

# BIOLOGICAL NITROGEN FIXATION TECHNOLOGY FOR TROPICAL AGRICULTURE

Edited by  
Peter H. Graham  
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# Biological Nitrogen Fixation Technology for Tropical Agriculture

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## FOREWORD

In recent years there has been a great surge of interest and activity in the field of biological nitrogen fixation. Rightly so, since the increased cost of energy and the growing demand for nitrogen fertilizer is expected to cause dramatic increases in the price of this commodity in the years ahead. As we struggle to feed a growing and hungry world, the need for a better understanding and a fuller application of the mechanism of biological nitrogen fixation is, however, of perhaps even greater importance than is apparent from the problems of cost and supply mentioned above. Most of the food in the tropical developing countries is produced by subsistence farmers, whose resource base is so small, and whose physical access to supply markets so limited, that they cannot take full advantage of new technologies that are overly dependent on purchased inputs. Biological nitrogen fixation, used appropriately, could reduce the production constraints facing these farmers in the many nitrogen-deficient soils of the world.

The importance of this subject was illustrated by the attendance at this meeting: 178 participants from 33 countries. But this was not just another international conference on biological nitrogen fixation. As its title indicates this was a workshop — not just a presentation of formal papers, but a series of discussions on what to do with this knowledge, and how to work together in its development and application. Indeed, one of the stated objectives of the workshop was to develop cooperative links, and in this I believe it has been highly successful. Also important was the applied nature of the workshop, which has been involved with seeking technology for tropical agriculture — a task relevant to the many hungry regions of the world.

All of CIAT's programs adhere to the common philosophy of relevance, complementarity, and minimum inputs. *Relevance*, because CIAT is an institute dedicated to the generation of technology that will enhance agricultural production and productivity. *Complementarity*, because CIAT recognizes that it is only one link in the cooperative network of national programs and institutions working in the field of scientific research and agricultural development, and that it will play its part effectively only if it works in close collaboration with other institutes. *Minimum inputs* to keep the production costs of all new technology within the reach of the small and less advantaged farmers. Since these three elements of CIAT's philosophy were all central to the biological nitrogen fixation workshop, CIAT was delighted to share with the University of Hawaii NifTAL Project and ICRISAT the co-sponsorship of the workshop, and to host it.

I would like to thank the co-sponsors for this very successful cooperative effort and to record their gratitude for the cooperation received from ADAB,

the Boyce Thompson Institute, Cornell University, the East-West Center, ICARDA, INTSOY, IRRI, North Carolina State University, UNESCO, University of Puerto Rico, USAID and USDA. I am sure I speak for all the cosponsors, cooperators and participants, in expressing the hope that these proceedings will stimulate greater cooperation in the application of our knowledge of nitrogen fixation to the benefit of farmers and consumers in the tropics.

**JOHN L. NICKEL**

Director General

**CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL**

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## KEYNOTE ADDRESSES



# TABLE OF CONTENTS

	Pages
<b>Foreword</b>	<b>iii</b>
J.L. Nickel	
<b>Acknowledgements</b>	<b>v</b>
<b>Sponsorship</b>	<b>v</b>
<b>Section 1: Keynote addresses</b>	
<i>Biological nitrogen fixation — problems and potential</i> A. App & A. Eaglesham	1
<i>A role for legumes in tropical agriculture</i> M.J.T. Norman	9
<b>Section 2: Plant factors affecting N<sub>2</sub> fixation</b>	
<i>Plant factors affecting symbiotic nitrogen fixation in legumes</i> P.H. Graham	27
<i>Selection for enhanced nitrogen fixation in common beans</i> (Phaseolus vulgaris) J. McFerson, F.A. Bliss & J.C. Rosas	39
<i>Biological nitrogen fixation as a criterion for soybean breeding: Preliminary results</i> M.S. Chowdhury & A.L. Doto	45
<i>Genetic manipulation of nodulation in groundnut</i> P.T.C. Nambiar, P.J. Dart, S.N. Nigam, & R.W. Gibbons	49
<i>Screening for nodulation characteristics in chickpea and subsequent generation of seeds</i> O.P. Rupela & P.J. Dart	57
<i>Influence of plant genotype on some parameters of nitrogen fixation in Phaseolus vulgaris</i> F.F. Duque, L.T.G. Salles, J.C. Pereira, & J. Döbereiner	63

<i>Host-plant factors affecting nitrogen fixation of the peanut</i> J.C. Wynne, S.T. Ball, G.H. Elkan, T.G. Isleib, & T.J. Scheneweis	67
<i>Energy cost of biological nitrogen fixation</i> M.C.P. Neves	77
<i>The mechanism of recognition between legume roots and rhizobia: Some implications for biological nitrogen fixation in the tropics</i> F.B. Dazzo	93
<b>Section 3: Technology for inoculant production</b>	
<i>Modern concepts in legume inoculation</i> J.C. Burton	105
<i>The storage, quality control, and use of legume seed inoculants</i> R.J. Roughley	115
<i>Culturing Rhizobium in large-scale fermentors</i> A.P. Balatti	127
<b>Section 4: Environmental factors affecting symbiotic N<sub>2</sub> fixation</b>	
<i>Soil constraints to legume production</i> D.N. Munns & A.A. Franco	133
<i>Effects of inoculation, nitrogen fertilizer, salinity, and water stress on symbiotic N<sub>2</sub> fixation by Vicia faba and Phaseolus vulgaris</i> A.S. Abdei-Ghaffar, H.A. El-Attar, M.H. El-Halfawi, & A.A. Abdel Salam	153
<i>Influence of molybdenum on nitrogen fixation by white clover in the Bogota savanna</i> A. Lozano de Yunda & N. Mora de González	161
<i>Nitrogen and phosphorus requirements for the growth and nodulation of Cajanus cajan in Panamanian soils</i> B.C. Hernandez, J.M. Méndez-Lay & D.D. Focht	167

<i>The legume/Rhizobium association as affected by high root temperature</i> F. Munévar & A.G. Wollum II	173
<i>Microbial constraints to legume symbiosis</i> C. Vidor	183
<i>Susceptibility of Rhizobium strains to antibiotics: A possible reason for legume inoculation failure in cerrado soils</i> M.R.M.M.L. Scotti, N.M.H.Sa, M.A.T. Vargas, & J. Döbereiner	195
<i>Survival of streptomycin-resistant mutants of Rhizobium phaseoli in nonsterile soil</i> C. Vidor, P.E. Lovato & R.H. Miller	201
<i>Survival of cowpea rhizobia as affected by soil temperature and moisture</i> Nantakorn Boonkerd & R.W. Weaver	207
<i>Study of Rhizobium in the legume rhizosphere</i> M.P. Salema, C.A. Parker, D.K. Kidby, & D.L. Châtel	213
<i>The physical effect of drying and rehydrating Rhizobium on inoculated seed</i> M.P. Salema, C.A. Parker, D.K. Kidby & D.L. Chatel	219
<b>Section 5: Inoculation trials</b>	
<i>The International Bean Inoculation Trial (IBIT): results for the 1978-1979 trial</i> P.H. Graham, C. Apolitano, R. Ferrera-Cerrato, J. Halliday, E. Lepiz, O. Menendez, R. Rios, S.M.T. Saito, & S. Viteri	223
<i>Multi-locational field responses of Phaseolus vulgaris to inoculation in eastern Africa</i> S.O. Keya, V.R. Balasundaram, H. Ssali, & C. Mugane	231
<i>Alternate inoculation methodologies for bean farmers in tropical countries</i> J.B. Sartain, D.H. Hubbell, & O. Menendez	235

<i>Response of groundnut (Arachis hypogaea) to inoculation</i> P.T.C. Nambiar, P.J. Dart, B. Srinivasa Rao & H.N. Ravishankar	241
<i>Inoculation trials on groundnuts (Arachis hypogaea) in Sudan</i> M.A. Hadad, T.E. Loynachan & M.M. Musa	249
<i>Field responses to Rhizobium inoculation in Arachis hypogaea, Vigna spp. and Dolichos spp. in India</i> S.V. Hegde	257
<i>Response of pigeonpea to Rhizobium inoculation in northern India</i> R.P. Pareek	265
<i>Response of green gram (Vigna radiata) and cowpea (Vigna unguiculata) to inoculation with rhizobia from wild legumes</i> J.S. Srivastava & V.P. Tewari	269
<b>Section 6: N<sub>2</sub> fixation in grain legumes</b>	
<i>The characterization of new Rhizobium japonicum germplasm</i> H.H. Keyser & D.F. Weber	275
<i>Management of the cowpea/Rhizobium symbiosis under stress conditions</i> V. Marcarian	279
<i>Research on the inoculation of Glycine max and Vicia faba in Egypt</i> Y.A. Hamdi & M.N. Alaa El-Din	287
<i>Cowpea group Rhizobium in soils of the semiarid tropics</i> J.V.D.K. Kumar Rao, P.J. Dart & M. Usha Khan	291
<i>The effects of fertilizer nitrogen and Rhizobium inoculation on the yield of cowpeas and subsequent crops of maize</i> S.K. Mughogho, J. Awai, H.S. Lowendorf, & D.J. Lathwell	297
<i>Effect of nitrogen fertilization on leaf nitrate reductase and nodule nitrogenase activity in soybeans</i> T.C. Juang, C.C. Tann & S.C.S. Tsou	303

- Studies on the persistence of introduced strains of Rhizobium japonicum in soil during fallow, and the effects on soybean growth and yield*  
V. Ranga Rao, G. Thottapilly & A. Ayanaba 309

- Effects of supplemental nitrogen on nodulation, assimilation of nitrogen, growth, and seed yield of Phaseolus vulgaris and Vigna unguiculata*  
M.S. Fernández, M.C.P. Neves & M.F.M. Sá 317

- Profiles of ureides and amino acids in exudates from senescing soybean nodules*  
L.L. Shearman & R.V. Klucas 327

## **Section 7: N<sub>2</sub> fixation in pasture legumes**

- Native legumes in Minas Gerais State, Brazil*  
N.M.S. Costa 337

- Nitrogen fixation and forage characterization of Aeschynomene spp. in a subtropical climate*  
K.H. Quensenberry, S.L. Albrecht & J.M. Bennett 347

- Legume establishment in pangolagrass pastures in the humid tropics*  
W.B. Bryan & E.R. Velásquez 355

- The role of legumes in mixed pastures*  
A.S. Whitney 361

- The importance of legume cover crop establishment for cultivation of rubber (Hevea brasiliensis) in Malaysia*  
Chee Yan Kuan 369

- Improving the growth and nodulation of alfalfa in southern Chile with selected Rhizobium strains, inoculation methods, cultivars, and nutrient applications*  
W.M. Murphy, L.E. Barber, O. Romero Y., & M. Fernández del Pozo 379

## **Section 8: N<sub>2</sub> fixation in trees**

- Ensuring effective symbiosis in nitrogen-fixing trees*  
Y. Dommergues 395

<i>Nitrogen-fixing tree resources: Potentials and limitations</i> J.L. Brewbaker, R. Van Den Beldt & K. MacDicken	413
<i>Casuarina: Actinorhizal nitrogen-fixing tree of the tropics</i> J.G. Torrey	427
<i>Sesbania rostrata as a green manure for rice in west Africa</i> G. Rinaudo, B. Dreyfus & Y. Dommergues	441
<i>Nitrogen fixation by tropical woody legumes: Potential source of soil enrichment</i> J.P. Roskoski, J. Montano, C. van Kessel, & G. Castilleja	447
<i>Response of Leucaena leucocephala to inoculation in a soil of pH 5.5</i> J.E. Almeida, M.J. Valarini y E.S. Lopes	455
<b>Section 9: Associative N<sub>2</sub> fixation</b>	
<i>Field inoculation of grasses with Azospirillum</i> Y. Okon	459
<i>Emerging technology based on biological nitrogen fixation by associative N<sub>2</sub>-fixing organisms</i> J. Döbereiner	469
<i>Nitrogen fixation in paddy soils in Egypt</i> Y.Z. Ishac, S.A.Z. Mahmoud, M.N. Alaa El-Din, W.A. Mashhoor, & M.N.A. Omar	485
<i>Nitrogen fixation in artificial associations of nonlegumes and Rhizobium</i> D. Hess	491
<i>Perspectives on biological nitrogen fixation in sugarcane</i> A.P. Ruschel	497
<i>Associative dinitrogen fixation in Diplachne fusca (Kaller grass)</i> K.A. Malik, Y. Zafar & A. Hussain	503
<i>Nonsymbiotic nitrogen-fixing bacteria in soils from Patagonia</i> M.G. Pozzo Ardizzi de Fidel	509

- Some pertinent remarks on  $N_2$  fixation associated with the roots of grasses*  
P. van Berkum, C.R. McClung & C. Sloger 513

- Studies on Azospirillum/ Amaranthus interrelationships*  
G. Oblisami & V. Udhayasurian 527

- Effect of Azobacter inoculation and nitrogen fertilization on the yield of seed potatoes in the coastal area of Peru*  
J. Zapater R. 533

#### **Section 10: The Azolla/ Anabaena association**

- Chinese technology for the cultivation of Azolla*  
T.A. Lumpkin 537

- The effect of species of Azolla under three management practices on the yield of paddy rice*  
T.A. Lumpkin, Li Zhuo-sing, Zu Shou-xian, & Mao Mei-fei 549

- The nitrogen balance of paddy fields cropped two to three times per year to cereal grains, including rice*  
Lee Shi Ye 555

- Propagation of an Azolla sp. and its potential as a green manure for corn in Mexico*  
R. Ferrara-Cerrato & A. Miranda Romero 561

- The use of Azolla in west Africa*  
P.A. Reynaud 565

- Some experiments on the use of Azolla for rice production in Indonesia*  
S. Brotonegoro, M. Sudjadi, S. Partohardjono,  
H. Sukiman, T. Prihatini, & V. Hendriks 567

#### **Section 11: Critique of methodologies**

- $^{15}N$  research as a tool in biological nitrogen fixation research*  
P.B. Vose, A.P. Ruschel, R.L. Victoria, S.M.T. Saito,  
& E. Matsui 575

<i>A whole-system approach to quantifying biological nitrogen fixation by legumes and associated gains and losses for nitrogen in agricultural systems</i> D.F. Herridge	593
<i>Quantification of symbiotic nitrogen fixation using ureides:</i> <i>A review</i> D.L. McNeil	609
<i>Genetic fingerprinting as a tool in research on biological nitrogen fixation</i> J.E. Beringer	619
<i>Application of inherent antibiotic resistance to ecological studies of rhizobia</i> O.P. Rupela, D.P. Josey, B. Toomsan, S. Mittal, & P.J. Dart	625
<b>Section 12: General considerations</b>	
<i>The nitrogen relationships of maize/bean associations</i> S.M.T. Saito	631
<i>Assessing the nitrogen contribution of cowpea (Vigna unguiculata) in monoculture and intercropped</i> A.R.J. Eaglesham	641
<i>Nitrogen fixation by groundnut (Arachis hypogaea) in intercropped and rotational systems</i> P.C.T. Nambiar, M.R. Rao, M.S. Reddy, C. Floyd, P.J. Dart, & R.W. Willey	647
<i>Effect of cowpeas in cereal rotations on conditions in Upper Volta</i> W.A. Stoop & J.P. van Staveren	653
<i>Residual effects of pigeonpea (Cajanus cajan)</i> J.V.D.K. Kumar Rao, P.J. Dart & P.V.S. Subrahmanya Sastry	659
<i>A technology assessment of biological nitrogen fixation</i> R.H. Randolph & B. Koppel	665



<i>Economic analysis of biological nitrogen fixation</i> D.E. Welsch	675
<i>Research and development for biological nitrogen fixation in India</i> G. Rangaswami	683
<i>The Brazilian program in biological nitrogen fixation</i> J. Döbereiner	687
<i>Internationally sponsored development of biological nitrogen fixation technology</i> S.C. Harris	689
<i>Research on biological nitrogen fixation in the international agricultural research centers</i> P.H. Graham	695
<b>Participants</b>	707