

**Agri Life NITROFIX™ - AV**  
***Azotobacter vinelandii***  
**BioFertilizer**  
(Regd in Fertilizer Control Order, Govt of India)

**APPROVED FOR USE IN ORGANIC AGRICULTURE**

**Introducing Agri Life NITROFIX™ - AV**

Agri Life NITROFIX™ – Av is a biological fertilizer based on a selected strain of naturally-occurring beneficial diazotrophic bacteria - *Azotobacter vinelandii* (NCIM -2821 , ATCC -12837 ). Owing to their unique metabolism they can actively fix atmospheric nitrogen in soil by conversion to ammonia. It is used as an effective soil application product.

Overdependence and abuse of nitrogenous fertilizers based on fossil fuel / chemical has resulted in depletion of beneficial soil microbial organisms. Cost of chemical nitrogenous fertilizers is increasing progressively and making it unaffordable to farmers. Biological nitrogen Fixation ( BNF) is proven concept for over a century and is a cost effective proposition.

Agri Life NITROFIX™ – AV contains cysts of *Azotobacter vinelandii* . It is formulated as Wettable Powder with CFU count of  $5 \times 10^7$  / g. Agri Life NITROFIX™ – AV is registered under the Fertilizer Control Order- Govt of India. Agri Life NITROFIX™ – AV is approved for use in Organic Agriculture.

**A Historical Brief**

*Azotobacter vinelandii*, was discovered and described in 1903 by the Russian scientist Jacob Lipman at Rutgers University.

**Mode of Action**

Nitrogen cannot be absorbed by the plants owing to the strong triple bonds between the nitrogen atoms making it inert and therefore non assimilable by plants.

*Enzyme production:* *Azotobacter vinelandii* produces enzymes such as molybdenum-containing nitrogenase enzyme and two alternative nitrogenases; one in which vanadium replaces molybdenum and a second which contains neither transition metal but only iron.

Nitrogen fixation needs a large amount of energy in the form of ATP and an anaerobic environment (no oxygen environment). Thus *Azotobacter* develops a special defence mechanism against oxygen by intensifying its metabolism that reduces the oxygen concentration in its cells. It can also synthesise a protective 2Fe-2S protein which can bind to nitrogenase in conditions of oxygen stress to form an oxygen-

stable complex that is inactive but protected from damage. Homocitrate ions play some role in the processes of Biological Nitrogen Fixation (BNF).

**Nitrogenase action:** This is an important enzyme used to convert atmospheric nitrogen into ammonium / nitrate ions which get fixed in soil and can be absorbed by the plants. The basic type is molybdenum-iron nitrogenase.

Nitrogen fixation is regulated by the enhancer protein NifA and the "sensor" flavoprotein NifL which modulates the activation of gene transcription of nitrogen fixation by redox-dependent switching. These two proteins form a unique complex not seen in other nitrogen fixing bacteria.

**Bio Active compound synthesis:** *Azotobacter vinelandii* synthesizes some biologically active substances including some phytohormones and vitamins thereby stimulating plant growth. They also facilitate the mobility of heavy metals in the soil and thus enhance bioremediation of soil from heavy metals, such as cadmium, mercury and lead.

### **Method of Application**

**Seed Treatment:** Mix 10 g. of Agri Life NITROFIX™ – AV with 10 g. of crude sugar in sufficient water to make a slurry and coat 1 kg of seeds, dry in shade and sow / broadcast / dibble in the field

**Note:** Do not store treated / coated seeds more than 24 hrs

**Seedling treatment:** Mix 100 g. of Agri Life NITROFIX™ – AV with sufficient quantity of water and organic manure to form a slurry. The seedlings are dipped in this slurry for 30 minutes prior to planting so that the bacteria get attached to the roots.

**Soil application:** Mix 3-5 Kg/ acre of Agri Life NITROFIX™ – AV with compost and apply to an acre of soil.

**Drip Irrigation:** Mix 3 Kg / 3 L of Agri Life NITROFIX™ in drip stream.

### **Target Nutrition**

Nitrogen supplementation

### **Crops**

Agri Life NITROFIX™ – AV is suitable for application on Cereals , Millets , Pulses, Oilseeds, Fibre Crops , Sugar Crops , Forage Crops , Plantation crops ,Vegetables, Fruits, Spices , Flowers , Medicinal crops , Aromatic Crops , Orchards and Ornamentals.

### Compatibility

Agri Life NITROFIX™ – AV is compatible with BioPesticides and other Bio Fertilizers.

### Shelf Life

Agri Life NITROFIX™ – AV is stable for a period of 1 year from the date of manufacturing.

### Mass Composition

CONSTITUENT	W/W %	FUNCTION
<i>Azotobacter vinelandii</i>	02.00%	Active
Inactive ingredients	99.00%	Inactive
Carrier Powder – Talc/Dextrose/Lignite	Q.S	Inactive

### BIOLOGICAL COMPOSITION

CONSTITUENT	CFU/g.	FORMULATION
<i>Azotobacter vinelandii</i>	5*10 <sup>7</sup>	Powder

### OTHER FORMULATIONS AVAILABLE

<i>Azotobacter vinelandii</i>	CFU/ml	1*10 <sup>8</sup>	Liquid
<i>Azotobacter vinelandii</i>	CFU/g/ml	1*10 <sup>9</sup>	Powder/ Liquid
<i>Azotobacter vinelandii</i>		1*10 <sup>10</sup>	Powder
<i>Azotobacter vinelandii</i>			Lyophilized

*Free from Salmonella, Shigella, E.Coli*

### Cautions for handling and use of product

1. Mixing equipment is to be thoroughly rinsed with water and detergent before using the same equipment for formulating other fertilizers/ pesticides.
2. Surplus product may be disposed in crop lands
3. Do not eat / drink / smoke during application.
4. Direct incidence of Agri Life NITROFIX™ – AV may cause irritation and therefore it is recommended that the operator should use protective gear viz gloves, apron, mask, eye gear and hood.

## Antidotes

In the case of ingestion: Symptomatic treatment

In the case of contact with Eyes: Flush with water liberally for 20 minutes.

## Citations

There are many citations in public domain for over a century on effectiveness of *Azotobacter vinelandii* as a BioFertilizer

## Commitment to Nature

- Agri Life NITROFIX<sup>™</sup> – AV is approved for use in organic agriculture.
- Agri Life NITROFIX<sup>™</sup> – AV is safe to use along with bio fertilizer inoculums like P Sol B<sup>®</sup> (Phospho bacteria) ; K Sol B<sup>®</sup> (Potash mobilizing bacteria); Zn Sol B<sup>®</sup> (Zinc mobilizing bacteria) :S Sol B<sup>®</sup> ( Sulphur solubilizing bacteria ) : Si Sol B<sup>™</sup> ( Silica solubilizing bacteria ): Fe Sol B<sup>®</sup> ( Iron / Ferrous solubilizing bacteria ) : Mn Sol B<sup>™</sup> ( Manganese solubilizing microbe ) and Agri Life Agrivam<sup>®</sup> (Vesicular-arbuscular mycorrhiza)
- Agri Life NITROFI<sup>X™</sup> – AV is safe to use along with botanical and microbial bio pesticides.
- Agri Life NITROFIX<sup>™</sup> – AV can be used as an effective component in INM programmes, thereby leading to a reduction in use of chemical fertilizers and creating a safer environment.
- Agri Life NITROFIX<sup>™</sup> – AV does not lead to residue problems and doesn't cause resistance or resurgence problems.

## Benefits from Agri Life NITROFIX<sup>™</sup> – AV

- Agri Life NITROFIX<sup>™</sup> – AV effectively fixes Nitrogen from atmosphere and is a true biofertilizer
- Natural Nitrogen fixation improves both plant and soil health and also aids in soil remediation.
- Agri Life NITROFIX<sup>™</sup> – AV is earthworm friendly , pet friendly , eco friendly and infant friendly