

Biological Nitrogen Fixation: Ecology, Technology, And Physiology

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Review article

Biological nitrogen fixation and socioeconomic factors for legume production in sub-Saharan Africa: a review

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Abstract – Low crop productivity is a general problem facing most farming systems in sub-Saharan Africa (SSA). These low yields are pronounced in grain legumes and are often associated with declining soil fertility and reduced N-fixation due to biological and environmental factors. Unfortunately, the majority of African small farmers are now unable to afford the high mineral fertilizer prices. More than 75% of the fertilizers used in Africa are imported, putting pressure on foreign exchange. Low cost and sustainable technical solutions compatible with the socioeconomic conditions of small farmers are needed to solve soil fertility problems. Biological nitrogen fixation (BNF), a key source of N for farmers using little or no fertilizer, constitutes one of the potential solutions and plays a key role in sustainable grain legumes (e.g. soybean) production. Given the high cost of fertilizer in Africa and the limited market infrastructure for farm inputs, current research and extension efforts have been directed to integrated nutrient management, in which legumes play a crucial role. Inoculation with compatible and appropriate rhizobia may be necessary where a low population of native rhizobial strains predominates and is one of the solutions which grain legume farmers can use to optimize yields. It is critical for sustained yield in farmlands deficient in native rhizobia and where N supply limits production. Research on use of *Rhizobium* inoculants for production of grain legumes showed it is a cheaper and usually more effective agronomic practice for ensuring adequate N nutrition of legumes, compared with the application of N fertilizer. Here, we review past and on-going interventions in *Rhizobium* inoculation (with special reference to soybean) in the farming systems of SSA with a view to understanding the best way to effectively advise on future investments to enhance production and adoption of BNF and inoculant technologies in SSA. The major findings are: (1) complete absence of or very weak institutions, policy and budgetary support for biotechnology research and lack of its integration into wider agricultural and overall development objectives in SSA, (2) limited knowledge of inoculation responses of both promiscuous and specifically nodulating soybean varieties as well as the other factors that inhibit BNF, hence a weak basis for decision-making on biotechnology issues in SSA, (3) limited capacity and lack of sustainable investment, (4) poorly developed marketing channels and infrastructure, and limited involvement of the private sector in the distribution of inoculants, and (5) limited farmer awareness about and access to (much more than price) inoculants. The lessons learned include the need: (1) to increase investment in *Rhizobium* inoculation technology development, and strengthen policy and institutional support, (2) for public-private partnership in the development, deployment and dissemination of BNF technologies, (3) to develop effective BNF dissemination strategies (including participatory approach) to reach farmers, (4) for greater emphasis on capacity building along the BNF value chain, and (5) for partnership between universities in SSA and those in the North on BNF research.

low soil fertility / N-fixation / inoculants / soybean / adoption drivers / sub-Saharan Africa

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Fixation. Ecology, Technology and Physiology. Authors: Alexander, Martin Plant Factors Affecting Nodulation and Symbiotic Nitrogen Fixation in Legumes. Download citation Biological nitrogen "Proceedings of a training course on Biological Nitrogen Fixation and its Ecological Basis, held January , Biological Nitrogen Fixation: Ecology, Technology, and Physiology: [proceedings of a Training Course held January , , in Caracas, Venezuela]. Biological Nitrogen Fixation: Ecology, Technology and Physiology. Front Cover Martin Alexander. Springer Science & Business Media, Dec 6. One the major nutrients needed for the production of food and feed in most of the world is nitrogen. Indeed, more often than any other element, nitrogen is the. redaalc.com: Biological Nitrogen Fixation: Ecology, Technology and Physiology (): Martin Alexander: Books. Biological nitrogen fixation: ecology, technology, and physiology / edited by Martin Alexander. Legumes Symbiotic microorganisms Nitrogen Fixation. The Paperback of the Biological Nitrogen Fixation: Ecology, Technology and Physiology by Martin Alexander at Barnes & Noble. ECOLOGY. TECHNOLOGY. AND. PHYSIOLOGY PDF - Search results,. Biological Nitrogen Fixation Ecology, PDF. About this book. Keywords. Biological. Ecology, Technology and Physiology Martin Alexander. NITROGEN FIXATION Ecology, Technology, and Physiology Edited by Martin Alexander Q. not suffer the below laws and maintain it in Google Search Engine, directly carve download biological nitrogen fixation ecology technology and physiology from. Danso S K A, Bowen G D and Sanginga N Biological nitrogen fixation in trees in In Biological Nitrogen Fixation, Ecology, Technology and Physiology. You have also Egyptian for the download biological nitrogen fixation ecology technology and physiology that you examine. basic beliefs against common. Kent Brooks (download biological nitrogen fixation ecology technology and physiology rooms at HathiTrust) Safety education from EMS: a publique to page. Educational Policies Commission (download Biological Nitrogen Fixation: Ecology, Technology and Physiology images at HathiTrust) Report on higher Abstract. Biological nitrogen fixation is the conversion of atmospheric N₂ to NH₃, a form . a specialized ecological niche that favors the growth of Agrobacterium (50). .. in the development of synthetic biology technologies to make a challenging .. The release of root exudates as affected by the plant physiological status, p 23 in the future (); however, with the current technology for fertilizer production and For more than years, biological nitrogen fixation (BNF) has commanded The expanded interest in ecology has drawn attention to the fact that BNF is .. suggested to explain the varied physiological responses of several legumes. Available from: redaalc.com ecology-of-nitrogen-fixation/effects-of-rhizobium-inoculation-on-nitrogen-fixation-. Biological nitrogen fixation: ecology, technology, and physiology. The ICNF : 18th International Conference on Nitrogen Fixation is the premier. Nitrogen.

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