Technical Bulletin 4

Organic Farming

Seed Treatment in Organic Farming

आजीविका AAJEEVIKA

DAY – National Rural Livelihood Mission

SEED TREATMENT

For better crop yields, seed is the prime. It is important to have uniform germination and high seedling vigor. To enhance germination, beneficial bio-agent, bio-formulation, microbes belonging to arbuscular mycorrhizal fungi, Trichoderma spp., rhizobia and other bacteria are applied to seeds before sowing via coating or priming treatments.

Their presence establishes early relationships with plants, leading to biostimulant effects such as plant-growth enhancement, increased nutrient uptake, and improved plant resilience to abiotic stress.

Why we need seed treatment?

Seed treatment provides better germination and prevents seed and soil borne diseases in plant. Outcome is healthy (disease free) and high yielding crop.

Advantages of Seed Treatment:

- ✓ It protects germinating seeds and seedlings against soil and seed-borne pests anddiseases.
- ✓ It improves the germination process and increases the germination percentage.
- ✓ It enhances the seed viability and vigour which are the two most important factors in agriculture orcultivation practices.
- ✓ It results in the early and uniform establishment and growth of the crop or plants.
- ✓ It enhances nodulation in legume crops.
- ✓ It results in uniform crop stand especially in adverse situations like low moist and high most conditions.

METHODS OF SEED TREATMENT

Hot water treatment

The use of hot water treatment to eradicate seed borne diseases, particularly those caused by plant pathogenic bacteria, is well-established. While the technique does not work for large-seeded vegetable crops, it has proven effective for brassicas, carrots, tomatoes, and peppers, and to a lesser degree, celery, lettuce, and spinach.

Caution: Precision in temperature and timing are important, as the seed embryo may be killed in hotter water or the disease incompletely eradicated in cooler water. (In general the exposure should be at 50 deg C for 15 mins

Seed-borne pathogens could be reduced without significant losses of germination by hot water treatments. Below mentioned temperature for given crops can be considered at the time of treatment:

Crop	Required Temperature	Required time
Tomato	122⁰ F	25min
Onion (seeds)	122⁰ F	20min
Onion (sets)	155⁰ F	60min
Egg plant	122⁰ F	25 min
Coriander	127⁰ F	30min
Mustard	122⁰ F	25min
Spinach	122⁰ F	25min

Organic Formulations

1. Beejamrit

Beejamrit is an ancient, sustainable agriculture technique. It is used for seeds, seedlings or any planting material. It is effective in protecting young roots from fungus. Beejamrit is a fermented microbial solution, with loads of plant-beneficial microbes, and is applied as seed treatment. It is expected that the beneficial microbes would colonize the roots and leaves of the germinating seeds and help in the healthy growth of the plants.

Inputs needed (for 100 kg seed): 5 kg cow dung, 5 litre cow urine, 50-gram lime, 1kg bund soil, 20 litre water.

Preparation of Beejamrit:

5 kg cow dung
↓
20 litre water (12 hrs)
↓
50gm lime (in one litre water)
↓
Add 1kg soil
↓
Add 5 litre of desi cow urine

Application as a seed treatment: Add Beejamrit to the seeds of any crop; coat them, mixing by hand; dry them well and use them for sowing. For leguminous seeds, which may have thin seed coats, just dip them quickly and let them dry.

2. Panchgavya Solution:

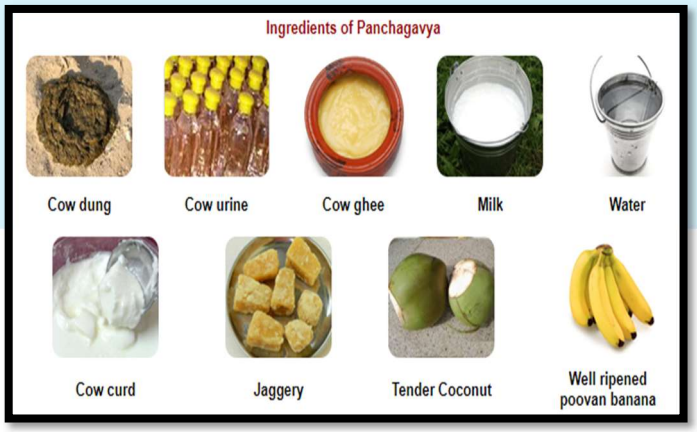
Panchagavya has the potential to play the role of promoting growth and providing immunity in plant system.

Inputs Needed: Panchagavya consists of nine products (5 cow based & 4 others), when suitably mixed and used, these have miraculous effects.

Cow dung-7kg, Cow ghee- 1kg, Cow Urine-10ltr, cow milk-3ltrs, cow curd- 2ltrs, water 10 ltr, tender coconut water- 3ltrs, jaggery- 3kg, well ripended banana- 12nos.

Preparation of Panchgavya:

Mix cow dung & cow ghee
↓ **(Keep 3 days)**
Mix cow urine
↓ **(Keep 15 days)**
Mix cow milk, curd, tender coconut water, jiggery & ripened banana
(Will ready after 30 days)



Application:

Seed/seedling treatment

3% solution of Panchagavya can be used to soak the seeds or dip the seedlings before planting. Soaking for 20 minutes is sufficient. **Rhizomes of Turmeric, Ginger and sets of Sugarcane** can be soaked for 30 minutes before planting.

Seed storage

3% of Panchagavya solution can be used to dip the seeds before drying and storing them.

Botanical Formulation for Seed Treatment

1. **Turmeric Powder:** Turmeric known as the golden spice has natural bactericidal and antifungal properties. Mix 25gm of powder in 1litre of water 10kg seed. Treatment provides protection against **fungal rot and wilt disease**
2. **Garlic Extract:** Garlic extract showed fungicidal activity on the endogenous fungal contamination of the wheat seeds and particularly reduced the degree of disease caused by *Bipolaris sorokiniana* and *Drechslera tritici-repentis*. **Allicin in garlic juice corrected the poor germination of wheat seeds caused by natural mycoflora of grain**. Crush 250gm garlic cloves in 1 lit of mineral oil. Keep overnight and collect filtrate. 20 kg of seeds can be treated with this extract.

Biological Seed Treatment

Biological seed treatment consists of active ingredients that can include microbes like fungi and bacteria, as well as plant extracts and algae extracts. Biological substances are applied to the seed in a powder form or as a liquid. An even layer covers the whole seed. In this way, the beneficial ingredients are available to the seed when it requires them. Benefits of biological seed treatment:

- Biological seed treatment acts as a biostimulant: a treated crop becomes stronger and grows better.
- The treatment enhances crop yields while helping plants to fight off plant pathogens and minimize biotic stress;
- The plant growth promoting microorganisms colonize the roots and protect the crop during the entire growing season.
- Seed treatment increases the availability of plant nutrients in the root system and the nutrient uptake;
- The enhanced root and shoot growth means that the early growth rate is optimized and that both the nutritional value of the crop as well as production yields are boosted;
- ***Trichoderma viride:*** Used as bio control agent against plant pathogenic fungi and effective as seed dressing in the control of seed and soil borne disease including ***Rhizoctonia solani, Macrophomia phaseolina and Fusarium species.***

  On application it colonizes on the seed surface and kills not only the pathogens present on the cuticle, but also provide protection against soil borne pathogen.
- ***Trichoderma harzanium***: Used as biofungicide for suppression of various diseases caused by fungal pathogens ***(Botrytis, Fusarium and Pencillium sp.)***
- ***Pseudomonas fluorescens***: Have excellent biocontrol properties; protect the roots of plants against pathogenic fungi such as ***Fusarium and Pythium.*** P. fluorescens has been found effective against some ***phytophagous nematodes.***
- ***Bacillus subtilis:*** Some strains are effective biofilm producers around roots of treated seed, thereby protecting their roots from various soil borne fungal pathogens. Hs been found very effective in vegetable crop especially ***tomato & brinjal.***

Use of liquid microbial consortia:

In general, about 5 to 30 per cent yield increase has been recorded from various crops by such bacterial inoculation.

- The ***bacterial*** cultures viz., ***Azospirillum, Pseudomonas, Azotobacter and Methylobacterium*** promotes seed germination and seedling growth.
- The co-inoculation of ***Rhizobium and Bacillus sp***. increased the root length, root mass, number of nodule and mass as compared to control in blackgram.
- Similarly, PPFM (***PINK PIGMENTED FACULTATIVE METHYLOTROPS)*** inoculated with a diazotroph as individual and combined inoculants treatments has resulted in increased seedling vigour, dry matter production and yield.

Studies show that:

- Tomato seeds treated with liquid Azospirillum culture showed significant differences in germination in which, the Azospirillum culture diluted at 1:50 ratio increased the seed germination (92 %) at 24 h soaking period when compared with untreated control (74 %).
- The seed infused with PPFM liquid culture at 1:100 dilution for 18 h soaking duration has recorded the highest germination (97 %).

RECOMMENDATION OF SEED TREATMENT FOR CROPS

CROP	PEST/DISEASE	SEED TREATMENT	REMARKS
Sugarcane	Root rot and wilt	*Trichoderma* spp. 4-6 g/kg seed	For seed dressing metal seed dresser/earthen pots or polythene bags are used.
Rice	Bacterial sheath blight	*Pseudomonas fluorescens* 0.5% W.P. 10 gm/kg.	
Wheat	Bunt/False smut/loose smut/covered smut	*T. viride* 1.15 % WP @ 4 g/kg	
Vegetables	Soil borne infection	*Trichoderma viride* @ 2 gm/100g seed.	
	Root knot nematode	*Pseudomonas fluorescens* and *Verlicillium clamydosporium* @ 10g/kg seed as seed dresser	