HISTORY OF THE CAPS PROGRAM

Introduction

AFNS began with a philosophy of supporting research projects, led and managed by indigenous scientists in the developing world. Such projects were usually relatively rather small, and their scientists often young, needing sympathetic encouragement and advice. Monitoring visits were therefore planned once in six months, although this was often more a pious hope than a practical reality.

The target population was the small cultivators of the developing world, especially its subsistence farmers. The semi-arid tropics were identified as an area of special need.

Past research work in the developing world, often under colonial systems, had been heavily oriented towards generating more revenue. The traditional indigenous agricultural systems had been overlaid by an infrastructure of administrative, educational, health, law-and-order and similar services. These needed financing, and the existing indigenous systems could not support their cost. As such services became more effective, so death control became more wide-spread, and increasing populations brought new pressures to bear on the prevailing agricultural systems.

Revenue creation through agriculture had been achieved by introducing and developing crops of high commercial value for export (cash crops), and working out productive systems for their management. The indigenous traditional farming systems were expected to take care of most of the cultivators' needs, although certain major food crops, such as maize, did receive special attention. Large farms, frequently owned by expatriates, were encouraged in a few countries, as being more efficient generators of revenue. Serious attempts were made to develop new, more effective farming systems for small farmers in many places, but generally with little input from the small farmers themselves - barriers of language, life style, and culture existed. Some traditional customs were a hindrance, thus the use of the commercial value of cattle to generate cash was seldom acceptable to pastoral peoples.

Rulers of independent countries had the same need to raise revenue, for the same reasons. National priorities were therefore also slanted towards this end.

Pricing and marketing activities were frequently government-controlled, and were often used to divert revenue to government rather than profits to the producer. The small farmer was subsidizing cheaper food in the townships, and contributing towards the costs of government, with scant reward for his hard labour. Thus, agriculture became sheer drudgery, and the main objective of many small subsistence farmers was that of educating their children: educating them so that they could escape from the drudgery of farming to the good life in the towns, in salaried jobs.

IDRC recognized that new and changed agricultural systems required new types of most crops, as well as increased and improved inputs. Many national governments also recognized these needs, and project requests were readily made. The key requirement was to identify project leaders, local scientists who would be both qualified and available to undertake projects. Foreign project advisors could not always be wholly dispensed with, unless our activities were to be delayed for ten or twenty years. This was particularly true for Africa. The need to work in such countries justified temporary modification to our philosophy of only supporting indigenous scientists.

Initially, the activities of the Crops and Cropping Systems group and of the Animal Sciences group were quite closely interwoven: the staff consisted of one associate director in each. Subsequently, the two programmes developed independently until 1983, when they were brought together again to tackle the thorny problems of farming systems.

The Programme

Cropping/Farming Systems

The first foundation project was Rural Development, Colombia (71-0005), a cropping/farming systems style of project which was developed and managed by the Associate Director, Animal Sciences, with the help of two expatriate advisors.

CIDA had negotiated two projects with IARCs, - "cassava-swine" at CIAT, and "triticale" at CIMMYT. IDRC managed these projects, and put some of its own money into related national programme activities. These represented the second and third foundation projects. Thus developed the idea of a group of projects in national programmes relating to a major research activity of an IARC. This idea was often followed. (Not without some disillusionment and friction; it was easy to imagine that the IARC was more concerned to use the outlying projects as multi-locations for its own research programme, building its own reputation and image, rather than doing everything possible to serve, develop and strengthen the national programme through the national project. This is not an easy balance to hold.)

A fourth foundation project was Multiple Cropping, Philippines (71-0107, followed by 73-0014 and 75-0086). Richard Bradfield had been operating a Rockefeller Foundation funded project, trying to see how much could be produced from a unit area of land, by taking as many crops as possible with ample water and maximum inputs. Bradfield's project closed at the end of 1970. David Hopper put Gordon Banta in to hold the fort, and in 1971 C and CS picked up this project funding it through IRRI. Banta turned the project round and began to work it from the other end--how could the small farmer make maximum use of his land and water, what inputs could he afford? Richard Harwood, an agronomist, joined Banta, and they worked as a team.

Cropping Systems

The Multiple Cropping (Philippines) project involved from the beginning farmers working in their own fields around IRRI, which Banta had already begun. Soon the University (UPLB) became interested, and ran its own IDRC project, in which Pexy Carangal was involved (73-0014). Photoperiod insensitive rices of fixed, shorter duration maturity length had been developed at IRRI, making possible two rice crops a year where the rainy season was long enough, or one rice crop with a dryland crop. The latter might be planted before the rice, or after the rice. Occasionally, planting both before and after the rice was possible.

The development of cropping systems based on these new rice cv's was a whole new ball-game, and full of interest. Cropping systems projects were begun with national programmes, some funded by other donors. IDRC supported such projects in Bangladesh (74-0019, 78-0064, 81-0081), Indonesia (74-0157, 77-0010), Sri Lanka (75-0107, 78-0050, 82-0185), and Thailand (76-0083, 78-0049, 81-0169). Changes were being made rapidly as the new rices were introduced. Much depended on what the small farmer was willing and able to do in practice. The farmer was involved in the research right from the beginning, and there was a process of debate with the farmer--what were his traditional practices? How might they be modified to adopt the new rices most effectively? What else could be grown as well--and when? The possibilities were studied by the researchers, discussed with the farmers, then tried out by the individual farmer on his fields in an agreed manner. The cropping systems methodology had begun to take shape.

Linkages between the different country projects were planned, so that the project leaders could meet twice a year, at a different project site each time. A project coordinator was required, and Pexy Carangal was designated for this position. Much training at IRRI was needed for workers from the country projects. Negotiations with IRRI began. The first project with IRRI was 74-0053, when an investment of 1,304,000 CAD was made over two years, covering the cost of much of the CS work, salary of the network co-ordinator (Carangal), training, group meetings, travel and a workshop. This established the Asian Cropping Systems Network (ACSN). The second phase of this project cost 1,398,300 CAD over two years (76-0087).

Harwood left, and in 1976 Hubert Zandstra took over this position, as a regular IRRI staff member, no longer financed by IDRC. He had been one of the IDRC advisors in the Caqueza project (Rural Development, Colombia), which was very successful. Zandstra brought to the IRRI project his experiences from Caqueza, resulting in a fruitful interaction of ideas. IRRI assumed the cost of all the CS work at IRRI. IDRC continued to fund the network costs: group meetings, travel, training, and an occasional workshop. Cropping Systems Outreach IRRI (78-0095, 82-0089) paid for these. Carangal became an IRRI financed staff member.

An important supporting project with UPLB was provided by Varietal Screening, Philippines (74-0079, 78-0045). The new rice-based CS required Upland crop cv's that could establish and grow in rice soils, often wet soils. Much germplasm screening was done in this project to identify such cv's in a wide range of crops. This series of CS projects taught us a great deal about cropping systems research in which the farmer was himself actively involved, and underlined the importance of the socio-economic component.

One project, Multiple Cropping Thailand (72-0006), with Kasetsart University was not a part of the main stream on the ACSN series, and produced few results of lasting importance.

Ideas and approaches generated in ACSN were taken to Latin America and the Caribbean with Cropping Systems, Nicaragua (77-0085, 80-0114), Cropping Systems, Honduras (77-0086, 79-0145), and Multiple Cropping, Colombia (79-0021, 82-0095). Another project, Small Farm Modules, Colombia (78-0103) possibly belongs here. This group of projects has continued to yield good results, and CS project development has continued there.

CS work in Africa has not proved to be easy, being beset by staffing problems. Farming Systems, Mali (77-0058, 81-0141) was set up with advice from D. Norman, and had problems of staff continuity. Useful progress is now being made. Farming Systems, Tanzania (79-0173) was set up with the University, following on a sustained intercropping project which served a valuable training function, but did not get out to the farmers (Intercropping, Tanzania, 72-0025, 74-0087). An intercropping project in Swaziland (78-0112, 82-0013) was also unable to make much impact on farmers. A small project in Togo (77-0050) was not very encouraging.

There have been two projects on banana cultivation systems, both in the Caribbean region. Cropping Systems, Winban (77-0074, 80-0120) and Legumes under Bananas, UPEB (79-0101): and two projects on the drylands of the Middle East:- Crop Intensification, Syria (76-0127, 80-0130), and Desert Farming Systems, Egypt (79-0120, 83,0097). Crop Rotations, Kenya (75-0122) with the University of Nairobi had a useful training function there. One small related project of the Cooperative Programme type was Plant to Plant Interaction, UBC (73-0063), dealing with interplant competition in mixed species and types.

Component Research

Fertilizer is an expensive input to cropping systems, and phosphate is particularly important. IFDC has been studying the utilisation of rock-phosphate deposits using simple techniques such as acidification. This work was supported under Fertilizer Development, IFDC (76-0152, 78-0088, 80-0003). Fertilizer Efficiency, Egypt (77-0017) looked at fertilizer use.

Crops

Root Crops

From the CIAT cassava-swine project developed an important series of projects on cassave, which continued to be in the Animal Sciences programme for several years, although the animal component was minimal. Cassava was recognised as a most valuable source of carbohydrates, easy to grow, tolerant of temporary drought. It can often be stored in the ground for a period, and harvested root by root when needed - in some countries, it was used as a famine reserve. It is easy to dry, chip, store and make into flour, after lifting.

72-0125, (CIAT Swine Outreach) supported cassava work in Latin America; as did Cassava Brazil (73-0146), Cassava Peru (74-0002), Cassava Ecuador (74-0153), and Cassava Outreach Latin America (74-0162). Cassava Germplasm Brazil (76-0038) and Wild Cassava Brazil (79-0022) were related projects. Root-crops Caribbean (71-0079; 75-0001) had a cassava component, but also included sweet-potatoes and Colocasia. These Latin American projects had informal links with CIAT.

Another cassava project series was developed in Asia: Cassava Indonesia (73-0043, 76-0060), Malaysia (74-0046), India (74-0056) and Cassava Nutrition Thailand (74-0060, 78-0026). Root Crops Philippines (74-0074) partly belongs here, although its major area of success was with sweet potatoes at VISCA. This project continued as Sweet Potatoes, Philippines (81-0071). These projects were linked together for a time by a network coordinator, under Cassava Cooperative Research Asia (75-0123). Root Crops Sri Lanka (77-0049, 83-0199) was added later. The Thailand project, in conjunction with the PPS Cassava processing projects (74-0016, 76-0037) made a significant contribution to the cassava chip industry which exported large quantities of chips overseas (mainly to Europe) as livestock feed.

IITA was the IARC in Africa involved with cassava. Africa has a serious virus disease, cassava mosaic, which does not occur in Latin America, so material from there is usually very susceptible. The pest and disease situations in the two continents are such that direct transfer of plant material is unacceptable, and some diseases may be seed-borne, e.g. cassava blight. One of the early projects was Bacterial Blight Nigeria, 73-0123, in which the spread of this disease from IITA through infected seed was identified. (G. Persley who did this work has played a part in getting ACIAR off the ground.) Cassava Nigeria (74-0047, 77-0034) was followed by Root Crops Cameroon, which had a parallel component with IITA (75-0041, 79-0087, 83-0132). Cassava, sweet potatoes, yams and cocoyams were involved. Cassava Zanzibar (76-0105, 81-0001) was begun in 1976. Resistance to green mite was first identified in this project. A cassava project in Congo Brazzaville followed (79-0040). The control of pests that moved into Africa without their controlling parasites and predators was studied in Cassava Mite CIBC (73-0136, 75-0026, 79-0065) and Cassava Mealybug CIBC (76-0160, 80-0116).

Some projects with Canadian institutions foreshadowed the development of the Cooperative programme. Cassava Microbiology, Guelph (75-0094, 76-0120, 78-0130) studied the development of microbial protein for stockfeed, while Cassava Germplasm PRL (78-0024, 79-0062) developed tissue culture and protoplast, and studied storage in liquid nitrogen.

Triticale

Mention has been made of the CIDA project with CIMMYT on triticale. Triticale outreach was developed by projects in Ethiopia (72-0024, 76-0052), Chile (73-0012, 76-0088, 79-0052), Kenya (73-0050), India (74-0004) and Lebanon (74-0142). CIMMYT funding supplied improved triticale nurseries to these projects. The triticale performed well in all of these projects, usually outyielding wheat in the more marginal and difficult areas, frequently doing so under good wheat growing conditions. The main weaknesses were the shrivelled appearance of the grain, and lower bushel weight. Much progress was made in Chile in minimizing these problems, and the crop has a future there if local wheat prices harden. It undoubtedly has a future in both Ethiopia and Kenya, where it performed well. There was a strong prejudice against triticale in Ethiopia, where there was the feeling that the crop had not been developed for human food, but for livestock feed. Two back-up projects with Canadian Universities to support the CIMMYT programme were Winter Triticale, Guelph (74-0026, 76-0148, 77-0081), and Triticale, Manitoba (76-0149). Launching triticale into the developing world was premature, but not desperately so: the effort should have been delayed until grain appearance and bushel weight had been improved, but the exercise was not a waste of time, and ought to be repeated in a few years' time when these grain problems have been solved.

Pulses

Grain legumes (pulses) received attention early on starting, with Grain Legumes, Caribbean (71-0078, 74-0160, 76-0191). One of the locally important legumes was pigeon pea, which in that area is produced very largely as a green pea for canning. Some of the dwarf, determinate, shorter term types produced were popular, and could be mechanically harvested.

In a project with Makerere University, Uganda, IDRC supported research on pigeon pea which was done by post graduate students (72-0054, 75-0110). One of these students, after obtaining his MSc degree, returned to Nairobi University. There, he led our project Pigeon Peas, Kenya (75-0131, 79-0063, 81-0139). This included involvement in the Pigeon Pea area of Kenya, S.E. of Nairobi (Makuyeni). Very good farmer involvement was developed. ICRISAT started its Pigeon Pea programme in India in 1973, and IDRC gave support for two years (73-0013, 74-0161).

The next group of pulses to receive attention was those of the Mediterranean littoral, involving chick-peas, lentils and faba beans. In some countries, labour was scarce, and mechanical harvesting of the first two crops was sought. IDRC supported grain legumes in the ALAD programme. This was based in Beirut, but had extensive regional activities, especially training and germplasm distribution (73-0010, 75-0031) ALAD was replaced by ICARDA, and IDRC suppported grain legumes research there (77-0101, 79-0144, 81-0101). ALAD/ICARDA served a series of national programmes, of which the following were supported by IDRC: Algeria (73-0033, 78-0043), Sudan (77-0092, 83-0122 - this project included work on haricot beans and field peas as well) - Egypt (77-0073, 80-0118), and Turkey (78-0048). Geoffrey Hawtin, IDRC supported Food Legume Breeder in the ALAD project, became Deputy Director General (International Programs) with ICARDA, then rejoined IDRC as Associate Director (CAPS) in July 1984.

Pulses are important in South Asia: Grain Legumes, Bangladesh (77-0048, 79-0134), and Food Legumes, Pakistan (79-0090) dealt mainly with the winter pulses-chick-pea, lentil, and grass-pea (Lathyrus). Of these, the most widely grown and most neglected is Lathyrus. This crop is invaluable to the small farmer, it establishes well after rice, needing only to be broadcast into the stubbles. It provides livestock feed as well as a harvest of peas for human consumption.

Work was also done on the summer crops, black gram and mung bean, which need to be photoperiod insensitive and disease resistant to be of use. Food Grains, Sri Lanka (76-0132, 80-0082) worked on the improvement of cowpea and mung bean, with some attention to black gram. A cowpea had been selected in the national program that was an acceptable substitute for lentils (Masoor dhal), all of which was imported into the island from the Middle East. Cowpeas developed under this project resulted in a wide range of seed types becoming generally acceptable.

In West Africa, a project was started in Sierra Leone (77-0102, 81-0006) working with the University of Njala on beans, cowpeas and pigeon peas, these last being new to the area. There were two projects in Niger on cowpeas, (77-0092 and 79-0027). Food Legumes, Mali (78-0040, 83-0025) were also on cowpeas, but included Bambara groundnuts as well. Lastly, a food legume project in Upper Volta was established (79-0038, 81-002, 81-0114, 82-0256) at first jointly with IITA, later to separate into a national project cooperating with IITA, and an IITA project. A small project was funded with the University of Upper Volta to study cowpea storage in conjunction with bruchid resistance, to support the work of the plant breeders (79-0172).

Groundnuts are classified by CAPS as a pulse crop: a groundnut improvement project was established in Mozambique with the University of Maputo, and this was the first donor agency research project in that country after independence. This project has done well (79-0017, 82-0093). A small project was also started with the University in Tanzania on groundnuts, mung, soya and cowpea improvement - Pulses and Groundnuts Tanzania (79-0142).

Cereals

IDRC's concern has been that of neglected crops, and emphasis was on the semi-arid tropics. Sorghum is a major staple in those areas. ICRISAT was building up during the period under review, so strengthening sorghum work, especially in Africa, became our major theme for cereals. The original ICRISAT report had noted the value of working in four areas of Africa. We were not successful in developing a project in Nigeria, but were able to support work in Senegal, Ethiopia, and East Africa.

Sorghum, Senegal (72-0011, 75-0088, 79-0094) was based on the Bambey research station east of Dakar. This had been a strong centre for sorghum research, but staffed by expatriates. The project was led by a project advisor, but aimed to build local capability, and to make better contacts with the local farmers. Progress was slow, but some useful sorghums were going out to farmers by the end of the period, and a Sengalese Ph.D trained in this project returned to continue the program (after the end of the project period). There was a broad training component, and of the 11 students sent to Laval University from several countries in Francophone West Africa, most are back working in related agricultural fields in their own countries.

Sorghum Improvement, East Africa (72-0011, 75-0088, 79-0094) located at Serere in Uganda gradually moved toward working on finger millet as well as sorghum. It maintained steady progress through the break-up of the East African Community and all the turmoils in Uganda. Several varieties were developed, tested and released. The project leader for several years, S.Z. Mukuru, is now a senior sorghum breeder with ICRISAT in Hyderabad.

Sorghum, Ethiopia (72-0095, 74-0023, 79-0016) began at the University in Alamaya, working on the highland sorghums. It then moved down to Nazareth to deal with the whole country under the Ethiopian Sorghum Improvement Project (ESIP). This project continued through the revolution, which interfered with some of the national testing sites and discouraged some trainees in Canada from returning. ESIP is still operating well, led by one of the trainees from the project. The original leader left to become the ICRISAT/SAFGRAD sorghum coordinator for eastern Africa. ESIP now comes directly under IAR, although the university still cooperates in the sorghum program.

Sorghum, CIMMYT, and Cold Tolerant Sorghum, ICRISAT (72-0073, 74-0132, 76-0134, 78-0092) began as a holding operation. CIMMYT had developed some good high altitude sorghums in Mexico: the plans were for ICRISAT to locate its high altitude work in Ethiopia. The Mexico work was expected to move there is due course. In fact, the work has continued well in Mexico, but it is an operation that can equally well be funded by another donor. In most of Latin America, sorghum is not the small man's food crop as it is in Africa or India.

Two supporting projects looked at drought problems. Drought Resistance, Laval (72-0101, 74-0107) tried to correlate various laboratory tests for drought resistance with the actual performance of cultivars in field trials run by the Bambey project. Drought tolerance, Saskatoon (73-0129, 79-0064) was an excellent fundamental project studying differences in drought response of two sorghum types, and associating these with the levels of the four major hormones. ICRISAT was involved in the final phase of the studies. Another long-shot was a small project with PRL attempting the somatic hybridisation of sorghum and maize (75-0019). Some good work was done on sorghum tissue culture, and the young Indian scientist involved is now in the IRRI rice tissue culture group. Another basic project was with ICIPE in East Africa, studying resistance to sorghum shoot-fly and <u>Chilo</u> stem borer (76-0103). Polyphenols, Sheffield (75-0043, 76-0102) studied tannins in sorghum grains, important both for bird resistance and for food preparation.

Three other projects had a sorghum component: Sorghum and Maize, Papua New Guinea (73-0041) was a project with the University supporting a small breeding programme on these two crops. Semi-arid Crops, Thailand (74-0058) looked at the potential of sorghum among other crops in N.E. Thailand. Sorghum, Triticale and Oilseeds, Rwanda (75-0037, 81-0025) attempted to develop and strengthen the indigenous component of crops research, with some success. The same is true for Beans (now Peas) and Maize, Burundi (77-0083, 81-0089).

Witchweed (Striga) is a major source of crop loss for small sorghum growers (other cereals also), especially under intensive land use. We supported work on its control. The project in Upper Volta (Burkina Faso) (78-0006, 81-0113) was with ICRISAT. Resistant varieties were developed, and tested with farmers, also simple agronomic practices (cultivation, low levels of fertilizer). Good progress has been made, but much more work is needed. Striga, Sudan (77-0041) works in the same way, and tests resistant material from the ICRISAT project, together with suggested practices.

Striga, Sussex (73-0015, 75-0065, 76-0101, 78-0085) supported PDF studies under Professor Alan Johnson to synthesise chemicals (Strigols) that would stimulate the Striga seed to germinate in the absence of a host plant. It would then die. This approach may yet be important.

Orobanche is a similar weed, damaging a range of crops in the Middle East and Ethiopia. The synthetic strigols produced by the Sussex project were likely also to be of use against Orobanche. Two projects were started, one with ICARDA (74-0119, 78-0041), the other with Egypt (75-0112) to look at the Orobanche problem and control methods, but no convincing results have been obtained.

Rice is a crop with a big potential in Africa, but in many places it is still rather new. IDRC supported the establishment and development of WARDA, the West African Rice Development Association, and also funded the special project on irrigated rice in North Sénégal, with Dr. Chandler (ex-Director General of IRRI) as a consultant. The project is Rice Research, WARDA (73-0145, 78-0047, 81-0183).

Minor millets are of much importance in dry areas, in times of drought, and are also useful in exploiting temporary habitats. Thus, Paspalum millet is important in India. In the South seeds are stored in the temples, and given out to people to grow when grain stocks are low through drought. These millets are grown mainly by the Tribals. In Bangladesh, temporary islands are left when the floods subside--these are exploited with short-term Panicum millet. Millets, India (75-0072, 82-0187) supports work on Proso, Italian, Little millet, Barnyard millet, and Kudu (Paspalum) millet at five centres.

Millets, Bangladesh (79-0140) is concerned with Proso (Panicum) and Italian (Setaria) millets.

The last project in the cereals group was Barley Improvement, Turkey (78-0042). This will not be pursued further.

Crops of Special Situations

In the High Andes, the Altiplano, there is an interesting group of very old crops, grown in an old agricultural system. A Chenopodium, Quinua, is used as a cereal. The white grain types are most acceptable, others contain saponins, and are less palatable to both birds and people, a parallel situation to that with tannins in sorghum. Quinua, Bolivia (76-0078, 80-0115) has made good progress in developing improved lines of this crop. Quinua Introduction, Colombia (78-0107) explored the possibility of developing this crop in Colombia. Andean Crops (78-0133, 82-0091) Peru supported work on a whole series of crops in the Quinua type agriculture - faba beans, lupins, potatoes and a few other fascinating root crops. Another difficult area in Latin America is the Northern Pacific side of the isthmus, Guatamala, El Salvador, Honduras, and Nicaragua, where rainfall distributions are very irregular. In Drought Resistant Crops, CATIE (78-0046, 82-0092) IDRC supports testing and screening of crops such as maize, beans, cowpea, linseed, and sesame, together with appropriate management practices. The work is being done under the Centro Agronomics Tropical de Investigacion y Ensenanza (CATIE).

Oilseeds

Oilseeds are important in the diet of the developing world, but relatively little work has been done on several essentially subsistence oilseed crops. A project on sesame in Israel (73-0143) attempted to obtain useful indehiscent types through mutation breeding. Four projects were then developed through India, Sesame (75-0098, 82-0062) at Vriddhachalam in Tamil Nadu, Safflower (750097, 82-0061) at Indore in Madhya Pradesh, Mustard (75-0114, 82-0059) at Hissar in Hariyana, and Rapeseed (75-0032, 82-0060) at Pantnagar, Himachal

Pradesh. Although approved in 1975, the money was not appropriated until 1978. Oilseeds, Egypt (78-0044, 81-0117) supports work on sesame, sunflower, groundnuts, and rapeseed. Oilseeds, Sri Lanka (79-0104) has concentrated on sesame and groundnuts. Two projects were developed in Ethiopia, Highland Oil Crops Improvement (80-0131) on niger, linseed, Ethiopian mustard and sunflower: and Lowland Oil Crops Improvement (82-0096) on sesame, safflower, castor and groundnuts. An oilseeds advisor was located in Ethiopia to act as network coordinator for this whole group of projects (Oilseeds Network (Ethiopia) 80-0131).

Bananas

A crop important to many small cultivators in the higher rainfall zones is the banana/plantain. Plantains (Cameroon) (78-0039, 83-0022) supports the identification of improved cultivars, cultivation methods and marketing for small-scale producers.

Miscellaneous

IDRC has provided support to several IARCs to help them to get their programmes started. Such help was given to ICRISAT (72-0086), ILCA (73-0061) ILRAD (73-0062) and ICARDA (74-0138).

Animal Sciences

The Animal Sciences programme saw the greatest need as the improvement of food supplies for livestock, with almost the whole emphasis on ruminants. There were two projects on diseases, and none on livestock breeding. The disease projects were (a) Trypanosomiasis, East Africa (73-0101, 74-0163), with the East African Veterinary Research Organisation (now defunct) on control of this disease and (b) Bovine Diseases, Guelph (73-0113, 75-0040).

Pastures

The first project was Pasture Legumes, Caribbean (71-0006, 75-0002, 77-0007). The project was with the University of the West Indies in Trinidad, and aimed to improve the productivity of native pastures through the incorporation of legumes, using imported exotic, locally established exotic, or endemic legumes. Pasture Legumes, Belize (76-0131, 79-0003, 81-0132) followed similar lines, with stress on local collections of legumes. Some grass introduction was also included. Attention was given to seed production, and to pasture management. Evaluation was done through measuring the liveweight gain of the grazing animal. Pasture Legumes, ICARDA (77-0125) was also concerned with grass-legume mixtures, using local and exotic legumes. Pasture Legumes, Panama (78-0032) had a similar programme and also gave attention to pigeon pea and Leucaena used in conjunction with Hyparrhenia rufa. Pasture Development, Chile (78-0036, 81-0115) obtained and evaluated grass legume mixtures, and also looked at forage conservation techniques and the use of by-products. Pasture Management, Mexico (75-0042, 78-0135) developed improved systems of forage production using crops such as sorghum, sudangrass and sunflower. Pasture Management, Peru (76-0144, 80-0058) faced the need for greatly increased pasture production in the High Andes. Grass-legume mixtures and their management were studied as in the other projects of this group, as well as supplementary forage species.

By-Products

Programme Officer shortage during the early years resulted in most of the project being in Latin America, but the By-Products series covered a wider area. These projects were concerned with evaluating and utilizing local agricultural by-products for ruminant or poultry feed. They were located in Guatamala (72-0115, 74-0143), Mexico (73-0139, 76-0064), Egypt (76-0074), Bali (77-0087), Sudan (77-0088, 83-0110) and Kenya (78-0031). There was also a project in Egypt on summer forage (76-0075). A project in Thailand looked at the use of lignocellulolytic fungi for degrading lignin in feeds (79-0137, 82-0137).

Production Systems

The first Animal Production System project was with CATIE (75-0090, 79-0047). A crops/livestock farm was established (a module) with pastures, the commonly cultivated food crops, and a herd of dual purpose cattle. Amazonian Production Systems, Peru (78-0035, 83-0119) attempted to increase livestock production in the Amazonian region using grass/legume pastures, silage, disease prevention and good management,

Dairy Beef Feeding Systems, Panama (77-0046) aimed to double the stocking rate on the existing pasture using silage and by-products.

Lastly, Native Swine, El Salvador (78-0058) was intended to study present local management systems, to evaluate potential feeds, and to develop low-cost practical feeding systems superior to those currently in use by the farmer.

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Ottawa June 1985