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ICRAF

**INTERNATIONAL COUNCIL
FOR RESEARCH IN
AGROFORESTRY**

FIRST REPORT, 1978/79



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ICRAFS ORIGINS

The International Council for Research in Agroforestry (ICRAF) is an autonomous, non-profit, international institute governed by a Board of Trustees with equal representation from the developed and the developing world. It is supported by voluntary financial contributions from governments and private, public and international organizations, supplemented by specially contracted activities in project evaluation, development and management.

ICRAF's objective is to improve the nutritional, economic and social well-being of the people of developing countries by the promotion of agroforestry systems designed to result in increased productivity of food, wood and plant products without deterioration of the environment. Such systems at the same time build as much as possible upon local practices and cultures.

To achieve its objective, ICRAF collects, screens and disseminates agroforestry information, identifies and obtains support for the research required to fill gaps in current knowledge, and fosters a joint approach by all relevant disciplines to promote such research. It also helps build bridges between agriculture and forestry by developing agroforestry curricula, training courses and workshops.

Agroforestry is the name given to a land management system that increases the overall yield of the land by combining the production of food crops, trees, forest plants and animals simultaneously or sequentially on the same piece of land. Using management practices that are compatible with the culture of local populations, agroforestry attempts to achieve these overall yield increases by taking advantage of the biological, economic and environmental benefits of trees, rather than relying constantly on expensive agricultural inputs.

The modern concept of agroforestry is essentially a refinement, using scientific and technological principles, of ancient practices

such as shifting cultivation and the multi-layered systems of farming that are found in Africa, Asia and Latin America.

The need for promotion of this concept is highlighted by the fact that, because of the pressures of population expansion and to meet increasing demands for food and fuel, the inhabitants of many developing countries are destroying the world's tropical forests at an alarming and ever-increasing rate. At the same time they are causing a steady decrease in the fertility of the land.

ICRAF's interests embrace all marginal lands in the tropics. Such lands occupy about 4,900 million hectares, or 65% of the land area of developing countries, and are the home of about 630 million people. The people who live in these areas are among the poorest in the world.

ICRAF arose from a recognition by Canada's International Development Research Centre that the world's tropical forests, vast and rich in resources though they were, made but a small contribution to the economic and social well-being of people who live in or near them. The Centre was also concerned that the forests were being rapidly destroyed and that the land on which they stood was being quickly degraded once the trees disappeared. It therefore organized a study to review needs for the management of these lands.

This study, *Trees, Food and People: Land management in the Tropics*, by John Bene, H.W. Beale and Andree Cote, concluded that agroforestry systems can greatly improve production and at the same time protect the environment on marginal and sub-marginal lands. It also concluded that present largely empirical agroforestry practices need to be substantially improved and extended on the basis of carefully focused research.

As a result of the study, meetings of experts from both industrial and developing nations and foundations were held in Paris and Amsterdam in 1976 and 1977. They concluded that the potential of agroforestry systems for marginal lands was so great, and

knowledge in the field so limited, that an International Council for Research in Agroforestry should be established.

Later eight trustees were elected from both developing and developed countries (since increased to 11) and it was decided to locate the new organization in a developing country. An interim year was passed at the invitation of the Dutch government at the Royal Tropical Institute in Amsterdam in 1977. Dr. K.F.S. King, a Guyanese who was then assistant Director-General of the United Nations Food and Agriculture Organization, was appointed Director-General of ICRAF, and a committee selected Nairobi as the headquarters site. ICRAF formally began operations on July 1, 1978.



ICRAF'S SPECIAL ROLE

Among international bodies concerned with scientific research, ICRAF finds itself in an unusual situation: in order to gain acceptance from the majority of scientists of the type of research it is promoting, it must first explain the concept of agroforestry and then describe agroforestry research procedures. For while agroforestry practices have existed for centuries, they have always been based on tradition, not on science. A science of agroforestry does not yet exist. It is part of ICRAF's mission to help create one. Such difficulties do not confront the majority of international research organizations.

This is not to suggest that there is currently no interest in agroforestry. Indeed, the reaction of delegates from 31 countries and eight international institutes at ICRAF's Conference on International Cooperation in Agroforestry in July, 1979, demonstrated how lively an interest exists throughout the world. And the World Bank has recently provided approximately \$200 million for rural forestry programmes, many of which make provision for either simultaneous or sequential food and tree cropping, which could be considered as agroforestry components.

But the fact remains that agroforestry is not yet accepted as a discipline by most scientists or as a valid approach by those concerned with land management. It is even challenged by a few. And for this reason, ICRAF has found it necessary during its first months of operation to devote considerable time to explaining and publicizing the concept of agroforestry and citing reasons for its importance. This kind of activity has occupied a large part of the professional staff's time: for example, even at this early stage in its development, requests from more than 40 countries for information on agroforestry have had to be answered.

Because of this unusual situation, ICRAF faces another problem: very few, if any, professionals and technicians can be found who have had formal training in agroforestry. This has meant that, even among the small team that ICRAF has recruited to promote

and conduct agroforestry research, it has been necessary to spend considerable time in defining and refining the concepts of agroforestry. And because agroforestry is an inter-disciplinary activity, it has been necessary to mould professionals from different disciplines into a team.

ICRAF started building its team in September, 1978. By May, 1979, it had recruited the last member, and six professionals from widely differing fields (in addition to the Director-General) were assembled in Nairobi. These included a plant physiologist, a geneticist, a horticulturalist, an agronomist, a soil scientist and a fodder production specialist, all from different countries. This group of specialists had therefore been operating as a team for only eight months at the end of 1979.



INITIAL ACTIVITIES

This first report is concerned with ICRAF's activities in the 18 months from July 1978, when the Council began formal operations, to December 1979. Following is a summary of its major activities.

Seminars Early in ICRAF's formative stages it was decided that because agroforestry was little understood, it was necessary to hold a series of workshops and seminars to enable scientists to get together to help the new organization identify problem areas in specific fields of agroforestry research, establish priorities in its research programme and decide on the most suitable methodologies to be followed in various aspects of agroforestry research.

The first of these was held in March, 1979, on soils research, and produced ICRAF's first scientific publication, *Soils Research in Agroforestry, Proceedings of an Expert Consultation*, H.O. Mongi and P.A. Huxley, Editors, ICRAF O/Ole. The second was the Conference on International Cooperation in Agroforestry which was held in July, 1979. The proceedings of this conference will be published in 1980. The first conference reviewed the state of the art of soils research that could be of value in the study of agroforestry systems and developed a common outlook on methodology. It also indicated which techniques require further development and emphasized the need for standardization in methodology and reported styles. The second conference discussed the state of the art from the forester's point of view, endorsed the principle of agroforestry research and training and made specific recommendations in this field.

During 1979, a workshop on the Plant Aspects of Agroforestry was also organized and scheduled for December in Nairobi, but it had to be postponed for lack of funds. It is hoped that this workshop will be held during 1980.

Information Dissemination As noted earlier, many requests

for information on agroforestry were received during ICRAF's first months of operation. These sought advice on the most suitable forest and agricultural species to be established in certain ecosystems, the compatibility of various combinations of agricultural and forest species, the management systems and practices to be employed in the establishment of different species in an agroforestry system, and so on.

In answer to these requests, ICRAF sent out more than 100 documents dealing with research and development information. They were selected from the 1880 documents ICRAF had acquired after a search of bibliographic titles that identified 6750 documents on agroforestry in the world literature. Such activities were estimated to take up to 10% of the professional staff's time.

Also* included in ICRAF's information programme were the scientific publication noted earlier, the publication of the first issue of a newsletter in December, and the submission of a number of articles to newspapers, news services, magazines and scientific journals, most of which have already been published. One thousand copies of the soils publication were printed and sent to agronomists and soil scientists in developing countries, some 50 research institutions and as many as 100 colleges and universities. The publication also went to both national and international agriculture and forestry institutions.

During its first months of operation, ICRAF also published *The Wasted Lands*, by K.F.S. King and M.T. Chandler, in English, French and Spanish. This basic document, which describes the concept of agroforestry, the premises on which it is based, the nature of ICRAF, and its core and field activities, has been distributed free of charge to all developing countries and to developed countries that seem to be interested in agricultural and forestry development in the Third World. It is still in great demand, and it has stimulated further requests for information and for ICRAF's participation in agroforestry research projects.

In addition, the Director-General and the scientific staff of ICEAF have attended a large number of seminars and conferences and delivered numerous papers or published them in scientific journals. These are listed in ICRAF's Programme of Work and Budget.

Finally in the information field, ICRAF scientists are compiling "crop sheets" for woody agroforestry species and selected field and horticultural crops known (or thought likely) to be used in multiple land-use systems. These contain information about the origins, habit, physiology, genetics and management of the species concerned, in condensed form. They will be published in 1980.

Education Apart from one or two course units in the curricula of some forestry and agricultural faculties, no formal training in agroforestry is available anywhere in the world. There is also a serious shortage of trained personnel to teach the subject. Because of this, ICRAF has from the beginning considered education and training in agroforestry to be one of its principal responsibilities.

During 1979, ICRAF evolved a strategy for the development of training and education systems in agroforestry at the technical, degree and post-graduate levels. This strategy was presented to heads of forestry services, policy makers and others at the Conference on International Cooperation in Agroforestry in July, 1979. The proposals were accepted by the Conference and are in the process of being implemented.

The scope of ICRAF's activities in this area could be very wide. Such activities could include:

- incorporation of agroforestry teaching into existing curricula;
- design of regular agroforestry courses at technical, graduate and post-graduate levels;
- design of short, intensive in-service courses at various levels and for different audiences;
- design of special courses for executives, administrators and politicians, and of seminars and conferences;
- provision of on-the-job training;
- arrangement of study trips.

Because of the almost total lack of university courses, however, ICRAF decided that it could best promote agroforestry studies by working out an agroforestry module that could be adapted readily to final year undergraduate programmes in faculties of either agriculture or forestry.

Accordingly, the professional staff has prepared a 35-hour lecture outline for a general course in agroforestry, assuming an undergraduate background in the usual subjects students at this level have taken — for example, soil and plant sciences, economics and statistics.

The module begins by outlining the historical aspects of land-use systems, emphasizing the place of trees and describing the evolution of crop plants, animals and tree species. This is followed by a section on social and economic factors that encourage or restrain the development of multiple land-use systems.

Intercropping is dealt with in the context of agroforestry, as well as the factors that require special consideration when handling woody perennials as distinct from annual crops. Also enumerated are the special considerations relating to the eco-physiology of mixed plant communities, and the effects of agroforestry systems on the soil and the environment.

Existing examples of agroforestry in different ecological zones of the world are described, and a brief account is given of the range of field experimentation available. Particular emphasis is placed on the problems of setting objectives and handling experiments in the field when dealing with both woody perennials and annual crop species or pastures.

Agricultural students will be taught some of the elements of tree raising and management. Both agricultural and forestry students will be given a short account of multi-purpose trees.

The course will include both written exercises and field visits, and a special feature will be a practical research project to estab-

lish, evaluate and compare data from local agricultural, forestry and agroforestry systems. Discussion of these data will form the substance of the last two or three sessions of the course.

Agreement has been reached to have elements of this course presented at the Universities of Nairobi and Juba in 1980. Interest has also been shown by the University of Dar es Salaam and the Indian Council for Agricultural Research, notably its Central Soil & Water Conservation Research and Training Institute at Dehra Dun and the Central Arid Zone Research Institute at Jodhpur.

Field Work During its first 18 months of operation, ICRAF has been approached by 30 developing countries with requests for the preparation of agroforestry projects. ICRAF mounted missions to several of these and has prepared seven project proposals. Two of these are for Brazil, one for Colombia and Brazil jointly, one for Senegal, one for Somalia, one for Kenya and one for Tanzania.

The guidelines used in preparing these projects were that they should have wide ecological applicability; affect a large number of people; be innovative and able to contribute to knowledge; be capable of producing a demonstration effect; be relatively sure of success; have a high probability of improving land management; and be likely to attract donors. Short descriptions of the projects follow:

Brazil: Agroforestry Systems for the Humid Amazon

Despite their vast potential, the Amazon forests are not being fully utilized and Brazil suffers from a balance-of-payments deficit in wood and wood products. Forest exploitation is bound to occur in the future at an increasing rate. In the past, such exploitation has led to deterioration of the ecosystem. This project will seek to determine whether agroforestry could, in the face of such exploitation, conserve the ecosystem and still satisfy farmers' demands for food. It involves a comparison of cut-over forests continuously farmed, with cut-over areas reforested with

multi-purpose trees, and with cleared forests replanted with multi-purpose trees and intercropped with annual and perennial agricultural crops. These experiments will also identify optimum spacings for trees and agricultural crops in combination, and assess the merits of the combined production system.

The project was prepared by ICRAF in collaboration with Programa Nacional de Pesquisa Forestal (PNPF) and Empresa Brasileira de Pesquisa Agropecuaria (EMBRAPA). Its principal objective is to develop economically viable and ecologically sound land management systems using combinations of forest and agricultural species. In order to attain this broad objective, the specific research will include the selection of suitable species; the choice of optimum spacings; the choice of optimum patterns of admixtures of species; the selection of the cultural and management techniques to be used; and monitoring of the soil nutrient changes.

A number of forest tree species, perennial agricultural species, and annual agricultural species will be tested. Forest tree species will include *Cordia goeldiana*, *Inga alba*, *Leucaena leucocephala* and *Jacaranda copaia*; perennial agricultural species will include cocoa (*Theobroma cacao*), coffee (*Coffea arabica* and *C. canephora*), and black pepper (*Piper nigrum*). The annual crops will be maize (*Zea mays*) and cowpea (*Vigna unguiculata*) grown together in accordance with the general practice of the locality.

Brazil: Agroforestry Systems for the North-East

The North-Eastern region of Brazil is perhaps the most depressed, socially and economically, in that vast region. Within it there is a shortage of both food crops and wood, and the situation seems certain to worsen, with the population expected to double by the year 2000. Land management systems must therefore become more productive, and research on agroforestry may help rejuvenate these areas while arresting environmental degradation.

The general objective is the same as in the previous project except

that, in addition to land management systems using combinations of forest and agricultural species, systems using multi-purpose species will be investigated.

The areas of research will include trials of multi-purpose trees for fuelwood, timber and fodder; combinations of trees and fodder crops in arid areas; combinations of trees and food crops, principally in the moist areas; screening of potential tree and fodder species; testing of cultural treatments — site preparation, planting, pruning, testing of drought resistance of individual species and mixtures; and apiculture. The project will be developed in three phases: screening, evaluation and trials and experiments.

There will, in addition, be four sub-projects: to select forage and fodder species for agroforestry systems in the "caatinga" area; to screen tree species for use in that area; to develop farming systems involving various tree and food crop combinations; and to develop agroforestry systems involving tree plantations and cattle-raising.

Four multi-purpose tree species that meet the project requirements for the arid areas of the Northeast have been selected: angico branco vermelho (*Piptadenia rigida* or *P. colubrina*), canafistula (*Cassia excelsa*); pau ferro (*Caesalpinia ferrea*); and juazeiro (*Zizyphus joazeiro*). In addition, the exotic species algarobeira (*Prosopis juliflora*) meets most of the project requirements and appears to be adaptable to the site conditions of the caatinga.

Species of interest for the moister areas include the babacu palm (*Orbignya martiana*), cashew (*Anacardium occidentale*), coconut (*Cocos nucifera*), camauba palm (*Coperneckia cerifera*), mango (*Mangifera indica*) eucalyptus (*Eucalyptus* spp.) and the pine (*Pinus caribaea* var. *hondurensis*).

Agricultural species for arid areas will be buffel grass (*Cenchrus ciliaris*), sorghum (*Sorghum bicolor*) and pearl millet (*Pennisetum typhoideum*), while for the moister areas they will be corn, rice (*Oryza sativa*), cowpea and cassava (*Manihot esculenta*).

The emphasis in both the Brazil projects will be on relatively short-term applied aspects of agroforestry research in preference to long-term basic research, so some results may be immediately applicable. Even so, many of these treatments cannot fully be evaluated until the tree component has developed for at least part of its growth cycle, which could mean 10-15 years.

Colombia and Brazil: Agroforestry Research for Latin America

In October and November, 1979, a joint team from ICRAF, CIAT (the International Centre for Tropical Agriculture) in Cali, Colombia and IDRC (Canada's International Development Research Centre) visited a number of countries in tropical Latin America to carry out a feasibility study for an agroforestry programme for the region. The team found the potential of agroforestry techniques promising for solving some of the region's problems of land management, and found that research institutes in the area were motivated to develop such techniques. After reviewing the priorities of national agencies, the team recommended a strategy for developing a research programme in the region and an operational model with which to implement it.

The strategy consists of developing agroforestry research projects, called modules, concerned with land-use problems in the various ecological zones. Any country could undertake one or more such modules, which would be the focus for research and training activities in agroforestry. These activities would be conducted by teams of both national and expatriate scientists co-ordinated regionally by an ICRAF officer.

The officer would collaborate with national agencies in defining module objectives and specifying the infrastructure necessary to achieve them, while emphasizing the complementarity among different modules in the same ecological zone. The officer would act as liaison with ICRAF headquarters and deal with all activities involving international co-operation.

Such an organization of field activities on a regional basis could

provide an appropriate framework for more efficient use of agro-forestry research resources in a number of countries in a single region. It would imply some form of project management on the part of ICRAF, the degree of involvement varying among countries and modules. It would also permit potential donors to identify themselves with particular countries and ecological problems.

The plan proposes that the ICRAF officer should initially work out of the IDRC's Latin American Regional Office in Bogota, Colombia.

Kenya: Drought-Tolerant Multipurpose Plant Systems

Rapid population growth (more than 3 per cent per annum), limited arable land, and a shortage of employment opportunities in the industrial and service sectors have led to a substantial growth in the number of smallholders who farm and ranch in Kenya's marginal lands. This trend is expected to continue into the twenty-first century.

While increased settlement and exploitation provide a basis for the livelihood of small-scale farmers, the results are not an un-mixed blessing. Soils are subject to serious erosion. Much of the natural cover of the range-lands has been over-grazed, and in some areas the ground cover has been completely removed. In addition, rainfall is low (600 to 800 mm) and subject to considerable fluctuation.

It is therefore not surprising that standards of living are low. Indeed, during times of rainfall deficiency the Government of Kenya has had to divert scarce developmental funds to provide famine relief. Moreover, the degradation and depletion of the areas' soil and forest resources do not augur well for the future generations who might be forced to live on such marginal lands.

Recognizing the serious plight of the farmers who live in these areas, noting the spread of desertification, and conscious of the fact that marginal and semi-arid lands occupy 80 per cent of

arable land in Kenya, the University of Nairobi and ICRAF have prepared a project to ascertain whether certain types of agroforestry might not arrest the degradation, improve food and wood production on a sustained basis, and raise the living standards of the people who occupy these lands.

The specific objectives are to develop farming systems involving multi-purpose trees and food crops, and to select the most suitable species; to study the production potential of the proposed systems; to assess the input requirements, management techniques and economic advantages of the systems; to evaluate the effect of farming systems on soil fertility and conservation; and to demonstrate feasibility and desirability in the context of the current farming systems. The species included are: *Leucaena leucocephala*, *Prosopis cineraria* and *Acacia albida* (forest); maize, sorghum and cowpea (agriculture); and Rhodes grass (*Chloris gay ana*) and buffel grass (forage).

The project is to be administratively located in the Department of Soil Science, Faculty of Agriculture, University of Nairobi, Kenya. The field experiments will be conducted at land recently acquired by the university at Kibwezi in the semi-arid zone of Kenya.

Senegal: Development of Suitable Agroforestry Systems

Senegal presents an almost classical case of environmental degradation as a result of increasing pressure of human and livestock populations on infertile soils. Peasant farmers try to eke out a living with traditional agricultural methods and ranching systems, but about 35% of the country's food and wood requirements must be imported. Agroforestry looks likely to contribute to increased production of food, fodder, fibre, fuel and wood so ICRAF has prepared a research project with the Institut Senegalais de Recherches Agricoles (ISRA) at the request of the Government of Senegal. The project will assess production potentials of forest tree and agricultural species when grown together in different regions, and will evaluate the biological, social and economic

effects of the taungya systems as practised in Senegal.

The tree/agricultural crop combinations that will be examined in this project are *Acacia albida* with groundnuts (*Arachis hypogaea*), maize, soya bean (*Glycine soja*), millet, sorghum, cassava and other crops and *Eucalyptus camaldulensis* with the same range of agricultural crops.

Apart from testing various experiments and species combinations, research will be directed towards: the study of water-balance under *Acacia albida* and *Eucalyptus camaldulensis* plantations; the genetic improvement of *A. albida*; the improvement of nitrogen fixation by *A. albida* and studies of the economics of the various systems and the means of integrating them into the peasant farming systems.

Research will also be carried out on possible agricultural and forestry combinations during the earlier parts of a rotation. This research basically involves the extension of the "taungya" method to the Sudano-Guinean zone. It will embrace: the selection of local or exotic species to be utilized in the combinations; the optimum spacings to be adopted; the determination of optimum combinations of crops; and the means of integrating the crops and techniques into the systems currently employed by the peasants.

Finally research will be carried out on suitable multi-purpose trees involving the selection of suitable species and the management (pruning, lopping, coppicing, spacings, etc.) to be followed in the production of such species.

Tanzania: Tree-based Farming Systems

Although the average density of population in Tanzania is not great, the distribution of the population is highly uneven, about 75% of the people living on less than 15% of the land area. As a consequence, not only is there considerable pressure on land in these regions, but the adjoining areas are encroached upon, causing

considerable environmental degradation. Moreover, soils in most parts of the country are infertile and prone to erosion, rainfall is low and unpredictable over large areas, and the topography in a major proportion of the country is unfavourable to arable agriculture.

Although agriculture supports about 92% of the country's population, agricultural production, not surprisingly, does not meet even internal demands.

In addition, forestry resources are poorly managed and utilized and indiscriminately exploited. In many areas the forest estate is under severe pressure and considerable destruction is taking place at an alarming rate.

The research project therefore seeks to devise and perfect a land-use system that would increase the production of both food and wood and conserve the ecosystem of these fragile and unproductive areas. It also attempts to improve practices that have been traditionally employed by the people of Tanzania in many areas.

The project consists of five sub-projects to be carried out in different locations by the following institutions: the University of Dar es Salaam's Faculty of Agriculture, Forestry and Veterinary Science; the Division of Forestry of the Ministry of Natural Resources; the Crops and Livestock Division of the Ministry of Agriculture; and the Capital Development Authority, Dodoma.

The five sub-projects will embrace: agroforestry for environmental protection; agroforestry for soil conservation and increased productivity in mountain ecosystems; improvement of the taungya system; and agroforestry in semi-humid ecosystems.

The following woody species will be used: *Acacia albida*, *Acacia mearnsii*, *Acacia Senegal*, *Albizia lebbek*, *Cupressus lusitanica*, *Eucalyptus camaldulensis*, *Eucalyptus saligna*, *Grevillea robusta*, *Leucaena leucocephala*, and *Pinus patula*.

Somalia is one of the poorest countries in Africa. It suffers from frequent shortages of food, fuel and fodder and is critically short of foreign exchange.

Traditionally the people of Somalia have led a nomadic existence and only in recent times has there been a rapid increase in settlement. This, combined with an intensive programme to optimize the use of rangelands, suggests that much thought is being given to appropriate land-use systems that will increase production while conserving the ecosystem.

The project that has been prepared by ICRAF is modest in scope. It assumes that multipurpose species are likely to form the basis of the farming systems to be developed, and proposes the identification and screening of exotic and indigenous species with promising potential. After the species have been screened and selected, simple management trials will be conducted. These will involve espacement experiments and thinning and pruning research designed to optimize production. The project will consist of two parts, each with several phases, and the two parts will overlap. In the final phase of the project, intercropping experiments will be undertaken. The project will be carried out in collaboration with the National Range Agency of the Ministry of Livestock, Forestry and Range.

Somalia is fortunate in having two indigenous genera with high known potential: "Yicib" (*Cordeauxia edulis*) a leguminous shrub growing in the central arid districts, which has long been utilized for its nutritious nut-like seeds and for browse and firewood; and *Boswellia*, whose species *B. freereana* and *B. carteri* have for centuries been a source of frankincense. Both *Cordeauxia* and *Boswellia* are already of considerable importance to Somali's economy, and are ideal for inclusion in land-use systems based on agroforestry. But little has been done to determine their exact ecological requirements or to explore the genetic variability that exists within species. Investigations are required on environ-

mental and management factors that can optimize growth and propagation.

In addition to these studies, a selection will be made of exotic woody species that have demonstrated value as multi-purpose trees and shrubs elsewhere. The project will start with the following: *Prosopis juliflora* (from Central and South America); *Prosopis cineraria* (from India); *Azadirachta indica* (from India and Burma); *Acacia cynophylla* (from Australia); *Acacia albida* (from Africa); and *Zizyphus mauritiana* (from Africa).

Special projects

Special projects consist essentially of all non-core activities other than project management and usually involve the use of ICRAF facilities and experts in carrying out clearly defined actions in a limited time span. Example are consultancies carried out by ICRAF staff, co-operative research projects, training exercises or contract research.

In 1979, ICRAF negotiated two special contracts:

(1) The drafting of an agroforestry discussion paper for the UNEP Consultation on Tropical Deforestation. This document will examine the probable effects of agroforestry systems in rehabilitating deforested areas and arresting deforestation, and will discuss the biological and institutional factors relevant to successful implementation. The paper will be prepared under contract to UNEP and will be completed in 1980.

(2) The preparation of a profile of a Sudano-Sahelian region for use in programme planning and development for sustainable agricultural production. The study will review national and international research, development and training programmes, evaluate institutional and agency capabilities, and assess needs and opportunities for further research and development in one of the world's major fragile tropical environments. It will be completed in 1980.



ICRAF'S CAPABILITIES

As noted earlier, ICRAF assembled, during 1979, a competent international professional core staff of six in addition to the Director-General, representing a number of disciplines germane to agroforestry: plant physiology, genetics and plant breeding, horticulture, agronomy, animal science and soils science. In addition, a public information specialist was seconded from the International Development Research Centre. The last core staff member took up duties in Nairobi in May. The professional core staff engaged were the following:

K.F.S. King, Guyana, Director-General

Dr. King holds the degrees LL.B. from London University; B.Sc. (Forestry), University of Wales; and D. Phil. (Land Classification Techniques and Land Use Planning), University of Oxford. He was formerly Minister of Economic Development, Guyana, and Assistant Director-General of the Food and Agriculture Organization of the United Nations and head of its Forestry Department.

M.T. Chandler, Canada. Plant Physiologist

Dr. Chandler holds a B.Sc. (Agriculture) degree from the University of Guelph and a Ph.D. (Plant Physiology) from Simon Fraser University, Canada. He came from the East and Central African Regional Office of the International Development Research Centre, where he was Assistant Director.

R.B. Contant, The Netherlands. Training and Education Officer and Genetic Resources Specialist

Seconded from the Government of the Netherlands, Dr Contant holds a band. (Tropical Agriculture) diploma; an Ir. degree (Tropical Agriculture and Plant Breeding); and a Dr. Agr. Sci. (Radiobiology and Mutation Breeding) from the University of

Wageningen, the Netherlands. Before coming to ICRAF, he was Secretary of the East African Council for Agricultural Education.

P.A. Huxley, United Kingdom. Horticulturalist/Agronomist

Dr Huxley holds B.Sc. and Ph.D. degrees in Horticultural Botany from the University of Reading, United Kingdom. He came to ICRAF from Libya, where he was manager of a UNDP/FAO project strengthening that country's Agricultural Research Centre.

H.O. Mongi, Tanzania, Soils Specialist

Dr. Mongi holds a B.J.Sc. (Agriculture) from London University, an M.Sc. (Agronomy and Soils) from the University of West Virginia and a Ph.D. (Agronomy and Soil Fertility) from the University of Dar es Salaam. He was formerly soil fertility expert with a UNDP/FAO project in Tanzania.

P.K.R. Nair, India. Agronomist

Dr. Nair holds a B.Sc. (Agriculture) and an M.Sc. (Agriculture) from the University of Kerala; a Ph.D. (Agronomy) from the Agricultural University of Pantnagar, India, and a Dr. Sc. Agr. from the University of Goettingen, Germany. He was recently a Senior Research Fellow (Alexander von Humboldt Foundation) at the Institute of Soil Science and Forest Nutrition, University of Goettingen.

F. Torres, Argentina, Range Management and Fodder Production Specialist

Dr. Torres holds a B.J.Sc. (Crop and Animal Nutrition) from the University of Buenos Aires and a Ph.D. (Animal Nutrition and Animal Science) from Cornell University, U.S.A. He was formerly Professor of Animal Nutrition and Coordinator of the graduate programme in animal production at the National Institute of

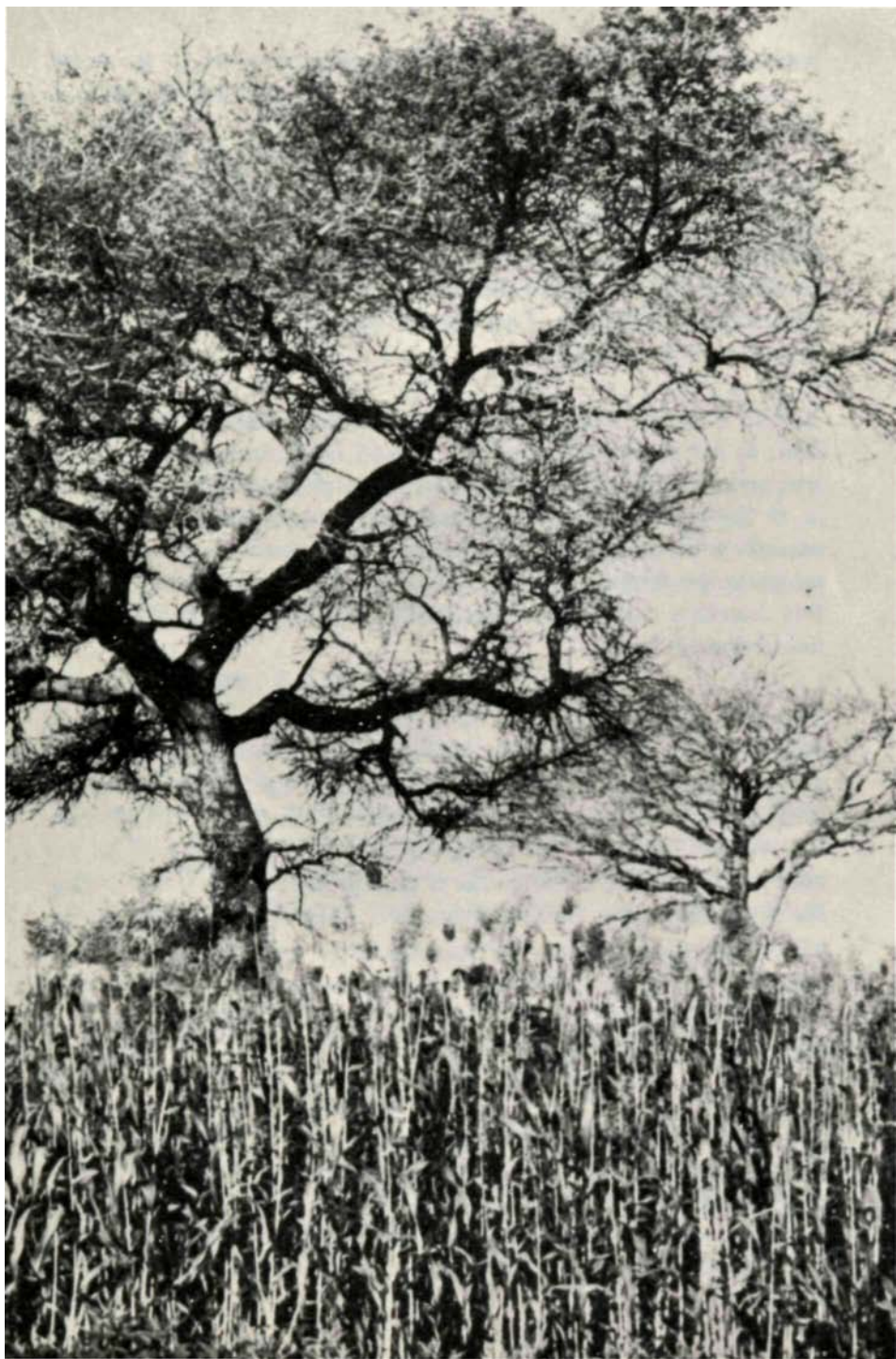
Agriculture and Technology in Argentina.

D.C. Spurgeon, Canada. Senior Science Writer

Seconded from the International Development Research Centre, Dr. Spurgeon holds a B.A. (General Arts) from the University of Western Ontario, Canada, an M.S. (Journalism) from Columbia University, U.S.A., and an LL.D. (Honoris causa) from the University of Guelph, Canada. He was formerly Senior Science Writer with the IDRC.

ICRAF'S policy with respect to the staffing of research projects is that, as far as possible, research should be undertaken by citizens and/or national institutions of the countries in which the research is to be conducted. Where necessary, internationally recruited experts will complement the local research teams. However, in the interests of following common policies and methodologies, it is felt desirable that at least one ICRAF staff member be part of the field research team.

The role of ICRAF's core staff in project implementation and monitoring is considered to be crucial. In cooperation with the donor agency ICRAF may recruit research staff for the projects; provide technical back-stopping to both local and ICRAF field researchers; monitor the progress of the projects; arrange for review teams to visit the projects and advise on forward planning, shifts in emphasis and direction, etc.; seek funding for future phases of the projects; publish scientific and technical papers, manuals and final reports; arrange for the conducting of seminars, training courses, etc., both in-service and externally; and facilitate the outreach activities of the projects.



FINANCIAL STATEMENTS

BALANCE SHEET 31 DECEMBER 1979

	CAN\$	US\$
ASSETS		
Bank balance	308,623	266,000
Prepaid expenses	18,581	16,000
Total	327,204	282,000

LIABILITIES AND SURPLUS

Liabilities		
Accruals and other payables	85,616	73,800
Surplus	241,588	208,200
Total	327,204	282,000

FUNDING, EXPENSES AND SURPLUS
YEAR 1979

	CAN\$	US\$
Funds available	1,392,020	1,200,000
Minus expenses	1,150,432	991,800
Surplus	241,588	208,200

FUNDING FOR THE YEAR 1979

	CAN\$	US\$
Balanced carried from 1978	536,212	462,200
Revenues		
Interest earned	20,331	17,500
Government of Switzerland	176,429	152,100
Government of the Netherlands	146,496	125,000
Canadian International Development Agency	200,000	172,400
Conference grant from German Foundation for International Development	6,757	5,800
German Ministry of International Cooperation Consultancy	5,795	5,000
International Development Research Centre - Phase 3	300,000	260,000
Total revenues	*855,808	737,800
 Funds available for 1979	 1,392,020	 1,200,000

*In addition contributions in kind (two seconded staff members) were received during 1979 from the Netherlands Government and the IDRC.

EXPENSES FOR THE YEAR 1979

	CAN\$	US\$
Administration Services	534,093	436,245
Programme Activities	408,195	376,055
Information Services	16,812	14,500
Equipment, Furniture & Fittings	119,954	103,500
Consultancies	71,378	61,500
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Total	1,150,432	991,800
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