

Rhizobium inoculation in cluster bean

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Cluster bean is one of the major kharif crop and is grown for vegetables, cattle feed, green manure, fodder and various industrial uses because of occurrence of gum in its endosperm. Although it is drought tolerant crop but erratic rainfall and improper fertilizer management are the major constraints hampering its production. Fertilizers contribute a lot in fulfilling the nutrient requirement of crops but the regular, excessive and unbalanced use may lead to health and ecological hazards, depletion of physiochemical property of soil and ultimately poor yield. Nitrogen is first limiting plant nutrient in arid region and has a great influence on crop growth, yield and quality. Soil generally deficient in organic matter thus not able to release nitrogen at require rate to maintain adequate nitrogen supply to growing plant.

Some seed producers supply seeds that has already been coated with rhizobium inoculant but farmers are guided to inoculate seeds by themselves before planting because of poor quality of pre inoculated seed as rhizobia do not survive well on seeds. Low-cost nutrient supplementation through biofertilizers by farmers can be taken as a better alternative to fulfil the nutrient supply.

Rhizobium: Rhizobium is a genus of gram-negative soil bacteria that fix atmospheric nitrogen by making symbiotic association with the root of leguminous plants.

Rhizobium inoculation: it is the process of adding appropriate amount of rhizobium bacteria to the soil to ensure successful nodulation of legume crops. This is done by coating the seeds with a liquid or peat-based powder inoculant, or by treating the soil with a granular or liquid inoculant.

Why rhizobium inoculation????

- Rhizobium inoculation on cluster bean grain yield resulting in saving of about 13.37 to 21.73 kg/ha nitrogen. An increment in seed yield by 2.34 to 8.05 q/hac is noticed by rhizobium inoculation.
- Rhizobium inoculate triggers plant

growth, development and yield and is normally used as a substitute for mineral nitrogen fertilizer which is often costly.

- Rhizobium fix atmospheric nitrogen by infecting the roots and formation of root nodules. This symbiotically fix nitrogen

can meet up to 30-80% nitrogen requirement of plant.

- Poor socio-economic condition of farmer coupled with low and erratic rainfall distribution and continuous degradation

Preparation and application of seed inoculation

Seeds are inoculated by coating them with a slurry of inoculant (Rhizobium) and sticker solution. Mix 250 ml of sugar in 1L of water to prepare sticker solution of jaggery. Stir and mix thoroughly to make a smooth liquid slurry. The seeds should be inoculated with suitable rhizobium culture @ 600gm rhizobium /15kg of seeds. Add these seeds into the already prepared slurry and stir the mixture

Soil Inoculation

Seed coating is not always the best way to inoculate. Some inoculants are designed to be placed directly into the soil. This practice is recommended under the following conditions:

1. When seeds are pre-coated with pesticides or herbicides: -These chemicals are toxic to rhizobia. Among the fungicides, Thiram is the least toxic, but even this chemical can be harmful under some conditions. Soil inoculation is recommended for seed treated with these fungicides. Insecticides for legume crops are usually distributed in the furrows as granules. When applied in this way, they are not usually harmful to rhizobia.
2. When planting in hot, dry soil: - if legume seeds are planted in hot, dry soil and must wait for rain before they germinate, the rhizobia used to coat them are likely to die. Under these conditions, the rhizobia

Preparation and application of soil inoculation

A dry type soil inoculant is made by mixing the 100 gm of peat inoculant with 10 kg of dry sand. Place the dry, cool sand in a bucket, add the inoculant while stirring and keep stirring until the mixture is uniform colour. Mixing the seed inoculant with sand makes it easier to handle

of soil by use of chemical fertilizers.

- Cluster bean fix nitrogen biologically, the cultivation of legume reduces greenhouse gas by reducing the need for artificial nitrogen fertilizer.

continuously until the seed is evenly coated. It should be dried for 30 minutes in shade. Dried seeds should be sown within 24 hrs. of inoculation. The mixing container should be twice the volume of seeds. The slurry should be added to the seeds in small amount because too much sticker solution will cause the seeds to clump together or swell.

will survive better if the inoculant is placed in the soil below the seeds.

3. When seed inoculation has failed: - Soil inoculation can be used to save a crop that for some reason has failed to modulate. The inoculant may be sprayed on the soil surface just before irrigation or rain.
4. When very large numbers of rhizobia are needed: - Soil inoculation can add more rhizobia to a field than possible with seed inoculation. Soil inoculation may be necessary, for instance, when the introduced rhizobia must compete with a large population of native rhizobia that form nodules but are not effective nitrogen fixers. Soil inoculation may also be necessary if the quality of the inoculant is known to be poor and the farmer needs to increase the application rate.

and apply in the field. One kg of sand inoculant is enough to inoculate about 100 m of row.

This dry soil inoculant should be placed in the furrow before planting or with the seed. It should be placed below the seeds. Commercial

granular inoculant can be applied with a simple mechanical seed applicator.

Do and don't while go for inoculation

Do:

- Use the correct inoculant (rhizobium species). Check the label for the species you are planting.
- Protect inoculant from sun and heat to keep it alive. The ideal storage temperature is between 4°C-26°C.
- Store inoculant in closed bags.
- Use of sticker is must while inoculating seeds. Use recommended amount of inoculant.
- Inoculate seeds just before planting.
- Apply dry soil inoculant when the soil is moist or just before planting. Cover

furrows immediately after planting inoculated seeds.

Don't:

- Expose inoculants to temperature above 30° C
- Use inoculants after their expiry date or after they have been exposed to high temperatures.
- Let inoculants dry out.
- Mix fertilizers or pesticides with inoculated seeds.
- Apply inoculant to seeds without sticker.
- Apply inoculants to the surface of dry soil.
- Plant commercially pre-inoculated seeds.