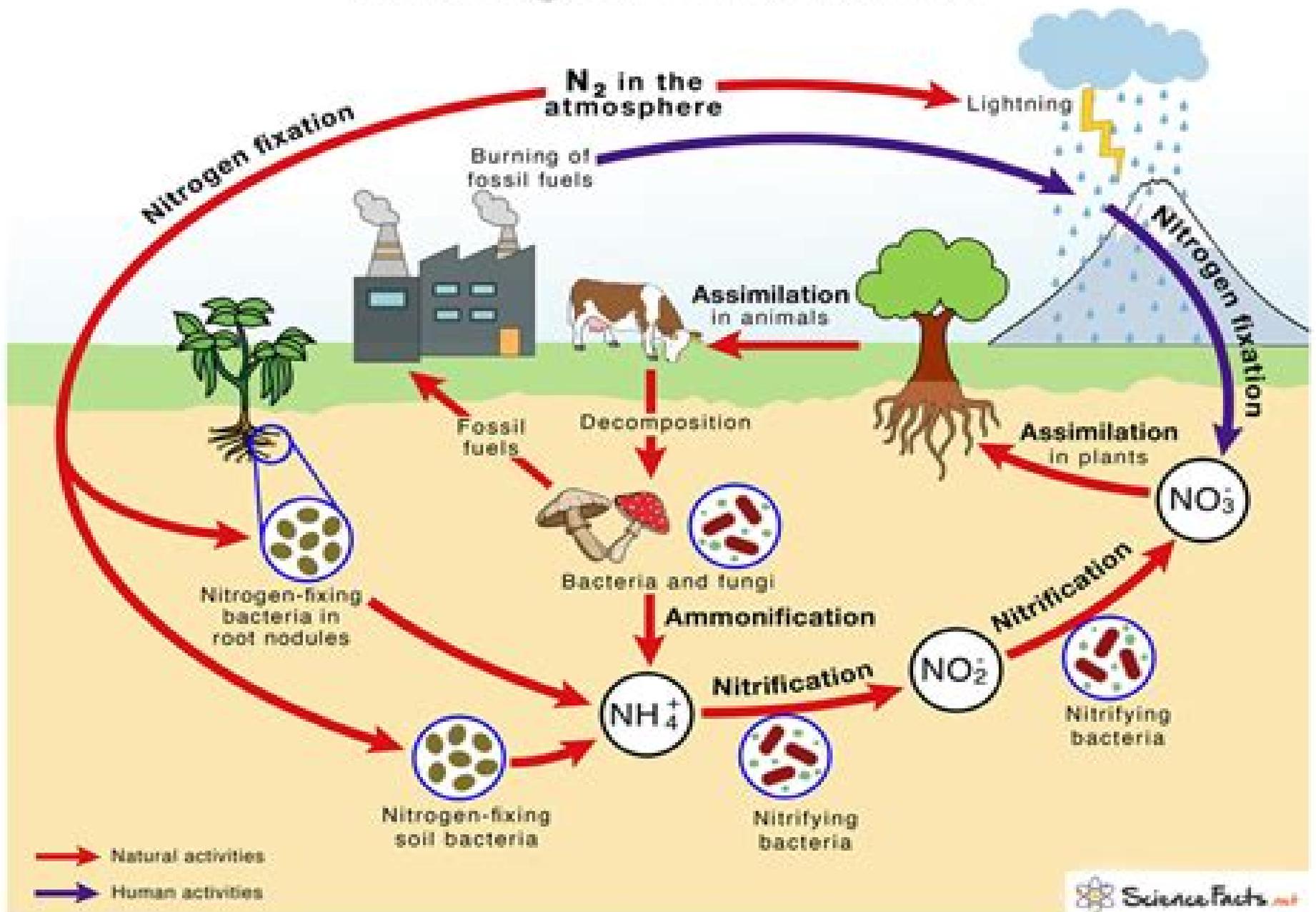


Nitrogen Fixation



Biological Nitrogen Fixation

Frans J. de Bruijn



Biological Nitrogen Fixation:

Nitrogen Fixation John Raymond Postgate, 1998-10-15 This book provides an introductory level survey of biological nitrogen fixation covering the role of the process in the global nitrogen cycle as well as its biochemistry physiology genetics ecology general biology and prospects for its future exploitation **Biological Nitrogen Fixation** Gary S. Stacey, Robert H. Burris, Harold J. Evans, 1992-04-30 Phylogenetic classification of nitrogen fixing organisms Physiology of nitrogen fixation in free living heterotrophs Nitrogen fixation by photosynthetic bacteria Nitrogen fixation in cyanobacteria Nitrogen fixation by methanogenic bacteria Associative nitrogen fixing bacteria Actinorhizal symbioses Ecology of bradyrhizobium and rhizobium The rhizobium infection process Physiology of nitrogen fixing legume nodules compartments and functions Hydrogen cycling in symbiotic bacteria Evolution of nitrogen fixing symbioses The rhizobium symbiosis of the nonlegume parasponia Genetic analysis of rhizobium nodulation Nodulins in root nodule development Plant genetics of symbiotic nitrogen fixation Molecular genetics of bradyrhizobium symbioses The enzymology of molybdenum dependent nitrogen fixation Alternative nitrogen fixation systems Biochemical genetics of nitrogenase Regulation of nitrogen fixation genes in free living and symbiotic bacteria Isolated iron molybdenum cofactor of nitrogenase **Biological nitrogen fixation in forest ecosystems: foundations and applications** John C. Gordon, C.T. Wheeler, 1983-09-30 Silvicultural systems and biological nitrogen fixation Morphology of nitrogen fixers in forest ecosystems Taxonomy and distribution of non legume nitrogen fixing systems Isolation and culture of nitrogen fixing organisms Wheeler biochemical physiological and environmental aspects of symbiotic nitrogen fixation Analysis of nitrogen fixation Agricultural and horticultural systems implications for forestry Nitrogen fixing plants in forest plantation management Nitrogen fixation in North American forestry research and application Application of biological nitrogen fixation in European silviculture Nitrogen fixation in Southeast Asian forestry research and practice Biological nitrogen fixation in forestry research and practice in Australia and New Zealand *Biological Nitrogen Fixation for the 21st Century* Claudine Elmerich, Adam Kondorosi, William E. Newton, 2013-12-01 Nitrogen availability is one of the most critical factors that limits plant productivity The largest reservoir of nitrogen is the atmosphere but this gaseous molecular nitrogen only becomes available to plants through the biological nitrogen fixation process which only prokaryotic cells have developed The discovery that microbes were providing fixed nitrogen to legumes and the isolation of the first nitrogen fixing bacteria occurred at the end the 19th Century in Louis Pasteur's time We are now building on more than 100 years of research in this field and looking towards the 21st Century The International Nitrogen Fixation Congress series Started more than 20 years ago The format of this Congress is designed to gather scientists from very diverse origins backgrounds interests and scientific approaches and is a forum where fundamental knowledge is discussed alongside applied research This confluence of perspectives is we believe extremely beneficial in raising new ideas questions and concepts **Biological Nitrogen Fixation** Martin Alexander, 2012-12-06 In ten chapters attention is paid to taxonomy metabolism

ecology limiting soil and plant factors breeding and selection of Rhizobium and to the associative nitrogen fixation of Azospirillum Also the current use of legume inoculant technology is considered *Biological Nitrogen Fixation, 2 Volume Set* Frans J. de Bruijn, 2015-07-07 Nitrogen is arguably the most important nutrient required by plants However the availability of nitrogen is limited in many soils and although the earth's atmosphere consists of 78.1% nitrogen gas N₂ plants are unable to use this form of nitrogen To compensate modern agriculture has been highly reliant on industrial nitrogen fertilizers to achieve maximum crop productivity However a great deal of fossil fuel is required for the production and delivery of nitrogen fertilizer Moreover carbon dioxide CO₂ which is released during fossil fuel combustion contributes to the greenhouse effect and run off of nitrate leads to eutrophication of the waterways Biological nitrogen fixation is an alternative to nitrogen fertilizer It is carried out by prokaryotes using an enzyme complex called nitrogenase and results in atmospheric N₂ being reduced into a form of nitrogen diazotrophic organisms and plants are able to use ammonia It is this process and its major players which will be discussed in this book Biological Nitrogen Fixation is a comprehensive two volume work bringing together both review and original research articles on key topics in nitrogen fixation Chapters across both volumes emphasize molecular techniques and advanced biochemical analysis approaches applicable to various aspects of biological nitrogen fixation Volume 1 explores the chemistry and biochemistry of nitrogenases nif gene regulation the taxonomy evolution and genomics of nitrogen fixing organisms as well as their physiology and metabolism Volume 2 covers the symbiotic interaction of nitrogen fixing organisms with their host plants including nodulation and symbiotic nitrogen fixation plant and microbial omics cyanobacteria diazotrophs and non legumes field studies and inoculum preparation as well as nitrogen fixation and cereals Covering the full breadth of current nitrogen fixation research and expanding it towards future advances in the field Biological Nitrogen Fixation will be a one stop reference for microbial ecologists and environmental microbiologists as well as plant and agricultural researchers working on crop sustainability *Biological Nitrogen Fixation* Nanjappa Shamanna Subba Rao, 1988 *The Biology of Nitrogen Fixation* Anton Quispel, 1974 General introduction Methodology Free living heterotrophic nitrogen fixing bacteria Nitrogen fixation in the phyllosphere Photosynthetic bacteria Blue green algae Associations with blue green algae Root nodule symbioses with Rhizobium Root nodule symbioses with actinomycete like organisms Development of root nodule symbioses Putative nitrogen fixation in other symbioses The enzyme system Genetics of N₂ fixing organisms Prerequisites for biological nitrogen fixation **Management of Biological Nitrogen Fixation for the Development of More Productive and Sustainable Agricultural Systems** J.K. Ladha, M.B. Peoples, 1995-09-30 Reprinted from Plant and Soil v 174 nos 1 2 1995 this volume is devoted to discussions on the role of biological nitrogen fixation BNF in agricultural sustainability Papers presented on BNF in crop forage and tree legumes are augmented with discussion of integrated farming systems involving BNF soil and N management and recycling of legume residues BNF by non legumes is discussed and attempts to transform cereals into nodulating plants are critically

reviewed Also described are advances in the development of new methodologies to understand symbiotic interactions and to assess N₂ fixation in the field means of enhancing BNF through plant and soil management breeding and selection problems encountered in exploiting BNF under farmers field conditions and promising approaches to improve BNF exploitation Lacks a subject index Annotation copyright by Book News Inc Portland OR *Nitrogen Fixation: Biology and Ecology* Sara Langer, 2021-11-16 The process of converting atmospheric nitrogen into ammonia and other nitrogenous compounds in soil is termed as nitrogen fixation Most of the biological nitrogen is fixed by prokaryotic bacteria A few of these are cyanobacteria azotobacter azospirillum rhizobium and bradyrhizobium Clover soybean peanut etc are some of the plants which help in nitrogen fixation process These processes are part of the nitrogen cycle They are of utmost significance in agriculture as nitrogen is required for the synthesis of various organic compounds like amino acids nucleic acids and proteins Nitrogen is also fixed by natural phenomenon such as lightning It is also responsible for the formation of nitrogen oxides which may react with water to form nitrous acid or nitric acid The acids seep into the soil where they are converted into nitrates This book includes some of the vital pieces of work being conducted across the world on various topics related to nitrogen fixation From theories to research to practical applications case studies related to all contemporary topics of relevance to this field have been included in it This book is a vital tool for all researching or studying the biological and ecological aspects of nitrogen fixation as it gives incredible insights into emerging trends and concepts Biological Nitrogen Fixation, Sustainable Agriculture and the Environment Yi-Ping Wang, Min Lin, Zhe-Xian Tian, Claudine Elmerich, William E. Newton, 2006-01-30 The 14th International Nitrogen Fixation Congress was held in Beijing China from October 27th through November 1st 2004 This volume constitutes the proceedings of the Congress and represents a compilation of the presentations by scientists from more than 30 countries around the World who came to Beijing to discuss the progress made since the last Congress and to exchange ideas and information This year marked the 30th anniversary of the first Congress held in Pullman Washington USA in 1974 Since then this series of Congresses has met five times in North America three in the United States and once each in Canada and Mexico once in South America Brazil four times in Western Europe once each in Spain The Netherlands Germany and France once in Eastern Europe Russia and once in Australia and now for the first time in Asia China was a most appropriate choice because China is a big country with the largest population in the World about 1.3 billion people which is about 22% of the World's population It is traditionally an agricultural country even though China has only 7% of the available farming land This situation explains why agriculture and its productivity are major issues for the Chinese people its government and the scientists in the field **Nitrogen Fixation in Agriculture, Forestry, Ecology, and the Environment** Dietrich Werner, William E. Newton, 2005-10-24 Sustainability has a major part to play in the global challenge of continued development of regions countries and continents all around the World and biological nitrogen fixation has a key role in this process This volume begins with chapters specifically addressing crops of major global

importance such as soybeans rice and sugar cane It continues with a second important focus agroforestry and describes the use and promise of both legume trees with their rhizobial symbionts and other nitrogen fixing trees with their actinorhizal colonization An over arching theme of all chapters is the interaction of the plants and trees with microbes and this theme allows other aspects of soil microbiology such as interactions with arbuscular mycorrhizal fungi and the impact of soil stress factors on biological nitrogen fixation to be addressed Furthermore a link to basic science occurs through the inclusion of chapters describing the biogeochemically important nitrogen cycle and its key relationships among nitrogen fixation nitrification and denitrification The volume then provides an up to date view of the production of microbial inocula especially those for legume crops

Biological Nitrogen Fixation Frans J. de Bruijn, 2015-06-12 Nitrogen is arguably the most important nutrient required by plants However the availability of nitrogen is limited in many soils and although the earth's atmosphere consists of 78.1% nitrogen gas N_2 plants are unable to use this form of nitrogen To compensate modern agriculture has been highly reliant on industrial nitrogen fertilizers to achieve maximum crop productivity However a great deal of fossil fuel is required for the production and delivery of nitrogen fertilizer Moreover carbon dioxide CO_2 which is released during fossil fuel combustion contributes to the greenhouse effect and run off of nitrate leads to eutrophication of the waterways Biological nitrogen fixation is an alternative to nitrogen fertilizer It is carried out by prokaryotes using an enzyme complex called nitrogenase and results in atmospheric N_2 being reduced into a form of nitrogen diazotrophic organisms and plants are able to use ammonia It is this process and its major players which will be discussed in this book

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Biological Fixation of Nitrogen for Ecology and Sustainable Agriculture Andrzej Legocki, Hermann Bothe, Alfred Pühler, 2013-06-29 Biological nitrogen fixation BNF the conversion of molecular nitrogen into ammonia is one of the most important reactions in ecology and agriculture It is performed exclusively by microbes prokaryotes that live in symbiosis with plants This book summarizes the latest research on this reaction the participating microbes and the genetics of how their relevant genes could be transferred into the plants In the light of a more sustainable

and less ecologically damaging agriculture this is becoming an increasingly pressing issue Current Developments in Biological Nitrogen Fixation N. S. Subba Rao, 1984 This volume discusses the most recent advances in biological nitrogen fixation with chapters written by experts on the ecology physiology biochemistry and genetics of biological nitrogen fixation

Biological Nitrogen Fixation: Towards Poverty Alleviation through Sustainable Agriculture Felix D.

Dakora, Samson B. M. Chimphango, Alex J. Valentine, Claudine Elmerich, William E. Newton, 2008-06-26 Poverty is a severe problem in Africa Asia South America and even in pockets of the developed world Addressing poverty alleviation via the expanded use of biological nitrogen fixation in agriculture was the theme of the 15th International Congress on Nitrogen Fixation Because nitrogen fixation research is multidisciplinary exploiting its benefits for agriculture and environmental protection has continued to attract research by diverse groups of scientists including chemists biochemists plant physiologists evolutionary biologists ecologists agricultural scientists extension agents and inoculant producers The 15th International Congress on Nitrogen Fixation was held jointly with the 12th International Conference of the African Association for Biological Nitrogen Fixation This joint Congress was hosted in South Africa at the Cape Town International Convention Centre 21-26 January 2007 and was attended by about 200 registered participants from 41 countries world wide During the Congress some 100 oral and approximately 80 poster papers were presented The wide range of topics covered and the theme of the Congress justifies this book's title Nitrogen Fixation Applications to Poverty Alleviation Biological Nitrogen Fixation, Biological Nitrogen Fixation Frans J. de Bruijn, 2015-04-27 Biological Nitrogen Fixation is a comprehensive 3 volume work bringing together both review and original research articles on key topics in nitrogen fixation Chapters across all three volumes emphasize molecular techniques and advanced biochemical analysis approaches applicable to various aspects of biological nitrogen fixation but each volume also has a unique focus Volume I explores the chemistry and biochemistry of nitrogenases nif gene regulation the taxonomy evolution and genomics of nitrogen fixing organisms as well as their physiology and metabolism Volume II covers the symbiotic interaction of nitrogen fixing organisms with their host plants including nodulation and symbiotic nitrogen fixation Volume III features chapters on the omics of nitrogen fixing organisms and host plants nitrogen fixing cyanobacteria and archaea nitrogen fixing plant growth promoting rhizobacteria and non legumes as well as field studies and nitrogen fixation in cereals Covering the full breadth of current nitrogen fixation research and synthesizing it to point the way forward Biological Nitrogen Fixation will be a one stop reference for microbial ecologists and environmental microbiologists as well as plant and agricultural researchers working on crop sustainability

Limitations and Potentials for Biological Nitrogen Fixation in the Tropics J. Dobereiner, 2013-03-09

The 15th Latin American Symposium IAS held in Brasilia FD on 11-18 February 1977 on a topic of great interest for agriculture especially in the tropics Many new developments have taken place in the field of research in N₂ fixation during the last few years They were made possible by the improved methods of measuring of nitrogenase activity progress in genetic engineering fields and

the increased interest in taking advantage of natural sources for biological nitrogen fixation The approach used in this Symposium together with the one held four months earlier in Brookhaven on Genetic Engineering for Nitrogen Fixation gives an interesting picture of the present status of nitrogen fixation from two diverse approaches This is my 20th year visiting Latin America I am most impressed with the tremendous development which has taken place during these years in Latin American science I want to congratulate our Brazilian colleagues for arranging this excellent and timely symposium and its excellent organization These symposia are a cooperative effort between our Latin colleagues and scientists all over the world They are made possible by excellent local support and support by a number of international agencies and several groups in the United States Earlier symposia in this series are listed on pp viii x Alexander Hollaender vii viii PREFACE I International Symposium on Tissue Transplantation Santiago Valparaiso Chile Published in 1962 by the University of Chile Press Santiago edited by A P Cristoffanini and Gustavo Hoecker 269 pp

Methods for Evaluating Biological Nitrogen Fixation F. J. Bergersen, 1980 The cultivation of diazotrophic microorganisms Measurement of nitrogen fixation by direct means Measurement of nitrogen fixation by indirect means Methods for legumes in glasshouses and controlled environment cabinets Non legume nodule systems Methods for studying nitrogenase Methods for studying enzymes involved in metabolism related to nitrogenase Preparation and experimental use of leghaemoglobin Methods for identifying strains of diazotrophs Genetic studies with diazotrophs Experiments with crop and pasture legumes principles and practice Production and quality control of legume inoculants Forage grasses and grain crops Nitrogen fixation in natural plant communities and soils Systems involving blue green algae cyanobacteria

Biological Nitrogen Fixation, 2 Volume Set Frans J. de Bruijn, 2015-07-07 Nitrogen is arguably the most important nutrient required by plants However the availability of nitrogen is limited in many soils and although the earth's atmosphere consists of 78.1% nitrogen gas N_2 plants are unable to use this form of nitrogen To compensate modern agriculture has been highly reliant on industrial nitrogen fertilizers to achieve maximum crop productivity However a great deal of fossil fuel is required for the production and delivery of nitrogen fertilizer Moreover carbon dioxide CO_2 which is released during fossil fuel combustion contributes to the greenhouse effect and run off of nitrate leads to eutrophication of the waterways Biological nitrogen fixation is an alternative to nitrogen fertilizer It is carried out by prokaryotes using an enzyme complex called nitrogenase and results in atmospheric N_2 being reduced into a form of nitrogen diazotrophic organisms and plants are able to use ammonia It is this process and its major players which will be discussed in this book Biological Nitrogen Fixation is a comprehensive two volume work bringing together both review and original research articles on key topics in nitrogen fixation Chapters across both volumes emphasize molecular techniques and advanced biochemical analysis approaches applicable to various aspects of biological nitrogen fixation Volume 1 explores the chemistry and biochemistry of nitrogenases nif gene regulation the taxonomy evolution and genomics of nitrogen fixing organisms as well as their physiology and metabolism Volume 2 covers the

symbiotic interaction of nitrogen fixing organisms with their host plants including nodulation and symbiotic nitrogen fixation plant and microbial omics cyanobacteria diazotrophs and non legumes field studies and inoculum preparation as well as nitrogen fixation and cereals Covering the full breadth of current nitrogen fixation research and expanding it towards future advances in the field Biological Nitrogen Fixation will be a one stop reference for microbial ecologists and environmental microbiologists as well as plant and agricultural researchers working on crop sustainability

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