2.82	4.65	0.0059	0.0074
30	78	80	8	8	1.99	2.26	2.80	4.60	0.0055	0.0071
15~35	94	90	7	7	1.90	2.00	2.86	3.55	0.0057	0.0070

Acronym used: DTG=Days Taken for Germination, T=Temperature, G= Germination, L= Lot, RL= Root Length, SL= Shoot Length, SDW= Seedling Dry Weight

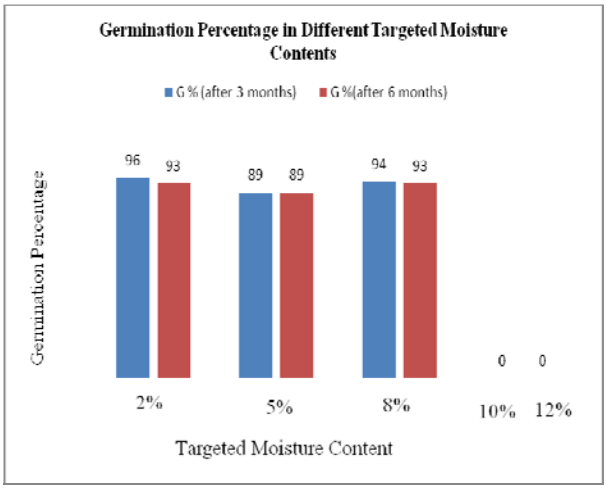

Fig: 1. Effect of storage period on germination of seeds with different moisture content.

Temperature is one of the main environmental factor regulating dormancy and germination (Kruk & Benech-Arnold1998 [3], Vleesh & Krof 2000[4]) and seed with less dormancy can germinate over a wide range of temperature condition (Vleesh *et al* 1995[5], Benech- Arnold *et al* 2000[6], Vleesh- Bouwmee 2001[7]). Temperature determines germination percentage and germination rate (Ellis *et al* 1986[8]), besides playing a critical role in the elongation of radcal and shoot, and thus seedling emergence. In *Lepidium sativum* maximum germination occurred over a wide range of temperature from 15^{0} to 25^{0}C and germination declined sharply in 31-32^{0} C. Germination rate usually increases linearly with increasing temperature from a base temperature up to an optimum and decreases linearly to a ceiling temperature. Cardinal temperatures, the minimum the maximum and optimum temperature exist in most species for seed germination (Bewley & Bleek 1994[9]).

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