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Progress Report - Research Grant No. RG/AID/2

Investigators Dr. J.M.R.S. Bandara and Dr. G. Keerthisinghe visited NifTAL project and BNF research centre in Bangkok in March 1984. Report of the visit was submitted earlier. (Copy annexed for information.) Following this visit it was decided to continue on the inoculent production aspect of the programme initially.

The major constrain to inoculum production is the period of survival of Rhizobia in carrier materials used in inoculant. At present we are testing commonly available agricultural and industrial by-products as carriers for inoculant. The materials that are under investigations are coir dust, saw dust and rice husk in comparison to Peat. The peat - collected locally has been proved successful in a previous study. The peat is the commonly used carrier in most commercial inoculant. However, locally available peat collected from Horton plains is a scarce commodity and it is not cost beneficial for inoculant production. The carrier material should be cheap, it should be favourable for bacteria multiplication and growth. No inhibiting factors should be present, should be able prepare to required texture as a carrier. Carrier materials analysed for C, NH_4^+, NO_3^-, P was analysed using routine mathods and K, Na, Mg and Ca by atomic absorption spectroscopy. pH, water holding capacity and lime requirements of the carriers have been assessed.

SEP 27 1984

Finely dried materials were inoculated with Broth culture of Cowpea Rhizobium strain isolation from Winged bean (No. SUP 1,206). The survival of the bacteria is being assessed using direct isolation from samples of carrier after incubation at 26°C. Experiment will be continued at least for 90 days before its viability and ability of nodulation will be tested under control conditions.

Report of the visit to NifTAL Project of University of Hawaii at Paia, Maui, Hawaii, USA and to the BNF Resource Centre of NifTAL, Dept. of Agriculture, Banghan, Bangkok, Thailand

Participants - Dr. J.M.R.S. Bandara - Microbiologist
Dr. Gamini Meerthisinghe - Soil Scientist

We arrived at Kahului, airport at Maui on the 17th March 1984 and were kindly picked up by Mr. Heinz, Hoben, the Biochemist and the foreign training Co-ordinator of NifTAL - Mircen Project. We were provided with excellent accomodation at Kaun., Plaza by Dr. James King, Head Communication and Training.

After orientation at Paia on Sunday, we commenced our programme as scheduled by Head Communication on the 19th March, We spent the morning with Dr.James King on an informal discussion - an overview of the NifTAL Project. The other participants in this programme were, Dr. M. Majilis, Dr. M. Islam, Dr. F.A. Choudury and Dr. M. Ali of Bangladesh. They were with us for a very short period during the first week.

Schedule followed for the first week was to discuss the NIFTAL activities with the following scientists.

Dr.Paul Singleton - BNF & Soil fertility
Agronomist.

Dr. Joann Roskoski - Current research
Microbiologist &
Head Research Section.

Dr. Padma Somasegaran - Inoculant Production
Microbiologist,
Foreign Training Instructor.

Dr. Chris Van Kessel - N^{15} studies
Soil Scientist.

Mr. Heinz Hoben - Antiserum Production
Biochemist.

The reprints and research publications of NiFTAL scientists and others provided by Dr. James King were most useful in gathering information in BNF research. We were also informed about the facilities provided by NiFTAL to other scientists in tropics, such as supply and maintenance of Rhizobium cultures, antiserum for these cultures.

In addition to this audio visual models and projection slides on BNF activities are provided to interested scientists, BNF Bulletin edited by Dr. James King and Princess Ferguson keeps the scientists, in touch with the latest BNF news. Jim kindly offered his services to review scientific articles that are in preparation by us if needed.

From the discussions with Dr. Paul Singleton we gathered information on the influence of plant nutrients on the effectiveness of Rhizobia. The green house experiments on effect of P on the effectiveness of Rhizobium and the Mycorhizal transfer of P to crops are in progress to study these inter-relationships. Dr. Paul Singleton was very helpful in equainting us with their newst water purification system designed by them to obtain detoxified demineralised and sterile water. Pure sterile water is an essential item in aseptic inoculation studies of Rhizobia.

The benefit of tree legumes in tropic agriculture was demonstrated by the field trials conducted by Dr. Joann Roskoski. It was very clearly presented by her, that the tree legumes once established, needs minimum maintenance and provide beside N_2 fixation, forage for cattle, firewood, erosion control, aesthetic benefits, and important of the envoronment. These were further confirmed by visits to farmers fields and research fields.

Inoculant production is the main theme where all supporting research are based at NiFTAL. Comprehensive discussions with Dr. Somasegaran equipped us with sufficient information on latest development in techniques of inoculant produc tion. We were pleased to learn about the inoculant carrier studies and Padma's comments about similar work we are conducting at Peradeniya. We were also made aware of the procedures involved in the large scale commercial inoculant production. It is geared for on farm production. During this part of the programme it was demonstrat to us how simple equipment such as domestic or portable autoclave could be used for inoculant production. We were able to gather information on various other techniques in inoculant production and multiplication of Rhizobia,

It was great opportunity to listen and participate actively in a discussion on 15_N studies by Dr. Chrievan Kessel. We noted that according to his experience, techniques using 15_N provided better assessment of N_2 fixation than acetylene reduction assay that evaluated nitrogen are activity. Use of depleted 15_N for field studies to evaluate N_2 fixation seems to be more economical than use of conc. 15_N. However, the need for mass spectrophotometer for the detection of depleted 15_N amount is a limiting factor in countries like Sri Lanka.

It is absolutely imparative that one should be aware about the response to inoculation and ability to identify the bacterial strains that nodulate the legume plant. This is made possible and comment by serological methods used by Mr. Heinz Hoben, we were able to see ourselves the value of these techniques such as Immunofluorescence, Agglutination in identificationof nodulating strains of Rhizobia. We were able to participate in photographically recording of different plate prepared for identification of strain. Very often, it is not possible to obtain a comprehensive exposure to all steps of serum production in such a short stay. WE ARE grateful to Mr. Heinz Hobler for inviting us to accompany him to the field to collect serum samples from goats. Although it was not a pleasure for goats who donated blood for advancement of science it was a valuable experience for us.

We were also given the opportunity of meeting people involved in private sector agriculture, Our visit to Hawaian Commercial and Sugar Company at Puunene, Hawaii was beneficial to usin soil fertility aspects. Fertilizer evaluation studies and different test application systems carried out by them were the main topics discussed.

We realized that it is a difficult task to simplify science to farmers by attending Roger Watanabe's talk on liming. We wish to appreciate Jim's thoughtfulness in taking us in a late evening to such a discussion organised for the farmers by its extension.

We wish to thank Joann for her contribution towards preparation of the revised proposal to USAID. Her suggestions and criticisms are greatly appreciated. We like to note here that she feels, as a whole the project is practicable and acceptable but additional funds would be needed to complete the whole project.

Comments made by Director Dr. Jake Halliday are encouraging. His assurance and friendly attitude towards link between Sri Lankan BNF group and NIFTAL was most aplahdable.

We also visited the University of Hawaii at Honolulu and had fruitful discussions on soil fertility and BNF microbiology with;

I. Dr. Robert Fox
   Soil fertility. St. John 406A

2. Dr. Mitiku Habte
   Agrohomy and Soil Science Dept.
   St. John 203.

We appreciate Dr. Mac Arther's efforts in arranging these appointments.

Visit to BNF Resource Centre at Bangkok:

On our way back home we were pleased to spend few days at the BNF Resource Centre at Bangkok. Dr. Douglas Hack, Resource Centre Director was kind enough to take us around and explain the activities at BNF resource centre. We were impressed by the amount of work he has accomplished in a very short period in Bangkok. It is a difficult task to introduce the concept of inoculation, and the productioning quality inoculant in a developing country. It is more difficult to initiate real commercial scale inoculum production and maintain quality insuch a short period under such conditions. We are sure the organisation at Bangkok will definitely serve as a model for Sri Lanka in BNF activity.

We would like to thank Dr. Irwin Asher for making it possible to aquaint us with the recent development in BNF activities by funding this project. Our sincere thanks go to Mr. Oswin Silva and his colleagues at USAID Office in Colombo for providing us speedy assistance in organising this visit. We also thank NARESA staff for their help. Although few sentences cannot appreciate the assistance provided by Dr. Jim King and his efficient secretary Mrs. Princess Ferguson andPProject

Manager, Mrs. Karean Y. Zukeran, we wish to say a big thank you. Finally we must mention here that a friendly informal group of scientists at NiFTAL made us feel very homelyat Maui.

Dr. J.M.R.H. Bandara

Dr. G. Keerthisinghe

cc: Dr.Jim King
Dr. Jake Holliday
Dr. Douglas Back
Mr. Oswin Silva
Director General MARESA
Vice Chancellor