CONTRIBUTION OF IDRC TOWARDS INCREASING

WORLD FOOD PRODUCTION

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We are continuously reminded, from many different sources, that international development should concentrate upon improving the quality of life of the world's underprivileged people. But for many of the poorer people the first step towards a better quality of life is an improved diet. The majority of Asians, Africans and Latin Americans derive more than 75% of their calories and proteins from cereal grains such as rice, wheat, maize, millet and sorghum and food legumes such as soya beans, pigeon peas and chickpeas. Consequently, the highest priority in international agricultural research is being given to increasing the yield and improving the nutritional qualities of these staple crops.

This is very much the approach taken by IDRC, the International Development Research Centre, in its support of research programs undertaken by some of the International Agricultural Research Centres and by national and regional institutions of the developing countries.

In this perspective, food aid can only be considered as a temporary measure against hunger and malnutrition. On a long-term basis the only prospect for a true food reserve is the enhancement of the national food and agricultural production capacities of the developing countries, to enable them to produce their food requirements without resorting to costly food imports, or food aid. It is to their agricultural economies that they must turn for protection.

.../2

It is hoped that this brief presentation today will help you to understand the international character of the Centre as well as its responsibility and contribution in coordinating the research efforts of hundreds of scientists scattered throughout about 75 countries of the developing world, Canada, and a few other developed countries.

First we will review the IDRC, its organization and philosophy, then we will briefly describe the group of International Agricultural Research Centres and finally we will concentrate on the various types of research programs undertaken by IDRC to improve food production in the developing world.

The International Development Research Centre (IDRC) was established in May 1970 by an Act of the Canadian Parliament to pioneer a different style of development operation. It is supported by Canadian funds and submits an Annual Report to Parliament through the Secretary of State for External Affairs. While its objectives are set by the Canadian Government, the Centre is a public corporation headed by a Board of Governors; the Chairman and 10 members are from Canada; 6 of the non-Canadians come from developing countries. The first Chairman of the Board was the late Lester Pearson. The Board is now under the Chairmanship of Mr. Louis Rasminsky, former Governor of the Bank of Canada.

The President of the IDRC is a man who was one of the prime movers in the Green Revolution, Dr. David Hopper. Speaking about the goals and the mode of operation of the Centre, Dr. Hopper used these words "Part of the function of the IDRC, is to let the developing countries undertake the research, to let them do the job, recognizing that it may involve risks and a few

.../3

mistakes but only by making the mistakes can the developing countries' researchers eventually learn to solve their own problems. It is they who must articulate their problem, it is their priority that they must follow, it is their perceptions that must guide their research, it is their understandings that must be fostered, nurtured and assisted through a process of learning by doing". This is the fundamental concern of the Board of Governors of the Centre.

As an extension to its Ottawa home base, the Centre has opened five regional offices in Bogota, Dakar, Singapore, Beirut and Nairobi to keep in touch with the changing needs of developing regions and with the conduct of its projects. The IDRC staff now totals over 330 of whom 64 are non-Canadians from 26 different countries. For the operation of its research programs the Centre is organized in five divisions: The Agriculture, Food and Nutrition Sciences Division (AFNS), to which I belong and whose activities we will review later; the Information Sciences Division; the Population and Health Science Division; the Social Sciences and Human Resources Division and the Publications Division.

Besides its international character and its status as a public corporation, which gives it a great deal of autonomy, what makes the Centre different among development organizations?

The Centre's uniqueness lies primarily in the rationale or criteria used in supporting some project proposals while rejecting others. These criteria are: First, the project should fit a priority that has been expressed by a government or an institution in a developing country -

the project is not imposed on the country. Second, the findings emanating from the project should have useful applications outside the country or region in which the research is taking place - the project has a multiplier effect. Third, the project should contribute toward the task of closing the gap of living standards between the poorest and the richer people in developing countries - it does not just help the elite. This criteria conforms to one of the priorities set by the IDRC Board of Governors: to increase the well-being of rural people. Fourth, the project is carried out in great part by personnel from the countries involved. Foreigners are only hired in projects funded by the Centre when specific expertise crucial to the project's success is required, which the developing region cannot supply. In total, there were only 15 expatriates working full-time on the first 100 projects supported by IDRC. Fifth, and closely linked with number four, the project should have a training component built into the budget, so that it leaves behind an investment in better trained or experienced researchers.

The Centre's budget is part of the Official Canadian Development Assistance Program which is authorized by the Government and issued to CIDA (Canadian International Development Agency) through the Department of External Affairs; this program could reach close to $900 million in 1975-1976. Of this amount a yearly cash grant has been given to IDRC since 1970. The first grant was of $2.444 million; in 1974-1975: $20,000,000., in 1975-1976: $27,000,000. and for 1976-1977 is expected to be $34,000,000. During the Centre's first five years of operation, the Board approved over 270 projects which called for appropriations of $51.9 million. Of

.../5

the total IDRC budget, the AFNS Division (Agriculture, Food and Nutrition Sciences) has been allocated more than 40% every year. Added to the responsibility of the AFNS Division is the management of a few projects for which CIDA is providing the necessary funds. In the case of the research on Cassava and Triticale, which we will describe later, this amounts to $6.5 million over a 5-year period.

All five administrative divisions of the Centre accept the well-being of rural people as their major concern but this obviously fits the work of the AFNS Division which has concentrated its financial support on research to help the people who live in the semi-arid tropics. In this belt that runs across the middle of Africa and India, and through several Asian and Latin American countries, some 400 million people live off crops such as sorghum, millet and certain legumes on which comparatively little research has been done. And these 400 million are of course the people who have been hit by the recent worldwide drought. In answer to the pressing needs of these people, the Centre has been supplying funds for research in plant breeding, multiple cropping systems, grain storage and postharvest crop protection, forestry and the use of forest products. In addition, the Division supports action research to help small fishermen, and is conducting projects in nutrition, home economics, and food technology.

In order for you to understand better the implications of IDRC's activity in agricultural research I would now like to describe briefly the group of International Agricultural Research Centres which has been expanding quite rapidly in recent years.

.../6

The history of the International Centres begins in 1944 when four young American scientists from the Rockefeller Foundation began work in the hills outside Mexico City. Their work was to be very successful and the team eventually included Norman Borlaug who is well known for his work on the development and adoption of the high yielding varieties of cereal grains, mainly wheat and rice, and who was awarded the Nobel Prize for his imaginative work.

Encouraged by the Mexican success, during 1962 the Rockefeller and Ford Foundations combined forces to establish the International Rice Research Institute (IRRI) in the Philippines.

During 1963 the Mexican Rockefeller program was administratively transformed into an International Centre, CIMMYT, the Centro Internacional de Mejoramiento de Maiz y Trigo, with its headquarters near Mexico City.

During 1968-1969 two new international research centres for tropical agriculture, one in Cali, Colombia, and the second at Ibadan in Nigeria, were founded by the Rockefeller and Ford Foundations. Very soon afterwards, several other donor agencies became interested in giving their support to these centres. This culminated in May 1971 in the first meeting of what is now the Consultative Group on International Agricultural Research (CGIAR).

The official sponsors of the CGIAR are the World Bank Group (IBRD), the Food and Agricultural Organization (FAO) and the United Nations Development Program (UNDP). Membership in the Group, which is entirely

.../7

voluntary, includes 18 national governments, including Canada, plus other organizations such as IDRC. The donors all give their financial support to one or more of the existing agricultural research centres.

The objects of the CGIAR are:

1. to examine the food and agricultural needs of the developing countries;
2. to define the opportunities for increasing their agricultural production and food supplies through concentrated research efforts; and
3. to provide adequate financial and technical resources by which to support existing and necessary new international research programs.

About a month ago in Washington members of the CGIAR pledged more than $68.0 million for the calendar year 1976 to support the capital and operating budgets of nine international agricultural research centres, that is 5 new organizations in addition to the original four, plus a few other programs.

Each of the Centres is established in a different developing country and each specializes either in the improvement of a limited number of crops or upon the farming systems of specific important ecological or agroclimatic zones. Each Centre is largely autonomous, each has its own international Board of Governors, and its senior staff is recruited from amongst the most able scientists in the world without regard to nationality. There is one Centre located in each of the following

.../8

countries: Nigeria, Kenya, Ethiopia, India, Philippines, Mexico, Colombia, and Peru. IDRC is presently acting as Executing Agency for the Establishment of another international centre to be located in the Middle East with an associated station each in Lebanon, Syria and Iran. It is hoped that this Centre will start its activities in 1976.

The programs and budgets of the IARCs fall into three broad categories:

1. Local activities carried on largely at the Centres' headquarters research site;
2. Outreach and training which seeks to spread, and have their useful research results adopted in the farming systems of the less developed world and;
3. Co-operative activities with scientists and scientific institutions in various parts of the world, particularly those of the developed countries who can make a significant contribution to the applied research programs of the Centres.

After this outline, a discussion of some of the activities which IDRC is supporting under these headings and how it is linking the efforts of Canadian scientists with those of the International Centres should now be more meaningful.

MULTIPLE CROPPING IRRI

Of all the projects in which we are involved at the International Centres, the greatest potential benefit to mankind would probably result from the multiple cropping program at IRRI (International Rice Research Institute, in the Philippines). Multiple cropping can be defined as a

.../9

food production system in which more than one crop is harvested from the same land in each crop year. It can include inter-cropping in which several different crops are grown simultaneously, and sequential or rotational cropping in which two or more additional crops are planted while the first crop is growing or immediately after it is harvested.

This program which has been supported by IDRC since its inception is based at IRRI but is already expanding to several Southeast Asian countries. The project deals exclusively with multiple cropping in combination with irrigated and rain fed rice grown in the Monsoonal regions of South and Southeast Asia. Its purpose is to increase the productivity per unit area of land, to increase the income of small rice farmers, and to produce a nutritionally more adequately balanced crop mix.

It has been demonstrated during the 4 years of the project's life that each of these objectives is attainable. Multiple cropping, when systematically organized, significantly increases the yield of food calories, protein and other nutrients per unit area of land, per unit of time, makes for more efficient use of labor, and adds saleable cash crops to the predominantly subsistance rice crops harvested by the small farmers.

Certain interesting concomitant effects have been noticed. For example, certain legumes planted after rice make more efficient use of residual soil nitrogen. Some of the leafy legumes shade out weeds and therefore reduce the need for herbicides. Maize and peanuts, when intercropped following rice, intercept 60% more sunlight and are nearly 50% more

.../10

productive than when either is grown separately.

It has also been discovered that peanuts play host to certain carnivorous insects which attack and destroy the pest of other plants. Consequently, maize grown with peanuts suffers a much lower incidence of attack from stemborer than when it is grown alone. Consequently, multiple cropping offers a number of unexpected advantages for the biological control of weeds and insects and therefore makes for a more economical and judicious use of agricultural chemicals.

There are also some undesirable effects in that certain crops do not perform very well when planted after sweet potatoes or mung beans. IRRI is now supporting a study at the University of British Columbia into the mechanism of this potentially damaging interaction between food crops and the multiple cropping systems of interest to the Asian region. Since the results demonstrated at IRRI have to be tested and adapted to a wide range of soil and climatic conditions, a large training and demonstration program is being developed and cooperative research projects have been established at two other centres in the Philippines, at the Bangladesh Rice Research Institute (BRRI), in Indonesia and more recently in Sri-Lanka.

TRITICALE

IDRC is supporting a cooperative research project by scientists from the IARC, CIMMYT, in Mexico, the University of Manitoba and the University of Guelph, to develop a new cereal grain "Triticale". The name Triticale is a combination of the generic name of its two parents, wheat and rye -

.../11

"Triticum" is the generic name for wheat and "Secale" the generic name for rye.

A number of people have asked why, apart from satisfying scientific curiosity, anyone would wish to invest time and money in producing a fertile hybrid of wheat and rye. Wheat possesses certain unique properties most important of which include the ability of its protein, when mixed with water, to form the cohesive, elastic substance called gluten. Rye proteins will also form a gluten-like mass but rye gluten does not have the elasticity of wheat gluten and consequently, bread made from 100% rye flour is much heavier and darker than wheat bread. Wheat grows best in temperate and sub-tropical climates and prefers heavy loam and clay soils. Rye will grow in roughly the same latitudes as wheat but is much more tolerant of sandy soils and soils of lower fertility. Consequently, the primary objective of the triticale breeder is to develop a hybrid which will combine the superior baking properties of wheat with a greater environmental adaptability than either of its parents and in particular the capacity to grow successfully on what might be described as marginal land, and under conditions such as low night temperatures unsuited to wheat and other established cereals.

From the nutritional point of view, wheat, as is common with most other cereals, is comparatively deficient in lysine, one of the essential aminoacids. The proportion of lysine in rye is significantly higher than in wheat and therefore, another objective of the project, which has now been achieved, was to produce a cereal whose protein is of better biological quality than that of wheat.

.../12

Another very important achievement of the program was the discovery at CIMMYT of some very fertile lines because, when the first crosses of wheat and rye were made, more than a hundred years ago by A.S. Wilson in Scotland, the hybrid was totally sterile, none of the plants having produced a single fertile seed.

Triticale trials are in progress in nearly 50 countries and the progress made in the CIMMYT-Manitoba project has been sufficient to encourage IDRC to sponsor a series of triticale outreach projects in various countries. In Ethiopia, triticales are now out yielding the best wheats known in the country, particularly at higher altitudes where cold tolerance is important. Home economists are studying the reaction of Ethiopan consumers to traditional food made with triticale and assessing the best method of incorporating triticale in njera their traditional bread. At. G.B. Pant University, in North India, triticale is being crossed with established wheat varieties and then tested under a wide variety of environmental conditions ranging from valleys up to elevations above 10,000 feet in the Himalayan region. First results indicate that, particularly at the higher altitudes, triticale performs better than wheat. Food scientists and nutritionists at the University are working to adapt triticale flours to both traditional Indian cereal foods and to novel products, particularly for the benefit of the more poorly nourished members of the community. In Kenya, an important objective is to identify triticale lines which are resistant to a wide spectrum of rust disease races. Triticale outreach research is also taking place with IDRC sponsorship in Algeria, Lebanon, Rwanda and Chile. In cooperation with the International Union of Food Science and Technology,

/13

IDRC has established an international working group which is exploring how triticale can best be used in the world's traditional cereal foods and in new formulations designed to meet severe nutritional needs.

In common with the other research programs, it is supporting in the international centres, IDRC has financed a number of symposia, technical workshops and "state of the art" reviews in order to bring together all of the relevant available knowledge.

CASSAVA-SWINE

Cassava, also known in different places as tapioca, manioc and yuca, is an important source of food calories for many people in the humid tropics in Africa, Asia and Latin America and is popular with small farmers of those regions because of its resistance to drought and its ability to grow on poor soil. Until recently it has been accorded scant attention by plant breeders and agronomists and therefore its yield in many developing countries is as low as 5 tons of roots per hectare. It has been demonstrated that yields of between 25 and 50 tons per hectare are distinctly attainable, and under special circumstances more than 75 tons per hectare are not impossible.

The interest in cassava is timely in that it has recently become a valuable export crop from several Far Eastern countries to Europe, Japan and North America where it is used as a major energy source in animal feeding stuffs. It is now recognized that even existing varieties

.../14

of cassava can, in terms of calories per unit of land per unit time, outproduce wheat, rice, maize and sugar cane, all of which have received considerable research attention over the years while the IDRC Cassava Program at CIAT (Centro Internacional de Agricultura Tropical) in Cali, Colombia, is the first major attempt to apply modern plant science research methods to its improvement in yield and protein content.

The primary objectives of the Cassava-Swine program are:

a) to develop more efficient genotypes for higher productivity and lower toxicity;

b) to develop the agronomic practices and systems whereby to grow cassava in developing countries more efficiently and economically; and

c) to develop cassava processing systems whereby to produce more nutritious food and feeds from this much neglected crop.

The main activity goes on at the CIAT research station in Colombia but a network of supporting activities is growing steadily in several parts of the world. For example, there are affiliated programs in which the scientists have been trained at CIAT, in Brazil, Bolivia, Ecuador and Peru and in the Caribbean, in Zaire and Nigeria, and in Malaysia, Indonesia, Thailand and India. In several African countries we are supporting a study into the control of bacterial wilt, a seriously devastating disease of cassava in many countries. In Latin America we are supporting a group of research and training programs each related to the use of cassava together with agricultural by-products in hog rations.

.../15

MAIDUGURI MILL PROJECT

Increasing crop yields is the most obvious way of increasing food production and this is the main objective of the multiple cropping, triticale and cassava projects. Another important, and yet quite neglected means of achieving the same goal, is to minimize crop losses taking place between harvest and end use by the consumer. No accurate figure is available to account for these losses but they can easily reach 30% or more of a total crop, thus the need for improved processing, storage and distribution systems is evident.

The IDRC project referred to as the Maiduguri Mill Project is one of many projects in the area of processing and postharvest systems in general. Its purpose was to first establish and then improve a rural milling system capable of processing locally grown grain into acceptable flours.

The small, rural hammer mills of Northern Nigeria are frequently overcrowded and there is an evident need for additional and improved milling capacity. Each mill serves only 10 to 20 customers each day and milling and sieving losses are believed to be very high; consequently, the process is both wasteful and uneconomic, and the final product excessively expensive.

Maiduguri, a rapidly growing city of over 150,000 inhabitants, lying approximately in the center of the crop growing area of northern Nigeria, was selected as the site for the pilot mill. The main crops growing in

.../16

the area are sorghum and millet. Smaller amounts of wheat and cowpeas are produced. The project is a joint venture of the Nigerian Ministry of Agriculture and Natural Resources, the Ministry of Cooperatives and Community Development and IDRC.

The initial task was to obtain information on the existing postharvest food grain system in the Northeast State. Further information was also needed on the various ways food grains were processed and prepared for consumption in order to establish guidelines as to the type of mill products required, packaging methods and marketing techniques. Accordingly, a preliminary consumer grain preference study was initiated followed by an in-depth consumer study.

The purpose of the consumer study was two-fold:

a) to determine the type and volume of flour to produce in the experimental mill, and
b) to develop a consumer education program for improving household utilization of cereals and grain legumes in their diets.

Women of 1100 households in Maiduguri were interviewed about household practices of storing, purchasing, processing, and using grain in the family diet, and the changes taking place in these practices. The entire Home Economics Department of the Northeast State was involved in the study. The study showed a trend toward urbanization as indicated by an increase in the use of packaged flour for preparing traditional staple cereal foods. It also indicated a shift to processed foods; non-traditional foods derived from prepared flour are gaining popularity as a part of the Nigerian food consumption

.../17

pattern, an example being bread, which is becoming a popular breakfast food. At the time of the survey, 64% of the households were purchasing bread, with more than half of it being purchased daily.

A Test Kitchen was established at the mill. A Nigerian Home Economist is in charge of its operation where the work program involves milled product quality control; incorporating the mill flour in traditional food product recipes; development, testing and consumer acceptance of the recipes, and demonstration of recipes to Home Agents.

After the completion of the first phase of the project in 2 years, the Nigerian Government requested approval for another two-year project. In essence an extension of the first phase of the project, Phase II is concentrating on further improving the efficiency of the acitivities conducted during Phase I and on building and operating a bakery for preparing Nigeria-style bread from composite flour using both the traditional manner, without modernized equipment, and a more mechanical manner, which is being adopted by larger bakeries. It is intended that the bakery serve as a training centre to introduce the technology for preparing composite flour bread. A Nigerian baker will be in charge of the operation. At the present time mill products are being sold throughout the town and in the market, and sales have increased significantly.

FORESTRY

The long drought in Sahelian Africa has left the people of the region more conscious than ever of their need for healthy forest plantations and

.../18

woodlots at a time when this resource has been dangerously reduced. The drought itself destroyed many trees; but, even before the drought years, the growth of human population had put heavy demands on the forests for firewood while livestock herds of ever-increasing size damaged or ate many young trees.

Many of the IDRC forestry projects were designed to help restore and improve these resources and show only secondary concern for encouraging food production. Such is the case of projects in Sudan and Nigeria where lines of trees serve as windbreaks or shelterbelts to protect agricultural crops on irrigated or rainfed lands. In a more recent project in Kenya, a different approach is being taken: there the research is designed to find species that will grow well on marginal soils and provide enough timber resources for the country so that high rainfall areas, at present under forest plantation, can by stages be released for agricultural production.

IDRC is also investigating the potential for research in agrisilviculture in tropical Africa. Agrisilviculture is the system of raising forest crops in combination with agricultural crops and has been expanding rapidly in recent years.

AQUACULTURE

In the fisheries sector, the weight of IDRC support has been placed behind aquaculture, (fish husbandry or fish farming), rather than into improving methods of fish capture. At present only about 8% of the

.../19

world's fish production is derived from aquaculture. But as a plateau is reached in capture fisheries and warnings become clearer that many of the most valuable wild stocks (such as herring) are being over-fished, more attention is being paid to aquaculture. This is particularly true of Southeast Asia where already 4 million tons of fish and fish products are raised each year through aquaculture.

The concern in aquaculture to date has been how to increase this production many times over.

IDRC's aquaculture involvement began in April 1973 with the sponsoring of a Seminar at Malacca in Malaysia, where representatives of 11 Southeast Asia countries stated their priorities and needs. As a result of this seminar, IDRC began to receive project proposals for aquaculture research. By 1975 the Centre had moved to support research in the breeding of carp in West Malaysia and India, in milkfish in the Philippines, and in oysterculture in Sabah (East Malaysia).

The shortage of fish seed supplies for the breeding of fish in captivity was a problem pinpointed at the Malacca seminar. This has been a particular problem with Indian and Chinese carp, which normally only deposit eggs within their natural spawning grounds and only at certain seasons. Malaysia, moving to increase fishpond production of carp, faced a grave shortage of seed since carp would not breed in captivity, and was continually having to import fish fry with a consequent heavy foreign exchange cost.

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In British Columbia scientists of the Fisheries and Marine Service of Environment Canada had prepared gonadotropin, a hormonal extract from the pituitary glands of salmon taken when spawning. This gonadotropin when injected into female carp, when the female is ripe for spawning, induces her to lay her vast numbers of eggs (and the male to fertilize them) in controlled conditions where few would be lost.

Late in 1973 thousands of salmon were taken from Spring Creek in Washington State, from a spawning channel on Vancouver Island, and from a cannery in Vancouver. While the salmon went to the canneries, the pituitary glands were removed and turned into a purified extract which was prepared for spawning experiments and sent to Malaysia. We are now awaiting the results on this part of the program.

It is through these various research programs that IDRC is trying to improve the quality of life of the underprivileged nations of the world. As you know this is a very complex and delicate task which calls for much more than financial and technical assistance and which cannot be completed quickly.

The value of the IDRC's contribution toward increasing world food production, thus "feeding the world", can really be assessed through the words of Miralimu Julius Nyerere, President of Tanzania, one of the leaders of the Third World: "Development means the development of people. Roads, buildings, increases in crops... are not development: they are only the tools of development... An increase in the output of wheat, maize or beans is development only if it leads to the better nutrition of people...

Development brings freedom, provided it is development of people. But people cannot be developed; they can only develop themselves... An outsider cannot give a man pride and self-confidence in himself as a human being. Those things a man has to create in himself by his own actions."

It is my most sincere hope that our action will give pride and self-confidence to many agricultural scientists throughout the developing world.

LA CONTRIBUTION DU CRDI POUR AUGMENTER LA PRODUCTION ALIMENTAIRE MONDIALE

1. Présentation

   a) CRDI, ses objectifs, sa structure et sa philosophie

   b) CGIAR, ses origines, ses membres et son action

   c) SAAN, son programme et ses projets

2. Discussion / Questions

LISTE DES SIGLES UTILISES

SAAN	Sciences de l'Agriculture, de l'Alimentation et de la Nutrition
CGIAR	Consultative Group on International Agricultural Research (Groupe consultatif sur la recherche agricole internationale)
CIAT	Centro Internacional de Agricultura Tropical, Cali, Colombia. (Centre international d'agriculture tropicale)
ACDI	Agence Canadienne pour le Développement International
CIMMYT	Centro Internacional para el Mejoramiento del Maiz y del Trigo,Mexi (Centre international pour l'amélioration du mais et du blé)
FAO	Food and Agriculture Organization (U.N.) (Organisation des Nations Unies pour l'agriculture et l'alimentatio
ICARDA	International Centres for Agricultural Research in Dry Areas
CRDI	Centre de Recherches pour le Développement International
IITA	International Institute of Tropical Agriculture, Nigeria. (Institut international d'agriculture tropicale)
IRRI	International Rice Research Institute, Philippines (Institut international de recherche sur le riz)
PNUD	Programme des Nations Unies pour le développement

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1. Presentation
   a) IDRC, its objectives, structure and philosophy
   b) CGIAR, its origin, members and action
   c) AFNS, its program and projects

2. Discussion / Question Period

LIST OF ACRONYMS USED

AFNS	Agriculture, Food and Nutrition Sciences
CGIAR	Consultative Group on International Agricultural Research
CIAT	International Center of Tropical Agriculture (Centro Internacional de Agricultura Tropical, Cali, Colombia)
CIDA	Canadian International Development Agency
CIMMYT	International Maize and Wheat Improvement Centre (Mexico)
FAO	Food and Agriculture Organization (U.N.)
ICARDA	International Centres for Agricultural Research in Dry Areas
IDRC	International Development Research Centre
IITA	International Institute of Tropical Agriculture (Nigeria)
IRRI	International Rice Research Institute (Philippines)
LDCs	Less Developed Countries
UNDP	United Nations Development Program