Biofertilizer Group Newsletter

Issue No.3 July 2003

BIOFERTILIZER MESSAGE

Food and Agriculture Organization (FAO) work plan in 2004 to 2009 including one objective of assisting countries in the development of organic agriculture. Also to streng then FAO'S information base and partnership on issues of importance organic agriculture. One priorities of the work plan is the formulation of integrative approaches to soil and nutrient management within holistic organic production systems, with particular emphasis on low input farming systems. So studies on production and use of **biofertilizer** will be one effective approach to organic soil management and sustainable use of biodiversity.

RESEARCH DIGEST

Biofertilizer Research in Thailand has been carried on by many institutes namely, Department of Agriculture, Kasetsart University, Chaing Mai University,Thailand Institute of Scientific and Technological Research. Intensive research has been done largely by the Soil Microbiology Research Group, Division of Soil Science, Department of Agriculture. The following articles are some of the recent works of Biofertilizer research in Thailand.

Rhizobium

There was one experiment showed that the undisturbed and highland area having less rhizobium population than the cultivation area particularly the area growing leguminous plant. By growing crop rotation with leguminous plant will keep steady rhizobium population in the soil all year.

Selected rhizbium strains could increased green soybean variety Chieng Mai no 1. The best result will be obtained by applying N- fertilizer 0–56-38 kgs N-P_2O_5-K_2O/ha., and mixing soybean with rhizobium inoculum then coated with $CaCO_3$. This will increased more growth and yield of soybean significantly from uninoculated plant and uncoated with $CaCO_3$.

Scientists : Mr. Somsak Koteponges,
Mr. Chirasak Arunsri
Dr. Ashara Nantakij
(Soil Microbiology Research Group, Department of Agriculture)

Nitrogen fixing bacteria

Nitrogen fixing bacteria has been studied their effectiveness on growth and yield of rice. The experiment in Thailand showed that compared to control plant; applied compost, N. fix bacteria , compost + N-fix bacteria, N-fertilizer, N-fertilizer + N-fix bacteria, compost + N-fertilizer + N-fix bacteria increassed yield of rice 4.2%, 6.3%, 10.0%, 16.7%, 17.6% and 23.0% respectively. So by applying the combination of N-fertilizer, N-fix bacteria and compost could increased the activities and quantity of N-fix bacteria:by increasing growth, hay weight, total N in plant and rice yield which is better than applied only single facter.

Besides rice the effect of N-fix bacteria was studied on pineapple. The result showed that applied N-fix bacteria increased pineapple growth more than noninoculated. In nature pineapple obtain nitrogen from the atmosphere by the process of N-fix bacteria which were found approximately 58 isolates in pineapple in Thailand.

Scientists : Mr. Banharn Tangcham
Mr. Sompong Muanjang
(Department of Agriculture)

Mycorrhiza

VA Mycorrhizal work; studies the increasing efficacy usage of mineral fertilizer by VA mycorrhiza fungi in pineapples showed that by applying VAM with half rate of mineral fertilizer increased the yield of pineapple higher than applied only full recommended rate of fertilizer.

Other study showed that teak seedlings produced by tissue culture technigue were inoculated with 6 species of VAM had higher height, shoot dry weight and root dry weight than noninoculated seedlings in all species.

By using nuclar technique to measure the amount of P^{32} in the study of the effect of VAM and phosphate fertilizer on phosphorus uptake of Vetiver. (*Vetiveria zizanioides* L. Nash). Four rates of superphosphate 3, 30, 60 and 90 Kg P_2O_5 /ha were used. *Acaulospora scrobiculata* significantly increased vetiver height, while the number of tillers per plant and the biomass were not affected.

Ectomycorrhizal work ; many species of Boletaceae were found in Dipterocarp Forest of Thailand. Most of them were edible. Some can grow as ectomycorrhiza of Mango, Water olive, and many species of legume plants. Mycelium of Bolete can be stimulated by using PDA + 1% of Pumice.

Orchid mycorrhizae work ; after root cross-sectioning and microscopic examination, the results showed that mycorrhizal fungi were found in the roots of seventeen epiphytic and all terrestrial orchid species. The fungi isolated from the root of epiphytic and terrestrial orchids were identified as *Rhizoctonia* spp.

Scientists : Dr. Omsub Nopamornbodi,
(Department of Agriculture)
Dr. Uthaiwan Sangvanit,
Dr. Poonpilai Suwanalit,
Mr. Deeprom Chaiwongkeit
Dr. Leka Manoch
Ms. Sombun Techapinyawat
(Kasetsart University)

Phosphate Solubilizing Microorganisms

Phosphate solubilizing bacteria and fungi were collected from soil and root plant 1,322 isolates. Six selected isolates were tested for their effectiveness on solubilizing phosphate from soil and from rockphosphate (guano phosphate). The results showed that 3 isoloates of fungi could solubilized $CaHPO_4$ and rock phosphate to available phosphate. So there is a tendency of using these fungi together with rock phosphate to promote plant growth.

Scientists : Ms. Bhaowana Likhananon
Ms. Supranee Munmai
(Department of Agriculture)

Potting mix for Mycorrhiza development

The use of heavy soil in nursery containers prevents the development of ectomycorrhizas in many plant nurseries. By contrast, appropriate potting mixes favour mycorrhizal formation. Availability of substrates will vary from one region to another, but the following substrates can be used to make excellent potting mixes.

Organic matter : Organic matter is a major component of any potting mix and can include peat, leaf humus, shredded coconut and other agricultural by products. Plant materials should be well composted to a humus-link material. Some composted plant barks or litter, when mixed with vermiculite, are conducive to ectomycorrhiza formation.

Vermiculite and perlite : These are bulking agents that keep the potting mix wet and well aerated, and prevent the growing medium from settling and compacting.

Wood product : Sawdust and bark are sometimes substituted for peat. Mycorrhizas may fail to form in sawdust because of phenolic compounds and unfavourable carbon/nitrogen ratios. Fresh products must be composted before use.

Sand coarse : washed river sand can be used in addition to vermiculite/perlite.

In general, start with a 1:1 mix of peat and/or vermiculite and adjust the ratio depending on the availability of local materials. Potting mixes should be pasteurised (steamed at 80℃ for 30 minutes or solar pasteurised) to reduce the threat of pathogens and competing organisms that may prevent the development of the inoculated fungus.

Factors affecting N_2 fixation and yield of legumes

The following topics should be considered when working with rhizobium:

1. Effect of nitrogen fertilizer
2. Liming
3. Rates of inoculation and inoculation methods
4. Effect of molybdenum
5. Effect of pesticides and herbicides
6. Nodule occuracy by inoculated strain
7. Post inoculation methods
8. Effect of VA mycorrhizal fungi on N_2 fixation
9. Effect of N-serve

WHO'S WHO IN BIOFERTILIZER : PROFILE OF PROJECT LEADER

Profile of project leader of each country will be described briefly in this column. This issue will be Thailand, the issue no. 2 was China, Indonesia and Philippines, the other countries will be described in later ones.

Project leader of Thailand

Dr. Omsub Nopamornbodi
Senior Soil Scientist Expert
Department of Agriculture
Bangkok, 10900
Thailand

Projects (as Chief Scientific Investigator with funding awarded.)

1. USAID-Collaborative Research Support Program in Peanut Rhizobia (CRSP)
2. Role of VA Mycorrhizal in the Phosphorus Nutrition of Economic Leguminous Crops in Thailand. (USAID – PSTC)
3. Maintenance of Soil Fertility and Improvement of Crop Yield in Highland by biofertilizer, mycorrhizal fungi. (STDB)
4. An Innovative Approach to Maintain Selected VAM in Cropping System. (USAID-PSTC)
5. On-farm Optimization of Biological Nitrogen Fixation of Grain Legumes. Comission of the European Communities. (STDB)
6. Development the technology on production and application of VA-Mycorrhizal on leguminous plant. (NSTDA)
7. Conservation of Soil Microorganisms in Thailand. (Thai Government)
8. Mycorrhiza Production and Application. (Thai Government)

Biofertilizer Related Works (Highlights in 2002)

- VAM strains from leguminous plants were isolated approximately 232 strains, These were tested for their effectiveness on soybean and acacia growth. Effective strains were selected and kept to use as inoculum in the future.
- The production techniques for producing VAM inoculum were studied. Corn, pearl mildred, sorghum and kudzu can be used as the good host plant and grow in substrate of potting mix: clay, sand, and compost.
- Many species of Boletaceae were tested for their ectomycorrhizal forming in mango and fast growing trees (leguminous plant). It was found ectomycorrhizal forming in the mango and water olive root. They also increased growth in the glasshouse, their effect in the field will be tested next.

2003 Joint Workshop on FNCA Biofertilizer Project and JSPS-NRCT/DOST/LIPI/VCC Large Scale Cooperative Research Program in the Field of Biotechnology, Development of Biomanure Based on the Symbiotic System

This year, we will hold the joint workshop with JSPS-NRCT/DOST/LIPI/VCC Large Scale Cooperative Research Program in the Field of Biotechnology, Development of Biomanure Based on the Symbiotic System Workshop, for the sake of effective discussion and exchange of wider perspectives since the scope of both workshops are quite relevant. Time and place of the joint workshop are planned to be held into two separate cities in succession, from October 20 to 22 in Hanoi and from October 23 to 24 in Ho Chi Minh City.

Date: October 20 (Monday) – October 24 (Fri)

Venue: Hanoi and Ho Chi Minh City, Vietnam

Meeting Place: Sofitel Plaza Hanoi Hotel (Oct. 20-22, in Hanoi)
Rex Hotel (Oct. 23-24 in Ho Chi Minh City)

Editor : Omsub Nopamornbodi,
Project Leader of FNCA Biofertilizer Project of Thailand
Department of Agriculture
Paholyothin Rd., Chatujak, Bangkok, 10900, Thailand
Phone : +662-5790574, Fax : +6629405472,
E-mail : omsub@doa.go.th

Secretariat : Mari Miura
Japan atomic industrial forum, inc
Asia cooperation center
Tel:+81-3-5777-0753 Fax:+81-3-5777-0757
E-mail : mmiura@jaif.or.jp

This Biofertilizer Newsletter is issued by the Japan Atomic Industrial Forum Inc. (JAIF) under the contract of the Ministry of Education, Culture, Sports, Science and Technology.