



Seed Treatment in Groundnut for Crop Protection and Enhanced Crop Yields



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What is seed treatment?

Seed treatment refers to the application of either synthetic pesticides like, fungicide and insecticide and/or living microbes (*Trichoderma*, *Pseudomonas*, *Rhizobium* or Phosphorous-solubilizing bacteria) alone or in combination to seeds so as to protect them from seed-borne or soil-borne pathogens, early season pests (thrips, leafhoppers, aphids and white grubs), and to enhance plant growth by making nutrients available to plant.

Sequence of seed treatments:

Seed treatment should be done in the order of:

1. Fungicide or bio-agents (*Trichoderma* or *Pseudomonas*)
2. Insecticide
3. *Rhizobium* or P-solubilizing bacterial culture (bio-fertilizers)

The underlying principle is that, the first layer in seed treatment is formed by fungicide or bio-agents which immediately take care of both seed- and soil-borne pathogens; insecticides treatment forms the second layer which acts as a bridge between first and third (*Rhizobium* or P-solubilizing bacteria) layers of treatments (Fig.1). If seeds are treated with chlorpyrifos, a contact broad spectrum insecticide it protects seeds from white grubs while, treatment with imidacloprid, a systemic insecticide protects young seedlings from sap sucking insects. The third or outer layer is formed by seed treatment with either *Rhizobium* or P-solubilizing bacteria, which quickly come in contact with soil and establish their colonies respectively in roots of the germinated plant or rhizosphere. *Rhizobium* is known to fix atmospheric nitrogen in plant roots while; P-solubilizing bacteria make fixed Phosphorus available to plants.

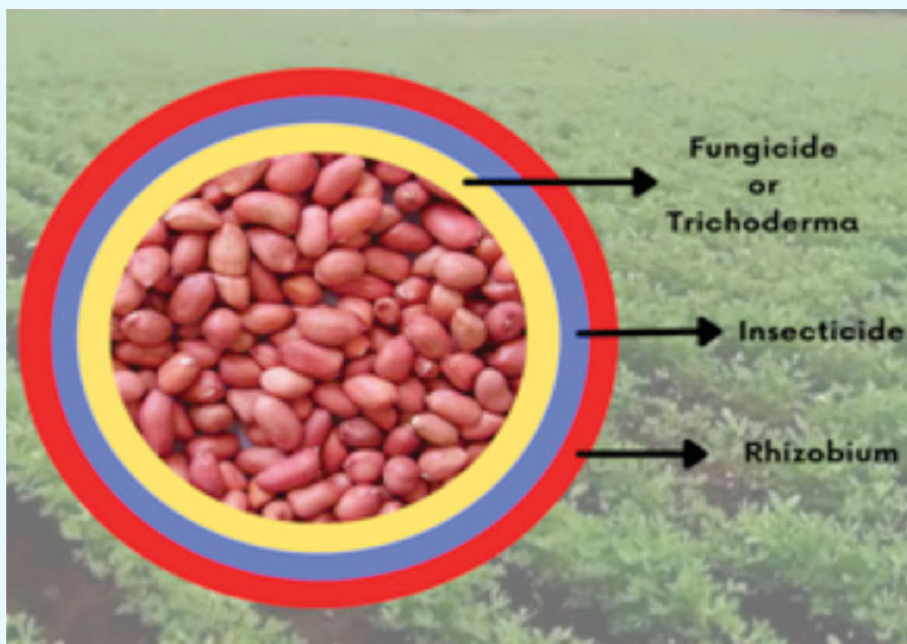


Fig.1: Order of seed treatments: First layer of fungicide or bio-agents; Second layer of insecticide and Third layer of *Rhizobium* or P-solubilizing bacteria

FLOWCHART FOR SEED TREATMENT IN GROUNDNUT

Seed treatment with fungicide

- ◆ Prepare a fungicide slurry by dissolving fungicide [tebuconazole 2DS at 1-1.25 g or thiram 75WS at 5.0 g or carbendazim 25+mancozeb 50WS at 3 g or penflufen 13.28+trifloxystrobin 13.28FS at 8.0-10.0 g per kg seed] in recommended quantity of water (**Fig. 2**).
- ◆ Pour and distribute the fungicide slurry on the walls of the seed drum.
- ◆ Place seeds in the seed drum, close the lid.

Seed treatment with *Trichoderma*

- ◆ Commercially talc-based formulations of *Trichoderma* are available as *Trichoderma viride* and *Trichoderma harzianum*.
- ◆ Apply either of the *Trichoderma* formulations at 10 g per kg seed directly without addition of water.
- ◆ First place seed in the seed drum.
- ◆ Then add *Trichoderma* formulation to the drum and close the lid.

or

Precaution: Fungicide treatment must be done at least 24-hrs prior to Rhizobium or P-solubilizing bacterial culture treatment.

- ◆ The drum should then be swirled gently to provide uniform coating on the seed.
- ◆ Spread the treated seeds on cement floor or plastic sheet and shade-dry for 2 hrs.

Seed treatment with insecticide

- ◆ Place fungicide/*Trichoderma* treated seeds in the seed drum.
- ◆ Prepare insecticide slurry by dissolving insecticide (imidacloprid 48FS or thiamethoxam 30FS at 2.0 mL per kg seed) with 6 mL of water for sucking pests.
- ◆ In white grub endemic areas, directly apply insecticide (imidacloprid 48FS at 2.0 mL or clothianidin 50WDG at 2.0 g or chlorpyrifos 20EC at 12.0 mL or quinalphos 25EC at 25.0 mL per kg seed).
- ◆ Pour and distribute the insecticide or insecticide slurry on seeds.

- ◆ The drum should then be swirled gently to provide uniform coating on the seed.
- ◆ Spread the treated seeds on cement floor or plastic sheet and shade-dry for 2 hrs.

Seed treatment with Rhizobium or P-solubilizing bacteria (bio-fertilizer)

- ◆ Prepare bio-fertilizer slurry by dissolving 500 g of sugar in 500 mL of water.
- ◆ Heat the solution in a container for 15 minutes.
- ◆ Add 200 g gum arabica and cool the mixture to room temperature.
- ◆ Add either Rhizobium or P-solubilizing bacterial culture (1.25 kg ha) and rest it for 15 minutes.
- ◆ Place the insecticide-treated seeds in the seed drum.
- ◆ Add bio-fertilizer slurry to seed drum.

- ◆ The drum should then be swirled gently to provide uniform coating on the seed.
- ◆ Spread the treated seeds on cement floor or plastic sheet and shade-dry for 30 minutes.

- ◆ Sow the seeds in furrow and provide irrigation immediately.

Advantages of seed treatment:

- Protects seeds and seedlings from both seed- and soil-borne pathogens and insect-pests (up to 30 days).
- Reduction in initial inoculum of the pathogen.
- Combination of treatments can be applied more precisely.
- Even and uniform application of the chemical.
- Improves germination per cent and crop stand.
- Reduces the amount of external supply of nutrients through fertilizers.
- Increased root development helps plants in sustaining prolonged moisture-deficit stress.
- Cost-effective and environmentally safe means to protect crop and enhance crop yields.



Fig.2: Fungicide treated seeds; (A) carbendazim+ mancozeb, (B) tebuconazole

Dos and Don'ts of seed treatment

Dos	Don'ts
Select good quality seeds of recommended varieties.	Discard diseased and damaged seeds for sowing.
Use the recommended seed rates depending on the germination test.	Don't increase seed rate if the germination is 100%.
The order in which seed treatment should be done shall be as follows: i. Fungicide or bio-agents ii. Insecticide iii. Rhizobium or P-solubilizing bacterial culture	Don't use fungicide and bio-agents like <i>Trichoderma</i> or <i>Pseudomonas</i> together.
Check fungicides and insecticides compatibility chart before seed treatment.	Avoid randomly mixing fungicides and insecticides for seed treatment.
Check the quality standards like, date of manufacture, CFUs, microbial load, expiry date etc. for commercially available bio-agents and Rhizobium or P-solubilizing bacterial cultures	Avoid application of spurious formulations.
Shade-dry the treated seeds at each step before sowing.	Avoid direct exposure to sunlight for drying.

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