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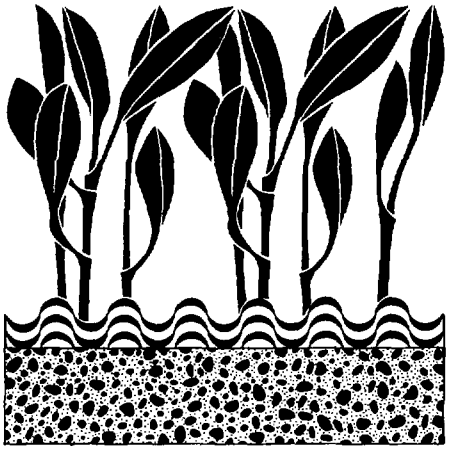

Soils Newsletter

JOINT FAO/IAEA DIVISION
OF ATOMIC ENERGY
IN FOOD AND AGRICULTURE

INTERNATIONAL
ATOMIC ENERGY AGENCY, VIENNA

Vol. 1, No. 2 October 1978

CONTENTS

TO OUR READERS

We are happy to publish the second issue of the Soils Newsletter. We are grateful for the appreciation and favourable comments on the first issue received from many of our readers. We shall endeavour to maintain the publication of the Newsletter at as regular intervals as possible. We wish to reiterate that one of the purposes of the Newsletter is to provide a forum for dissemination of information on recent advances in isotope- and radiation-aided research into soil-water-plant relations in Member States of FAO and IAEA and would welcome contributions from our readers.

The present issue starts with summary reports of six technical assistance projects executed in Member States in Africa and Latin America. A report on a research coordination meeting on Agricultural Nitrogen Residues with Particular Reference to their Conservation as Fertilizers and Behaviour as Potential Pollutants (3-7 July 1978, Piracicaba, Brazil) is presented. An account of the current activities at the Agricultural Section, Seibersdorf Laboratory is included. We conclude this issue with reports on two interregional training courses held at Leipzig, German Democratic Republic; and IAEA Laboratory, Seibersdorf, Austria, during April - June 1978 and an announcement of a forthcoming training course to be held in Moscow, U.S.S.R.

We hope you find this material of interest and thank you for your encouragement and cooperation.

SOIL FERTILITY, IRRIGATION
AND CROP PRODUCTION SECTION

Reports on
TECHNICAL ASSISTANCE PROJECTS

The Soil Fertility, Irrigation and Crop Production Section has the technical responsibility for the implementation of a number of assistance projects as indicated in the first issue of the Newsletter. These technical assistance projects deal with the application of isotope and radiation techniques to solve specific problems of soil fertility, fertilizer usage, plant nutrition, soil moisture and water management in developing Member States. Summaries of final reports of field experts assigned to six technical assistance projects in Member States in Africa and Latin America are included here. A brief description of these projects was given in the first issue.

I. AFRICA

1. Ivory Coast

Project: IVC/5B/05

Institution: Institut des Savanes, Bouake

Expert: Dr. Truong Binh

Duration of
Assignment: January - February 1978

During the course of the expert's earlier mission, a technique was developed to determine the rooting depth of upland rice with the aid of ^{32}P. This technique was tested on a large number of rice varieties and allowed for their classification according to rooting depth.

In the present assignment, attempts were made to improve the technique of placing the radioactive solution and to achieve better reproducibility of the radioactivity measurement through increasing the volume of soil labelled and minimizing the sources of variation.

Relationships were examined between active root distribution in rice varieties measured by the absorption of ^{32}P-labelled KH_2PO_4 placed in the soil and the uptake of water by these varieties determined using tensiometers. Data indicated maximum root activity of varieties Pratao, Lac 23, and 63-83 at a depth of 95 cm; these results confirmed the findings of the previous year's study. Highly significant correlation was obtained between ^{32}P and water uptake for the rice varieties examined; hence, these findings also demonstrate a correlation between active root development and water uptake in the rice varieties.

2. Ivory Coast

Project: IVC/5B/06

Institution: Institut des Savanes, Bouake

Expert: Dr. G. Vachaud

Duration of Assignment: 13-26 February 1978

This mission was a follow-up to the assignment implemented by Mr. M. Vauclin from 7-21 November 1977. The objectives of the assignment were:

a) To calibrate the neutron moisture meters used at different sites of the Bouake experimental station;

b) To study the hydrodynamic properties of soils of the station so that the amounts of water that percolates below the root zone can be estimated.

Reliable calibration curves were established for three representative soil types. Differences between horizons were given due consideration while establishing the calibration curves.

The tensiometer readings recorded by Mr. J.M. Kalms since 1975 indicate clearly that the hydraulic gradient below the root zone could change its sense (from + to -) rapidly during the year. It is not possible to determine the water consumption without having a reliable quantitative estimate of the amounts of water which moved up to or down below the rooting zone.

$$ETR = \Delta S - q.\Delta t$$

ETR: real evapotranspiration (during period Δt)

ΔS: amount of water stored in soil profile

q: flux mm/d

Δt: time interval under consideration

$$q = -K(\theta) \cdot \frac{\Delta H}{\Delta Z} \qquad \text{(Darcy's law)}$$

- $K(\theta)$: hydraulic conductivity
- θ: moisture content cm^3/cm^3
- $\frac{\Delta H}{\Delta Z}$: hydraulic gradient

The hydraulic conductivity was determined as a function of moisture content on three soil types following the techniques adopted by cooperators in our coordinated research programme on the Use of Isotope and Radiation Techniques in Studies of Soil-Water Regimes.

Methods of Extrapolation of Results

As the determination of the hydraulic properties of soils [i.e. $K(\theta)$] in situ is time consuming and difficult to achieve, it is not possible to carry out in the field a number of experiments large enough to allow for statistical treatment of the data. The following two methods are therefore suggested:

a) an indirect method based on the determination of an important number of suction curves on undisturbed soil samples, then analysing these curves with the aid of the model of "Mualem." This model allows for using the suction curve as a basis for reconstituting the conductivity curves;

b) a direct method based on laboratory determination of the hydraulic conductivity curves on undisturbed soil samples, using a simple and rapid method.

Water Balance

The use of the static concept of "available water" assumes that no water movement takes place between the rooting zone and the deeper soil layers. The great interest in characterizing the hydraulic properties of the soils is due to the fact that this knowledge allows for:

a) controlling the flux of water across a certain level;

b) defining the modality of water extractions by roots in layer by layer in the soil profile.

The different experiments carried out in Bouake during the last three years have clearly indicated that the root activity is concentrated in the top-70-cm layer of the soil. It is therefore suggested to use the tensiometer readings at 75 and 90 cm to characterize the water movement across the 82-cm level.

$$\frac{\Delta H}{\Delta Z} = \frac{H_{90} - H_{75}}{25}$$

The water content at 82-cm depth is measured with a neutron moisture meter. Knowing the hydraulic conductivity K as a function of water content θ the flux (at Z = 82 cm) will be

$$q = -K. \frac{\Delta H}{\Delta Z}$$

$$q. \Delta t = - K. \frac{\Delta H}{\Delta Z} . \Delta t$$

The value of q will be positive if the water movement is downward $(\frac{\Delta H}{\Delta Z} < 0)$ or negative if the movement is upward $(\frac{\Delta H}{\Delta Z} > 0)$.

The expert made the following recommendations for future work:

a) two neutron moisture meters complete with scalers and spare parts should be provided to the Institute to replace those which were extensively used since ten years;

b) taking into consideration the importance of the work being performed to investigate the effects of ploughing on the physical properties of the soil, the purchase of a gamma density probe to facilitate such studies was also recommended;

c) the services of a short-term expert who would cooperate in evaluating the data obtained and help giving the research plans the right orientation was recommended;

d) the importance of training was emphasized, and awarding a fellowship to a national scientist to gain the necessary experience in the use of isotope and radiation techniques in soils research was recommended.

3. Syria

Project: SYR/72/018

Institution: Faculty of Agriculture, University of Aleppo, Aleppo

Expert: Dr. D.R. Nielsen

Duration of Assignment: 23 July - 8 August 1978

Lectures in soil physics were given to post-graduate students and counterpart scientists were assisted in interpretation of results of field experiments and in planning a sound, applied research programme to be carried out with the aid of isotope and radiation techniques. Determinations of the hydraulic conductivity as a function of moisture content were made at various locations with a view to studying the spatial variability within the University's Experimental Farm near Aleppo.

The contacts between the International Center for Agricultural Research in the Dry Areas (ICARDA) and the Department of Soil Science of the College of Agriculture of the University of Aleppo which were established during Dr. Barrada's visit in April 1978 were furthered through several meetings initiated by Dr. Nielsen. In the near future, ICARDA and the Soils

Department of the University of Aleppo will start applied research programmes aiming at improving the efficiency of water and fertilizer use with the aid of isotope and radiation techniques. This cooperative research will utilize the isotope laboratory and the equipment provided to the University of Aleppo through the U.N.D.P. project SYR/72/018.

4. Tanzania

Project: TAN/5B/02

Institution: Faculty of Agriculture, University of Dar-Es-Salaam, Morogoro

Expert: Dr. E. Danfors

Duration of Assignment: March - April 1978

Ten counterpart scientists and technicians were trained on the proper use of neutron moisture meters and studies were initiated aiming at:

a) quantitatively determining the effects of mulching, zero tillage and other management practices on water conservation;

b) comparing the water consumption under different cropping systems and estimating the effect of fallow on water conservation; this was achieved through following moisture changes in soil profiles in pasture and fallow plots as well as under maize, sorghum, squash and cowpea grown as monocultures or in combinations (intercropping).

As originally planned and strongly recommended by the expert, services of a soil fertility expert well versed in the use of tracer techniques will be made available to the Faculty of Agriculture for the duration of four months. The expert stressed the need for intensive training of two technicians and one scientist abroad on the use of nuclear techniques in soil physics studies. It was also recommended that the adequate facilities of the College of Agriculture at Morogoro be used for international meetings (working groups and seminars) or training courses.

II. LATIN AMERICA

1. Colombia

Project: COL/5B/04

Institution: Institute of Nuclear Research, Bogota

Expert: Dr. I.G. Valencia

Duration of Assignment: April - November 1977

The overall objective of the expert assignment was to assist local scientists in the development of efficient fertilization practices to obtain higher yields of rice in regions of Colombia where rice is cultivated in acid soils of low fertility.

Fractionation studies were executed on various soils of the Llanos region. It was successfully determined that the native soil phosphorus is predominately found as iron phosphates whereas aluminium phosphates are found in reduced quantities. With the addition of phosphorus as a fertilizer, however, the phosphates not native to the soil were rapidly absorbed more into the aluminium phosphate fraction of the soil rather than the iron phosphate fraction.

Phosphorus-32-labelled fertilizer was also applied to these soils to determine: (i) the most suitable fertilizer source; (ii) the best time of fertilizer application; (iii) the most economical rate of fertilizer application; (iv) the relative % utilization of fertilizer by the first and second crop; and (v) the relationship between rates of applied phosphorus and certain rice plant diseases in the Llanos region. These experiments have been continued by local scientists and the results are under evaluation to determine the most efficient fertilizer practice.

2. Uruguay

Project: URU/5B/08

Institution: Institute of Viticulture, Las Piedras, Canalones

Expert: Dr. J. Fernandez

Duration of
Assignment: November - December 1977

The objectives of the expert assignment were to implement a current study on comparisons between commonly used grape varieties as to their root distribution (activity) through phosphorus-32 translocation studies and photosynthetic activity through field measurements of the fixation of carbon-14-labelled CO_2. Counterpart scientists were trained in methodology for root activity and photosynthetic research.

TECHNICAL ASSISTANCE ADVISORY MISSIONS

Agricultural Advisory Missions were carried out in nine Member States in Africa, Asia and Latin America by Staff Members of the Soil Fertility, Irrigation and Crop Production Section on behalf of the Division of Technical Assistance. Dr. Y. Barrada visited Niger, Syria, and Zambia during March/April 1978; Dr. K. Mistry visited Indonesia, Malaysia, and Sri Lanka during April/May 1978; and Dr. M. L'Annunziata visited Nicaragua, Costa Rica, and Ecuador during June/July/August 1978.

POTENTIAL AND ACTUAL POSSIBILITIES FOR IMPROVING THE EFFICIENCY OF WATER USE -

Report on Study Leave of Dr. Y. Barrada in California, U.S.A. during May/June 1978

The 9 million acres under agriculture in the state of California consume about 31 million acre-feet per year or about 85% of the total water available to the state. Through the recent two successive years of drought, the population (including the urban population) became aware of the urgent need for improving the efficiency of water use by the main consumer, "agriculture." During his stay in California during May/June 1978 Dr. Y. Barrada examined the potential and actual ways and means for saving water. A brief discussion of these possibilities is presented here.

1. A great potential for saving water is reducing transpiration, as only about 1% of the total water taken up by plants remain in the mature crop while the rest is transpired to the atmosphere. Although reducing transpiration through the use of antitranspirants is not an economic solution at present, it is hoped that it will become possible in the future.

2. Saving water should be possible also through the development of varieties which are more efficient (in photosynthesis and water use), early maturing, and suffering a relatively small yield reduction if grown under water stress for certain periods.

Regional projects are now being carried out to determine the yield reduction which various crops would suffer if water supplied is less than what is required for optimum evapotranspiration. The results obtained would provide a sound basis for determining whether it is more beneficial to grow crops on a small area while providing adequate water supply or to grow crops under limited stress on a larger area, eventually making use of water stored in soil profiles. Growth conditions will be carefully recorded so that information gained in a given location can be applied to other areas.

3. Water management is the key to improving water use efficiency and has to take into consideration the soil properties, weather conditions, crop needs, and water quality. Among the major factors which affect the efficiency of water use, the following are discussed:

a) The uniformity of water distribution greatly affects the efficiency of water use. If basin (flooding) irrigation is used, adequate leveling of the soil to establish an appropriate slope plays a very important role in achieving a high water use efficiency. When furrow irrigation is used, the grade, length of run and head of water applied should be designed to strike an adequate balance between run-off and infiltration rate. Providing some type of surface drainage to take care of excess irrigation water and rain and recirculating the collected drainage water is now obligatory in California as this appreciably improves the efficiency of water use.

b) The choice of adequate irrigation system is of prime importance. For example, the central pivot irrigation system performs very well on light-textured soils where frequent irrigation using relatively small amounts of water are necessary. This system,

however, requires a high pressure of about 6 atmosphere and is likely to cause problems on soils of low permeability which are common in the areas where clay content exceeds 12%.

Sprinkler irrigation allows fairly accurate control of the amount and distribution of water applied and requires minimal land grading. The investment involved amounts, however, to U.S. $300. to $800. per acre in addition to roughly $15./acre-foot required for the energy necessary to pressurize water.

Careful consideration should be given to the movement of salts, especially in connection with trickle and furrow irrigation. In the latter case, the decision to irrigate every other row to reduce the amounts of water applied would necessitate additional amounts of water at a later stage for leaching accumulated salts.

c) Problems caused by hardpans, claypans, or compacted and layered soils are often encountered. Because of the limited water reservoirs in such cases, irrigations must be lighter and more frequent. It is also essential to match the rate of water application to the rate of infiltration to avoid problems of poor aeration and diseases resulting from excessive water. Mechanical methods should be considered only if the hardpan or compacted layer is rather thin and can be easily reached by adequate machines. For growing trees or vines on such problem soils, holes must be dug several months before planting. The holes should be deep enough to penetrate the hardpan or compacted clay layer, and the compacted soil removed should be replaced with topsoil.

d) The Salinity Laboratory at Riverside is actively engaged in applied research aiming at the development of adequate management practices which would permit the use of low-quality water for irrigation. Studies on the effects of water quality on yields and water requirements (leaching factor coefficient or percentage over ET) are being carried out in heavily instrumented large concrete lysimeters and in the field. Recycled drainage water (total salt content approximately 3000 ppm) are used for irrigation in the "waste-water trials" being conducted in the Central Valley.

e) Every effort is being made to help farmers schedule irrigation properly and use only the necessary amounts of water in each irrigation. The following methods of scheduling irrigation are either being used or are under consideration for use in California:

   i) It is planned to establish a number of agricultural meteorological stations at various locations. Each of these stations will be provided with a class-A open pan surrounded by a standardized area of irrigated grass kept at specific height. Based on evaporation measured from these open pans, tables will be worked out which would indicate the water consumption of a given crop at a specific location and a certain stage of growth. With the aid of these tables, the University

Cooperative Extension Specialist would help farmers to decide when to irrigate and estimate the amount of water to be applied in each irrigation.

ii) A number of large farmers and consulting firms are now using neutron moisture meters for scheduling irrigation on the basis of a rather simple technique for estimating the water-depletion rate from the top 3-foot soil layer. The new developments, which combine the scaler and the probe in a single composite unit and rendered the equipment lighter in weight, safer in handling, and more economical, are certain to lead to the use of the neutron moisture as a common practice for scheduling irrigation in the near future. The price of the equipment (around $3,000.—) and the training of personnel on the proper handling of the equipment are the main problems. The manufacturers, however, hold periodical one-day training courses which gives the trainees a good idea about the equipment and satisfies the state's requirement for permitting persons to use radiation equipment. Further training can, of course, be organized in cooperation with the various campuses of the University of California, and the manufacturers will certainly be prepared to organize longer and more comprehensive training courses.

iii) Studies are being carried out to develop a technique for scheduling of cotton irrigation on the basis of plant water potential measured with a commercially available pressure chamber. This measurement is related to plant growth as indicated by main stem elongation rate. It was determined that on Panoche clay loam, the first irrigation should be made at -17 bars. Similar studies on other crops grown on different soils can provide information very useful for irrigation scheduling.

iv) Gypsum blocks are being used by many farmers and consulting firms to indicate whether the soil at a given depth is either wet or dry. This information is being used either alone or in combination with pan evaporation data for the purpose of scheduling irrigation.

v) Tensiometers are being used for scheduling irrigation. The fact that they function only in the wet range requires certain experience in the interpretation of the information they provide in relation to the depth at which they are placed. A new fast responding portable tensiometer was developed. This tensiometer has a gauge to indicate suction, a brass tube that can be forced into the soil down to 18 inches, and a capillary to ensure quick response. When not in use (during transport), the tensiometer cup is immersed in water. This very practical instrument costs about $130.

4. The thermal images obtained by low (500 m) and very high (50,000 m) flying airplanes as well as by satelites are expected to prove in the future as very valuable tools for improving water use efficiency through following soil moisture changes and the proper choice of crops suitable for specific locations.

For the present, intensive land measurements are being carried out at various locations where wheat and barley are grown in order to calibrate and interpret the thermal images. At each location, 150 average values of various variables are printed out every twenty minutes, day and night. Included are temperatures of soil, air, plant surface, incoming radiation, albedo, wind speed, wind direction, etc. Other variables such as soil moisture content, rainfall, plant height, number of tillers are also recorded. In addition, the effects of varying slopes facing different directions on the micrometeorological data are being carefully observed.

It is hoped that, through proper calibration, these thermal images will provide information on moisture content, yields of small grain, and eventually be helpful in identifying the different crops grown on the areas surveyed. That would lead to reliable estimates of areas grown to certain crops and anticipated yields. Such information is of great economical, social, and political importance.

5. In general, improving the efficiency of water use costs additional effort and investment. Therefore, where irrigation water is provided at no or very low cost, it is extremely difficult to improve the efficiency of water use to any appreciable extent. Education and advice alone are normally not sufficient to persuade farmers to make the effort and additional investment necessary to use water more efficiently. Demonstration of the favourable effects on crop yields and the economic incentive in the form of the cost of water are likely to be very effective in achieving a higher efficiency of water use.

Report on the FAO/IAEA/GSF RESEARCH COORDINATION MEETING ON AGRICULTURAL NITROGEN RESIDUES WITH PARTICULAR REFERENCE TO THEIR CONSERVATION AS FERTILIZERS AND BEHAVIOUR AS POTENTIAL POLLUTANTS

Piracicaba, Brazil

3-7 July 1978

The fourth meeting of participants in the Joint FAO/IAEA/GSF Coordinated Research Programme on Agricultural Nitrogen Residues with Particular Reference to their Conservation as Fertilizers and Behaviour as Potential Pollutants was held during 3-7 July 1978 at the Centro de Energia Nuclear na Agricultura (CENA), Piracicaba, Sao Paulo, Brazil. This programme is being executed jointly by the Soil Fertility, Irrigation and Crop Production Section and the Chemical Residues and Pollution Section of the Joint FAO/IAEA Division and supported by the Government of the Federal Republic of Germany. Drs. F.P.W. Winteringham (programme coordinator) and M. Fried (Joint FAO/IAEA Division Director) served as secretariat to the meeting. The meeting was attended by 27 participants from Australia, Arab Republic of Egypt, Brazil, Chile, Denmark, Federal Republic of Germany, India, Israel, Mauritius, Netherlands, Pakistan, Trinidad, U.K., U.S.A., and Yugoslavia. Representatives of the FAO Land and Water Development Division, UNDP, CENA, University of Sao Paulo, and the Brazilian Atomic Energy Commission also participated.

This mid-term meeting was devoted to presentation and discussion of results of the 1977-1978 experiments and to summarize the data from all experiments which were initiated in 1975.

The objectives of the programme are to contribute to the control of the pollutant potential of fertilizer nitrogen residues as undesirable nitrate in food, feed and water and to improve their conservation in soil as useful plant nutrients. Particular attention is being given to these problems in developing countries. On the basis of these studies, the programme aims to develop recommendations designed to attenuate the problems in the context of environmental quality without impairing essential agricultural production. The studies employ fertilizer materials labelled with ^{15}N and ^{14}C.

The participants presented experimental results on the following aspects of the programme:

(i) The fate and behaviour of the fertilizer nitrogen in the field experiments under influence of the different soil and climatic conditions, irrigation, crops and cropping systems, soil management, etc.;

(ii) Lysimeter experiments with nitrogen fertilizers under different conditions;

(iii) Leaching of nitrate nitrogen and other solutes through the soils;

(iv) Measurement of soil water flux for use in determining nitrate flux below a rooting zone;

(v) The cycling of nitrogen and other plant nutrients in agricultural ecosystems;

(vi) Rapid determination of nitrogen containing compounds by flow injection potentiometry;

(vii) Effect of 1-triacontanol on crop growth, yield and nitrogen metabolism.

The experiments were carried out under different soil and climatic conditions, with different agricultural crops and with different soil and water management practices. Data from experiments with ^{15}N-labelled fertilizer indicate that from 20 to 70% of the plant nitrogen in wheat, maize, rhodes grass, bean crop, sugarcane, moong, swiss chard, lettuce, celery and rice crops, was derived from the labelled fertilizer during the first year after application. The proportion of initial applied fertilizer available to the plant fell to less than 7% by the second year and to nearly 1% by the third year. Some field and lysimeter experiments indicated that fertilizer nitrogen appeared as nitrate more than 200 cm below the soil surface, whereas another investigation (Pakistan) did not indicate significant nitrogen leaching below the root zone. Important progress has been made in the development of a special electrode for instantaneously measuring nitrate concentration in plant material, soil leachate and water. Useful progress has also been made in the development of methodology and models for predicting fertilizer nitrogen losses through leaching. Results obtained so far indicated the roles of the total soil nitrogen resevoir, irrigation rate, ratio and optimal fertilizer rates as critical factors in this problem.

The research coordination meeting recommended continuing with the agreed investigations until 1980 when a further review, report, and recommendations are envisaged.

The proceedings and report of the fourth research coordination meeting are in preparation for publication.

CURRENT ACTIVITIES AT AGRICULTURAL SECTION, SEIBERSDORF LABORATORY

1. Field Programme on Symbiotic Nitrogen Fixation

A series of field experiments were carried out to compare different techniques for the determination of symbiotic nitrogen fixation by soybeans and Vicia faba in the field.

In particular, the nature of the "non-fixing" standard was included in the experimental treatments, i.e. inoculation with inactive rhizobium, absence of inoculation and non-legume crops such as barley and a non-nodulating isoline of soybean.

Particular care was taken to distribute a low dose of highly ^{15}N-enriched nitrogen fertilizer to the entire surface of the experimental plots in order to reduce the experimental variation to a minimum. During successive years, legume and non-legume crops will be grown on the experimental fields to measure the symbiotic nitrogen from "labelled soil" plots.

2. Analytical Services for ^{15}N

During the period 1 January to 31 July 1978, the service laboratory carried out more than 3000 mass-spectrometric analyses of ^{15}N in samples taken from field experiments involved in the coordinated research contract programmes on symbiotic nitrogen fixation by legume crops and on nitrogen residues in soils.

In addition, about 200 samples were analysed for ^{15}N by means of emission spectrometry for low N containing samples from the Nitrogen Residues Programme.

Further 150 samples of a preliminary experiment on N fertilizer timing with cotton for a Technical Assistance project in Peru were analysed and about 400 samples from field experiments carried out in Seibersdorf.

A total of 3750 samples were analysed for ^{15}N during this seven-month period.

TRAINING COURSES

Report on the Interregional Training Course on the Use of ^{15}N in Soil Science and Plant Nutrition

The Interregional Training Course on the Use of ^{15}N in Soil Science and Plant Nutrition organized by the Joint FAO/IAEA Division of Atomic Energy in Food and Agriculture was held during 3 May to 2 June 1978 at the Zentralinstitut für Isotopen- und Strahlenforschung, Leipzig, German Democratic Republic.

The object of the course was to train scientists from developing countries in different aspects of the use of ^{15}N-enriched and-depleted compounds in soil and plant nutrition studies. Particular emphasis was

placed on laboratory exercises and studies directed towards improving the techniques of ^{15}N determination in soil and plant samples and the efficiency of the use of nitrogen fertilizer in agriculture.

Nineteen participants were selected from the following Member States: Argentina, Brazil, Bulgaria, CSSR, Egypt, India, Indonesia, Mauritius, Mexico, Pakistan, Philippines, Sri Lanka, Turkey, Uganda, Venezuela, Viet Nam and P.D.R. of Yemen. The programme of the course included 23 lectures, time for discussion, 28 laboratory experiments with soil and plant samples, 4 scientific visits and 3 excursions. The lectures covered different aspects of the problems of the use of ^{15}N in soil science and plant nutrition. Drs. M. Fried, V. Ladonin and R. Rennie, staff members of the Joint FAO/IAEA Division, Dr. V. Middelboe, Veterinary and Agricultural University, Copenhagen, Denmark, Dr. H. Faust, Director of the course, and staff members of the host institute delivered lectures according to the programme of the course.

For the basic part of the course dealing with sample preparation and the determination of $^{15}N/^{14}N$ ratio in the soil and plant, seven groups were formed and each group of two or three trainees had one instructor from the staff members of the host institute to supervise their work.

The participants of the course visited the isotope laboratory of the Central Institute for Crop Research, Gatersleben; the Institute of Plant Nutrition, Jena; the Institute of Fertilizer Research, Leipzig; and the Isotope Laboratory of the Institute of Plant Biochemistry at Halle.

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 and Radiation Techniques in Studies on Soil/Plant Relationships was held in the Seibersdorf Laboratory from 17 April to 2 June 1978.

Seventeen participants were selected from Asian, African and Latin American countries. Five invited specialists from Denmark, Canada, Brazil, Spain and the German Democratic Republic together with five Joint Division staff members and the technical staff of the Laboratory were involved in lecturing and carrying out of practical field and greenhouse experiments.

The first two weeks of the course the participants received lectures on safe handling, use and detection of isotopes including Geiger-Müller, scintillation counting, emission spectrometry, and the use of gamma density and neutron moisture probes.

Field and greenhouse experiments were initiated to study water movement in field plots, the uptake of fertilizer phosphorus by barley as affected by method of fertilizer placement, symbiotic nitrogen fixation by Vicia faba in the field, the active root pattern of tree crops and a comparison of the plant availability of phosphorus from different sources of fertilizer phosphate.

During the third and fourth weeks the participants became familiar with sample preparation and isotope detection in the laboratory.

Subsequently, a four-day excursion was organized in cooperation with the Agricultural University of Vienna during which the participants were introduced to some major agricultural problems and associated research in Austria.

During the remaining three weeks the participants measured photosynthetic activity in field crops and used autoradiographic techniques. All field and greenhouse experiments were sampled, analysed and interpreted by the participants.

During the course, each participant delivered a lecture on his own country to inform his colleagues on the nature of agricultural problems. Participants had an opportunity to discuss their future work and possible technical assistance from the IAEA with staff members of relevant divisions.

A course evaluation was made by the participants with a view to finding out to which extent modifications in facilities and organization should be introduced in future training courses. Valuable suggestions were obtained and efforts are being undertaken to improve the conditions in the Seibersdorf Laboratory for future interregional training courses.

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

Place:	Timiryazev Agricultural Academy, Moscow, USSR
Time:	1 September to 30 November 1978
Organizer:	The International Atomic Energy Agency in cooperation with the USSR State Committee on the Utilization of Atomic Energy and the Timiryazev Agricultural Academy
Language:	Russian
Purpose:	The objectives of the course are to provide intensive training on the use of stable and radioactive isotopes and radiation techniques to scientists from developing countries who are actively engaged in research in different fields of agricultural research (plant nutrition, irrigation, plant physiology, fertilizer management practices, etc.). The course will help developing countries to effectively utilize isotope and radiation techniques in applied research aimed at increasing crop production.

OBITUARY

Guenther Proksch

1940 - 1978

Mr. Guenther Proksch died at the age of 38 on 10 April 1978 after years of suffering from leukemia. He worked at the Seibersdorf Laboratory in the Agricultural Section for a number of years and was beloved by his colleagues in the laboratory as well as in the Agency's Headquarters. Mr. Proksch made valuable contributions to the development of analytical facilities, especially the emission-spectrometric techniques, for ^{15}N determination in biological samples at the Seibersdorf Laboratory. He was regarded as an honest and capable person who always maintained his good humor even throughout the last difficult weeks of his illness. We shall always remember Mr. Proksch's excellent qualities and were deeply distressed at his untimely demise. We extend to Mrs. Proksch and his two children our sincere sympathy.

COMING EVENTS

FAO/IAEA Research Coordination Meeting on the Use of Radiation and Isotope Techniques in Studies of Soil-Water Regimes

Ghent, Belgium
11-16 September 1978

FAO/IAEA Research Coordination Meeting on Isotope-Aided Micronutrient Studies in Rice Production with Special Reference to Zinc Deficiency

Bogor, Jakarta, Indonesia
11-15 September 1978

FAO/IAEA International Symposium on the Use of Isotopes and Radiation in Research on Soil-Plant Relationships

Colombo, Sri Lanka
11-15 December 1978

FORTHCOMING PUBLICATIONS

"The Potential Use of Isotopes in the Study of Biological Dinitrogen Fixation" (Proceedings of an Advisory Group Meeting on the Potential Use of Isotopes in the Study of Biological Dinitrogen Fixation held in Vienna, Austria, from 21-25 November 1977).

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