# THE STUDIES ON SEED GERMINATION OF THREE SPECIES OF *BAUHINIA* L.

**Dissertation**
**submitted to Palamuru University in partial fulfilment**
**of the requirement for the award of**

# Student Study Project

**IN**

**BOTANY**

**by**

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**Submitted to**

**DEPARTMENT OF BOTANY**
**DR. BRR GOVERNMENT DEGREE COLLEGE**
**JADCHERLA – 509 301**

**MAY- 2023**

# DECLARATION

We hereby declare that the Research work presented in this Dissertation entitled **"The studies on seed germination of three species of *Bauhinia* L."** is original work carried out by us under the supervision of **Dr. B. Sadasivaiah**, Department of Botany, Dr. BRR Government Degree College, Jadcherla during the period 2022-2023 for the award of the degree of Student Study Project in Botany. The research work is original and no part of the work has been submitted for the award of any degree or diploma of this College or any other College/University.

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***……Upendra, Sai baba, Venkatesh & Narayana***

## Chapter-I
## INTRODUCTION

Germination is the beginning process of growth and development of embryo which is active after imbibition of bauhinia acuminate,Bauhinia racemosa,Bauhinia purpurea seeds, it is driven by the ability of the plant embryo embeded within the Seeds, to resume it's netabolic activities, in a Sequential manner and it is the Process of Seeds developing into new plant. Bewley and Black 1994 first environmental conditions trigger the seed to grow. Germination is"Critical "stage in the life cycle of plants. It starts with the uptake of Water by the dry seed of Bauhinia and strychnoux nux vomica seeds (imbibition). Continues with biochemical Preparative process and the elorgation of the embryonic axis. When the seed germination, the time between the beginning of imbibirion and radicle protrusion out of the seed neflects the rate of which bio-physical and physiological process occur in the embryo and seed as a whole the gemination test seedlot aims to determine the germination capacity. The rate of germination and the homogencity of this seedlot.

It we take strychnos nux vomica seedy why seeds may not germinate under a set of favourable environmental conditions where adequate levels of water oxygen, light temperature and hard Seed coat are present. In fact under adequate and water and oxygen availability. Temperature in most important environment as factors to regualating both the timing and rate of seed germination. And for the bauhinia seeds where adequate levels of water Oxygen light. Temperature availability is the most important environmental factors for regulating seed germination.

The effects of seed temperature on seed germination exploring the responses of several hundred Species from different biomes. Seed germination has been stadied uder both alternating and constant temperatures conditions. Alternating diurnal temperatures in germination have long been employed as a Method to mimic bield conditions and have been reported as tavouring genminability in many species Suchas. Bauhinia recemosa, Bauhinia acuminata, Constant temperatures. This approach does not allow the estimation of eardinal temperatures nor the germination rate surres to temperature.

With respect to the germination rate, the effects of temperature can be expressed in terms of cardinal temperatures. Namely the minimum, optimum & maximum temperatures. The rate of process is fastest at the optimum temperature, while the mimumum & maximum temperature determine the range at which nondormant. Seeds can be germinate beyond these extremes. No gemination can occur proposed to describe the effects of cardinal temperatures on germination rates.

Seeds at constant low temperatures germinate as well as nondormant. Seeds at constsnt near – optimal temperatures provided they have enough time to germination. To this end we compared the germination dynamics and the time required to achive full seedlot geminability at $5^0$ C and $21^0$ C of thirteen accessions of wild populations from three cool seasons. In orde to compare the Effect of temperature on germinatin between wild species and domesticated species.

To the development of seed germination of many species a set of favourable environmental conditions, where adequate levels of moisture light, tempetature, water, oxygen then regulating the timing and rate of Germination.

Hence, the present work has been undertaken with the following objectives.

The primary objectives of the study are–

- To know the germination capacity of three *Bauhinia* species
- To know the various technics of breaking of seed dormancy in *Bauhinia* species
- To check the growth patterns of Bauhinia species under various fertilizers

## Chapter-II
## REVIEW OF LITERATURE

Dr. Khan was concluded that the Seedling characteristics of Bauhinia racemosa Lamk.The seedling was of phanecotylar Epigeal reserve type.The total leaf area per seedling increase expoentially with age with relatively larger tale of leaf are increment by the 48th day of seedling age the total area of 60th days old seedlings was (2256.57+193 74mm2) .

Das and Paria (1999) have describe seedling morphology of nine Indian species of Bauhinia accuminata,Bauhinia rufescens,Bauhinia tomentosa,Bauhinia vahlii and Bauhinia variegata .He describe that the most of species of fabacea produce seeds with physical dormancy. Therefore the seeds stored for around a year .were scarified with conc H2SO4. The several of time such as 15mins, 30min, 45mins, 50 scarified seeds were germinated in pockets filled with loam soil maintained at 75%water holding capacity.

Maximum germination of 60% was achieved within 10 days .Prabhakar (2004) being sample and based upon the structure of stomata and not their ontogenetic pathway was adopted to ascertain stomatal type.And also Prabhakar (2004) described that paracytic, anisocytic, anisotricytic, and strurocytic type of stomata were found on leaves and cotyledons. Javed Zaki (2015) observed that the cotyledons were 5-6(7) cotyledonary and leaves 9-nerved. The cotyledonary and foliar venation was branchido fomous type.The cotyledons and leaves amphistomatic.

The Paria (2014), seedling morphology is an expiored but emerging domain in plant science which document the morphological charecters and the changes that occur during development from early stages to adult. Pazhayaveetil (2019) worked on the seed charecteristics and germination behaviour of *Bauhinia malbaria* and stated that concentrated sulphuric acid treatment for 30mins is the best pretreatment for enhamncing seed germination and reducing germination period of *Bauhinia malabaria*.

Deepu Mathew and Shivakumar (2002) worked on Accelerated seed germination in *bauhinia purpurea* by pre-sowing growth regulator treatments and concluded that in *Bauhinia purpurea*, GA at a concentration of 500ppm can be used for pre-sowing seed soaking treatment for 120 mins to obtain high percentage and early seed germination.

Alderate-Chavez and Gucra-Santos (2011) were worked on the promoyion of germination of *Bauhinia divaricata*. Seeds by the effects of chemical scarification and stated that the germination was affected by all $H_2 SO_4$ scarification treatments. Then the treatment of Immersion in sulphuric acid for 15 mins gave 57 percent of germination after 30days.

Shanhorey (2021) was worked on effect of microwave on seed germination Growth rate in some Garden fabuceae these in antoniades garden (A) *Sophora secundibora* and *Bauhinia purpurea* was concluded that the *Bauhinia purpurea* seeds to lowest micro wave exposure rime (5 and 10 sec) the microwave belore sowing in seeds the microwave. The best to promote a high geminah in percentage and to produce uniform seedling.

Hanumantha and Rajesh (2014) were worked on enhancement of seed germination in stored seeds using different pre-sowing treat ment in *Bauhinia purpurea* was stored that the germination of seeds of *B. purpurea* soaking in hot water for 2 to 5min followed by overnight soaking in normal water germination can be improved 59%. Anolieto and Gill (1992) was worked on the germination biology of *Bauhinia monandra*: efect of chemical and growth performance in different soil type. Aseedu Asare-Bedianko (2011) worked on the effect of pre-souier treatments on seed germination and establishment of *Bauhinia dufescene* and stated that the germination about seeds is errabic but is improved significantly by boilins the seeds in water for less thous 10 sec and allowing the seeds cool down completely in the water before showing.

Amissah (2018) were worked on the Errch of pre- sowing treatments on seed germination and seedling growth of silver butter fly tree. Cemal Gultekin (2011) was worked on the effect of sowing nime. On germination of "twenty two" Leguminosae species and started that untreated seeds included three *Bauhinia* spp., germination various depends on seed quantity, treatment after collection, sowing rime and a host of genetically programmed inhibitors. And also concluded that seed sowing intje early spring were more effective on Germination percentages to all the species. Essilfie and Normal were worked on the effect of pre-sowing treatments on the germination and seedling growth of silver butterfly tree (*Bauhinia references*) and concluded that the water and plant growth regulation significantly effected the germination and growth of *Bauhinia* and can be used in breakup seed dormancy and it is advised that hartieut uints soak seeds in 1000ppm promalin (or) in acid scarification for 60 min plas soaking in tap water for 24hrs for highest germination percentage and also for the higher number of leaves/plant, tallest plant is highest

fresh shoot weight horticulturist could also soak Bau-r, seeds in 500 ppm GA3 & 750 ppn GA3 respectively to the tallest plant and higher, highest fresh root weight and fresh root weight. Seeds could be soaked in acid scarification for 45 minutes soaking in water for 24 hours. Roopa et al (2014) was worked on the Enhancement of seed germination in stored seeds using different pre-sowing treat ments in *Bauhinia purpurea* L. and stated that seed treatments entrance seed germination in stored seeds of *Bauhinia purpurea* and the treatment like soaking seeds in that water for 2 to 5 min followed by over night soaking in normal water resulted in highest germination about 59% over control (40%).

Nader (2019) was worked in effect of micro wave on seed germination Fabaceae trees in antoniades and *Bauhinia purpuria* and stated that the *Bauhinia purpuria* seeds of eacs treatment were subjected to a different time enposure to the microwave the radiation for '0' seconds (control), 5s, 10s, 15s, 20s, 25s, and 30s in the first & second season's the respectively. To the higher Germination seedling were planted individually in 20 cm diameter plastic pots filled with nirtune of clay and sand at the ratio of (1:1) by volume.

# Chapter-III
# METHODOLOGY

***Bauhina accuminata***

*Bauhinia accuminata* seeds were collected from the Telangana Botanical Garden of Dr. BRR Government degree College, Jadcherla. They were collected rawly & matured seeds and dried in the sunlight, they were dried up we have followed these steps of methods applied on for seeds for the germination process. The pictures related to *Bauhinia acuminata* are mentioned in **Plate-1, 2.**

To breakdown the Seed dormancy of *Bauhinia accuminata*, there are several methods such as:

1. **Immersion in the chemical of conc. $H_2SO_4$.**

   The seeds were immersed in conc. $H_2SO_4$ for various time periods. Such as

   i) For the time period of 15 minutes

   ii) For the time period of 30 minutes

   iii) For the time period 45 minutes

2. **Scarification** :

   Some the selected seeds were scarified for the removal of seed domancy

3. **Immersion in water for 24 hours**

4. **Control:** These are the seeds which are sowed directly without any artificial methods or implementati

***Bauhinia purpurea***

*Bauhinia purpurea* seeds are collected from the Natrural source from village -Divitipally which is located near to the Bangalore –Hyderabad, NH-47 which is near to the Jadcherla. These are the raw & matured seeds collected from the fruit of Bauhinia purpurea and dried up in the sunlight. Then the methods which are used for the seed dormancy for the Germination of seeds in different methods are and phtographs were presentated **Plate 3.**

**1) Control method**: which the artificial implementations are not done & directly sowed.

**2)** Immersion in $H_2O$ for 24hrs.

These species seeds consists weak (thin) seedcoat. So that it is taken under only two methods comparing to the other species of *Bauhinia*.

**Plate-1**: Methodology of *Bauhinia acuminata*

**Plate 2:** Methodology for *Bauhinia accuminata*

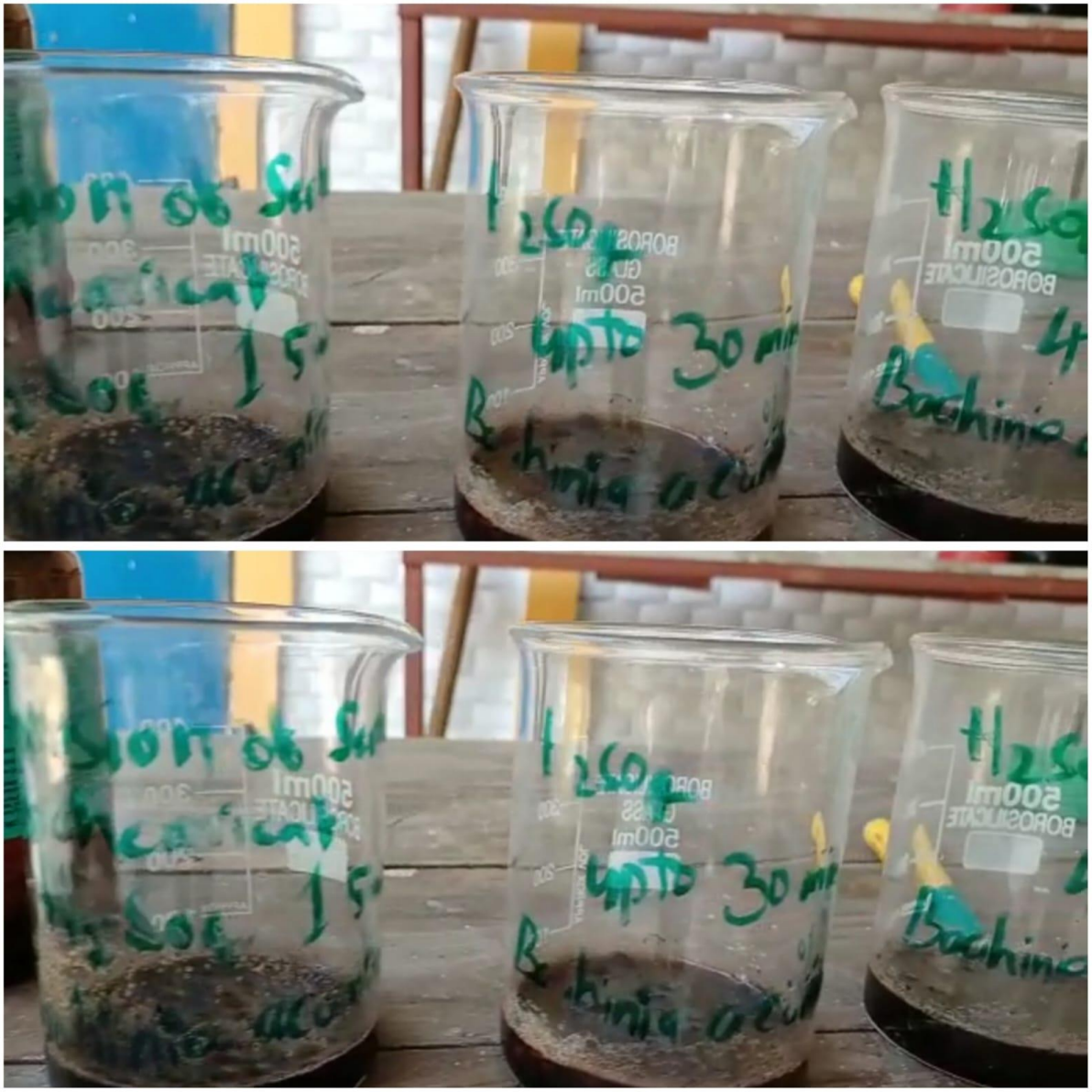
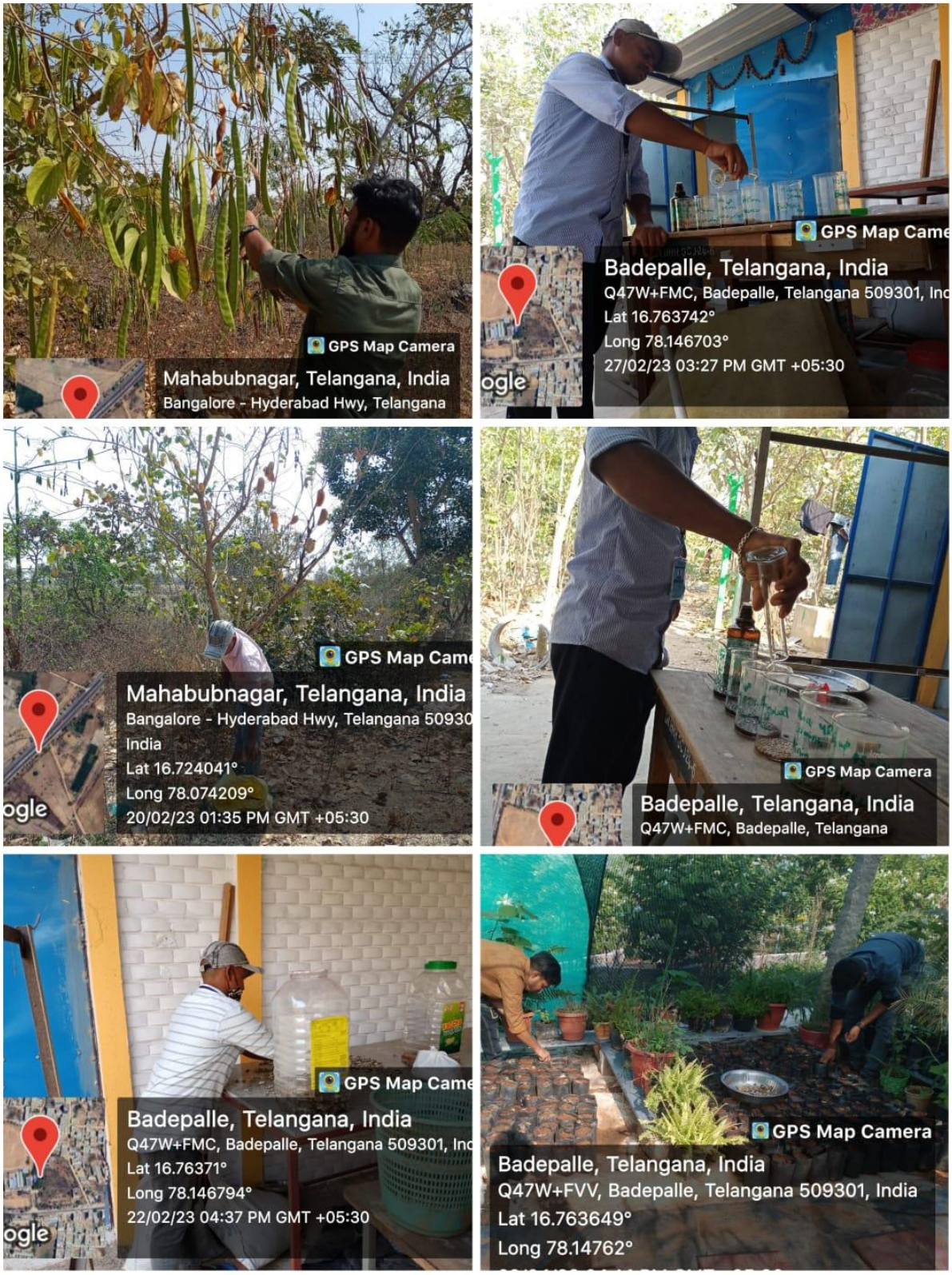


**Plate 3:** Methodology of *Bauhinia purpurea*



## *Bauhinia racemosa*

*Bauhinia recemosa* seeds are collected from the village Aloor, Jadcherla mandal, Telangana. These seeds are having strong seedcoat and are made them to get dried in the sunlight and made them to get stabilization of temperature under the shadow. Then followed these methods for the breakdown of seed dormancy for easy germination of seeds. The pictures of *Bauhinia racemosa* mentioned in **Plate 4**.

The following are the methods are followed:

**1) Scarification**: for removal of Seedcoat or to break down the Seedcoat

**2) Immersion in $H_2o$ for 24 hours**

**3) Immersion in Chemical H2SO4**

The seeds were immersed in conc. $H_2SO_4$ for various time period. Such as

i) For the time duration of 15 minutes
ii) For time duration of 30 minutes
iii) For time duration of 45 minutes

**4) Control**: These are the seeds which are sowed directly without any artificial methods or mplementations

All these methods are used in same loam content to sow the seeds into the Germination process for the availability of Nutrient medium & for the free development of Embryo into the Saplings of the Species into the Plants. The soil mixture nutrient is prepared by inter mixing of different nutrient mediums like wise

i) Red soil
ii) Black soil
iii) Coco pet
iv) Vermicompost as the Nutrient medium and used as Manure

These are soil nutrients medium taken in the ratio of 3:2:1 (Red soil:Black soil:Coco pet)

- Every day watered to the Seedlings twice in a day upto 15 days
- Then the saplings started to flush the leaves , we watered to the seedlings regularly only once in a day
- We took the beds which were in the size of 4/8

**Plate 4:** Methodology

**Plate 5**: Preparation of Soils & Sowing of Seeds

## Chapter-IV

# RESULTS

***Bauhinia accuminata*** L., Sp.Pl.376.1753; Baker in Hook.f., FI.Brit,India 2: 276. 1878; Gamble, FI. Madras 1; 408.1919.

Shurb, 2-3 m high. Leaves 3.7-6.2 cm long, lobbed to one-third their length, lobes acute or accuminate, 7-11-nerved, glabrous. Petiole ca 3.7 cm long. Calyx spathaceous, acuminate or beaked; corolla 6.2-7.5 cm across, white. Pods 10-12.5×1.8cm, beaked, widest above and tapering downwards, ca 7- seeded, ridged on each side of the upper suture.

Planted in gardens as ornamental and also runs wild.

Fl. & Fr.: July – February

According to the various methods to germination of the three species of Bauhinia .L. Based on the seed coat we applied several methods to break seed dormancy.

Such as 1. Scarification,

2. Immersion in water for 24 hrs,
3. Immersion in $H_2$ $So_4$ for 15mins, 30mins and 45mins,
4. Control.

Through the scarification method in *Bauhinia acuminata* 20 seedlings were emarginated within first 10 days. Through the immersion in water for 24 hrs only one seedling was emmerginated within first 10 days. Where as through the chemical immersion of conc. $H_2So_4$ for 15mins 3 seedlings were emmerginated, for 30 mins 2 seedlings were emmerginated, for 45mins 10 seedlings were emerginated within first 10 days and where as in the control 18 seedlings were emmerginated within 10 days.

Based on the above results, scarification and control are the best methods of germination of *Bauhinia acuminata* rather than chemical immersion. The same results were presented in **Plate 6**.

**Plate 6**. *Bauhinia acuminata* germination

***Bauhinia purpurea*** L., Sp.Pl. 375. 1753; Beaker in Hook. f., Brit. India 2: 284.1878; Gamble, F1. Madras 1:407. 1919. *Phanera purpurea* (L.) Benth. in Miq. P1. Jungh.262. 1852.

Vern.: Kanchanam

Trees upto 15 m high, bark great brown, branchlets warty. Leaves suborbicular, 5.5-11.5× 6-12 cm, subcoriaceous, deeply lobed, leaflets obling, apex obuse or subacute, connate about half way up and sometimes overlapping, 9-1-nerved, glabrous, painted below base sub college margin entire. Petiole to 3 cm, stipule triangular. Flowers rose to two pink in the terminal or axillary racemes or panicles, peduncle stout, 5 cm, bract ovate to 4 cm. Calyx spathaceous, 2.5×1cm, tube turbinate; petals 5, equal and similar, obovate, 1.9×0.5cm, narrow at base, obtuse. Stamens 5, fertile only 3, filaments to 6 cm, anther oblong, to 6mm; ovary compressed, grooved, 2.5cm. Pods 30-40×1-2, linear, flat, apiculate, reddish- brown, woody, pendent, apex horned, puberulous; seeds 10, globose, smooth, glabrous, bright brown.

Occasional in throught out the state and planted in gardens.

Fl.: September - February; Fr.: February - March

Immersion in water for 24 hrs *Bauhinia purpurea* gave germination for 12 seeds within 10 days and from control 18 seedlings were germinated. Hence, control is the best method for germination of *Bauhinia purpurea* seeds.

***Bauhinia racemosa*** Lam., Encycl. 1: 390. 1785; Baker in Hook. f., Fl. Brit. India 2:276.1878; Gamble, Fl. Madras 1: 407. 1919. *Piliostigma racemosa* (Lam.) Benth. in Miq.PI Jungh.262.1852.

Vern.: Arechettu.

Trees, about 10 m high; bark white, rough; branchlets densely tomentose. Leaves ovate-orbicular, 1.5-3.5 x 3-3.5 cm, thin coriaceous, leaflets connate to two thirds of their length, 7-8-nerved, shortly pubescent below, glabrous above, base cordate, margin entire, apex deeply emarginated; petiole to 1 cm. Flowers creamy yellow in terminal and leaf-opposed racemes; pedicel to 2 mm; bracteoles subulate, to 1 mm. Calyx spathaceous, 5 x 2 mm, glabrescent, apex cleft; petals 5, equal and similar, 5 x1mm, narrow at base. Stamens 10, filaments to 1.5 mm, anther oblong, 3 mm; ovary compressed, grooved, to 4 mm. Pods linear-oblong, 12-16 x 1.5-2 cm,

woody, slightly curved, dark-brown or brownish black, indehiscent; seeds about 15, flattened, ovoid,brown, smooth, polished.

Common in all districts in dry deciduous forests and open lands.

Fl. & Fr.: March-November.

Through scarification, *Bauhinia racemosa* germinated 21 seedlings within first 10 days; from seeds immersion in water for 24 hrs only one seedling was observed. Where as in the method of immersion in $H_2So_4$ for 15 minutes 3 seedlings were emarginated, in immersion in $H_2So_4$ for 30 minutes 2 seedlings were emarginated, for 45 minutes 10 seedlings were emerginated within the time period of first 10 days. Where as in the control only 1 seedlings was emerginated within first 10 days.

So best method for germinatin of *Bauhinia racemosa* seeds is scarification and immersion in $H_2So_4$ for 45 minutes.

The peak germination period of three species of *Bauhinia* presented in **Table 1** and the peak leaf flushing period of three species resented in **Table 2** where as the total results of the three species date wise were mentioned in Appendices.

**Table 1**: Peak germination period of three species of *Bauhinia* L.

| S. No. | Name of the Species | Scarification | Immersion in Water (24 Hrs) | Immesrion in H2SO4 | | | Control |
|---|---|---|---|---|---|---|---|
| | | | | H2SO4 for 15min | H2SO4 for 30min | H2SO4 for 45min | |
| 1 | *Bauhinia accuminata* | 10 days (20 seeds) | 38 days (1 seed) | 10 (3 seeds) | 10 (2seeds) | 31 (10) | 10 (1 seed) |
| 2 | *Bauhinia purpurea* | | 10 days (12 seeds) | | | | 10( seeds) |
| 3 | *Bauhinia racemosa* | 10 days (21 seeds) | 38(1 seed) | 10 (3 seeds) | 10 (2 seeds) | 10 (10 seeds) | 10 (1seed) |

**Table 2.** Peak leaf flushing period of three species of *Bauhinia* L.

| S. No. | Name of the Species | Scarification | Immersion in Water (24 Hrs) | Immesrion in H2SO4 | | | Control |
|---|---|---|---|---|---|---|---|
| | | | | $H_2So_4$ for 15min | $H_2So_4$ for 30min | $H_2So_4$ for 45min | |
| 1 | *Bauhinia accuminata* | 21 days (6 leaves) | 10 days (4 leaves) | 73 days (7leaves) | 10 days ( 5leaves) | 10 days (2 leaves) | 73 days (9leaves) |
| 2 | *Bauhinia purpurea* | | 10 days (5 leaves) | | | | 10 days (5leaves) |
| 3 | *Bauhinia racemosa* | 10 days (4 leaves) | 45 days ( 4 leaves) | 73 days (7leaves) | 10 days (2 leaves) | 10days (4 leaves) | 10 days (2leaves) |

**Plate 7**. *Bauhinia purpurea* germination

**CHAPTER – VI**

# SUMMARY & CONCLUSION

*Bauhinia acuminata*, *Bauhinia racemosa* and *Bauhinia purpurea* seeds were tested for their germination capacity under various methods. The successful germination of *Bauhinia* species are by the well breakdown off seed dormancy by the different methods such as scarification, immersion in $H_2So_4$ for 15 min, 30 min, 45 min, immersion in water for 24 hours and control were tested.

The seed with hard seed coat like *Bauhinia acuminata* and *Bauhinia racemosa* showed good germination capacity in scarificaion method and immersion of seeds in $H_2So_4$ for 45 min.

*Bauhinia acuminata* showed only 4% germination under immersion of water for 24 hours; under immersion in $H_2So_4$ for 15 minutes showed 10% germination rate. For the 7 days of time period the germination rate was developed up to 1 to 2%. To the successful germination rate of *Bauhinia acuminata* observed in scarification method, the germination rate is 66% and in the control it was 60% of germination rate.

In *Bauhinia racemosa* immersion in $H_2So_4$ for 30 minutes germination rate was about 6 % and in a week of time period the germination rate is just 1%. By increasing the time period and in immersion in $H_2 So_4$ for 45 minutes showed 30% germination rate. In immersion in water for 24 hours the germination rate was just 4% and in 7 days period the germination rate was less than 1% and in control the germination rate was very less nearly 1%. Among all the methods great germination rate was observed in scarification about 60 % and also immersion in $H_2So_4$ for 45 minutes.

In the immersion of $H_2So_4$ for 15 minutes the germination rate was 12% and for the 7 days time period the germination rate is less than 1%; for 30 minutes showed 58% of germination rate and for 45 minutes immersion only 14% germination rate. For *Bauhinia purpurea* control is the best method.

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# Appendix

❖ Bauhinia racemosa

❖ Results of Scarification techiniques

| Method | Date of sowing | Day of Germination | No.of seeds germinated | Height of seedling(cm) | No.of leaves |
|---|---|---|---|---|---|
| Scarification | 28-02-2023 | 10-03-2023 (10 days) | 21 | 2.6 | 2 to 4 |
| Scarification | 28-02-2023 | 17-03-2023 (7 days) | 1 | 1 | 2 |
| Scarification | 28-02-2023 | 24-03-2023 (7 days) | 2 | 2 | 2 |
| Scarification | 28-02-2023 | 30-03-203 (7 days) | 5 | 2.5 | 2 |
| Scarification | 28-02-2023 | 06-04-2023 (7 days) | 1 | 2.5 | 2 |
| Scarification | 28-02-2023 | 13-04-2023 (7 days) | 0 | 0 | 0 |
| Scarification | 28-02-2023 | 20-04-2023 (7 days) | 1 | 2.9 | 1 |
| Scarification | 28-02-2023 | 27-04-2023 (7 days) | 0 | 0 | 0 |
| Scarification | 28-02-2023 | 04-05-2023 (7 days) | 0 | 0 | 0 |
| Scarification | 28-02-2023 | 11-05-2023 (7 days) | 0 | 0 | 0 |
| Sacrirification | 28-02-2023 | 18-05-2023 (7days) | 0 | 0 | 0 |

❖ Results of Immersion in H2O for the time period 24 hours

| Method | Date of Sowing | Day of Germination | No.of Seeds Germinated | Heights of Seedling(cm) | No.of Leaves |
|---|---|---|---|---|---|
| Immersion in H2O for 24 Hrs | 28-02-2023 | 10-03-2023 (10 days) | 0 | 0 | 0 |
| Immersion in H2O for 24 Hrs | 28-02-2023 | 17-03-2023 (7 days) | 0 | 0 | 0 |
| Immersion in H2O for 24 Hrs | 28-02-2023 | 24-03-2023 (7 days) | 0 | 0 | 0 |
| Immersion in H2O for 24 Hrs | 28-02-2023 | 30-03-203 (7 days) | 0 | 0 | 0 |
| Immersion in H2O for 24 Hrs | 28-02-2023 | 06-04-2023 (7 days) | 1 | 0.5 | 2 |
| Immersion in H2O for 24 Hrs | 28-02-2023 | 13-04-2023 (7 days) | 1 | 2.5 | 4 |
| Immersion in H2O for 24 Hrs | 28-02-2023 | 20-04-2023 (7 days) | 0 | 10.1 | 0 |
| Immersion in H2O for 24 Hrs | 28-02-2023 | 27-04-2023 (7 days) | 0 | 0 | 0 |
| Immersion in H2O for 24 Hrs | 28-02-2023 | 04-05-2023 (7 days) | 0 | 0 | 0 |
| Immersion in H2O for 24 Hrs | 28-02-2023 | 11-05-2023 (7 days) | 0 | 0 | 0 |
| Immersion in H2O for 24 Hrs | 28-02-2023 | 18-05-2023 (7days) | 0 | 0 | 0 |

❖ Results of Immersion in H2SO4 for the time period 15 Mins

| Method | Date of Sowing | Day of Germination | No.of Seeds Germinated | Heights of Seedling(cm) | No.of Leaves |
|---|---|---|---|---|---|
| Immersion in H2So4 for 15Mins | 28-02-2023 | 10-03-2023 (10 days) | 3 | 2.5 | 4 |
| Immersion in H2So4 for 15 Mins | 28-02-2023 | 17-03-2023 (7 days) | 0 | 0 | 0 |
| Immersion in H2So4 for 15Mins | 28-02-2023 | 24-03-2023 (7 days) | 0 | 0 | 0 |
| Immersion in H2So4 for 15 Mins | 28-02-2023 | 30-03-203 (7 days) | 0 | 0 | 0 |
| Immersion in H2So4 for 15 Mins | 28-02-2023 | 06-04-2023 (7 days) | 1 | 1.5 | 2 |
| Immersion in H2So4 for 15 Mins | 28-02-2023 | 13-04-2023 (7 days) | 0 | 0 | 0 |
| Immersion in H2So4 for 15 Mins | 28-02-2023 | 20-04-2023 (7 days) | 1 | 0.4 | 2 |
| Immersion in H2So4 for 15 Mins | 28-02-2023 | 27-04-2023 (7 days) | 0 | 0 | 0 |
| Immersion in H2So4 for 15 Mins | 28-02-2023 | 04-05-2023 (7 days) | 0 | 0 | 0 |
| Immersion in H2So4 for 15 Mins | 28-02-2023 | 11-05-2023 (7 days) | 1 | 8.4 | 7 |
| Immersion in H2So4 for 15 Mins | 28-02-2023 | 18-05-2023 (7days) | 0 | 0 | 0 |

❖ Results of Immersion in H2SO4 for the time period 30 Mins

| Method | Date of Sowing | Day of Germination | No.of Seeds Germinated | Heights of Seedling(cm) | No.of Leaves |
|---|---|---|---|---|---|
| Immerison in H2SO4 for 30 mins | 28-02-2023 | 10-03-2023 (10 days) | 2 | 1 | 0-2 |
| Immerison in H2SO4 for 30 mins | 28-02-2023 | 17-03-2023 (7 days) | 0 | 0 | 0 |
| Immerison in H2SO4 for 30 mins | 28-02-2023 | 24-03-2023 (7 days) | 0 | 0 | 0 |
| Immerison in H2SO4 for 30 mins | 28-02-2023 | 30-03-203 (7 days) | 0 | 0 | 0 |
| Immerison in H2SO4 for 30 mins | 28-02-2023 | 06-04-2023 (7 days) | 0 | 0 | 0 |
| Immerison in H2SO4 for 30 mins | 28-02-2023 | 13-04-2023 (7 days) | 0 | 0 | 0 |
| Immerison in H2SO4 for 30 mins | 28-02-2023 | 20-04-2023 (7 days) | 1 | 0.1 | 1 |
| Immerison in H2SO4 for 30 mins | 28-02-2023 | 27-04-2023 (7 days) | 0 | 0 | 0 |
| Immerison in H2SO4 for 30 mins | 28-02-2023 | 04-05-2023 (7 days) | 0 | 0 | 0 |
| Immerison in H2SO4 for 30 mins | 28-02-2023 | 11-05-2023 (7 days) | 0 | 0 | 0 |
| Immerison in H2SO4 for 30 mins | 28-02-2023 | 18-05-2023 (7days) | 0 | 0 | 0 |

Results of Immersion in $H_2So_4$ for the time period of 45 Mins

| **Method** | **Date of sowing** | **Day of Germination** | **No.of seeds germinated** | **Height of seedling(cm)** | **No.of leaves** |
|---|---|---|---|---|---|
| Immersion in H2SO4 45 mins | 28-02-2023 | 10-03-2023 (10 days) | 10 | 2 | 2 to 4 |
| Immersion in H2SO4 45 mins | 28-02-2023 | 17-03-2023 (7 days) | 0 | 0 | 0 |
| Immersion in H2SO4 45 mins | 28-02-2023 | 24-03-2023 (7 days) | 2 | 2.5 | 2 |
| Immersion in H2SO4 45 mins | 28-02-2023 | 30-03-203 (7 days) | 2 | 3 | 2 |
| Immersion in H2SO4 45 mins | 28-02-2023 | 06-04-2023 (7 days) | 1 | 0.7 | 2 |
| Immersion in H2SO4 45 mins | 28-02-2023 | 13-04-2023 (7 days) | 0 | 0 | 0 |
| Immersion in H2SO4 45 mins | 28-02-2023 | 20-04-2023 (7 days) | 0 | 0 | 0 |
| Immersion in H2SO4 45 mins | 28-02-2023 | 27-04-2023 (7 days) | 0 | 0 | 0 |
| Immersion in H2SO4 45 mins | 28-02-2023 | 04-05-2023 (7 days) | 0 | 0 | 0 |
| Immersion in H2SO4 45 mins | 28-02-2023 | 11-05-2023 (7 days) | 0 | 0 | 0 |
| Immersion in H2SO4 45 mins | 28-02-2023 | 18-05-2023 (7days) | 0 | 0 | 0 |

❖ Results of Immersion in Control Techinique

| Method | Date of sowing | Day of Germination | No.of seeds germinated | Height of seedling(cm) | No.of leaves |
|---|---|---|---|---|---|
| Control | 28-02-2023 | 10-03-2023 (10 days) | 1 | 1 | 2 |
| Control | 28-02-2023 | 17-03-2023 (7 days) | 0 | 0 | 0 |
| Control | 28-02-2023 | 24-03-2023 (7 days) | 0 | 0 | 0 |
| Control | 28-02-2023 | 30-03-203 (7 days) | 0 | 0 | 0 |
| Control | 28-02-2023 | 06-04-2023 (7 days) | 0 | 0 | 0 |
| Control | 28-02-2023 | 13-04-2023 (7 days) | 1 | 1.9 | 2 |
| Control | 28-02-2023 | 20-04-2023 (7 days) | 0 | 0 | 0 |
| Control | 28-02-2023 | 27-04-2023 (7 days) | 0 | 0 | 0 |
| Control | 28-02-2023 | 04-05-2023 (7 days) | 0 | 0 | 0 |
| Control | 28-02-2023 | 11-05-2023 (7 days) | 0 | 0 | 0 |
| Control | 28-02-2023 | 18-05-2023 (7days) | 0 | 0 | 0 |

## ❖ Bauhinia Purpurea Results

Results in the Techinique of Control

| Method | Date of sowing | Day of Germination | No.of seeds germinated | Height of seedling(cm) | No.of leaves |
|---|---|---|---|---|---|
| Control | 28-02-2023 | 10-03-2023 (10 days) | 18 | 3.5 | 5 |
| Control | 28-02-2023 | 17-03-2023 (7 days) | 4 | 1 | 2 |
| Control | 28-02-2023 | 24-03-2023 (7 days) | 3 | 1 | 2 |
| Control | 28-02-2023 | 30-03-203 (7 days) | 5 | 1 | 2 |
| Control | 28-02-2023 | 06-04-2023 (7 days) | 1 | 0.2 | 2 |
| Control | 28-02-2023 | 13-04-2023 (7 days) | 4 | 1.4 | 3 |
| Control | 28-02-2023 | 20-04-2023 (7 days) | 0 | 0 | 0 |
| Control | 28-02-2023 | 27-04-2023 (7 days) | 0 | 0 | 0 |
| Control | 28-02-2023 | 04-05-2023 (7 days) | 0 | 0 | 0 |
| Control | 28-02-2023 | 11-05-2023 (7 days) | 0 | 0 | 0 |
| Control | 28-02-2023 | 18-05-2023 (7days) | 0 | 0 | 0 |

❖ Results of Immersion in Water for 24 Hours method

| Method | Date of sowing | Day of Germination | No.of seeds germinated | Height of seedling(cm) | No.of leaves |
|---|---|---|---|---|---|
| Immersion in Water for 24 Hrs | 28-02-2023 | 10-03-2023 (10 days) | 12 | 9 | 5 |
| Immersion in Water for 24 Hrs | 28-02-2023 | 17-03-2023 (7 days) | 7 | 3 | 2 |
| Immersion in Water for 24 Hrs | 28-02-2023 | 24-03-2023 (7 days) | 6 | 1 | 2 |
| Immersion in Water for 24 Hrs | 28-02-2023 | 30-03-203 (7 days) | 5 | 1 | 2 |
| Immersion in Water for 24 Hrs | 28-02-2023 | 06-04-2023 (7 days) | 1 | 3 | 2 |
| Immersion in Water for 24 Hrs | 28-02-2023 | 13-04-2023 (7 days) | 1 | 6 | 4 |
| Immersion in Water for 24 Hrs | 28-02-2023 | 20-04-2023 (7 days) | 0 | 0 | 0 |
| Immersion in Water for 24 Hrs | 28-02-2023 | 27-04-2023 (7 days) | 0 | 0 | 0 |
| Immersion in Water for 24 Hrs | 28-02-2023 | 04-05-2023 (7 days) | 0 | 0 | 0 |
| Immersion in Water for 24 Hrs | 28-02-2023 | 11-05-2023 (7 days) | 0 | 0 | 0 |
| Immersion in Water for 24 Hrs | 28-02-2023 | 18-05-2023 (7days) | 0 | 0 | 0 |

❖ Results of Bauhinia accuminata

Results of Immersion in $H_2So_4$ for 15 Mins of Time

| Method | Date of sowing | Day of Germination | No.of seeds germinated | Height of seedling(cm) | No.of leaves |
|---|---|---|---|---|---|
| Immersion in H2SO4 for 15 Mins | 28-02-2023 | 10-03-2023 (10 days) | 1 | 2 | 2 |
| Immersion in H2SO4 for 15 Mins | 28-02-2023 | 17-03-2023 (7 days) | 2 | 1 | 2 |
| Immersion in H2SO4 for 15 Mins | 28-02-2023 | 24-03-2023 (7 days) | 0 | 0 | 0 |
| Immersion in H2SO4 for 15 Mins | 28-02-2023 | 30-03-203 (7 days) | 0 | 0 | 0 |
| Immersion in H2SO4 for 15 Mins | 28-02-2023 | 06-04-2023 (7 days) | 0 | 0 | 0 |
| Immersion in H2SO4 for 15 Mins | 28-02-2023 | 13-04-2023 (7 days) | 1 | 6.1 | 5 |
| Immersion in H2SO4 for 15 Mins | 28-02-2023 | 20-04-2023 (7 days) | 0 | 0 | 0 |
| Immersion in H2SO4 for 15 Mins | 28-02-2023 | 27-04-2023 (7 days) | 1 | 3.6 | 1 |
| Immersion in H2SO4 for 15 Mins | 28-02-2023 | 04-05-2023 (7 days) | 0 | 0 | 0 |
| Immersion in H2SO4 for 15 Mins | 28-02-2023 | 11-05-2023 (7 days) | 1 | 15 | 7 |
| Immersion in H2SO4 for 15 Mins | 28-02-2023 | 18-05-2023 (7days) | 0 | 0 | 0 |

❖ Results of Immersion in $H_2So_4$ for 30 Mins of Time

| Method | Date of sowing | Day of Germination | No.of seeds germinated | Height of seedling(cm) | No.of leaves |
|---|---|---|---|---|---|
| Immersion in H2SO4 for 30 Mins | 28-02-2023 | 10-03-2023 (10 days) | 17 | 3 | 5 |
| Immersion in H2SO4 for 30 Mins | 28-02-2023 | 17-03-2023 (7 days) | 3 | 0.8 | 2 |
| Immersion in H2SO4 for 30 Mins | 28-02-2023 | 24-03-2023 (7 days) | 2 | 6.2 | 4 |
| Immersion in H2SO4 for 30 Mins | 28-02-2023 | 30-03-203 (7 days) | 2 | 6.2 | 4 |
| Immersion in H2SO4 for 30 Mins | 28-02-2023 | 06-04-2023 (7 days) | 3 | 0.9 | 1 |
| Immersion in H2SO4 for 30 Mins | 28-02-2023 | 13-04-2023 (7 days) | 1 | 1.4 | 2 |
| Immersion in H2SO4 for 30 Mins | 28-02-2023 | 20-04-2023 (7 days) | 0 | 0 | 0 |
| Immersion in H2SO4 for 30 Mins | 28-02-2023 | 27-04-2023 (7 days) | 0 | 0 | 0 |
| Immersion in H2SO4 for 30 Mins | 28-02-2023 | 04-05-2023 (7 days) | 0 | 0 | 0 |
| Immersion in H2SO4 for 30 Mins | 28-02-2023 | 11-05-2023 (7 days) | 1 | 6.7 | 4 |
| Immersion in H2SO4 for 30 Mins | 28-02-2023 | 18-05-2023 (7days) | 0 | 0 | 0 |

❖ Results of Immersion in $H_2So_4$ for 45 Mins of Time

| Method | Date of sowing | Day of Germination | No.of seeds germinated | Height of seedling(cm) | No.of leaves |
|---|---|---|---|---|---|
| Immersion in H2SO4 for 45 Mins | 28-02-2023 | 10-03-2023 (10 days) | 4 | 2 | 2 |
| Immersion in H2SO4 for 45 Mins | 28-02-2023 | 17-03-2023 (7 days) | 0 | 0 | 0 |
| Immersion in H2SO4 for 45 Mins | 28-02-2023 | 24-03-2023 (7 days) | 0 | 0 | 0 |
| Immersion in H2SO4 for 45 Mins | 28-02-2023 | 30-03-203 (7 days) | 1 | 2 | 2 |
| Immersion in H2SO4 for 45 Mins | 28-02-2023 | 06-04-2023 (7 days) | 1 | 1 | 2 |
| Immersion in H2SO4 for 45 Mins | 28-02-2023 | 13-04-2023 (7 days) | 1 | 1.4 | 2 |
| Immersion in H2SO4 for 45 Mins | 28-02-2023 | 20-04-2023 (7 days) | 0 | 0 | 0 |
| Immersion in H2SO4 for 45 Mins | 28-02-2023 | 27-04-2023 (7 days) | 0 | 0 | 0 |
| Immersion in H2SO4 for 45 Mins | 28-02-2023 | 04-05-2023 (7 days) | 0 | 0 | 0 |
| Immersion in H2SO4 for 45 Mins | 28-02-2023 | 11-05-2023 (7 days) | 0 | 0 | 0 |
| Immersion in H2SO4 for 45 Mins | 28-02-2023 | 18-05-2023 (7days) | 0 | 0 | 0 |

❖ Results of Scarification technique

| Method | Date of sowing | Day of Germination | No.of seeds germinated | Height of seedling(cm) | No.of leaves |
|---|---|---|---|---|---|
| Scarification | 28-02-2023 | 10-03-2023 (10 days) | 20 | 1.5 | 2 |
| Scarification | 28-02-2023 | 17-03-2023 (7 days) | 3 | 1 | 2 |
| Scarification | 28-02-2023 | 24-03-2023 (7 days) | 1 | 1 | 6 |
| Scarification | 28-02-2023 | 30-03-203 (7 days) | 4 | 1 | 6 |
| Scarification | 28-02-2023 | 06-04-2023 (7 days) | 0 | 0 | 0 |
| Scarification | 28-02-2023 | 13-04-2023 (7 days) | 2 | 6.5 | 5 |
| Scarification | 28-02-2023 | 20-04-2023 (7 days) | 0 | 0 | 0 |
| Scarification | 28-02-2023 | 27-04-2023 (7 days) | 1 | 10.4 | 4 |
| Scarification | 28-02-2023 | 04-05-2023 (7 days) | 1 | 10 | 4 |
| Scarification | 28-02-2023 | 11-05-2023 (7 days) | 1 | 10.5 | 4 |
| Scarification | 28-02-2023 | 18-05-2023 (7days) | | | |

❖ Results of Control Method

| Method | Date of sowing | Day of Germination | No.of seeds germinated | Height of seedling(cm) | No.of leaves |
|---|---|---|---|---|---|
| Control | 28-02-2023 | 10-03-2023 (10 days) | 10 | 1.3 | 2 |
| Control | 28-02-2023 | 17-03-2023 (7 days) | 1 | 1.4 | 2 |
| Control | 28-02-2023 | 24-03-2023 (7 days) | 2 | 1.8 | 4 |
| Control | 28-02-2023 | 30-03-203 (7 days) | 6 | 1.8 | 4 |
| Control | 28-02-2023 | 06-04-2023 (7 days) | 8 | 0.5 | 2 |
| Control | 28-02-2023 | 13-04-2023 (7 days) | 1 | 1 | 2 |
| Control | 28-02-2023 | 20-04-2023 (7 days) | 3 | 8.5 | 4 |
| Control | 28-02-2023 | 27-04-2023 (7 days) | 1 | 3.3 | 4 |
| Control | 28-02-2023 | 04-05-2023 (7 days) | 0 | 0 | 0 |
| Control | 28-02-2023 | 11-05-2023 (7 days) | 2 | 12 | 9 |
| Control | 28-02-2023 | 18-05-2023 (7days) | 0 | 0 | 0 |

❖ Results of Immersion in Water for the period of 24 Hours

| Method | Date of sowing | Day of Germination | No.of seeds germinated | Height of seedling(cm) | No.of leaves |
|---|---|---|---|---|---|
| Immersion in Water for 24 Hrs | 28-02-2023 | 10-03-2023 (10 days) | 4 | 2.5 | 4 |
| Immersion in Water for 24 Hrs | 28-02-2023 | 17-03-2023 (7 days) | 0 | 0 | 0 |
| Immersion in Water for 24 Hrs | 28-02-2023 | 24-03-2023 (7 days) | 5 | 3 | 4 |
| Immersion in Water for 24 Hrs | 28-02-2023 | 30-03-203 (7 days) | 1 | 3 | 4 |
| Immersion in Water for 24 Hrs | 28-02-2023 | 06-04-2023 (7 days) | 8 | 1.3 | 2 |
| Immersion in Water for 24 Hrs | 28-02-2023 | 13-04-2023 (7 days) | 2 | 1.2 | 2 |
| Immersion in Water for 24 Hrs | 28-02-2023 | 20-04-2023 (7 days) | 2 | 2.3 | 2 |
| Immersion in Water for 24 Hrs | 28-02-2023 | 27-04-2023 (7 days) | 0 | 0 | 0 |
| Immersion in Water for 24 Hrs | 28-02-2023 | 04-05-2023 (7 days) | 0 | 0 | 0 |
| Immersion in Water for 24 Hrs | 28-02-2023 | 11-05-2023 (7 days) | 0 | 0 | 0 |
| Immersion in Water for 24 Hrs | 28-02-2023 | 18-05-2023 (7days) | 4 | 2.3 | 3 |