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# Chlorophyll contents of *Abrus precatorius* L. under the influence of IAA, Brassinolide, Thiourea and Potassium nitrate

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**Abstract**

In this investigation, the seeds of *A. precatorius* L. were studied for their chlorophyll contents which were pretreated with IAA, Brassinolide, Thiourea and Potassium nitrate before germination. The highest chlorophyll contents were found to be in IAA treated seeds followed by those treated with brassinolide, thiourea and potassium nitrate. The respective amount of chlorophyll under these treatments was found to be 4.91, 4.79, 4.66 and 4.33 mg-g FW ¿¹ under IAA (100 ppm), brassinolide (50 ppm), thiourea (50 ppm) and potassium nitrate (50 ppm) compared to the control seedlings which were estimated to have 4.26 mg-g FW ¿¹ of chlorophyll. The mentioned results concluded that the primary productivity of this chosen plant increases with higher dozes of IAA as compared to controlled seedlings as well as other used factors.

This medicinallly important plant is a member of the family Fabaceae. It is commonly known as Crab's eye. It is a slender perennial climber that twines around trees, shrubs and hedges. It is a legume with long, pinnate leafleted leaves. This plant is best known for its seeds. The plant is native to Indonesia and grows in tropical and subtropical areas of the world. The seeds of this plant are very similar in weight. In older times, Indians used these seeds as a measure of weights called as *Ratti*. This was used to generally measure gold and 1 *tola* (11.6 grams) = 12 *Masha*; 1 *Masha* = 8 Ratti. Its seeds are usually white, green and red in color which are much valued in native jewelry for their bright coloration among which the variety with black eye is the most common.

In the present investigation, the seeds of *A. precatorius* were subjected to various treatments which are mentioned above to enhance its germination and also to check the impact of these treatments on its primary productivity. Studies on germination, dormancy and the primary productivity have been carried out by various workers which include *In vitro* propagation of *Abrus precatorius* L. A Rare Medicinal Plant of Chittagong Hill Tracts[1]. Monago & Nwodo[8] have investigated antidiabetic effect of crude trigonelline of *Abrus precatorius* Linn. seed in alloxan diabetic rabbits. Phytopharmacological evaluation of

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ethanolic extract of the seeds of *Abrus precatorius* has studied by Rashmi *et al.*,[12]. Bhatia *et al.*,[4] have worked on *Abrus precatorius* : An evaluation of traditional herb. Chemical constituents of Abrus precatorius have studied by Ragasa *et al.*,[11]. Lebri *et al.*,[6] have worked on phytochemical analysis and *in vitro* anticancer effect of aqueous extract of *Abrus precatorius*. Pharmacological activities of *Abrus precatorius* seeds have reported by Prabha *et al.*,[10]. Similarly, Okhale, & Nwanosike,[9] have reported phytochemistry, ethnomedicinal uses, ethnopharmacology and pharmacological activities of *Abrus precatorius*.

Antibacterial, antioxidant and phenolic compound analysis of *Abrus precatorius* seed coat extract and its different fractions have been investigated by Mobin *et al.*[7]. Vyas[14], studied changes in seedling growth and biochemical contents in *Abrus precatorius* under nickel treatment. Pharmacognostic, phytochemical analysis and antidiabetic activity of dried leaves of *Abrus precatorius* have been studied by Boggula *et al.*,[5]. Bhakta *et al.*,[2] have investigated herbal contraceptive effect of *Abrus precatorius, Ricinus communis*, and *Syzygium aromaticum* on anatomy of the testis of male Swiss albino mice. The medicinal values of *Abrus precatorius* have also been reported by Bhakta, & Das[3]. And also Uddin *et al.*,[13] have investigated the seasonal effects on photosynthetic pigments, nutrients, flavonoids, polyphenol and antioxidant activity of *Abrus precatorius* (Kunch).

Healthy seeds of *A. precatorius* were collected. The seeds were washed with running tap water three to four times and once surface sterilized with 0.1% $H_gCL_2$ solution for 5 minutes to remove the surface adhering microbes. After surface sterilization, the seeds were again washed with double distilled water. Uniform sized seeds were then transferred to sterilized Petri Plates provided with filter paper pads. Three replicates of treated and control seeds were kept for germination studies. The filter paper pads were moistened as and when needed. The emergence of radical was taken as germination.

The leaves of the treated as well as untreated plants were subjected to the chlorophyll estimation at regular intervals preferably fortnightly by the method given by Arnon (1949). For the estimation of chlorophyll a, chlorophyll b, and total chlorophyll contents, weighed amount of the leaves was taken and a paste was made in acetone in a clean mortor. It was finely ground with the help of pestle and filtered through a Buchner funnel under suction. The process was repeated till the residue became colourless and devoid of chloroplast pigments. The volume of the filterate was adjusted to 100 ml by adding sufficient quantity of 80% acetone. The filterate was subjected to spectrophotometric calculation of optical densities. The optical density was measured at 645 nm, 652 nm & 663 nm. The calculation of chlorophyll amount was made on the basis of per gram of leaf tissue and expressed in milligrams.

The highest chlorophyll contents were found to be in IAA treated seeds followed by those treated with brassinolide, thiourea and potassium nitrate. The respective amount of chlorophyll under these treatments was found to be 4.91, 4.79, 4.66 and 4.33 mg-g $FW^{-1}$

under IAA (100 ppm), brassinolide (50 ppm), thiourea (50 ppm) and potassium nitrate (50 ppm) compared to the control seedlings which were estimated to have 4.26 mg-g $FW^{-1}$ of chlorophyll (table-1).

Table-1. Effect of various factors on the chlorophyll contents of *A. precatorius* L.

| Treat-ments | Chloro-phyll a | Chloro-phyll b | Total Chlorophyll |
|---|---|---|---|
| | ------ (mg/g $FW^{-1}$) -------- | | |
| Control | 2.31 | 1.95 | 4.26 |
| IAA 10 ppm | 2.42 | 2.01 | 4.43 |
| IAA 50 ppm | 2.56 | 2.13 | 4.69 |
| IAA 100 ppm | 2.7 | 2.21 | 4.91 |
| Brassinolide 10 ppm | 2.42 | 2.04 | 4.46 |
| Brassinolide 50 ppm | 2.57 | 2.22 | 4.79 |
| Brassinolide 100 ppm | 2.34 | 1.69 | 4.03 |
| Thiourea 10 ppm | 2.37 | 1.98 | 4.35 |
| Thiourea 50 ppm | 2.49 | 2.17 | 4.66 |
| Thiourea 100 ppm | 2.29 | 1.99 | 4.28 |
| Potassium nitrate 10 ppm | 2.25 | 1.89 | 4.14 |
| Potassium nitrate 50 ppm | 2.6 | 1.73 | 4.33 |
| Potassium nitrate 100 ppm | 2.18 | 1.67 | 3.85 |

The above observed results concluded that in case of potassium nitrate, the moderate doses increase the primary productivity of *A. precatorius* while the lower and higher doses decrease the primary productivity of this medicinally important plant by decreasing its chlorophyll contents. In case of thiourea, also moderate doses enhance its primary productivity while lower and higher doses also decrease its primary productivity. Similarly, in case of brassinolide, the moderate doses results in the increment of its primary productivity while its lower and higher doses result in the decline of the primary productivity of this plant and finally in case of IAA, higher doses increase the primary productivity while its lower and moderate doses exhibit decreased amount of chlorophyll contents comparatively but this is the only factor which exhibited highest amount of chlorophyll contents among all the factors hence increased primary productivity.

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