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Research Article

Seed germination and seedling growth study of *Abrus precatorius* (L.) for biodiversity conservation

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Abstract

Abrus precatorius is the native medicinal plant of India belongs to Fabaceae family and grow as wild vine in tropical and subtropical climate conditions**.** Seeds of this species posses seed dormancy and restricts germination to overcome unfavorable environmental conditions. This dormancy need to be removed to improve seed germination under favourable condition of plant growth. So the aim of the study is to remove seed dormancy and enhance germination capacity within a short period. To overcome the problem of dormancy, the experiment was carried out to investigate the effect of different treatment. It was observed that the seeds of *Abrus precatorius* (white) treated with IBA + GA at 600 ppm has significantly favorable for maximum germinability and increased shoot and number of length.

INTRODUCTION

Abrus precatorius is commonly known as Gunja belonging to family Fabaccae, abundantly found all throughout the plains of India, from Himalaya down to Southern India. The plant *Abrus precatorius* is used in Ayurveda, Folk, Homeopathy, Sidha, Tibetian and Unani. The plant is considered as a valuable source of natural products for development of medicines against different diseases. The roots, seeds and leaves are used in traditional folklore medicine (Choi, *et al* 1989). *Abrus precatorius* is a slender, perennial, much branched, perennial climber that twines around trees, shrubs, deciduous, woody, prickly twinning herbaceous. (Joshi,2000). Its leaves are used as nerve tonic, applied on cuts and swellings and mouth ulcer. *Abrus precatorius* is also used as an abortifacient, laxative, sedative and aphrodisiac. (Qadry *et al*.,2005).

The roots are used for jaundice and haemoglobinuric bile. The oil extracted from seeds is said to promote the growth of human hair. (Samy *et al.*, 2008) The leaves are used for their anti-supportive properties. The plant contains glycyrrhizin as an active phytoconstituents (Rastogy and Mehrotra, 1998).Seeds have the potential of good insecticide and antimicrobial activity (Saxena and Vyas, 1986). They are considered abortifacient (Nath and Sethi 1986, Hikino *et al* .,1966), anodyne, aphrodisiac, antimicrobial, diuretic, emetic, expectorant, emollient, febrifuge, hemostat, laxative, purgative, refrigerant, sedative, vermifuge, antidote and used in various ailments to cure headache, blennorrhagia, boil, cold, colic, conjunctivitis, convulsion, cough, diarrhoea, fever, gastritis, jaundice, malaria, night-blindness, rheumatism, diabetes and chronic. (Rain-tree, 2004). Dried seeds are taken orally as an aphrodisiac (Elisabetsky *et al*.,1992, Chopra 1933). Hot water extract of seeds is taken orally for malaria (Burkhill, 1966)**.** Various African tribes use powdered seeds as oral contraceptives (Chakre, 1948, Nadkarni and Nadkarni, 1954). Abrus seeds are also taken for tuberculosis and painful swellings (Arseculeratne *et al*.,1985).

In the wild conditions, seeds takes at least one year for the germination. The seed, being the potential source of propagation, needs to be extensive study for its germination.This facts indicate the existence of seed dormancy in this plant and no literature is available describing the seed dormancy breaking methods to bring about early germination in white *Abrus precatorius.* With these objectives the present study was planned. For the threatened or endangered state of many of the plants, many factors, such as human settlement, natural calamities, unscientific exploitation and road construction were responsible (Attal *et al.,* 2010). On the today's market, demand is increasing and the supply of herbal drugs is decreasing. Thus, to fulfill the gap between demand and supply, there is an urgent need to conserve and cultivate medicinally important plant species (Glasby,1991, Kinjo *et al*.,1991).

MATERIALS AND METHODS

This study was conducted at the Experimental Laboratories of Department of Botany. Swami Vivekanand senior college Mantha, Dist.Jalna (M.S) India.

Collection Of Seed Material

In the present study, seeds of the *Abrus precatorius* (White) were collected from different locations of Jalna district. Collected seeds were then packed in sterile polythene bags in first week of June.

Treatments of Seeds

Seeds were first surface sterilized for 1 minute in 0.1 % $HgCI_2$ solution for 5 minutes and subsequently washed with water. The experiment was arranged as a completely randomized design with three replications for each treatment. Seeds were treated with IBA+ GA at different concentration (ppm). Germination was measured daily for 60 days. All plants were harvested to determine percent germination, shoot length, root length and number of leaves.

Statistical Analysis.

In the present study data was analyze statistically, Standard Deviation (S.D) Standard Error (S.E) and Critical Difference (C.D) was calculated.

RESULTS AND DISCUSSION

Seeds of *Abrus precatorius* (White) and *Abrus precatorius* (Red) were treated with different treatments and results were observed after 60 days. Results are given in table. In order to understand the effect of plant growth hormones (IBA + GA) on seed germinability of *Abrus precatorius* (white seed). Percent germinability shoot length and root length in cm were observed. It is clear from the result summarized in table 2 that seeds of *Abrus precatorius* (white seed) treated with IBA + GA at 600 ppm was significantly favorable for maximum germinability and increased shoot and number of length. Similarly seeds of *Abrus precatorius* (white seed) treated for IBA + GA at 400 ppm and 600 ppm were found equally effective for maximum percent germination.It is interesting to mention that as there was increase in IBA + GA concentration there was decrease in germination percent and shoot of *Abrus precatorius* (white seed). Several workers have performed different experiment on seeds of medicinal plants. (Satya *et al*.,2018). *A. precatorius* shows hard seeds because of leathery seed coat which hinders the absorption of water and exchange of gas (Russi *et al*., 1992, Lopez *et al*., 1999).(Gaikwad,2021) studied and concluded that the seeds treated with IAA , IBA for100 ppm and GA3, NAA for 75 ppm were proved favorable to express maximum percent germination, shoot length and root length.

Treatment of seeds with plant growth hormones has been found to be beneficial for the improvement of seed germination. Similar type of effect of plant growth hormones of sowing on seed germinability have been reported by (Satya *et al* 2018, Bao and Zhang, 2011).

The present study observed the effectiveness of different seed dormancy breaking treatments to improve early germination of white seeded variety of *Abrus precatorius*. In order to understand the effect of IBA + GA on seed germinability, the seeds of *Abrus precatorius* (white) treated with IBA + GA at 600 ppm has significantly favorable for maximum germinability and increased shoot and number of length may be recommended for plantation programme.

Table 2 Effect of plant growth hormones (IBA+ GA) on seed germination and seedling growth of *Abrus precatorius* (white seed)

Treatment (ppm)	Germination %	*Abrus precatorius* (white seed) Mean		
		Shoot length (cm)	Root length (cm)	No. of leaves
IBA 50+ GA 50	70	13.12	10.23	9.82
IBA 200 + GA 200	70	14.97	10.77	10.48
IBA 400+ GA 400	80	16.38	11.02	10.71
IBA 600+ GA 600	80	16.52	10.63	11.66
IBA 800+ GA 800	60	16.14	10.58	11.41
Control (pre-soaked)	40	14.12	9.23	9.44
S.D	15.12	1.31	0.65	0.93
S.E	5.71	0.50	0.24	0.35
C.D	14.69	1.27	0.63	0.90

(IBA) = Indole-3-Butyric Acid, (GA_3) = Gibberlic Acid

Photo.1: A: *Abrus precatorius* (White seed) plant collected from Mantha region.

Photo 2.: Effect of plant growth hormones (IBA+ GA) on seed germination and seedling growth of Abrus precatorius (white seed).

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