



FNCA Biofertilizer Newsletter

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Biofertilizer is able to increase the yield of grain legumes and other crops that are important food for both people and animal. In other hand, biofertilizer can clean the environment and mobilize the productive capacity of land by reducing the amount of chemical fertilizer consumption.

FNCA Biofertilizer Project aims to improve the biofertilizer technology and enhance the biofertilizer use by actual farmers. Different bacteria like Rhizobia, Azospirillum, Azotobacter and Mycorrhiza fungi were selected as target microorganisms for biofertilizer in this project, and the most effective rhizobium for each specific crop will be identified by measuring nitrogen fixation efficiency using ^{15}N as a tracer and other methods. Radiation is also used to sterilize the soil as the carrier of the rhizobium and other biofertilizers.

2003 FNCA Biofertilizer Project Activities

Joint Workshop with JSPS (Japan Society for the Promotion of Science) Group

The "2003 Joint Workshop of NRCT/DOST/LIPI/VCC Multilateral Cooperative Research Program in the Field of Biotechnology, Development of Biomanure Based on the Symbiotic System" took place in Hanoi and Ho Chi Minh City, Vietnam on October.



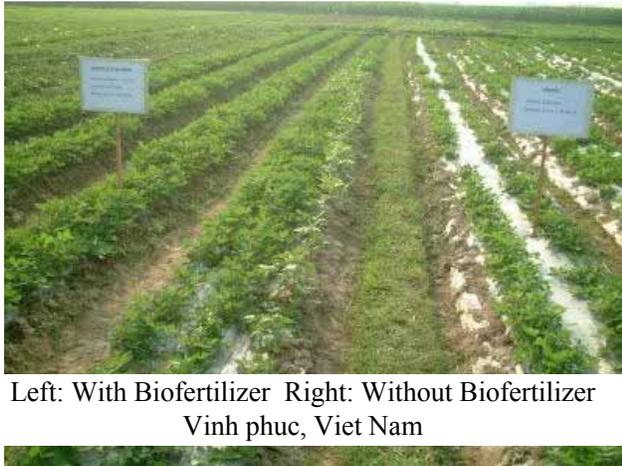


Total 33 participants from FNCA and JSPS and experts from IAEA (International Atomic Energy Agency), ICRISAT (International Crops Research Institute for the Semi Arid Tropics) and host organization in Viet Nam attended to this Workshop. The future cooperation between FNCA and JSPS/IAEA/ICRISAT was discussed in the session. In 2003 Workshop, each participant country reported the

result of field experiments conducted as planned including experiments using nuclear technique such as ^{15}N and ^{32}P to measure the efficiency of nutrient uptake.

The work plan of 2003 was reviewed and the plan for 2004 was discussed in the 2003 Workshop held in Hanoi and Ho Chi Minh City in Viet Nam.

Field Experiment and Demonstration of Biofertilizer



Field demonstration of application of biofertilizer on crops was the important point of FNCA biofertilizer project. In 2003 Workshop each participating countries reported the field experiments conducted as planned. Multistrain biofertilizer produced from N-fixing, P-solubilizing, plant promoting and plant pathogen antagonistic microorganism are tested for different

crops in Vietnam. The total area of field demonstration and experiment were about 200 ha in different provinces. Field experiments show that new biofertilizer has the positive effect on the growth and increase yield of potato 30.98-72.38%, groundnut 13.33-19.07%, tomato 20.5%, coffee 16.42%. Better growth of pine and wattle tries can be observed in the field experiment. Multistrain biofertilizer can also reduce some root diseases caused by some bacteria and fungi. In awareness of the economical benefit, the farmers in those areas have accepted to use the new biofertilizer.

Biofertilizer in Vietnam

Vietnam is predominantly an agricultural country with the land expansion of 235,200 ha per year, so the cultivated area increased from 9.040 million ha in 1990 to 12.470 million ha in 2000. The high demand for the mineral fertilizer is increasing annually. To decrease the use of chemical fertilizer and make agriculture more ecologically sustainable, Vietnam has planned to stimulate the research, production and utilization of biofertilizer. Sterile or non sterile carrier based and liquid inoculants are produced. Inoculants are produced not only from single strain but also the mix culture of N-fixing, P solubilizing, plant growth promoting and root disease pathogen antagonizing microorganisms, as well as, biofertilizer for different crops in different ecosystems. Biofertilizer has a positive effect on growth and yield of different crops and bring more profit for farmers. Following are informations of biofertilizer research and development in Vietnam.

The national projects of biofertilizer

- R&D of Rhizobium inoculants production technology for legume crops in Vietnam
- R&D of nitrogen fixing inoculants for rice and some non legume crops
- Developing new technique to improve the production and application of biofertilizer in Vietnam
- R&D of mix culture as biofertilizer for agricultural plant and forestry trees in Vietnam
- R&D the technique to produce of multi strain inoculants as multi functional biofertilizer used for agricultural plant, industrial crops and forestry trees in Vietnam

Research organizations working on biofertilizer

- Vietnam Agricultural Science Institute
- Institute of Biotechnology
- Agricultural University Hanoi
- Hanoi University of natural Science
- Institute of forestry Sciences
- Cantho University
- Oil plant institute
- Institute of Agricultural genetic
- Institute of Agriculture of South Vietnam
- Institute of Soil and fertilizer

- Institute for nuclear science and technique

Orientations of biofertilizer development

- Establish a demonstration model of biofertilizer production technology from laboratory scale to production scale
- Develop and transfer new technology and techniques of production and application of biofertilizer to produce it in local conditions
- Improve the knowledge and experience for the biofertilizer user by both farm demonstration and local training course for extension workers and farmers
- Expand production of biofertilizer
- International cooperation aim to improve the situation of biofertilizer R&D in Vietnam and other developing countries.



Inoculants for legume crops

Legume crops have a long history of cultivation in Vietnam and play an important

role in Vietnam agricultural system. Vietnam cultivated about 700,000 ha of legumes annually, equally distributed between the North and the South of the country. Production is about 700,000t, worth US\$ 175 million.

Project of Nitrogen inoculants is carried out in Vietnam for more than 20 years. Both formulation inoculants (liquid and peat carrier based) can be produced. Nitrogen inoculants contains a density of 10^9 CFU/g or 10^9 CFU/ml.

The results show that Nitrogen inoculants have positive effect on the growth and yield of legume. It can increase gain yield of 6.7-24.3% by soybean and 13.8-17.5% groundnut in North, Middle and 22% in South of Vietnam. This effect can be see clearly in infertile soil and in legumes new cultivated land. Nitrogen inoculants can bring the benefit of 442,000 VND (28.2USD)/ha in Vietnam.

The production area will expand from 250,000 ha in 2001 to 330,000 ha in 2005 for groundnut and from 130,000 ha in 2001 to 500,000 ha in 2005 for soybean by establishing intensive legume production zones, rotation or intercropping with industrial crops. So the potentiality of using Nitrogen inoculants is very high.

Inoculants for rice

Since 1991, Vietnam Agriculture Science Institute in collaboration with various research institutes has been testing the effectiveness of N-fixing biofertilizer on some rice varieties. The result show that the fertilizer status and nutrition content of soil, can increase the yield of rice by 4.04-19.59% dependly. Benefit brought by N-fixing inoculation is 15,000-481,000 VND (0.96-30.6USD)/ha for rice.

N-fixing and P. solubilizing inoculants



Mix-inoculants from N-fixing and P. solubilizing microorganisms has a positive effect on growth and yield of different crops and bring more profit for farmers. Mix-inoculants can increase the yield of 14.7-15.7% by rice in small experimental scale and by 10.65- 12.7% in large filed trial, 16.3-19.5% by soybean in small experimental

scale and by 13.31- 13.58% in large filed trial, by 12.3% by citrus. Benefit brought by mix-inoculants are 914,400-1,282,600 VND (58.2-81.7USD)/ha for rice 1,336,000-1,525,100 VND (85.1-97.1USD)/ha for soybean, 417,600 VND (26.6USD)/ha for citrus in Vietnam.

The mixture of Mycorrhiza and P. solubilizing inoculants has a positive effect on the growth (increasing of plant high, root diameter) and plant biomass (increasing fresh weight, dry weight) of pine tree Mavi in the nursery.

The research also shows that, the use of N-fixing inoculants can reduce chemical nitrogen application by 30-60 kg N/ha/year and P-solubilizing inoculants and rock phosphate can replace 30-50% mineral phosphorus fertilizer.

Multi-strain inoculants

Multi-strain inoculants which contains N-fixing, P solubilizing, plant growth promoting and root disease pathogen antagonizing microorganisms as multi functional biofertilizer have been studying and using for agricultural plant, industrial crops and forestry trees in Vietnam.

The result show that the functional biofertilizer has a positive effect on growth, yield of different crops and bring more profit for farmer. Pot and field experiments show that it can increase the yield of 13.06% by groundnut, 16.81-39.70 % by potato, 18.52% by tomato, 22.85% by pepper, 12.40% by cotton and 26.87% by coffee. It can also inhibit some root disease caused by *Pseudomonas solanasearum*, *Fusarium*, *Rastonia*, *Sclerotium* and *Phytophthora*.

Benefit cause by multi-strain inoculants are 2,700,000-3,050,000 VND (171.9-194.3USD)/ha for groundnut, 4,260,000-7,600,000VND (271.4-484.1USD)/ha for potato, 6,450,000-22,454,000 VND (410.9-1430.3USD)/ha for tomato, 14,450,000-25,124,000 VND (920.4-1600.4USD)/ha for pepper, 743,600 VND (47.4USD)/ha for cotton, 12,310,000 VND (784.1USD)/ha for coffee.



Project Leader of Vietnam

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Project Coordinator :

- Research and development of P-solubilizing inoculant (1994-1997)
- National project for biofertilizer research & development in Vietnam (1996-2000)
- National project for research and development of multistrain biofertilizer for agricultural, industrial crops and forestry trees (2001-2004)
- Microbial germ bank used in agriculture (annual project)
- FNCA biofertilizer project (2001-2006)

Senior research scientists in the following projects:

- R & D of N-fixing inoculant for rice and non legume crops (1991-1995)
- R & D of biocontrol to decreasing the crop diseases in Vietnam (1996-2000)
- R & D of biocompost from different wastes in Vietnam (1996-2000)
- Study on the Effective Microorganism preparation (EM) under vietnamese condition (1998-2001)
- ICRISAT/VASI watershed managment in Vietnam (1998-2002)

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FNCA Web Site: <http://www.fnca.jp/english/>

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