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## NATURAL NOURISHMENT: REVITALIZING SEED TREATMENT WITH ORGANIC APPROACHES

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Seed-borne pests and diseases pose significant threats to crop production. Seed treatment involves the application of biological and chemical agents to combat these primary soil and seed-borne infestations. This practice enhances crop safety, ensuring robust and healthy plant establishment, which translates to improved yields. Seed treatment effectively increases germination rates and promotes uniform emergence of seedlings. By protecting seeds and young plants from early-season diseases and pests, it fosters better crop emergence and growth. Additionally, treating seeds with *Rhizobium* enhances nitrogen fixation in legume crops, boosting their productivity. While seed treatment is widely practiced in developed countries, a large portion of seeds in our country—around 80%—remains untreated. This practice not only safeguards emerged seedlings from sucking insect pests but also provides comprehensive guidance on seed treatment procedures using natural products tailored for various crops. Each procedure is detailed, offering flexibility to users to select treatments based on resource availability or prevalent diseases and pests in their region.

**Table.1:** Preparation procedures of Botanicals and Animal Products used for seed treatments

SL. No.	Botanicals/ Animal bi-product	Preparation methodology
1	<i>Panchagavya</i>	To prepare <i>Panchagavya</i> , gather fresh cow dung and combine it with ghee in a plastic barrel, letting it sit for three days. Simultaneously, mix cow's urine, cow's milk, and cow's curd in another plastic barrel. On the third day, merge the contents of both barrels and leave them uncovered for seven days, stirring twice daily with a wooden stick. Cover the barrel's opening with wire netting or <i>khada</i> cloth. After a week, filter the mixture through <i>khada</i> cloth or Terracotta (TC) cloth and store the resulting liquid in sealed containers. Ensure the container caps have small holes to prevent pressure buildup. This process yields approximately 10 liters of <i>Panchagavya</i> , a traditional organic formulation known for

		its agricultural benefits.
2	<b>Sweet Flag Extract</b>	To create sweet flag extract, combine 500 grams of powdered sweet flag rhizome with 2.5 liters of water. Place the seeds in small cloth bags and immerse them in the extract for thirty minutes. Subsequently, dry the seeds in the shade before proceeding with sowing. This method harnesses the beneficial properties of sweet flag to prepare seeds for planting.
3	<b>Prosopis Kashayam</b>	Begin by gathering 2 kilograms of Prosopis plant material, excluding the roots, and weigh it using a balance scale. Cut the plant into small pieces and place the chopped leaves into a wide-mouthed brass vessel. Add 8 liters of water, which is four times the volume of the leaves. Boil the mixture over low heat until the liquid reduces to one-fourth of its original volume. Allow the solution to cool before filtering it through <i>khada</i> cloth. Store the filtered product in white-colored containers. This process yields approximately 2 liters of the final extract, derived from Prosopis plants through a traditional method.
4	<b>Amirthakaraisal</b>	In a cement tank, combine fresh cow dung weighing 10 kilograms, 10 litres of cow's urine, 1 kilogram of country jaggery, and 100 litres of water, ensuring thorough mixing. Allow the mixture to sit overnight, and it will be ready for use the following day to treat seeds. This organic concoction is prepared using natural ingredients and is effective for seed treatment purposes.
5	<b>Jivamirtham</b>	In a barrel, combine 100 liters of water with 10 kilograms of cow dung and 10 liters of cow's urine. Stir thoroughly using a wooden stick, then incorporate 2 kilograms each of old jaggery and flour (from gram, pigeon pea, moong dal, cowpea, or urad dal). Ensure thorough mixing of the ingredients with the wooden stick. Allow the solution to ferment undisturbed for a period ranging from 2 to 7 days. During this time, stir the mixture three times daily to facilitate the fermentation process. This preparation method utilizes natural ingredients and fermentation to create an effective solution for agricultural use.
6	<b>Amrit Pani</b>	Combine 10 kilograms of cow dung with 500 grams of honey, thoroughly blending them together until they form a smooth, creamy paste. Next, incorporate 250 grams of ghee into the mixture and mix vigorously at a high speed. Gradually dilute the mixture with 200 litres of water. This process involves mixing natural ingredients to create a diluted solution suitable for agricultural applications.

(Source: TNAU Agritech portal, [agritech.tnau.ac.in](http://agritech.tnau.ac.in))

## Seed Treatment in Rice

### a. Seed Treatment for Improved Germination

To enhance seed germination and seedling vigor, various methods can be employed before sowing. Seeds can be dried under direct sunlight for 30 minutes around midday, which is optimal for improving their germination potential. Another technique involves soaking paddy seeds in water for 12 hours followed by biogas slurry for another 12 hours prior to sowing. Alternatively, soaking seeds in *Panchagavya* solution (35 ml per litre of water) for 30 hours has been found effective. For a different approach, seeds wrapped in *khada* cloth can be soaked in sweet flag extract (made from 500 gms of sweet flag rhizome powder in 2.5 litres of water) for 30 minutes and then dried in shade. Another method involves soaking seeds in cow dung extract prepared by diluting fresh cow dung with cow's urine and water, soaking the seeds for 5-6 hours and drying them in shade before sowing. Additionally, filling seeds in a tightly woven bamboo basket lined with *Salvadora persica* leaves and pouring water over it, covering it with more leaves and a weight, allows for soaking seeds for 24 hours before sowing, promoting early and robust germination. Furthermore, mixing biofertilizers like *Azospirillum*, *Phosphobacteria*, or *Pseudomonas* with cooled rice gruel and applying this mixture to sprouted seeds before shade drying for 30 minutes can also enhance seed performance prior to sowing.

### b. Seed Treatment for Healthy Seedlings

For achieving robust and healthy seedlings with a strong root system, immerse paddy seeds enclosed in a tightly sealed gunny bag in biogas slurry for 24 hours prior to planting. This method ensures the seedlings establish quickly after transplantation, exhibiting vigorous growth. Another beneficial technique involves preparing cow's urine in a mud pot and aging it for 48 hours. Use a diluted solution of this urine (10% concentration, i.e., 100 ml cow's urine per litre of water) to soak paddy seeds before sowing, followed by a brief shade drying period of 30 minutes. Additionally, a blend of Vitex, Tulsi, and Pongam leaves (3 kgs each, pounded and extracted in 1 litre of water) combined with fresh cow dung solution (5 kg cow dung in 15 litres of water) proves effective. Soak 25 kg of paddy seeds tied in a gunny bag in this mixture for 12 hours, ensuring a short shade drying period before sowing. This approach promotes the growth of sturdy and disease-resistant seedlings.

**c. Seed Treatment against of Pest and Disease Attack**

To boost resistance against bacterial leaf blight disease in paddy, soak seeds in water for 12 hours, then mix them with either 10% cow's urine (10 ml cow's urine + 90 ml water) or 5% *Prosopis kashaayam* (5 ml *kashaayam* + 95 ml water). Afterward, dry the seeds for 30 minutes and use them for sowing within 24 hours. This method enhances the paddy's ability to resist bacterial leaf blight. Alternatively, prepare small bundles of paddy seeds using *khada* cloth and soak them in a solution of cow's urine (500 ml cow's urine + 2.5 litres water) for 30 minutes before shade drying them prior to sowing. This treatment effectively protects the crop from seed-borne fungal and bacterial diseases. Another effective approach involves soaking paddy seeds in a 20% extract of mint leaves (200 ml leaf extract + 800 ml water) for 12 hours before planting. This not only boosts germination rates and seedling vigor but also aids in controlling *Helminthosporium* leaf spot disease in paddy. Lastly, improve resistance against seed-borne bacterial and fungal diseases by soaking small bags of sprouted paddy seeds in sweet flag solution (500 g sweet flag rhizome powder + 2.5 litres water) for 30 minutes and then shade drying them before sowing.

**d. Seed Treatment for Nutrition**

Before sowing, combine paddy seeds with cow dung. This application not only shields the seeds from birds and insects in the nursery but also serves as a natural fertilizer. This method enhances drought resistance and toughens the seeds, making it particularly advantageous for dryland paddy farming.

**Seed Treatment in Pulses****a. Chickpea**

Before sowing, immerse seeds in water to boost their germination rate. Another effective method involves coating seeds (1 kg) with a mixture of turmeric and sweet flag powder (50 g turmeric powder and 15 g sweet flag powder mixed with 10 ml water) and planting them after a 10-minute interval. This application significantly enhances the crop's resistance against diseases. Alternatively, coat seeds with mustard oil at a rate of 100 ml per 40 kg of seeds before sowing to prevent wilt disease. For pigeon pea or chickpea seeds, soaking them in curd for 24 to 48 hours prior to planting helps in controlling wilt disease. These practices are proven to improve seedling health and overall crop yield.

**b. Bengalgram**

Blend seeds thoroughly with well-fermented (sour) buttermilk and allow them to dry in shade before planting. The acidity of the buttermilk helps minimize occurrences of wilt and dry root rot diseases. This method is effective in promoting healthier seedlings and enhancing crop resilience.

**c. Blackgram and Greengram**

For safeguarding against disease-causing microorganisms, apply *Trichoderma viride* at a rate of 4 grams per kilogram of seeds, or *Pseudomonas* at 10 grams per kilogram of seeds. These treatments are effective in protecting seeds from harmful pathogens, ensuring healthier plant development and improved crop yield.

**\*Seed Pelleting in Greengram**

Place the seeds in a plastic tray and introduce a small amount of adhesive (10% maida solution) to ensure even coating. Gently shake the tray to distribute the seeds uniformly, covering all surfaces of each seed. Add *Arappu* powder (*Albizia amara*) as a filler material, ensuring an even spread over the seeds, and continue shaking until a consistent coating is achieved. Remove any seed clumps and excess filler material manually by sieving. Subsequently, dry the seeds in shade before sowing. This method facilitates the treatment of small and irregularly shaped seeds, enabling precise sowing and enhancing the physiological attributes of the seeds

**Maize**

Before sowing, immerse seeds in a 2% *Panchagavya* solution (20 ml *Panchagavya* mixed with 980 ml water) for a duration of 2 hours. This practice is aimed at fostering the growth of robust and vigorous seedlings.

**Sorghum (Jowar)**

To prevent ergot disease in sorghum, apply an *asafoetida* solution (75 – 100 grams in 1 litre of water) to the seeds and allow them to dry in shade before planting. This treatment effectively safeguards the seeds. Another method involves mixing seeds with an extract prepared from Ashwagandha and Datura (for every 1 kg of seeds, pound 250 grams of Ashwagandha roots and 50 grams of Datura leaves with water) and drying them before

sowing to promote the growth of healthy, disease-free seedlings. Additionally, enhance germination by treating seeds with dried cow dung powder and cow's urine (100 grams cow dung powder and 250 ml cow's urine per kilogram of seeds). Alternatively, soak seeds overnight in lime water (1 kg lime in 10 litres of water aged for 10 days, using only the surface water collected) and dry them thoroughly before sowing. These methods are effective for improving seed health and enhancing germination rates.

### **Pearl Millet and Finger Millet**

Before sowing, immerse pearl millet or finger millet seeds in *Panchagavya* solution (35 ml per liter of water) for 7 to 8 hours to foster the growth of seedlings free from diseases. Another effective method involves combining the seeds with an extract made from Ashwagandha and Datura (for every 1 kg of seeds, pound 250 grams of Ashwagandha roots and 50 grams of Datura leaves with water) and drying them in shade before planting. This approach promotes the cultivation of robust and healthy seedlings without diseases. Applying the amino acid proline, which acts as a suppressor of reactive oxygen species, significantly decreased the incidence of downy mildew in pearl millet seedlings following intentional infection with its causal agent, *Sclerospora graminicola* (Raj *et al.*, 2004).

### **Groundnut**

In groundnut cultivation, using pre-germinated seeds enhances yield by maintaining an optimal plant population in the field. Begin by soaking seeds tied in a gunny bag in water for 4 to 6 hours. Afterward, untie the gunny bag and cover it with another moistened gunny bag for 12 to 14 hours. Subsequently, shade dry the germinated seeds for 3 to 4 hours before treating them with Rhizobium (@ 600 grams per 110 to 120 kg of seeds). Sow the seeds within 1 or 2 days after treatment. Another method involves coating the seeds with *kallipal* (milky latex from leafy spurge or milk hedge) before sowing, applying 100 grams of *kallipal* per 10 kilograms of seeds to protect the crop from pests and diseases. Alternatively, soak the seeds in an *asafoetida* solution (250 grams in 2 liters of water) for 12 hours before sowing to prevent blight disease. Treat the seeds with *Trichoderma viride* (4 grams per kilogram of seeds) or *Pseudomonas fluorescens* (10 grams per kilogram of seeds) and sow them after 24 hours for disease control. Additionally, treat seeds with Rhizobium (5 grams per kilogram of seeds) mixed with cooled rice gruel, ensuring careful handling to avoid seed coat damage. Another effective method involves soaking seeds in *Jeevamirtham*, *Amirthakaraisal*, or

*Panchagavya* for 4 to 6 hours, followed by shade drying before sowing. These techniques optimize seedling health and contribute to improved crop performance.

### Coconut

In Kerala, it is a common practice to improve the germination of seed coconuts by allowing them to float on the surface of irrigation wells or water. This technique encourages germination within approximately one month after floating begins.

### Sugarcane

Immerse sugarcane setts in a solution made from extracts of Keezhanelli (*Phyllanthus niruri*), Poovarasu (*Thespesia populnea*), and Pongam (*Pongamia pinnata*). Prepare the solution by drying and boiling 1 kg of leaves from each plant type in sufficient water, then filtering after 2 days for use. Cover the treated setts with a moistened gunny bag for one day, and plant them on the following day. This method effectively manages seed-borne diseases in sugarcane cultivation.

### Cotton

To enhance resilience against water stress during rainfed and summer sowing, it is recommended to toughen seeds using a 1% solution of Prosopis and Pungam leaf extracts (10 ml each extract in 980 ml water). For improved drought resistance and robust growth, treat seeds with termite hill soil following a 6-hour water soak. Combine equal parts of termite hill soil and water, mix thoroughly with seeds, and allow them to dry for 1 hour before sowing. Prior to planting, shade dry the seeds for 30 minutes. Additionally, fortify seeds with *Trichoderma viride* at a rate of 4 grams per kilogram of seeds. Mix *Trichoderma* with 100 ml of cooled rice gruel, apply to the seeds, and sow within 24 hours. Again, ensure seeds are shade dried for 30 minutes before sowing. These methods are effective in preparing seeds for optimal growth under challenging environmental conditions.

### Trees and Flower Crops

To improve germination percentage and growth rate, soak Sunflower and Tamarind seeds overnight in a solution containing wheat flour, rice flour, black gram, ground sesame, and fresh buffalo milk (50 grams each diluted in 1 litre of milk). After soaking, shade dry the seeds and fumigate them with turmeric for one minute before planting. For fumigation, place the seeds in a sieve or wire mesh, and sprinkle turmeric powder over hot coal in a metal plate.

Hold the sieve close to the fumes for one minute to ensure effective fumigation. Similarly, soak Balsam seeds overnight in a mixture of wheat flour, rice flour, black gram flour, turmeric, and fresh buffalo milk (50 grams each diluted in 1 litre of milk), then shade dry them before sowing. This method also enhances germination percentage and growth rate in Balsam seeds.

### Other Vegetables

In a study conducted by Van Der Wolf et al. (2008), various substances including essential oils such as thyme, oregano, cinnamon, and clove, as well as organic acids and plant extracts like *Biosept*, *Tillecur*, stinging nettle, and golden rod, were evaluated for their effectiveness in disinfecting vegetable seeds. Treatments lasting thirty minutes with specific essential oils resulted in a 99% reduction of bacteria on cabbage seeds and lowered fungal presence in blotter tests. Organic acids at concentrations above 2.5% also significantly reduced bacterial populations on seeds. However, certain products like propionic acid, cinnamon oil, and Biosept exhibited adverse effects on seed germination when concentrations exceeded 1%. Among all treatments tested, thyme oil emerged as the most promising option. According to Lizot et al. (2002), soaking carrot seeds in vinegar proved effective in combating *Alternaria dauci*. The addition of oligoelements to the vinegar enhanced its efficacy in this regard.

### Conclusion

Organic seed treatments offer significant advantages in enhancing seed germination, seedling vigor, and overall crop health. Methods such as soaking seeds in natural solutions like raw cow's milk and cow's urine, as well as using biogas slurry, use of various plant extracts, flours of different cereals and pulses, *panchagavya* and beneficial microorganisms like *Trichoderma viride* and *Pseudomonas*, not only promote robust seedlings but also contribute to disease suppression and improved yield potential. These practices underscore the effectiveness of organic approaches in sustainable agriculture, providing farmers with environmentally friendly options to optimize seed performance and ensure healthy crop establishment.

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