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TO COMPARE THE EFFECT OF VRIKSHAYURVEDA AND MODERN TECHNIQUES ON GERMINATION OF ASOKA AND GAMBHARI.

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Abstract:

The germination response pattern of seeds is also regarded as a prime feature in plant life history strategy. The common means of regeneration and propagation of medicinal plants include seed-based, clonal and micropropagation method. Seed-based multiplication is the most effective, realistic and convenient means for most species. Destructive and non-sustainable collection methods coupled with low regeneration and habitat destruction have posed serious threats to the survival and availability of Asoka and gambhari. Asoka in traditional medicine and in ayurveda is used to treat rakta pradara. Gambhari is a tridosh shamaka and it is an important constituent of dashmoola and mainly of bruhat panchmoola. The species is generally propagated by seeds but its germination rate and viability is very low due to seed abortion which limits its natural propagation. the seed set is poor and seed viability is low. Problems related with natural propagation and indiscriminate exploitation for medicinal purpose have pushed asoka and gambhari to the list of endangered plant species of india. These various seed priming processes have been carefully designed in *Vrikshayurveda* to allow early germination, to obtain good quality of seedlings by following the classical techniques explained. Hence the present study is intended to compare the effects of *Vrikshayurveda* and Modern cultivation techniques on germination of Asoka and gambhari.

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INTRODUCTION:

- Cultivation of medicinal plants is not only a means for meeting current and future demands for large volume production of plant-based drug and herbal remedies, but also a means of relieving harvest pressure on wild populations¹ With the increased realization that some wild species are being over-exploited, due to longterm exploitation of medicinal herbs, many important medicinal plants are becoming rare and endangered. Government and number of agencies are recommending that wild medicinal species should be brought into cultivation systems² Successful seed germination is the first essential step for successful cultivation³ A variety of factors including endogenous as well as environmental variations effects seed germination which is a complex process⁴ one of the reason is low germination rate or prolonged seed dormancy. Some plants, at some stage of their life cycle produce a resistance to extremes of climatic conditions and become capable of persisting without obvious morphological change over considerable period of time incapable of germination because of some inhibitory factors. Such seeds even under suitable environments of germination are unable to germinate which is called as seed dormancy⁵ Seed dormancy is defined as the failure of an intact viable seed to complete germination under favorable conditions⁶ To break this dormancy various methods also called as pre treatments are used based on the species and kind of dormancy which include mechanical scarification, chemical scarification (especially H₂SO₄), cold-wet, hot water, electro sonic waves and stratification⁷ Pretreatment (seed priming) is a treatment applied before sowing seeds which enhances rapid and synchronized germination and aids in seed establishment Either there is acceleration of the natural processes of dormancy release or simulation of these processes.
- It is the need of the day to explore the knowledge of ancient techniques to overcome the adverse side effects of inorganic farming. In today's world, global environmental issues
- Relating to sustainable development has emerged as topics of major concern. Asoka and Gambhari is such a plant species which is propagated naturally by seeds and their seedlings require moderate shade in early stages. However, the seed set is poor and seed viability is low. Problems related with natural propagation and indiscriminate exploitation for medicinal purpose has pushed *Asoka* and *Gambhari* to the list of endangered plant species of India. The existence of s.asoka and g. arborea in natural population is highly threatened and has been categorized vulnerable by the government of india.
- Gambhari is sweet, astringent, bitter in taste with hot potency and heavy in nature. It promotes digestive fire and is a pergstive. It manages vertigo, inflammation, vata disorder, pain, piles, fever, heat and toxins.⁸
- The meaning of *Ashoka* in sanskrit is without grief/ sorrow less. Each part of the tree is of proven medicinal value and cures many disorders; hence it is called Ashoka. The barks, seeds and flowers of the tree are helpful in preparing capsules and tonics to solve various gynecological problems of women.⁹
- *Vrikshayurveda* a science of plant life is the first available full-fledged text on the science of arbore-horticulture. There are frequent references to this science in ancient Indian literature such as *Atharvaveda* (1000 BC), *Arthashastra of Chanakya* (321-296 BC), *Brahatsamhita* of *Varahamihira* (6th century AD) & *Sharangadhara paddhati* of *Sharangadhara* (13th century AD)¹⁰ *Vrikshayurveda* explain details about pre-sowing seed treatment techniques with organic materials. This reflects that the

knowledge of seed dormancy existed even then. As this vast knowledge is not yet properly understood, effort should be made to explore the Vedic methods of plant cultivation and protection. Facing the rapidly growing demands for medicinal plants, domestic cultivation is a viable and long-term way of protecting wild medicinal plant resources.

- It is the need of the day to know about *Vrikshayurveda* techniques to identify safe, alternative m Hence an attempt was made in this study to know the effect of different seed treatments on germination of *asoka and gambhari* by comparing modern techniques with techniques explained in *vrikshayurveda* system.
- Ethods to break seed dormancy in *Ashoka* as in today's world, global environmental issues relating to sustainable development have emerged as topics of major concern. The various seed priming processes have been carefully designed in *Vrikshayurveda* to allow early germination and to obtain good quality of seedlings like soaking in milk, rubbing seed with cow dung, applying some organic medicines to seeds. .
- Hence an attempt was made in this study to know the effect of different seed treatments on germination of *asoka and gambhari* by comparing modern techniques with techniques explained in *vrikshayurveda* system.

AIMS AND OBJECTIVES

To compare the effect of *vrikshayurveda* and modern techniques on germinations of *Asoka (Saraka Asoca)*

- To compare the effect of *vrikshayurveda* and modern techniques on germinations of *Gambhari (Gmelina Arborea)* Seeds.

MATERIAL AND METHODS

1. ASOKA

CLASSIFICATION

- Kingdom : *Plantae*
- Order : *Lamialse*
- Family : *Caesalpinoidea*
- Genus : *Saraka*
- Species : *S.Asoka*
- Botanical Name : *Saraka Asoka*

DISTRIBUTION

- It is distributed throughout the greater part of India up to an altitude of 1200 m including sub-Himalayan tracts, Bihar, North Bengal, Chittagong, Odisha .

MORPHOLOGY

- A small to medium sized, deciduous tree, up to 12 m high. Leaves are large, bipinnate or tripinnate. Flowers purple, fleshy in large erect racemes Capsules flat, sword shaped upto 90 cm long. Seeds thin flat with broad silvery wings.

PROPERTIES

- *Rasa* : *Kasaya , Tikta*
- *Guna* : *Laghu, Ruksha*
- *Virya* : *Sita*
- *Vipaka* : *Katu*
- *Dosha Karma* : *Pittahara*

CHEMICAL CONSTITUENTS

- BARK - ALKANES, ESTERS AND PRIMARY ALCOHOL.

2. GAMBHARI

CLASSIFICATION

- Kingdom : *Plantae*
- Order : *Lamiaceae*
- Family : *Verbenaceae*
- Genus : *G.Melina*
- Species : *G.Arborea*
- Botanical Name : *Gmelina Arborea Roxb.*

DISTRIBUTION

- It is distributed throughout the greater part of India extensively in the sub Himalayan tracts, Assam, West Bengal ,Odisha.

MORPHOLOGY

- Gambhari is a tree that can grow to 30 m high, with smooth, whitish to greyish reddish brown bark and a straight trunk. Leaves are 8 to 20 cm long, 4.5 to 15 cm wide, and covered with star- shaped hairs. The flowers are reddish yellow, hairy and five-lobed. The hairless fruits are 10 to 15 mm in diameter and glossy yellow when mature¹¹.

PROPERTIES

- *Rasa* : *Tikta , Kasaya, Madhur.*
- *Guna* : *Guru*

- *Virya* : *Ushna*
- *Vipaka* : *Katu*
- *Doshkarma* : *Tridoshashamaka*

CHEMICAL CONSTITUENTS

- Bark : Acetone and Methanol n hexane, Diethyl ether, ethyl acetate.
- Leaf : Premnazol.

SOIL ANALYSIS

- Soil analysis was done before sowing the seeds at Parul University analysis center, Waghodiya, Vadodara

METHODOLOGY¹²

| | Groups | No. of seeds | Treatment |
|----|----------|--------------|--|
| 01 | Group 01 | 50 | Control group- no treatment for seeds |
| 02 | Group 02 | 50 | ASOKA AND GAMBHARI seeds treated with 1% H ₂ SO ₄ (Sulphuric acid) for 50 minutes ¹³ |
| 03 | Group 03 | 50 | Seed sprinkled with Milk & dried for 5 days .It is then smoked with Mustard (<i>Brassica campestris</i>) & Vidanga (<i>Emblica ribes burm</i>) ¹⁴ |
| 04 | Group 04 | 50 | Seed sprinkled with Milk, rubbed with cow dung, dried & profusely smeared with Honey and Vidanga (<i>Emblica ribes burm</i>) ¹⁵ |

- The Quantity of Ingredients and the Duration of Processing (Fumigation/soaking/drying) may vary according to the need/requirement. Consequently Standard Operative Procedures was developed for quantity of ingredients & the duration of processing (Fumigation/soaking/drying).

TREATMENT FOR THE SEEDS

- Number of Treatment groups: 3
- Number of Replications: 5
- Number of seeds per Replications: 50
- Total Number of seeds per Treatment group: 200

- Experimental Design: Randomized Block Design {RBD}

OBSERVATIONS TO BE RECORDED

1. Number of days taken for sprouting
2. Number of seeds germinated
3. Percentage of seed germination
4. Germination parameters was determined according to following formulae

A. GERMINABILITY (G %)

- = Total No. of seeds germinated/ Total No. of seeds sown x 100

B. EMERGENCE INDEX (EI)

- was calculated by the formula of Baskin (1969)¹⁶
- $EI = (n1/dn1) + (n2/dn2) + (n3/dn3) + \dots + (nx/dnx)$
- Where n=No. of seeds emerged on the day 1st, 2nd, 3rd, nth day
- dn= No. of days from the day of sowing.
- dnx=No. of days to the final count.

C. Relative seed germination (RSG)

- = (No. of seeds germinated in Treatment group / No. of seeds germinated in control group) x 100
- The data is subjected to Statistical Analysis of Variance subjected to Randomized Block Design {RBD} as described by Panse and Sukhatme (1985)¹⁷

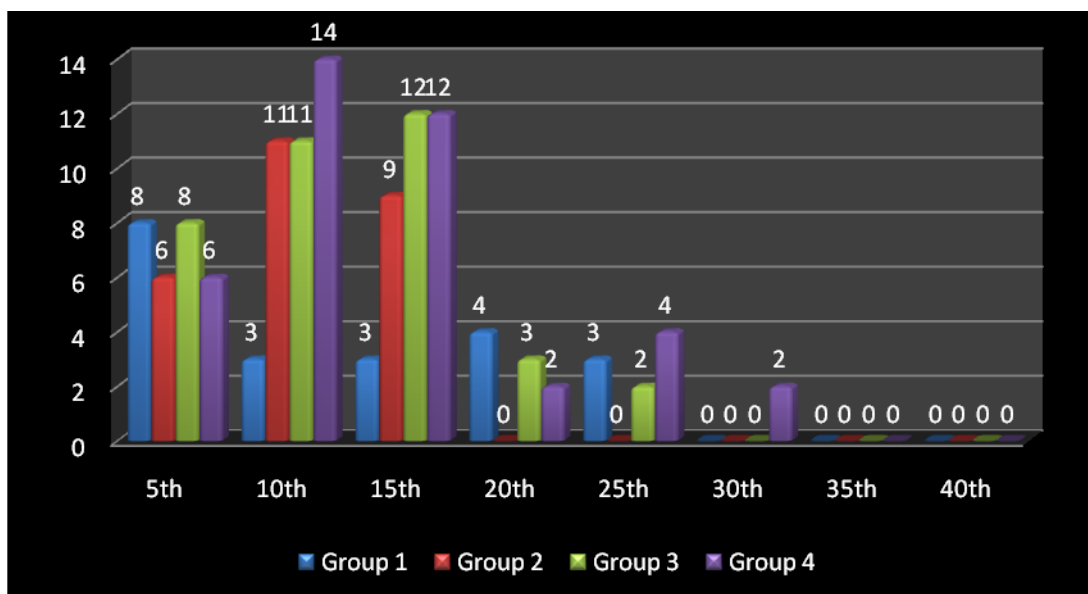
OBSERVATION AND RESULTS

Table 1: soil analysis reports

| No | Soil health information | Normal range | Results | Efficiency |
|----|---------------------------------------|--------------|---------|------------|
| 1 | pH | 6.3-8.3 | 7.4 | Normal |
| 2 | EC | <1 | 0.24 | Normal |
| 3 | OC% | 0.5-0.75 | 0.69 | Normal |
| 4 | P ₂ O ₅ kg/acre | 9-22 | 46.4 | More |
| 5 | K ₂ O kg/acre | 50-120 | 166 | More |
| 6 | Zn | 1 | 0.43 | Less |
| 7 | Cu | 0.2 | 0.39 | More |
| 8 | Mn | 2 | 8.1 | More |
| 9 | Fe | 4.5 | 15.7 | More |

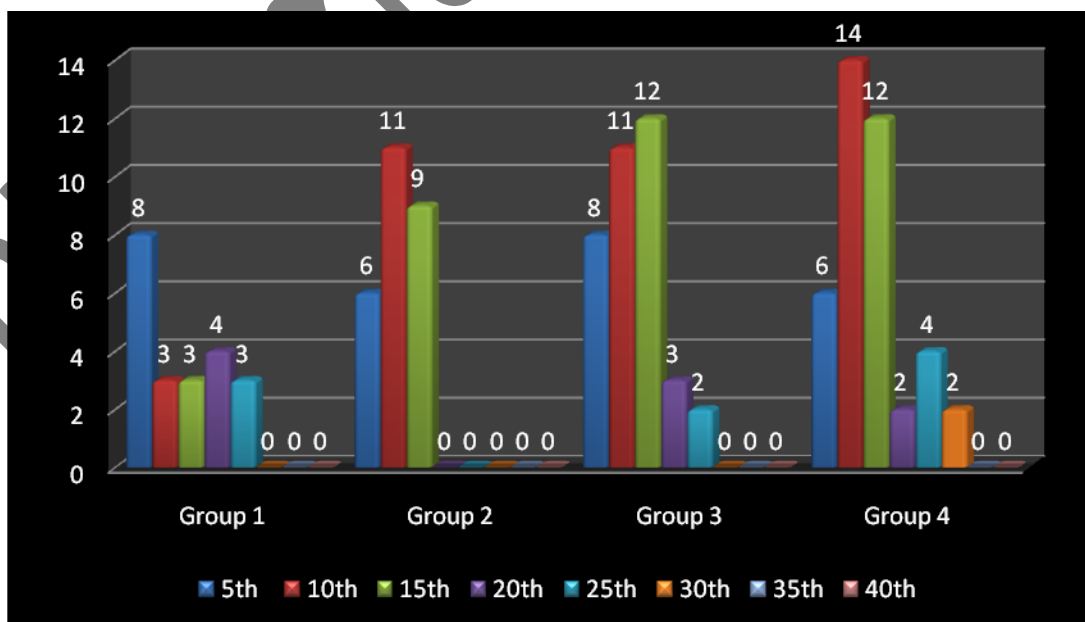
Table 2: effect of different treatment on germination of ashoka

| | 5 th | 10 th | 15 th | 20 th | 25 th | 30 th | 35 th | 40 th | Total |
|---------|-----------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|-------|
| Group 1 | 8 | 3 | 3 | 4 | 3 | - | - | - | 21 |
| Group 2 | 6 | 11 | 9 | - | - | - | - | - | 26 |
| Group 3 | 8 | 11 | 12 | 3 | 2 | - | - | - | 36 |
| Group 4 | 6 | 14 | 12 | 2 | 4 | 2 | - | - | 40 |



Maximum number of seed germination was in group 4 (40) followed by group 3 (36), 2 (26)

and 1 (21).



A. GERMINABILITY (G %)

- = Total No. of seeds germinated/ Total No. of seeds sown x 100

| Groups | G% |
|---------|------|
| Group 1 | 10.5 |
| Group 2 | 13 |
| Group 3 | 18 |
| Group 4 | 20 |

B. Relative seed germination (RSG)

- = (No. of seeds germinated in Treatment group / No. of seeds germinated in control group) x 100

| Groups | RSG |
|---------|-------|
| Group 1 | 100 |
| Group 2 | 123.8 |
| Group 3 | 171.4 |
| Group 4 | 190.4 |

Table 2(a): Germination Percentage of treatments of Group 1 with others

| | | Differences | P value | Summary |
|---------|---------|-------------|---------|-----------------|
| Group 1 | Group 2 | 2.5 | 0.57 | Non significant |
| | Group 3 | 7.5 | 0.89 | Non significant |
| | Group 4 | 9.5 | 0.01 | Significant |

Group 1 showed statistically non significant results with **group 2 and 3** while with **group 4** showed significant results.

Table 2(b): Germination Percentage of treatments of Group 2 with others

| | | Differences | P value | Summary |
|---------|---------|-------------|---------|-----------------|
| Group 2 | Group 3 | 5 | 0.59 | Non significant |
| | Group 4 | 7 | 0.02 | Significant |

Only group 2 and 4 showed statistically significant results except group 3

Table 2(c): Germination Percentage of treatments of Group 3 and 4

| | | Differences | P value | Summary |
|--|--|-------------|---------|---------|
|--|--|-------------|---------|---------|

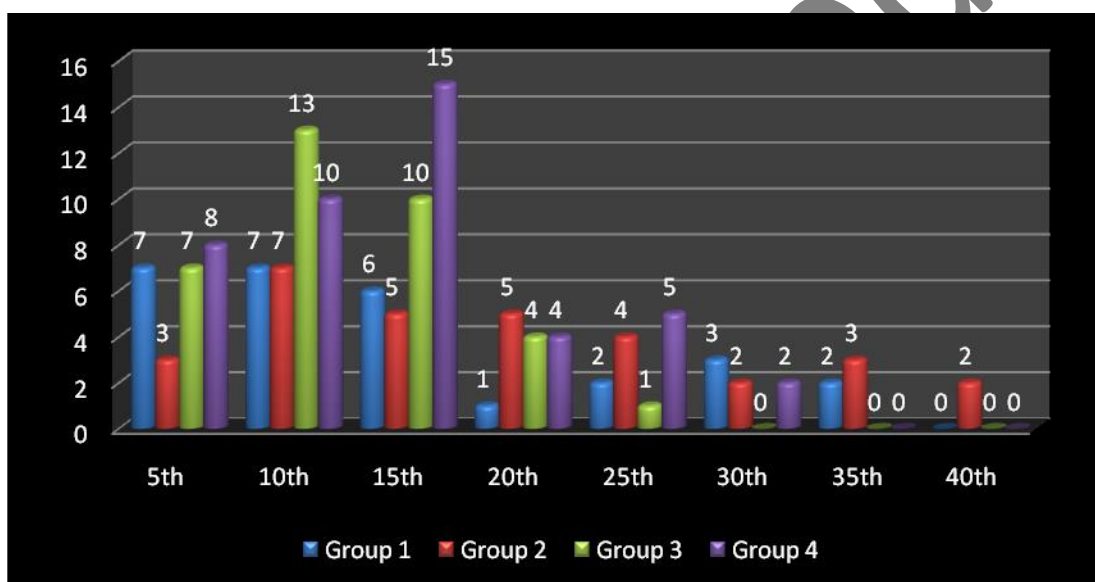
| | | | | |
|---------|---------|---|------|-----------------|
| Group 3 | Group 4 | 2 | 0.06 | Non-Significant |
|---------|---------|---|------|-----------------|

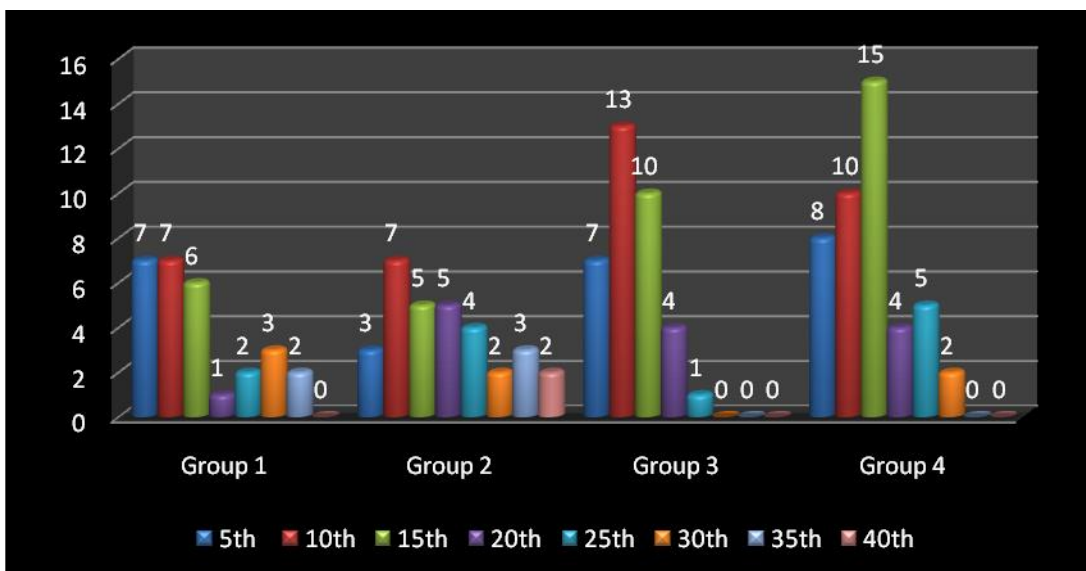
Only group 2 and 4 showed statistically significant results

Table 3: effect of different treatment on germination of gambhari

| | 5 th | 10 th | 15 th | 20 th | 25 th | 30 th | 35 th | 40 th | Total |
|---------|-----------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|-------|
| Group 1 | 7 | 7 | 6 | 1 | 2 | 3 | 2 | - | 28 |
| Group 2 | 3 | 7 | 5 | 5 | 4 | 2 | 3 | 2 | 31 |
| Group 3 | 7 | 13 | 10 | 4 | 1 | - | - | - | 35 |
| Group 4 | 8 | 10 | 15 | 4 | 5 | 2 | - | - | 44 |

Maximum number of seed germination was in group 4 (44) followed by group 3 (35), 2 (31) and 1 (28).





A. Germinability (G%) = Total No. of seeds germinated/ Total No. of seeds sown x 100

| Groups | G% |
|---------|------|
| Group 1 | 14 |
| Group 2 | 15.5 |
| Group 3 | 17.5 |
| Group 4 | 22.5 |

B. EMERGENCE INDEX (EI)

- will be calculated by the formula of Baskin (1969)
- $EI = (n1/dn1) + (n2/dn2) + (n3/dn3) + \dots + (nx/dnx)$
- Where n=No. of seeds emerged on the day 1st, 2nd, 3rd,nth day
- dn= No. of days from the day of sowing.
- dnx=No. of days to the final count

| Groups | EI |
|---------|------|
| Group 1 | 0.40 |
| Group 2 | 0.49 |
| Group 3 | 0.57 |
| Group 4 | 0.71 |

C. Relative seed germination (RSG)

- = (No. of seeds germinated in Treatment group / No. of seeds germinated in control group) x 100

| Groups | RSG |
|---------|-------|
| Group 1 | 100 |
| Group 2 | 110.7 |
| Group 3 | 125 |
| Group 4 | 160.7 |

Table 3(a): Germination Percentage of treatments of Group 1 with others

| | | Differences | P value | Summary |
|---------|---------|-------------|---------|-----------------|
| Group 1 | Group 2 | 1.5 | 0.89 | Non significant |
| | Group 3 | 3.5 | 0.09 | Non significant |
| | Group 4 | 8.5 | 0.02 | Significant |

Group 1 showed statistically non significant results with **group 2 and 3** while with **group 4** showed significant results.

Table 3(b): Germination Percentage of treatments of Group 2 with others

| | | Differences | P value | Summary |
|---------|---------|-------------|---------|-----------------|
| Group 2 | Group 3 | 2 | 0.77 | Non significant |
| | Group 4 | 7 | 0.02 | Significant |

Only group 2 and 4 showed statistically significant results except group 3

Table 3(c): Germination Percentage of treatments of Group 3 and 4

| | | Differences | P value | Summary |
|---------|---------|-------------|---------|-------------|
| Group 3 | Group 4 | 5 | 0.05 | Significant |

Only group 3 and 4 showed statistically significant result

Figure 1: Place of cultivation



Figure 2: Seeds



Figure 3: Cultivation



Figure 4: Groups of Ashoka



Figure 5: Groups of Gambhari



Figure 6: *Ashoka* after treatment



Figure 7: *Gambhari* after treatment



CONCLUSION

Group 4 seeds which were sprinkled with Milk, rubbed with cow dung, dried and profusely smeared with Honey and *Vidanga (Embllica ribes Burm)* exhibited better result in germinability, emergence index and other germinative parameters compared to other groups. It implies that Group 4 seed priming technique was quantitatively better in comparison to standard group and other *vrikshayurveda* group. It was also observed that the ancient seed pre-treating groups showed improved results over standard and control group in terms of quantity and quality of seedlings after many months of germination¹⁸.

Being an endangered plant species the above methods and other *vrikshayurveda* methods can be tried to improve the viability of the seeds for better germination

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