

Institute: ICAR-Sugarcane Breeding Institute, Coimbatore

- The formulation containing *Heterorhabditis indica* strain SBITND78 has a shelf life of nine months with 92% survival of nematodes at a temperature range of $30\pm 5^{\circ}\text{C}$.
- The formulation containing *Steinernema glaseri* strain SBILN1 has a shelf life of 12 months with 90% survival of nematodes at a temperature range of $30\pm 5^{\circ}\text{C}$.
- The EPN powder formulation caused mortality of the insect larvae of *Galleria mellonella* and white grub *Holortrichia serrata*.
- <https://tinyurl.com/whvfnm9>



Navsari Agricultural University (NAU)

- Banana Pseudostem sap is obtained as a by-product during the extraction of fiber.
 - It is a rich source of plant nutrients and growth regulators.
 - This can be enriched with organic inputs through anaerobic incubation.
 - It can be injected directly through a drip system in any crop.
 - It reduces the use of chemical fertilizers and is suitable for use in the organic farming system also.
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- <https://tinyurl.com/eku2zavx>



Institute: ICAR-Indian Agricultural Research Institute (IARI), New Delhi



- The recycling of this agri-waste is both an ecological necessity and economic compulsion.
- Similarly, vegetable, fruit, and kitchen waste when degraded properly are great sources of nutrient-rich compost.
- <https://tinyurl.com/7w6xj3mn>

Institute: ICAR-Indian Agricultural Research Institute (IARI), New Delhi

The novel *T. harzianum* strain of this invention can be used as a bio-control agent in combination with sub-lethal doses of other chemical to control plant diseases caused by a wide range of plant pathogens that are resistant to some fungicides i.e. *R. solani*, *P. aphanidermatum*, *C. capsici*, *S. rolfsii*, *S. sclerotiorum*, *L. theobromae* and *Fusarium* spp.

<https://tinyurl.com/636jdcx6>

Institute: ICAR-Indian Agricultural Research Institute (IARI), New Delhi

- It helps in the synthesis of growth-regulating substances like auxins, cytokinin and Gibberellic Acid (GA).
- In addition, it stimulates rhizospheric microbes, protects the plants from phytopathogens, improves nutrient uptake and ultimately boosts up biological nitrogen fixation.
- <https://tinyurl.com/3fj59bvj>

Institute: ICAR-Indian Agricultural Research Institute (IARI), New Delhi

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- In addition, it stimulates rhizospheric microbes, protects the plants from phytopathogens, improves nutrient uptake and ultimately boosts up biological nitrogen fixation.
- The Azotobacter Liquid formulations have a longer shelf life and can be used through drip irrigation also.
- <https://tinyurl.com/2pxnwhj8>

Institute: ICAR-Indian Agricultural Research Institute (IARI), New Delhi

- Phosphorus solubilizing bacterium (PUSA Biophos) is a microbe with an inherent capability of solubilizing the unavailable form of P into a soluble form so that it can be up taken by the growing crop.
- The biofertilizer has been tested in many crops under field and pot conditions and found to improve the P-nutrition of the plant.
- <https://tinyurl.com/sfdajd2m>

Institute: ICAR-Indian Agricultural Research Institute (IARI), New Delhi

- PUSA Sampoorn is an eco-friendly biofertilizer having consortium of 3 bacteria with properties of fixing atmospheric N to ammonia and solubilization of unavailable P and K in soil to make it available for plants.
- The liquid formulations have longer shelf life and support larger counts of the bacteria.
- This liquid formulation has shown an improved plant growth and enhancement in N, P, K uptake by various crops tested.
- <https://tinyurl.com/6cunyr9w>

Institute: ICAR-National Research Centre for Integrated Pest Management (NCIPM), New Delhi

- CONEEM, a cow urine based herbal formulation, has been developed with effective plant growth regulator properties, which has been patented in India Patent House, during February, 2018.
- The product had been tested under lab as well as field for tomato crop, for successive two years.
- <https://tinyurl.com/46n85y56>



Institute: ICAR-Vivekananda Parvatiya Krishi Anusandhan Sansthan (VPKAS), Almora, Uttarakhand

- The formulation was developed using a Himalayan strain of a bacterium, which has shown high efficacy against the grubs.
- It is a gram +ive bacteria isolated from diseased white grubs, formulated in talc for field applications.
- *Bacillus cereus* WGPSB-2 caused 93% mortality of 2nd instar larvae of *A. dimidiata* in the lab and micro plot conditions.
- <https://tinyurl.com/52sb337s>

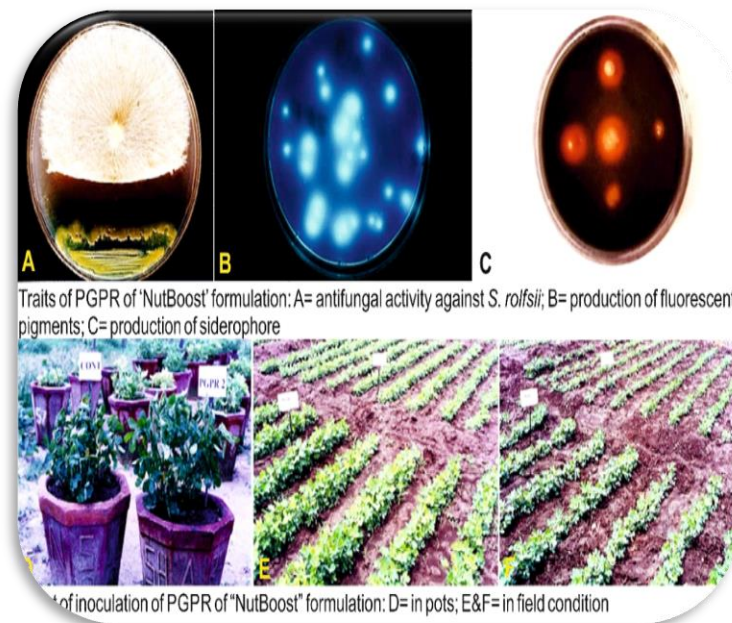


Institute: ICAR-Indian Institute of Spices Research (IISR), Kerala

- An alternative to existing biofertilizer formulation (talc/ liquid/peat based etc.). The process involves encapsulating any agriculturally important microorganism in a gelatin capsule.
- The total weight of the biocapsule is only 1g.
- It also reduces the use of inert talc thereby reducing the cost of investment, cost of handling and transport.
- <https://tinyurl.com/28rbcahm>

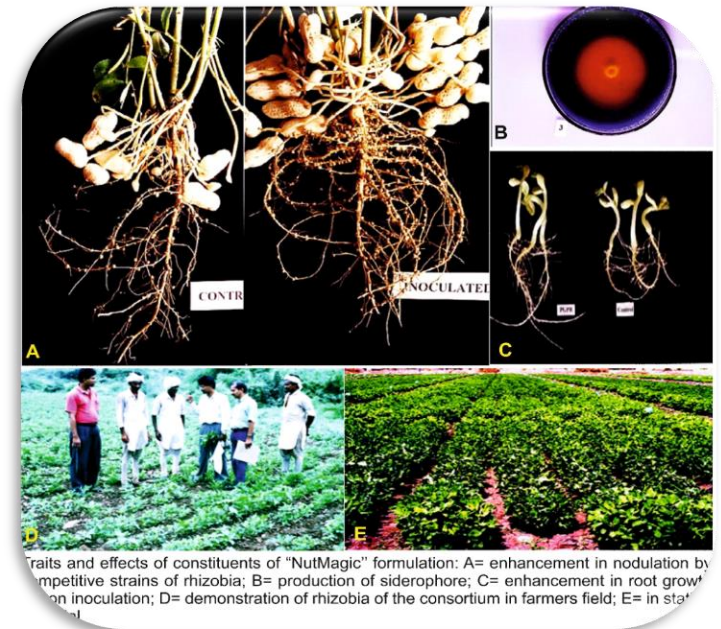
Institute: ICAR-Directorate of Groundnut Research (DGR), Junagadh

- PGPRs comprising of *Pseudomonas gessardii* BHU1 (PGPR1), *Pseudomonas putida* S1(6) (PGPR2) and *Pseudomonas putida* BM6 (PGPR4).
- These microorganisms are having multiple plant-growth promoting attributes like ACC deaminase (an indicator of plant growth promotion), phosphate solubilization, production of siderophore, antifungal metabolites, hormones, and ammonification traits.
- <https://tinyurl.com/vsvd8swa>



Institute: ICAR-Directorate of Groundnut Research (DGR), Junagadh

- “NutMagic” is comprised of PGPR ((*Pseudomonas gessardii* BHU1, *Pseudomonas putida* S1(6)); PSB (*Enterobacter cloacae* BM8; *Bacillus polymyxa*), and rhizobia (*Sinorhizobium americanum* NRCG4 and *Rhizobium* sp. NRCG9).
- The consortium can take care of plant growth promotion by ACC deaminase activity, siderophore production, ammonification, suppression of pathogens, and solubilization of Zn and K; better phosphate solubilisation by PSBs; and improved biological nitrogen fixation by rhizobia.



- <https://tinyurl.com/mnwyy9hh>

Institute: ICAR-Central Soil Salinity Research Institute (CSSRI), Karnal

- Formulation contains highly efficient salt tolerant strains of P solubilizing bacteria that can be used in normal as well as salt affected soils.
- It ensures better root development and better nutrient uptake and thereby vigorous crop growth.
- Liquid formulation of Halo-PSB can be used for rice, wheat, mustard, maize and vegetables crops.
- The liquid formulation is tested to suit soils with pH in the range of 7.5 to 9.7.
- <https://tinyurl.com/y2az63e6>



Institute: ICAR-Central Soil Salinity Research Institute (CSSRI), Karnal



- Formulation contains highly efficient salt tolerant N-fixing bacteria that can be used in normal as well as salt affected soils.
- Liquid formulation of Halo-Azo can be used for rice, wheat, mustard, fodder and vegetables crops.
- The formulation is more suited for soils with pH in the range of 7.5 to 9.8.
- Inoculation of N-fixers helps to augment 10 to 15 kg N ha⁻¹ .

<https://tinyurl.com/559zuwhn>

Institute: ICAR-Central Soil Salinity Research Institute (CSSRI), Karnal

- Salt tolerant (halophilic) bacterial strains of N-fixers, P solubilizers and Zinc solubilizing bacteria (ZSB) were isolated from native salt affected soils, tested at multi locations in salt affected as well as normal soils.
- The consortia of halophilic N-fixers, P solubilizers and Zinc solubilizing bacteria were prepared in suitable standardized media as liquid bioformulations viz. Halo-Mix.
- These can be used either for seed treatment or soil application.
- <https://tinyurl.com/txcz7a6d>



Halo-Zinc: Microbial Formulation for Salt Affected Soils

Institute: ICAR-Central Soil Salinity Research Institute (CSSRI), Karnal

- Salt tolerant (halophilic) bacterial strains of Zinc solubilizing bacteria (ZSB) were isolated from native salt affected soils, tested and prepared in suitable standardized media as liquid bioformulations viz.
- Halo-Zinc. These can be used either for seed treatment or soil application.
- In saline and sodic soils, where other methods of reclamations are becoming difficult, costly and availability of amendments is not easy, application of these liquid bioformulations helps to remediate salt stress and enhances plant growth and yield through mobilization of essential nutrients.



<https://tinyurl.com/3urptzzu>

ICAR-FUSICONT: An Effective Bio-Fungicide for The Management of The Devastating Wilt Disease of Banana and Cumin

Bio formulations

Institute: ICAR-Central Soil Salinity Research Institute (CSSRI), Karnal

- FUSICONT is a unique bio-fungicide that has been developed using the antagonistic fungi *Trichoderma reesei* a novel strain obtained from high stress rhizosphere cultured in a unique modified CSR medium which is under IPR protection.
- The formulation is the only effective bio-fungicide available in the country for the management of banana wilt disease caused by Tropical race 4.
- <https://tinyurl.com/2hu5rdcn>



Institute: ICAR-Indian Institute of Horticultural Research (IIHR), Bengaluru

- This is a carrier-based product containing three *Streptomyces* spp., that have the ability to solubilize insoluble P & Zn, produce phytohormones and a variety of enzymes involved in organic matter recycling.
- The product can be stored and used without deterioration of its quality for 4-6 months under room conditions.
- It can be applied either through seed, seedlings, soil, irrigation water (drip irrigation – soil drenching) or by the enrichment of compost/FYM/cocopeat.
- <https://tinyurl.com/j2r4uv6x>



Institute: ICAR-Indian Institute of Horticultural Research (IIHR), Bengaluru

- Combination of N fixing, P & Zn solubilizing and K mobilizing and plant growth promoting microbes in single carrier.
- This technology exploits the synergistic effects of the individual microbial strains and does away with the need for applying individual microbial inoculants.
- As per their convenience, farmers can apply this product either through seed, soil, water and nursery media like cocopeat.
- <https://tinyurl.com/2xr9j9hx>



Institute: ICAR-Indian Institute of Horticultural Research (IIHR), Bengaluru

- It had exhibited antagonistic activity against root knot nematode, *Meloidogyne incognita* by causing 61 to 64 % suppression in egg hatching of root knot nematode, *Meloidogyne incognita*.
- It caused 62 to 76% parasitization of nematode eggs in okra, tomato, carrot and brinjal crops under field conditions.
- It also exhibited an increase in yield of 14.6 to 16.5% in brinjal, 14.6 to 16.2% in carrot, 21.3 to 22.5 % in tomato and 18.6% to 20.5% in okra under field conditions.
- <https://tinyurl.com/246bxreu>

Institute: ICAR-Indian Institute of Horticultural Research (IIHR), Bengaluru

- *Pseudomonas fluorescens* IIHR Pf-2 had exhibited antagonistic activity against root knot nematode, *Meloidogyne incognita* by causing 71 to 74 % suppression in egg hatching; 60 to 67% inhibition in growth of *Fusarium oxysporum* f.sp. *vasinfectum*; 67 to 72% inhibition in growth of *Ralstonia solanacearum* on tomato; 61 to 66 % inhibition in growth of *Erwinia caratovora*; 65 to 70% inhibition in growth of *Ralstonia solanacearum* on brinjal, 62 to 66% inhibition in growth of *Fusarium solani*.
- It also exhibited an increase in yield of 13.2 to 15.6% in brinjal, 18.4 to 20.2% in carrot, 21.8 to 23.5 % in tomato and 17.1 to 19.4% in okra under field conditions.
- <https://tinyurl.com/393cpmax>

Institute: ICAR-National Bureau of Agriculturally Important Microorganisms (NBAIM), Kushmaur (U.P)



- A unique formulation of NPK providing bacteria was developed that consists of a nitrogen fixing (*Azotobacter chroococcum*), P-solubilizing (*Paenibacillus tylopii*) and K –solubilizing (*Bacillus decolorationis*) bacteria.
- Inoculation with this single product can help to augment 20-25 kg N, 15-20 kg P₂O₅ and 5-10 kg K/ ha.
- <https://tinyurl.com/yp4bs4aw>

Institute: ICAR-National Bureau of Agriculturally Important Microorganisms (NBAIM), Kushmaur (U.P)

- Formulation contains highly efficient P solubilizing bacteria that can be used in different types of soils.
- Inoculation of P solubilizer helps to augment 15 to 20 kg P₂O₅ ha⁻¹. Keep soils biologically active and helps in soil health maintenance.
- The formulation has a shelf life of one year.
- The product can be stored at elevated temperature. No loss in plant growth promoting activities in formulation even on long storage.
- <https://tinyurl.com/yry2j4kb>



Institute: ICAR-National Bureau of Agriculturally Important Microorganisms (NBAIM), Kushmaur (U.P)

- Zinc solubilising bacteria play crucial role in dissolution or insoluble source of zinc through secretion of organic acids and other metabolites.
- When applied to soil, it converts insoluble form of Zn to soluble form and make it available to the plant.
- Liquid formulation of Zinc solubilizer can be used for cereals, millets, pulses, vegetables, fiber and oil producing commercial crops.
- The formulation is more suited for soils with pH in the range of 6.5 to 8.5.
- <https://tinyurl.com/2bf67m8z>



Institute: ICAR-National Bureau of Agriculturally Important Microorganisms (NBAIM), Kushmaur (U.P)

- The formulation was developed utilizing a consortium of bacteria endowed with phosphorus solubilization, IAA and siderophore production attribute.
- Liquid formulation of Biogrow can be used for maize and vegetables particularly tomato and other solanaceous crops.
- The formulation is more suited for soils with pH in the range of 6.5 to 8.5.
- <https://tinyurl.com/y8vwkckt>



**Institute: ICAR-National Bureau of Agriculturally Important
Microorganisms (NBAIM), Kushmaur (U.P)**

- The culture maintains a high cfu count throughout its storage. It helps plant to utilize K fixed in soil.
- Inoculation of K-solubilizer helps to augment 10-15 kg K ha⁻¹.
- This formulation can be applied to crops like maize and potato.
- <https://tinyurl.com/2esdanc2>

**Institute: ICAR-National Bureau of Agriculturally Important
Microorganisms (NBAIM), Kushmaur (U.P)**

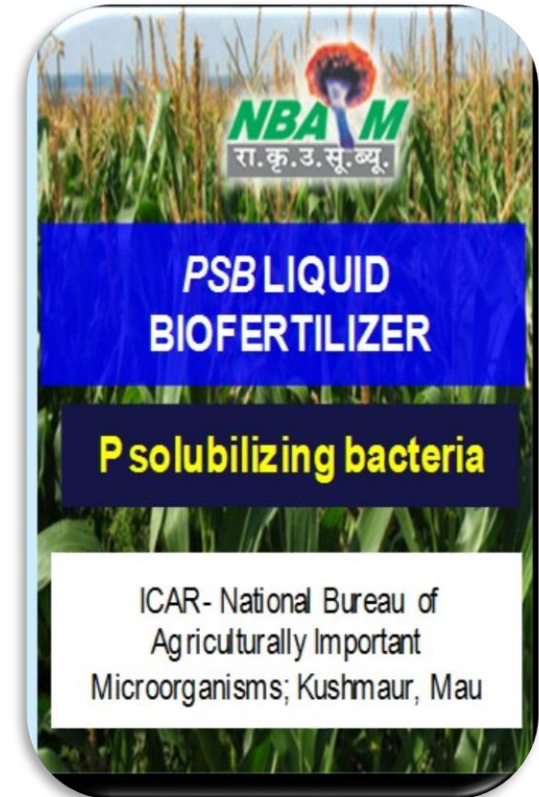
- The formulation contains effective strain of Azotobacter which is free living nitrogen fixer.
- It is a multipurpose strain and not only contributes nitrogen but also produces IAA and can solubilize little amount of P.
- Azotobacter is not specific for any crop plant and can be routinely used to supplement nitrogen in all the crops.
- When applied as seed inoculant it can add 15-20 kg/ha nitrogen to the soil.
- <https://tinyurl.com/a3wymwcr>

Institute: ICAR-National Bureau of Agriculturally Important Microorganisms (NBAIM), Kushmaur (U.P)

- The application of this formulation can reduce the application of chemical nitrogen fertilizer.
- Its inoculation is more beneficial for crops like soybean and French bean where native population is absent in Indian soils.
- Efficient strain for chickpea, pigeonpea, mungbean, urdbean, groundnut, pea and lentil are available.
- <https://tinyurl.com/22ezh69z>

Institute: ICAR-National Bureau of Agriculturally Important Microorganisms (NBAIM), Kushmaur (U.P)

- Formulation contains highly efficient P solubilizing bacteria that can be used in different types of soils.
- Inoculation of P solubilizer helps to augment 15 to 20 kg P₂O₅ ha⁻¹. Keep soils biologically active and helps in soil health maintenance.
- The formulation has a shelf life of one year.
- Bacterial protectants added to the formulation improve the shelf life, survival of the culture on seed and also help the culture regain active growth under favourable conditions.
- <https://tinyurl.com/ybbk6x8c>



Institute: ICAR-Central Coastal Agricultural Research Institute (CCARI), Goa

- 1. Goa Bio 1 Bio-formulation for plant growth promotion of paddy under salt affected soils of coastal regions**
<https://tinyurl.com/uyh2y5j8>
- 2. Goa Bio 2 Bio-formulation for plant health management of field, vegetable crops and black pepper in Coastal regions**
<https://tinyurl.com/hz5n26e4>
- 3. CCARI Bio 3 Value added formulation of PGPB (STC-4) for vegetables**
<https://tinyurl.com/ytet9mxc>
- 4. CCARI Bio 4 Value added formulation of PGPB (RCh6-2b) for vegetables**
<https://tinyurl.com/uudsavh6>