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COLECCION HISTORICA

THE STAGE OF DEVELOPMENT OF THE REGIONAL PROGRAMME
ON BEANS IN EASTERN AFRICA(1)

(2)
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The Eastern Africa Regional Bean Programme started in 1985 with the posting of one CIAT scientist, but only became fully operational last year. The region consists of Ethiopia, Somalia and Uganda, with Kenya as a participant in some, but not all, components of the programme.

Organisation of the Programme

As is also the case with the other regional bean programmes in Africa, which cover the Great Lakes Region and Southern Africa, the Eastern Africa programme aims to support national efforts on beans particularly in three areas : genetic improvement, the development of more productive cropping systems and practices, and the training of staff.

Four positions for regional scientists are included in the funding provided to CIAT's Eastern Africa Programme by the United States Agency for International Development and by the Canadian International Development Agency. These positions are: Coordinator/Agronomist, based in Ethiopia; Agronomist and Breeder, both based at Kawanda in Uganda; and an Agricultural Economist to be based at Arusha, Tanzania. Recruitment for the latter two positions is not yet completed.

Each regional scientist is assigned by agreement to work with a host national programme while retaining regional responsibilities. The economist will work across regional boundaries as part of an overall CIAT strategy to provide efficient interdisciplinary support to national programmes without unnecessary duplication (a single entomologist position is similarly included under the Southern Africa

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programme). This decentralised mode of staffing is felt to be particularly appropriate to Eastern Africa, where national programmes are generally more developed than elsewhere in Africa. Table 1 gives approximate staffing of two national programmes.

Table 1 Time spent by Researchers on Beans in Selected National Programmes

	(a)			
	Ethiopia		Uganda	
	Postgraduate Degree	Graduate Degree	Postgraduate Degree	Graduate Degree
Breeding	1.0	1.0	2	1
Agronomy	1.0	0.5	0	2
Pathology	0.5	0.8	2	0
Entomology	1.0	0.3	0	1
Socioeconomics	0	0.8	0	0

Note (a): The number of researchers engaged on bean research in Ethiopia is much higher than these numbers indicate, as all disciplines except breeding work across several crops.

The activities of the regional programme are planned and monitored by a steering committee that now meets once per year (more frequent meetings were useful during the formative stages). This committee is composed of the national bean research coordinator or team leader from each of the four countries, CIAT's regional coordinator and a representative of each donor organisation.

The general functions of the steering committee are to guide CIAT in its implementation of support functions and to set priorities for the region. Specific topics that require agreement within the committee include strategies and plans for implementing the following activities:

- Selection of research priorities with regional application;
- Regional germplasm movements, nurseries, etc.
- Regional training programme;
- Organisation of workshops and monitoring tours;
- Identification of regional needs for consultancy services from CIAT, from within the region or from elsewhere;

- Annual work plan covering all the above (submitted in draft by the regional coordinator);
- Allocation of financial resources where discretion is provided within the budget; i.e. for collaborative research subprojects, capital equipment for national programmes, training and workshops.

Research Activities

In order to encourage the strengthening of national programmes that are more likely to remain effective after the withdrawal of external support, the Eastern Africa regional programme does not run separate field trials. Instead, every effort is made to support national teams in conceptualising, planning and carrying out field research for which each national team retains the responsibility and the credit for its achievements. However, the collation and interpretation of results across the region is a particular function of the regional programme.

a) Germplasm

As a short-term strategy, the African Bean Yield and Adaptation Nursery (AFBYAN) was assembled from released varieties or the most promising advanced material offered by national programmes in Eastern, Central and Southern Africa. Initial sets were distributed from Rwanda to Ethiopia and Uganda for evaluation at one key site in 1986. Simultaneous multiplication of seed has permitted multilocational testing within countries in 1987. The highest yielding varieties in Uganda have included several introduced from the Great Lakes region: Urubonobono, Rubona-5 and Nain de Kyondo.

In the case of Uganda, local scientists visited Rwerere and made selections from the Rwanda programme material. This material is now being developed for the south-western part of the country, which is ecologically similar to northern Rwanda. A further approach to revitalizing Uganda's ability to quickly identify new varieties for farmers has been the crossing at CIAT of K20, a variety released by the Uganda programme in 1968, with sources of resistance to diseases that have been its principal limitation.

To expand national germplasm resources for further improvement in the medium term, Ethiopia conducted a preliminary evaluation in 1986 of some 1200 lines (in unreplicated rows) which sample the range of diversity available in the CIAT germplasm bank. Some materials already appear promising and have been advanced within the national system, while the increased seed was evaluated in two other agroecological zones in 1987. Uganda is now following a similar approach with the same set of materials. Further introductions from the world collection are expected to be focussed upon sources that are already proving to be well adapted to local conditions. These two countries are also now making use of annual introductions of suitable grain types from the CIAT VEF nurseries, as well as specialised nurseries

for disease resistance.

In the smaller grain legume programme of Somalia, a much smaller set of materials has been introduced this year, using the primary criterion of adaptation to other hot, dry regions of the world. Both CIAT's WANABAN nursery and selections from the germplasm bank are included.

On-farm testing of bean varieties started in Ethiopia in 1986 and in Uganda in 1987. In each case, simple trials compare three or four selections from previous multilocation trials with farmers' varieties under management provided by the farmer. Up to 15 farms are used in each area, and plot sizes from 50 to 100 m² with one or two replications per farm are employed. A separate series of varieties is tested for each area. As part of the Ethiopian crop is destined to be canned, the trial of white peabeans has been evaluated also for canning quality in collaboration with Michigan State University, USA.

It is expected that Ethiopia and Uganda will soon be in a position to release their first new varieties of beans for more than ten years.

b) On-farm research

The past two years have been marked by a considerable improvement in understanding of farmers' constraints in bean production. As a consequence, several adjustments have been made in research priorities and in evaluation criteria. However, the institutional arrangements have been different in each country.

Diagnoses of bean research needs in Ethiopia have relied heavily upon the results of general surveys of farming systems in selected areas, followed immediately by on-farm trials of promising new varieties. The latter type of trial has provided additional opportunity to understand farmers' management practices. In the low-rainfall area of the Rift Valley, where beans are the principal cash crop, lack of weeding is the main factor limiting yields of beans. This is now seen to be due to labour shortage related to weeding of the staple cereal, teff (*Eragrostis tef*). Allowing farmers themselves to sow the first on-farm trials quickly revealed that they try to compensate for failure to weed beans by broadcast seeding at a rate higher than the recommended one (derived, of course, under weed-free conditions on the research station). Plant densities of up to 750,000 per hectare have been recorded, although this is exceptional.

With this knowledge, extension recommendations for planting in rows have been abandoned, at least until such time as a simple ox-drawn inter-row cultivator is developed. An on-farm agronomy trial is

now in progress to determine whether adequate control of weeds might be achieved through changing to a bush bean variety having a more vigorous growth habit, or to even higher planting densities with an upright type. Meanwhile, a more specialised survey focussed upon bean production has been conducted very recently, which has among its objectives the decision on whether or not to invest in herbicide research.

The above example of diagnostic research in Ethiopia involves staff of three departments of the Institute of Agricultural Research. The Farming Systems and Agricultural Economics Department is primarily responsible for conducting both the general and the specialised surveys and the on-farm variety trials; the Agronomy Department is responsible for the weeding x genotype x seeding rate trials; and the Lowland Pulses (Breeding) Programme participated in the design of trials and surveys and identified the variety treatments. Coordination in planning is provided by the management of the Nazret station which is responsible for research in the Rift Valley zone.

In Uganda, on the other hand, there is no farming systems programme. Diagnostic work has been started by the Bean Programme, which includes several disciplines, with a survey in the important bean-producing area of Kabale district in south-west Uganda. As in similar areas of Ethiopia (1750 - 2100 metres altitude with good rainfall), intercropping beans with sorghum is common. Diseases are a major constraint, either directly or through causing susceptible varieties to be planted later than optimal for yield, in order to avoid the wet season. This is the only area of the Eastern Africa region where varietal mixtures are commonly grown, and farmers were able to identify advantages and disadvantages for each component. Generally advantageous characteristics of a variety included yield stability (i.e. disease resistance), large seeds which are easier and quicker to shell from green pods, "sweet" taste, early maturity, colour other than black, fast cooking time, and erect plant habit.

Agronomy research for this area needs to be focussed on maintaining and improving soil fertility. Uganda's present emphasis on breeding for disease resistance has been confirmed as correct, while a new area requiring research is the control of bruchids in storage.

It may be noted here that in neither country has use been made so far of multi-factorial diagnostic trials. The surveys and farmer-managed variety trials have already provided what is felt to be an adequate working assessment of farmers' constraints, to permit the focussing of available research resources. The Ethiopian on-farm trial of weeding x genotype x seeding rate is partially exploratory in nature, in that its results could feed back new criteria for the selection of varieties in the future.

c) Agronomy

Besides the exploratory research in progress in Ethiopia related to overcoming the primary constraint of weed competition in the Rift Valley, the other active area of bean agronomy is the intensification of cropping systems in the wetter, cooler areas of highland Ethiopia. Double cropping, relay cropping or simultaneous intercropping of beans with either sorghum or maize is being investigated at the stations of Awassa, Bako and Jimma. In the more densely populated area around Awassa intensive relay cropping of certain crops into maize is practiced, sometimes with stripping of lower leaves from the maize.

Elsewhere, associated cropping may be less attractive to farmers than the favourable land equivalent ratios appear to suggest. An on-farm trial in the Bako area of western Ethiopia is now looking at the feasibility of broadcasting beans into maize at the time of weeding with an ox-drawn implement. There are plans also to investigate climbing beans as a maize intercrop. However, this will require first of all the introduction and screening of climbing varieties that are very much earlier in maturity than the local types, which are grown traditionally on fences around the homestead.

d) Regional Collaborative Research

Three regional subprojects were approved by the steering committee during 1987, all on topics of bean pathology:

- bean rust (researcher: Mr Habtu Assefa, Ethiopia);
- anthracnose (coresearchers: Mrs Beatrice Male-Kayiwa and Mrs Theresa Sengooba, Uganda);
- common bacterial blight (coresearchers: Mrs Sophy Musaana and Mrs Fina Opio, Uganda).

All these projects include assessments of crop losses, screening of germplasm and investigations on epidemiology. Coordination with researchers in the Great Lakes region will be especially important in the studies on anthracnose and CBB.

Another area of coincidence between research projects in the Great Lakes and in Eastern Africa concerns the beanfly. Mr Tsedeke Abate is presently conducting his PhD research in Ethiopia on the management of this insect pest. His programme includes screening of germplasm for resistance, evaluations of seed dressings, and a study of beanfly ecology. He had worked earlier on maize/bean trap cropping for Heliothis control.

A Ugandan entomologist will soon start MSc coursework in Tanzania on other aspects of beanfly.

Training

a) National Training Courses

The following training courses have been conducted in Eastern Africa:

(i) Ethiopian bean research technicians:

A two-week course was arranged at Melkassa in August 1987 for 17 research technicians from seven research locations. Resource persons were drawn from CIAT Eastern and Southern Africa programmes and from the Institute for Agricultural Research (IAR), Ethiopia. This course focussed on field research methods, with alternating sessions of theory and practice.

(ii) Uganda course for research technicians:

A similarly organised two-week course held at Mukono, Uganda, in June 1987 for 19 research technicians and recent graduates from the Uganda bean programme and two technicians from Somalia's grain legume programme.

(iii) Ethiopia course for research agronomists:

A two-week course conducted at Nazret in February 1987 for 50 graduate agronomists, conducted and sponsored jointly by IAR, CIMMYT and CIAT. This course was concerned with the design and analysis of agronomy trials.

Other training courses within the region are envisaged. A course on Weed Management Principles and Methods has been approved for Uganda for 1988.

b) Individual Training for Visiting Scientists

Several breeders and pathologists from national programmes of the region have spent periods of two to four months at CIAT. Working directly with CIAT staff, visiting scientists can update their techniques where necessary, and acquire new techniques for specialised applications. Two or three scientists from Eastern Africa can be taken in one year, in response to specific requests related to a defined need in a particular national programme.

In view of the expense and limited range of relevance for Africa of training at CIAT headquarters, there are no plans to expand this activity beyond its present level.

c) Academic Training

The regional programme has received funds for a number of post-graduate scholarships. These scholarships are available to scientists of all disciplines important to the improvement to bean production, in accordance with each national programme's priorities, following approval by the steering committee.

Scholarships are tenable at local universities or at other universities in the region or overseas. Thesis research conducted locally and on relevant issues is encouraged, and CIAT's dispersion of regional scientists in a range of disciplines to five locations in Africa increases the opportunities for local supervision.

At present, a Ugandan bean entomologist is undertaking coursework towards an MSc degree at Sokoine University of Agriculture in Tanzania, and thesis research will probably be conducted in association with the SADCC/CIAT Southern Africa programme. An Ethiopian entomologist is conducting research towards a PhD degree from Simon Fraser University, Canada, on the management of beanfly in Ethiopia. A Uganda agronomist is studying for her MS degree at the University of Florida, USA.

Regional Workshop

The first regional workshop on bean research in Eastern Africa was held in Uganda in June, 1987. Thirty-three participants from a wide range of disciplines took part, and included representatives from Rwanda and Tanzania, countries that immediately adjoin this region.

Conclusion

The complementarity of much of the bean research in Eastern Africa and in other regions of Africa should be evident to researchers from other parts of the continent. This is especially true, for example, between Uganda, Rwanda and Zaire due to their common borders and similar ecological zones.

Until now the benefits of collaboration on bean research between regions have been mostly in favour of Eastern Africa, due to the more advanced stage of collaboration within the Great Lakes Region. This is now a rapidly growing potential for reciprocal benefits, which the regional programmes are ready to encourage.