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Liquid Biofertilizer : Azoteeka

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Background :

Biofertilizers are the carrier based living microorganism's strains that are beneficial to the growth and development of the plants. Biofertilizers are eco-friendly, non-toxic and helps to maintain the physical, chemical and biological properties of the soil. They minimizes the pollution of the environment by lowering the use of chemical fertilizers. Nitrogen is most important nutrients for growth in plants. Nitrogen fixing bacteria helps to fix the nitrogen from the environment and make available to plant. Biofertilizers helps to save the chemical fertilizer up to 25% and increases the crop yield by 5 – 10 %. Centre of Biofertilizer Production and Technology, Department of Microbiology, CCS HAU, Hisar is producing biofertilizers to meet the farmers demand in Haryana, Punjab, Rajasthan, Himachal Pradesh and Jammu & Kashmir. One such product referred as "Azoteeka" is an azotobacter biofertilizer. Strains were screened under ICAR's All India Network Project on Soil Biodiversity Biofertilizers (AINP SBB). The current technological bulletin highlights the significance of the product, precaution and application protocol. The product is commercially produced and during 2015-20, a revenue of Rs 3539130/- generated. The technology has been transferred to industries and more than 10000 farmers were benefitted.

Azoteeka:

- It contains nitrogen-fixing bacteria *Azotobacter spp*, which were mainly isolated from semi-arid, arid and hyper-arid zones of Haryana and Rajasthan state.
- Azoteeka biofertilizer is used for different non-legumes and cereal crops like corn, wheat, oat, barley, rice, pearl millet, sorghum, mustard, sunflower etc.
- The liquid formulation of the azoteeka biofertilizers developed by the Department of Microbiology, CCSHAU Hisar Haryana has self-life more than six months and carries high microbial load of 10^8 – 10^{10} cfu/ml.
- They are very easy to handle, store and transportation in the field for the application.
- This azoteeka can be used for the seed treatment, root dip for the seedling in the transplanted crops and soil treatment.
- It can add 15-20 kg/ha of nitrogen to soil and increases the crop productivity by 5-15%.

Method of Application:

Dissolve 50 g Sugar /Gur (Jaggery) or 10 % Gum aerobic in 250 ml of hot water, which is used as sticky material for seeds. It also acts as a C-source for the bacteria. Add the solution to seeds and mix by rubbing with both hands. Add azoteeka biofertilizer as per the recommendation and mix thoroughly. Air-dry the seeds on gunny bag. After complete drying, the seeds can be sown. Complete process of seed inoculation takes around 2 hrs. The seeds requiring treatment of pesticides or insecticide should be done 12 hours prior to seed treatment with biofertilizers to maintain the viability of different biofertilizers.
Seedlings of vegetable and rice crops can be done by root dipping in liquid biofertilizers diluted with water (1:4 ratio). After half an hour of root dipping, the seedlings can be transplanted. The liquid biofetilizer can be poured in field during irrigation or mix with cow dung (Gobar khad) and apply in the soil.

Protocol of preparation:

1. Dissolve 50 g Sugar/Gur (Jagerry) or Gum aerobic (10%) in 250 ml of hot water.
2. Add the jaggery solution to seed and mix thoroughly.
3. Add biofertilizer to the sticky seeds.
4. Air dry the seeds in shades on gunny bag.
5. Sow the seeds as per recommendation.

Site characterization (specific to the area): Arid, Semi-arid and Hyper-arid zones of the Haryana and Rajasthan State

Precautions during biofertilizer application:

- Store biofertilizers in cool and dry place, avoid direct sunlight.
- For long time storage of biofertilizers, use refrigerator.
- Use specific biofertilizer for the specific crop.
- See the label for manufacturing date and expiry date.

Recommended doses:

- 50 ml biofertilizer for 10 kg of seed.

Benefits of the using biofertilizers:

- Crop yield increase: 5-15 %
- Fertilizer saving: 20-25%.
- Biofertilizers provides different growth hormones and protects plants from pathogens.
- Germination is also increased by the use of biofertilizers.

Azoteeka production and revenue generated (2015-2020) at Centre of Biofertilizer Production & Technology, CCS HAU, Hisar

Year	2015-16	2016-17	2017-18	2018-19	2019-20	Total vials (2016-20)	Revenue generated
Number of 50 ml vials produced	68045	43175	38270	123504	80919	353913	3539130

Technology transfer:

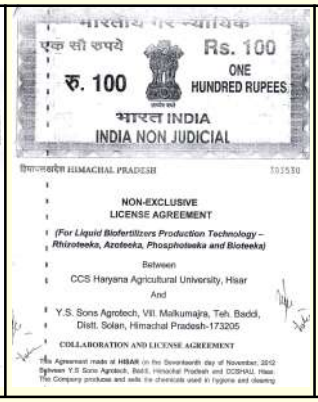
Liquid biofertilizer technology transferred to (1) M/S MicroBAC India West Bengal (Kolkatta); (2) Y.S. Sons Agrotech, Baddi, Himachal Pradesh and (3) M/S Bharat Biocon Ltd. Jhunagarh Lane, Chattisgharh for commercialization.

Commercial production in Public Private Partnership mode - FPO group M/s HABITAT Genome Improvement Primary Producers Company Pvt. Ltd. Village- Ramayan, Hisar, Haryana.

Technology has been adopted by State agricultural department and recommendations published in Astral, 2nd edition.

Technology transfer: Memorandum of understanding (MOUs) with industries

M/s Bharat Biocon, Chattisgharh.



M/s Y S Sons Agrotech, Himachal Pradesh.

M/s MicroBac, West Bengal.

M/s Habitat Genome, Hisar.

Stakeholders:

S. No.	Beneficiaries	Numbers
1.	Farmers	>10000
2.	KVKs	1. Coordinator, Krishi Vigyan Kendra, Bawal, CCS HAU, Hisar, Haryana 2. Sr. Coordinator, Krishi Vigyan Kendra, Mahendergarh, CCS HAU, Hisar Haryana 3. Sr. Coordinator, Krishi Vigyan Kendra, Sonipat, CCS HAU, Hisar Haryana 4. Sr. Coordinator, Krishi Vigyan Kendra, Jhajjar, CCS HAU, Hisar, Haryana 5. Sr. Coordinator, Krishi Vigyan Kendra, Kaithal, CCS HAU, Hisar Haryana 6. Sr. Coordinator, Krishi Vigyan Kendra, Ambala, CCS HAU, Hisar Haryana 7. Sr. Coordinator, Krishi Vigyan Kendra, Jind, CCS HAU, Hisar Haryana 8. Coordinator, Krishi Vigyan Kendra, Fatehabad, CCS HAU, Hisar Haryana 9. Coordinator, Krishi Vigyan Kendra, Sirsa, CCS HAU, Hisar Haryana 10. Coordinator, Krishi Vigyan Kendra, Sadalpur, CCS HAU, Hisar Haryana

The information given in the document is based on the experiments carried out at the AINP centre-Microbiology division, Hisar Agricultural University, HAU, Hisar. Haryana. For training, demonstration and other enquiries please contact the department.

Processing Unit

Demonstration of biofertilizers application to the farmers

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