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Soils Newsletter



JOINT FAO/IAEA DIVISION
OF ISOTOPE AND RADIATION APPLICATIONS
OF ATOMIC ENERGY
FOR FOOD AND AGRICULTURAL DEVELOPMENT
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TO OUR READERS

We are pleased to present our sixth issue of the Soils Newsletter and to inform you of the activities of the Soil Fertility, Irrigation and Crop Production Section. An item of major interest is that Dr. M.F. L'Annunziata has recently transferred to the Department of Technical Assistance. Michael's talents as an author, lecturer, chemist and technical expert will be greatly missed. We are hopeful that his position can be filled in the near future and thus maintain a strong and active section.

The Newsletter reports on the activities of Agency experts related to technical assistance projects in Member States of the FAO and IAEA. It also contains a report of the recent, highly successful FAO/IAEA/GSF Seminar on the Useful Conservation and Pollution Potential of Agricultural Nitrogen Residues.

The Agriculture Section of the IAEA Laboratory at Seibersdorf continues to be very active. In addition to conducting another successful training course, it maintains active research and analytical services in support of the research programmes of the section.

As indicated in previous Newsletters, we welcome any contributions, comments, or suggestions from our readers. We hope you will find this issue of the Soils Newsletter of interest.

SOIL FERTILITY, IRRIGATION
AND CROP PRODUCTION SECTION

CHANGES IN STAFF

Dr. M.F. L'Annunziata left the Soil Fertility, Irrigation and Crop Production Section of the Joint FAO/IAEA Division on 1 September 1980 after three years of service. His activities included acting as project officer for the Coordinated Research Programme on the Use of Isotopes in Studies on Biological Dinitrogen Fixation. He had technical responsibility for technical assistance projects in Latin America and was a very effective lecturer at training courses for scientists from developing countries. He has now taken up his new duties in the Fellowship and Training Section of the Division of Technical Assistance of the IAEA.

Reports on
TECHNICAL ASSISTANCE PROJECTS

The Soil Fertility, Irrigation and Crop Production Section has technical responsibility for the implementation of soils related technical assistance projects in 19 developing Member States. These projects deal with the application of isotope and radiation techniques to solve specific problems of soil fertility, fertilizer use, plant nutrition, soil and water management and salinity control. All projects are submitted through the official channels of government which usually is the local atomic energy commission. A brief description of the projects approved for implementation in 1980 was presented in the previous newsletter. Summaries of the final

reports of field experts assigned to six of the technical assistance projects is included here.

I. AFRICA

1. Ivory Coast

Project: IVC/5B/06
 Institute: Centre IRAT de Bouaké
 Expert: Dr. G. Vachaud
 Duration of
 Assignment: June 1980

The project aimed at developing a technique by which the water uptake of upland rice from different soil layers could be studied while taking into consideration the spatial variability of the soil and the variabilities in plants. This ambitious objective was partially achieved through 5 missions which were carried out by Dr. G. Vachaud and his coworker Dr. M. Vauclin. These missions took place during 1978, 79, and 1980.

In 3 sets of experiments summarized below (A, B, and C), 4000 measurements of moisture content and hydraulic head were obtained and systematically analysed:

- A) Detailed comparative study on water uptake of two varieties of upland rice (IRAT 13 and I Guape CATETO) during a dry period which took place 92 to 100 days after sowing;
- B) Hydrodynamic characterization of the site of the experiment (A) through determining the hydraulic conductivity as a function of moisture content for three soil profiles;
- C) Comparison of 24 upland rice varieties submitted to water stress during the stage of heading (75 to 85 days after sowing).

Experiments A and C were performed in conjunction with ^{32}P placement experiments to study the relation between P and H_2O uptake. The results obtained from the mentioned investigations lead to the following conclusions:

- a) The percentage of fine particles ($<20 \mu$) accounted for a major portion of the variation in hydrodynamic characteristics of soils.
- b) The experiments indicated the possibility of reducing the required number of moisture measurements and simplification of the work. In a soil having a high proportion of fine particles (a low hydraulic conductivity), the root extraction of water layer by layer could be directly measured with the aid of a neutron moisture meter. It is not necessary in such a case to know the hydraulic conductivity as a function of soil moisture content for the upper soil layers. This is only necessary at one deep level to allow for establishing a water balance down to a given reference depth. Thus, a limited number of tensiometric profiles could be used. This means, however, that numerous sets of tensiometers have to be placed near the reference level. It should be noted that the hydraulic head at this rather deep level changes slowly, and variations are small in magnitude.
- c) The preliminary experiments performed with the aid of ^{32}P indicated that uptake of phosphorus by plants was not related to

their pattern of water extraction. A detailed report on this matter will be prepared in the near future by Drs. Vachaud and Truong Binh and will appear in the next issue of the Soils Newsletter.

- d) For the soil type considered in this study, determining the moisture changes in soil profiles established valid comparisons of the water extraction by the rice root systems down to a given depth. A supplementary study on a sufficient number of samples (> 5 replications) would be required to define the conditions under which this technique could best be used for screening varieties for drought tolerance.

This type of research could be used to study the behaviour of plants under periods of water stress. For this purpose it is indispensable to correlate soil measurements with bioclimatic and plant physiological measurements.

2. Ivory Coast

Project: IVC/5B/07

Institute: Institut des Savanes de Bouaké

Expert: Dr. Truong Binh

Duration of

Assignment: 9 October to 22 December 1979

The project aimed at studying with the aid of isotopes the uptake of nutrients, the extraction of water and the rooting depth of different varieties of upland rice. The maximum rooting depth under well-defined conditions served as a means of screening upland rice varieties for drought resistance.

Through placing the isotope ^{32}P at various depths in soil profiles, a detailed description of the active root system of upland rice varieties was made. With the aid of this technique a large number of upland rice varieties were screened according to the depths reached by their root systems. A study performed in 1978 on two varieties at two stages of growth and 5 depths established a good correlation between the uptake of ^{32}P and the root mass.

An experiment was carried out in 1979 to compare the performance of 13 upland rice varieties under 2 different moisture regimes. In one case, 6 irrigations (25 mm each) supplemented the rainfall which amounted to 685 mm during the growing season while in the other case no irrigation was applied. The evaporation from a class-A pan during the growing season totaled 417 mm. Under irrigation the uptake of ^{32}P placed at 40 cm depth was only about one third of that taken up under the drier moisture regime. This could probably be explained by assuming that the root system reached greater depths under water-deficient conditions and that irrigation favoured the development of a rather shallow root system. The performances of the tested varieties were different under the two applied moisture regimes, indicating an interaction between variety and moisture regime as far as the rooting pattern is concerned. In general, however, the rooting patterns showed greater homogeneity and smaller differences between varieties under irrigation than under the drier moisture regime. Therefore, it is essential to define clearly the moisture regime under which varieties are screened according to their rooting patterns, and it is better to screen varieties for drought tolerance under deficient moisture regimes.

The data collected from experiments designed to investigate the possible relation between the uptake of water and ^{32}P for several upland rice varieties at different soil depths while taking soil properties into consideration are being processed and further studies are being performed. It is hoped that a short report on this important subject will appear in the coming issue of the Newsletter.

3. Senegal

Project: SEN/5/011
 Institute: Centre de Recherches Agricoles de Bambey
 Expert: Dr. M. Vauclin
 Duration of
 Assignment: 8-22 June 1980

Dr. Vauclin (Chargé de Recherches C.N.R.S., Grenoble, France) carried out an assignment as part of the Technical Assistance Project SEN/5/011. The main objectives of his assignment were to cooperate with his counterparts in:

- a) Interpretation of the data obtained during the last 3 years on the hydrodynamic properties of soil profiles.
- b) Evaluation of the water balance studies performed with groundnuts during the 1979 season.
- c) Attempting to establish a nutrient balance with groundnuts.
- d) Planning and initiating a water and nutrient balance study with millet during the 1980 season.

The main achievements of the project (including previous assignments performed in 1977 and 1979 by Dr. G. Vachaud of the same Institute are summarized below:

- a) The development of simplified methodology which allows for establishing a water balance in a given field while taking the spatial variability of the soil into consideration. This was based on establishing (under the conditions of the study) the following relationship between the hydraulic conductivity (K) and the moisture content (θ):

$$K = K_0 (\theta/\theta_0)^B \text{ where}$$

B = location specific constant
 K_0 = infiltration rate at saturation in cm/hr
 θ_0 = moisture content at saturation in cm^3/cm^3

K_0 and B were correlated to the average content of clay and silt in soil profiles down to a given reference level (in this study, the reference level was selected as 110 cm below soil surface as the roots of groundnuts showed negligible activity below this level). This correlation was found to be:

$$K_0 = 29.1 - 1.545 (A + L)$$

$$B = 3.61 + 0.44 (A + L)$$

$(A + L)$ = average clay and silt content in soil profile

- b) The average water consumption of the groundnuts during its whole growth cycle (90 days) amounted to 362 ± 26 mm. During

this time the rainfall amounted to 372 mm while the water requirement of the crop was estimated at 437 mm. On the other hand, the coefficient of variation of the daily real evapotranspiration (calculated on a weekly basis) varied as a function of the level of water consumption from 15 to 35%. This clearly shows that it is very difficult to obtain a daily water balance with satisfactory precision using this method. The estimate of water flux at the depth of 110 cm showed great heterogeneity among the 6 plots involved in the investigation.

- c) The variability encountered while measuring nutrient concentration was much greater than that involved in soil moisture determination. Nevertheless, a good qualitative agreement was evident between the movement of nutrients by mass flow, rainfall and the uptake by groundnuts. While the establishment of a satisfactory water balance was possible, the same could not be claimed for the nutrient balance. This is due to the following reasons:
- i) Soil solution samples for measuring the concentrations of Ca, Mg, K, Na, and NO_3 were taken at 30, 60, and 110 cm depths, through applying a suction of 600 m bars for 12 hours. The number of soil solution samples taken were too few and definitely not enough to know whether the concentration is normally or log-normally distributed.
 - ii) The spatial variability of the soils and the uncertainty involved in the determination of the nutrient concentration which is a function of the solution volume measured which, in turn, depends on the soil moisture content at the sampling location.
 - iii) The rainwater composition and the chemical properties of the soil profiles were neither adequately defined, nor taken into consideration.
- d) For the 1980 season a 90-day millet crop will follow groundnuts. The effects of tillage and no tillage on the water and nutrient balance will be investigated. The reference levels for estimating the loss of water through deep percolation will be taken as 160 cm (the level below which roots of millet show negligible activity). The number of soil solution samples will be greatly increased.

The data obtained during the last three years and that being currently collected on studies of water and nutrient balance under groundnuts and millet will be included and discussed in a comprehensive report which will also provide detailed information about the root system development studies carried out on the two crops under well-defined conditions.

4. United Republic of Tanzania

Project: URT/5B/003

Institute: Mlingano Agricultural Research Institute

Expert: Dr. Y. Barrada

Duration of

Assignment: 6-20 May 1980

The Institute has the prime responsibility for planning, conducting, and coordinating research aiming at increasing production of Sisal and Coconut in the whole country. The Institute is also very active in its supporting role of the cereals and legume research programmes designed to improve and increase production in the Tanga region.

The National Soil Service, which is part of the Mlingano Agricultural Research Institute, plans, initiates and conducts research aimed at increasing agricultural production, improving or maintaining the soil fertility status, reducing erosion hazards, and conserving the soil and water resources. It also provides technical guidance and coordinates soil research in Tanzania. The service is supported by the FAO-managed UNDP "National Soil Service" Project. This project currently provides the services of five internationally recruited experts specialized in soil surveys, soil chemistry, soil fertility and soil physics.

The Agency's expert discussed the need for establishing a small, simple isotope laboratory with the concerned staff of the Institute. A separate block having a total area of about 50 m² was selected. Detailed plans were worked out for the introduction of necessary modifications to the selected block so that it becomes suitable to serve as an isotope lab.

The importance and the need for training local scientists on the use of isotope and radiation techniques in their respective fields of interest was stressed. Training programmes involving a total of 48 man-months were worked out for seven staff members of the Institute who will be nominated by the Government of Tanzania to be considered for IAEA Fellowship Awards.

The expert cooperated with the Institute's Director, his coworkers, and the FAO experts in planning an isotope-aided research programme aiming at:

- a) Evaluating the locally available rock-phosphate.
- b) Developing adequate soil and water conservation practices.
- c) Increasing yields of the main crops through improving the efficiency of water and fertilizer use.

The expert services, training requirements, equipment and expendable supplies essential for the proper implementation of the above-indicated research programme were identified. A Technical Assistance Request indicating the nature and scope of the required aid was prepared and submitted to the Agency for its consideration for the 1981 programme.

II. ASIA

1. Bangladesh

Project: BAN/5/05
Institute: Institute of Nuclear Agriculture, Mymensingh
Expert: Dr. I.G. Valencia
Duration of
Assignment: 1-30 May 1980

Dr. I.G. Valencia advised the local staff in a broad research programme using P-32 to determine the availability of phosphorus in Bangladesh soils and determine the suitability of several soil testing methods for local conditions. Several laboratory and greenhouse studies were initiated. Dr. Valencia advised on equipment needs of the Institute and attempted to further cooperative links between it and other agricultural research centres in Bangladesh.

III. EUROPE & MIDDLE EAST

1. Albania

Project: ALB/5B/002
Institute: Institute of Nuclear Physics, Tirana
Expert: Dr. J.-C. Fardeau
Duration of
Assignment: 10 June - 9 July 1980

Upon the request of the Government of Albania, the IAEA made the services of Dr. Fardeau available to the Institute of Nuclear Physics at Tirana for the duration of one month. The objectives of the expert's assignment were to train Albanian scientists on the use of tracer techniques in soil fertility research and to cooperate with his counterparts in planning and initiating an applied research programme aiming at improving the efficiency of the use of fertilizers.

As none of the staff of the Host Institute has experience in agriculture, soil scientists and agronomists from the "Soils Institute" and the "Higher Institute of Agronomy" were invited to cooperate with the expert.

During the expert's assignment a pot experiment was initiated to study the effect of certain cultural practices on the utilization of super-phosphate by wheat plants, and a laboratory experiment was conducted to study the kinetics of isotopic dilution of phosphate ions in "soil solution" systems over periods varying from 1 to 100 minutes. In addition, the expert cooperated with his counterparts in planning isotope-aided field experiments aiming at improving the efficiency of phosphatic fertilizer use by cereals and tree crops through determining the most adequate placement methods. Dr. Fardeau also explained the use of ^{32}P in the evaluation of the low-grade rock-phosphate ore found in the south of Albania (6 to 8% P_2O_5).

It is anticipated that Albanian scientists will soon initiate ^{15}N -aided studies aimed at increasing yields of the main field crops through improving the efficiency of nitrogenous fertilizer use.

TECHNICAL ASSISTANCE ADVISORY MISSION

Dr. J.B. Bole, technical officer of the Soil Fertility Section, participated in a 10-day Mission to Ghana in August 1980 to advise on the soil-plant-water research requirements of a proposed Centre for Nuclear Agriculture within the Ghana Atomic Energy Commission. Technically sound applied research programmes in soils, plant breeding and food preservation at the Centre would make valuable contributions to the development of agriculture in Ghana. The Mission advised on the personnel, training and equipment requirements of the Centre and on the role the Agency could play in its establishment. Dr. Bole appreciated the opportunity to discuss research needs with soil scientists at the Ghana Atomic Energy Commission, University of Ghana, University of Science and Technology (Kumasi) and the Soils, Crops, and Cocoa Research Institutes.

Report on theFAO/IAEA/GSF SEMINAR ON ISOTOPE TECHNIQUES IN STUDIES OF THE USEFUL CONSERVATION AND THE POLLUTANT POTENTIAL OF AGRICULTURAL NITROGEN RESIDUES In Combination with theFAO/IAEA/GSF RESEARCH COORDINATION MEETING ON AGRICULTURAL NITROGEN RESIDUES WITH PARTICULAR REFERENCE TO THEIR CONSERVATION AS FERTILIZERS AND BEHAVIOUR AS POTENTIAL POLLUTANTS

About seventy scientists from thirty-three Member States, the IAEA, the FAO, the Palestine Liberation Organization, and the International Fertilizer Development Centre participated in an international seminar on improving the conservation of soil and fertilizer nitrogen for agricultural production and minimizing its pollutant potential. The Seminar was held at the Vienna International Centre from 25 to 29 August 1980.

The increasing world population, growing food demands and diminishing cultivated land resources have dictated a dramatic increase in the use of, and dependence upon, nitrogen fertilizers for agricultural food production in recent decades. Moreover, these trends must continue to increase and exacerbate the associated problems of conserving agricultural nitrogen resources and minimizing their potential to contribute to water pollution in certain agricultural areas. Thirty-nine papers related to different aspects of nitrogen residue problems were presented and discussed by participants at the meeting.

The Seminar was also the occasion for the fifth Research Coordination Meeting for the participants in the Joint FAO/IAEA/GSF Programme on Fertilizer Nitrogen Residues. The aim of the programme is to quantify soil nitrogen losses and the fate of added fertilizer nitrogen, not only in terms of harvested crops, but also in terms of the unrecovered "residues" which can appear as pollutants. Such residues also represent the loss of an increasingly costly and energy-dependent input. Isotope techniques have provided a powerful tool in this programme by enabling added fertilizer nitrogen to be distinguished from that already present in the atmosphere-plant-soil system of agriculture.

The scientific data presented clearly indicated that mobile nitrate in the root zone was derived from the soil-N pool as well as from fertilizer nitrogen, and that the amount of nitrogen lost was dependent on agricultural practices. Some uncertainty remains as to what proportion of the added

^{15}N , apparently lost or unaccounted for, is in fact immobilized in the root zone at undetectable enrichment levels.

The Seminar identified the more urgent problems to be attacked and the most appropriate scientific methodology and isotope techniques for solving them. Research priorities for the triennial extension of the Nitrogen Residues Programme and for other scientific investigations to improve the management of the pool of nitrogen in the soil include:

- The improvement of irrigation management coupled with field measurements of soil water status.
- The improvement of nitrogen fertilizer efficiency by optimal fertilizer timing, formulation, placement, and by the appropriate use of nitrification inhibitors.
- The increased use of crop rotations which include deeper rooted crops and legumes.
- Improvement in fallowing techniques to eliminate bare fallowing and plant residue burning.
- More extensive monitoring of long-term changes in total soil and plant-available nitrogen.

The Seminar was capably chaired by Dr. D.R. Nielsen. The participants payed tribute to Dr. F.P.W. Winteringham, Scientific Secretary of the meeting, who recently retired from the Joint Division. He has actively supported the Nitrogen Residues Programme over its five-year existence as Head of the Chemical Residues and Pollution Section.

SOILS RESEARCH AT AGRICULTURE SECTION,
SEIBERSDORF LABORATORY

1. Symbiotic Nitrogen Fixation by Legume Crops under Field Conditions

Field experiments dealing with the time course of symbiotic nitrogen fixation of Vicia faba and Glycine max. were carried out and harvested.

The effect of placement on the uptake of starter nitrogen was studied in a field experiment using a "balanced" design including starter nitrogen applied both in a band and broadcast on the surface. Either the banded or surface applied nitrogen was labelled with ^{15}N . In this way the method of placement does not affect symbiotic nitrogen fixation since all treatments are identical with regard to rate and location of the nitrogen application.

2. Nitrogen Residues Programme

Injections of ^{15}N -labelled nitrogen solution into the soil were made at 0-30, 30-60, and 60-90 cm depths to find out the change of active root development of sugar beets during the growing season.

As expected the sugar beet initially had its "active" root system in the 0-30 cm of the soil. At maximum leaf development the major uptake of nitrogen came from the 30-60 cm layer. In the second half of the

growing season the bulk of the soil nitrogen was taken up from 60-90 cm depth, and insignificant amounts were derived from the soil surface layer.

3. ¹⁵N Analyses

During 1980, a total of 6150 mass-spectrometric and 370 emission-spectrometric analyses of ¹⁵N were carried out in plant samples provided by the cooperators of the coordinated research programmes on dinitrogen fixation and nitrogen residues.

TRAINING COURSES

Report on the

FAO/IAEA Interregional Training Course on the Use of Isotope and Radiation Techniques in Studies on Soil/Plant Relationships

An interregional training course on the use of isotope techniques in soils and crops research was held at the IAEA Laboratory, Seibersdorf, from 31 March to 6 June 1980. The course was extended to 10 weeks and limited to 14 participants this year. Scientists from Bangladesh, Bolivia, Cuba, Egypt, Ghana, Guinea, Panama, Romania, Sierra Leone, Sri Lanka, Thailand, and Turkey were introduced to methods of effectively using nuclear techniques in soils research. Training emphasized the planning and execution of experiments to solve practical agricultural problems in developing countries.

Greenhouse and field experiments were conducted dealing with the following topics:

1. Intercomparison of natural phosphates for P availability to crops.
2. Efficient use of superphosphate as affected by banding and surface application.
3. Symbiotic N fixation by legume crops and efficient use of starter N.
4. Active root distribution of trees.

Much time was devoted to the planning and interpretation of results of data derived from field experimentation. Prof. Soper, Canada, Prof. Faust, German Democratic Republic, and members of the Joint FAO/IAEA Division lectured on various topics during the training course. An excursion was organized to the southern part of Austria to familiarize the participants with some aspects of practical agriculture in Austria. All participants had an opportunity to report on related research in their home countries and to discuss their future research plans and objectives and pursue avenues of future cooperation with staff of the Laboratory and Joint Division.

Report on the
Interregional Training Course on the Application of Nuclear Techniques
in Agriculture

The Interregional Training Course on the Application of Nuclear Techniques in Agriculture began on 1 September 1980 at the Timiryazev Agricultural Academy in Moscow, USSR, and will continue to 30 November 1980. The object of the course is to provide intensive training on the use of isotopes and radiation techniques in various fields of agricultural research to scientists from developing countries.

Twenty-two scientists from 16 Member States are currently participating in the course. The staff members of the Joint FAO/IAEA Division and of the Host Academy will serve as lecturers. During 1-9 November a study tour will be organized to the agricultural research institutes of Tashkent as part of the training course. A full report on the course will be published in the next issue of the Soils Newsletter.

Announcement of the
FAO/IAEA Interregional Training Course on the Use of Isotope and
Radiation Techniques in Studies on Soil/Plant Relationships

Place: IAEA Seibersdorf Laboratory, Austria

Time: 6 April - 5 June 1981

Language: English

Organizers: International Atomic Energy Agency and the Food and Agriculture Organization of the United Nations. Financed by the Swedish International Development Authority (SIDA).

Purpose: The objective of the course is to provide intensive training on the use of isotopes and radiation techniques to scientists in developing countries who are actively engaged in research in soil science, plant nutrition, biological dinitrogen fixation, fertilizer and water management practices. The course will help developing countries to build up adequately trained personnel who would be able to effectively utilize isotope and radiation techniques in applied research aiming at increasing crop production.

Nature of the Course: The course will deal with the principles involved in the use of isotopes and radiation equipment in research in soil chemistry, soil physics, plant nutrition, fertilizer and water management practices. Through lectures, laboratory, greenhouse and field experiments, films and discussions, the course will provide information and practical experience to participants on how nuclear methods can be effectively used for increasing crop production economically through a better understanding of the soil-water-plant system. Laboratory exercises will be designed to familiarize the participants with

the principles involved, use of equipment, and laboratory discipline pertaining to the safe handling of radioactive materials and minimizing contamination risks. The practical exercises will be designed to carry through to completion short-term research-type projects. This would include planning, execution, sample preparation, analysis, interpretation and presentation of results.

Announcement of the
FAO/IAEA Interregional Training Course on the Use of N-15
in Soil Science and Plant Nutrition

Place: Zentralinstitut für Isotopen- und Strahlenforschung,
Leipzig, German Democratic Republic

Time: May to June 1981 (provisional)

Organizers: The International Atomic Energy Agency and the Food and Agriculture Organization of the United Nations, in cooperation with the Government of the German Democratic Republic

Language: English

Purpose: The object of the course is to train scientists from developing Member States in all aspects of the use of nitrogen-15-enriched or depleted fertilizers in soil and plant nutrition studies. Particular emphasis will be placed on laboratory experiments and studies directed towards improving the techniques of N-15 determinations and the efficiency of the use of nitrogenous fertilizers.

Nature of the Course: The programme of the five-week course will include lectures, laboratory exercises with soils and plants, discussion periods and scientific visits. The subject matter of the lectures will include the properties of isotopes of nitrogen, availability of stable isotopes N-15 and N-14, principles of their separation, determination of $^{15}\text{N}/^{14}\text{N}$ isotope ratios by mass- and emission-spectrometry, N-15 density labelling experiments, isotope effects, tracer kinetics, N balance studies in the soil-plant system, use of N-15 in research into biological dinitrogen fixation, nitrogen transformation, improvement of nitrogen fertilizer management practices, and the effects of herbicides on the utilization of nitrogenous fertilizers.

The laboratory exercises will include determination of total N and N-containing fractions in soils and plants, sample preparation for isotope ratio analysis, sources of errors, isotope dilution chemistry, isotope ratio determination by mass- and emission-spectrometry, N-15 density labelling and positional N-15 isotope analysis by nuclear magnetic resonance techniques, plant uptake of labelled fertilizer nitrogen, and losses of nitrogen by leaching and volatilization. The design of field experiments with N-15-labelled fertilizers and factors influencing the N-15 enrichment required for field experiments will also be included in the course.

Announcement of the
FAO/IAEA Training Course on the
Use of Radiation Equipment for Soil Moisture and Irrigation Studies

Place: Centre d'Etudes Nucléaires de Cadarache,
Saint-Paul-lez-Durance, France

Time: 22 June - 10 July 1984

Organizers: International Atomic Energy Agency and the
Food and Agriculture Organization of the United
Nations in cooperation with the Commissariat à
l'Energie Atomique (CEA), France

Language: French

Purpose: The objective of the course is to provide intensive training in the use of radiation equipment for measuring soil moisture and bulk density to French speaking technicians in developing countries. Through the course, technicians will gain experience in using radiation equipment in applied research aimed at improving the efficiency of water use on irrigated land and the development of adequate water management practices under rain-fed agriculture. It is intended that the course assist in filling a gap of trained technicians in this field, which presently prevents many Member States from utilizing the above-mentioned powerful research tools.

Partici-
pation:

Participants should have 12, or at least a minimum of 11, years of education. This corresponds to high or secondary or equivalent technical school certificate level or one year less than that level. Preference will be given to those who have had a few years of practical experience as technicians in a soils laboratory and are under 35 years of age. Invitations will soon be extended to Member States of the sponsoring international organizations to nominate candidates for the mentioned course.

Nature of
the Course:

The course would emphasize the calibration, proper handling and maintenance of the various types of radiation equipment. The advantages and limitations of the equipment would also be thoroughly discussed. In addition, due consideration would be given to the interpretation of results and to reducing or eliminating possible sources of error, for example, through proper placement of access tubes and avoiding soil compaction. It is planned that the first week of the course would provide the basic information essential for explaining the theories involved and the precautions necessary to avoid radiation hazards while the remaining two weeks would concentrate on the practical applications of the equipment in the field.

COMING EVENTS

FAO/IAEA Advisory Group Meeting on the Use of Nuclear Techniques in Improving Pasture Management. The meeting will be held in cooperation with ICARDA in Aleppo, Syria. About twenty international experts on range management and ecology and the use of isotope and radiation techniques in pasture systems will meet to present recent scientific information and discuss topics relevant to the theme. They will outline the objectives and research plans for a proposed Coordinated Research Programme on Pasture Management which may be initiated in 1981.

Aleppo, Syria
10-14 November 1980

FAO/IAEA/SIDA Research Coordination Meeting on Isotope Techniques in Studies of Biological Dinitrogen Fixation. The second meeting of this group of 14 research contract and 7 research agreement holders will be held in Vienna 12-16 January 1981. The participants will discuss the progress of the programme and attempt to solve problems of mutual concern. The research objectives for the next cropping season will be discussed and experimental plans will be developed.

Vienna, Austria
12-16 January 1981

FAO/IAEA Workshop on N-15 Methodology for Measuring the Integral Amount of N_2 Fixed by Legume Crops in the Field. Invited participants involved in coordinated research programmes utilizing ^{15}N to quantify dinitrogen fixation will spend a week reviewing the theory and practice of this important technique.

Vienna, Austria
19-23 January 1981

FAO/IAEA Research Coordination Meeting on Isotope and Radiation Techniques for Efficient Water and Fertilizer Use in Semi-Arid Regions. The 10 contract and 3 agreement holders and invited consultants involved in this programme will meet in Vienna from 23 to 27 March 1981 to discuss the initial research results, consider ways and means for overcoming the problems encountered, and develop future research plans.

Vienna, Austria
23-27 March 1981

RECENT PUBLICATIONS

- "Soil Nitrogen as a Fertilizer or Pollutant"
(Report and Proceedings of the Fourth Research Coordination Meeting of the FAO/IAEA/GSF Coordinated Research Programme on Agricultural Nitrogen Residues held in Brazil, 1978)
Price: A.S. 580, Number: STI/PUB/535

FORTHCOMING PUBLICATIONS

1. "Nuclear Techniques in the Development of Management Practices for Multiple Cropping Systems" (Proceedings of the FAO/IAEA Advisory Group Meeting on Nuclear Techniques in Development of

- Fertilizer and Water Management Practices for Different Cropping Systems, held in Ankara, Turkey, from 7-12 October 1979). - 1980
2. "Isotope and Radiation Techniques in Soil and Water Conservation Studies in Africa" (Proceedings of the Regional FAO/IAEA Seminar on the Use of Isotopes and Radiation Techniques in Soil and Water Conservation Studies in Crop Production for Developing Countries in Africa, held in Khartoum, Sudan, from 12-17 November 1979) - 1980
 3. "Grain Legumes: Management for Optimum N-Fixation and Fertilizer Utilization" (Results of a five-year, eleven-country, FAO/IAEA coordinated research programme using isotopically labelled fertilizers) - 1981
 4. "Zinc Fertilization of Flooded Rice" (Results of a five-year FAO/IAEA coordinated research programme using ⁶⁵Zn-labelled fertilizer conducted in ten countries) - 1981
 5. "Radiation and Isotope Techniques in Studies of Soil-Water Regimes" (Results of a five-year coordinated research programme carried out in ten countries designed to develop techniques for studying water movement in different unsaturated soils and obtain reliable estimates of drainage percolation of representative soil profiles in Member States) - 1981

Soils Newsletter

Joint FAO/IAEA Division
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for Food and Agricultural Development

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