

## TRIAL I

### SCOPE OF BIOFERTILIZER APPLICATION IN TEA

Biofertilizer or **microbial inoculants** are environment and farmer friendly, renewable, non-bulky, **organic agro- inputs**, that can **replace about 30-50 per cent of chemical fertilizer requirement in tea**. In organic tea cultivation, they play a significant role along with **other organic inputs like humic acid, oil cakes, biocompost etc**. In general, biofertilizers play a significant role in **Integrated Soil Fertility Management (ISFM) in tea gardens**.

Recommended manurial dose for tea bushes of above 4 years is as follows.

Age of tea bushes	Kg/acre			N		P	K
	N	P	K	Ammon-ium sulphate	urea	Rock Phosph a-te	Muriate of potash
IV year onwards	120	40	120	290 kg	130 kg	165 kg	200 kg
By applying biofertilizers 30% of chemical fertilizer requirement can be reduced	<i>Azospirillum</i> 3 kg	<i>Aspergillus awamori</i> 3 kg	<i>Frateuria aurantia</i> 3 kg	saving 87 kg	saving 39 kg	saving 50 kg	saving 60 kg

Note: *Aspergillus awamori* is recommended in the place of *Bacillus megaterium* as *A.awamori* shows very high P-solubilizing activity in acidic soils.

### ECONOMICS:

#### 1. Cost of Biofertilizers

Biofertilizer	Recommended dose/acre	Cost/kg	Total cost
<i>Azospirillum</i> (Green Light)	3 kg	Rs.100	Rs.300
<i>Aspergillus awamori</i> (Green Awamori )	3 kg	Rs.100	Rs.300

VAM (Green VAM)	4 kg	Rs.55	Rs.220
<i>Fratureia aurentia</i> (Green K)	3 kg	Rs.100	Rs.300
Total cost /acre			Rs.1120

## 2. Reduction in cost of chemical fertilizers when biofertilizers are used.

Chemical fertilizer	30% chemical fertilizer(kg)	Cost/kg (Rs)	Total cost saving (Rs)
1. Ammonium sulphate	87.00	14.60	1270.00
2. Urea	39.00	8.00	312.00
3. Rock phosphate	50.00	8.00	400.00
4. Muriate of Potash	60.00	16.00	960.00
Grand Total			2942.00

**So the net saving using biofertilizer will be Rs.1822/acre**

Apart from monetary benefit, other advantages of using biofertilizers are indicated below.

### Major advantages:

1. Biologically fixed nitrogen is not leached generally.
2. Chemically fixed phosphorus is made available to the plants, apart from preventing immobilization of phosphorus in cellular material of plants grown on acidic soils.
3. VAM apart from solubilizing phosphorus and making it available in **organic** form to plants, is also make available micronutrients like zinc, iron, copper, manganese etc and secondary nutrients sulphur and calcium.
4. VAM imparts drought tolerance to the plants as the fungal hyphae functions as the extended root system to explore greater volume of soil for water and nutrients.
5. Biofertilizers produce several fungistatic substances which induct resistance in plants to
  - a). Soil borne fungal pathogens
  - b). Phytoparasitic nematodes

6. *Aspergillus awamori* helps in quick mineralisation of rock phosphate.
7. Generally biofertilizers produce growth promoting substances which positively influence plant growth and abundant leaf production.

### **BIOFERTILIZER APPLICATION METHOD**



## **Inference received from Mr.Dinesh rajuDharmona estate, Kothagiri,South India one month after biofertilizer application**

Dear Sir,

It is interesting to hear that there is some positive results in the biofertilizer experiment. To improve the composition of biofertilizers, I have added 2 kg of Zinc mobilizing bacterium, *Bacillus subtilis* without your permission. This bacterium apart from mobilizing Zinc, it also helps in phosphorus solubilisation and disease management. The rationale behind adding this bacterium is that I have seen zinc deficiency in several estates like Curzon and addition of this bacterium may increase leaf yield and quality.

There is a 10 % yield increase in green leaf in this trial which can be further improved by other organic components like oil cake, etc.,

### **TRIAL II**

#### **TRIALS ON HUMIC ACID IN TEA**

##### **1 Soil application of Green Humic Miracle**

We may apply 2 Kgs of Humic Miracle per acre of Tea plantation just prior to summer rains or when there is enough soil moisture. The advantages being

- 1) It buffers high and low pH's to allow nutrient up take in less than optimum conditions. The buffering capacity range between 5.5 and 6.5.
- 2) It unlocks and chelates macro and micro nutrients for plant up take. In the absence of chelates in the soil zinc, Iron, Manganese, Copper and magnesium are converted to insoluble hydroxides which are not available to the plants.
- 3) Green Humic Miracle contains a wide variety of major and trace elements and several essential amino acids.
- 4) It increases aeration of soil and stimulates growth and proliferation of beneficial micro organisms such as Azotobacter.
- 5) It helps soil to absorb more water and hold moisture for longer time.
- 6) It helps in formatting excellent root growth. It increases the rate of development of the root system



7) In plants it increases the permeability of plant membranes promoting uptake of nutrients.

8) It stimulates phytoenzymes and act as catalyst. It increases vitamin content of plants and stimulates plant growth by accelerating cell division.

9) It helps plants in production of more foliage, flowers and fruits.

**Table 1. Effect of foliar application/ soil application on yield of certain crops.**

Method of application	Dose	Pepper**		Tuberose**		Potato	
		Treated	control	Treated	control	Treated	control
Foliar application	500 ml/ha					350 quintals	200 quintals
Foliar+soil	2kg /acre	5 kg/vine	8 kg/vine				
Soil	1 kg/acre			7kg flowers/day	3kg flowers/day		

\*\*Trials conducted with our product Green Humic Miracle.

The application of Green Humic Miracle does not cost much ( only Rs 600/2 kg). But its application results in the production of abundant foliage in Tea. By its application we can reduce the leaf plucking duration and increase the yield.

## **Inference**

**There is 20 % yield increase in green leaf in tea.**

Foliar application of humic acid is not suitable as it leaves black deposition of carbon in tea leaves which does not disappear before plucking.

We can work out the total organic tea cultivation package including pests and diseases.