

Seed Age Effect on Germinability in Seeds of *Rheum emodi* Wall. ex Meissn: An Endangered Medicinal Plant of Garhwal Himalaya

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Abstract: *Rheum emodi* Wall. ex Meissn is a perennial stout herb, distributed in the temperate and subtropical regions of Himalaya from Kashmir to Sikkim, between an elevation of 2800 and 3800 m. In Garhwal Himalaya it is generally found between 2800 and 3600 m in an alpine zone on rocky soil, between boulders and near streams. For the present study seeds of the years 2005, 2006 and 2007 were used, to evaluate the effect of age on germination and infection occurrence. Very poor germination was found in the present study because, age of seeds. Only 25% seeds of the year 2007 were germinate in T4 treatment and 15% in T1 treatment. No germination was recorded in all other presowing treatments. Infection percent was also evaluated and it was observed that as old as seed was showed higher infection percent. The result revolved that age of the seeds of *Rheum emodi* were directly effect the viability and vigour, even one year old seeds was also showed very poor germination and infection. [New York Science Journal. 2009;2(4):81-84]. (ISSN: 1554-0200).

Keywords: Seed; Age; Germinability; *Rheum emodi*; Plant; Garhwal Himalaya

Introduction:

In the Garhwal Himalayas *Rheum emodi* is generally found between 2800-4500 m on rocky soil surfaces, between boulders and near streams. Population density is between 0.5-1.5 plant m⁻² in very restricted localities, and is designated rare in status. The plant is a perennial stout herb, 1.0-3.0 m in height, distributed in the temperate and subtropical regions of the world between 2800-3600 m altitudes. Rhubarb, however, may exert an astringent action after purging. It is used as an astringent tonic; it's stimulating effect combined with aperient tonic; its stimulating effect combined with aperient properties render it especially useful in atonic dyspepsia (Chopra, 1958; Chopra *et al.*, 1986). The essential oil content is 0.05% in the root, and its characteristic odor is due to the presence of eugenol (Chopra, 1958). The total oxalic acid contents of the leaves and stems are reported to be 0.65 and 0.81 respectively. The drug contains a number of anthraquinone derivatives based on emodin, emodin-3-monomethyl ether, chrysophanol, aloe emodin, and rhein. In the wild population of Garhwal, emodin percent ranges between 0.81-1.88, rutin 0.24-0.93, chrysophenol 2.51-2.82 and chrysophenic acid between 0.35-1.08% (Maithani, 2001).

Material and Method:

For the present study seeds of *Rheum emodi* were collected from the forest of Tungnath (3600 m) in Uttarakhand Garhwal Himalya. The seeds of the years 2005, 2006 and 2007 were used for the study to evaluate the effect of age on germination. The seeds were properly dried and stored in plastic containers under ambient condition. The stored conditions for all the seeds were same. For investigation the seeds were subjected to following presowing treatments (24 hours) to study their effect on germination period and germination percentage:

T ₁	:	Cold water
T ₂	:	Luke warm water
T ₃	:	Boiling water
T ₄	:	GA ₃ - 50 ppm
T ₅	:	GA ₃ - 100 ppm
T ₆	:	IAA- 50 ppm
T ₇	:	IAA- 100 ppm

Table-1: Seed Age effect on germination of *Rheum emodi*:

	GERMINATION START (DAYS)			GERMINATION CEASE (DAYS)			GERMINATION PERIOD (DAYS)			GERMINATION %		
	2005	2006	2007	2005	2006	2007	2005	2006	2007	2005	2006	2007
T1	0	0	4	0	0	7	0	0	4	0	0	15
T2	0	0	0	0	0	0	0	0	0	0	0	0
T3	0	0	0	0	0	0	0	0	0	0	0	0
T4	0	0	6	0	0	12	0	0	4	0	0	25
T5	0	0	0	0	0	0	0	0	0	0	0	0
T6	0	0	0	0	0	0	0	0	0	0	0	0
T7	0	0	0	0	0	0	0	0	0	0	0	0

For germination test (McDonald and Copeland, 1999) seeds were sown on moist filter paper in petridishes with three replicates of each treatment. Watering was done daily or as required. The seeds were allowed to germinate at 30 °C with 16 hr light and 8 hr dark condition. Germination was noticed when radical emerged. Germination count was taken daily until it was over and constant. Data were analyzed using mean and standard deviation. For viability test 1% TDZ (Tretazolium solution) was prepared and seeds of three years were incubated at 35 °C in continuous dark condition for 24 hr (Agrawal, 1995) The infection on the seeds were also evaluated and calculated as infection percentage and days of infection.

Result and Discussion:

Rheum emodi Wall. ex Meissn. is a perennial stout herb, distributed in the temperate and subtropical regions of Himalaya from Kashmir to Sikkim, between an elevation of 2800 and 3800 m. In Garhwal Himalaya it is generally found between 2800 and 3600 m in an alpine zone on rocky soil, between boulders and near streams (Nautiyal *et al.*, 2002). Current estimates by the Threatened Plants Species Committee of the Survival (TPSSC) of IUCN indicate that 1 in 10 species of vascular plants on earth is endangered or threatened due to commercial exploitation and international trade. It has been pointed out that nearly 60,000 plant species may be in danger of extinction leading to gene erosion during the next 30–40 years¹. *Rheum emodi* is among the top of that list, particularly for Garhwal Himalaya; it has been identified as a top-priority species for conservation and cultivation.

The data presented in table-1 indicate that the seeds of year 2005 and 2006 have no germination even in any presowing treatments. Germination was found only in the seeds of year 2007 on T1 and T4 treatments. Higher percentage (25%) of germination was recorded in T4 treatment. T1 treatment also showed 15% germination. The viability test indicates only 30% viability in the seeds of year 2007. Infection on seeds was evaluated daily and found that the seeds of year 2007 showed very low infection while the old one seed of year 2005 showed higher percentage of infection (Table- 2). In the seeds of year 2005 infection was start very quickly i.e. from 2nd days of the experiment. 2006’s seeds were also showed higher percentage of infection. Germination behavior and seed dormancy of alpine plants from different alpine populations of world have been studied by several workers (Bliss, 1958; Amen, 1964; Semwal and Purohit, 1980; Rawat, 1989). Seeds of alpine plants are well known for high temperature requirements (Bliss, 1971). Billings and Mooney (1968) described 25 °C optimum germination temperature as measured by speed and completeness of germination percentage in many Himalayan alpine species. Amen (1966) did not found any evidence where an alpine seed can germinate at temperature below 10°C. Present study showed that as old as seeds of *Rheum emodi* were reduced their viability, that’s why seeds were not germinated even in the presowing treatments of growth regulators and the rate of infection, is also increase.

Table-2: Seed age effect on infection occurrence:

Day s	Infection %																							
	2nd			3rd			4th			5th			6th			7th			8th			9th		
	2005	2006	2007	2005	2006	2007	2005	2006	2007	2005	2006	2007	2005	2006	2007	2005	2006	2007	2005	2006	2007	2005	2006	2007
T1	0	0	0	45	0	0	0	0	0	20	55	0	0	0	15	15	30	0	60	75	0	0	0	5
T2	45	0	0	0	50	0	25	0	0	0	20	0	60	0	5	0	10	0	0	80	0	75	0	10
T3	0	0	0	0	0	0	35	0	0	0	0	0	30	10	0	0	0	0	0	0	0	25	25	0
T4	60	0	0	0	65	0	30	0	0	0	30	5	10	0	0	0	15	5	0	25	15	0	0	0
T5	0	0	0	75	55	0	0	0	0	30	0	5	0	35	0	25	0	0	15	0	10	0	5	0
T6	35	0	0	0	0	0	20	0	0	0	5	0	65	0	0	0	5	0	0	5	5	90	0	0
T7	0	0	0	85	60	0	0	0	0	0	0	10	90	55	0	0	0	5	0	0	0	75	30	0

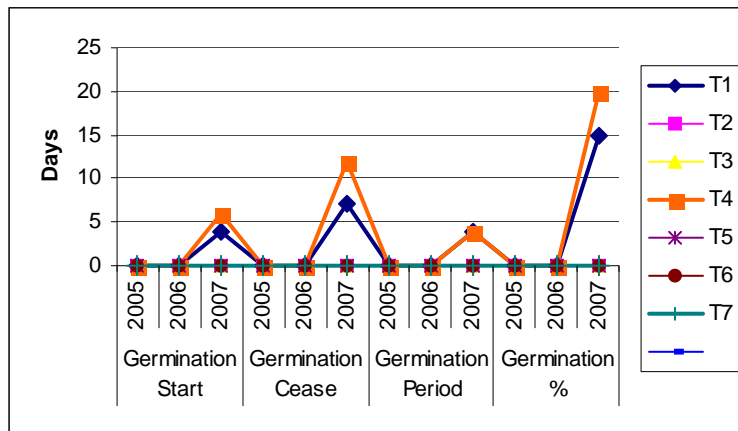


Fig.1: Germination study on Seeds of *Rheum emodi*

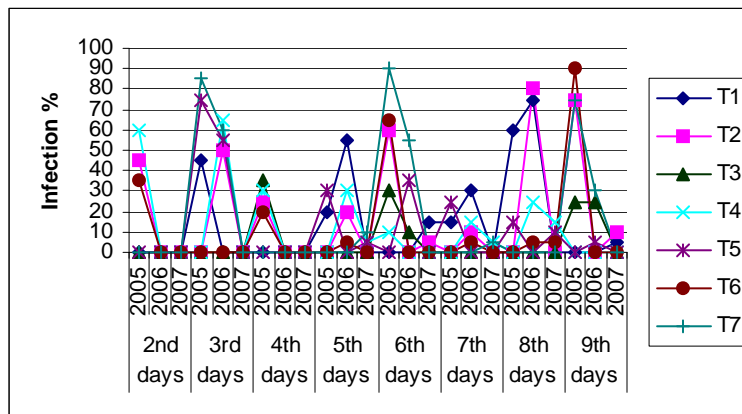


Fig.2: Infection percent on seeds of *Rheum emodi*

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