



# Effect Of Light And Temperature On Seed Germination Of *Cassia Alata* L. - A Medicinal Plant

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**Abstract-** *Cassia alata* L. is an outstanding plant of Chhattisgarh in India. different parts of the plant such as leaves, stem, root and seeds have medicinal properties.

The study investigated the effect of light and temperature on scarified seed of *Cassia alata* on the germination percentage because seeds are the main source of perpetuation in *Cassia alata*. Seeds have a wide range of adaptation capacity to survive in the adverse environmental conditions in the higher plants.

Six months old seeds are incubated at 15°C, 20°C, 25°C, 30°C, 35°C, 40°C and 45°C which is coupled with acid scarification and mechanical scarification. (Seeds did not germinate without scarification.). In this study maximum percentage of germination was obtained between 25°C to 30°C.

Seed germination was observed from 3<sup>rd</sup> day up to 7<sup>th</sup> day.

Maximum germination percentage in the direct light was 85% at the temperature of 30°C and minimum percentage was 23% at the temperature of 40°C. At 45°C no germination has been occurred.

In diffused light condition, maximum germination percentage was 93.75% at 30°C, and minimum percentage was 45.75% at the temperature of 40°C.

In dark, maximum germination percentage was 86.25% at the temperature of 30°C to 35°C, and minimum germination percentage was 33.75% at 40°C.

The length of dormancy was studied by continuous observation of collected seeds up to 6 months. Seeds were collected in January 2024, and germination occurred in August 2024. Six months old seeds show 80-95% germination at 25°C to 30°C.

**Index Terms** – Dormancy, Germination percentage, Viability test.

## I. INTRODUCTION

*Cassia alata* L. is an erect annual herb of Leguminosae family. Taxonomically *Cassia alata* is classified as family Fabaceae under the sub-family Caesalpiniodeae. Its synonym is *Senna alata* L. Roxb. It is commonly known as candle bush, ringworm bush. It is known as “Hinglaj” in Chhattisgarh state. It is distributed in the tropical and humid region. It is commonly found in Asia and Africa.

Plant of *Cassia alata* L. is an annual herb. Its average height is 1 - 4.5 metre. Leaves are petiolate and compound with 7 to 14 leaflets. The length of leaflet is 2 to 3 cm long. It has dense flowers arranged in Racemose inflorescence. Inflorescence bears bright yellow coloured zygomorphic flowers. The fruits are 10 to 20 cm long pod. Pod has thick flattened wings. It has greenish black triangular shaped seeds. The length of seed is 5.5 mm long and width is 4 mm wide at the base.

The primary and safest therapeutic approach since prehistoric time is herbal medicine, which has displayed significant role in primary health care (oladeje, O.S. et al 2019). One third of the commonly used drugs are obtained from natural sources (Verpoorte, R. 2015). In Ayurvedic, Chinese, African and Sinhala traditional medicine various parts of *Cassia alata* have shown diverse therapeutic activities in disease control. The decoction of leaf, stem and root is used in dermal infection, burns, constipation and respiratory tract infection (O. Adedayo et al 2001). In Chhattisgarh, different parts of the *Cassia alata* plant is traditionally used in the treatment of diabetes, asthma, ringworm, scabies, and eczema. Numbers of secondary metabolites has been reported, such as tannins, alkaloids, flavonoids, terpenes, anthraquinone, saponins, phenolics and alkaloids (oladeje, O.S. et al 2019).

## II. MATERIALS AND METHODS

The seeds of *Cassia alata* were collected from the Lundra forest area. Seeds were sundried and stored in glass bottle at 25-30°C. Seeds of *Cassia alata* were first subjected to viability test and then germination test. Seeds lots were dipped in tap water for pre-soaking of water for 24 hours. For viability test, soaked seeds were cut horizontally and transferred to 0.1% solution of 2,3,5, triphenyl tetrazolium chloride solution and incubated in dark for 12 hours. Then seeds were observed for the viability, if the tissue had taken the pink or red stain or not (Baskin & Baskin, 1998).

The length of dormancy was studied by continuous observation of collected seeds up to six months. For this, freshly collected seeds were germinated every month without any treatment at room temperature (25°C to 30°C). Seed germination was studied by soaking the seeds in distilled water for 24 hours and then putting these on Whatman No. 1 filter paper overlain by a thin cotton layer in Petri dishes.

The experiments were carried out under different temperature regime and light conditions. Seeds were surface sterilized with 10% Chlorox for 30 seconds and rinsed with tap running water for 3 times.

Seeds were chemically scarified with concentrated sulfuric acid for 2 minutes. Mechanical scarification was accomplished by rubbing seeds in between sand papers till the testa ruptured.

Seeds were tested for germination at 15°C, 20°C, 25°C, 30°C, 35°C, 40°C and 45°C at different light condition. Each set has 5 replicates of 20 seeds. Extending the radicles 1.5 mm beyond the seed coat treated as

germinated seeds. For direct light petri-dishes were placed under the light of 2000 Lux in lab. Viability percentage and germination percentage calculated as-

$$\text{Viability test} = \frac{\text{No. of seeds stained red}}{\text{Total seeds}} \times 100$$

$$\text{Germination test} = \frac{\text{No. of seeds germinated}}{\text{Total seeds}} \times 100$$



**3rd day of seed germination  
(5 replicates)**



**5th day of seed germination  
(5 replicates)**

**Table-1.1** Mean percentage germination of *Cassia alata* seeds under direct light

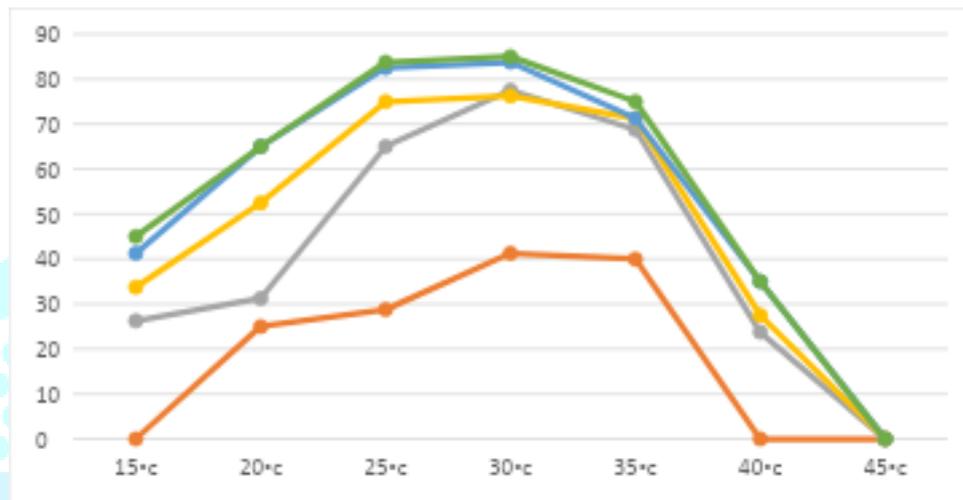
Temperature	15°C	20°C	25°C	30°C	35°C	40°C	45°C
Days							
3 <sup>rd</sup> day	-	25	28.75	41.25	40	-	-
4 <sup>th</sup> day	26.25	31.25	65	77.5	68.75	23.75	-
5 <sup>th</sup> day	33.75	52.5	75	76.25	71.25	27.5	-
6 <sup>th</sup> day	41.25	65	82.5	83.75	71.25	35	-
7 <sup>th</sup> day	45	65	83.75	85	75	35	-

**Table-1.2** Mean Percentage germination of *Cassia alata* seeds under diffused light

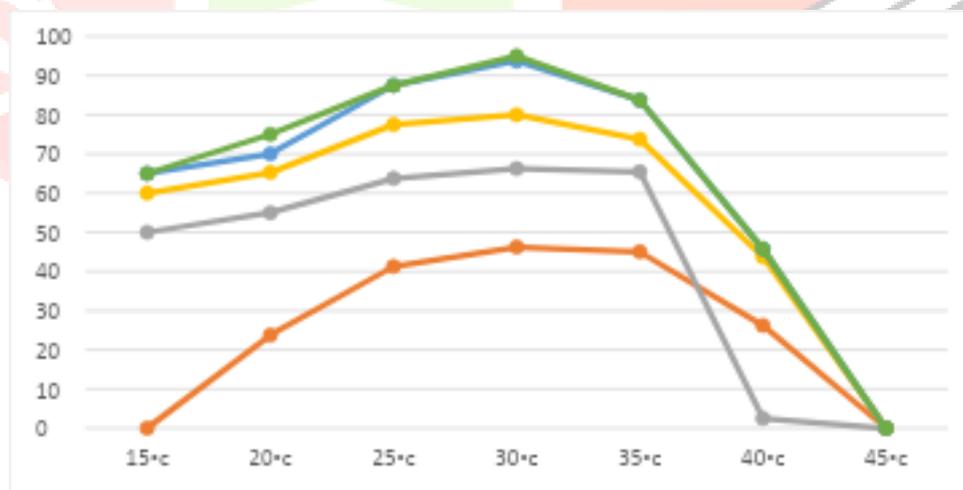
Temperature	15°C	20°C	25°C	30°C	35°C	40°C	45°C
Days							
3 <sup>rd</sup> day	-	23.75	41.25	46.25	45	26.25	-
4 <sup>th</sup> day	50	55	63.75	66.25	65.45	2.5	-
5 <sup>th</sup> day	60	65.25	77.5	80	73.75	43.75	-
6 <sup>th</sup> day	65	70	87.5	93.75	83.75	45.75	-
7 <sup>th</sup> day	65	75	87.5	95	83.75	45.75	-

**Table-1.3** Mean Percentage germination of *Cassia alata* seeds in dark

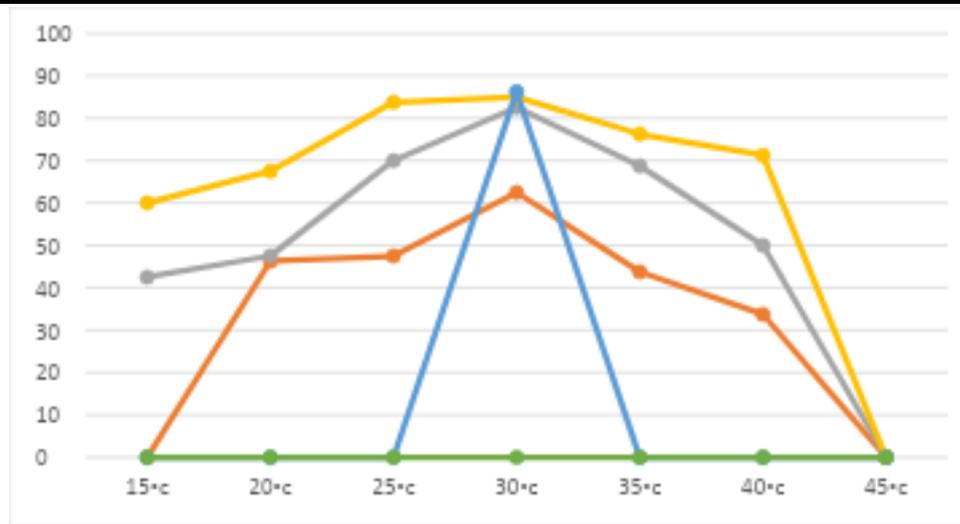
Temperature	15°C	20°C	25°C	30°C	35°C	40°C	45°C
3 <sup>rd</sup> day	-	46.25	47.5	62.5	43.75	33.75	-
4 <sup>th</sup> day	42.5	47.5	70	82.5	68.75	50	-
5 <sup>th</sup> day	60	67.5	83.75	85	76.25	71.25	-
6 <sup>th</sup> day	-	-	-	86.25	-	-	-
7 <sup>th</sup> day	-	-	-	-	-	-	-



**Graph 1.1-** Mean percentage germination of *Cassia alata* seeds under direct light



**Graph 1.2-** Mean Percentage germination of *Cassia alata* seeds under diffused light



**Graph 1.3-** Mean Percentage germination of *Cassia alata* seeds in dark

### III. RESULT AND DISCUSSION

The length of dormancy was studied by continuous observation of collected seeds up to 6 months. Freshly collected seeds did not germinate at any condition as the freshly collected seeds were tested over the different temperature regime in light and in dark for 15 days. Seeds were collected in January 2024, germination occurred in August 2024. Six months old seeds showed 80-95% germination at 25-30°C. After 6 months storage germination percentage did not increase with increase of storage time at room temperature. As the six months old seeds show 80-95% germination at 25°C to 30°C, the dormancy of seeds of *Cassia alata* seems to be due to presence of thicker layer and hard seed coat during the unfavourable conditions, this is physical dormancy, which seeds of *Cassia alata* shows. Viability test shows 90-100% viability. Non-scarified seeds also do not exhibit any germination at all temperature regime. Seeds of *Cassia alata* are water impermeable seed coat that became permeable after acid or mechanical scarification. Germination was observed from 3<sup>rd</sup> day up to 7<sup>th</sup> day. In direct light at 15°C and at 20°C there was no germination. At 25°C, 28.75%, at 30°C, 41.25% and at 35°C, 40% germination was occurred on 3<sup>rd</sup> day. On 6<sup>th</sup> day there was 41.25% germination at 15°C, 65% germination at 20°C, 82.5% germination at 25°C, 83.75% germination at 30°C and 71.25% germination at 35°C has been occurred. In diffused light on 3<sup>rd</sup> day, the germination was 41.25% at 25°C, 46.25% at 30°C, 45% at 35°C and 26.25% at 40°C has been occurred. At 45°C there was no germination occurred. On 6<sup>th</sup> day, it was 87.5% at 25°C and 93.75% at 30°C. At 35°C it was 83.75%. In dark, on 3<sup>rd</sup> day 46.25% germination at 20°C, 47.5% germination at 25°C 62.5% germination at 30°C 43.75% germination at 35°C and 33.75% germination were occurred at 40°C. on 6<sup>th</sup> day 86.25% was the highest germination percentage at 30°C. Many workers (Hussain et al 1988 & 1994) reported 25°C - 35°C temperature is optimum for the germination of many plants. In this study at 30°C maximum germination has been obtained in all the conditions of light.

## IV. CONCLUSION

After 6 months storage germination percentage did not increase with increase of storage time at room temperature. Seeds of *Cassia alata* are water impermeable seed coat that became permeable after acid or mechanical scarification. Pre-soaking of the seeds in water for 24 hours is also required. According to Cavanagh (1980) germination occurs when the damaged testa is softened due to proper imbibition of water. Scarified seeds germinated at temperature regime from 25°C to 35°C. On the whole, this study has indicated that germination test of *Cassia alata* should be conducted between 25<sup>0</sup>c to 35<sup>0</sup>c. This temperature range could be determined as optimum temperature for the germination of *Cassia alata* seeds.

## V. REFERENCES-

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