

# The technical cooperation project between Belgium and the University of Zambia at the Department of Soil Science.

R.F.P. Dynoodt

## 1. Objectives and historical overview

The technical cooperation between the Belgian Aid and Development Cooperation (BADC) and the Department of Soil Science at the School of Agriculture of the University of Zambia (Lusaka Campus), was initiated in 1982. The objectives of the cooperation project were

1. Full logistic and academic support to the Department of Soil Science of the University of Zambia. This includes the input of equipment, permanent experts and visiting professors.
2. A gradual programme of zambianization through the formation of counterparts by local and foreign fellow- and scholarships, leading to MSc and PhD degrees. By the end of the programme, a number of seven Zambian soil scientists filling all academic vacancies within the Department was projected. This number should be sufficient to support the different activities in teaching, research, and public service.
3. The development, introduction, and support of research projects in all possible fields of soil science.
4. The development of «service units» for the public, mainly through farm and land surveys in the field, and through fertilizer recommendations based on plant and soil analysis in the lab. This objective was included in a later stage, with the aim of making the Department as financially self-supporting as possible in view of the limited financial means of the University and of the ultimate withdrawal of Belgian financial support.

The emerging Department of Soil Science consisted in 1982 of two locally recruited expatriate members of staff, who contributed a total of 270 hours of soil science courses, towards the degree of «Bachelor of Science (BSc) in Agronomy», which is awarded upon graduation after five academic years. From 1982 to 1987, the teaching load of the Soil Science Department was extended to 810 hours, of which 310 were optional specialization courses, leading to the degree of «Bachelor in Agronomy, Option Soil Science». In order to support this program BADC supplied a total of two senior experts and one junior expert, mainly concentrating on the fields of Soil Physics and Conservation, and Soil Chemistry and Fertility. The junior expert was recalled in 1987 according to a planned zambianization process, which gradually proceeded in conjunction with the return of local counterparts from their studies abroad.

In 1988, a regional postgraduate «Masters of Science (MSc) in Agronomy» programme of two additional years was introduced. This programme is sponsored through SACCAR (Southern African Centre of Coordination in Agricultural Research), which is a daughter organization of SADCC (Southern African Development Coordination Conference). It

includes students from Botswana, Lesotho, Malawi, Swaziland, Tanzania, Zambia and Zimbabwe and has options in crop and in soil science. The soil science component was developed in close cooperation with the BADC project. After a thorough survey, a new BSc programme in «Land Management» was also developed, in order to adapt to the MSc developments, and in order to satisfy the increased local demand for soil scientists, geared towards land and farm management. During this period the average academic staffing of the Soil Science Department consisted of three Zambians, and two Belgians.

In agreement with the ongoing zambianization, one senior BADC expert left at the end of the 1989-90 academic year, leaving one expert until the end of the 1991-92 academic year, by which time the zambianization process should be completed.

## 2. Material and financial resources.

Before 1982, the Department of Soil Science had little or no material or financial resources. It was located in an ancient building, together with the Crop Science, Animal Science, Agricultural Engineering, and Rural Economics Departments. It consisted of three offices and two poorly equipped laboratories. Transport for research or field trips had to be provided for through the University's heavily taxed pool of vehicles.

Through the financial input of BADC, the Soil Science Project acquired a Landrover 109, a Peugeot 504, and a Leyland-Van Hool bus for the benefit of the School of Agriculture, with full priority for the Department of Soil Science. These vehicles were handed over to the University in 1988. They are still in proper running condition, and are now fully maintained by the University itself. In 1989 they were replaced by a new Landrover and Peugeot 504. These vehicles have solved the transport problems for the Department since the beginning of the project. Tight supervision, proper maintenance, and the employment of two reliable drivers, have avoided major breakdowns and accidents.

BADC also provided the necessary chemicals, glassware, and instrumentation to the Department of Soil Science. During the extend of the project up till now, a total input of about 25 million BF enabled the purchase the five above mentioned vehicles, a neutron moisture meter and other equipment for soil moisture measurements, an atomic absorption unit for the measurement of soil nutrients, pH and related automatic titration equipment, a fully automatic Kjeldahl unit for total nitrogen analysis, a HP portable and desktop microprocessor and two Tulip IBM-compatible

computers, two photocopying machines, two greenhouses, material for micromorphology and mineralogy, aerial photo-interpretation equipment, erosion measurement equipment, and a fully equipped agrometeorological station installed at the self-supporting 520 ha University farm, situated at 25 km east of Lusaka, which is the site of several field experiments. Regular provision for subscription to international journals and the purchase of the newest books in connection with soil science, has since the beginning also been made. Local running expenses and travel grants have also partly been covered by the BADC project.

In 1985 the School of Agriculture was able to move to the newly Canadian-constructed buildings, which for the Soil Science Department provided an ample 12-room office space, two well designed large laboratories, as well as four small research laboratories for soil chemistry, mineralogy, physics, and microbiology respectively. Special rooms for storage, sample reception, sensitive equipment, and cleaning of glassware are since then also available. Before the end of the project in 1992, additional equipment is expected in relation to the rapid analysis of nitrate, ammonium and phosphate by means of an automatic analyzer system.

### 3. Teaching activities and curriculum development

Traditionally, the Department of Soil Science only provided the necessary input towards the degree of BSc in agronomy. This included courses in Fundamentals of Soil Science, Soil Physics Drainage and Irrigation, Soil Fertility, and Land Evaluation and Improvement. After the introduction of the Zambian-Belgian cooperation, a fifth year of specialization was added to the traditional BSc programme, providing for an optional specialization in Soil Science. This implied the introduction of new courses in Soil Chemistry, Irrigation and Drainage Engineering, Soil Genesis Classification and Survey, and Advanced Soil Physics. In addition, the Department was engaged in providing a course in General Soil Science for the School of Engineering, and occasionally helped the Natural Resources Development College in Lusaka with their courses, whenever they faced a serious staff shortage.

The introduction of the degree of MSc in agronomy considerably increased the teaching burden of the Soil Science staff. New compulsory courses included Plant Nutrition, and Crop Environment and Physiology of Yield, plus a number of elective courses, such as Physical Chemistry of Soils, Instrumental Analysis and Radiochemistry, Soil Amendments and Fertilizer Technology, Soil Microbiology, Soil Physics, Soil Conservation, Water Management, Soil Classification and Land Evaluation, Soil Survey and Aerial Photo Interpretation, and Soil Mineralogy and Micromorphology. It increased the teaching load per lecturer to an average of 12 contact hours per week.

The introduction of the MSc programme, induced the School of Agriculture to a complete curriculum review, in which the BSc in Agronomy would be separated in clearly specialized options in Crop Science, Animal Science, or Land Management. This means the introduction of specialized programmes in the third, instead of in the fifth year. The new programmes have started from the 1990-91 academic year onwards.

During the two months of vacation, the School also introduced the concept of «in service training» for extension workers, farmers, and people from private and governmental institutions. These training sessions are provided against a fee, and consist of three weeks of intensive training in all practical aspects connected with soils.

### 4. Research and Service

From the start the project engaged in research related to soil and water management and soil chemistry. Field plots were laid out at the University farm, which resulted in the publication of research reports, and 35 publications and presentations at conferences. The following list of selected papers will give an idea about the different topics which were investigated.

- Dynoodt R.F.P., Mwambazi T.M., 1988. The interactions of liming and phosphorus adsorption on two red soils from Zambia. *Proc. Int. Symp. on Red Soils of East and Southern Africa*, 402-413, Harare, Zimbabwe.
- Dynoodt R.F.P., Lungu O.I., 1989. Fertility constraints of soils of Southern Africa: the need for a common basis for their identification. *Soil Resources Workshop of the SADCC region*, Harare.
- Dynoodt R.F.P., Lungu O.I., 1990. Iron and zinc deficiencies in Zambian soils, *Productive Farming*, 197: 13-15.
- Dynoodt R.F.P., 1990. Irrigation water quality and increasing alkalinity in soils. *Productive Farming*, 201: 20-24.
- Lenvain J.S., Pauwelyn P.L., 1988. Comparison of the physical properties of two Zambian soils. *Proc. Int. Symp. on Red Soils of East and Southern Africa*, 379-390, Harare, Zimbabwe.
- Lenvain J.S., Pauwelyn P.L., Sakala W.K., 1988. Iso-erodent map of Zambia, Part II: Modelling of the monthly erosivity and mapping. *Soil Technology*, 1: 251-262.
- Lenvain J.S., Pauwelyn P.L., Phiri C.S., Phiri E.B., 1988. Soil and water movement under maize on an oxic Paleustalf in Zambia. *5th International Soil Conservation Conference*, Bangkok.
- Pauwelyn P.L., Lenvain J.S., Sakala W.K., 1988. Iso-erodent map of Zambia. Part I: Rainfall data bank and calculation of the erosivity. *Soil Technology*, 1: 235-250.

Currently the project is engaged in an evaluation of indigenous rock phosphates, and in several erosion studies. Research concerning nitrogen movement and leaching in the profile are about to start with the advent of the rainy season. New publications are currently being prepared for a *Noragric* book on Tropical Soil Ecology, and on acidification of an Alfisol under continuous cropping.

The research activities are accompanied by consultancy work in the field and the laboratory. Several detailed survey and evaluation maps and reports resulted from a concerted action by all members of the Department. Amongst others the survey and evaluation of a 7500 ha cotton irrigation scheme at Mswebe (Lonhro Ltd. Zambia — 38 pp and 41 pp.

annex) and a survey and drainage potential report of 6000 ha of the soils of the Chanyanya area (Kafue Flats) for Massstock Zambia Ltd (28 pp.) can be mentioned. Currently the Department is engaged in a survey of a 7000 ha Kamilonga farm, north of Lusaka.

In addition to the field surveys, the Department, with the help of BADC, started a service laboratory for fertilizer recommendations. The recommendations are based on soil and plant

analysis, and resulted in about 100 small individual reports for farmers. They enabled the Department to evaluate the extent of iron and zinc deficiencies in Zambian soils, and the increasing alkalization of soils under irrigation. These aspects of soil fertility were previously practically unknown in Zambia. Both consultancy and service lab generate a substantial income for the Soil Science Department, which for the year 1990 may approach the sum of two million Kwacha (1 Kwacha is approximately 0.8 BF).

R.F.P. Dynoodt: Belgian, MSc. in Chemical and Agricultural Industries - University of Ghent (U.G.), Belgium.

## **Advanced methods in medical and veterinary vector control.**

**January 25 to March 5 1993.**

**London School of Hygiene and Tropical Medicine and Imperial College.  
University of London.**

### **Course aims**

This intensive course is designed to familiarise participants with the general biology of the vector-borne diseases, and with the problems of their control, to provide an up-to-date and authoritative theoretical and practical introduction to the key advances in techniques which are essential for today's medical and veterinary entomologists, whether in the research laboratory or in the field, to present the principles of these techniques so as to facilitate their appropriate application, to show how field entomologists can make use of the high technology facilities now existing in research laboratories and, in cooperation with research staff, elucidate the epidemiology of vector-borne diseases in man and animals, to indicate the problems arising from insecticide and drug resistance.

### **Fees**

The fee for participants is £ 4,700. A reduction of £ 200 will be given for participants paying before 30 November 1992. This includes tuition, course notes, residential accommodation, and all meals on the Silwood campus. You are strongly urged to apply for a place on this course as soon as possible, and to submit applications for financial support, where necessary, to several grant giving bodies without delay.

Please note that fees should be paid before the course commences.

### **Queries and contact**

Queries about the technical content of this course should be directed in writing, to Professor Elizabeth Caning, Imperial College, Silwood Park, Ascot, Berkshire, SL5 7PY, United Kingdom.

All completed application forms, together with queries regarding registration and all other administrative matters, including possible sources of financial support, should be directed to Pamela Manser, Continuing Education Centre, 558 Sherfield Building, Imperial College, London SW7 2AZ, Tel. (UK Code) 071 0225 08666/7, Fax 071 225 8668.