FIELD METHOD OF APPLICATION OF CYANOBACTERIAL INOCULUM

Cyanobacteria also have a unique potential to contribute to productivity in a variety of agricultural and ecological situations. Cyanobacteria have been reported from a wide range of soils, thriving both on and below the surface. They are often also characteristic features of other types of sub-aerial environment and many intermittently wet ones such as rice fields.

Most paddy soils have a natural population of cyanobacteria which provides a potential source of nitrogen fixation at no cost. Due to this important characteristic of nitrogen fixation, the utility of cyanobacteria in agriculture to enhance production is beyond doubt. Many studies have been reported on the use of dried cyanobacteria to inoculate soils as a means of aiding fertility.

Effect of adding cyanobacteria to soil on rice yield was first studied in the 1950s in Japan. The term 'algalization' is now applied to the use of a defined mixture of cyanobacterial species to inoculate soil, and research on algalization is going on in all major rice producing countries. The average of the results from all these studies have shown an increase in grain yield of 15-20% in field experiments. It has been suggested that the cyanobacteria introduced as a result of algalization can establish themselves permanently if inoculation is done consecutively for 3-4 cropping seasons.

The basic advantage of this technology is that farmers after getting the soil based starter culture can produce the biofertilizer on their own with minimum additional inputs. An inoculum of 10-12 kg is considered sufficient to inoculate one hectare of paddy field 3-4 days after transplantation. Efforts have also been made to improve the technology by developing new economically feasible protocols for production of quality inoculum so that these organisms can be practically exploited on a large scale.

After harvesting of fully grown culture of cyanobacterial bioinoculants, it is mixed with the carrier material, presoaked overnight in water and multani mitti (in 1: 1 ratio) and sun dried. The dried material is ground and packed in suitable size polythene bags, sealed and stored for future use. The final product contains 10,000 to 1,00,000 units or propagules per gm of carrier material and, therefore, 500 g material is sufficient to inoculate one acre of rice growing area. A number of field trials conducted with this material have shown promising results both in terms of nitrogen saving as well as crop yield. However, statistical analysis of the data on alagalization in experimental fields has suggested that the effects of inoculation are inconsistent. The best results appear to be obtained when mixed inocula are produced from local stocks, and the biofertilizers are used in combination with a low level of nitrogenous fertilizer. Addition of fertilizer to rice fields generally leads to accelerated growth of algae.

Most cyanobacteria inoculated in soil fail to dominate over the flora. There are many indigenous flora associated with the soil in the rice fields. Cyanobacterial bioinoculants

treated to soil in the rice fields are able to dominate only when the indigenous flora is sparse. Thus, 'algalization' seems likely to be most useful where there are marked seasonal changes in land such as when ground is ploughed frequently before planting so that the natural soil inoculum is much reduced by the time of new paddy season.

In India, considerable progress has been made in the development of cyanobacteria based biofertilizer technology. It has also been demonstrated that this technology can be a powerful means of enriching the soil fertility and improving rice crop yields. However, the technology needs to be improved further for better exploitation under sustainable agriculture systems. It is important to obtain a much more detailed understanding of cyanobacterial population dynamics over the whole annual cycle in agriculture systems. Extensive field studies aimed at developing region specific high quality inoculum are also needed.