

# AND NOW, A NEW BIOFERTILIZER

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Rhizobium inoculants for leguminous crops are well known. Lately their use has increased for leguminous fodders and pulses to meet the nitrogen requirement. Similarly, azotobacter inoculants are also becoming popular for cereal crops like wheat, millets, rice and maize. Though they are not as efficient nitrogen fixers as the rhizobia, still contribute significantly to the nitrogen requirement of these crops.

For the last 10 years, a third type of biofertilizer has been getting attention. It is azospirillum. Its efficiency ranges between that of rhizobium and azotobacter and is effective mainly on cereal grasses like wheat and millets. Recently, these bacteria have been isolated from plantation crops at Central Plantation Crops Research Institute (CPCRI), Kasaragod and IARI, New Delhi. In India, the azospirillum biofertilizers are yet to become popular though a beginning has already been made. Use of a fourth type of biofertilizer, blue-green algae, has been going on in India but its scope is limited to situations where there is abundance of water and sunshine (mainly it has been applied to rice fields).

And now a new type of biofertilizer is attracting attention. It is vesicular-arbuscular mycorrhizae popularly called as VA-mycorrhizae or simply VAM. VA-mycorrhiza is a form of association in which a group of soil fungi colonises plant roots. They occur in nearly all the important crop plants, including many tropical trees. The VA-mycorrhizal roots show typical vesicles and arbuscules when stained and observed under the microscope. The plant roots infected with VA-mycorrhizal fungi absorb nutrients especially phosphorus efficiently from soil where these are present in very low and unavailable quantities. Like other biofertilizers, VA-mycorrhizal fungi cannot be cultured on synthetic media since they are obligate symbionts. So VA-mycorrhizal inoculants are prepared by multiplying these fungi on living hosts

and the fungal spores and soil mixture or infected roots are used as inoculants.

Use of VA-mycorrhizal biofertilizers is all the more important in tropical soils because these include a considerable portion of phosphorus deficient or phosphorus fixing soils. Superphosphate which is normally used as phosphorus source, is in short supply in the developing countries of this region. Yield increases due to inoculation with VA-mycorrhizal fungi have been reported in a number of crops including wheat, barley, millets, groundnut, soybean, potato, cowpea, tomato and chillies. The best results have been obtained in nutritionally marginal soils especially poor in phosphorus. There are also reports showing improved utilisation of insoluble phosphates like rock phosphate, bone meal, apatite etc. when plants were inoculated with VA-mycorrhizal fungi.

Leguminous plants are capable of forming a dual beneficial association with Rhizobium as well as with VA-mycorrhizal fungi. Inoculation of soybean, cowpea and groundnut with specific Rhizobium and VA-mycorrhizal fungi resulted in better root nodulation, nitrogen fixation and phosphorus uptake by the plants. Maximum benefit, can therefore, be obtained in legumes by adopting dual inoculation with Rhizobium and VA-mycorrhizal biofertilizers.

It has also been observed that VA-mycorrhizal plants perform better under drought conditions. VA-mycorrhizal could be used for crops like millets, groundnut, etc. which are usually grown under poor moisture and soil conditions. In addition to the above, inoculations of VA-mycorrhizal fungi to plants has also been observed to suppress some of the soil borne pathogens like fungi and nematodes.

Use of VA-mycorrhizal biofertilizers has begun in a big way in U.S.A. where commercial preparations are already available in the market. Some other countries like Britain, New Zealand and Australia have also taken up commercial production of these biofertilizers. In India, research work is going on on these biofertilizers at CPCRI, Kasaragod, ICRISAT, Patancheru, IARI, New Delhi, HAU, Hissar, and UAS, Bangalore but commercial production is yet to start.