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A. To Our Readers,

It is a pleasure to announce that the professional staff within the Soil and Water Management & Crop Nutrition Sub-programme of the Joint FAO/IAEA Division is now at full strength with Dr. Lee K. Heng joining the Soil Science Unit, Seibersdorf, on May 16. Dr. Heng's appointment fills an important gap in our research team, as her expertise lies in the area of soil physics and simulation modelling. Her recruitment underscores the importance we attach to the Project - *Management of Scarce Water Resources for Maximising Plant Productivity*. This is the first time within the past two years that there has not been one or more vacancies within the professional ranks of the Sub-programme. It means that we can manage our existing projects more effectively and efficiently and plan future activities with greater confidence.

The work of the professional staff based at IAEA Headquarters in Vienna involves technical support of Co-ordinated Research Projects (CRPs) and Technical Co-operation Projects (TCPs). Good communication and the co-operation of both contract and agreement holders are essential ingredients for the smooth running of these projects. E-mail is a rapid and convenient means of communication, although the facsimile remains an important vehicle in many developing countries. However, the ease of communication by e-mail can lead to unnecessary usage. Much time would be saved if project participants would carefully read the information sent out by our staff and follow requested procedures.

Non-staff travel to research co-ordination meetings (RCMs) is a significant component of our budget, and it is a major task for our secretarial staff to prepare the travel document. The travel document must be completed for all participants (usually 10-12 contract holders and 4-5 agreement holders) before official invitations can be issued, and the official invitation may be required by the employer as well as for the issue of a visa. The issue of a visa is a process which can take several weeks. Thus delays in the submission of a progress report or the return of a signed contract (either initial or renewal) can seriously disrupt the administrative process, and could jeopardise attendance at the RCM. We therefore ask that you honour set deadlines and comply with requests in a timely manner.

Professional staff at Headquarters have been busy during April in evaluating the technical merit of applications for Technical Co-operation Projects during the 1999-2000 biennium. The Sub-programme has received fewer applications to evaluate than in the past. Unfortunately, many requests were not properly formulated, with inadequate background information, broad objectives covering several disciplines and an inappropriate workplan. We would welcome the opportunity to work with prospective applicants in the future to formulate competitive project proposals that may be based in a Member State or in a region.

Two important events for the Sub-programme will take place in 1998 and 2000. The Joint FAO/IAEA Division is hosting a Workshop at the 16th World Congress of Soil Science in Montpellier during the afternoon of August 21, 1998. The programme is included in this Newsletter. The Joint Division will also host an International Symposium at IAEA Headquarters in Vienna in 2000. The theme of both events is the use of *Nuclear Techniques for Developing Sustainable Soil, Water and Nutrient Management Practices*. We will begin detailed planning of the International Symposium in the near future, and would welcome suggestions for the programme including keynote speakers or individual oral or poster presentations.

I look forward to meeting you at either one or both of these events.

Phillip M. Chalk
Head, Soil and Water Management

& Crop Nutrition Section

B. Staff

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3. **Staff Changes**

Dr. Shawel Haile-Mariam, Research Associate at Michigan State University, joined the Soil Science Unit in April 1998 for a 4-month consultancy. His work will focus on the effects of organic matter on soil aggregation and the use of the stable isotope, ¹³C, to determine the dynamics of soil organic carbon pools.

Dr. Lee K. Heng joined the Soil Science Unit on 16 May 1998, as a Soil Scientist. She is a graduate of the University of Waikato, New Zealand (B.Sc. Tech), the University of Wisconsin - Madison, USA (M.S.) and Massey University, New Zealand (Ph.D). She worked as an environmental soil physicist with DSIR Land Resources in New Zealand before joining the University of Melbourne, Australia, as a Research Fellow. Her work covers the measurement and modelling of soil water, solute transport, evapotranspiration and environmental and soil water instrumentation. She has participated in under-graduate teaching and has supervised post-graduate research in Soil Science.

C. Future Events

RESEARCH CO-ORDINATION MEETINGS (RCMs) OF FAO/IAEA CO-ORDINATED RESEARCH PROJECTS (CRPs)

- * **Third RCM of CRP on "The Use of Irradiated Sewage Sludge to Increase Soil Fertility and Crop Yields and to Preserve the Environment" (D1.50.04), Oeiras, Portugal, 22-26 June 1998**

Eleven contract holders and five agreement holders are expected to participate in this RCM. Dr. Phillip Chalk is the Project Officer, and will serve as the Scientific Secretary. Dr. Eugénio Mendez Ferreira is the local organizer. A comprehensive project description including objectives, expected outputs, action plan, time schedule etc., has been sent to participants. This document will form the basis for the formal review of the CRP following this RCM.

- * **First RCM of CRP on "The Use of Nuclear and Related Techniques in the Management of Nutrients and Water in Rainfed Arid and Semi-arid Areas for Increasing Crop Production" (D1.20.06), Vienna, Austria, 6-10 July 1998**

A new CRP was approved on 1997-09-05 for an estimated duration of five years. Research contract and agreement holders are under selection; it is expected that ten to twelve contracts and four to five agreements will be awarded. A meeting is anticipated in the Headquarters, 6-10 July 1998, for finalizing the guidelines as suggested earlier by the Consultants' Meeting. Dr. Pierre Moutonnet is the Project Officer, and will serve as Scientific Secretary for the meeting.

- * **Final RCM of CRP on "The Use of Nuclear Techniques for Optimizing Fertilizer Applications under Irrigated Wheat to Increase the Efficient Use of Fertilizers and Consequently Reduce Environmental Pollution" (D1.40.07), Vienna, Austria, 28 September to 2 October 1998**

Twelve contract holders and four agreement holders are expected to participate in this final RCM which will be held at IAEA Headquarters. Dr. P. Moutonnet is the Project Officer, and will serve as the Scientific Secretary for the meeting. Each participant will produce, by 1 September 1998, a final report dealing with the results obtained during the period 1994-1998. These reports should be submitted according to the "Instructions for formatting A4 manuscripts using Microsoft Word" for IAEA TECDOC publications. These texts (20 pages maximum) will be edited prior to publication. Additionally, a Questionnaire has been prepared; it should be filled and sent back to the Project Officer by 15 August 1998.

- * **Final RCM of CRP on "The Use of Nuclear and Related Techniques for Evaluating the Agronomic Effectiveness of Phosphate Fertilizers, in Particular Rock Phosphates" (D1.50.03), Vienna, Austria, 16-20 November 1998**

Fifteen contract holders and five agreement holders are expected to participate in the final RCM which will be held at IAEA Headquarters. Dr. Felipe Zapata is the Project Officer, and will serve as Scientific Secretary for the meeting. Each participant will make an account of the main results and conclusions of their research component. The presented data will be thoroughly discussed, and conclusions and recommendations to improve and sustain soil P status will be drawn. The results of the CRP will be

published as a TECDOC. For this purpose, all participants are kindly requested to prepare their contributions following IAEA instructions and submit them to the IAEA by 31 July 1998 (hard copy and diskette in Microsoft Word).

TECHNICAL CO-OPERATION PROJECTS (TCPs)

- **FAO/IAEA Regional TCP for Latin America on "Plant Nutrition, Soil and Water Management" (RLA/5/036), ARCAL XXII**

- **Advanced Regional Training Workshop on "Quality Assurance for N-15 Analysis", Montevideo, Uruguay, 8-12 June 1998**

The objective of this training workshop will be to evaluate the quality of the data produced by the participating laboratories in the region and to provide recommendations to improve the quality assurance of N-15 analysis in the region. Technicians who are in charge of isotope analytical facilities in soil/plant research, from Argentina, Chile, Cuba, Guatemala, Mexico, Uruguay and Venezuela will participate. Follow-up actions of the first workshop on the topic held in Santiago in November 1996 will also be reviewed. Mr. Raul Goyenola, staff member of the National Directorate of Nuclear Technology (DNTN), is the local organizer.

- **National Workshop on "Tillage Systems and Nutrient Cycling", Maracay, Venezuela, 28 September to 02 October 1998**
- **National Training Course on the "Use of Nuclear Techniques in Studies of Soil Fertility, Fertilizers and Water Management", Guatemala City, Guatemala, 12-16 October 1998**
- **Field-trial Network**

The objective of this network is to use nuclear techniques to devise novel strategies in plant-nutrient, soil and water management for sustainable crop production in countries of the region. Replicated field experiments will test current local practices and experimental treatments that are expected to improve water and nutrient-use efficiency. It is envisaged that these trials will be located on farmers' fields or conducted under similar conditions.

Progress in the implementation of these field trials was reported during the second co-ordination meeting in March 1998, Chile. (See Section past events). During the same meeting future experimental plans were also discussed. From the analysis of the results obtained so far, the following recommendations were made:

- i) To increase substantially the IAEA inputs to this activity during the second phase.
- ii) To introduce adjustments/modifications in the original experimental plans which are required to work at the cropping system level and to monitor soil water status and potential leaching of mineral nitrogen.
- iii) To make an assessment of the inputs provided by the IAEA and local sources to the implementation of the field trials.
- iv) To include phosphate studies using P-32 isotopic techniques in future years, as originally planned.
- v) To promote further the use of nuclear techniques in field trials by incorporating new institutions which only use conventional techniques.
- vi) To contribute to the development of technological packages through the incorporation of the results obtained under the field trial network of this ARCAL project.
- vii) To submit to the Technical Officer of the project the new proposals by 1 June 1998.

viii) To monitor closely the implementation of the field trial network in March and November 1999 during the respective workshops.

Technical Manuals

Three manuals in Spanish will be prepared in 1998. The first will be on Nitrogen Fertilization of Annual Crops (Ed. Dr. Segundo Urquiaga, Brazil), the second on "Biological Nitrogen Fixation in Legumes" (Ed. Juan José Peña-Cabriales, Mexico) and the third on "The Improvement of Water Use and Management in Agriculture" (Ed. Dr. T. Muraoka, Brazil). All of these manuals will contain a compilation of relevant results obtained in the region using nuclear techniques. During the second co-ordination meeting held in Chile, the content of the last two manuals was re-structured and their publication re-scheduled for 1999.

- **FAO/IAEA Regional TCP for West Asia on "Water Balance and Fertigation for Crop Improvement" (RAW/5/002)**

This project was initiated in 1995 with the participation of six countries from the Middle-East: Iran, Jordan, Saudi Arabia, Syria, Lebanon and United Arab Emirates. The objectives were to proceed with water balance and fertigation studies, using nuclear techniques including the soil moisture neutron probe and ¹⁵N-labelled fertilizers, in order to improve crop production in arid and semi-arid areas. Emphasis has been put on the following activities:

- to compare conventional fertilization methods with fertigation,
 - to evaluate the respective recoveries of N-fertilizer when applied through both methods,
 - to evaluate water use efficiency and crop water requirements under both techniques,
 - and to estimate comparatively the potential risks of nitrate pollution of groundwater.
- Annual Co-ordination Meetings have been held in Turkey, Cyprus and Lebanon.

- **Fourth Co-ordination Meeting, United Arab Emirates, November 1998**

Each participant will submit a final report summarizing the most significant results obtained through fertigation. These reports will be edited, then published as an IAEA-TECDOC. A "phase II" project might be initiated on *"Fertigation for increasing water use efficiency and crop yields in the Middle East"*.

- **FAO/IAEA Regional TCP for East Asia and the Pacific on "Nuclear Techniques for the Promotion of Agroforestry Systems" (RAS/5/029)**

This Regional TCP was initiated in 1995 involving Bangladesh, China, Indonesia, Malaysia, Myanmar, Pakistan, Philippines, Sri Lanka, Thailand and Viet Nam. It is in the second phase of implementation, with Dr. Gamini Keerthisinghe as the Technical Officer.

- **Third Co-ordination Meeting, Serdang, Malaysia, 20-24 July 1998**

The main purpose of this meeting will be to review the overall progress and to discuss the future activities of the project. All country representatives will present their main achievements of Phase I of the project and the progress of Phase II in accordance with the work plan and research activities discussed at the last workshop held in Faisalabad, Pakistan. Dr. Roland Buresh of the International Centre for Research in Agroforestry (ICRAF) will serve as a consultant to assist in the review of the project. Dr. Zaharah Abdul Rahman of the Dept. of Soil Science, Universiti Putra Malaysia, will be the local organizer of the meeting.

FAO/IAEA Interregional Model Project on "Sustainable Utilization of Saline Groundwater and Wasteland for Plant Production" (INT/5/144)

• In-Country Workshops

Workshops will be held in Iran and Syria (June 1998), Pakistan (July 1998), Egypt (September 1998), Morocco and Tunisia (October 1998) during the visit of the Project Manager from the IAEA. All team members from different laboratories and organizations taking part in the Model Project activities in the respective countries will present their work and discuss future activities. The purpose is to monitor and evaluate progress, facilitate and catalyse internal co-operation, provide backstopping and plan future activities. Such Workshops have been held in four countries and will be a regular half-yearly feature in each of the participating countries.

NON-FAO/IAEA MEETING

- **Workshop on "The Use of Nuclear Techniques For Developing Sustainable Soil, Water and Nutrient Management Practices, 16th World Congress of Soil Science", Montpellier, France, 21 August 1998.**

Programme

14:00 - 14:15	Opening P. M. Chalk, Head, Soil and Water Management & Crop Nutrition Section, Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture, Vienna
14:15 - 14:45	Analytical Determination of Concentric Carbon Gradients Within Stable Soil Aggregates" <u>A. J. M. Smucker</u> and E. A. Paul
14:45 - 15:15	"Use of The Stable Isotope of N to Quantify Below-ground N Inputs and N Turnover by Crop and Pasture Plants" <u>A. McNeill</u> , I. Fillery, D. Murphy and C. Russell
15:15 - 15:45	"Managing Nitrogen and Its Use Efficiency in Alley Cropping Systems" <u>N. Sanginga</u> , B. Vanlauwe, J. Diels and R. Merckx
15:45 - 16:15	Break
16:15 - 16:45	"Nuclear Techniques in Sustainable Management of Soil Water and Mineral Nitrogen" <u>M. Bazza</u> and P. Moutonnet
16:45 - 17:15	"The Use of Fallout Radionuclides as Tracers in Soil Erosion and Sedimentation Investigations" <u>F. Zapata</u> , E. Garcia Agudo and D. Walling
17:15 - 17:30	General discussion

D. Past Events

RESEARCH CO-ORDINATION MEETINGS (RCMs) OF FAO/IAEA CO-ORDINATED RESEARCH PROJECTS (CRPs)

- * **Second RCM of CRP on "The Use of Isotope Techniques in Studies on the Management of Organic Matter and Nutrient Turnover for Increased, Sustainable Agricultural Production and Environmental Preservation" (D1.40.08), Vienna, 20-24 April 1998**

Fifteen scientists participated in this RCM which was held at IAEA Headquarters, five as agreement holders: D.F. Herridge (Australia), R. Merckx (Belgium), O.P. Rupela (ICRISAT, India), D.S. Powlson (UK), C. van Kessel (USA.) and ten as contract holders or their substitutes: S.M. Rahman (Bangladesh), D. Dourado-Neto (Brazil), E. Zagal (Chile), J. Wang (China), M.S.A. Safwat (Egypt), R. Abu Bakar (Malaysia), J.Z. Castellanos (Mexico), I. Mohammed (Morocco), R. Sangakkara (Sri Lanka), Phan Thi Cong (Viet Nam). Dr. T.L. Bachmann participated as the FAO representative and Dr. G. Keerthisinghe was the Scientific Secretary for the meeting.

Individual contract and agreement holders presented reports on the progress of their experimental work within the framework of the CRP. The discussions were focused mainly on progress made so far in achieving the project objectives. Field experiments have been initiated by all contract holders according to the experimental protocols decided at the first RCM. The results generated from different agro-ecological zones would serve as an important data base for modeling to develop management recommendations to a wide range of environments.

- * **Second RCM of CRP on "The Assessment of Soil Erosion through the Use of Cesium-137 and Related Techniques as a Basis for Soil Conservation, Sustainable Production and Environmental Protection" (D1.50.05), Bucharest, Romania, 25-29 May 1998**

Results obtained on the application of the Cs-137 technique in the research work of the participants were reviewed. Adjustments to working protocols for further application of the Cs-137 technique were discussed and agreed to. Special attention was devoted to the Cs-137/erosion rate calibration models developed by Drs. D.E. Walling and Qingping He. A full review of the project document was also made. This RCM was held together with the one from the Sedimentation CRP co-ordinated by the Isotope Hydrology Section. Dr. Christian Hera of the Romanian Academy of Agricultural and Forestry Sciences was the local organizer. Drs. Felipe Zapata and Edmundo García Agudo, Project Officers of the CRPs, served as Scientific Secretaries for the joint meeting.

TECHNICAL CO-OPERATION PROJECTS (TCPs)

- **FAO/IAEA Regional TCP for Latin America on "Plant Nutrition, Soil and Water Management" (RLA/5/036), ARCAL XXII**

This Regional TCP is completing its first phase of implementation, with Dr. F. Zapata as the Technical Officer. The first phase of this project (1996-1998) focused on the compilation of data from the basic and applied research carried out within the framework of Agency's programmes, with a view to contributing to the generation of technologies preferably with the end-users (farmers/producers) to demonstrate their technical and economic feasibility. Nuclear techniques were used, where appropriate, to monitor nitrogen supply from various sources and soil water status.

- **Second Co-ordination Meeting of the Project**

This co-ordination meeting was held during 23-27 March 1998 at the Chilean Nuclear Energy Commission in Santiago, Chile. Ms. Inés Pino was the local organizer. The objectives of this meeting were to evaluate the progress made in the implementation of the first phase of the project, to present and discuss the results obtained in the network of field trials, and to plan the detailed programme of activities for the second phase. The project co-ordinators of Argentina, Brazil, Cuba, Chile, Guatemala, Mexico, Uruguay, and Venezuela participated in the meeting.

Overall the project has been implemented very smoothly through the following activities:

i) Network of field trials, ii) Organization of regional workshops and national training events, iii) Preparation of Technical Manuals and iv) Provision of equipment and supplies. The results obtained so far are satisfactory and progress has been made towards achieving the specific objectives of the project.

- **Field-trial Network**

The project co-ordinators of the participating countries in the second co-ordination meeting reported on the progress in implementation of their field trials. The status of the work of the network, the results achieved and the conclusions drawn are summarized as follows:

- i) All participating countries carried out the experimental plans for 1997.
- ii) All the field experimental work has been completed. The sample processing and analysis as well as the interpretation of data are in different stages of implementation due to differences in the growing season and laboratory equipment problems.
- iii) The common topic of research was the efficient use of fertilizer nitrogen in a variety of cropping systems of high socio-economic importance.
- iv) The expenses for the implementation of the field trials with the exception of the N-15 labelled fertilizers were borne by the countries.
- v) Most of the trials were laid out in the fields of farmers/producers or institutes related directly with transfer of technology.
- vi) The abnormal weather conditions of the year 1997 (El Niño phenomenon) affected the normal growth and production of crops in the region.
- vii) The studies on fertilizer nitrogen efficiency should also consider the potential hazard of nitrogen pollution due to leaching of mineral nitrogen.
- viii) In this context due consideration should be given to the integration of fertilizer nitrogen and water management practices in these studies.
- viii) The preliminary results indicate that soil degradation due to intensive use without adequate soil management and conservation practices is the main problem in the region.

- **Technical Manuals**

Two technical manuals were completed in 1997. A Manual on “Neutron Moisture Probes and Their Applications” was prepared by Drs. O. Bacchi, K. Reichardt and M. Calvache. In view of its relevance as a training manual, it has been submitted to the IAEA Publication Committee for approval. Another Manual on “Efficient management of phosphatic fertilizers with emphasis on rock phosphates for direct application” has been compiled and edited by Dr. E. Casanova. It is presently in press and will soon be distributed in the region.

Special thanks are due to the co-ordinators/editors for their untiring efforts in the preparation and editing of the manuals. There is no doubt that they will contribute greatly to the achievement of the objectives of the regional project.

FAO/IAEA Interregional Model Project on "Sustainable Utilization of Saline Groundwater and Wastelands for Plant Production" (INT/5/144)

The project has been operational in seven countries, namely, Egypt, Iran, Morocco, Myanmar, Pakistan, Syria and Tunisia since 1 January 1997. Dr. Mujtaba Naqvi is the Project Manager. Ten hectare sites were selected for demonstration of the feasibility of growing salt-tolerant plant species on saline wastelands using saline groundwater. After obtaining initial data some salt-tolerant plant species were introduced; observations on survival and other features are continuing and more plant species tried. Some of the participants are now using the neutron moisture gauge for irrigation management.

• In-Country Workshops

Workshops were held in Morocco (December 1997) and Tunisia (March 1998) where all individuals and institutions taking part in the project in these countries presented their work. The Project Manager from the IAEA was also present. The discussions continued during the visits to the demonstration sites and future activities delineated during the final sessions. The workshops proved to be helpful for monitoring and evaluation, for fostering better internal co-operation, for providing the required backstopping and for formulating future activities.

• Training Courses

Three courses were held during March and April 1998.

A course on "Water and Soil Sampling, Analytical Techniques and Use of Neutron Moisture Probes" was held in Faisalabad, Pakistan, 2-14 March 1998. The course was organised by the Agency in co-operation with the Pakistan Atomic Energy Commission (PAEC) and one of its research centres, the Nuclear Institute for Agriculture and Biology (NIAB). The purpose was to train technicians in the use of: laboratory and field conductivity meters, flame photometer, neutron moisture gauge, etc., practical exercises in field preparation, nursery raising, transplantation; irrigation management with saline water; soil and water sampling; screening for salt-tolerance and use of lysimeters. Thirteen technical personnel from six countries participated.

A course on "Hydrological Studies on the Project Site, with Particular Reference to Isotopic Techniques" was held in Islamabad and Faisalabad, Pakistan, 2 March to 24 April 1998. The course was organised by the Agency in co-operation with PAEC and two of its research establishments, the Pakistan Institute for Nuclear Science and Technology (PINSTECH), Islamabad and NIAB, Faisalabad. The purpose was to elaborate the role of isotope hydrology in the project and to train professional scientists in the use of relevant techniques. It included: basic principles of isotope hydrology; radiation measurements and safety; analytical techniques for stable isotopes; surface/groundwater studies- origin, recharge, aquifer characteristics, etc.; sedimentology - estimation of soil erosion, sedimentation transport; field exercises - sampling techniques, in situ measurements of pH, electrical conductivity, temperature, dissolved oxygen, etc.; field visits and use of other field equipment. Seven professional scientists from six countries involved with the hydrology component of the project participated.

A course on "Nuclear and Related Techniques Used in the Study of Soil Physical, Chemical and Biological Parameters and the Effects of Salinity and Plant Growth on These Parameters" was held in Faisalabad, Pakistan, 24 March to 5 April 1998. The course was organised by the Agency in co-operation with PAEC and NIAB. The purpose was to train professional scientists in the use of laboratory and field techniques used in the Model project. The programme included: safety aspects while operating neutron, gamma and beta sources; radiation and radioisotopes in soil-plant studies; biosaline agriculture; measurement techniques used in the field; use of EM-38; atomic absorption spectrometry and complexometry, etc.; field calibration and use of neutron probes; carbon and nitrogen cycle in saline soils; effect of plant growth on soil properties; tree water use and transpiration measurements; data analysis. Eight professional scientists from six countries participated.

TRAINING COURSE

An FAO/IAEA Regional Training Course for West Asia on "The Use of Nuclear Techniques in Water and Nutrient Management Practices" was held in Damascus, 3-28 May 1998. The Course was organized by the Agency in co-operation with the Government of the Syrian Arab Republic through the Syrian Atomic Energy Commission (AECS). The programme consisted of the following main subjects:

- crop water requirements and their measurement through the use of a soil moisture neutron probe,

- soil nitrogen and phosphorus availabilities using isotope-aided techniques (^{15}N , ^{32}P),

- integrated plant nutrient management applied to fertigation practices,

- use of ^{15}N and other methods to estimate biological nitrogen fixation, and the contribution of legumes to the N economy of cereal-legume rotations,

- water management in rainfed arid and semi-arid areas,

- practical exercises and calculations involving the use of nuclear techniques in agriculture.

Eighteen candidates participated in this regional training course: eleven from West Asian countries, five local participants, and two observers. Six lecturers participated, including F. Zapata and P. Moutonnet from the SWMCN Section. Dr. Misbah Haj-Issa (AECS) acted as the Course Director, assisted by Dr. M. Janat (AECS). Dr. Pierre Moutonnet was the IAEA Technical Officer.

E. Status of Co-ordinated Research Projects

◆ **Use of Nuclear Techniques for Optimizing Fertilizer Applications under Irrigated Wheat to Increase the Efficient Use of Fertilizers and Consequently Reduce Environmental Pollution (D1.40.07)**

Project Officer: P. Moutonnet

This project has sixteen participants, five of whom are agreement holders: P. Cepuder (Austria), G. Vachaud (France), I. Ortiz-Monasterio (CIMMYT-Mexico), W. Baethgen (USA), J. Schepers (USA), and twelve are contract holders: S.M. Rahman (Bangladesh), A.E. Boaretto (Brazil), I. Vidal Parra (Chile), X. Wen (China), A. Monem (Egypt), M. S. Sachdev (India), X. Uvalle-Bueno (Mexico), J. M. Sanchez-Yañez (Mexico), M. Bazza (Morocco), G. Cioban (Romania), A. Arslan (Syrian Arab Republic), C. Kirda (Turkey). The fourth season of experiments is now completed and the third RCM was held in Vienna, Austria, 29 September - 3 October 1997. The CRP will be closed in 1998, with the final RCM in Vienna, 28 September to 02 October 1998. A TECDOC will be published.

◆ **The Use of Nuclear and Related Techniques in the Management of Nutrients and Water in Rainfed Arid and Semi-arid Areas for Increasing Crop Production (D1.20.06)**

Project Officer: P. Moutonnet

This project has sixteen participants, five of whom are research agreement holders: F. Maraux (France), D.L. Deb (India), V.R. Maparla (India), R.J.K. Myers (ICRISAT-India), A. Bationo (IFDC/ICRISAT-Niger), J. Ryan (ICARDA-Syria), and eleven are research contract holders: D.R. Prieto (Argentina), G.X. Cai (China), M.J.M. Rusan (Jordan), J.M. Arreola Tostado (Mexico), K. El Mejahed (Morocco), T. Sithole (Zimbabwe), M.M. Iqbal (Pakistan), N.E.D. Sharabi (Syria), M. Mechergui (Tunisia). The first RCM is to be held in Vienna, 6-10 July 1998. The research programme will be

discussed and the guidelines established for the next cropping seasons.

◆ **Use of Nuclear and Related Techniques for Evaluating the Agronomic Effectiveness of Phosphate Fertilizers, in Particular Rock Phosphates (D1.50.03)**

Project Officer: F. Zapata

The third RCM was held in Vienna, 17-21 March 1997, and the CRP is now in its final phase. There are fifteen contract holders: (Regular Budget) T. Muraoka (Brazil), L.M. Xiong (China), C. Herrera-Altuve (Cuba), I. Pino (Chile), E. Sisworo (Indonesia), N. Karanja (Kenya), Z. Rahman (Malaysia), J. Mahisarakul (Thailand), E. Casanova (Venezuela); (French funded) I. Bogdevitch (Republic of Belarus), T. Németh (Hungary), V. Mašauskas (Lithuania), M. Fotyra (Poland), Z. Borlan (Romania), R. Alexakhin (Russian Federation); and five agreement holders: M.J. McLaughlin (Australia), D. Montange (France), J.-C. Fardeau (France), J.M. Barea (Spain), S.H. Chien (USA). The mid-term review of the project was successfully completed. It was concluded that significant progress has been made by all participants in this network towards achieving the objectives of the project. Standard characterization of phosphate rock samples utilized in the network has been completed at specialized laboratories (CNRS, France and CERPHOS, Morocco) and funding for this activity was provided by IMPHOS. Other standard characterizations of the benchmark soils are being performed in selected laboratories according to the Action Plan of the project, agreed in the third RCM. In the final phase of the project most participants are conducting field trials to develop fertilizer P recommendations. All contractors will collect the minimum data set for validation of the P sub-model. Instructions and data sheets have been provided accordingly. The final RCM will be held in Vienna from 16-20 November 1998.

It is planned to publish the results generated from this project in several ways. This will be discussed during the final RCM. Participants have been requested to submit in advance their contributions following IAEA instructions for the preparation of a TECDOC. (See Future Events)

◆ **Use of Irradiated Sewage Sludge to Increase Soil Fertility and Crop Yields and to Preserve the Environment (D1.50.04)**

Project Officer: P.M. Chalk

Participating in this CRP are eleven contract holders, C. Magnavacca (Argentina), S. Ahmed (Bangladesh), T. Jiang (China), R. El-Motaium (Egypt), V.V. Athalye (India), M. Mítrosuhardjo (Indonesia), F. Ishak (Malaysia), F. Azam (Pakistan), E.M. Ferreira (Portugal), M. Dumitru (Romania), P. Chaiwanakupt (Thailand), and five Agreement Holders, F. Kock (Austria), H. Harms (Germany), K. Kumazawa (Japan), A.C. Chang (USA), and S. McGrath (UK). The second RCM was convened in Cairo, Egypt, from 14-18 September 1996. The third RCM is planned for 22-26 June 1998 in Oeiras, Portugal. This CRP is in the second phase of implementation and will be formally reviewed by the Research Contracts Committee at the end of its third year, i.e., following the third RCM.

◆ **Use of Isotope Techniques in Studies on the Management of Organic Matter and Nutrient Turnover for Increased, Sustainable Agricultural Production and Environmental Preservation (D1.40.08)**

Project Officer: G. Keerthisinghe

This CRP is in the second phase of operations, with ten contract holders, S.M. Rahman (Bangladesh), K. Reichardt (Brazil), E. Zagal (Chile), J. Y. Wang (China), M.S.A.

Safwat (Egypt), R. Abu Bakar (Malaysia), M. Ismaili (Morocco), J. Z. Castellanos (Mexico), R. Sangakkara (Sri Lanka), Pan thi Cong (Viet Nam), and five agreement holders: D.F. Herridge (Australia), R. Merckx (Belgium), O.P. Rupela (India), C. van Kessel (USA), and D.S. Powlson (UK). All contract holders have field studies under way to determine the role of residue management practices on crop production and soil fertility. A minimum data set will be collected from each experimental site for validation of models to obtain information for development of effective residue management practices for a wide range of environments. The third RCM is scheduled for September 1999. The dates and venue have not been decided yet.

◆ **Assessment of Soil Erosion Through the Use of Cesium-137 and Related Techniques as a Basis for Soil Conservation, Sustainable Production and Environmental Protection (D1.50.05)**

Project Officer: F. Zapata

This CRP is in the first phase of implementation. Participating are nine research contract holders: A. Bujan (Argentina), O. Bacchi (Brazil), A. Ellies (Chile), X. Zhang (China), L. Hua (China), I. Ionita (Romania), V. Golosov (Russian Federation), E. Fulajtar (Slovak Republic), and L. Mukurumbira (Zimbabwe), Dr. D.E. Walling (UK) as technical contractor and four agreement holders: P. Wallbrink (Australia), D. Pennock (Canada) J.C. Ritchie (USA) and F. Penning de Vries (IBSRAM, Thailand). The second RCM was held in Bucharest, Romania, 25-29 May 1998. The Chemistry Unit at the IAEA Seibersdorf Laboratory prepared and distributed the reference soil sample to the participating laboratories for an inter-comparison exercise on Cs-137 and other radionuclides analysis. The Cs-137/erosion rates calibration models developed by Drs. D.E. Walling and Qingping He have been placed in the Internet. The web site address is: http://http.iaea.or/dist/gnip/rip_his and the file to be downloaded is `csmodell.exe`. It is a file of 3.7 Mb, Binary Executable.

◆ **Use of Nuclear Techniques for Developing Integrated Nutrient and Water Management for Agroforestry Systems (D1.20.07)**

Project Officer: G. Keerthisinghe

This CRP has been approved by the Nuclear Applications Research Contract Sub-Committee. Research contract and agreement holders are under selection. The deadline for proposals is 30 June 1998.

F. Laboratory Activities

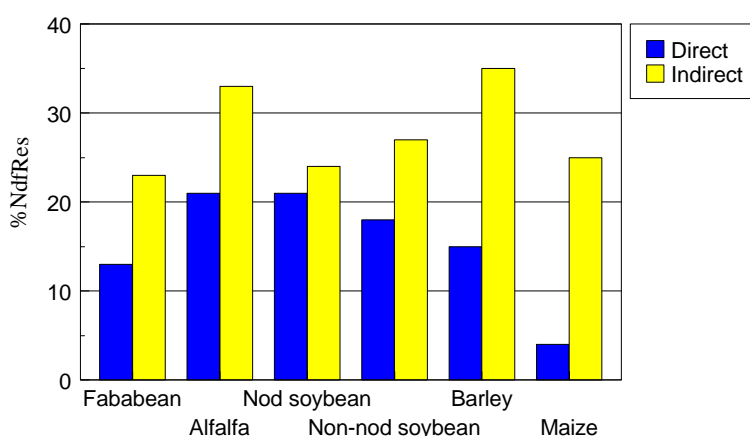
Research and Development

- Nutrient availability from plant residues

The contribution of organic residues to the N nutrition of plants is presently being evaluated using direct and indirect techniques. The direct method involves addition of ¹⁵N-labelled residues to soil. The residues are produced by growing plants in ¹⁵N-labelled nutrient solution or sand culture. This technique is expensive and is unsuitable for materials which cannot be easily labelled, e.g., animal manure. The indirect technique is based on the principle of isotope dilution. The method involves

comparison of the isotopic composition of plants grown in ^{15}N -labelled soil with and without unlabelled residue addition. In most studies using the isotope dilution technique, labelled fertilizer and organic residues are added simultaneously. However, research at the Soil Science Unit has shown that simultaneous addition of residue and fertilizer leads to inaccurate estimates of the amount of nitrogen derived from organic residues (Ndfr) using the direct technique as a control. The problem is due to the phenomenon known as pool substitution. When residues and labelled fertilizer are added simultaneously, a proportion of the fertilizer is immobilised into the soil microbial biomass and the assumptions inherent in the technique are invalid.

Comparison of the direct and indirect methods for measuring N availability from crop residues



In an attempt to overcome this problem, a series of experiments were set up in which ^{15}N fertilizer was immobilized by addition of a carbon source. Once stabilisation of the ^{15}N -enrichment in the inorganic N pool is achieved it will be possible to determine the N release from organic residues using the ^{15}N isotope dilution technique without the interference of the pool substitution phenomenon.

Preliminary studies comparing the new isotope dilution technique with the direct approach have yielded positive results. The estimates of Ndfr obtained using the new approach were not significantly different from estimates using the direct approach. These initial findings will be validated in the field and in Co-ordinated Research Projects in Member States. This technique will allow us to study the release of nutrients from a variety of organic residues. For further information contact Dr. Rebecca Hood.

Training

The following fellowships are planned at the Unit during 1998:

Mr. Abdul-Hussain Ali (IRQ/97006P), will be working on the use of isotopes to measure nutrient availability from organic sources under the supervision of Rebecca Hood during the period 1998-06-01 to 1998-11-30.

A group fellowship training on water use efficiency is being planned for the period 1998-06-15 to 1998-09-11. It is proposed that the following fellows will attend this session:

- Mr. Mohamed Beqqali (MOR/98008P)
- Mr. Faqir Hussain (PAK/98028R)
- Ms. Robina Shaheen (PAK 98026R)

Scientific Visits

The following scientists visited the Soil Science Unit in the first half of 1998:

- Mr. R. Ngoy-Tshibambe, Dem. Rep. of Congo, 1998-02-09.
- Dr. M. Nakanishi, Associate Professor, The University of Tokyo, 1998-03-27
- Mr. M. Al-Chammaa Mohamad (SYR/97006). One week scientific visit in March.
- Mr. Y. Diatta (SEN/98002), 1998-04-03.
- Dr. M. Duwayri, DIR-AGP, FAO, Rome, 1998-05-15.
- Mr. A. Zakra (Counterpart of IVC/98001) visited on 20-21 May.

Consultant

- Dr. Jean Claude Fardeau, INRA, France, conducted experiments on the ^{32}P isotopic exchange method during 11-20 May, in support of CRP D1.50.03.

Analytical Services

During 1997 the Soil Science Unit analysed 7374 samples for total N and ^{15}N of which 3361 were for Co-ordinated Research Projects, 1287 for Technical Co-operation Projects and 2726 for Research and Development within the Soil Science Unit, i.e., 7374 samples plus 3751 standards, replications and blanks or 11125 measurements in total.

External Quality Assurance

The first interregional exercise on Quality Assurance on N-15 analysis of plant materials by optical emission spectrometry (OES) was performed by the Soil Science Unit of the Agency's Laboratories, Seibersdorf, in the biennium 1994/95 (INT/5/130). Fifteen laboratories from thirteen Member States in five regions participated in this exercise. Eleven laboratories, that fully or partly complied with the acceptance criteria established by the Soil Science Unit, were identified. Four laboratories provided data outside the control limits. The best eleven laboratories were selected to participate in a joint QA-project of the Animal Production and the Soil Science Unit launched by the Department of Technical Co-operation with the objective "To establish Quality Assurance programmes for counterpart laboratories for analytical services relevant to the use of RIA and ELISA diagnostic kits and for ^{15}N measurements, and to identify a network of 'IAEA recognized' regional laboratories for sustainable support to the programme."

The present project was initiated in February 1997. It includes three rounds of analyses of test panels each consisting of five unknown plant samples and of three workshops on Quality Assurance. Each laboratory received a test panel consisting of five dry powdered ^{15}N -labelled plant materials to be analysed for both total N-content by the Kjeldahl method and atom % ^{15}N by OES as well as a questionnaire on laboratory resources to be completed. The deadline for submission of results of the first round was the end of 1997.

Nine of the eleven participants submitted results, including the questionnaire, before the deadline. Two laboratories reported technical problems with the instrument and the sample preparation, respectively. The first round of the project can be considered as successfully completed. In general, no major changes in the quality of analysis occurred in this second exercise, but some laboratories showed an improvement. This exercise clearly demonstrates the need to follow continuously the development of quality of analysis and the need to enhance the implementation of Quality Control (QC)-measures to

guarantee good long-term performance.

Participating laboratories are from the following Member States:

AFRICA	EAST ASIA & PACIFIC	LATIN AMERICA	EUROPE	WEST ASIA
Algeria Ethiopia Morocco	Malaysia Thailand	Chile Guatemala Mexico Uruguay	Turkey	Syria

Martina Aigner and Gudni Hardarson organised and attended a Workshop on “External Quality Assurance (EQA) for ^{15}N Analyses by Optical Emission Spectrometry” during 9-13 March 1998 at Centro de Investigación Estudios Avanzados, Instituto Politécnico Nacional, CINVESTAV, Irapuato, Mexico. The meeting was attended by eleven counterparts, local participants and an IAEA expert from Brazil, Dr. E. De Nadai Fernandes, who introduced quality assurance to the participants. The local counterpart and organiser of the workshop was Dr. J.J. Peña-Cabriales.

Production of IAEA-certified ^{15}N -labelled plant materials

At the present time there is no certified ^{15}N -labelled plant material on the market. Although certified ^{15}N -labelled inorganic compounds can be obtained, they are not always suitable as calibration standards when plant samples are being analysed for ^{15}N abundance by emission or mass spectrometry. In order to satisfy demand and the needs of External Quality Assurance, the Soil Science Unit initiated the production of ^{15}N -labelled plant material under field conditions in May 1997. A total of eight plots of soybean, common bean, maize and rye grass received either a split application of ^{15}N or unlabelled N. Each plot was large (80 m²) as the aim was to produce 20 kg of dry material of both labelled and unlabelled material of each species. The preparation of the reference materials is continuing and they will soon be sent out to several laboratories for intercomparison analyses.

G. Internet Support Services

Web Sites

- <http://www.iaea.or.at/>

[WorldAtom©](#) and [TecAtom©](#) are public information services of the IAEA. Items are presented for informational purposes only, not as official records. On the home-page you will find the following topics - About the IAEA - On-line products - Programmes - Job openings - Meetings -IAEA books - What's new? - Site index - Feedback - Search - and an image-gallery database.

- <http://www.iaea.org/programmes/rifa/>

The Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture is part of both FAO's Agriculture Department and the IAEA's Department of Research and Isotopes. Detailed Information on the function, structure and staffing of the Joint Division, its programmes of research and technical co-operation and publications are provided on the web site. This information is given for each of the Division's five sub-programmes one of which is Soil and Water Management & Crop Nutrition.

The site can also be visited through FAO. <http://www.fao.org/WAICENT/Agricul.htm>

- <http://www.fao.org/waicent/FaoInfo/Agricult/AGL/aglhomp.htm>

Information on the FAO Land and Water Development Division (what's new, structure, work programme, publications, land and water Newsletter) is provided on the web site.

- <http://www.fertilizer.org>

Information on the International Fertilizer Industry Association (IFA) including publications, trade information sources, fertilizer demand and crops, fertilizer and environment, statistics, membership and linkages is provided on the website.

H. Publications

Printed

Sessitsch A., Ramirez-Saad H., Hardarson G., Akkermans A.D.L., and De Vos W.M. 1997 Classification of Austrian rhizobia and the Mexican isolate FL27 obtained from *Phaseolus vulgaris* L. as *Rhizobium gallicum*. International Journal of Systematic Bacteriology. 47 (4), 1097-1100.

Hardarson G. and Hera C., 1998 Use of ¹⁵N isotope dilution method to quantify nitrogen fixation in legumes and its potential use for non-legumes. In "Nitrogen Fixation with Non-Legumes", Eds Malik K.A. et al, pp 307-312. Kluwer Academic Publishers.

In Press

"Crop Yield Response to Deficit Irrigation",
Edited by C. Kirda, P. Moutonnet, C. Hera and D.R. Nielsen. Kluwer Academic Publishers.

"Use of ¹³⁷Cs in the Study of Soil Erosion and Sedimentation",
Proceedings of a Consultants' Meeting organized by the Soil and Water Management & Crop Nutrition Section, Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture, Vienna, 13-16 November 1995. IAEA-TECDOC Series.

"Management of Nutrients and Water in Rainfed Arid and Semi-arid Areas",
Proceedings of a Consultants' Meeting organized by the Soil and Water Management & Crop Nutrition Section, Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture, Vienna, 26-29 May 1997. IAEA-TECDOC Series.

"Improving Yield and Nitrogen Fixation of Grain Legumes in the Tropics and Sub-tropics of Asia", Results of a CRP organized by the Soil and Water Management & Crop Nutrition Section, Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture. IAEA-TECDOC Series.

In Preparation

"The Use of Nuclear Techniques in the Management of Nitrogen Fixation by Trees to Enhance Fertility of Fragile Tropical Soils", Results of a CRP organized by the Soil and Water Management & Crop Nutrition Section, Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture. IAEA-TECDOC Series.