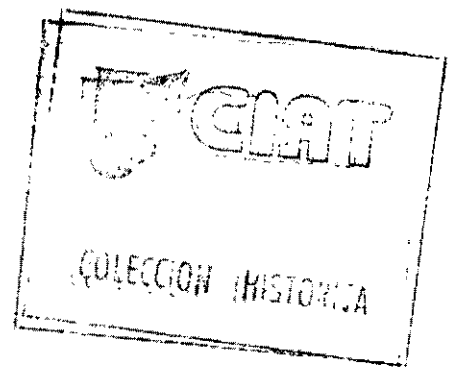
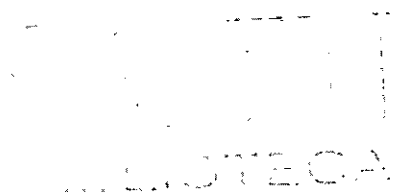


FOURTEENTH MEETING

HELD AT MBABANE, SWAZILAND

24-26 NOVEMBER 1993



CONTENTS

SADC/CIAT REGIONAL PROGRAMME ON BEANS IN SOUTHERN AFRICA

MINUTES OF THE FOURTEENTH MEETING OF THE STEERING COMMITTEE

Held at Mbabane, Swaziland, 24-26 November 1993

Those present:

Ms. Zodwa Mamba, Malkerns Research Station, P.O. Box 4, Malkerns, Swaziland. (Lady Chairman).

Mr. Lefa Thamae, Maseru Research Station, P.O. Box 829, Maseru 100, Lesotho.

Dr. Roland Chirwa, Chitedze Reseach Station, P.O. Box 158, Lilongwe, Malawi.

Ms. Marcela Libombo, INIA, C. P. 3658, Mavalane, Maputo, Mozambique.

Dr. Clemence Mushi, Lyamungu Agricultural Research Institute, P.O. Box 3004, Moshi, Tanzania.

Dr. Joyce Mulila-Mitti, Mount Makulu Research Station, P. Bag 7, Chilanga, Zambia.

Mr. Augustine Gubba (representing Dr. Olivia Mukoko), Department of Research and Specialist Services, P.O. Box 8100, Causeway, Harare, Zimbabwe.

Dr Martin Kyomo, Director, SACCAR, P.B. 00108, Gaborone, Botswana. (part of meeting only)

Dr. Roger Kirkby, CIAT, P.O. Box 23294, Dar es Salaam, Tanzania. (Acting SADC/CIAT Regional Coordinator).

Dr. Andres Liebenberg, Grain Crops Institute, Private Bag X1251, Potchefstroom 2520, South Africa. (Observer). (Tel 27-14-82977211; Fax 27-14-82976572).

Absent:

Mr. Antonio Castame Francisco, IIAA, C.P. 2104, Luanda, Angola. (Tel 244-1-323235; Fax 244-1-321943; Telex 3322).

Dr. Seja Mmopi, Sebele Research Station, P.O. Box 0033, Gaborone, Botswana.

Mr. Louis van Coller, Ministry of Agriculture, Water and Rural Development, Private Bag 13184, Windhoek 9000, Namibia.

Ms. Heather Cameron, CIDA/SADC Programme, P.O. Box 2619, Harare, Zimbabwe.

1. Opening

Ms Zodwa Mamba, Lady Chairman, opened the meeting and welcomed Steering Committee (SC) members. She noted that the meeting was being held in the same location in consecutive years so as to facilitate communication with the SACCAR Board, who were meeting concurrently.

While seven countries were participating, Botswana had indicated that beans were not sufficiently important in that country to warrant its participation, and Angola was in the process of identifying a new coordinator following Mr Camarada's departure for PhD studies. SACCAR had encouraged the Coordinator to invite an observer from South Africa, and the Lady Chairman welcomed Dr Liebenberg to the meeting.

2. Minutes of the 13th SC Meeting

The following correction was made:

P.15, item 7 (iv): The variety reported by Zambia to be doing well (and now pre-released) was A 197, not A 176.

The Minutes were then proposed, and adopted, as a true and accurate record.

3. Matters arising from the Minutes

p.2, item 3 (4th paragraph): Kirkby drew attention to the SADC/ISNAR/ESAMI workplan for 1994, which includes regional and national training in research management and reporting.

p.3, item 3 (10th paragraph): The proposed regional course on advanced statistical and computing methods was held. However, only four participants arrived in Arusha, due to problems with passports and travel clearances. Mushi assessed the course as particularly valuable in introducing new software, but it could have been extended to two weeks. There remained an incompletely satisfied need in this area.

p.4, item 3 (4th paragraph): Editing of the proceedings of the 3rd Regional Workshop was in progress - this was the last chance to submit any outstanding manuscripts. The SC agreed that the proceedings of the Regional Planning Workshop be published.

p.4, item 3 (7th paragraph): Gubba acknowledged the assistance of South Africa's representative in equipment purchasing.

p.5, item 3 (2nd paragraph): Thamae confirmed that Lesotho had taken over from SADC/CIAT the responsibility for funding a bean technician.

p.5, item 3 (2nd paragraph): Mushi reported that Mattsen cookers have been manufactured in Tanzania. Distribution was agreed as follows: Lesotho/Mozambique/Swaziland - one each; Malawi/Zambia - two each. Others would go to Eastern Africa. Liebenberg

reported that South Africa no longer uses the Mattsen cooker due to problems with variability within samples; instead, a larger sample is cooked, and put through a sheer press to obtain texture. Mushi reported that variability can be controlled by testing three replicates; this is feasible if a technician is available. Liebenberg offered to arrange for South Africa's food technologist to visit Lesotho to assist in the cooker's initial use, or to carry out tests on their behalf. Tests of cooking time are important as several countries are making new varietal releases; exchange of results would be useful.

p.5, item 3 (3rd paragraph): Mamba reported that the computer had been maintained successfully.

p.9/10, item 5: Kirkby described the current recruitment for a regionally hired network coordinator for RESAPAC, the Great Lakes bean network, and drew attention to the position announcement. The coordinator, reporting directly to the regional Committee of [NARS] Directors, will take over responsibility for RESAPAC from mid 1995, after an overlap with the CIAT coordinator. CIAT will then revert to a solely technical role in support of the Network. Kirkby's invited discussion paper to the SADC Board on the role of NARS in networks management (see Appendix) outlined some options for the SADC network. In Eastern Africa, directors now met regularly to review bean (EABRN) and other networks, but without an institutional structure such as SADC.

p.11, item 5 (ii), 2nd paragraph: At last year's SACCAR Board meeting, Mulila-Mitti had been unable to represent the Network due to illness; Dr Edje had participated. Remarks on the regional programme had been complementary, without any new suggestions for its refunding.

p.11, item 5 (ii), 2nd paragraph: The SC passed a resolution noting with concern the lack in certain countries of any graduate research agronomist to work on beans, or indeed any other crop. SACCAR was urged to give priority in allocating its MSc scholarships to candidates endorsed by this Network (and others). A criterion for endorsement would be a thesis proposal that addressed a topic of regional priority. Members agreed to send names to the Coordinator, with a copy to the Lady Chairman, so that endorsements can be made to Prof. Chinene, Dean, University of Zambia. South African universities such as Natal might also offer an inexpensive option; although plant breeding is not well served with formal courses, research is usually permitted in the home country after an initial one-year residential period.

p.13, item 6 (iii): The BNF sub-project did not operate, for lack of a leader. Mulila-Mitti believed she had identified a suitable scientist; Kirkby to send background information. South Africa might extend its BNF work from other legumes to include beans, as part of adjusting to small farmers' needs.

p.17, item 7 (ix): All commitments to equipment purchases were completed. Mozambique's expressed need for a computer cannot be met unless a new source of funds is obtained.

4. Annual Report by Regional Coordinator

Kirkby presented his report (see Appendix) and also summarized discussions earlier in the week at the annual meeting of team leaders with the SACCAR Board. As bean research starts to achieve impact at the farm level, the SC and its individual members had an important responsibility in bringing to the attention of policy makers the returns from this investment (see Section 8).

Discussion focussed on the implications of bilateral projects for the operations of the regional network. Malawi expected its proposal to ODA to enable the national programme (NP) and CIAT to continue a strong breeding effort including coordination of the SAZBYT/SAZBEN regional nurseries, and Malawi to pay for its participation in network activities. The CIAT breeder position, proposed for inclusion in this project, would still be of benefit to the region, although regional travel would be reduced.

Zambia's new UNDP project should be able to cover sub-projects and SC participation, but provision was not made for outside travel by NP scientists. Several other countries may have possibilities for developing bilateral projects, and participation in regional network events should be built in.

5. Progress Reports by National Coordinators

Written reports, presented by all coordinators present, are reproduced as appendices.

(a) Lesotho. The varieties *Harold* and *Nodak* were released, the former being multiplied on 3 ha. Pinto types, such as *Nodak* which is particularly appreciated for its taste, are now well liked by consumers. However, consumer preferences need more investigation. Funds are inadequate for a full programme of farmer-managed trials. Several highly promising new materials were identified from the regional nursery (SAZBEN). Lesotho would like to evaluate climbing beans; Malawi agreed to send a nursery.

(b) Malawi. Bean research has been reorganised to reflect increased commitment by MOA's Department of Agricultural Research; a team under a national coordinator is being developed at Chitedze, while Bunda will be an important component of the NP. PVA 692 was released and 500 kg seed produced for decentralised on-farm multiplication; two local varieties were also released, under the continuing strategy of making a relatively large number of varieties available to farmers used to managing mixtures. More attention may be given to climbing types. Discussion of the bean price differential between Malawi and S.W. Tanzania led to the theory that transport difficulties might be responsible, but economic research could by worthwhile.

(c) Mozambique. Five widely cultivated varieties, plus a new release from South Africa renamed *INIA Zambezia*, were multiplied. INIA collaborates with World Vision and other NGOs for on-farm testing. In contrast to reports from other countries, the introduction of *Carioca* (as food aid) has not led to its

continued production. The suggestion was made that efficiency might be increased by using 3 seasons, adding a season of selection in the north between southern seasons.

(d) South Africa. A more detailed report had been invited for this first attendance. A dichotomy was reported in production systems of large-scale, commercial high-input producers, and the small, subsistence producers of beans, living mostly in Transvaal and Kwazulu. The latter grow speckled sugar types and obtain yields around 500 kg; special funding will be necessary to address their research needs, since current bean research is funded by the commercial sector. *Carioca* (A286) is popular because of its yield potential and disease resistance.

No work is done on BCMV since reliance is placed on I-gene resistance, and this disease is considered to be a research station phenomenon. Discussion turned on whether the risks involved in releasing varieties containing unprotected I-gene may have been overestimated in other southern latitude countries. Possibilities for network collaboration, assuming SA joins SADC soon, include collaboration (even merger) between the SAZBYT and SA's regional SARBEIN trials and monitoring; this should be discussed at the regional breeders workshop.

(e) Swaziland. The three released varieties have not reached farmers because of weather and manpower problems in off-season multiplication, and consequent inability to provide the seed company with the minimum 200 kg of seed. Farmers particularly want PVA 894 and A 286 (Carioca type); *Carioca* is in demand by sugar estates for their workers, and Zambia Seed Co. is selling it. The SC encouraged Swaziland to promote *Carioca*, starting with seed from Zambia; PC 256 has now been released in SA, and seed is available. As Swaziland now has no pathologist, Liebenberg offered help in identifying diseases by bringing his pathologist.

(f) Tanzania. The variety EP4-4 is a candidate for release in the Southern Highlands. Gallex, Stomp and Flex are recommended herbicides.

(g) Zambia. Seed of A 197, now prereleased, was multiplied by SADC/CIAT Malawi to supply on-farm trials. Zamseed continues to make money out of *Carioca*. ZPV 292 is the basis of much of the breeding programme. Research funding is now fully adequate under a Food Legumes Programme/UNDP project, but human resources have become more limiting. The national headquarters team moved to Golden Valley, where irrigation was available; increasing awareness of beans among commercial farmers would become an objective. The blackroot nursery for Africa was requested from CIAT/Uganda (import permit to be sent).

(h) Zimbabwe. Research scientists were also becoming temporarily scarce here: the agronomist left for PhD studies in Canada, and the virologist expected to do likewise in 1994.

6. Technical Advisory Reports From Working Group Meetings

The only pan-African working group which held its triennial meeting this year was that for Bean Entomology. Mushi, as participant, introduced the report of its second meeting, held in Harare from 20 to 22 September 1993 (see Appendix).

Revised recommendations on regional priorities, and for future allocation of budget, were noted. The SC recorded its appreciation of a valuable meeting and useful report.

7. Reports from Leaders of Research Sub-Projects

Annual progress and financial reports were submitted by all sub-projects except those on Drought (Malawi) and BNF (Malawi) - the latter being overdue by one year since the former leader had indicated an unused balance of US$ 5000 - and on Bruchids (Tanzania component); a financial report was lacking from BCMV (Zambia component). Kirkby was asked to write to these sub-project leaders.

Reports are reproduced as appendices (see also Section 10). The SC found the summary reporting format useful. Discussion comments appear below, in the sequence: Insect Pests/Diseases/Agronomic Constraints.

Bean Stem Maggot (Tanzania): A potentially useful technique, developed by the regional entomologist, was employed for improving natural infestation levels by spreader strips and staggered sowing of replicates. Present work suggested relatively simple inheritance of resistance, but a larger number of parents are to be used in the next stage. A regional nursery of F_6 materials was ready for distribution - agreed to send immediately to Malawi, Mozambique and Zambia.

Bruchids (Zimbabwe): A full technical report was also provided (not reproduced here). It was noted with satisfaction that a crossing service for incorporation of resistance to *Zabrotes* bruchid into elite varieties from other programmes is now available on request from the Tanzania component at SUA.

Anthracnose (Zambia): The problem of inadequate disease pressure might have been due to difficulties in monitoring a distant site; a new NP pathologist at Kasama could assist the leader.

Angular Leaf Spot (Swaziland): No work was carried out and funds remained intact; the pathologist was leaving for a regional coordination position. Communication among pathologists on pathogenic variation was important; Tanzania had a new but experienced pathologist proposing to start work on ALS, and SA had been looking at this aspect in SA and Malawi (but in future was likely to restrict work on this pathogen to resistance screening). Liebenbeg also reported that they had changed from V8 to PVA agar medium.

Bean Common Mosaic Virus (Tanzania): Zimbabwe had been unable to access the funds from Treasury, and there was no financial report on the Zambian component. The Entomology WG recommended that remaining problems were in the domain of virology. Work on wild hosts might be more productive if legume species were screened first for transmisibility, then focussing on those species around disease hotspots.

Common Bacterial Blight (Tanzania): The strong sub-project in Uganda was also noted; it distributed a nursery and offered a crossing service for improvement of other countries' varieties. SA reported using XAN 159 as a resistance source, noting however that a good seed scheme is needed for its maintenance.

Drought (Malawi): Besides there being no report, the SC noted that the Tanzania component had not received financial or germplasm support from Malawi.

Low Phosphorus (Tanzania): Mushi was asked to discuss with the leader a follow-up strategy that would give other countries access to promising lines (e.g. Swaziland expressed interest).

Cropping Systems (Zambia): A full technical report was also submitted (not reproduced here). Additional survey data was available in Swaziland and Tanzania (latter not analysed); these data should be sent to Zambia for processing. A regional meeting to discuss results and plan new research would be the next step.

BNF (Malawi): Mulila-Mitti anticipated a Zambian researcher being able to take over if unused funds were recovered from Malawi.

8. Assessment of Adoption and Impact of Bean Research

The importance of this agenda item was reinforced by the SACCAR Board session, and by the initiation of a new regional project under SACCAR on this topic.

The considered view of the SC was that work on beans, in most countries of this region, was too recent to expect many cases of widespread farm-level impact. However, at the present escalating rate of output of recommendations from research, considerable impact from national and regional research should be measurable within three years. Concern for achieving impact was reflected in the application of non-formal seed dissemination methods for new varieties, an area in which this Network already appeared to have more experience than most participants at a SADC/FAO On-Farm Seed Production Workshop being held concurrently in Mbabane.

The status of bean technology development in each country and of other benefits from regional collaboration was reviewed; the Coordinator's draft summary prepared for the SACCAR Board was updated (Table 1). The following three cases may warrant study now:

(a) Carioca variety use in Zambia: the published study required updating, especially for non-traditional areas. Central Province's rural sociologist should be able to do this.

(b) Nasaka variety use in Malawi, and the effectiveness of seed dissemination systems: issues arise also in trading and pricing policy. Assistance from CIAT's socio-economist was requested.

(c) Lyamungu 85 and 90 varieties, seed rate and weed control in Tanzania: a variety adoption study is already in progress, but needed extending to more areas (sub-project proposal).

Additionally, *seed dressing in Zambia* may soon provide a case, as input supply is starting; a baseline study would be useful.

9. Review of Regional Strategy and Technical Priorities

The extended CIDA Phase I would end on 31 March 1994. The SC agreed to adopt in principle the following five strategies, derived from the Regional Planning Workshop, as the revised objectives of the SADC Network:

- To strengthen national programmes;
- To strengthen a regional research and training network;
- Genetic improvement of beans;
- Improvement of cropping systems with beans;
- Development of a regional strategy for technology transfer.

The next meeting of the SC would develop a logical framework for the network, with indicators of performance. This timing would allow the SC to benefit from the the experience of the EABRN, and each member should arrive with a draft for the SADC Network. An extended meeting, up to five days, could be necessary.

The SC noted that all present sub-projects responded to topics of high regional priority, except for BCMV which was ranked No. 20 among the 42 significant technical constraints to bean production. The absence of any sub-project on the first-priority constraint of seed availability was also noted.

10. Prospects for Sustaining the Network

Review of Options

Regional activities had continued a year beyond the scheduled end of CIDA funding, due to conserving funds through a drastic cutback in SADC/CIAT staffing. Remaining staff were either already transferred to Eastern Africa funding, or were shortly expected to do so. A new regional project to support the collaborative research network was not currently in prospect.

The SC believed that the Network should establish its own identity. Alternative approaches would be needed to sustain the following, regarded as key components of the Network:

- Research sub-projects on regional priorities;
- Training;
- Communication of results, among scientists and to users;
- Monitoring and evaluation;
- Coordination of the above.

Members saw sub-projects as the core, without which a network would not be worthwhile. Bilateral projects, especially if developed by more countries in addition to Zambia and, hopefully, Malawi, may offer the best solution. Tanzania would develop a regional proposal for its new Agricultural Research Fund. Non-governmental organisations could be interested in seed dissemination. The SC suggested that SACCAR consider allocating some research grants preferentially to on-going sub-projects.

Funding would probably need to be sought separately for most activities. The prospect of future collaboration with South Africa could have implications for the SAZBYT regional trials. The FAO/SIDA Farming Systems Research Project based in Gaborone might be another source, although limited to Tanzania and Zambia.

Support for regional travel and workshops, so vital for strengthening collaboration around sub-projects, should be sought from SACCAR Travel Grants. Again, bilateral projects would enable countries to "buy into" network activities, and large activities such as the planned 4th SADC Bean Workshop might require several funding sources and eforts by all NCs. Savings in travel costs for the SC annual meeting could be made by holding it consecutively with meetings of other SADC/GLIP components. SACCAR scholarships should be made use of for long-term training needs.

The SC considered a regional coordinator to be essential to providing a focal point to an autonomous SADC Bean Network, through the following activities:

Coordination Needs of the Network

(a) Ensure effective communication:

- with NPs and sub-project leaders on implementation of specific activities;
- with National Coordinators on funding of each activity;
- with SACCAR on SADC grants;
- with CIAT Pan-Africa Coordinator on information and funding of other CIAT activities;
- with coordinators of other regional bean networks.

(b) Catalyse/facilitate germplasm exchange:

- within the region (SAZBYT, SAZBEN, SARBEIN, BSM, etc);
- across regions in Africa (ABDREN, ANSES, PADN, etc);
- with CIAT.

(c) Ensure regional workplan is implemented.

(d) Organise Steering Committee meetings.

(e) Organise regional workshops.

(f) Coordinate/assist host country on any short courses.

(g) Prepare and submit annual report to SACCAR.

In the absence of a regional project, the SC considered how it might ensure coordination. Even if several countries supported their own participation, a coordinator would require a communications budget. This led to an offer from Malawi, conditional upon approval of a bilateral proposal for bean research, to carry out coordination functions with its own funds. This generous offer appeared acceptable to the SC on a trial basis, particularly as Zambia expressed a willingness to assist.

Meeting with Director of SACCAR

At this point Dr Kyomo joined the meeting. The Lady Chairman expressed the Committee's appreciation for his taking the time from a very busy schedule during the SACCAR Board meeting. She summarized the discussions (above), which she said reflected the commitment of the Committee "to maintain what we have started"; the Committee requested that SACCAR look upon the Network's needs for postgraduate training, research funds and information exchange as priorities in allocating its scholarships and other awards.

The Director apologised for not having been able to meet the SC earlier due to his duties as Secretary to the Board. The Board viewed this Network as "a shining example, a true network that has built the capacity of national programmes to share, implement and monitor research".

Approaches had been made to potential donors - DANIDA, SDC, USAID and EEC - but to no avail. Also, the SPAAR Executive Secretary had received no reply to his submission to ADB. Dr Kyomo agreed that the SC's suggestions on travel and small research grants (SAREC-supported) were appropriate, and would present them to the Board the next day. IFS was another possible source of research grants, and he intended sharing with SAREC the SC's procedure for screening sub-project proposals, which had impressed the Board. He believed that SACCAR would be able to assist with certain activities. Giving preference in allocating scholarships, however, might be difficult as selection is determined primarily by universities. He would be prepared to solicit funds for a specific training course, and requested a budget and description of the regional workshop for possible direct support.

Dr Kyomo advised that SADC had informed South Africa that it is welcome to join, on equal terms with other members, as soon as a democratic government is elected. Technical collaboration could take place immediately and was already happening among universities and in conservation of genetic resources. However, expectations should not be excessive, since SA will need to invest heavily in redressing the balance in its own development.

This programme was not alone in encountering funding problems - the SADC Council of Ministers had had to make up for a shortfall following Finland's withdrawal. Science and technology generally were receiving increased attention within SADC, and African Presidents, meeting recently in Gaborone, agreed to increase investment in this sector from the present average of 0.3% GNP.

In responding to questions from the SC, the Director agreed to take to the Board the SC's wish to have one of their number as Coordinator, and the request for support for communications expenses. As BSc-level training is considered a national responsibility, diverting postgraduate scholarship funds for this purpose would be difficult; however, Swaziland's Training Council had a few regional scholarships at that level (not specifically for agriculture). Channelling new SACCAR donors towards beans was difficult as they usually had their own interests; SACCAR was looking to south-south collaboration to attract potential new donors. A write-up of the Network and the SC's strategy in the SACCAR Newsletter was encouraged.

[The following day Dr Kyomo indicated to Kirkby that the Board had indicated that some funds would be diverted if necessary from activities of lower priority, and requested a proposal for the year starting April 1994.]

Concluding Discussion

Following the departure of the Director, members expressed their appreciation to the Lady Chairman for her clear presentation of SC deliberations on this topic.

Referring to allocation of the local coordination role, Mushi raised the status of Tanzania's original nomination by SADC as regional leader in beans. In the light of Tanzania's facilities and experience, and proximity to CIAT's Pan-Africa Coordinator, he offered to take on this role.

During subsequent discussion of alternative options, Mushi indicated that Tanzania was unlikely to move away from SADC (to join EABRN), and that the invitation to apply for a Tanzania Agricultural Research Fund grant indicated a national concern for sustaining the Network. The question was raised as to whether Malawi or Tanzania was better placed to provide regional nurseries: Malawi seemed to offer advantages in broader ecological similarities, and a freedom from problems with plant quarantine.

The SC finally agreed to accept Tanzania's offer to provide general coordination and Malawi's to coordinate germplasm exchanges (see above, "Coordination Needs of the Network"). These decisions would be reviewed by the SC at its next annual meeting.

10. Regional Research Sub-Projects: Proposals for 1994

Applications for Renewals

The SC returned to its discussions on reports (Section 7) in cnsidering renewals. Significant credit balances were held by several sub-projects; some did not require additional funding for 1994, and a few had surplus funds available for reallocation. The Coordinator was instructed to recover balances of funds where appropriate.

New budgets approved for 1994 are shown in Table 2. The overall requirement for refunding those sub-projects scheduled to continue was between US$ 3,000-8,000 (depending on further data from the awaited financial reports).

New Proposals

SC decisions on eight new proposals are summarized in Table 2. The total approved cost of four sub-projects, accepted in principal since no funds are immediately available, was US$ 15,500. Notes on these, and on proposals not approved, appear below.

a) Impact Assessment - Lyamungu 85 (Tanzania): A one-year sub-project; rated high priority by the SC; approved without alteration.

b) Climbing Beans (Tanzania - two proposals, from Northern and Southern Highlands): Rated low priority due country specificity, most members believing that climbers do not have much potential further south in the region; not approved.

c) IPM for *Ootheca* (Tanzania): Rated a high priority topic, but only Parts I and II were approved for the first year, at a reduced budget.

d) Farmer Participation in Cultivar Evaluation (Tanzania): Received a high rating because FPR techniques require more development and use in the Network; approved at a reduced budget.

e) Clean Seed Production (Malawi): The original proposal, entitled Winter Production Technology, was felt to be to country-specific, but the SC welcomed the idea of a service project in an irrigable dry-season location that would produce clean seed on request from breeders, on-farm researchers or extension/seed agencies; approved at a slightly reduced budget.

f) Tolerance to Low-P Soils for Tea/Bean Intercropping (Malawi): Rated medium priority for the region, and not approved for Network support because it should be easier for the Tea industry to do so.

g) Regional Crossing using ICA Pijao and Others (Mozambique): The SC accepted Malawi's offer to undertake this work within its bilateral efforts.

11. Regional Workplan and Budget

These were developed collaboratively, and is attached with these Minutes. Discussion points were as follows:

SA would be an attractive venue for 4th SADC Bean Workshop; Liebenberg offered to investigate if SA had by then joined SADC. On cost considerations, however, it was felt preferable to hold this activity back-to-back with the breeders working group meeting and the next SC meeting, in Malawi.

If priorities had to be made among these three events planned for Lilongwe, the regional workshop could be postponed for a year.

Lesotho's request for assistance with labour costs for trials (very high due to competition from SA) might better be approached within a sub-project that Mrs Pomela was encouraged to prepare after completing her PhD.

A small fund for assistance in national seed production was approved in principle. Lesotho, Swaziland and others now embarking on dissemination of new varieties were encouraged to use non-formal approaches - distribution of small packets to large numbers of farmers (not the reverse!) at a cost that ensures contination of seed production. Even on-farm testing could be achieved inexpensively. Two regional activities would attempt to address experiences with these methods.

12. Next Meeting

The next annual meeting of the SC was set for September 1994, in Lilongwe to facilitate participation of members in other regional events.

Table 1. BEAN TECHNOLOGY AND INFORMATION FOR FARMERS AND POLICY MAKERS

A. Country-Specific Results

Country	Recommended to Farmers	Restricted Availability	Very Promising for Future
Angola			
Botswana	N O	B E A N	R E S E A R C H
Lesotho	Introduced cvs:Harold,Nodak		Introduced AND lines, and Malawi landraces.
Malawi	3 cvs: local selection (1), bred from local (1), introduction PVA 692		Several introduced lines
Mozambique	Introduced cv: Carioca Local cvs:INIA-10, Encarnado	3 introduced cvs: PVA 773, Diacol Calima,INIA-Zambeze Also local cv: ENS-2.	
Namibia	B E A N	R E S E A R C H	R E C E N T
Swaziland	Introduced cvs: BAT 1713; PVA 894; Carioca		
Tanzania	Introduced cvs: Lyamungu 85 | Lyamungu 90; Uyole 84 & 90 | Local cv: Ilomba. Herbicides: Flex,Galex,Stomp.	Introduced cvs: EP4-4, SUA 90, PVAD 1156 Hedgerow macro-contours	1 local cv. Introduced cv: G 8864. IPM against stem maggot.
Zambia	Introduced cv: Carioca Stem Maggot - seed dressing	Introduced cvs: A 197, PAT 10.	2 local cvs: Sulwezi Rose, ZPV 292; also Introductions
Zimbabwe	Introd. cvs:Ex-Rico 23; C20. Bruchid control: silica dust and sun drying. Plant population.	Introduced cv:H1401-Z2PE	Introduced lines: MCM 5001 and others

B. Immediate Potential Application by All Countries

1. Non-formal, farmer-based seed systems for disseminating new varieties (functioning in Tanzania, already started in Malawi). Elements: small-scale farmers are prepared to pay well above food prices to obtain new varieties; make seed available in small packs (e.g.1kg); use NGOs for decentralised multiplication seed release procedures for non-formal systems should encourage many cvs.

2. Intensification through climbing bean systems - new varieties plus intercropping or staking (developed and widely adopted in Great Lakes region); great potential in higher rainfall, densely populated areas of Tanzania, Zambia, Malawi, Mozambique.

3. Seed Treatment against Bean Stem Maggot (developed in Zambia, transferred and adopted in many other countries.

4. Fertilizer requirement diagnosis by the DRIS method, for improved precision and efficiency (developed in Eastern Africa).

5. Regional sub-projects offer a crossing service to improve elite varieties at request of other countries: resistance to bruchids and stem maggot (Tanzania) and other specific crossing (Malawi).

6. Goal-Oriented Participatory Planning (GOPP) continues to prove its value in the Bean Networks. Greater use could be made of the technique within NARS at the commodity and zonal levels.

Table 2. REGIONAL RESEARCH SUB-PROJECTS, 1994

Title	Country	Leader	Institution	Balance Unused 1993	Approved 1994	Additional funds required	Budget notes
Diseases							
Angular Leafspot	SD	J.Teri	Univ., Luyengo	4500	0	(4500)	Return and redistribute balance.
	TZ	F.Ngulu	DRT Lyamungu	-	2000	2000 [2]	Conditional upon adequate proposal.
Anthracnose	ZA	C.Haciwa	Univ Zambia	3570	2570	(1000)	Transfer 1000 to BNF (Zambia)
	TZ	F.Mwalyego	DRT Uyole	-	1500	1500 [2]	Workplan/Budget required.
Bean Common Mosaic Virus (BCMV)							
- Strains	TZ	A.F.Lana	SUA Morogoro	50	800	750	
- Breeding	ZW	O.Mukoko	DRSS Harare	2000	2500	500	
- Wild Hosts	ZW	A.Gubba	DRSS Harare	1500	2000	500	
- Vector	ZA	P.H.Sohati	DAR Msekera	?	800	?	Financial report required.
Common Bacterial Blight (CBB)	TZ	R.Mabagala	SUA Morogoro	2120	2120	0	
	MW	?	?	-	1750	1750 [2]	Proposal/Workplan/Budget required.
	ZW	?	?	-	1750	1750 [2]	" " " " .
Insect Pests							
Bean Stem Maggot - Resistance	TZ	C.S.Mushi	DRT Lyamungu	2350	4000	1650	
Bruchids - Species, IPM	ZW	D.P.Giga	Univ Zimbabwe	4450	4450	0	
- Resistance Breeding	TZ	S.Nchimbi-Msolla	SUA Morogoro	?	?	0	Reports required; balance remaining from US$ 1500 to be used for 1994.
Integrated Pest Management - Ootheca	TZ	S.Slumpa	DRT Lyamungu	-	4000	4000 [1]	Only Parts I+2 approved.
Crop Management and Abiotic Stresses							
Biological Nitrogen Fixation (BNF)	MW	N.Lupwayi	Univ., Bunda	?	-	0	Reports required; transfer balance.
	ZA	?	?	-	1000	1000 [2]	Proposal required; funds from Anthracnose (Zambia).
Cropping Systems	ZA	G.A.Mitti	DAR Msekera	1450	1450	0	To organise planning meeting.
Drought	MW	A.B.Mkandawire	Univ., Bunda	?	-	0	Reports required; transfer balance.
	TZ	C.Madata	DRT Uyole	-	2000	2000 [2]	Workplan/budget required; funds from Malawi component.
Low Phosphorus Soils	TZ	I.K.Kullaya	DRT Lyamungu	1680	1680	0	

Table 2. (continued)

Title	Country	Leader	Institution	Balance Unused 1993	Approved 1994	Additional funds required	Budget notes
Socio-Economic Aspects							
Farmer Participation in Cultivar Dev.	TZ	M.Mkuchu/C.Madata	DRT Uyole	-	2000	2000 [1]	
Clean Seed Production	MW	R.Chirwa	DAR Chitedze	-	2000	2000 [1]	To provide service on request.
Impact Assessment - Lyamungu 85	TZ	P.A.Ndakidemi	DRT Lyamungu	-	7500	7500 [1]	One year project only.

Notes:

[1] New proposals received and approved at this meeting.
[2] New funding approved in principle, but proposal procedures not complete.

SADC BEAN RESEARCH NETWORK

WORKPLAN AND BUDGET FOR 1994

Developed by Steering Committee, 24-26 November 1993

Objective 1: To strengthen national programmes

1.1 National planning for bean research and development

1.1.1 Swaziland Planning Workshop
May 1994? Swaziland to organise, and seek national/bilateral funding. CIAT resource persons available from own travel budgets.

1.1.2 Publication of Malawi/Zambia planning workshops
Production/distribution of these workshops encouraged, using national resources.

1.2 Training

1.2.1 CIAT Multidisciplinary Course
For graduate bean breeders/crop protection researchers.
4 Apr-27 May. First month at Egerton, Kenya; second month at Arusha (entomology), Kawanda (breeding) and Rubona (pathology).
7 participants: Zambia (2 - bre/path), Lesotho/Mozambique/ Tanzania (1 breeder each), Malawi/Zimbabwe (1 path each).
Cost per participant: US$ 5000.

Training: US$ 35,000

1.2.2 Visiting scientists at CIAT, Colombia
Supervised individual study visit for 3-4 weeks, Apr/May.
3 participants: Malawi's national coordinator/breeder, Tanzania pathologist, Zimbabwe sub-project leader for bruchid research.
Cost: US$ 5000 each.

Training: US$ 15,000

1.2.3 Crop Management Research Training (CMRT)
6-month course at Egerton University, Kenya in collaboration with CIMMYT/KARI and CIAT. 6-month course starts 2 February.
Cost: US$ 8,000 each. 1 participant from Swaziland.
(To apply direct, no network support)

1.2.4 Regional study visit
Swaziland food scientist to programmes at Nazreth, Ethiopia and Katumani, Kenya.

Training: US$ 2,000

1.2.5 Postgraduate scholarships

a. Swaziland - entomologist continuing but requires refunding after completion of present support.
   - present commitments of SADC/CIAT: US$ 3,500
   - further support will require partial scholarship

b. New scholarships needed for : Malawi/Tanzania/Zambia (2 each), Mozambique/Swaziland (1 each).
JM-M to obtain and distribute forms for SACCAR scholarships, applications to specify thesis title corresponding to regional priorities (Malawi regional planning workshop), copy to CM, who will endorse to SACCAR on behalf of Network.

Scholarships: Total = 8

1.2.6 Training materials

Complete production/distribution of the following:
Field Pests and Diseases in Africa (audio-tutorial)
Conducting On-Farm Experiments (manual)
A Training Manual for Bean Research (manual)

SADC/CIAT Budget: US$ 3,000

Objective 2: To reinforce the SADC Bean Research Network

2.1 Network coordination

2.1.1 SADC Steering Committee Annual Meeting

Lilongwe. Five days in September.
11 participants.

Steering Committee: US$ 15,000

2.1.2 Coordination by Tanzania National Coordinator

Communication expenses for Tanzania ($5,000) and $500 for each of 6 other countries.

Communications: US$ 8,000

2.2 Germplasm coordination and services

2.2.1 Coordination/facilitation of regional germplasm exchange

Malawi to assemble/produce/distribute/report on regional trials (SAZBEN/SAZBYT).

Regional Trials, Crossing & Seed: US$ 5,000

2.2.2 Regional crossing service for varietal improvement

Malawi to provide upon request.
(e.g. ICA Pijao x regional varieties requested by Mozambique).

Regional Trials, Crossing & Seed : US$ 4,000

2.3 Information exchange

2.3.1 SADC Bean Breeders Working Group Meeting

Lilongwe. Two days in September, back-to-back with 2-1 and 2-3.
10 participants.

Workshops: US$ 5,000

2.3.2 SADC Bean Research Conference

Lilongwe. Five days in September, back-to-back with 2-1 and 2-2.
40 participants.

Workshops US$ 25,000

2.3.3 Pan-Africa Working Group Meeting on Screening for Tolerance to Edaphic Stresses in Bean
Moshi or Kampala, 24-27 May.
Three participants, from Malawi/Tanzania/Zambia (collaborators in ANSES).

Workshops: US$ 1,500

2.3.4 Pan-Africa Working Group Meeting on Bacterial/Viral Diseases of Bean. Kampala, 23-26 May.
Two participants (leaders of BCMV and CBB Sub-Projects, currently from Tanzania), also South Africa if a SADC member.

Workshops: US$ 1,500

2.3.5 SADC Traveling Workshop on Bean Varieties On-Farm Testing Methods
Arusha/Kilimanjaro, Tanzania. 6-9 June.
10 participants.

Workshops: US$ 12,000

2.3.6 Pan-Africa Workshop on Bean Seed Production/Dissemination
Kampala. Four days in September.
One or two participants from each country having a case study to report (Malawi/Tanzania/Zambia).

Workshops: US$ 5,000

2.3.7 Monitoring Tour on Sugarcane/Bean Intercropping
Kenya/Uganda. Possibly in October.
Up to 4 participants from Malawi/Tanzania (preferably two each, from sugarcane and bean research).

Workshops: US$ 2,500

2.3.8 Publications on network research
Complete production/distribution of the following:

Proceedings Series	: Tanzania Planning Workshop
" "	: Regional Planning Workshop
Reprints Series	: Soil Nutrients (Lushoto)
Occasional Papers	: Bruchid Tour
" "	: BSM Training Course

SADC/CIAT Budget: US$ 10,000

2.4 Improve network planning/information systems

2.4.1 Develop a logical framework
A logical framework for the Network, specifying outputs and indicators of progress against the five objectives defined in the regional planning workshop, is to be developed by the Steering Committee at its 1994 meeting. Members to come with drafts prepared, using Eastern Africa framework as an example.

2.4.2 Develop a regional database
A database of national/regional activities and achievements is to be developed and installed with each national coordinator, who will be responsible for updating and exchanging information. Tanzania's Coordinator and CIAT to develop.

Objective 3: To improve yield and yield stability of bean varieties to be released by national programmes

3.1 Regional germplasm exchange and services

3.1.1 Regional trials and nurseries - see 2.2.1

3.1.2 Regional crossing service - see 2.2.2

3.2 Collaborative research sub-projects

3.2.1 Continuing sub-projects

Anthracnose (Zambia)
BCMV (Tanzania; also Zambia/Zimbabwe)
CBB (Tanzania)
Bean stem maggot (Tanzania)
Bruchids - breeding (Tanzania)

3.2.1 New sub-projects or additional components

Angular Leafspot (Tanzania)
Anthracnose (Tanzania)
CBB (Malawi/Zimbabwe components)

Total new funds required..... Sub-Projects US$ 5,700

Objective 4: To improve the productivity of cropping systems in which beans are produced

4.1 Collaborative research sub-projects

4.1.1 Continuing sub-projects

Bruchids - IPM (Zimbabwe)
Cropping systems (Zambia)
Low phosphorus (Tanzania)

4.1.2 New sub-projects or additional components

BNF (Zambia)
IPM for Ootheca (Tanzania)
Drought (Tanzania)

Total new funds required.....Sub-Projects US$ 7,000

Objective 5: To assist the transfer of new technology to bean producers

5.1 Seed production to achieve rapid impact

5.1.1 Production of initial quantities of breeders seed
Assist urgent non-formal dissemination of new varieties: Lesotho (2 cvs--$500), Malawi (2 cvs--$1000), Mozambique (5 cvs -$2000), Swaziland (3 cvs--$500), Tanzania (1 cv--$1000).
Regional Trials, Crossing $ Seed: US$ 5,000

5.2 Increase farmer participation in technology development

5.2.1 Introduce or encourage farmer-managed trials - see 2.3.5

5.3 Assess impact of bean research

5.3.1 New research sub-projects

Farmer participation in cultivar development (Tanzania)
Clean seed production (Malawi)
Impact assessment (Tanzania)

Total new funds required.....Sub-Projects US$ 11,500

BUDGET SUMMARY (US $)

Training	
- short courses	52,000
- materials, publications, scholarship	16,500 [1]
Workshops & Visits	52,500
Research	
- Sub-Projects	24,200
- Regional trials, crossing & seed	14,000
Coordination	
- Steering Committee	15,000
- Communications (Tanzania & others)	8,000
TOTAL	US $ 182,200 [2]

[1] items already committed and funding secured under SADC/CIAT

[2] total may be reduced by countries that fund activities using national/bilateral sources.

SADC/CIAT REGIONAL PROJECT ON BEANS IN SOUTHERN AFRICA

REPORT FOR 1993 TO THE SACCAR BOARD

Roger Kirkby, Acting Coordinator

ACHIEVEMENTS IN 1993

General

Survival of the Programme for 1993 was assured by a bridging fund from CIDA and by CIAT's decision to rapidly reduce its regional staffing at Arusha. From January 1993 support in agronomy and pathology has been provided, on a reduced level, by CIAT regional staff based in Eastern Africa and the Great Lakes. Regional coordination has been provided from Dar es Salaam by CIAT's pan-Africa coordinator, in an acting capacity. These resources, including associated travel costs, come from outside the SADC/CIAT budget.

The Steering Committee met in October 1992 to plan activities for the present year. The Committee has now met 13 times since 1987, and several members have earned PhD degrees during this period. Consequently, the group has matured considerably and was well able to make difficult decisions at that meeting concerning allocation of a reduced budget. Faced with an available budget of US$100,000 (excluding support for continuing postgraduate students), the Committee made the following allocations by broad categories: research sub-projects 45%; training in the region 10%; information exchange 16%; thesis supervision 7%; small equipment 7%; and Steering Committee meeting costs 15%. These allocations allowed for a Program of Work comprising a full portfolio of regional research sub-projects, accompanied by a reduced level of training, workshops and other activities.

The following report on accomplishment of activities during the past year is organised by sections that correspond to the Workplan approved by the Steering Committee. Where a scheduled activity has not been fully carried out, this is also mentioned. The set of Appendix tables gives more complete technical data.

PROGRAMME OBJECTIVE 1 : *To develop improved bean cultivars, in collaboration with national programmes (NPs).*

1.1. *Evaluation of new introductions of germplasm*

1.1.1. Introductions from CIAT

i) VEF 91 Nursery from CIAT

This nursury contained 114 bush lines originating from crosses, mostly of large-seeded Andean types. The material was planted in unreplicated observation plots at Bunda and Dedza. Performance of the top 15 entries in Malawi is given in (Appendix) Table A-1. The most outstanding line was CAL 143, having a high level of resistance to angular leaf spot (ALS), rust and halo blight (HB), and producing a substantially high yield than the recommended Malawi local varieties.

ii) IBCMV Black Root Nursery

Crosses have been made at CIAT HQ to overcome the problem of susceptibility to African strains of bean common mosaic virus that induce black-root necrosis symptoms in varieties carying the I-gene. 78 such materials were introduced from Colombia to Malawi, and evaluated. Thirty-six single plants were selected for good disease resistance combined with desirable seed characters, and will be further evaluated next year.

iii) Segregating Populations

A total of 74 segregating F_2 populations from CIAT were evaluated in Malawi.

The population PAL 9102C contained lines combining low soil fertility, ALS and yield; population PAL 9202A contained lines combining resistance to necrotic strains of BCMV and to root rot, with yield characteristics. The best performing populations in each category (Tables A-2 and A-3) suggest excellent potential for further selection in bulk until pure lines can be extracted.

1.1.2. Introductions from the region

A major achievement this year was the first cycle of germplasm exchange among groups of countries that share broadly similar agro-ecological conditions. An Eastern Africa Zonal Bean Yield Trial (EAZBYT) was distributed from Arusha to northern Tanzania and Eastern African network countries (assistance in multiplication was provided by the Tanzania national Programme), and a Malawi-based Southern Africa Zonal Bean Yield Trial (SABYT) and Evaluation Nursery (SAZBEN) were grown on request by all SADC members except Angola, with Malawi receiving three sets for different environments.

i) Southern Africa Zonal Bean Yield Trial (SAZBYT)

This replicated yield trial of 14 entries contributed by national programmes offers each country the opportunity to evaluate the best materials from their neighbours. Results received from Malawi, Zambia, Lesotho Zimbabwe and Namibia are summarised in Table A-4. While high yields, in general, were produced by lines having an I-gene, the non I-gene variety A 197, contributed by Zambia, produced respectable yields at several sites and was the highest yielder at Bunda. It has large white seeds and is soon going to be proposed for release in Zambia.

ii) Southern Africa Zonal Bean Evaluation Nursery (SAZBEN)

This unreplicated nursery, containing 144 selections made in Malawi in the 1991-92 crop season, offered national programmes easy and rapid access to promising materials identified by the regional breeder. Results are already received from the same five countries, and others are expected.

In Zimbabwe, the highest yielding site (Table A-5), a yield of 5333 kg/ha was produced by MCM 5001, a CIAT-bred line recently released in Uganda for its resistance to black root. Eight other varieties yielded over 4000 kg/ha; five of these are known to be resistant to blackroot, whereas two high-yielding Zimbabwean entries have the I-gene and are therefore susceptible. In Malawi (Tables A-6 and A-7) most top yielders were non I-gene materials (e.g. AFR lines bred by CIAT for Africa), and in other locations also several non I-gene lines produced high yields. At Maseru some of the best performers were from the Malawi germplasm; their bush habit and early maturity indicate insensitivity to photoperiod and this may have played a role in adaptation and high yield in Lesotho (Table A-8). Results from Zambia and Mozambique are given in Tables A-9 and A-10.

A report will be compiled for national programmes. While the best entries differed from country to country, suggesting a strong genotype x environment interaction and a need for each country to select its own varieties, a comparison with local checks suggests excellent progress is being made.

iii) African Bean Yield and Adaptation Nursery III (AFBYAN III)

This pan-African trial of 25 varieties, currently coordinated by the SADC/CIAT breeder at Arusha, started in 1986 and is now in the second year of its third phase. Its primary purpose was to encourage cooperation among national breeding programmes through the exchange of elite lines. Additionally, the AFBYAN trials are providing a large amount data for a comparative classification of the major bean growing regions of Africa. Data received during 1993 has included trials from Mozambique, Lesotho and Tanzania. National bean breeders are recognizing that trials with limited numbers of new entries gathered from all bean growing areas in Africa have a low probability of being a source of elite lines, and although some good lines show consistent performance over multiple sites (Table A-11), this trial has been rendered obsolete by the initiation of zonal trials and will probably end. A further

report for collaborators will be prepared.

iv) African Bean Drought Resistance Evaluation Nursery (ABDREN)

This pan-African trial, originally coordinated by the Ethiopia national programme and, within SADC, by a Malawi-led sub-project, was designed as a mechanism to permit the interchange of germplasm exhibiting drought resistance among national bean programmes. An attempt this year to multiply seed for further trials failed due to drought at Tanzania's site, coupled with irrigation equipment failure. More seed has been collected for a third try.

v) Bean stem maggot (BSM) resistance: Confirmatory Nursery-2

In 1992 a BSM confirmatory nursery was evaluated in various locations. Resistant entries were put together for evaluation by the BSM research network this year. During seed multiplication, there was a heavy incidence of BCMV, which enabled blackroot susceptible materials to be eliminated from distribution.

vi) Bean stem maggot resistance: screening Tanzania germplasm

This year some 527 accessions from the Tanzania germplasm collection were evaluated at Mabughai. This site has low soil fertility and a high BSM (*O. spencerella*) population. An augmented design was used with frequent appearance of checks (Lyamungu 85 dressed with Endosulfan as "resistant check" and Lyamungu 85 untreated as "susceptible check"). Each pair of checks had 6 test entries between them, and the mean value of the resistant plots was used as a reference for the test entries. Several test entries performed better than the mean of the resistant check. These included materials with seed characteristics acceptable within the region, e.g. PAD3, G 13856, BAT 1272 and BAT 1251 (Table A-12), which are proposed for use in breeding and for further evaluation at multiple locations by the BSM research network.

vii) Podborer (*Maruca testulalis*) incidence and damage

This year there was an outbreak of *Maruca testulalis* on bean research trials at Bunda. This afforded an opportunity to evaluate both local and introduced materials for possible sources of resistance to this pest. Damaged pods ranged from 18% to 33%, and entries showing minimal pod damage were recorded. In spite of the high incidence of visible damage, yield did not seem to be depressed, possibly of a timely insecticidal application.

viii) Germplasm for low-fertility soils

The Malawi Ministry of Agriculture's research station at Bembeke (pH 4.6-5.0, available P 0.35-1.40) provided suitable conditions to initiate screening for this regional problem. Liming was used to vary the level of aluminium.

In one experiment 15 bean varieties from Malawi, Zambia, Tanzania and CIAT (Table A-13), selected on the basis of their previous performance in a low pH soil, were compared in two-row plots with three replications. Root, shoot and nodule characters, as well as grain yield, increased almost linearly with lime applications up to 75% of Al neutralization (Table A-14). However, nodules and grain yield declined at higher levels of liming, perhaps because soils at Bembeke are also extremely low in other soil nutrients such as K, P and Zinc, and imbalances in these nutrients may have occurred. The varieties Sankana, Ngwangwa, G 16140 and Masai Red appeared the most promising (Table A-15). Analysis of correlation coefficients among various characters, which were all positive, suggest that measurement of shoot weight would be the most convenient indicator of good varietal yield.

A non-replicated trial of 42 varieties received from CIAT in Rwanda was also planted at Bembeke. Again, under conditions of very low fertility, plant growth was poor. RWR 221 was the best variety (Table A-16); this has also been one of the best in Rwanda. Several promising varieties were multiplied in the dry season and will be further evaluated.

ix) Specific Requests

Several specific requests for seed were received by SADC regional breeders. Malawi supplied Tanzania with the 1990 and 1991 VEFs. Tanzania supplied Eastern Africa network countries with EAZBYT and AFBYAN-III; Cameroun with AFBYAN-III; and Mauritius with several white and red kidney types. A request has been received from South Africa for Al-tolerant lines.

1.2. *Advancing of previous introductions (Genetic improvement)*

1.2.1. Within national programmes

Lesotho, Malawi, Tanzania, Zambia and Zimbabwe are known to be at an advanced stage of testing or recommending potential new varieties. Further information on progress within national programmes will be shared by national coordinators at the annual Steering Committee meeting in November.

1.2.2. By SADC/CIAT

i) Crosses for southern SADC environments

As some national programmes cannot readily make their own genetic crosses, SADC/CIAT in Malawi initiated a series of crosses to improve locally adapted varieties for disease resistance, seed characters and yield. Other crosses were made between varieties tolerant to low fertility (high Al) and locally improved and introduced lines. Populations (34 F_1 and 13 F_2 crosses) from these crosses were grown in the rainy season and advanced again in the dry season under irrigation at Bunda College. Approximately 300 single plants were selected from the F_2 populations; F_1s were harvested as bulks to establish F_2 populations in the rainy season.

ii) Crosses for bean stem maggot resistance

Bean stem maggot (*Ophiomyia* spp.) (BSM) is the most serious insect pest affecting beans in Africa. No single gene has been identified as conferring true resistance, and it is unclear if the tolerance identified in recent years is due to enhanced plant growth (e.g. development of adventitious roots) or an inhibitory effect on the maggot. Our approach at Arusha to developing bean lines having enhanced tolerance, while keeping open the possibility of identifying simply inherited genes, is to view tolerance as being conditioned by multiple genes, each one having a small effect.

For a first population, eight tolerant bean lines have been mated for three generations. One more round of mating will be conducted before the population is considered fully randomized. Then families will be formed for selection. From the first diallel crossing, 80 F3 families have been produced, and will be evaluated for BSM tolerance during the coming season. A number of new lines which show good tolerance to BSM will be used to form a second population.

iii) Crosses for rust resistance

Local germplasm was crossed at Arusha with lines that had shown tolerance to rust in Tanzania, to develop improved lines. Lines, to be formed from the F2 generation onwards, will be tested after sufficient seed is produced. The following lines are included: ZAA 54, GLP 1004, TB 79/467, *Kablanketi*, ZAA 12, ZPV 292, XAN 1351, *Carioca*, Guerero 9, RAB 211, A 316.

iv) Multiple resistance nursery

This nursery was initiated at Arusha to combine lines with various disease resistance characteristics into a common population. From this population, it was expected that lines showing multiple disease resistance could be selected. Unfortunately, the lines that resulted from the crosses are largely of poor quality and low acceptability. Consequently, it was decided to recombine this set of material with locally acceptable types. This was completed during the first season of 1993 and material for selection will be available for screening in the coming year.

1.3. *Strengthening of national systems for cultivar development*

At present, most national programmes incorporate germplasm supplied by SADC/CIAT straight into the national testing systems from which they select promising lines for release. It is evident from visits and discussions that some programmes have the potential to develop their own breeding materials; for them, introductions of improved germplasm should become more specific.

1.4. *Specialist input to techniques of field evaluation*

Regional staff visited national programmes to monitor research trials, offer technical advice to develop research plans and setting up of breeding or testing schemes, and provide logistic support, customised crosses and assessment of training needs. Interaction has been closest with Malawi, Tanzania, Zambia, Zimbabwe, Lesotho, Mozambique and Namibia. Examples of technical assistance were customised crosses for Mozambique, development of breeding/testing schemes for Malawi and Lesotho, and evaluation and selection of promising lines for Zambia, Zimbabwe and Namibia.

1.5. *Improvement of systems for on-farm evaluation and diffusion of cultivars*

a) Methodology study for on-farm variety testing

A major constraint to on-farm adoption of improved bean varieties has been low acceptability of 'improved' elite lines, relative to other local lines that move through market channels. This may be due to problems with grain type, marketability, suitability of plant growth characteristics, or to agroecological differences between research station and farmer conditions. Traditionally, on-farm testing begins when the number of entries has been reduced to only four or so, and frequently the number of collaborating farmers is inadequate due to shortage of seed; yet even this limited opportunity for farmers to select under their conditions is being eroded in many NARS by the expense in time, perdiems and fuel. The objective of this study at five sites across northern Tanzania is to evaluate the usefulness of low-cost farmer assessment of the acceptability of good range of experimental lines during all phases of production, on farmers' fields next to their own varieties.

Drought conditions during 1993 meant that nearly half of the farmers either lost their crop or did not plant. The basic trial is a 4x4 lattice where each farmer represents an incomplete block and grows four entries (more recently, five including a common check variety). Four farmers are chosen, by research, from a village which represents one replication, and one of the farmers is designated as the researcher contact-farmer. Four villages from an area represent a trial. This has involved a total of 80 farmers, of whom 20 are the contact farmers. Researcher involvement is now set at three visits - to distribute seed, to observe the crop post-flowering, and to obtain farmer evaluation post-consumption. The majority of farmers have been very positive, some having saved seed to evaluate on their own during the subsequent season. However, some planted the trial in a poor part of their field and gave it little care relative to their 'own' crop, so selection of farmers is important and they need to be truly representative.

The first year's data (Table A-17) indicate that many of the lines are not ever going to find acceptance by a majority of farmers, so only the leading eight entries can be recommended to continue in advanced yield trials. Monitoring of disease and insect problems over a wide area during the season can give the breeder added insight of possible problems with some of the lines, justifying a reduction in the number (and expemse) of yield trial sites. The methodology being tested in this study could be handled by a trained technician using a motorcycle.

b) On-farm research with rural institutions

An important class of bean producers are represented by schools, prisons and religious institutions. They generally have land, labour and a need to produce cheaply large quantities of beans. Consequently, there is generally a ready acceptance to try new and higher yielding varieties - and large numbers of students are exposed to new ideas. A series of variety trials are

being conducted with six institutions in Tanzania, for whom climbing beans are also being evaluated.

c) Research on non-formal channels for seed dissemination

Availability of seeds of improved varieties is a serious constraint in making an impact at the farm level. The formal seed sector does not function well in many countries due to organisational and logistic problems, and the private sector is generally not interested in beans due to inadequate profitability. The non-formal seed sector is considered the most promising option for beans in most countries, as has been well demonstrated in Rwanda and Uganda, and SADC/CIAT with national institutions is catalyzing three case studies in Tanzania and one in Malawi. A pan-African workshop is planned in 1994 to bring together case studies from many countries.

i) In Lushoto District, Tanzania, a seed dissemination study with the variety Lyamungu 85, started in 1990 by the former SADC/CIAT agronomist Dr Edje, is continuing. Some farmers have adopted the variety, which can now be found in the local market. In 1992 a second study was started with the variety Lyamungu 90, in which farmers were offered two kilos of seed, and then pass two kilos onto another farmer after the harvest, and so on to a third in the same manner. This is now in its second phase; 40 farmers have received seed, and only two have dropped out due to poor production.

ii) An adoption study of the recent bean variety release *Lyamungu 90* was started in Kagera Region of Tanzania in conjunction with a Tanzania/Netherlands Farming Systems Research Project. One hundred farmers each received one kilogram of seed at the start of the September 1992 season, and a preliminary interview survey should soon be conducted to determine what has happened to the seed.

iii) In conjunction with a fish farming project, 50 farmers from various regions in Tanzania received one kilogram of *Lyamungu 90*. The farmers are being contacted via mail to determine the variety's adoption and whether it has been passed on to neighbours.

iv) The national programme in Malawi this year initiated a similar approach. Four hectares of multiplication of a previously released variety, Nasaka, is underway at Lifuwu and Masenjere, two irrigated sites. A total of 3-4 tons of seed of this variety and current candidates for release is expected to be harvested. Arrangements have been made to sell and distribute this seed through Action Aid, Christian Services, and the Ministry of Agriculture; village traders will also be encouraged to sell in small quantities.

1.6. *Specialist contribution to the SADC region by the CIAT social scientist*

An important monitoring tour to Rwanda was organized in June for a group of bean scientists from all three African regional networks. This group, comprising a mix of biological and economics disciplines, was able to examine all steps followed in Rwanda in achieving the recent dramatic impact of climbing beans. Variety and management practices that double on-farm yields have already been adoption by about 50% of farmers nationally. Participatory research methods used in developing the technology, and non-formal seed systems used in its dissemination, have been key inputs by CIAT's social scientist.

Two Tanzanian reearchers participated, but Malawi's nominees were unfortunately unable to obtain clearance shortly before national elections. Several candidate areas in Anglophone regions were selected for focussing network efforts at adapting and replicating this success.

The social science position has now been made pan-African in scope, and its base moved late this year from Rwanda to Uganda. These changes are intended to increase future inputs to this region.

1.7. *Network research conducted by sub-projects and post-graduate students*

Regional sub-projects continued on nine principle regional priorities this year [see Steering Committee Minutes]. Work on a further priority, biological nitrogen fixation, failed to find a scientist prepared to assume the responsibility. Sub-project leaders will present written reports to the annual meeting of the Steering Committee in November.

PROGRAMME OBJECTIVE 2 : ***To develop improved cropping systems and practices for bean production, in collaboration with NPs.***

2.1. *Conclude diagnostic research in important bean producing systems not yet adequately covered*

2.1.1. The interaction between BSM attack and root disease

The interaction between BSM attack and root disease infection was further evaluated at three Tanzanian locations under different soil types and disease organisms. Endosulfan and Vitavax seed dressings were used to protect treatments against BSM and root disease infection, respectively. The plots were monitored regularly and all dead plants were removed and assessed for the cause of mortality. Independently, each adversity caused mortality to bean plants, but their combined effect was more severe (Appendix, Fig.2). A hypothesis is that BSM feeding creates avenues for entry by the pathogen. Resistance to or protection from BSM damage also reduced loss from root disease. Breeding for multiple resistance to BSM and root diseases will be desirable in areas where both problems occur together.

2.2. *Technical contribution to SADC region by CIAT cropping systems agronomist based in Uganda*

The pan-African agronomist visited Tanzania once and Zambia twice, to advise on research content, design and methods, particularly for soil productivity improvement, and to lead a farmer-participatory research case study/training in Kagera, Tanzania.

2.3. *Continue to assist NPs in setting research priorities and planning trials in response to farmers' needs.*

Field research case studies were developed on soil productivity improvement in an area of Tanzania with impoverished soils (see Section 2.2), and in integrated pest management (see 2.5).

2.4. *Collaboration with NPs in agronomic trials on-station*

i) A research opportunity for intensification of tea production following replanting has been identified in collaboration with the Tea Research Foundation (TRF). A leguminous intercrop could improve soils and the nutrition of tea workers. To grow beans successfully on these acid soils, suitable varieties would need to be identified. With those objectives in mind, a collaborative screening programme was initiated last year with the TRF in Malawi.

The general growth of the 50 varieties was poor from emergence but improved at flowering. The soil pH was 3.90. Magnesium defficiency symptoms were also observed but a 3% magnesium solution did not correct the condition. So the poor growth could be because of aluminium toxicity caused by low pH. Yields in general were low, from about 50 to 600 kg/ha, and the harvest contained about 40% shrunken seeds, the reason for which is not known (no moisture stress was observed). The high yielding lines were 1327 and Nasaka from Malawi, and several from CIAT.

ii) Beans as an irrigated winter crop in low altitude areas

It is estimated that several thousand hectares of beans could be grown in Malawi, Mozambique and elsewhere under irrigation or where enough residual soil moisture is available. Under these conditions farmers could produce

higher yields of superior quality, including for seed sales, and improve food security. A preliminary screening trial of 144 selected lines was planted this dry season at the Lifuwu Research Station, Malawi. An extremely high and damaging incidence of powdery mildew was observed and only three lines could be classified as resistant. Among these, CAL 143 was the best in terms of seed quality and general growth.

iii) Development of cultural strategies for BSM management

As BSM control through plant resistance is at best partial, the regional entomologist is conducting or catalysing research on other strategies. Cultural practices such as mulches and enhanced soil fertility were tested in various combinations with chemical seed dressing on soil types of different fertility. The results confirm that mulching with banana straw or weeds reduces plant mortality by ca 50% below that of the untreated, non-fertilised control. Mulch was the only non-chemical treatment that reduced plant mortality significantly, and its effect was increased by fertilizer application on impoverished soils. At the low-fertility site in Lushoto District, where farmers avoid growing beans during the peak BSM season, this combination increased yields 20 fold, and doubled the yield from using Endosulfan seed treatment alone. As part of an IPM strategy with farmers in the Arusha area, *Crotolaria* is now being tested as a mulch material.

2.5. *Collaboration with NPs in development and evaluation of on-farm research*

Besides working on cost-effective testing procedures for variety testing by farmers (see 1.5 above), a new area of activity has been the participatory development with farmers of integrated pest management (IPM) in the Arusha area, as a pilot study. As most small-scale farmers do not purchase inputs for beans, our approach to bean pest control in such farming systems should rely on strategies that can be generated within the farming environment.

Informal meetings were held with farmers in four communities. The steps involved in this exercise included joint appraisal of bean pest problems, including non-entomological ones; appraisal of farmer knowledge of control methods; and evaluation of (researcher and farmer) proposed control methods.

BSM, mites and aphids were described as the key pests that constrain bean productivity in the second growing season. Farmers believed that these pests were gaining prominence, but most do little to control them. Any insecticide may be used when available. After discussing a number of approaches from experimental results and farmer practices, farmers selected some methods for evaluation under their own management. Methods selected included the use of resistant varieties, botanical pesticides (Neem seed or *Melia azaderach* extract, *Tephrosia* leaf juice), mulching, earthing up and manuring. These will be followed to assess modifications that are made to them and their efficiency.

2.6. *Technical contribution to network research conducted through regional collaborative research sub-projects*

Refer to list of sub-projects; also to list of travel by regional staff (Appendix).

PROGRAMME OBJECTIVE 3 : ***To strengthen national programmes, especially through training***

3.1. *Technical contribution to SADC region by CIAT scientists in Africa*

Technical inputs by regional staff employed outside the SADC/CIAT Programme were made principally by CIAT's agronomist based in Uganda and by the social scientist in Rwanda; both positions are pan-African. Their contributions are referred to in sections 1.6 and 2.2 above.

3.2. *Pan-Africa, regional and in-country training courses*

With the reduction in funds available this year, the Steering Committee approved only one activity (see (a) below). In addition, practical on-site training in farmer-participatory research procedures in soil productivity was provided for four Tanzanian scientists at a pilot research site in Kagera, Tanzania.

a) SADC/CIAT Advanced Course on Experimental Design

A one-week regional course on experimental design was held at Arusha, Tanzania, 7-11 June 1993. The course was intended for participants active in bean research, holding advanced degrees, and familiar with statistical principles. Although seven participants had been expected, travel problems led to only four participants arriving - from Swaziland, Tanzania and Zambia. This reduction enabled more individual attention to be given in practical sessions. The following topics were covered:

- Overview of basic statistics
- Field visits to on-farm and on-station trial sites
- Conceptualization of 'variability'
- Review of commercial statistical packages
- 'Blocks' as random effects rather than fixed effects
- Analysis of participants' own data sets
- Incomplete blocking designs
- Covariate analyses (nearest neighbours)
- Review

3.3. *Individual training on short courses at CIAT*

The Steering Committee did not allocate funds for this activity this year.

3.4. *Academic scholarships for higher degrees*

The large programme of postgraduate training mounted under Phase-I is almost complete; three more students obtained their degrees this year. The last of five Ph.D. students is carrying out dissertation research in Lesotho, and the leader of Mozambique's bean programme neared completion of his M.Sc. studies in Brazil, the last of four students sponsored at this level.

3.5. *Supervision of post-graduate thesis research in the region*

The regional entomologist made a supervisory visit to Lesotho in connection with a PhD thesis. A further visit there by the university supervisor is scheduled.

3.6. *Training materials*

A manual on bean research methods, and an audio-tutorial unit on identification of bean pests in Africa are listed among this year's numerous publications of the Network (see Appendix). The regional mailing list was updated and extended during the year.

3.7. *Stimulate exchange of results and information throughout the network*

i) Breeders/agronomist tour of Tanzania and Northern Zambia

This was organized during late March to review on-going research in breeding, plant protection and agronomy at Arusha, Lambo, Lushoto, Morogoro and Uyole in Tanzania, and Kasama and Mbala in northern Zambia. National program participants on various sections of the tour included two from Tanzania and one from Zambia, in addition to those at each of the stations visited.

ii) Eastern Africa Bean Research Network

The Tanzanian national cordinator was invited to participate in the Third Multidisciplinary Workshop on Bean Research in Eastern Africa, and also in

their Steering Committee meeting.

iii) Pan-Africa Bean Entomologists Working Group

The second meeting of this group was held in Harare, 19-22 September 1993 to review progress and achievements made through the sub-projects, to review priorities and to advise steering committees on resource allocation in this field. The methodology used was a modified version of Goal-Oriented Participatory Planning (GOPP). To the earlier regional priorities of bean stem maggot, bruchids and aphids, were added new priorities on Ootheca, pod bugs and thrips. Potential research and development projects were identified. Recognising the real progress already made, e.g. in understanding BSM ecology and in availability of resistance to *Zabrotes* bruchids, emphasis should now shift to IPM and to breeders incorporating the resistance. Network resources available for entomology should be allocated as follows: BSM 25%; bruchids 20%; *Ootheca* 20%; aphids 10%; spiny brown bugs and thrips 7.5% each; and 10% was reserved for country specific problems.

3.8. *Strengthen network research through provision of small items of research equipment to national programmes*

The Steering Committee allocated 7% of Network funds in 1993 to this item. All purchases have been made. Outstanding commitments from the previous year were followed up.

SPECIFIC PROBLEMS FACING THE PROGRAMME

1. Funding

No donor funding for SADC Network activities is available beyond 31 March 1994. The Arusha base can be maintained, with a single regional scientist having pan-African responsibilities in bean entomology, at least for a further two years under funding for Eastern Africa. The Malawi-based breeder position has been proposed for inclusion in of a new bilateral project in Malawi which could have limited benefits for some other countries.

2. Plant Quarantine Constraints to Germplasm Exchange

Operations at the Arusha base have been adversely affected again this year by national plant quarantine restrictions; for a time it was not permitted to import any bean seed into Tanzania. This has not only affected materials expected from CIAT, but also requests from neighbouring countries such as Malawi (where a common border enables farmers and traders to cross with relatively large amounts of seed).

More recently, the situation has eased again. Local introductions are being permitted, but not yet those from CIAT.

CRITICAL REVIEW OF FINANCIAL AND OTHER PROCEDURES FOR SUSTAINING THE PROGRAMME

Document and Publicise Impact of Bean Research

A fundamental activity now in progress within the region is to assess the impact with farmers of the technology developed and/or disseminated in collaboration with the Programme. So far, this is mostly in Tanzania, although several technologies are now starting to reach farmers in other countries (Section VII).

Achieving greater impact, and reaching farmers sooner, are allied priorities of the Programme - see, for example, Section III 1.5 for case studies on methods for cost-effective on-farm testing and for case study approaches to seed dissemination methods.

During the next year we should be able to start publicising documented cases of impact. This can be used by NARS, SACCAR and CIAT to encourage governments and potential donors that sustained financial support for bean research is a

worthwhile investment.

Set Targets for Research Achievement

The Steering Committee will also be requested to set specific targets for the identification, dissemination, adoption and impact of bean research. This exercise will help to focus scientists' attention on relevance, and give the SACCAR Board a set of criteria against which research performance may be judged.

For example, the following targets were set in 1992 by the Great Lakes Bean Network, for achievement by 1995:

Productivity Increases:

At least 2000 farmers, in at least two regions of each country, adopting technology which increases their yields by 25%.

Many Higher Yielding Varieties Available:

Ten specifically adapted varieties available in each principal zone. At least 25% of varieties in multilocational trials outyielding the farmers' check by at least 25%.

Potential Productivity of Beans Better Exploited:

Yields of at least 30% of collaborating farmers raised by 15% through use of non-genetic (i.e. crop management) technology. At least two management technologies adopted by 30% of farmers collaborating in these studies. One technology developed in each of three regions per country.

More Use of Improved Varieties:

80% of disseminated varieties being used by at least 1% of a sample population of farmers. 10% of the population using at least one improved variety.

Organization and Management of the Network

The SADC Network's operational organization is summarized in Fig.2. This is considered to be fully operational and should be sustained through a combination of national and external resources.

Network Coordination

CIAT has always regarded its role in coordination as being catalytic in initiating and then strengthening regional collaboration among researchers and programmes in the region. In order to maintain coordination of activities this year, CIAT's pan-Africa coordinator took over on a temporary basis the duties of acting coordinator for SADC/CIAT, at no direct financial cost to the Programme. However, this situation is not sustainable, and funds are urgently needed for a regionally hired coordinator.

Technical Leadership and Management

Technical leadership jointly by NARS and by CIAT is currently assured by six specialized Working Groups, which advise Steering Committees on research needs and progress in the bean networks.

The Steering Committee will continue to encourage experienced sub-project leaders to become active regional leaders. While real opportunities exist, the process is also constrained by the small proportion of postgraduate staff in some national bean programmmes; additional scholarships, for tenure within the region, are also important to achieve this objective.

Unexploited potential exists in most countries to tap non-governmental

resources to ensure that the most appropriate expertise is brought to bear on critical problems. The SADC/CIAT Steering Committee now has an opportunity, in the area of seed systems for disseminating new varieties to small farmers, to plan activities directly with NGOs and the local small-scale private trading sector.

CIAT anticipates that it will have a long term comparative advantage in undertaking certain kinds of research on beans in Africa, particularly in certain strategic areas, in developing prototype technology for difficult problems where investments may by regarded as too risky by NARS, and in methods development. CIAT would therefore wish to remain, and hopes it will be invited to remain, as a member of the Network, contributing technically to its activities, beyond time of handing coordination responsibilities to a local institution.

National Contributions to Network Research Expenses

NARS currently meet salaries and allowances of all scientific personnel who lead or participate in regional research sub-projects. However, at present there is no obligation for countries to support any of the operational costs of sub-projects - a situation quite different from the that followed in both Eastern Africa and Great Lakes bean networks. In those networks, Directors' Committees agreed that at least 25% (50% in the Great Lakes) of the nominal cost of each regional sub-project should be contributed by the lead NARS, and that this proportion would increase over time.

A similar decision by the SACCAR Board would contribute to sustainbility of this centrepiece of regional collaboration which directly benefits a country's own research agenda.

Financial Management of Network Funds

The NARS already make collectively all decisions regarding the allocation of funds utilised by the network, through the Steering Committee and monitored by the SACCAR Board.

NARS also manage a large part of the expenditures approved by the Steering Committee. Funds for each sub-project are transferred by CIAT to the institution (NARI or university) responsible, which is required to provide the Committee at year's end with an annual financial report signed by the sub-project leader and the institution's financial manager. Similarly, funds for any workshop or training course not hosted directly by SADC/CIAT are managed by the NARS responsible for organizing the activity, against its written work plan and budget.

Funds still largely managed directly by CIAT are those for which foreign exchange and/or a high degree of regional coordination is required: major regional workshops in which airtickets constitute the principal expense; travelling workshops which move across two or more countries; training outside the region; publishing of regional documents; and purchase of equipment not available in the country.

Recent currency liberalization in several countries may open up some further opportunities for NARS to manage foreign exchange components and, more importantly, will facilitate the eventual management and regional disbursement of all network funds under the umbrella of a local research organization. CIAT is redesigning its regional accounting software so as to serve more directly the financial information needs of the regional coordinator and steering committee. These requirements are more detailed than donors need, and include expenditures by country and by sub-project. The new system will also serve as a management tool for the network once its coordination passes from CIAT.

Travel Expenses, Perdiem Rates and Honoraria

In the interest of avoiding distortion of national priorities, favouring sustainability and optimising the use of limited funds, national participants in regional events organised by SADC/CIAT receive a standard perdiem rate in

local currency equivalent to US$ 15 per day (reducing to US$ 7.50 after 15 days) to cover miscellaneous expenses beyond actual or estimated hotel bed and meal costs. Whenever possible, group rates are negotiated, preferably excluding the evening meal cost, which is then paid in cash to allow participants some flexibility. However, lack of uniformity among international organisations and donors in these practices sometimes causes conflict.

At any in-country event supported by the Steering Committee, national government or institutional rates are normally reimbursed to the local organising institution. This practice should be sustainable.

For the same reason, invitations to scientists to attend regional events normally state that any travel expenses incurred within their own country are not reimbursable by the organisers.

Scientists participating in a meeting of the Steering Committee receive the UN perdiem rate, and are responsible for their own expenses. CIAT staff receive reimbursement only for actual receipted travel expenses, and are not normally permitted to stay in hotels above 3-star.

Honoraria are not paid to national scientists to carry out duties that might normally be expected of them, such as training national technicians or acting as a resource person within their own country. Application of this principle has, occasionally, led to non-participation by local resource persons. A senior scientist, specifically recognised within the African networks as the authority on a topic, and when acting as a senior regional resoure person (e.g. in place of a CIAT staff member) in a training course outside his/her country and normal responsibilities, may receive an honorarium at SADC rates.

ITEMS THE BOARD CAN ASSIST WITH

The Board is requested to make decisions urgently on ways of sustaining financially a core of Network activities, particularly in view of the No. 4 priority ascribed to this programme in SACCAR's 1993 review of regional priorities. The Steering Committee will meet immediately after the Board meeting with Team Leaders, to implement those decisions in the Workplan for 1994. In the absence of adequate action, much of the Network is expected to stop functioning in early 1994.

Some options include the following:

a) Action to maintain regional research in the short/medium term

Regional sub-projects led by national scientists comprise the core of the Network. Together, these sub-projects offer improved efficiency in each country through specialisation in areas where it has comparative advantage and, for other areas, by sharing information developed by other countries.

Countries might agree to take over from CIDA the funding of operational budgets for a set of critical sub-projects to be approved by the 1993 meeting of the Steering Committee.

The Programme is currently providing about US$ 50,000 per year for this set of activities. Following the example of the regional bean networks in Eastern Africa and Great Lakes, CIAT recommends that the number of sub-projects (and therefore of NARS scientists involved) be increased by reducing the average budget to the equivalent of about US$ 2500.

b) Action to maintain information exchange among NARS

Each national programme publishes its own annual report, and each regional sub-project leader similarly produces an annual report. Copying and regional distribution of both kinds of report might become the financial responsibility of national coordinators.

c) Action to maintain network coordination

Each country that wishes to remain an active member of the Network might meet the travel expenses for its national coordinator to attend an annual meeting of the Steering Committee.

d) Action to maintain germplasm exchange among countries

The SADC region exchanges germplasm within two agroecological zones - Southern Africa (Lesotho northwards to Tanzania's Southern Highlands), and Eastern Africa (rest of Tanzania, plus Kenya /Uganda/Ethiopia etc). Currently, SADC/CIAT Malawi organises seed multiplication and distribution of the Southern Africa series; and the Eastern Africa series is organized by CIAT and multiplied by the Tanzania coordinator using funds from Eastern Africa. As Malawi's programme is likely to continue as the main regional source of germplasm for the Southern Africa zone, Malawi and the Malawi-based CIAT breeder are suggested to lead this activity. Tanzania's technical participation in the Eastern Africa zone is not effected by the SADC funding constraint.

e) Action to maintain short course training

If a country wishes to organise an in-country course and meet expenses for its participants, CIAT's staff based anywhere in Africa are available to participate as free resource persons, subject to time and regional workplans. Courses in certain topics are in any case more efficiently organized nationally across commodities, by drawing upon resouces from several networks.

f) Action to refinance the Network

(i) Action to improve each country's ability to participate in the Network: Several countries have good opportunities to obtain small bilateral projects to assist bean research and to enable them to participate more strongly in the Network - including support for sending staff to regional or pan-Africa bean workshops, the Steering Committee, training courses, etc. CIAT is willing to assist in this process, if requested.

(ii). A relatively modest proposal for establishing the Network in a second Phase, maintaining essential objectives with a regionally recruited coordinator based in Tanzania, has been shown to a few donors by SACCAR or CIAT. Could the Board assist by stressing to donors the high priority ascribed to this network?

(iii). The annual cost of the Network proposal could be further reduced, for example, by eliminating the handing-over period between coordinators from CIAT and from the region, and/or by Tanzania negotiating with the NARS directors for Eastern Africa for transfer of nothern Tanzania bean research to their network. In that event, a new coordinating site would need to be selected.

FINANCIAL REPORT ON NETWORK BUDGET, 1993 (USD)

ITEM	APPROVED BUDGET	EXPENDITURE	BALANCE
Regional Sub-Projects	45,000	45,000	0
Regional Training	10,000	2,646	7,353
Regional Workshops	8,000	8,376	(376)
Publications	8,000	8,850	(850)
Training Supervision	7,000	3,500	3,500
Equipment - Nat.Programmes	7,000	7,749	(749)
Steering Committee	15,000	14,000	(1,000)
	100,000	90,121	(9,878)

CIAT AUDIO-TUTORIAL UNITS PRODUCED IN 1992/93

Lynch, J. A. and Wortmann, C. S. 1993. Diagnosis of nutritional disorders in beans. CIAT.

Ampofo, J. K. 1992. Field pests of beans in Africa. CIAT.

PUBLICATIONS OF THE AFRICA BEAN NETWORK IN 1992/93

Workshop Proceedings Series

No. 21. Soil fertility research for maize-bean production systems of the Eastern Africa highlands: Proceedings of a Working Group Meeting, Thika, Kenya, 1-4 September,1992.

No. 22. Actes de l'Atelier sur les Strategies de Selection Varietale dans la Region des Grands Lacs, Kigali, Rwanda, 17-20 Janvier 1991.

No. 23. Proceedings of the Pan-African Pathology Working Group Meeting, Thika, Kenya, 26-30 May 1992.

Occasional Publications Series

No. 3B. First African Bean Yield and Adaptation Nursery (AFBYAN I): Part II. Performance across Environments.

No. 4. Assessment of Yield Loss caused by Biotic Stress on Beans in Africa. C.S.Wortmann.

No. 5. Interpretation of Foliar Nutrient Analysis in Bean - the Diagnosis and Recommendation Integrated System. C.S.Wortmann, J.Kisakye and O.T.Edje.

No. 6. The Banana-Bean Intercropping System in Kagera Region of Tanzania - Results of a Diagnostic Survey. C.S.Wortmann, C.Bosch and L.A.Mukandala.

OTHER CIAT TRAINING MATERIALS FOR AFRICA

Conducting On-Farm Experiments. A.Stroud. CIAT Publication No. 228. 118 pp. 1993.

PUBLICATIONS OF REGIONAL SCIENTISTS IN 1992/93

Ampofo, J.K.O. Developing IPM strategies for BSM control in small scale farming systems. In: Proceedings of the Third Multidisciplinary Workshop on Bean Research in East Africa. Thika, Kenya, April 19-23, 1993.

Ampofo, J.K.O. Current status of bean stem maggot (*Ophiomyia* spp.) research in Africa.Internationational Workshop of the *Phaseolus* Beans Advanced Research Network (BARN) CIAT, Cali, Colombia, September 7-10, 1993.

Ampofo, J.K.O. Host plant resistance and cultural strategies for BSM management. The 2nd Meeting of the Pan-Africa Bean Entomologists Working Group. Harare, Zimbabwe, 19-22 September, 1993.

Aggarwal, V.D. Overview of SADC/CIAT regional activities based in Malawi. 13th SUA/CRSP Bean Research Workshop, Morogoro, Tanzania, 17-19

September 1993.

Youngquist, W.C. The Africa Bean Drought Resistance Nursery. Third Multidisciplinary Workshop on Bean Research in East Africa. Thika, Kenya, April 19-23, 1993.

TRAVEL BY CIAT STAFF WITHIN SADC REGION, 1993

9-12 Jan 93	Malawi	R.Kirkby	(EAR) Discuss progress and plans at regional base at Bunda.
7-10 Feb 93	Lesotho	K.Ampofo	(SADC) To discuss and advise on Lilian Pomela's Ph.D research programme.
7-10 Feb 93	Lesotho	V.Aggarwal	(SADC) To monitor breeding trials
10-12 Feb 93	Namibia	K.Ampofo	(SADC) To visit bean trials and help assess need of the National Programme.
10-12 Feb 93	Namibia	V.Aggarwal	(SADC) To monitor breeding trials.
14-16 Feb 93	Malawi	K.Ampofo	(SADC) To follow-up on research priorities and discuss entomology support.
Feb/Mar 93	Zambia	V.Aggarwal	(SADC) To monitor breeding trials.
11-13 Mar 93	Zimbabwe	V.Aggarwal	(SADC) To monitor trials.
17-18 Mar 93	Botswana	R.Kirkby	(EAR) Discuss funding prospects with SACCAR.
18-19 Mar 93	Zimbabwe	R.Kirkby	(EAR) Discuss funding possibilities with USAID and DANIDA.
19-24 Mar 93	Malawi	R.Kirkby	(EAR) Discuss research and funding with Bunda, DAR. ODA and SADC/CIAT.
21 Mar 93	Zimbabwe	K.Ampofo	(SADC) Discuss progress on bruchid sub-project and plans for Working Group.
25 Mar -11 Apr 93	Tanzania Zambia	C.Wortmann "	(EAR) Technical support in soil productivity research by national programmes.
11 Apr- 4 May 93	Tanzania	J.Kamulindwa	(EAR) Training regional staff in accounts package.
27 Apr- 11 May 93	Tanzania	C.Wortmann	(EAR) Training and initiation of participatory research in Bukoba.
29 Apr 93	Tanzania	R.Kirkby	(EAR) Discuss cooperative research with SUA.
22-25 Mar 93	Mozambique	K.Ampofo	(SADC) Discuss progress and give technical assistance to the bean team.
16-19 May 93	Mozambique	V.Aggarwal	(SADC) To monitor trials.
2-4 Jun 93	Malawi	R.Kirkby	(EAR) Discussions on ODA project proposal; with ActionAid on seeds.
7-9 Jun 93	Tanzania	D.Pachico	(HQ) Review progress with national coordinator and regional staff.
14-17 Sep 93	Tanzania	V.Aggarwal	(SADC) SUA/CRSP Bean Workshop.
15-17 Sep 93	Tanzania	R.Kirkby	(EAR) SUA/CRSP Workshop.
19-23 Sep 93	Zimbabwe	K.Ampofo	(SADC) Pan-Africa Bean Entomologists Working Group meeting.
26-30 Sep 93	Zimbabwe	V.Aggarwal	(SADC) Discuss research plans, also with coordinators from Swaziland and Namibia.
1-2 Oct 93	Lesotho	V.Aggarwal	(SADC) Discuss research plans.

Table A-1. Performance of top 20 varieties in VEF 91 planted in Malawi at Bunda and Dedza, 1992/93.

Variety	Seed Yield (kg/ha)				Disease Scores									
					ALS				Virus			Rust		Halo blight
	BA	BB	DA	DB	BA	BB	DA	DB	BA	BB	DA	BA	BB	DA	DB
CAL 143	2230	2036	1953	2625	2	2	2	2	1	1	1	1	1	1	1
AFR 637	1963	1569	2086	2052	2	3	3	3	1	1	1	1	1	2	1
MCR 4008	2954	1809	1710	2508	3	3	2	2	1	1	1	2	1	2	3
LSA 189	2855	2819	1898	2339	1	1	2	2	1	1	3	1	1	1	1
AND 1012	1377	2376	1545	1816	3	3	3	3	2	1	1	2	1	1	1
DRK 86	1848	1938	1053	1916	2	2	4	3	2	1	1	2	1	1	1
AND 986	1959	2186	2097	3146	2	2	4	4	1	1	1	2	1	1	2
CARGABELLO	1829	3175	796	2022	2	2	4	4	1	1	1	2	1	1	2
MCR 2515	2306	2079	873	1628	4	3	4	3	1	1	1	3	1	1	1
AFR 623	1866	2873	910	1912	3	2	4	4	1	1	1	1	1	1	2
AFR 633	1804	3687	1858	2064	2	3	3	3	1	1	1	3	1	3	3
AND 961	1522	2682	1156	2035	2	2	4	3	1	1	1	1	1	1	1
CARIB 8903-23	2597	2909	1288	2047	3	2	3	5	1	1	1	2	1	2	2
AND 992	1674	2480	2433	2185	3	2	3	2	1	1	1	1	1	2	1
AND 975	1521	2913	1416	991	2	2	3	2	1	1	4	3	2	2	1
Controls															
Nasaka	1761	1939	442	1233	3	2	5	4	1	1	2	2	1	2	1
Phalombe	1594	2333	738	1418	3	3	5	4	2	1	1	2	1	3	2
Trial Mean	1407	2235	930	1381	3	2	4	4	1	1	2	2	1	2	2

Note: BA = Bunda, with disease spreader
BB = Bunda, without disease spreader
DA = Dedza, with disease spreader
DB = Dedza, without disease spreader.

Table A-2. Performance of top 10 varieties in the population PAL 9202A (F2) planted in Malawi at Bunda and Dedza, 1992/93.

Variety	Seed Yield (kg/ha)				Disease Scores									
					ALS				Virus		Rust		Halo blight	
	BA	BB	DA	DB	BA	BB	DA	DB	BA	BB	BA	BB	DA	DB
DB 123	2471	2374	1325	2256	2	2	2	3	2	1	1	1	1	1
DG 256	2408	2690	1256	1835	2	2	3	3	1	1	1	1	2	1
DB 159	2238	2848	1825	2094	2	3	3	3	1	1	1	1	2	2
DG 258	2229	3110	770	1773	4	3	4	4	1	1	1	1	2	2
DB 153	2226	2481	1617	2666	3	2	3	3	1	1	1	1	3	2
DB 148	2088	2553	1259	2325	3	2	4	4	1	1	1	1	2	2
DB 139	2066	2256	1840	2432	2	2	3	3	1	1	1	1	3	1
DB 155	1803	2918	1617	2334	2	3	2	3	1	1	1	1	3	2
DB 147	1838	2432	1902	2272	2	2	3	3	1	1	1	1	3	2
DB 122	2236	1004	1947	2259	2	2	3	3	1	1	1	1	2	2
Controls														
A 286	2389	2210	750	212	1	1	3	2	1	1	1	1	1	1
A 344	1636	261	635	279	2	1	4	2	1	1	1	1	2	1
Kabanima	1638	1711	881	817	2	1	3	2	2	1	1	1	1	2
Trial Mean	1878	2025	1213	1664	3	2	3	3	1	1	1	2	2	2

Table A-3. Performance of top 10 varieties in the population PAL 9102C (F2) planted in Malawi at Bunda and Dedza, 1992/93.

Variety	Seed Yield (kg/ha)				Disease Scores									
					ALS				Virus		Rust		Halo blight	
	BA	BB	DA	DB	BA	BB	DA	DB	BA	BB	BA	BB	DA	DB
VATT 773	2395	3037	564	1146	3	3	4	4	2	1	1	1	2	2
VTTT 779	2255	2163	559	1809	3	2	3	4	2	1	1	1	2	2
VATT 767	2081	2977	686	1524	3	3	3	3	2	1	1	1	3	2
MG 7	2064	1565	1549	1862	2	2	2	3	1	1	1	1	1	1
MG 13	2035	2230	1691	2036	2	1	2	2	1	1	1	1	1	2
MG 6	1969	2047	998	1230	2	1	3	2	1	1	1	1	1	1
ZM 4	1940	2506	1692	2056	3	2	2	3	1	1	1	1	2	2
ZM 1	1754	2418	1620	1457	2	1	3	2	1	1	1	1	1	1
MG 9	1794	2309	1563	1740	2	1	2	2	1	1	1	1	1	1
ZM 16	1318	1484	1424	2275	2	1	2	2	1	1	2	1	2	1
Controls														
A 286	2211	1824	1640	1704	2	1	2	2	1	1	1	1	1	1
A 344	1849	2227	350	1460	2	1	2	2	1	1	1	1	1	1
Kabanima	2492	2295	1975	1366	2	1	2	2	1	1	2	1	2	1
Trial Mean	1571	1921	939	1280	2	1	2	2	1	1	1	1	1	1

Table A-4. Comparative performance of varieties included in the Southern African Zonal Bean Yield Trial (SAZBYT) conducted at various locations in different countries in the 1992/93 crop season.

							Disease Scores (1-9)												
	Seed yield (kg/ha)						ALS		CBB				Halo Blight		BCMV			Rust	
No Variety	Bunda	Meru	Maseru	Msekera	Ukiwost	Harare	Bunda	Meru	Bunda	Meru	Maseru	Harare	Maseru	Harare	Bunda	Msekera	Harare	Bunda	Harare
1 A 286	975	2065	151	959	136	2181	1	2	4	2	1	2	2	1	1	1	2	1	2
2 A 344	900	1848	296	391	220	1611	1	2	2	4	1	2	2	1	1	2	2	1	1
3 BAT 477	1013	2531	244	443	211	1708	1	2	2	2	2	3	1	2	1	2	3	1	1
4 Nasaka	1225	1332	362	302	106	861	4	6	7	5	1	6	2	4	1	4	3	1	2
5 Sapelekedva	744	1598	235	358	75	806	6	6	3	5	1	5	1	3	2	4	4	1	2
6 A 197	1694	1798	128	784	235	1903	3	4	5	3	1	3	1	1	2	1	2	1	1
7 ZPV 292	1019	1682	235	531	190	1556	2	2	8	3	3	3	2	1	1	2	1	2	5
8 Carioca	644	2281	308	482	266	1944	1	2	2	3	2	2	1	2	1	3	3	1	1
9 Puebla cafe	1188	1415	276	413	303	2028	1	2	3	3	2	3	1	1	1	5	2	1	1
10 RAB 303	650	1565	414	470	256	1917	1	2	2	3	1	2	1	2	1	1	2	1	1
11 Uyole 84	650	2631	186	444	273	1222	1	2	3	2	2	2	2	1	1	4	2	1	1
12 NW 590	325	1249	270	841	218	431	2	3	1	3	2	4	2	1	3	2	2	7	7
13 SWB	1019	1432	223	438	140	722	3	3	3	6	2	3	2	1	2	1	1	2	7
14 Local Control	1575	1399	247	99	-	1708	3	4	1	3	2	2	1	1	1	5	3	2	3
Trial Mean	973	1773	265	497	202	1471	4	3	3	3	2	3	2	1	1	3	2	2	2
CV (%)	37	28	49	40	33	12	31	15	68	33	47	48	44	78	31	46	47	47	28
SE ±	208.2	253.3	74.4	115.5	38.6	175.0	0.7	0.3	1.3	0.6	0.4	1.3	0.1	1.1	0.2	0.7	0.	0.4	0.7

Table A-5. Performance of top twenty lines in SAZBEN planted at Harare, Zimbabwe, 1992/93.

Variety	Final Plant Stand	Days to 50% Flw	Days to Matur.	Disease Scores (1-9) CBB	BCMV	HB	Rust	Seed Yield (kg/ha
MCM 5001	43	46	94	4	1	1	3	5333
29/6/7	50	39	103	3	2	1	2	5235
AFR 499	51	41	94	3	1	1	4	4642
SUG 75	54	39	95	3	1	1	3	4346
MCR 2202	32	47	95	4	2	1	3	4346
AFR 599	48	34	90	6	1	1	3	4247
AFR 596	45	33	81	4	1	1	6	4148
28/6/1	42	46	104	3	1	1	5	4148
AFR 516	50	38	95	2	3		1	4049
A 742	39	38	90	2	1	2	1	3951
CAL 125	46	38	90	4	2	1	2	3852
RMMM 29	49	37	94	2	1	1	4	3852
VMHH 8	43	37	94	2	1	1	4	3852
A 62	48	42	93	3	1		3	3852
RMMM 39	47	35	94	3	3	1	2	3753
AFR 598	49	38	93	2	2	1	1	3654
VMHH 9	49	38	95	3	3	2	2	3654
AND 911	47	41	95	2	1	1	3	3556
ANT 3	46	43	94	2	1	1	2	3556
Controls								
RAB 303	38	49	97	2	1	1	1	3062
Nasaka	43	35	81	4	3	1	1	2239
Phalombe	44	37	87	5	2	3	1	2173
Natal Sugar (local)	69	51	112	1	5		3	

Table A-6. Performance of best 20 entries in the 1992/93 SAZBEN at Bunda College.

Variety	Days to 50% Flw.	Disease Scores (1-9) ALS	CBB	BCMV	ANTH	Rust	WB	Seed Yield (kg/ha)
AFR 520	35	4	2	1	1	1	1	2876
AFR 576	34	4	2	1	3	2	1	2622
AFR 596	31	5	2	1	3	1	2	2589
29/6/7	42	1	2	1	2	1	2	2534
AND 863	36	2	2	1	1	1	2	2469
0640	31	3	3	1	4	1	2	2444
A 74	38	2	2	1	1	1	2	2421
AND 890	33	4	2	1	2	1	2	2368
AFR 474	35	3	2	1	2	1	2	2361
MCR 2514	35	3	3	1	3	1	2	2325
ZPV 299	32	3	4	1	5	1	2	2316
CAL 121	33	4	2	1	3	1	2	2297
AND 873	33	3	2	1	2	1	2	2284
CAL 125	33	2	2	1	2	1	2	2284
AFR 510	32	4	2	1	1	1	2	2271
1283	32	3	3	1	4	1	1	2240
CAL 124	37	2	2	1	2	1	2	2230
MCR 2301	32	4	3	1	3	1	2	2228
AND 897	34	3	2	1	3	1	1	2227
AFR 598	33	2	2	1	2	1	1	2216
Controls								
Nasaka	31	4	3	1	3	1	2	1931
Phalombe	32	5	3	1	4	1	2	1549
RAB 303	32	1	2	1	2	1	1	2194
A 286	42	1	2	1	1	1	2	2630

Table A-7. Performance of best 20 entries in the 1992/93 SAZBEN at Meru, Malawi.

Variety	Days to 50% Flw.	Disease Scores (1-9) ALS	CBB	BCMV	ANTH	HB	RUST	Seed Yield (kg/ha)
AND 863	41	2	3	1	1	1	1	1933
A 74		1	2	1	1	1	1	1333
LSA 89	35	2	3	1	1	1	1	1267
CAL 129	39	4	2	1	1	2	1	1171
AFR 562	39	2	3	1	1	1	1	1138
AFR 598	38	2	3	1	1	1	1	1064
AFR 523	41	2	2	1	1	1	1	1000
CAL 114	38	3	3	1	1	1	1	953
H2 Mulathino	42	6	4	1	1	1	1	922
AFR 521	40	3	4	1	1	1	1	916
0632-1	31	3	5	1	1	1	1	903
MCR 2514	37	3	3	1	1	1	1	898
AFR 513	37	3	3	1	1	1	1	889
AFR 593	39	4	4	1	1	1	1	864
CAL 115	41	2	3	1	1	1	1	851
DG 226	37	3	4	1	1	1	3	847
AFR 532	39	2	3	1	1	1	1	840
Controls								
Phalombe	33	5	3	2	1	1	1	767
Nasaka	33	5	3	1	1	1	1	467
Rab 303	41	2	3	1	1	1	1	223
Local check	42	3	3	1	1	1	1	200

Table A-8. Performance of top 20 lines in the 1992/93 SAZBEN, Maseru, Lesotho.

Variety	Days to 50% Flw.	Dis. Scores		Seed Yield (kg/ha)
		CBB	HB	
AND 909	60	3	3	1887
0002	50	3	4	1657
0953	56	3	2	1517
AND 911	60	2	3	1507
AFR 523	56	3	2	1327
AFR 596	60	4	4	1197
AFR 513	56	1	3	1170
DRK 54	55	3	3	1167
AND 874	63	3	3	1147
AFR 521	63	4	3	1120
AND 873	56	1	3	1083.
ZAA 44	55	2	2	1027
AFR 609	46	4	3	997
0627	50	4	4	997
DRK 65	60	3	4	983
CAL 114	56	3	2	953
SUG 80	58	3	1	953
Swanga Market-18	45	4	1	947
1377^2	60	3	2	897
1243	60	2	2	890
Controls				
RAB 303	53	2	3	598
Nasaka	56	1	3	1123
Phalombe	55	4	4	453
Local check	44	3	3	1073

Table A-9. Performance of top 20 lines in the 1992/93 SAZBEN, Msekera, Zambia.

Variety	Final Plant Stand	Days to 50% Flw	CBB Score	Seed Yield (kg/ha)
Sangretoro Felidia	19	36	2	650
DRK 52	20	38	3	643
MCM 1015	22	40	3	623
DRK 51	22	39	3	530
AFR 599	17	38	3	480
AFR 593	18	44	3	420
AND 863	5	48	8	417
AFR 509	18	35	2	407
29/6/7	20	40	3	377
DRK 53	15	39	3	373
AND 859	17	37	3	370
AFR 532	17	38	2	363
AFR 573	26	38	4	303
A 74	25	40	4	297
AND 873	15	40	2	267
CAL 129	24	37	6	267
0627	26	36	5	257
28/6/1	15	1	5	257
BAT 85	16	41	5	250
Controls				
RAB 303	21	43	6	283
Phalombe	19	37	5	134
Nasaka	16	37	5	73
Mbala local	4	41	5	60

Table A-10. Performance of top 20 lines in 1992/93 SAZBEN in Umbeluzi, Mozambique.

Variety	Final Plant Stand	DFF	Disease Scores (1-9) ALS	Rust	BCMV	Anth.	WB	Seed Yield (kg/ha)
DRK 50	55	37	1	1	1	1	1	3357
KID 31	40	34	1	1	1	1	1	3071
CAL 127	42	34	1	1	1	1	1	2929
RAB 331	53	34	1	1	1	1	1	2929
MCR 2514	45	42	1	1	1	1	1	2857
1377^2	38	34	1	1	1	1	1	2643
DRK 54	47	35	1	1	1	1	1	2571
DRK 53	33	35	1	1	1	1	1	2500
MCR 2301	35	35	1	1	1	1	1	2500
0627	40	33	1	2	1	1	1	2500
Kigoma Swanga-37	45	34	1	2	1	1	1	2500
MCM 1015	31	40	1	1	1	1	1	2500
CAL 125	44	35	1	1	1	1	1	2429
0483	37	34	1	1	1	1	1	2429
AND 909	33	37	1	1	1	1	1	2357
0632	38	39	1	2	1	1	1	2286
0640	39	32	1	2	1	1	1	2286
H2 Mulathino	40	35	1	1	1	1	1	2286
AFR 513	40	37	1	1	1	1	1	2214
Sangretoro Felidia	42	35	1	1	1	1	1	2214
Controls -								
Nasaka	33	34	1	3	1	1	1	1167
Phalombe	43	38	1	1	1	1	1	2190
RAB 303	32	41	1	1	1	1	1	1333
D. Calima (local)	41	35	1	2	1	1	1	2536

Table A-11.Top yielding entries in AFBYAN III, for sites with complete data: six sites for days to flower; five for days to maturity; five for seed weight; seven for yield.

Entry	Days to Flower	Days to Maturity	100 Seed Wt. (g)	Yield (Kg/Ha)
PEF 14	39	80	38.2	1766
G2816	40	82	34.9	1577
Ikinmba	37	82	40.5	1549
Kilyumukwe	37	79	50.6	1496
CAL 98	40	82	52.2	1475
Diacol Calima	38	78	51.2	1461
A 321	43	87	33.9	1459
Overall Mean	41	82	37.5	1363
Standard Errors based on (ent x loc)	1.5	2.8	4.1	182

Table A-12. Germplasm Evaluation Mabughai February, 1993: Performance of selected entries in comparison with resistant and susceptible checks

Accession Name	Stand at Emergence	Total Plant Mortality	% Survival
MAB 93/52	17	0	100
MAB 93/164	18	0	100
PAD 3	18	0	100
MAB 93/290	14	0	100
G 13856	13	1	92.3
MAB 93/158	17	2	88.2
MAB 93/55	16	2	87.5
BAT 1251	14	2	85.7
MAB 93/133	17	3	82.4
XAN 78	16	3	81.3
XAN 176	15	3	80.0
XAN 186	15	3	80.0
MAB 93/158	13	3	76.9
BAT 1272	13	3	76.9
EMP 87	18	4	77.8
MAB 93/28	18	4	77.8
MAB 93/165	18	4	77.8
BAT 93	18	4	77.8
VEF 88 (34)	18	4	77.8
BAT 98	17	4	76.5
MAB 93/83	17	4	76.3
Means of Checks			
LY 85 Treated (R)	17.5	2.5	86.3
LY 85 Untreated (S)	17.1	13.7	19.9
LSD		4.3	22.5

Table A-13. List of varieties included in the low fertility/ Aluminium Toxicity Trial at Bembeke, 1992/93.

S No	Varieties	Origin
1	Calima	CIAT
2	Pintado	"
3	G 5059	"
4	BAT 477	"
5	Carioca	"
6	A 283	"
7	G 16140	"
8	Kabulangeti B 0117-1	North Zambia
9	Sankana B 0020-7	"
10	Ngwangwa B 0104-3	"
11	Masai Red	"
12	Chilemba Mukulu B 0038-1	"
13	G 19428	CIAT
14	2-10	Malawi
15	Rio Tibaji	CIAT

Table A-14. Mean values of five characters studied in the low fertility/Aluminium Toxicity Trial at Bembeke, 1992/93.

Lime Trtm. (%)	Seed yld (kg/ha)	Nodule Nos	Nodule wt (g)	Root wt (g)	Shoot wt (g)
0	147	2.67	0.07	3.25	12.75
25	161	4.96	0.11	3.39	13.08
50	153	6.96	0.15	3.23	11.31
75	266	12.16	0.30	3.40	14.25
100	235	11.38	0.27	3.60	13.61
100+P	253	11.56	0.37	3.59	13.95
Trial Mean	209	24.79	0.21	3.36	13.03
CV(%)	69	119	104	31	35
SE±	194.2	34.926	0.261	1.467	6.035

Table A-15. Mean performance of 15 varieties for yield and other characters in the low fertility/Aluminium Toxicity Trial at Bembeke, Malawi, 1992/93.

S No	Varieties	No of nod (10 plts)	Nod wt (g/plt)	Root wt (g/plt)	Shoot wt (g/plt)	Seed yld (kg/ha)
1	Calima	7.17	0.14	3.82	12.53	212
2	Pintedo	5.06	0.15	3.06	14.92	180
3	G 5059	6.28	0.10	3.44	12.51	86
4	BAT 477	4.28	0.12	2.99	10.33	215
5	Carioca	5.61	0.16	2.63	11.32	243
6	A 283	5.78	0.15	2.88	9.03	97
7	G 16140	18.28	0.56	4.73	14.81	215
8	Kabulangeti B 0117-1	9.33	0.38	3.39	16.22	146
9	Sankana B 0020-7	16.00	0.36	3.61	15.90	336
10	Ngwangwa B 0104-3	13.50	0.26	3.95	15.62	307
11	Masai Red	7.00	0.23	3.56	13.35	299
12	Chilemba Mukulu B 0038-1	9.44	0.25	3.82	15.44	236
13	G 19428	9.67	0.13	3.57	10.91	162
14	2-10	4.50	0.13	3.17	14.33	178
15	Rio Tibaji	2.28	0.05	2.57	10.15	127
	Trial mean	8.28	0.21	3.41	13.16	209
	CV (%)	119	103	27	33	69
	SE ±	20.911	0.153	0.734	3.257	99.1

Table A-16 Mean yields of bean lines received from Rwanda and screened under low fertility conditions at Bembeke, Malawi, 1992/93.

Entry No.	Variety	Mean Seed Yield (kg/ha)
1	RWR 1091	277.56
2	RWR 221	536.33
3	RWR 1083	142.78
4	MLB-39-89A	202.00
5	MLB-43-89A	181.00
6	MLB-49-89A	193.22
7	Income 2	199.56
8	MLB-38-89A	88.56
9	RWR 968	150.44
10	RWR 925	178.67
11	SP - 2	260.22
12	RWR 969	82.11
13	RWR 1080	177.56
14	RWR 954	93.67
15	MLB-48-89A	44.44
16	SP - 5	221.67
17	RWR 914	161.89
18	SP - 8	174.00
19	SP - 7	119.89
20	RWR 866	140.11
21	SP - 6	195.56
22	Kilyumukwa	146.11
23	MLB-45-89A	84.33
24	More 90 026	102.44
25	MLB-47-89A	38.67
26	RWR 950	122.67
27	SP - 3	85.00
28	RWR 957	37.11
29	MLB-36-89A	8.00
30	RWR 1092	115.89
31	Income - 1	127.11
32	RWR 1059	133.22
33	RWR 990	146.00
34	RWR 779	163.56
35	RWR 1087	93.22
36	RWR 897	150.67
37	RWR 951	101.33
38	RWR 1058	131.78
39	SP - 1	188.22
40	MLB-40-89A	216.11
41	RWR 972	206.89
42	2-10 (Control)	253.00

Table A-17 Farmer evaluations: preferred and rejected varieties with reasons given. Arusha, Babati and Karatu trials were grown under drought conditions.

Trial Site	Preferred Varieties	Reasons for Preference	Rejected Varieties	Reasons for Rejection
Bababti	G 1002 445 PAI 148 G 13236 ZAA 54	Early Maturity Seed Color High Yield Few Diseases Few Insects Large Pods	G 14374 284 SUG 5	Late Maturity Lodging
Mbulu	Lyamungu 90 (G 5621) Red Kidney TB 79-467	High Yield Drought Tol. Good Taste	Dore de Kirundu G 8864	Poor Yield Poor Drought Tolerance
Karagwe	Lushara Kisapuli Carioca (2) BAT 1373 Dawn Masebe	High Yield Marketable Good Taste	XAM 97 Mulathino	No Market
Muleba	Kisapuli Lushara Dawn Masebe Carioca	Early Maturity High Yield Marketable Good Taste	XAM 97 Mulathino	No Market
Arusha	Insufficient Data			

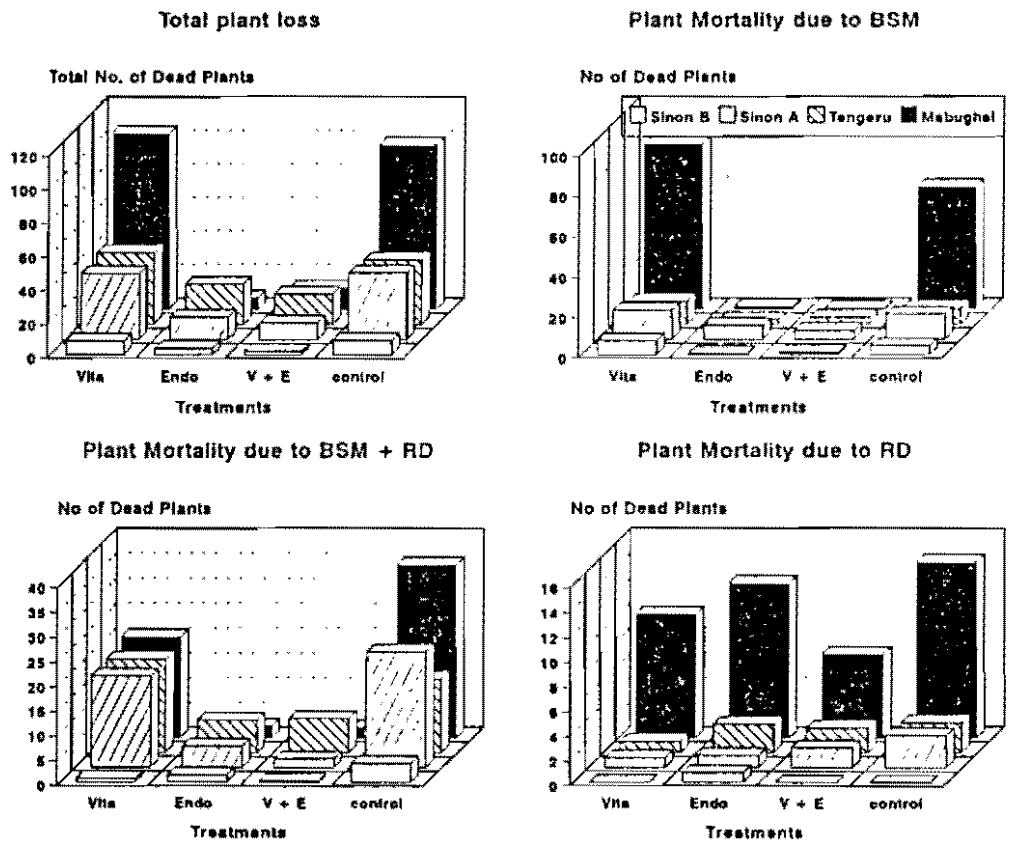


Figure 1. Plant mortality induced by BSM and root disease under four treatments at four sites in Tanzania.

BEAN RESEARCH PROGRESS REPORT IN LESOTHO 1992/93

INTRODUCTION:

Lesotho's arable land is 400,000ha and most of it is allocated to the staple foods such as sorghum, maize and wheat. Consequently, beans receive less hectarage compared to these other crops. Beans is considered to be the fourth major crop to sorghum, maize and wheat. Planting of beans in Lesotho has varied between 1338 to 20,865 hectares for the past eight years. (Lesotho Agricultural Situation Report 1989).

IMPORTANCE:

Beans are cash crops for farmers and nation. Beans also build up the soil nitrogen reserves. Beans contribute to the good soil texture and soil structures. Bean seed is an excellent source of proteins (amino acids and in combination with maize hard porridge (papa in Sesotho) the meal is almost balanced for protein content. The straw of beans is also used for animal feed.

Most of the bean varieties grown by the farmers in Lesotho are from South Africa. But with an on-going research for the past five years it was noticed that in comparison CIAT varieties are high yielding . The two varieties which have just been released are Nodak (pinto) and Harold (pink). The promising materials will be released after four years.

The average frost-free growing season in Lesotho, based on the 30 year average, ranges from 188 days in the mountains to 264 days in the lowlands. Dry beans are a short season crop, taking an average of 90-100 days to mature, so they are grown in lowlands, foothills and highlands. The beans grown in both foothills and highlands are of very good quality. Basotho farmers plant bigger area of dry beans late in the season, usually in December and early January. Lesotho Agricultural Research Division of the Ministry of Agriculture is looking for the high yielding, drought tolerant short season crops of beans in order to overcome these problems.

Because of this practice of planting late, the yield of beans in Lesotho is very low, averaging only 257kg/ha over the six year period of 1985/86 through 1990/91. The data presented in this report shows that higher yields are obtained with earlier, rather than later planting.

LOCATION:

Trials were conducted mostly at Maseru, the main station, one in Mafeteng (south), Leribe (north) Machache (foothills), and Thaba-Tseka (highlands).

Trials planted were as follows:-

1. Beans date of planting
2. SAZBEN (Southern African Zonal Bean Evaluation Nursery)
3. AFBYAN III (African Bean Yield Adoption Nursery III)
4. SAZBYT (Southern African Zonal Bean Yield Trial)
5. SARBEJN (Southern African Regional Bean Evaluation Nursery)

Really, it is with great pleasure to thank all the international organisations who have contributed to the success and improvement of beans in the world. I would like to take this opportunity to thank SADC/CIAT for the financial support which it has been giving Lesotho for more than 5 years. The support was used mainly to pay the technicians responsible for beans and some other important aspects relating to beans. Also I would like to thank CIAT for allowing Dr. Vas Aggrawal to visit Lesotho two times. Really I did not know how to interpret some of the plans, but right now I am well equipped with the knowledge I acquired from him.

I would also like to thank CIAT for supplying Lesotho with some important Materials which are serving the purpose needed by Basotho farmers. Right now Lesotho has caught up two babies from CIAT such

as NODAK (Pinto) and HAROLD (pink). Nodak is one of the most earliest variety of beans Lesotho has, also it has very good yield.

Dr. Emmanuel Motebang Pomela has left the Research Station to the Private Sector (Pioneer Hybrid International), so the problem of technical help is now prevailing; so I appeal to the International Organizations, specifically CIAT to change training from MSc to Phd to train from Diploma to BSc in any of the SADC countries because in Lesotho only Diploma and BSc people are staying to work at the Research Station.

Lesotho is having the great problems because the government is not willing to employ any new member right now, so there is great shortage of labour. In these regard I request CIAT to assist with some funds which will be used to pay casual labour during weeding of beans. I believe minimum of five people for three months will do much better so that we can get reasonable data during harvest.

Agronomy section in Lesotho is having only eighteen labours to plant, spray, weed, scare birds and harvest trials of maize, sorghum, wheat, beans,, sunflower cowpeas, groundnuts through out the lowlands of the country.

1993/94 Budget for casual labour request:-

5 people for three months
M 15.00/day/person
M 75.00/week/person
M1875/month/5 people
M375.00/month/5 people
M5625.00/3 months/5 people.

Because of the weeds in the trial Dr Vas Aggarwal was not impressed at all during his visit to Lesotho, but still unless something is

done weeding is still going to be a problem.

I personally appeal to the International Organisations responsible for beans production that it is high time that support for on-farm demonstration be considered. I therefore request for some funds to promote that, at the same time it will help to disseminate the knowledge to the farmers.

We have been making trials and releasing some important materials,, but they don't all reach farmers for adoption.

MALAWI BEAN RESEARCH PROGRAMME

A progress report - 1993

TECHNICAL ACHIEVEMENTS:

The bean research programme has recently released 3 new varieties, namely 21-5, 25-2 x 8-7 (proper variety names are not yet given) and PVA 692. The first two were derived from Malawi local germplasm and the last is a released variety in Colombia.

SEED MULTIPLICATION:

During the 1993 winter season the programme multiplied basic seed of Nasaka and PVA 692. Over 1 tonne of Nasaka and half a tonne of PVA 692 were produced. This seed is targeted for further multiplication through the smallholder farmer seed multiplication and distribution programme which involves both, government and none government organizations.

ORGANIZATIONAL CHANGES:

The bean research programme in Malawi has in the past been run by the University of Malawi scientists at Bunda College of Agriculture. However, the mandate for research on beans, like for all other crops, is with the Department of Agricultural Research (DAR) in the Ministry of Agriculture (MOA). The arrangement to have bean research work at Bunda was convenient because Bunda had the human resources and DAR did not. DAR supported the programme at Bunda with technical staff and Bunda run the programme with financial support from the USAID project (Bean/Cowpea CRSP) and other smaller projects. Recently, DAR has been going through a restructuring exercise. One of the activities was to development a seven year action plan for each commodity. Commodities were ranked according to priority for funding purposes and beans ranked second to maize. Since beans is currently considered a high priority crop in Malawi, DAR has decided to commit more resources to the commodity than it did before. Realizing that resources need control and close supervision DAR decided to reorganize the bean team. The new set up has two wings: one wing will be directly under DAR, based at Chitedze Research Station, and will be comprised of a breeder (team leader), an agronomist and a pathologist; and the other wing is that one at Bunda. Activities of these two wings will complement each other and the national programme will be coordinated from Chitedze. The SADC/CIAT programme in Malawi is also moving to Chitedze.

ANNUAL PROGRESS REPORT ON BEAN RESEARCH IN MOZAMBIQUE

Programme Objectives

The principal objective is breeding of appropriat varieties for local demands and environments. Clientele are small-scale family farmers.

Objectives for last year were: To develop varieties of large grain size; cream or dark red, and/or their mottled forms; with high levels of resistance to rust, virus and CBB.

Other countries collaborating with us are Tanzania, Malawi and Colombia.

Achievements

The programme's principal scientific achievements since initiation have been the clear identification of actual field problems in Mozambique and definition of research objectives; establishment of a National Uniform Yield Trial network; five extremely well accepted varieties (INIA-10, Encarnado and ENS-2 as local varieties, Diacol Calima and PVA 773 as introductions); another (INIA-Zambeze from South Africa) under rapid multiplication; and the identification of ICA Pijao as a worthy genetic progenitor.

It should be noted that, as Mozambique carried no regional sub-projects, we received no budget from SADC/CIAT this year.

Summary of 1993 research activities and results

1. A proposal for varietal release was made with respect to: Diacol Calima and PVA 773 (red mottle types), and ENS-2 and INIA-Zambeze (creams).

2. The outstanding agronomic traits of variety ICA-Pijao were confirmed. This variety is proposed for careful introgression into traditional farming and for "caracterization studies as a general progenitor model" as a parental material.

3. 3rd generation of lines selected against stem maggot was sown in the field.

4. First werification, under Mozambican environments, that low plant population (140,000-160.000/ha) produce higher yields than regular high number of plants per ha.

5. Conclusive results of beans & maize convenience for the peasant farmer.

6. Useful cooperation with AFBYAN, SAZBYT and SAZBEN regional nurseries.

7. Successfuly colaboration by SADC/CIAT Malawi in producing actual crosses among six selected progenitors of Mozambique F_1 seeds; F_2 plants already harvested.

8. Five copies of "A cultural do feijoeiro no Brasil" ["On bean production in Brazil"] were delivered from Cali to Maputo. Copies were sent for the University Library, INIA's Library, and Lichinga station.

9. In terms of regional communication of research progress, we had direct correspondence with Mrs Sengooba and Dr Opio of Uganda, Dr Aggarwal of Malawi and Dr Youngquist of Tanzania.

Important objectives remaining to be met

1. It is not clear yet what kind of varieties to breed for (specifically in regard to type of grain).

2. Overcoming the apparent disregard of beans as a crop of the peasant farmer and of multiple cropping practices and benefits.

Plan of work for next 12 months

1. Production of breeders seed of six varieties.

2. Final evaluation of 25 elite varieties.

3. To continue our breeding and variety selection scheme for Mozambique.

4. To produce the 4th generation of lines that have not shown bean fly attack in the three past seasons.

5. To produce seed samples for seed companies, extension services and some other organizations dealing with bean research.

6. International cooperation with AFBYAN and SAZBEN nurseries.

7. To carry further the proposal to identify and use a group of model progenitors, type ICA-Pijao. Uganda's programme looks ideal.

DISSEMINATION AND ADOPTION OF NEW TECHNOLOGY FOR BEAN PRODUCTION

COUNTRY MOZAMBIQUE ...PREPARED BY JESUS ARIAS ...DATE 22/11/93

DESCRIPTION OF TECHNOLOGY (Variety name and origin; crop management practice)	FIRST RECOMMENDED BY RESEARCH IN WHICH YEAR?	ESTIMATE OF USE BY FARMERS		DISSEMINATION ACTIVITIES IN 1993 (e.g. produced ?kg seed; extension leaflet?)
		On how many hectares?	How many (%)farmers?	
1. DIACOL-CALIMA - ICA COLOMBIA.	1990	100	*100%	800 kg.
2. " INIA-10 - INIA-MOZAMBIQUE	1.991	10.000	100%	3000 kg.
3. " ENCARNADO - INIA-MOZAMBIQ.	1.991	12.000	100%	4.000 kg.
4. P.V.A. - 773 - CIAT/COLOMBIA	1.992	50	100%	100 kg.
5. ENS-2 INIA-MOZAMBIQUE	1.993	10	100%	40 kg.
6. INIA-ZAMBEZE - INIA-MOZAMBIQUE	1.993	5	100%	30 kg.
7. BEANS IN DIRECT ASSOCIATION WITH MAIZE	1.992	UNKNOWN	UNKNOWN	
8. BEANS SEED PRODUCTION IN THE DOWNSTREAM LANDS OF LICHINGA.	1.993	3.000	100%	DIRECT CONTACT WITH FARMERS AND EXTENSIONIST.

Jesus Arias

* IF THERE WERE MORE SEED AVAILABLE THE FIGURES WOULD BE [illegible]

BEAN RESEARCH ACTIVITIES IN SOUTH AFRICA

Dr AJ Liebenberg, GCI, Private Bag X1251, Potchefstroom, 2520, South Africa

Production and marketing

The South African dry bean consumption is at present about 95000t per year. Production varies depending on the rainfall and the commodity price of beans relative to that of maize. Production went as high as 108000t in 1990 and 100000 in 1991. In 1992 production fell to 27000t due to the drought. Since then production has not recover to its previous level but was reduced to 60000t in 1993. This was mainly as a result of a reduction in the area under production from 75000 to 45000ha.

Bean production in South Africa is almost exclusively undertaken by commercial farmers in the cool high rainfall areas of the Eastern Transvaal and Eastern Free State. No statistics are available on small scale productions because these beans are mainly used for home consumption or sold on the informal market. The bean market has been completely deregulated since October 1993 and farmers have voluntary organised themselves into the Dry Bean Producers Organisation (DPO). The previous statutary organisation (the Dry Bean Board) operated under a floor price scheme which became effective only when a surplus production could cause a collapse in producer prices. The Board could regulate imports by means of import permits but this is now done by means of import tariffs (which is at present 10% of the import price).

Speckled sugar beans are the most important bean type and comprise 55 to 60% of production. Even more remarkable is the fact that this nearly exclusively comes from one cultivar i.e. Bonus. Small white canning beans comprising 20 to 25% of total production are also important. The local canning industry relies to a large extent on one cultivar i.e. Teebus. Another unique characteristic of the South African bean industry is the 10 to 13% annual production of *P. cocineus* (large white kidney beans). This is an cross pollinated crop which needs bees for pollination and no pure cultivar is used as farmers retain their own seed. The only other important bean type is brown haricot comprising 4 to 7% of the market. This also comes from only one cultivar i.e. Nuweveld.

Production practices

Commercial farming is based on high inputs. Of these the most important factors are: the use of disease free certified seed, weed control with herbicides as well as cultivation, high fertility levels, the use of chemicals for the control of fungus diseases and insect pests and different levels of mechanised harvesting. Input costs per hectare

(ha) can vary between R1200 and R1600 which means that prices and production must be high in order to make a profit. One of the main reasons for the reduced bean production is scalating production costs which increase the risks to an unacceptable level for some farmers. The seed cost can be as much as R400 per ha for speckled sugar beans. This is the most important expenditure.

Subsistence farmers rely on low inputs to reduce risk. They prefer cultivars with a short growing season. Resistance to the most important bean diseases combined with a high yield potential is also an important consideration. For this reason the carioca cultivar Mkuzi (A286) has become very popular for home consumption in spite of the limited market for this seed type. Yields are normally low.

Constraints

Bean production is limited to the cool high rainfall areas of the country. The variable climate of even the highest potential crop production regions of South Africa is responsible for most of the variation in yield. The presence or absence of a drought period with the associated high temperatures during the flowering period in January can make the difference between crop failure or a high yield. During wet seasons a number of foliar diseases can become important constraints. Rust can cause serious yield losses on the Eastern Highveld of the Transvaal and in Natal. Seed borne diseased such as common blight, halo blight, anthracnose and Bean Common Mosaic Virus were responsible for serious yield losses before disease free seed became available. In Natal angular leaf spot, scab and *Ascochyta* are important diseases in the mist belt and high rainfall areas.

Research priorities and activities

Until March 1991 all agricultural research in South Africa was undertaken by the Department of Agriculture. From April 1991 the eleven research institutes (situated in the different production areas) became part of the Agricultural Research Council (ARC) which is centred in Pretoria. The Grain Crops Institute (GRI) is responsible for research on all seed producing cash crops. This work is done at it's three centres of which the Oil and Protein Seed Centre (OPSC) at Potchefstroom is responsible for research on dry beans, groundnuts, soybeans and sunflowers. Each institute has to become selfsufficient as far as operating costs are concerned while the government will continue the funding of salaries. In the case of all the crops the commercial farmers' organisations took responsibility for the funding of research. This, however, means that they determine which research projects will be undertaken. At present most projects are also of importance for subsistence farmers but should they would have specific research needs in future these will need special funding.

In South Africa bean research concentrates mainly on two aspects: **breeding** of well adapted cultivars of seed types which are in demand and the improvement of **seed quality.**

Breeding is aimed at yield stability a over wide range of soil and climatic conditions. Only two seed types receive attention namely speckled sugar and small white beans. There is no breeding programme for large white kidney beans. Agronomic research is aimed mainly at cultivar evaluation. This is done in support of the breeding programmes and as an extension service to producers. The plant pathological research of the Oil and Protein Seed Centre (OPSC) at Potchefstroom is also centred round breeding in an effort to find lasting resistance to the main bean diseases. Private breeding programmes have less plant pathological support. Quality evaluation of cultivars is also an important consideration in cultivar release. This is done at the OPSC on all the entries in the cultivar trials and also on the advanced breeding lines.

Private research is restricted to breeding of seed types which are in demand. Companies centred in Natal produce cultivars which are well adapted to subsistence agriculture. Seed companies undertake production of disease free certified seed of their own cultivars.

The production of **disease free seed** is a very important aspect of the bean industry. Research on improved methods for the identification and prevention of seed borne diseases is done by the Plant Protection Research Institute (PPRI) at Rietondale in Pretoria.

Research programmes

Oil and Protein Seed Centre (OPSC)

In South Africa there are five **breeding** programmes on beans of which that undertaken at the OPSC is the most extensive. Breeding forms the nucleus of the research programme of the OPSC. It is divided into two separate projects i.e. for small and large seeded beans, and is supported by the following disciplines: agronomy, quality evaluation, plant pathology and biotechnology. Crosses are made at Potchefstroom and selections are done at four sites in the production areas. At this stage OPSC cultivars are all medium to long season ones with a high yield potential. The disease resistance of small seeded cultivars is good but most large seeded cultivars have poor rust resistance. Since Cedara, in the mist belt of Natal, has been included as a selection site field resistance to rust has improved in the newer breeding lines. Because the consumer in South Africa is very **quality** conscious new cultivars are released only if the quality standards are met, especially for canning beans. Segregating as well as advanced breeding lines are tested for canning and for cooking quality in the laboratory at OPSC. **Agronomic research** concentrates mainly on cultivar evaluation. The national **cultivar**

trials consist of 38 trials which includes 30 entries planted at 28 localities in all the main production areas. This work is coordinated by the OPSC and is conducted by seed firms, co-operatives, farmers and research stations. Overseas cultivars are also imported annually and are evaluated at Delmas in the main bean production area. Research on methods to identify **heat tolerance** in cultivars and breeding lines is being done as part of a M.Sc. project. Evaluation of the efficiency of different registered **herbicides** and **fungicides** is also done in order to advise farmers on the most effective and economical chemicals. **Plant pathology** concentrates on race identification in rust, angular leaf spot and halo blight in order to be able to breed for resistance to all known races. It is planned to breed for resistance to these diseases as well as common blight by means of a backcross programme. Research into methods of artificial inoculation of these diseases under field as well as laborarory conditions is an important facet of this research. Breeding for resistance against BCMV by means of the I-gene is done by the breeder without the assistance of the pathologists. We find the hypersensitive reaction of the I-gene to be a problem only on research stations. Serious plant losses occur because a mixture of cultivars and breeding lines with and without (some infected with BCMV) the I-gene are planted. The OPSC is also involved in producing **disease free breeders seed** of a number of cultivars. This service to the seed industry entails the increase of the 1 to 2kg disease free seed produced in the glass house to quantities which are large enough for commercial production. The **biotechnology** section is involved in developing a new method of producing disease free seed by means of meristem cultures. This section is also doing inter-species crosses between *P. vulgaris* and *P. acutifolius* (tepary beans) in an effort to incorporate the heat and drought resistance of tepary beans in new cultivars.

The researchers involved full time in bean research at OPSC are as follows: Dr AJ Liebenberg (programme leader and breeder), Mr J Lusse (agronomy), Mrs I van der Merwe (quality evaluation), Miss D Fourie (bacterial diseases) and Mrs MM Liebenberg (fungal diseases). Two researchers are only involved on a part time basis in one or two projects: Mrs C Mienie (biotechnology) and Mr P Hurn (weed control). Three technicians, two technical assistants and six labourers are working full time on beans while three technicians and many labourers are occupied part time.

Plant Protection Research Institute (PPRI)

Bean research at the PPRI at Rietondale Research Station in Pretoria concentrates on seed aspects only. This involves the development of more efficient ways to identify seed born bacteria, anthracnose, scab, *Sclerotinia* and viruses. Methods to disinfect seed in order to be able certify it as disease free are also investigated. This work is done in support of the disease free seed certification scheme. Research on the epidemiology of bacterial diseases, *Sclerotinia* (white mould) and a new unidentified virus disease in winter seed productions (with symptoms similar to Beat Curly Top) is also undertaken. PPRI has the only virus research unit in the ARC. They have unique

research facilities at Rietondale such as two scanning and two transmission electron microscopes and quarantine glass houses.

The researchers involved in full time research on beans at the PPRI: Mr J Serfontein (seed borne bacteria), Miss S Koch (anthracnose) and Mrs T van Tonder (viruses). Dr A Phillips is involved part time in work on *Sclerotinia* and scab.

Private research programmes

A number of private companies are involved in bean breeding. None of them have a full time bean breeder. Their aim is to give a choice of cultivars of all crops to their customers.

PANNAR with its head office in Greytown has released a number of cultivars which are well adapted to the climatic conditions prevailing in Natal. **Proseed** in Pietermaritzburg has released cultivars aimed at small scale farming in Natal. Some of these are small seeded CIAT lines of the carioca, beige and dark red types with excellent disease resistance but are not commercially acceptable. The firm has also released some of its own speckled sugar, small white and carioca cultivars. **Pioneer Hybrid International (PHI)** with a research station at Greytown has a breeding programme and has released its own cultivars aimed at Natal but is also involved in seed production of cultivars of Proseed. **SENSAKO** with its head office at Brits and a research station at Bethlehem has released speckled sugar cultivars aimed at the long season requirements of the main production areas. It is also involved in seed production for the DPO.

SARBEIN trials

The work of the Southern African Regional Commission for the Conservation of the Soil (SARCCUS) is done by a number of committees. The Standing Committee for Plant Production is responsible for a number of cultivar trials. One of these is the Southern African Regional Bean Evaluation and Improvement Nursery (SARBEIN) of which I am the coordinator. For the past eight years these trials have been planted in Lesotho, Malawi, Swaziland and South Africa. Botswana will plant its first trial this season. The SARBEIN trials consists of 15 entries of which each country supplies three local checks. Over the years the policy has been to vary the entries each year in order to provide the widest possible choice of cultivars and breeding lines. Most of the entries were from the OPSC breeding programme and other South African cultivars. A number of entries from Malawi were also included. The coordinator visits the trials in each country at least once during the growing season. A report with the results is compiled each year for the annual meeting of the Standing Committee in September.

The main value of the trials as far as the coordinator is concerned was the establishment of personal relationships with researchers in each of the participating

countries and a knowledge of the adaptation of different cultivars. The participating countries have up to now not been able to release any of the promising lines and cultivars which were identified. The main reason for this is the absence of an active seed scheme linked to national research programmes.

Future

As far as the future is concerned I think that better coordination between the SAZBYT and SARBEIN programmes is essential. This will make good use of the available infrastructure, manpower and funds and make the best technology and training available to all the countries in Southern Africa. This might mean that there will be only one regional nursery or perhaps a few specialised trials for specific seed types, growth habits or length of growing season.

DISSEMINATION AND ADOPTION OF NEW TECHNOLOGY FOR BEAN PRODUCTION

COUNTRY: South Africa PREPARED BY: Dr AJ Liebenberg DATE: 22 November 1993

DESCRIPTION OF TECHNOLOGY (Variety, name and origin; crop management practice)	FIRST RECOMMENDED BY RESEARCH IN WHICH YEAR?	ESTIMATE OF USE BY FARMERS		DISSEMINATION ACTIVITIES IN 1993 (e.g. produced ?kg seed; extension leaflet?)
		On how many hectares?	How many (%) farmers?	
1 Seed Certification Scheme	Plant and Quality control	50 000	85%	Seed firms advertise seed New cultivars are placed on variety list
2 Production of disease free seed Process of greenhouse production Seed production under field conditions Started by seed industry	PPRI 1976 OPSC 1977 Seed firms 1980	50 000	80%	Radio talks Seed firms advertise Cultivar recommendations with information on seed
3 Breeding of new cultivars Teebus Sumbo 3 Namboard Sherbourg	 OPSC 1977 OPSC 1980 OPSC 1983 OPSC 1992	 12 000 3 000 4 000 10	 15% 4% 5%	Seed orders are requested Certified and basic seed production in the winter Breeder's seed production in summer
4 National cultivar trials planted annually at 28 localities	Plant and Quality control 1975		100%	Report results of trials Cultivar recommendations Seed firms advertise seed

OPSC - Oilseed and Protein Seed Centre at Potchefstroom

PPRI - Plant Protection Research Institute at Rietondale, Pretoria

REPORT ON

BEAN RESEARCH PROGRAMME IN SWAZILAND, 1992/93 SEASON.

Beans are doing well in the Highveld and Middleveld where soil acidity is a problem. There was a positive response when 200kg of 2:3:2:(22) (N:P:K) rate was applied. However,there was no clear trend on nitrogen application.

Crop Protection:

Entomology:

An observational insect pest study was carried out during the season. Beanfly was found to be a problem. The two species are present in the country.

Pathology:

The plant pathologist left the Research Division as a result there was no pathological research. The diseases evaluation was done on the BCMV nursery and other bean trials.

Weed Management:

The formal survey conducted in 1992 found that farmers were either weeding once or none at all. Weed interference might be one of the limiting factors in production.

Released Varieties:

EAT 1713, PVA 894 and Carioca were released in July, 1992. However, there is no farmer growing any one of the varieties. There is a problem in multiplying the breeder's seed that has to be given to seed company which in turn produce the basic seed. Manpower and weather conditions were the major problems.

Training:

The Food Technologist had completed the M.Sc. programme and joined the Research Division. She is interested in working with beans. She would like to visit programmes where tests for acceptability and quality assurance on beans are going on like in Malawi and Tanzania.

Equipment:

The Food Technologist needs a Mattson Cooker and will be used in her research programme.

1 Germplasm Evaluation:

The programme conducted a number of introduction nurseries from different sources. It included SADC/CIAT, CIAT and SARBEIN (SARCCUS).

1. SADC/CIAT Nursery and Zonal Trials

2. CIAT Nursery included the VEF, BCMV and low phosphorus genotypes.

3. Sarbein Nursery.

<u>Evaluation of entries</u>:

SAZBEN Nursery : Fifteen entries gave yield above 1 tonne/ha that included: Phalombe, AFR 608, AFR 596 (susceptible to Rust), 0682, ZPV 299, RAB 351, RAB 508, MCM 1020, ZAA 44, Mechoste (susceptible to rust), MCM 1015, 13/6/5, 19/6/18, 142/6/1 and A 62.

SAZBYT Trial: Some entries had few seeds as a result, only two rows were planted instead of four (4). The performance was generally good for most entries. Carioca was more stable compared to the other varieties.

National Elite: Bean varieties that yielded over 500Kg/ha were: Nepture (RSA), Sugar (CIAT), Sugar 45 (CIAT), SRDA (Local), AFR 2479 (CIAT), AFR 246 (CIAT), Tikhuba (local), AFR 300 (CIAT) and PC 286 (RSA).

CIAT: A large number of entries had a shattering problem on VEF 91. A pinkish colour was dominate in that nursery.
Few lines will be selected on the low phosphorus nursery since they are the crannberry type which farmers prefer. However, the problem is their susceptibility to rust. This disease is a major problem in Swaziland.

SARBEIN: A large number (70 %) of entries in this trial are the crannberry type (sugar beans). The bean breeder is currently working on rust resistance. Some of the entries evaluated during 1992/3 season were either tolerant or intermediate. They were better than the Bonus (control), which is susceptible ti rust. Six lines(varieties) were identified for further research.

Agronomy:

A trial was initiated in 1991/92 season on planting date x variety x spacing. Farmers are using a 90 cm spacing between rows instead of 50-60 cm.

Planting dates did not give a clear trend while spacing increased grain yield for both type I and type II.

Trials were conducted on the application of basal fertilizer, nitrogen topdress and lime.

TANZANIA. PROGRESS REPORT

By

C.S. MUSHI
NATIONAL BEAN RESEARCH COORDINATOR

Bean research for 1992/93 seasons was hindered by insufficient funds and drought in Kilimanjaro region and some parts of Arusha region. In the lowland areas of Kilimanjaro region rain stopped when most of the crop was at flowering. Hence nothing was harvested in those areas where irrigation wasn't feasible. The bean programme at Uyole had virtually no funds despite efforts made of redirecting funds for Ismani, Kasulu and Ilonga to Uyole.

Research highlights

(a) Breeding in the medium altitude zone.

There was no new germplasm introduced due to reasons beyond our control. However, bean germplasm that was at Miwaleni under open quarantine was released to the National Programme by Plant Quarantine Staff at TPRI. This germplasm (VEF 90) was sown at Lambo and Selian. An array of genetic diversity was noted for the germplasm evaluated at Selian, a site that didn't experience severe drought.

In the yield evaluation trials, the best yielders were LB 2713, Masai Red, LB 2254, Rubona 5, Rubonobona and LB 674 in the Preliminary Yield Trial 1, Preliminary Yield Trial 2, Advanced Yield Trial 1, Uniform Cultival Trial 1, Uniform Cultivar Trial 2 and National Bean Yield Trial (medium altitude) respectively.

Hybridization work concentrated on transfering resistance for bean stem maggot and rust from identified sources into adopted cultivars.

Breeding in the high altitude zone.

The breeding work done at MARTI Uyole for 1992/93 season included evaluation of bean germplasm and varieties under different ecological zones. Only a limited work was done in on-farm work due to financial problems. Promising results were observed in yield. Generally the demand for the seeds of newly released varieties is now rising. The limited on-farm work has also shown that the approach ised seem to be working.

Breeding in the low altitude zone.

Breeding for bruchid resistant continued by incorporating arcelin in five promising lines. The F3 generation has been obtained and will be evaluated for bruchid resistant.Bruchids were separated and taxanomically identified from landrace samples. Sixteen lines were tested for cookability and water absorption. There was variation in the two characteristcs. Several crosses were made to incorporate fast cooking characteristic into EP4-4 and SUA90.

(b) Entomology

In the medium altitude zone research efforts were concentrated on evaluation of germplasm for bean stem maggot, study interaction between bean stem maggot damage and root rots, and time of sowing on the control of bean foliage beetle.

Promising bean lines with high levels of resistance to BSM were handled to the breeder for inclusion in the hybridization programme. Synergistic effects were found between BSM and root rots and it was concluded that research on these two problems should be done simultaneously.

Time of sowing beans on the control of bean foliage beetle revealed that early sowing of beans concidered with high foliage beetle population and hence high infestation. However, sowing late wasn't recommended because the crop would coincide with periods of drought and high BSM populations.

In the high altitude zone research efforts were also concentrated on intergrated control of bean stem maggot and chemical control. In the former, earthed up plants yielded higher than the control despite high BSM infestation as the control.

At SUA four insecticides were compared for control of pod sucking bugs. Yield losses ranged from 8-24%. Also, studies were initiated on the efficacy of spices to control bruchids and natural plant products to control BSM; and effect of time of planting on population dynamics of bean foliage beetle.

(c) Pathology

Screening bean germplasm for resistant to the major diseases in the medium altitude zone were the main activities in the previous season. In the ALS nursery, 7 lines/cultivars had scores of less than 1.5 implying that they have high levels of resistance. In the rust nursery, high levels of resistance were found in crosses of the Ikinimba family, a black seeded large size bean variety.

At Uyole, research activities in this descipline included; integrated contol of the angular leaf spot disease of the common bean, Effect of benlate T20 on seedborne diseases of common bean, Chemical control of bean foliage diseases, Evaluation of

traditional bean mixtures for yield and disease reactions. and sources of resistance to bean diseases.

Plant pathology work at SUA included; screening for resistance to major diseases found in the low altitude zone and an interdisciplinary team collected, identified, and documented Tanzania BCMV strains. The survey indicated that sreotype A strains are predominant.

(d) Agronomy

Optimum plant population and fertilizer for maize and bean intercrop has been evaluated for two years in farmers field in Arusha and Kilimanjaro region. Planting beans in association with maize at a plant population density (PPD) of 100,000 plants/ha and application of N fertilizer up to 60kg N/ha also gave significant increases in bean yield.

Bean cultivars in their final stage of release (on-farm) were evaluated for their potential to fix nitrogen using a commercial inoculant (NITROSUA) produced in Tanzania. Superior lines in fixing nitrogen were identified and inoculation increased seed yield by 20%. Some components of this trial will be tested on-farm for possible adoption.

Evaluation of Minjingu Phosphate Rock (MRP) and Triple Super Phosphate (TSP) as a source of P to beans was done in Kilimanjaro and Tanga regions. Preliminary results suggests that chances are there for making use MRP in soil which are acidic.

Weeds constitute the number one problem for both small and large scale farmers. Weeding twice was comparable to pre-emergence and post-emergence herbicides. As a result therefore, Gallex 500EC, Stomp 500EC and Flex which are already in the market can be effectively use for weed control in farmers fields.

Verification of technology on-farm has given good attributes on productivity. marketability and consumption assessments. Moisture stress in Kilimanjaro region affected several sites on-farm and on-station and therefore data may not be comparable to other seasons.

Collaborative Research

The National Programme continued to collaborate with the Regional Programme scientists in various activities including; evaluation of BSM resistant crosses, on-farm research in Lushoto and conducted the AFBYAN at Lambo and Selian.

The project on "Functional Diversity in Bean Mixtures in Tanzania" under the Natural Resources Institute, U.K. received support from the National Programme in terms of counterpart bean pathologist, Miss Adeletruda Massawe, and a technician.

Training.

Dr. C.S. Mushi and Mr. Patrick A. Ndakidemi participated in a one week advanced course, on experimental design and awareness of new computer softwares, held in Arusha.

STAFF DESPOSITION 1992/93 SEASON

C.S. Mushi	Ph.D	Breeding/Genetics	Lyamungu
M.E.T. Mmbaga	Ph.D	Agronomy/Physiology	Lyamungu
O.S. Mbuya	M.Sc	Agronomy	Lyamungu (on Ph.D programme)
F.S. Ngulu	M.Sc	Pathology	Lyamungu (on Ph.D programme)
P.A. Ndakidemi	M.Sc	Soils	Lyamungu
S. Slumpa	M.Sc	Entomology	Selian
S.O. Kweka	B.Sc	Breeding	Selian
L. Mukandala	B.Sc	Agronomy	Maruku
C. Madata (Mrs.)	Ph.D	Breeding	MARTI-Uyole
M. Mkuchu (Mrs)	M.Sc	Agronomy	" "
D. Kabungo	B.Sc	Entomology	" "
F. Mwalyego (Mrs)	M.Sc	Pathology	" "
S. Nchimbi	Ph.D	Breeding	SUA
P.R. Dimoso	M.Sc	Breeding	SUA
E.E. Maeda	Ph.D	Nutrition	SUA
N. Mollel	Ph.D	Sociology	SUA
R. Mabagala	Ph.D	Plant Pathology	SUA
Femi Lana	Ph.D	Plant Pathology	SUA
D. Mushobozi	M.Sc	Entomology	SUA
J.K. Ampofo	Ph.D	Entomology	SADCC/CIAT Selian

TECHNICIANS WORKING ON BEAN RESEARCH 1992/93

NAME	QUALIFICATION	SELIAN
E.T. Marenge	Diploma	Lyamungu
D.J. Mugunda	Diploma	Lyamungu
F.S. Assenga	Diploma	Lyamungu
G.Y. Muhulo	Diploma	Lyamungu
J.C. Matata	Certificate	Lyamungu
J. Pembe	Diploma	Kasulu
P. Bajuta	Diploma	Gairo
A. Nyenza	Diploma	Ismani
E. Mgaya	Diploma	MARTI-Uyole
Yengolo (Mrs)	Diploma	MARTI-Uyole

Elikunda	Diploma	MARTI-Uyole
R. Ole (Ms)	Diploma	MARTI-Uyole
L.P. Mwanjoka	Diploma	Mmbimba
W. Kibandiko	Diploma	Nkundi
J. Haule	Diploma	Ndengo
M. Utenga	Certificate	Ndengo
L.E. Mollel	Diploma	Selian
J. Clemence	Diploma	Selian
E. Mziray	Certificate	Selian
A. Kisamo	Diploma	Selian

BEAN RESEARCH PROGRESS REPORT FOR ZAMBIA

1992-1993

INTRODUCTION

Bean research activities for 1992-1993 season were concentrated at Msekera Research Station in the medium rainfall zone (Region III) and at Misamfu Regional Centre in the high rainfall zone (Region III).

An Agronomist, Mr. John Musanya was posted to Misamfu in October 1992 to coordinate bean research activities in the major bean growing area in the northern part of Zambia. As a result of this development, all bean variety trials were conducted at Misamfu Regional Centre in addition to Msekera Research Station. Bean variety trials were also conducted at other major testing sites in the country. However, at the time of reporting, no data had been received from any of these stations.

BEAN BREEDING

At Msekera, the yields in most trials were low. This was due to poor crop development caused by excessive waterlogging during the extremely wet months of January, February and March. The problem of waterlogging was also experienced in some trials at Misamfu.

Results of a few major trials are discussed below:

The National Climbing Bean Variety Trial with 9 entries, (one local check) was very poor at Msekera. The mean yield was only 410 kg/ha. In previous years mean yields have been higher than 800kg/ha.

The climbing bean trial was conducted for the first time at Misamfu where it generated a lot of interest among farmers. Yields were higher in Misamfu where a mean yield of 710 kg/ha was obtained, The highest yielding entry was ACV 8312 with 861 kg/ha.

Of the three national dwarf bean variety trials (small-seeded, large-seeded and Zamseed trials), the trial for small-seeded genotypes had the best results at both locations. The entry BAC 76 (813 kg/ha) had a significantly higher yield than the local check Carioca (488 kg/ha) at Msekera. At Misamfu, BAC 76 also yielded the highest with 852 kg/ha grain yield but did not outyield Carioca with 702 kg/ha.

In the large-seeded trials, the entries with outstanding performance at both locations were CIFEM 87033 and A 197. A 197 also performed well in last year's trials.

The variety has been approved for pre-release and will be tested in on-farm trials in all major bean growing areas.

In the Southern African zonal bean trial at Msekera, A 286 was the highest yielder with 768 kg/ha. In the same trial, A 197 yielded 627 kg/ha while the local check, ZPV 292 yielded 425 kg/ha significantly lower than A 286.

At Misamfu, A 344 was the highest yielder in the zonal trial, followed closely by A 286, both small-seeded genotypes. Among the large-seeded entries A 197 and ZPV 292 had better yields than the other two large-seeded entries from Malawi (Nasaka and Sapelekedwa).

BEAN ENTOMOLOGY

Two trials were planted at Msekera using bean cultivar G 4489 to evaluate the efficacy of local plant leaf extracts compared to chemical insecticides for the control of bean stem maggot.

Results from the two trials indicate the Endosulfan 50% WP applied as seed dressing is the best chemical insecticide against bean stem maggot. The other potential insecticides include Dimethoate 40% EC and Endosulfan 35% EC. However, among the botanicals, T. ciliata leaf extract appears to be the best substitute for chemical insecticides for bean stem maggot control. Orthene 75% WP in this trial was the least effective against bean stem maggot. However, it will be evaluated further as it is safer than endosulfan.

ON-FARM COLLABORATIVE BEAN RESEARCH

Collaborative bean research activities are undertaken by the ARPT of Northern Province and researchers in Arusha Tanzania.

The major activities are listed below:

- Bean on-farm exploratory trial on fertilizer
- Observations on bean stem maggot species composition dynamics
- Bean on-farm variety trials
- Fundikila improvement trial.

BEAN RESEARCH IN ZIMBABWE DURING THE 1992/93 GROWING SEASON- A PROGRESS REPORT by A. GUBBA

A wide range of biotic and abiotic factors are known to adversely affect the production of dry beans, *Phaseolus vulgaris* L., on a global scale. In Zimbabwe, research efforts are being directed towards breeding, plant protection, and agronomic aspects of beans all in a bid to improve the yields of the crop which are presently very low, averaging about 500kg/ha. These research efforts are part of the SADC/CIAT objectives of improving the productivity of the bean crop which is known to be a main source of protein to the majority of the people in the region.

1. PLANT PROTECTION

1.1 Parasitism of bean stem maggot (Zitsanza)

The study was conducted to establish the relationship between the pest and parasite populations over a 2 month period.Results show a high correlation between the number of pupae collected and the number of parasites emerging. A density dependent relationship in which parasites responded to changes in the population of its host was observed and this would imply that parasites play a significant role in the population dynamics of BSM. Parasites were identified as belonging to the order *Hymenoptera*. The genus *Opius* contributed 71% while *Herbertia* contributed 22% of the recorded parasites.

1.2 The importance of wild legumes as reservoirs of the necrotic strains of bean common mosaic virus(BCMV) (Gubba)

Leaf samples collected from six wild legume species growing in the vicinity of bean fields were tested for virus presence using bean differentials, ELISA and immunosorbent electron microscopy (ISEM). The wild legumes tested were; *Vignae pygmae, Dolichos kilimanjaricus, Sphenostylis erecta, Vigna nuda, Vigna unguiculata* and *Glycinea wightii*.All samples tested negative for the presence of BCMV. A more comprehensive survey is planned and further tests will be carried out during the coming season.

1.3 Bruchid research (Giga)

1.3.1 Evaluation of traditional grain protectants

Wood ash, sand, rapoko husks, sunhemp seeds and neem leaf powder were separately admixed with bean grain to evaluate their effectiveness against the two major Bruchid species. Additives applied at higher rates were effective in reducing the insect multiplication and grain damage. The ash treatment was the most effective at all rates.

1.3.2 Simulated storage in clay pots

The effectiveness of ash, sand, vegetable oils and rapoko husks admixed with beans stored at ambient conditions in clay pots was tested. The trial demonstrated that the admixtures protect the grain but their effectivenesss varied significantly. Oil followed by ash were the most effective treatments in controlling both species.

1.3.3 Bruchid populations in the field and infestation of pods
Callosobruchus rhodesianus and *Acanthoscelides* were the most abundant and they increased after pod initiation. Very few *Bruchidius* species and no *Zabrotes* were recorded.

1.3.4 Evaluation of armophous silica dust (Dryacide)
A commercial preparation of an amorphous silica dust was tested as a grain protectant. Efficacy of dust was compared with 2% dust formulations of pirimiphos-methyl and methacrifos. No insects survived the 5 and 7 day exposures in all treatments. Dryacide is therefore an ideal substitute to dilute dust insecticides for the small farmer.

1.3.5 Solar disinfection
Grain commonly exposed to sun at regular intervals to control bruchids. Approach showed some promise for bruchid control.

1.3.6 Competition
Competition between and within species has been suggested to have a determining factor in the distribution of pests. Laboratory results showed that at 22°C and 28°C, *Acanthoscelides* was the stronger competitor while at 32°C *Zabrotes* was the stronger competitor of the two.

1.3.7 Screening "RAZ" lines for bruchid resistance
Fifty three lines from CIAT were tested for resistance to *Zabrotes* and *Acanthoscelides*. RAZ lines did not deter oviposition of *Zabrotes*. Very few larvae developed successfully into adults. From the susceptible check, 148.8 adults emerged with a survival rate of 84.1%. In the case of *Acanthoscelides*, the number of adults that emerged from RAZ lines were not significantly different from the susceptible check. Thus bruchid resistant lines showed only preferential resistance to *Zabrotes* and not to *Acanthoscelides*, the most dominant species in Africa.

2. AGRONOMY (Nleya)

2.1 Identification of rhizobia strains with good nitrogen fixing potential
Eight exotic and two local strains were evaluated for their nitrogen fixing potential. Unfortunately nothing came out of this work due to the complete wiping cut of the trial by BSM attack.

3. BREEDING (Mukoko)

3.1 Crosses
Twenty five new crosses were made. Lines crossed are at pre-release stage and were screened for disease and bruchid resistance. The F2 will be available this summer and F3 in winter.

3.2 Segregating populations
Twenty three F5 populations from which 197 single plant populations have been taken. These will be tested in the non-replicated bean progeny rows and introductions trial at Harare this coming season.

3.3 Preliminary Variety Trials

Carioca type lines with 10 entries were tested at 2 sites. There are very good materials in this trial and some 3 lines of this lot are to be sent to CIAT.

3.4 Intermediate Variety Trials(IVTs)

3.4.1 Food Bean IVTs
Grown at 3 sites only due to shortage of seed following the severe drought of 1991/92. A total of 18 entries at each site.

3.4.2 Michigan Peabean IVTs
Grown at 5 sites with 40 entries per site.

3.5 Advanced Variety Trials(AVTs)

3.5.1 Food Bean AVTs
Had 49 entries at 5 of the sites except Makoholi with 16 entries and Panmure with 33 entries.

3.5.2 Michigan Peabean AVT
Grown at 7 sites with a total of 16 entries per site.

3.6 Collaborative Trials

3.6.1 Bruchid resistance nursery trial
This is done in collaboration with Dr. Giga. Lines are tested for agronomic performance and bruchid resistance.The nursery is at Harare and has 58 lines.

3.6.2 Southern African Zonal Bean Yield Trial(SAZBYT
This is from the SADC/CIAT breeding programme. The trial facilitates exchange of elite material between national programmes, identifies superior lines to be advanced to the PVTs and it monitors the reaction of lines to different diseases and pests. Fourteen entries are being tested.

3.6.3 Southern African Zonal Bean Evaluation Nursery(SAZBEN)
Also from the SADC/CIAT breeding programme. It provides promising bean germplasm to national programmes and also identifies superior lines to be advanced to PVTs. One hundred and forty-four lines are being evaluated.

3.7 1993/94 season's collaborative trials
Materials received from CIAT, Colombia
a) IBCMV BRN No. 3
b) F2 segregating population
c) Bush and climbing lines
d) Natal Sugar type lines
e) Red Mexican (large red types)

4. STAFFING CHANGES

Mr. A. Gubba has been awarded a Rockefeller Foundation Fellowship and is likely to leave for the USA for PhD studies in plant virology either for the spring(January) or fall(August) semesters for the 1994 academic year.

DISSEMINATION AND ADOPTION OF NEW TECHNOLOGY FOR BEAN PRODUCTION

COUNTRY: ZIMBABWE PREPARED BY: DR. O.Z. MUKOKO DATE: 17 NOVEMBER, 1993

DESCRIPTION OF TECHNOLOGY (Variety name and origin; crop management practice)	FIRST RECOMMENDED BY RESEARCH IN WHICH YEAR?	ESTIMATE OF USE BY FARMERS		DISSEMINATION ACTIVITIES IN 1993 (e.g. produced ?kg seed; extension leaflet?)
		On how many hectares?	How many (%) farmers?	
Navy bean varieties released				.Produced about 100kg of each of 3 lines for potential release
1) Ex-Rice	1985	2 000	30	
2) C20	1988	2 000	30	.Updated bean production leaflet for distribution to farmers upon request
Plant population 45cm x 7.5cm spacing	1984	18 000	90	.Produced an article in a local farmer magazine on ways of minimising BCMV spread by breeding for resistance

/ks

A report on the 2nd Meeting of the Pan-Africa Bean Entomologists Working Group, Harare, 19-22 September, 1993

Introduction

In 1989 the first meeting of the Pan-African Working Group on Bean Entomology brought together entomologists from nearly all the major bean growing countries in Africa with the following primary objectives :

1. to review progress made in bean entomology in Africa and elsewhere.

2. to identify priorities for research in bean entomology in Africa.

3. to formulate research linkages among scientists through the development of regional collaborative research sub-projects.

At that meeting the following were identified as key pest that constrain bean productivity with Africa :

1. Bean stem maggot (*Ophiomyia* spp.)

2. Bruchids (*Zabrotes subfasciatus* and *Acanthoscelides obtectus* and

3. Aphids (as vectors of viral diseases).

Areas for Collaborative Research Sub-projects were recommended on these pests and subsequently various sub-projects were approved by the Steering Committees and were executed by National Programme Scientists with technical support from the regional entomologist and from entomologists at CIAT HQ.

The purpose of the 2nd Meeting was to :

1. review progress and achievements made through the sub-projects in solving the problems originally identified.

2. review the prioritisation of key pests and the focus on the areas of research.

3. allocate resources for research and development of solutions for priority problems.

Methodology

The methodology used was a blend of the "Project Planning by Objective" (PPO or ZOPP) and "The Planning Stage of On-Farm Research : Identifying Factors for Experimentation" by Tripp and Wooley, 1989.

The steps followed were :

1. Problem identification;

2. Setting priorities among problems;

3. Identification of causes and effect;

4. Identification of solutions and setting priorities among solutions;

5. Project design and documentation;

6. Resource allocation for research on problems.

Results

Key problems.

A total of 14 pest species and species complexes were identified as constraining bean productivity in different parts of the region. Out of these the following priority list was developed :

1. Bean stem maggot;

2. Bruchids;

3. Ootheca;

4. Aphids;

5. Pod bugs and

6. Thrips.

Several other pests were considered as being of localised importance e.g. leafminers in Mauritius and whiteflies in Sudan. In such cases the individual National Programmes were encouraged to tackle them directly and to request assistance from the regional programmes and/or the regional entomologist as necessary.

Research and Development.

Projects Identified

The following areas of research were identified for future sub-projects and national programme research focus.

Bean Stem Maggot (BSM)

The group felt that there is now a reasonable understanding of the pest distribution, biology and ecology and strategies developed for BSM management. The group should now be emphasis on: 1. continued screening for sources of resistance and development of resistant cultivars; 2. creation of farmer awareness on the BSM problem through the development of extension documents as well as farmer seminars; 3. farmer, extension and researcher collaboration in trials for technology transfer and adoption.

Bruchids

The group acknowledged that there are good sources of *Zabrotes* resistance available from CIAT; and that good progress has been made in the development of control methods. Emphasis should now be placed on: 1. incorporation of *Zabrotes* resistance into adapted or local varieties; 2. dissemination of bruchid management technologies through researcher, farmer and extensionist collaboration in evaluation and extension of technology; 3. develop IPM strategies especially for *Acanthoscelides* to which resistant varieties are not yet available.

Aphids

The group recommended that the sub-project on: "Differential transmission of BCMV strains by aphid species" should be transferred to the BCMV sub-project based in Sokoine University of Agriculture, Tanzania as what is left to be done is more virology rather than entomology. The new aphid sub-project should focus on: development of components for the management of aphids as direct pests (especially during the dry seasons.)

Ootheca spp, Thrips and Spiny Brown Bugs

The group acknowledged that there is insufficient knowledge about these pests, [1] and that initial focus should be on literature search to determine what is known about these pests and or related species. Future research may focus on biology and ecology.

[1]Mrs. Lilian Pomela is engaged in a Ph.D study on Spiny Brown Bugs).

The working group went ahead to allocate (hypothetically) resources available for entomology research and development of control strategies for these pests as follows: 1. bean stem maggot - 25%; 2. bruchids 20%; 3. Ootheca 20%; 4. aphids 10%; 5. Spiny brown bugs 7.5%; and 6. thrips 7.5%. 10% of available resources were reserved for country specific problems e.g. whiteflies in Sudan, leafminers in Mauritius etc.

It is the expectation of the Pan-African Bean Entomologists Working Group that future sub-project proposals will reflect these priorities and that steering committees will consider proposals in bean entomology research in the light of these identified priority areas.

2ND MEETING OF THE PAN-AFRICAN WORKING GROUP ON BEAN ENTOMOLOGY: HARARE, ZIMBABWE, SEPTEMBER 20-22, 1993

LIST OF PARTICIPANTS (SADC)

1.	Dr. Greenwell K.C. Nyirenda,	Entomologist, Malawi.
2.	Dr. Gareth Davies,	Entomologist, Mozambique.
3.	Dr. Clemence S. Mushi,	Breeder, Tanzania.
4.	Mr. Simon Slumpa,	Entomologist, Tanzania.
5.	Mr. David A. Kabungo,	Entomologist, Tanzania.
6.	Dr. J.K.O. Ampofo,	Entomologist, CIAT, Tanzania.
7.	Dr. D.P. Giga,	Entomologist, Zimbabwe.
8.	Mr. Peter Chinwada,	Student (Entomology), Zimbabwe.
9.	Mr. Jeff Mutimba,	Resource Person, Zimbabwe.

Could not attend because of other committments

10.	Dr. Susan Nchimbi-Msolla	Breeder, Tanzania.
11.	Mr. Philemon Sohati	Entomologist, Zambia.
12.	Mr. Jose Sancho-Cumbi	Entomologist, Mozambique.

Equipment Status 1993

National Equipment Budget Use in 1993
Approved at Steering Committee Meetings

Country Item	Date	Cost USD	Suppliers/ Agents	Status/ Action
ANGOLA				
Computer + Accessories	14/9/93	$ 3386.00	Payment made for local Purchase in Luanda	Received
LESOTHO				
Technical Asst. Support Jan 93-March 93	Jan. 93	$ 2100.00	Payment made on 9/10/92	Received
SWAZILAND				
Computer Maintenance Support	10/6/93	$ 600.00	Payment made on 17/6/93	Received
TANZANIA				
1. Stanton Balance		$ 2100.00		Received
2. SLR Camera with Macro lens		$ 600.00		On order
3. Cone Seeder		$ 3500.00		In process
4. Lab equipment		$ 1000.00		In process
ZIMBABWE				
BSM Research Items: (Muslin Cloth Hand Lenses Mettler Balance)	22/9/93	$ 365.00	Payment made on 22/9/93	Received
REGIONAL				
Mattson Coolers		$ 1000.00		On order

SUBPROJECT SUMMARY ANNUAL REPORT TO STEERING COMMITTEE

1. **SUBPROJECT TITLE:** Breeding for resistance to bean stem maggot.
2. **YEAR OF FIRST APPROVAL BY STEERING COMMITTEE:** 1989
3. **NAME OF PROJECT LEADER:** Dr. C.S. MUSHI
4. **NAME OF RESEARCH INSTITUTION AND COUNTRY:** Lyamungu Research Institute - Tanzania.
5. **BRIEF STATEMENT OF THE PROBLEM AND ITS MAGNITUDE:** In Africa, beanflies (Ophiomyia spp.) are the most important insect pests of the common bean (Phaseolus vulgaris L.). Serious losses of up to 100% has been recorded in beans.
5. **INTENDED DIRECT BENEFICIARIES OF THE SUBPROJECT:** (researchers in other countries? extension? producers? others) Availability of resistant cultivars in Tanzania and incorporation of resistance to adapted cultivars in other countries.
7. **LIST OF OBJECTIVES FOR LAST YEAR:** (as approved by Steering Committee)
   (1) Study inheritance of resistance to bean flies and the type of gene action confering asistance.
   (2) Develop appropriate breeding methodology for developing beanfly resistance varieties.
   (3) Continue screening for new sources of resistance.
8. **OTHER COUNTRIES COLLABORATING IN THIS SUBPROJECT:** Malawi and Zambia to collaborate later in the evaluation of advanced crosses.
9. **CONCISE SUMMARY OF RESEARCH ACTIVITIES AND RESULTS (LAST YEAR ONLY)** (organized by objectives - please limit to 1.5 pages)

I To study the inheritance of resistance to bean stem maggot.

In February 1991 lines that reconfirmed to have high levels of resistance to bean stem maggot were crossed to susceptible but adaptable cultivars. The resistant lines were ZPV 292 and Ikinimba, and the susceptible cultivars were Lyamungu 85, Canadian Wonder, and Dore de Kirundo.

The crosses were advanced to F2 and later to F3 with remnant seed of F" kept for field evaluation. Both the F2 and F3 populations together with their parents were sown at Selian Agricultural Research Institute in 1992 after the Masika rains; time when the beanfly population was very high.

Summary

The resistant parents showed higher levels of resistance to BSM and were similar in performance indicating that they can both be used to develop resistant cultivars. The F2 and F3 crosses reacted similarly for all traits measured indicating that resistance to BSM is heritable. However, this is only tentative conclusion pending verifications when heritability estimates are calculated.

II **To study type of gene action conffering resistance to BSM.**

The North Carolina Design III has bean employed in this study. The sources of resistance were crossed to susceptible lines, and F_1's advanced to F_2 generation. The materials for estimation of genetic parameters were produced by crossing randomly selected F_2 individuals (used as males) to each of the original parents(used as females). Due to the few number of parents that were available by that time and used in this study, a 9 x 9 partial diallel has been made using parents identified as having high levels of resistance.<

Results: Seed from all these crosses have been planted at Lyamungu for evaluation under irrigation.

III **Development of resistant cultivars with desirable seed colour.**

Crosses between the resistant cultivars and adapted cultivars were advanced to F_5 by single hill descent. These were separated into different colours per cross and evaluated for yield at Lambo and against BSM at Lyamungu, Moshi.

The trial at Lambo has been harvested , but seed hasn't been processed for yield determination. However, due to the drought that this site experienced, yield will be lower than expected.

The trial at Lyamungu was evaluated for BSM but due to the lower population of beanfly that prevailed, the trial is being repeated agaom at Lyamungu under irrigation.

IV **Development of appropriate breeding procedure.**

Crosses made between resistant and susceptible cultivars were advanced to F_4 by single plant descent. F_4 acrosses were evaluated at Selian as detailed in Experiment 1 above. Single plant selections were made and evaluated in progeny rows at Lyamungu under irrigation in early 1993. Also resistant plants were selected seed combined for some parents and evaluated at Lyamungu as above. This means two breeding procedures are being evaluated viz:

1. Combination of single hill descent and pedigree.

2. Recurrent selection.

Due to the low beanfly population that prevailed in the previous evaluation, the trials are being repeated again at Lyamungu under irrigation.

10. REGIONAL COMMUNICATION OF RESEARCH PROGRESS:
(monitoring tour organized by subproject? report at regional workshop? direct correspondence? other means?)
Reported at the 3rd SADCC regional workshop and at the Entomology Working Group Meeting at Zimbabwe

11. ANY DIVERGENCES FROM THE PLANNED ACTIVITIES, WITH REASONS:

No

12. PRINCIPAL SCIENTIFIC ACHIEVEMENTS SINCE INITIATION:
Promising BSM resistant cultivars in F6 generation.

13. SUMMARY OF BENEFITS FOR THE REGION:
Source of resistance identified for incorporation into desirable seed types from other countries.

14. PROPOSAL FOR CONTINUATION (IF APPROPRIATE):

a. Important regional objectives remaining to be met:

All three

b. Additional years needed to complete these priorities:

Three years

c. Plan of work for next 12 months (continue next page):

(1) Completion of the trials mentioned above, data analysis and report writing.

(2) Composition of BSM regional nursery using the F6 for evaluation in other countries.

(3) Incorporate resistance to adopted cultivars from other countries and advance them to F3 or further as desired by other countries.

(4) Continue screening for new sources of resistance.

d. Proposed budget:

		US $
(1)	Labourer wages	2560
(2)	Fuel for irrigation	1333
(3)	Transport	2560
(4)	Car maintenance	512
(5)	Land preparation	151
(6)	Chemicals	289
(7)	Harvesting materials	133
(8)	Stationery and office services	111
(9)	Subsistence allowance	1067
(10)	Overtime/meal allowances - technicians	111
(11)	Miscelleneous	111
(12)	Contingency 20%	1685
	Total (US $)	10623

FINANCIAL STATEMENT FOR THE ESM SUB-PROJECT SEPTEMBER 1992 TO 31 DECEMBER 93

ITEM	TAS (,000) allocated	TAS (,000) balance
Plastic pots	204	NIL
Labels and tags	104	NIL
Harvesting materials	187	57
Wages	680	220
Subsistence allowances	272	140
Chemicals	272	102
Transport	340	120
Land preparettions	102	42
Irrigation and pump maint.	152	NIL
Miscellenous	68	NIL
Total	2380	681
Balance carried forward		399.5
Total balance		1080.5 (US $ 2,350)

OFFICER I/C LYAMUNGU
RESEARCH CENTRE MOSHI.

Date 20/11/93 Authorized representative

Date 20/11/93 Sub-project leader

SUB-PROJECT SUMMARY ANNUAL REPORT TO STEERING COMMITTEE

1. SUB-PROJECT TITLE: Bruchid
2. YEAR OF FIRST APPROVAL BY STEERING COMMITTEE: 1991
3. NAME OF PROJECT LEADER: D.P. Giga
4. NAME OF RESEARCH INSTITUTION AND COUNTRY: University of Zimbabwe, Zimbabwe
5. BRIEF STATEMENT OF THE PROBLEM AND ITS MAGNITUDE:
Stored beans are attacked by the bruchids (*Acanthoscelides obtectus* and *zabrotes subfasciatus*. The cause significant losses in small farmer storage.

6. INTENDED DIRECT BENEFICIARIES OF THE SUB-PROJECT:
(researchers in other countries? extension? producers? others)
Extension, small farmers.

7. LIST OF OBJECTIVES FOR LAST YEAR:
(as approved by Steering Committee)

1. Develop cost effective control strategies
2. Screen "RAZ" lines
3. Species composition and distribution

8. OTHER COUNTRIES COLLABORATING IN THIS SUB-PROJECT:

9. CONCISE SUMMARY OF RESEARCH ACTIVITIES AND RESULTS (LAST YEAR ONLY): (organized by objectives - please limit to 1.5 pages)

Objective: To identify and evaluate the constraints to efficient bean storage faced by small-scale farmers.

Progress: A survey in 14 districts in 4 provinces of Zimbabwe is now complete. A detailed paper of this study was presented at the 3rd SADC/CIAT workshop in Swaziland. The survey collected information on bean production and post-harvest practices. Collaborators in Tanzania have yet to complete the survey in Tanzania. This objective has been fully achieved.

Objective: To assess levels of infestation and species composition and distribution.

Progress: Preliminary studies conducted during 1992/1993 season where populations of bruchids were monitored in the field and infestation levels on bean pods in the field and after harvest were measured. Pods were also artificially infested to determine whether drying/maturity influenced infestation. Generally, no differences between varieties but infestation increased with time and dehiscence. Zabrotes developed on pods only when seeds were exposed when pods split.

Objective: Species composition and distribution in Zimbabwe.

Progress: Samples are collected during the survey and through extension agents to determine species occurrences and distribution.

Except for one sample infested with *zabrotes*, all samples contained *Acanthoscelides*, even from areas where *zabrotes* were expected! Objectives is fully met.

Objective: Species distribution in Africa.

Progress: Results from various respondents varied in quality. This emphases the lack of information and proper identification of species in many countries. During my recent visit to International Institute of Entomology and National History Museum, London I examined all records of the two species. Acanthoscelides was widespread in to Africa and *zabrotes* records incomplete. Information collection is an on-going exercise. Further information was gathered during a travelling workshop in Zimbabwe, Tanzania and Uganda.

Objective: To develop and evaluate simple cost bean storage technologies for small farmers.

Progress: A number of experiments to assess traditional grain protectants in the laboratory and simulated conditions have been completed. The experiments evaluated the efficacy of admixing vegetable oils, neem oil, soil, wood ash, neem leaf powder, rapoko (millet) husks, sunnhemp and amorphous silica dust. These products were compared with insecticide grain protectants. Efficacy varied depending on application rate. Wood ash and vegetable oil treatments were found to be very effective.

Preliminary studies on solar disinfestation are now complete and results are encouraging. Further experiments are planned.

Objective: To screen *phaseolus vulgaris* germplasm.

Progress: 53 'RAZ' lines from CIAT-Colombia were multiplied and then screened against the 2 bruchid species. All RAZ lines were resistant to *zabrotes* but highly susceptible to *Acanthoscelides*.

Note: A progress report was presented at the 2nd Pan-African Bean Entomologists meeting held in Harare in September, 1993.

10. REGIONAL COMMUNICATION OF RESEARCH PROGRESS:
(monitoring tour organized by sub-project? report at regional workshop? direct correspondence? other means?)

Presentations at 3rd SADC/CIAT meeting in Swaziland October, 1992 and 2nd Pan-African Bean Entomologists Working Group meeting in Zimbabwe, September, 1993. Bruchid Travelling Workshop, September, 1992 in Tanzania, Zimbabwe and Uganda.

11. ANY DIVERGENCES FROM THE PLANNED ACTIVITIES, WITH REASONS:

On-farm trials delayed due to: drought, transport constraints and inadequate quantity of beans.

12. PRINCIPAL SCIENTIFIC ACHIEVEMENTS SINCE INITIATION:

- Critical evaluation of selected conservation methods
- Papers for publication in journals are in preparation
- Paper on use of amorphous silica dust accepted for presentation at international conference in Australia in April, 1994.

13. SUMMARY OF BENEFITS FOR THE REGION:

- RAZ lines now included in breeding programme at Sokoine University.
- Recommendations on use of wood ash and vegetable oils as admixtures NB. Need for producing extension leaflets.

14. PROPOSAL FOR CONTINUATION (IF APPROPRIATE):

a. *Important regional objectives remaining to be met*:

- Critical quantification of on-farm losses.
- On-farm validation of technologies.

b. *Additional years needed to complete these priorities*:

$1^{1}/_{2}$ - 2 years

c. *Plan of work for next 12 months (continue next page)*:

Transport permitting:

1) Trials on-farm to validate efficacy of selected admixtures e.g. wood ash, oils and composed with standard insecticides.

2) Continue studies on competitive-interaction between the two bruchid species.

3) Test under "semi-practical" situations followed by on-farm tests of the "Bean tumbling technic".

4) Solar disinfestation experiments.

d. *Proposed budget*:

Due to the fact that supplementary funds from Rockefeller foundation were obtained a significant amount of funds are not expended. These could go some way for the next season's work. Approximately US $2000 in addition is requested for on-farm work.

BRUCHID SUB-PROJECT FINANCIAL STATEMENT

UZ/CIAT BRUCHID PROJECT AT UNIVERSITY OF ZIMBABWE

Financial Statement as at June 1993

	Item	Budget	Expenditure	Funds received
1.	Research assistant/ enumerators	8,000	2720.90	Z$20 932.00 (US$5 500) Sept 1991
				Z$18 878.73
2.	Consumables	6,000	1584.87	(US$3 000) Nov. 1992
3.	Local travel	18,500	5472.09	
4.	Support services	1,200	442.67	
		33,700	10220.53	Z$ 39810.73
				(US$8 500)
	Balance with University of Zimbabwe		Z $29590.20	(US$ 4450)

Date _____ Signed _____
Bursar's Department

Date _____ Signed _____
Research grantee
(D.P. Giga)

SUBPROJECT SUMMARY ANNUAL REPORT TO STEERING COMMITTEE

1. **SUBPROJECT TITLE:** STUDIES ON IMPORTANT PATHOGENIC VARIATION AND MANAGEMENT OF ANTHRACNOSE IN THE SADCC REGION

2. **YEAR OF FIRST APPROVAL BY STEERING COMMITTEE:** 1991
3. **NAME OF PROJECT LEADER:** COY HACIWA
4. **NAME OF RESEARCH INSTITUTION AND COUNTRY:** UNIVERSITY OF ZAMBIA LUSAKA

5. **BRIEF STATEMENT OF THE PROBLEM AND ITS MAGNITUDE:**

THERE IS LITTLE INFORMATION ON THE IMPORTANCE OF ANTHRACNOSE, THE PREVAILING PATHOGENIC RACES AND THE EXTENT OF DISEASE CONTROL THROUGH CULTIVAR MIXTURE.

6. **INTENDED DIRECT BENEFICIARIES OF THE SUBPROJECT: (researchers in other countries? extension? producers? others)**

SMALL SCALE FARMERS.

7. **LIST OF OBJECTIVES FOR LAST YEAR: (as approved by Steering Committee)**

IDENTIFY PATHOGENIC RACES.

STUDY DISEASE CONTROL MEASURES THROUGH CULTIVAR MIXTURE AND PLANT RESISTANCE.

8. **OTHER COUNTRIES COLLABORATING IN THIS SUBPROJECT:**

TANZANIA

9. **CONCISE SUMMARY OF RESEARCH ACTIVITIES AND RESULTS (LAST YEAR ONLY): (organized by Objectives - please limit to 1.5 pages)**

Three trials were conducted at kaka in Northern Province under the day to day management of Mr. T. Banda. Mr. Banda is a trial assistant under ARPT and also manages CIAT trials. All three trials were planted on 5-2-93. This happened to be just before a dry spell, so germination and performance was not as good as expected.

TRIAL 1

The objective was to find the level of a resistant variety that are required to reduce anthracnose disease level in a susceptible mixture. Various combinations of the varieties G.6040 and Mbala local were made. G.6040 is resistant to anthracnose whereby Mbala local is susceptible. The combinations used were 100:0, 50:50, 25:75:10:90, 5:95 and 0:100.

G.940 alone or at 50:50 has higher yields (550 kg/ha) than the other treatments. However, the anthracnose scores were low in all plots. The anthracnose scores were never more than 1 (on a 1-9 scale) for all plots. The differences in yields may be attributed to the genetic potential of G.6040.

TRIAL 2

The objective was to assess the differences in disease reaction between a mixture of Mbala local and its components grown separately. The mixture had three components, a yellow, a white and a purple component.

The mixture had a yield of 420kg/ha, white (362), yellow (350) and Kablanketi (250. The anthracnose scores were again low and there was no correlation with yield.

TRIAL 3

The objective was to estimate the effect of host density on disease spread and severity. The treatments were combinations of 3 densities of Mbala local and sole Mbala local or mixed with G.6040.

Like the other trials anthracnose scores were low, so there were no differences in incidences and severity between different treatments.

PATHOGENIC RACES

Work continued on identification of pathogenic races. Thirty three more isolates were tested. However, they all fitted into groups that were identified earlier. None of them infected PI207262, TO, AB136 and G 2333. All of them infected michelite and Perry Marrow.

COMMENT: The results in KAKA were disappointing because of low levels of anthracnose. To improve on this, next season, susceptible material will be planted early in the season to get the disease. The distance from Lusaka to Kaka makes disease management very difficult.

10. REGIONAL COMMUNICATION OF RESEARCH PROGRESS: (monitoring tour organized by subproject? report at regional workshop? direct correspondence? other means?)

Pan-Africa Plant Pathology Working Group Meeting, Thika, Kenya. 26-30 May, 1992

11. ANY DIVERGENCES FROM THE PLANNED ACTIVITIES, WITH REASONS:

12. PRINCIPAL SCIENTIFIC ACHIEVEMENTS SINCE INITIATION:

IDENTIFICATION OF PATHOTYPES

13. SUMMARY OF BENEFITS FOR THE REGION:

PROVIDE INFORMATION FOR THE BREEDERS

14. PROPOSAL FOR CONTINUATION (IF APPROPRIATE):

a. Important regional objectives remaining to be met:

Disease Control Measures through Cultivar mixtures and plant resistance

b. Additional years needed to complete these priorities:

This is long term research

c. Plan of work for next 12 months (continue next page):

Repeat last years trials. Where the anthracnose scores were low look for another location in Northern Province.

More identification of Pathogenic Races.

d. Proposed budget:

	US $
Personal emoluments (labour)	1000
Equipment and materials	800
Expandable supplies	1000
Travel	200
Stationery, photography	500
Contingencies	4000

FINANCIAL STATEMENT

	ZK
Labour	188,500
Equipment (laptop computer)	900,000
Expandable supplies	113,000
Fuel	310,000
Subsistance	75,000
Postage/Stationery	15,000
TOTAL	**1601,500**
RECEIVED	**1732,500**
BALANCE	**131,000**

* Also received K1 300 000 for the previous year. This is being reserved for this season.

* Zambia received all 1993 allocation.

Next allocation should go to the collaborator (F. Mwalyego) in Tanzania.

C. HACIWA

SUBPROJECT SUMMARY ANNUAL REPORT TO STEERING COMMITTEE

1. SUBPROJECT TITLE: Angular leaf spot subproject

Studies on pathogenic variation in *Phaeoisariopsis griseola*

2. YEAR OF FIRST APPROVAL BY STEERING COMMITTEE: November 1992.

3. NAME OF PROJECT LEADER: J.M. Teri (with Dr. R.C. Kuhn).

4. NAME OF RESEARCH INSTITUTION AND COUNTRY:

University of Swaziland, Swaziland.

5. BRIEF STATEMENT OF THE PROBLEM AND ITS MAGNITUDE:

There are conflicting reports on whether pathogenic variation occurs in *P. griseola* or not. It is important to resolve this as a first step in developing breeding programmes for resistance to ALS in Eastern and Southern Africa.

6. INTENDED BENEFICIARIES OF THE SUBPROJECT:

Breeders and Pathologists with programmes for resistance to ALS.

7. LIST OF OBJECTIVES FOR LAST YEAR:

(a) To collect and assemble a collection of *P. griseola* from the region
(b) To acquire bean differentials which have been used in similar studies elsewhere (CIAT & Zaire)
(c) To refine techniques for obtaining abundant sporulation
(d) To initiate studies on variation

8. OTHER COUNTRIES COLLABORATING IN THIS SUBPROJECT:

Zimbabwe, Malawi, Tanzania, Zambia, Rwanda, Uganda

9. CONCISE SUMMARY OF RESEARCH ACTIVITIES AND RESULTS (LAST YEAR ONLY):

(a) Collections of ALS specimens have been obtained as follows (after obtaining import permit from MOAC, Swaziland):
(a) Tanzania - June 1993: 20 (from Mgeta & Mafiga)
(b) Rwanda - July 1993: 3
(c) Uganda - November 1993: 10 (from Kawanda, Kamenyamigo, Kachwekano, Nakabbango, Senge, Bukalasa, Rubale)
(d) Malawi - July 1993: one
(e) Swaziland - April-June 1993: Numerous (from Luyengo)

(b) Twenty bean differentials have been obtained from Dr. Robin Buruchara, CIAT-Rwanda (received in November 1993).

(c) Source of V-8 for making V-8 agar identified in November 1993 (MCB, Mbabane). But it may take up to February 1994 before an order can be expected.

Note that:

(i) envisaged travel to accomplish (a) and (b) was not done as correspondence proved adequate.

(ii) employment of assistants to accomplish (c) and (d) was not done as we were still in the preparatory stage.

10. REGIONAL COMMUNICATION OF RESEARCH PROGRESS:

N.A

11. ANY DIVERGENCIES FROM PLANNED ACTIVITIES:

NONE

12. PRINCIPLE SCIENTIFIC ACHIEVEMENTS SINCE INITIATION:

N.A

13. SUMMARY OF BENEFITS TO THE REGION:

N.A

14. PROPOSAL FOR CONTINUATION (IF APPROPRIATE):

The ground work to get the work started has been accomplished. We are now at the take-off stage.

However, a combination of circumstances make continuation of the studies by the present team unlikely. By the time V-8 is obtained in February (if an order was placed today) there would be no time to complete the studies before the expiry of our contracts. One of us (JMT) will leave. The other researcher (RCK) is still uncertain about his status at the end of his present contract in June 1994. Hence, we are unable to guarantee continuity since studies on variation cannot in earnest start before February 1994. Perhaps continuity can be worked out with the expected replacements later.

The budget is virtually intact.

We very much appreciate the trust you put in us to undertake this important study. Our sincere apologies for this new development and especially to our collaborators who so readily collected and mailed the materials to us.

SUBPROJECT SUMMARY REPORT TO STEERING COMMITTEE.

1. **SUBPROJECT TITLE**
   Strain monitoring of BCMV in Eastern and Southern Africa.

2. **YEAR OF FIRST APPROVAL BY STEERING COMMITTEE:**
   1989.

3. **NAME OF PROJECT LEADER:**
   Allan Femi Lana.

4. **NAME OF RESEARCH INSTITUTION AND COUNTRY:**
   Sokoine University of Agriculture, Box 3062, Morogoro Tanzania.

5. **BRIEF STATMENT OF THE PROBLEM AND ITS MAGNITUDE:**
   Bean Common Mosaic Virus has devastating effect on bean production worldwide. While certain varieties exhibit some levels of resistance against some strains of this virus, a need was established to investigate which strains are predominant in the two regions. The identification of these strains will further assist the plant breeders to determine whether or not the deployment of I gene cultivars is a sound strategy for these regions particularly should new strains emerge.

6. **INTENDED DIRECT BENEFICIARIES OF THE SUBPROJECT:**
   (researchers in other countries? extension? producers? others)
   On the short term, the knowledge of the existence and predominance of these strains will assist plant breeders to determine relevant methods to protect the I gene. On the long term, the results of their investigation in collaboration with the virologist will filter down to the farmers level under a well organised or coordinated bean management scheme.

7. **LIST OF OBJECTIVES FOR LAST YEAR:**
   (as approved by Steering Committee)
   To monitor the evolution of possible new strains that can or may overcome the bc - gene resistance particularly with the current emerging information that "weed" legumes habour strains of BCMV.

8. **OTHER COUNTRIES COLLABORATING IN THIS SUBPROJECT:**
   Uganda, Ethiopia, Kenya, Zambia, and Zimbabwe.

9. **CONCISE SUMMARY OF RESEARCH ACTIVITIES AND RESULTS (LAST YEAR ONLY):**
   (organized by objectives - please limit to 1.5 pages).

(a) . Using series of antisera to various strains of BCMV developed by the Tanzanian Center with the financial support of the Regional programme over the last 4 years, materials from Uganda were tested along with the newly advanced/developed EP4 lines in Tanzania.

(b). Within Tanzania, some of the newly collected land races in western parts of Tanzania were also screened against the necrotic strain (TNI) using both monoclonal and polyclonal antisera.

(c) In compliance with the directives given at the last BCMV Meeting in Nairobi in 1992, materials derived under the USAID - CRSP - SUA programme were exchanged with Uganda for evaluation.

(d) Right here on station, a short course for identification of BCMV strains for middle-level (Diploma and Certificate holders) is being organised. It is hoped that this type of training will assist these agricultural officers in the field to have some first hand knowledge in recognising what may look like diseases induced by new strains of BCMV if and when they come up in the farmers or research fields. These Agricultural Officers will alert the laboratory of this development and send such materials to us for identification. We must admit that communication with the Lake Region has been poor and this is regretted. Some seeds received from Uganda and Zambia have been incorporated into the Tanzanian lot and are to be tested under field (hot spot) and screen-house conditions. Our current "hot spots" are Mghetta, Morning Site and SUA in Morogoro. The results of these will be analysed and compared with those collected by the Washington Group (Mink and Myers).

10. **REGIONAL COMMUNICATION OF RESEARCH PROGRESS:**
(monitoring tour organised by subproject? report at regional workshop? direct correspondence? other means?).

A visit was paid to Uganda under a different funding and this provided an opportunity for exchange of research progress being made by the two countries in the subject matter.

11. **ANY DIVERGENCES FROM THE PLANNED ACTIVITIES, WITH REASONS:**
No. However a short training has beeng organised for two Zambians (Dr. Haciwa and Kaitisha) on diagnosis of legume viruses in SUA.

12. **PRINCIPAL SCIENTIFIC ACHIEVEMENTS SINCE INITIATION:**
The CIAT Team (Kirkby, Ampofo and Mushi) that visited the Tanzanian Center in April 1993 will confirm that we have been able to develop a mini antiserum bank (Polyclonal) to all strains of BCMV currently existing or isolated within the Eastern and Southern Region - hence we have a reference collection.

13. **SUMMARY OF BENEFIT FOR THE REGION:**
Such development under 12 (above) will make it easy to identify new strains if and when they emerge. Furthermore, antisera to these strains are available on request for distribution to others within the subproject.

14. **PROPOSAL FOR CONTINUATION (IF APPROPRIATE):**
(a). We must improve our contact with Robbin in the Lake Region - I consider this crucial.
(b). Surveying or screening for possible emerging new strain is a continuous progress. This will get us ready for any un-expected situation.
(c). The newly advanced EP-4 lines developed in SUA will have to be incorporated in our screening programme. We will forward and exchange seeds with Zimbabwe, Zambia, Uganda and Kenya.
(d). As approved by the steering committee in 1992, the group should meet at the end of 1994 to discuss and exchange progress and make new plans based on such progress.

D. **PROPOSED BUDGET (800 USD).**

As itemised in the proposal budget approved by the Steering Committee - see attached.

NOTE.

We still have a balance of 24,073/= left out of the 172, 423.30 approved for this mombring work. The amount was spent essentially on consumables. (ELISA plates, and chemicals). Actually, it may be cheaper for CIAT to purchase these for us as these sometime take long to get to us. All that has been done in the past is that CIAT just deducts costs from approved budget (see attachment). Thanks.

SUB-PROJECT SUMMARY ANNUAL REPORT TO STEERING COMMITTEE

1. SUB-PROJECT TITLE: Wild legumes as potential reservoirs of the necrotic strains of bean common mosaic virus.

2. YEAR OF FIRST APPROVAL BY STEERING COMMITTEE: 1992

3. NAME OF PROJECT LEADER: Prof. Allan Femi Lana

4. NAME OF RESEARCH INSTITUTION AND COUNTRY: Plant Protection Research Institute - Zimbabwe.

5. BRIEF STATEMENT OF THE PROBLEM AND ITS MAGNITUDE: Recent studies have shown the prevalence of the temperature - independent necrosis - including strains of BCMV, especially NL3, in Africa. These strains are now thought to have originated on wild legumes in Africa. Thus there is a high risk that unknown strains of BCMV on wild reservoirs could be transmitted by aphids to beans, making an even stronger case of protecting the I gene.

6. INTENDED DIRECT BENEFICIARIES OF THE SUB-PROJECT:
(researchers in other countries? extension? producers? others)
Breeders in the region working on protecting the I gene. Benefits will later filter down to producer who will have at their disposal varieties resistant to necrotic strains.

7. LIST OF OBJECTIVES FOR LAST YEAR:
(as approved by Steering Committee)

   1. To determine whether wild legumes are reservoirs of the necrotic strains of BCMV.
   2. To identify the strains isolated from identified wild legumes.
   3. To provide generated information to the breeders for incorporation into breeding programme.

8. OTHER COUNTRIES COLLABORATING IN THIS SUB-PROJECT: Uganda.

9. CONCISE SUMMARY OF RESEARCH ACTIVITIES AND RESOLTS (LAST YEAR ONLY): (organized by objectives - please limit to 1.5 pages)

<u>Research Activities</u>

a) Survey was confined to farming areas around Harare. Leaf samples were collected from the following wild legumes growing close to some bean farms/plots; *Glycinea wightii*, *Vigna pygmaea*, *Dolichos kilimanjorichus*, *Sphenostylis erecta*, *Vigna nuda* and *Vigna unguiculata*. Sap prepared from leaves of each of these legumes was inoculated onto 3 plants each of a complete set of bean differentials. One plant each of a complete set of bean differentials

was inoculated with either NL3 or healthy bean sap to be used as controls.

b) Another portion of the sap prepared from each of the wild legumes was used for preparing election microscope grids. Immunosorbernt electron microscopy was employed using NL3 antiserum as trapping antibody. Healthy and infected controls were included in this test.

c) Due to lack of reagents, ELISA was not used in these tests.

Results

a) None of the bean differentials inoculated with sap from the six wild legumes exhibited mosaic-like symptoms to indicate the presence of BCMV. Sap prepared from these inoculated bean differentials showed no virus-like particles when grids coated with this sap using the ISEM technique were viewed under the lectron microscope.

b) Sap prepared direct from the wild legumes, and used for coating electron microscope grids when viewed under the electron microscope had no virus-like particles.

10. REGIONAL COMMUNICATION OF RESEARCH PROGRESS:
(monitoring tour organized by sub-project? report at regional workshop? direct correspondence? other means?)

No communication yet on research progress.

11. ANY DIVERGENCES FROM THE PLANNED ACTIVITIES, WITH REASONS:

None

12. PRINCIPAL SCIENTIFIC ACHIEVEMENTS SINCE INITIATION:
Though there is need to survey more areas, the results so far indicate that in Zimbabwe, wild legumes growing adjacent to bean farms/plots are not infected with BCMV.

13. SUMMARY OF BENEFITS FOR THE REGION:

The danger of wild legumes having a high virus inoculum potential for infecting commercial beans and also providing the potential for new pathogenic strains of BCMV, based on findings so far, might not be there. The significance of this of this on current breeding strategies to protect the I gene might then fall away.

14. PROPOSAL FOR CONTINUATION (IF APPROPRIATE):

a. *Important regional objectives remaining to be met:*
The situation in other countries in the region (excluding Uganda) has to be monitored closely so as to come up with

a true representative picture of the role of wild legumes as reservoirs of the necrotic strains of BCMV in the region.

b. *Additional years needed to complete these priorities*: One additional year.

c. *Plan of work for next 12 months (continue next page)*:

1. More farms in Zimbabwe need to be visited to sample a lot more wild legumes growing in the vicinity of bean farms/plots.

2. Visits to some of the neighbouring countries in the region to carry out similar surveys. This is so because so far all the work has been confined to Zimbabwe.

d. *Proposed budget*: Amounts in Zimbabwean dollars.

		Budget	Funds Available
1.	Travel and accommodation	7,000.00	9,966.30
2.	Purchase of reagents	1,500.00	
3.	Purchase of stationary	250.00	---------
		8,750.00	9,966.30
	Balance	1,216.30	
		9,966.30	

* Current conversion rates Z$ 6,6442 = US$1

SUB-PROJECT SUMMARY ANNUAL REPORT TO STEERING COMMITTEE

1. SUB-PROJECT TITLE: Breeding for resistance to BCMV

2. YEAR OF FIRST APPROVAL BY STEERING COMMITTEE: 1992

3. NAME OF PROJECT LEADER: Prof. Allan Femi Lana

4. NAME OF RESEARCH INSTITUTION AND COUNTRY: Department of Research and Specialist Services - Zimbabwe.

5. BRIEF STATEMENT OF THE PROBLEM AND ITS MAGNITUDE: BCMV is an important pathogens of beans in Africa. Breeding for resistance is the only feasible way to control BCMV. Temperature - insensitive necrotic strains of the virus are known to overcome the I-gene resistance especially in Africa. I-gene cultivars though are not killed by necrotic strains if either of the genes b_c-2^2 or bc-3 or both are incorporated to protect the I-gene.

6. INTENDED DIRECT BENEFICIARIES OF THE SUB-PROJECT:
(researchers in other countries? extension? producers? others)
Breeding work for other countries where BCMV is a problem and there are no breeders.

7. LIST OF OBJECTIVES FOR LAST YEAR:
(as approved by Steering Committee)

   To breed for resistance to BCMV by incorporating the recessive bc-2^2 and/or bc-3 genes into beans cultivars at the prerelease stage.

8. OTHER COUNTRIES COLLABORATING IN THIS SUB-PROJECT: None.

9. CONCISE SUMMARY OF RESEARCH ACTIVITIES AND RESULTS (LAST YEAR ONLY): (organized by objectives - please limit to 1.5 pages)

   A set of 25 crosses were undertaken in January using MCM lines as resistant sources to BCMV. Seed from the crosses were harvested in May and the F1 seed is being grown out for positive identification of crosses.

   Backcrossing is to start at the F1 stage.

10. REGIONAL COMMUNICATION OF RESEARCH PROGRESS:
(monitoring tour organized by sub-project? report at regional workshop? direct correspondence? other means?)

    None

11. ANY DIVERGENCES FROM THE PLANNED ACTIVITIES, WITH REASONS:

None

12. PRINCIPAL SCIENTIFIC ACHIEVEMENTS SINCE INITIATION:

None

13. SUMMARY OF BENEFITS FOR THE REGION:

One protected by the recessive genes bc-2^2 and/or bc-3, the I-gene material will not be killed by the temperature - insensitive necrotic strains of BCMV.

14. PROPOSAL FOR CONTINUATION (IF APPROPRIATE):

a. *Important regional objectives remaining to be met*:

Backcrossing to incorporate the recessive genes.

b. *Additional years needed to complete these priorities*:

2 to 3 years.

c. *Plan of work for next 12 months (continue next page)*:

Backcrossing to incorporate the recessive genes.

d. *Proposed budget*:

No change from proposal submitted to the Steering Committee in 1992.

Telephone No.: 704531
Tel. Add.: "PHYTOSAN"
Fax: 728317

Reference No.:

MINISTRY OF AGRICULTURE
DEPARTMENT OF RESEARCH AND SPECIALIST SERVICES
Plant Protection Research Institute
P.O. Box 8100, Causeway
Zimbabwe

SUB-PROJECTS FINANCIAL STATEMENT

Please note that the US $1 500 and US $2 000 for the subprojects; "Wild legumes as potential reservoirs of the necrotic strains of BCMV" and "Breeding for resistance to BCMV" respectively had not been used up to the time work on the sub-projects was competed for the period under review. Due to the bureaucratic red tape involved in getting approval to use the funds from the government Treasury Department (standard procedure when money is donated by organizations outside the country), clearance to this effect was only received when work for the season had already been completed. Thus the activities conducted so far were with the funds of the department. This posed no problems as these activities were combined with other department's daily activities.

This therefore leaves the balance with the Department of Research and Specialist Services still at US $3 000 which is equivalent to Z$23 254.70
*Z$6.6442 =US $1

Date: 16/9/93 Signed: _____
(Authority Administering grant)

Date: 15/09/93 Signed: _____
(Research grantee)

Date: 15/09/93 Signed: O. Mukoko pp _____
(Research grantee)

SUBPROJECT SUMMARY ANNUAL REPORT TO STEERING COMMITTEE

1. SUBPROJECT TITLE: BCMV SUBPROJECT

2. YEAR OF FIRST APPROVAL BY STEERING COMMITTEE: 1989

3. NAME OF PROJECT LEADER: Prof. Allan Kemi Tana

4. NAME OF RESEARCH INSTITUTION AND COUNTRY: Msekera Research Station, Zambia

5. BRIEF STATEMENT OF THE PROBLEM AND ITS MAGNITUDE:
The Bean Common Mosaic Virus (BCMV) is a very important disease of beans, Phaseolus vulgaris (L.), which is spread by aphids. It affects most bean growers in the country and appears throughout the year wherever beans are grown. It causes severe losses to beans and up to 100% yield losses have been reported on-station.

6. INTENDED DIRECT BENEFICIARIES OF THE SUBPROJECT:
(researchers in other countries? extension? producers? others?)
To a large extent the producers and to a less extent the researchers in other countries

7. LIST OF OBJECTIVES FOR LAST YEAR:
(as approved by Steering Committee)
1. To identify the aphid species occurring in the bean environment
2. To understand the population dynamics of aphids in relation to BCMV incidence
3. To ascertain the species of aphids that transmit BCMV and their relative efficiency of transmission of the BCMV strain(s) prevalent in the region.

8. OTHER COUNTRIES COLLABORATING IN THIS SUBPROJECT:
Tanzania, Uganda, Zambia and Zimbabwe

9. CONCISE SUMMARY OF RESEARCH ACTIVITIES AND RESULTS (LAST YEAR ONLY): (organized by objectives - please limit to 1.5 pages)
Objective 1:
The alatae aphids were collected from yellow pan water trap placed in the bean field at Msekera thrice per week and preserved in 70% alcohol for identification. The trap collections started in January 1992 until crop harvest in April 1992.
A total of thirteen aphid species were collected from the trap during Jan-April 1992. Hyalopterus persicae (Sulzer) was by far the most abundant species followed by Aphis gossypii Glover, A. craccivora Koch and Lipaphis erysimi (Kaltenbach) in descending order. Brevicoryne brassicae (L.), Rallaphis sp., Hysteroneura setariae (Thomas), L. erysimi and Uroleucon compositae (Theobald) were recorded for the first time from the trap. No A. fabae Scopoli was collected from the trap despite the severe drought during the season which favoured high aphid infestation and activity.

Objective 2:
A bean/maize intercropping and aphid/BCMV build-up trials were planted on-station, but they were affected by the severe drought and hence no results.

Objective 3: i. BCMV-Aphid transmission studies
A preliminary study was conducted in the screenhouse at Msekera to compare the relative efficiency (%success) of transmission of BCMV by three aphid vectors, A. fabae, A. craccivora and A. gossypii. The BCMV susceptible variety used was 13.
A. fabae and A. craccivora with 26-33% success, were more efficient in transmitting BCMV than A. gossypii (4.2% success) on a bean cultivar Carioca. It was also observed that the higher the number of aphids per plant (3-4 aphids) the higher the chances of transmitting the virus.
ii. BCMV Strains identification
Fourteen bean leaf samples showing BCMV symptoms were collected from farmers' fields in two districts (Chadiza and Chipata) of the eastern province of Zambia. The samples were identified by Drs. Nicola J. Spence and David G. Walkey of the Horticulture Research International, Wellesbourne, U.K.
Of the 14 samples collected, 5 were indetitied as 7 of NL3 and 7 of NL6. Earlier work in Zambia (Kannaiyan and Harrika, 1989) identified BCMV strain NL3.

10. REGIONAL COMMUNICATION OF RESEARCH PROGRESS:
(monitoring tour organized by subproject? report at regional workshop? direct correspondence? other means?)
It has been mainly through report at regional workshop and also through direct correspondence to regional coordinator.

11. ANY DIVERGENCES FROM THE PLANNED ACTIVITIES, WITH REASONS:
No.

12. PRINCIPAL SCIENTIFIC ACHIEVEMENTS SINCE INITIATION:
Thirteen aphid species have been found occurring in bean fields. NL6 BCMV strain has been identified besides NL3 identified earlier. Planting early in the season, higher density and intercropping bean with maize minimizes BCMV spread by aphids.

13. SUMMARY OF BENEFITS FOR THE REGION:
The knowledge on aphid biology will be an added information to the BCMV Subproject which will finally enable the region to develop an integrated aphid/BCMV management.

14. PROPOSAL FOR CONTINUATION (IF APPROPRIATE):
a. Important regional objectives remaining to be met:
to ascertain the species of aphids that transmit BCMV and their relative efficiency of transmission of the BCMV strains prevalent in the region.
b. Additional years needed to complete these priorities:
One year
c. Plan of work for next 12 months (continue next page):
Transmission Studies: Timed Probe Assay:
Winged and wingless aphids of A. fabae, A. craccivora, A.

gossypii and M. persicae will be tested in the screenhouse using the Timed Probe Assay for the transmission of BCMV.
Procedure:

Transfer both winged and wingless aphids into a container say a beaker using a moistened brush. Starve the aphids for one hour and transfer 4-5 aphids to diseased bean plants. Allow feeding for minimum acquisation period. Transfer the aphids to the test plants that is disease free plants and permit feeding for minimum inoculation period. The test plants will be put in insect proof cages for 2-3 weeks to observe the symptoms of BCMV.

d. Proposed budget:

BCMV SUBPROJECT, MSEKERA, ZAMBIA-1992/93

Item	Budget (U.S. DOLLARS)
1. Labour	100
2. Fuel + lubricants	200
3. Bank charges	20
4. Travel	60
5. Stationary + postage	100
6. Purchase of seeds	20
Total	500

Signed..... Date...3/6/93.....

P. H. SOHATI
(Entomologist)

ATTACHMENT 1

PAN-AFRICAN COLLABORATIVE RESEARCH NETWORK PROJECT

Tittle: The establishment of Pan-African nurseries for BCMV disease resistance.

Investigators:		
	Augustine Gubba (Zimbabwe)	Pathologist
	Allan Femi Lana (Tanzania)	Virologist (Coordinator)
	Olivia Z. Mukoko (Zimbabwe)	Breeder
	Theresa Sengooba (Uganda)	Pathologist
	Philemon Sohati (Zambia)	Entomologist

Justification:

Bean common mosaic (BCMV) is an important pathogen of beans in most countries in Africa. Unlike the situation with fungal and bacterial diseases where there is an array of chemicals that can control the respective diseases, no chemicals have been found for the control of BCMV. Breeding for resistance is the only feasible way to control BCMV. Resistance to BCMV is imported by recessive strain-specific genes or by the dominant I-gene (Drijfhout, 1978).

The deployment of the I-gene has been very successful in Latin America. Temperature-insensitive or necrosis-inducing (necrotic) strains of BCMV have been reported in Europe, Africa and the USA that have overcome the I-gene resistance, and induce systemic necrotic. Drijfhout (1978) found that I-gene cultivars are not killed by necrotic strains if either of the genes bc 2-2 or bc 3 or both are incorporated to protect the I-gene.

Surveys to identify BCMV strains prevalent in Africa have established that, with the exception of Ethiopia, NL3, a necrotic strain, is the predominant strain in the countries of eastern, central and southern Africa (Spence and Walkey, 1991a). This implies that the deployment of I-gene cultivars is not a sound strategy in the African context.

Weed legumes have also been found to carry strains of BCMV (Spence and Walkey, 1991b). Information generated on such a study is important because it indicates the risk that unknown strains on wild reservoirs could be transmitted by aphids to beans. This information has a bearing on the breeding strategy to be employed.

Objectives

1. To breed for resistance to BCMV by incorporating the reaesive bc 2^2 and/or bc 3 genes into beans cultivars at the pre-release stage.

2. To monitor the evolution of possible new strains that can overcome the bc 3 gene resistance.

3. To determine importance of wild legumes as reservoirs of the necrotic strains of BCMV.

4. To study other mechanisms of resistance to BCMV such as :

(i) exploitation of variation in seed transmission rates
(ii) vector non-preferences
(iii) BCMV resistance in land races.

Methodology

1. Breeding for resistauce to BCMV (Olivia Mukoko)

This will be done by incorporating (by backcrossing) either the bc 3 genes or the bc 2^2 gene into bean cultivars that are at the pre-release stage in national programmes. BCMV resistant cultivars carrying these recessive genes will be obtained from CIAT. All resultant progeny will be screened for resistance to the NL3 strain of BCMV. These materials will be sent to the respective national bean programmes for yield testing in the field.

2. Strain monitoring (Allan Femi Lana)

In order to monitor the emergence of recessive resistance (bc 3, bc 2-2) breaking strains, an 'early warning package' or nursery will be put together. This nursery will comprise of material possessing the I-gene, some with the bc 2-2 gene, bc 3 gene and some without the I-gene and will be grown at BCMV 'hot spots' in different countries, every season*. This nursery will be evaluated for BCMV by collecting leaf materials which will be sent to the Tanzania investigator for strain identification using ELISA and Drifhout differentials.

3. Wild reservoir of BCMV (Augustine Gubba and Theresa Sengooba)

A study on the role of wild leguminous plants as alternate hosts of BCMV is already in progress in Uganda. Work on wild legumes will be intensified to cover southern Africa. Leguminous plants in the vicinity of the bean fields will be sampled and BCMV strain identification will be undertaken using ELISA, bean differential cultivars and electron microscope.

4. Other mechanisms of resistance (Lana and Sengooba)

(i) Seed transmission

Non-I gene cultivars will be screened for seed transmission rates of BCMV with the hope of identifying cultivars that possesses a very low ability or are incapable of transmitting BCMV through the seed. All plants of the cultivars to be

* These countries will be Rwanda, Tanzania, Uganda, Zambia and Zimbabwe.

screened will be manually inoculated with the NL3 strain of BCMV at the unifoliolate leaf stage. The plants will be grown to maturity. Seed harvested will be replanted and seedlings will bbe tested for the presence or absence of BCMV. This activity will be confined to the glasshouse.

(ii) Vector non-preferences (Sohati)

Cultivars will be screen for vector prerefences/non-preference ? Alighting responses will also be studied.

(iii) BCMV resistance in landraces (Lana, Sengooba, Mukoko and Sohati)

A study in Uganda has already indicated that there may well be restance to BCMV in a few landraces. Consequently, landraces will be collected from national programmes and screened for resistance to BCMV.

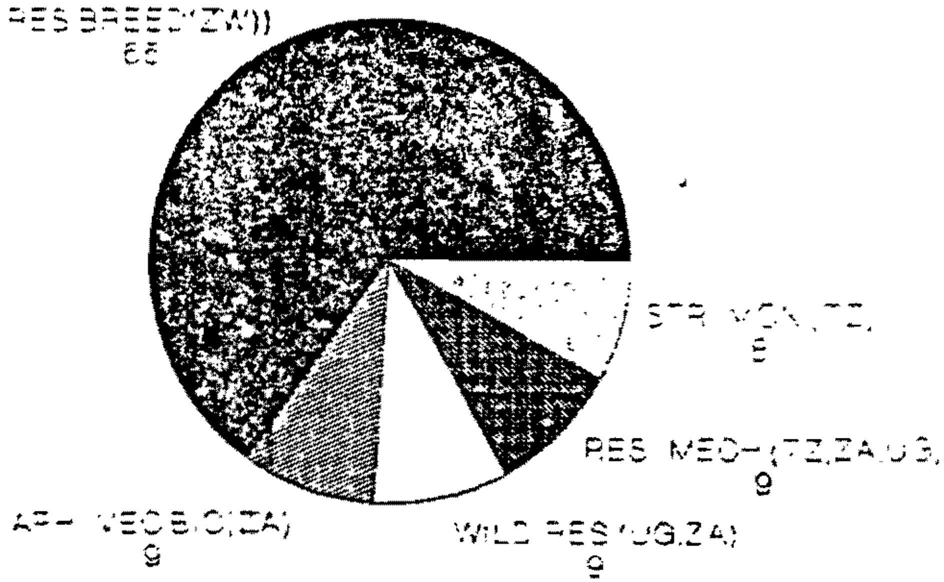
REFERENCES

Drijfhout, E. 1978. Genetic interaction between *Phaseolus vulgaris* and bean common mosaic virus, with implications for strain identification and breeding for resistance. Agricultural Research Reports 872. Centre for Agricultural Publishing and Documentation, Wageningen, Netherlands. 98pp.

Mukoko, O.Z. 1992. Breeding beans (Phaseolus vulgaris L.) for resistance to bean common mosaic virus in Zimbabwe. PhD thesis. University of Cambridge 117pp.

Spence, N.J. and Walkey, D.G.A. 1991a. Idenfitication of strains of bean common mosaic virus occurring in different regions of Africa. Annual Report of the Bean Improvement Cooperative (34) : 56.

Spence, N.J. and Walkey, D.G.A. 1991b. Bean common mosaic virus related isolates in legume weeds and other non-phaseolus hosts in Africa. Annual Report of the Bean Improvement Cooperative (43) :



WORK LOAD (%)

Budget

Expenditure	Jan-Dec 1993 Year 1	Jan-Dec 1994 Year 2	
a) Breeding (Mukoko)			
Field supplies	600	800	
Office supplies	100	200	
Lab supplies/reagents	700	700	
Labour	600	800	
	2000	2500	
b) Strain monitoring (Lana)			
Posting nurseries, ELISA Strips, reagents for strain Identification	500	800	
c) Wild reservoirs (Gubba/Sengooba)			
Travel + reagents :			
Uganda	1500	2000	
Zimbabwe	1500	2000	
	3000	4000	
d) Aphid vector biology (Sohati/Sithanantham)			
Screens, cages	500	800	
TOTAL US$	6000	8100	14,100
* Working group meeting at end of 2nd year >		5000	19,100

* N.B. It is envisaged that by Year 3, allocation to wild reservoirs will decline and that the work on resistance mechanisms will be initiated. The extent will be decided at this Working Group Meeting.

SUB-PROJECT SUMMARY ANNUAL REPORT TO STEERING COMMITTEE

1. SUBPROJECT TITLE: Screening bean landrace components for resistance to common bacterial blight disease in Eastern and Southern Africa.

2. YEAR OF APPROVAL: November, 1992.

3. NAME OF SUB-PROJECT LEADER: Dr. R.B. Mabagala

4. NAME OF RESEARCH INSTITUTION AND COUNTRY: Sokoine University of Agriculture, Morogoro, Tanzania.

5. BRIEF STATEMENT OF THE PROBLEM AND ITS MAGNITUDE:
- Common bacterial blight of beans caused by *Xanthomonas campestris* pv. *phaseoli* continues to be a serious problem in many bean growing areas of the world. The world-wide distribution of the disease is mainly due to the ability of the pathogen to infect seed.
- Management is based on the use of clean seed or resistant varieties. However, clean seed programs are lacking in Eastern and Southern Africa, and resistant varieties well adapted to the tropical environments are also lacking.

6. INTENDED BENEFICIARIES OF THE SUB-PROJECT:
(a) Small scale farmers
(b) Researchers in other countries through collaboration

7. LIST OF OBJECTIVES FOR LAST YEAR:
(as approved by steering committee)
(a) Collect, characterize and preserve *X.c.* pv.*phaseoli* cultures for use in screening bean germplasm in Eastern and Southern Africa.
(b) Identify and utilize desirable genetic variation regulating responses to common blight in bean landrace components.
(c) Recommend superior landrace components for use in various local environments according to interests of small scale farmers to reduce losses due to common blight disease.
(d) Preserve superior landrace components as genetic sources for bean improvement in the breeding programs for disease resistance in Eastern and Southern Africa.
(e) Increase the productivity of small scale farmers and contribute to sustainable agriculture by enabling small scale farmers grow disease resistant bean landrace components

8. OTHER COUNTRIES COLLABORATING IN THIS SUB-PROJECT:
i. Malawi ii. Zimbabwe.
Uganda was omitted as advised by the Pan-African CIAT Coordinator.

9. CONCISE SUMMARY OF RESEARCH ACTIVITIES AND RESULTS:
(Last year only)

OBJECTIVE 1:
Surveys were conducted in various regions (Morogoro, Rukwa, Mbeya, Kilimanjaro and Arusha) to collect local bean landraces and common blight disease samples. A total of 100 bean landraces were collected Bean landraces were also obtained from existing stocks collected by Dr. Dawn Terveson under the ODA-funded project. Small scale farmers perception of common blight and other bean diseases and to what extent these farmers take actions that affect the incidence and spread of disease were established. Isolation and characterization of *X.c.* pv. *phaseoli* were done.

The survey indicated that the diversity of bean landraces in regions with agricultural research stations has been lost tremendously as compared to other regions. This is a threat to the future survival of the bean industry in the region. Small scale farmers associated bean common blight disease with drought stress and halo blight was associated with heavy rainfall. Results of this project will contribute to sustainable measures of managing common blight disease by small scale farmers.

OBJECTIVE 2:
Twenty characterized strains of *X.c.* pv. *phaseoli* were used for screening sixteen bean landraces and their components. Of the 16 bean landraces screened under greenhouse and field conditions, 4 landraces had components that are promising sources of resistance to *X.c.* pv. *phaseoli*. Screening will continue in the next financial year.

10. REGIONAL COMMUNICATION OF RESEARCH PROGRESS:

(Monitoring tour organized by sub-project? Report at regional workshops? Direct correspondence? Other means)

Research progress was reported at the annual bean research workshop in September, 1993. The subject stimulated a lot of discussion and workshop participant expressed interest in this type of research and suggested that a social component be included. Communication of findings has also been done directly through the Pan-Africa CIAT coordinator, the Uganda CBB sub-project, and the National Bean Coordinator.

11. ANY DIVERGENCES FROM THE PLANNED ACTIVITIES, WITH REASONS:

Intended financial support to Uganda was omitted under the advice of the CIAT Pan-African Coordinator vide his letter Ref. 6-892 of January 29, 1993. He advised that Dr.(Mrs) Fina Opio was already funded from the Eastern Africa network budget, and that funds for this project were intended for SADC member countries. Funds were not disbursed to Malawi and Zimbabwe as needed due to difficulties associated with the accounting system at SUA and lack of timely communication from collaborators. Therefore, to avoid these drawbacks, I suggest that funds for collaborators be sent directly to them. Visits to collaborating countries were omitted following the reduced budget.

12. PRINCIPAL SCIENTIFIC ACHIEVEMENTS SINCE INITIATION:

The diversity of bean landraces in regions with agricultural research stations has been lost tremendously. Small scale farmers associate common bacterial blight disease with drought stress and no control measures are taken by these farmers. Landraces screened so far indicate that sources of resistance to common bacterial blight do occur these landraces. More screening work is therefore needed.

13. SUMMARY OF BENEFITS FOR THE REGION:

·Prevention of the loss of useful plant genetic material by encouraging research which maintains biodiversity, hence the ability to adapt to changing needs in the region.

·Locally adapted resistant material will allow bean breeding programs in the regions to cope with new ecological conditions and more virulent pathogens ,thus contributing to sustainable plant protection in the region.

14. PROPOSAL FOR CONTINUATION (IF APPROPRIATE)

(a) Important regional objective remaining to be met:

·Continue collecting and screening landraces to identify resistant components for recommendation for use by small scale farmers and their preservation for use by bean breeding programs in the region.

(b) Additional years needed to complete these priorities:

Two years.

(c) Plan of work the next 12 months:

·Continue with surveys to collect more isolates of *X.c.* pv. *phaseoli* and screen available landrace components for reaction to the pathogen.
·Multiply promising landrace components for seed increase
·Communicate results to the 1994 bean research workshop.

(d) Proposed Budget (for collaborating countries only)

i.	Malawi----------	US$ 1750.00
ii.	Zimbabwe----------	1750.00
	TOTAL	US$ 3500.00

SUB PROJECT FINANCIAL STATEMENT, NOVEMBER, 1993
CBB SUBPROJECT, MOROGORO, TANZANIA

ITEM	BUDGET (TANZANIA)	EXPENDITURE	FUNDS RECEI
	US$ 2000.00 (Tsh. 640000.00)		US$ 5000.0 (Tsh.1,600,0
1.Labour		30,000.00	
2.Land preparation		7,000.00	
3. Travel and per diem		252,960.00	
4.Transport (fuel and repair)		225,000.00	
5.Lab items		60,000.00	
6.Stationery /typing		15,000.00	
7.Field materials		28,000.00	
8.Glasshouse materials		5,400.00	
9.International travel		0.00	
TOTAL EXPENDITURE		623,360.00	
Balance with Sokoine University of Agriculture			976,640.00
GRAND TOTAL			1,600,000.00

Date ..... Signed .....
REVENUE ACCOUNTANT
SOKOINE UNIVERSITY OF AGRICULTURE
MOROGORO

Date 4/11/1993..... Signed .....
(Research Grantee)

SUBPROJECT SUMMARY ANNUAL REPORT TO STEERING COMMITTEE

1. **SUBPROJECT TITLE:** Screening for low P

2. **YEAR OF FIRST APPROVAL BY STEERING COMMITTEE:** 1991
3. **NAME OF PROJECT LEADER:** I.K. Kullaya
4. **NAME OF RESEARCH INSTITUTION AND COUNTRY:** Lyamungu Research Institute, Tanzania.
5. **BRIEF STATEMENT OF THE PROBLEM AND ITS MAGNITUDE:**

   Dominant soil orders on which bean are grown are deficient in Phosphorous. These have high P fixing capacities. These soil have other characteristics which tend to intesify P-stress such as low pH, low exchangeable Bases and high exchangeable AL.

6. **INTENDED DIRECT BENEFICIARIES OF THE SUBPROJECT:**
   (researchers in other countries? extension? producers? others)

   Researchers in Zambia, Malawi and finally producers.

7. **LIST OF OBJECTIVES FOR LAST YEAR:**
   (as approved by Steering Committee)

   To screen the bean promising lines under stress and none stress con conditions to allow selection of responsive efficient plants.

8. **OTHER COUNTRIES COLLABORATING IN THIS SUBPROJECT:**

   Next year evaluation of promising lines will be done in Zambia and Malawi.

9. **CONCISE SUMMARY OF RESEARCH ACTIVITIES AND RESULTS (LAST YEAR ONLY): (organized by Objectives - please limit to 1.5 pages)**

   During the cropping season beginning July 1992 A total of 280 bean varieties from the first anses set were field screened at primary Mulama experimental site. In the 1993 cropping season the best 120 entries were field evaluated at the same location under both stress and non-stress conditions to allow selection of responsive efficient plants ie. Those which will perform well under both conditions. About 50 promising lines will be passed to the third screening season next year which will involve field evaluation at several secondary sites to establish its performance across locations.

10. **REGIONAL COMMUNICATION OF RESEARCH PROGRESS:**
(monitoring tour organized by subproject? report at regional workshop? direct correspondence? other means?)
A paper was prepared for the 3rd SADCC/CIAT workshop but was not presented

11. **ANY DIVERGENCES FROM THE PLANNED ACTIVITIES, WITH REASONS:**
It was imposible to run a trial during off season as planned due to lack of irrigation water and high incidences of beanfly at Mulama.

12. **PRINCIPAL SCIENTIFIC ACHIEVEMENTS SINCE INITIATION:**

Promising lines at low P have been identified

13. **SUMMARY OF BENEFITS FOR THE REGION:**

Identified lines will be sent to other countries in the SADCC Region.

14. **PROPOSAL FOR CONTINUATION (IF APPROPRIATE):**

a. *Important regional objectives remaining to be met:*
Gene for low P will be incorporated into our adopted bean varieties ie. breeding for low P.

b. *Additional years needed to complete these priorities:*

Three

c. *Plan of work for next 12 months (continue next page):*

Angca nursery containing of 50 entries to be assessed at different location. Three secondary sites will be located in:

(1) Tanzania
(2) Kasama- Zambia
(3) Malawi

d. Proposed budget:

Screening for low P sub-project

ITEM		US $
1.	Agrochemicals	292.40
2.	Field supplies	816.96
3.	Soil analysis	303.04
4.	Communication, reports, publications, literature	30.14
5.	Local travel per diem	380.86
6.	Labour	1722.60
7.	Transport	815.76
	Sub-total	**4361.76**
	Plus 20% Contingency	872.352
	GRAND TOTAL	5234.11

FINANCIAL STATEMENT FOR LOW P SUB-PROJECT SEPT. 92 TO OCT. 93

ITEM	TAS (,000) allocated	TAS (,000) balance
Labour	476	236
Field allowances	136	36
Fuel and lubricants	272	122
Chemicals	102	52
Harvesting materials	34	4
Land prep./fencing	102	2
Rent for land	34	NIL
Vehicle maintenance	68	NIL
Soil analysis	102	102
Miscelleneous	34	2
Total	1360	556
Balance carried forward		217
Total balance		773 (US $ 1650)

OFFICER I/C LYAMUNGU
RESEACH CENTRE MOSHI.

Date 20/11/93. Authorized representative

Date 20/11/93 Sub-project leader

SUBPROJECT SUMMARY ANNUAL REPORT TO STEERING COMMITTEE

1. **SUBPROJECT TITLE:** BEAN CROPPING SYSTEMS

2. **YEAR OF FIRST APPROVAL BY STEERING COMMITTEE:** 1991
3. **NAME OF PROJECT LEADER:** GODFREY A. KITTI
4. **NAME OF RESEARCH INSTITUTION AND COUNTRY:**
   RESEARCH BRANCH (ARPT), ZAMBIA
5. **BRIEF STATEMENT OF THE PROBLEM AND ITS MAGNITUDE:**
   * LACK OF WORKING DEFINITION OF BEAN CROPPING SYSTEMS HENCE RESEARCH RATIONALISATION DIFFICULT.
   * NO BASELINE OF BEAN CROPPING SYSTEMS TO USE TO MEASURE RESEARCH IMPACT.

6. **INTENDED DIRECT BENEFICIARIES OF THE SUBPROJECT:**
   (researchers in other countries? extension? producers? others)
   COUNTRY AND REGIONAL SCIENTISTS AND OTHER BEAN DEVELOPMENT AGENTS.

7. **LIST OF OBJECTIVES FOR LAST YEAR:**
   (as approved by Steering Committee)
   * ANALYSE SURVEY DATA, INTERPRATE RESULTS AND REPORT.
   * PROPOSE RESEARCH AREAS IN BEAN SYSTEMS.

8. **OTHER COUNTRIES COLLABORATING IN THIS SUBPROJECT:**
   MALAWI, SWAZILAND, TANZANIA AND ZIMBABWE.

9. **CONCISE SUMMARY OF RESEARCH ACTIVITIES AND RESULTS (LAST YEAR ONLY): (organized by Objectives - please limit to 1.5 pages)**
   THE SURVEY DESIGN, EXECUTION AND ANALYSIS WAS DELAYED BY LACK OF COMPUTERS AND STAFF (ECONOMIST). EARLY THIS YEAR AN ECONOMIST WAS HIRED FROM ANOTHER PROVINCE. HE (POST) CODED THE QUESTIONAIRE AND ENTERED IT ON COMPUTER USING D-BASE AND SPSS SOFTWARE. LATER A SMALL WORKSHOP OF BEAN SCIENTISTS (AGRONOMISTS & BREEDERS AND 1 ECONOMIST) WAS CONVENED TO CONSOLIDATE THE ANALYSIS AND INTERPRATATION OF SURVEY DATA AND FINDINGS. THE TEAM ALSO PROPOSED FURTURE WORK TO FILL IN INFORMATION GAPS AS WELL AS RESEARCH TRIALS TO DEVELOP TECHNOLOGIES.
   A REPORT HAS BEEN DRAFTED.

10. REGIONAL COMMUNICATION OF RESEARCH PROGRESS:
(monitoring tour organized by subproject? report at regional workshop? direct correspondence? other means?)
A TENTATIVE REPORT OF THE SURVEY WAS PRESENTED AT A REGIONAL WORKSHOP IN 1991 (IN SWAZILAND).

11. ANY DIVERGENCES FROM THE PLANNED ACTIVITIES, WITH REASONS:

—

12. PRINCIPAL SCIENTIFIC ACHIEVEMENTS SINCE INITIATION:

DESCRIPTION OF BEAN CROPPING SYSTEMS

BASELINE INFORMATION OF THE BEAN SYSTEMS

13. SUMMARY OF BENEFITS FOR THE REGION:

PLANNING BASE FOR BEAN IMPROVEMENT PROGRAMS.

14. PROPOSAL FOR CONTINUATION (IF APPROPRIATE):

a. Important regional objectives remaining to be met:

* ENSURE A SYSTEMS PERSPECTIVE AND SENSITIVITY IN REGIONAL PROGRAMMS.
* SET UP IMPACT MONITORING SYSTEMS FOR RESEARCH PROGRAMMS

b. Additional years needed to complete these priorities:

ON GOING APPRAISAL /FEED BACK SYSTEM INTO RESEARCH PROGRAMMS.

c. Plan of work for next 12 months (continue next page):

* CONSOLIDATE AND SET UP MULTIDISCIPLINARY TRIALS (ESP. ON FARM)
* FURTHER DATA COLLECTION TO FILL IN GAPS (IDENTIFIED FOLLOWING SURVEY)
* COMPILE SUMMARY OF SURVEY FINDINGS ON REGIONAL BASIS.

d. Proposed Budget

	US $
Equipment and accessaries	1 500
Agro materials and tools	500
Stationery and supplies	300
Travel costs	1 200
Personal emoluments	1 300
Contingencies	200
	5 000

BEAN CROPPING SYSTEMS SUBPROJECT

[illegible]

	Detail	Amount
1	Wages	[illegible]
2	Stationery/Supplies	[illegible]
3	DSA	[illegible]
4	Fuel/Lubes.	[illegible]
5	[illegible]	[illegible]
	Total	[illegible]

Balance [illegible]

[illegible]

Project Leader [illegible]

[illegible]

1.0. TITLE : A PROPOSAL FOR A SUB-PROJECT ON THE STUDIES ON ADOPTION OF LYAMUNGU 85 AND THE USE OF ROW PLANTING IN THREE REGIONS OF NORTHERN TANZANIA.

2.0. INTRODUCTION AND BACKGROUND INFORMATION.

The common bean (Phaseolus vulgaris L) is an imprtant source of protein to majority of Tanzanians who cannot afford expensive animal protein. In Tanzania, the bean crop is often grown in subsistence agriculture. It is estimated that the bean hectarage in Tanzania is 0.45 million (FAO 1985). Average yields over the past 25 years 1965 - 1990 in Tanzania appears to have risen from 487 kg/ha (FAO 1965) to 620 kg/ha (FAO 1990). The increase noted here might be attributed to the adoption of new technologies from research.

Research on Phaseolus beans in Tanzania started far back in 1959 at the Northern Research Center, Arusha. Todate, the National Bean Programme has the mandate of promoting bean research in Tanzania. The major objective or the programme has bean that of developing high yielding and widely adopted varieties of beans and packages that will contribute to increased bean production (Mushi, 1993).

Lyamungu 85 bean variety was released by the programme in 1985 after proving its superiority both onstation and onfarm for several years (Koinange 1987). This variety outyielded the commercial variety Canadian Wonder which was widely grown in the country. Under good management it can produce up to 3000 kg/ha (Koinange 1987). The high yielding ability of this variety is mainly due to its tolerance to foliar disease such as anthracnose, angular leaf spotand rust which causes major economic loses in most of the bean growing areas in Tanzania (Gondwe 19878).

The Tanzania Seed Company (TANSEED) has the mandate of producing and distributing the released seeds to our farmers. It is unfortunate that this important grain legume is not given priority by this company in our country (Mushi, Personal communication 1993) and hence the non-market solutions to bean seed distribution is adopted (Grisley and Shamambo 1992).

The Onfarm research approach has been used to distribute the seeds of Lyamungu 85 and recommended practice of row planting to farmers in Tanzania. Substantial amount of seeds has been sent to the farmers fields in Arusha, Kilimanjaro and Tanga regions through onfarm variety trials, farmers managed trial, bean exploratory trial and seed distribution excercise (Mushi et al. 1991). The amount of seeds distributed in the three regions from 1988-1992 is shown in Table 1.

Table 1. Seeds of Lyamungu 85 (kg) distributed in the Northern Tanzania from 1988-1982.

Year	Arusha	Kilimanjaro	Tanga
1988/89	100	100	100
1989/90	200	200	500
1990/91	200	200	500
1991/92	200	200	500

3.0. JUSTIFICATION

TANSEED company in Tanzania is not willing to produce enough bean seeds commercially for our farmers. Non-market solution to bean seed distribution through research has been adopted in distributing the seeds of Lyamungu 85. Beans are grown randomly by the small scale farmers in the country. These farmers were given seeds of Lyamungu 85 together with the productional package through the National Bean Programme and SADCC/CIAT regional programme. Therefore, it is justifiable to study the impact of Lyamungu 85 among our small scale farmers who are the majority since its release in 1985.

4.0. EXPECTED IMPACT/BENEFICIARY

This will enable the bean research team to understand how their variety and row planting practice has been adopted in the system.

Our breeder will be in a position to improve some of the characters as may be advised by the farmers through this study.

Farmers will be advised on the purity of Lyamungu 85 seeds incase of any contamination.

OBJECTIVES

(1) To study the initial impact of Lyamungu 85 among bean producing small scale farmers in Arusha, Kilimanjaro and Tanga region,

(2) To evaluate factors influencing adoption or disadoption of Lyamungu 85.

6.0. MATERIALS AND METHODS

A total of 50 farmers from each region will be interviewed using a structured questionaire. Respondents will be sampled using a two-stage stratified random sampling technique. Firstly sampling will be done from the village register. Secondly village leaders and extension worker will identify farmers categories. Three vategories will be delineated viz: (i) Farmers who have conducted onfarm research or received seeds through distribution excercise (ii) Adopting farmers ie. farmers who had planted Lyamungu 85 and used row planting at least on a portion of their farms (iii) Traditional farmers, i.e. farmers who do not plant Lyamungu 85 neither in rows. The questionaire to be administered is being developed. The rate of farmers adopting the technology will be calculated by calculating the percent of farmers planting Lyamungu 85 and those planting in rows

7.0. Duration : 1 year

8.0. Principal Investigators :

P.A. Ndakidemi (Agronomist)
Dr. C.S. Mushi (Breeder)
E.M. Nkonya (Economist/Sociologist).

9.0. BUDGET

		US $
A. Questionaire Pretesting.		
-Fuel expenses, Arusha, Kilimanjaro, Lushoto-Arusha		
-Perdiem (4 researchers		
- Extension agents		
- Technicians)		1500
B. Administering the questionaire at planting time		
- As (A) above		1500
C. Administering the questionaire at flowering time		
- As (B) above		1500
D. Administering the questionaire at harvesting time		
- As (C) above		1500
E. Stationery and secretarial services		500
F. Car maintenance and repair		1000
	Sub-total	**7500**
G. 20% contingency (of US $ 7500)		1500
	GRAND TOTAL	**9000**

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MINISTRY OF AGRICULTURE
SELIAN AGRICULTURE RESEARCH INSTITUTE
PHASEOLUS BEAN RESEARCH PROGRAM.

SUB PROJECT TITLE: DEVOLOPMENT OF STRATEGIES FOR THE MANAGEMENT OF BEAN FOLIAGE BEETLES, *Ootheca spp* (Coleoptera: Chrysomelidae)

SUBPROJECT PROPOSAL SUBMITTED TO THE STEERING COMMITTEE (SADCC REGION) FOR APPROVAL AND FUNDING

Principal Investigator: S.Slumpa: M.SC.
Collaborators in Tanzania: C.S Mushi Ph.D
D. Kabungo B.SC.

Collaborating Countries: Malawi, Zambia, Kenya.

PROJECT NO. SEL/PB/CP/93/01

PROJECT TITLE: DEVELOPMENT OF STRATEGIES FOR THE MANAGEMENT OF BEAN FOLIAGE BEETLES, *Ootheca spp* (Coleoptera: Chrysomelidae).

1.0 INTRODUCTION:

Two species of the bean foliage beetles, *Ootheca bennigsenii* (Weise) and *O. mutabilis* (Sahlberg) are most damaging species of Chrysomelids found in Africa. They are reported from Kenya, Tanzania, Uganda, Burundi, Zambia, Malawi and Nigeria (Cardona and Karel 1990, Ochieng 1977), but their actual distribution is not well established. However, the importance of these two species in bean production was not reported by most countries, except Tanzania and Zambia during the entomology working group meeting held in Nairobi, Kenya, 1989. But recent observation by Dr. Ampofo (Personal communication) confirmed that the insect is an important pest of beans in some of the countries.

To further describe its importance, *Ootheca* was ranked number 8 priority constraints (Table 1) in bean production in the country. In the region, *Ootheca* ranked number 4 among insect pests hindering bean production. In setting these priorities, several factors (Figure 1) were considered as contributing to the importance of the insect in bean growing areas.

In Tanzania, bean seed yield losses of 18% - 31% have been attributed to *O. bennigsenii* (Karel and Rweyemamu, 1984). However, in cases of severe infestation at early stages of plant growth total defoliation and 100% crop losses are realized. For example first sown crop at Lambo, Moshi and Lushoto, Tanga was completely destroyed by *Ootheca* (Slumpa, 1990 unpublished).

1.1 Biology and Ecology

The adults are ca, 6mm long, with orange coloured head and shiny black/Orange elytra. To distinguish the two species, colour distinction has been used; *O. mutabilis* is shiny, light brown or light black (Ochieng, 1977; Singh et al., 1990). Whereas *O. bennigsenii* has a light brown colour (Cardona and Karel, 1990). This method seems confusing and therefore important to use other methods e.g. description of male genitalia (Hills, 1906)

Chrysomelid females deposit their eggs in the soil near plant roots in clusters of 40 - 60. One female can lay up to 200 - 400 eggs. The depth of egg deposition ranges between 1.5 to 2.5cm below the ground (Ochieng, 1977). The eggs hatch into larvae in about 11-14 days at room temperature of 25 - 32 °C.

Since the eggs are laid in the vicinity of the roots of the host plant (Ochieng, 1977), hence the larvae are more accessible to feed on the roots. In both species, three larval instars are recognized, all together lasting for 40 - 45 days, then it changes into pupa which takes 14 - 20 days. These insects have a tendency to diapause in order to survive in the dry period.

The diapausing stage take place in an earthen cell built by the mature larva. In this stage of diapause the insect remain relatively inactive for a period of 12 - 15 days. The emergence of the adult is synchronized with the onset of the rains and crop emergence. That means there is a relationship between softening of the earthen cell and emergence of the adults. In this respect therefore irrigation could also facilitate adult emergence. However, infestation is more severe during the onset of the rains thus early sown crop is more likely to be hit severely by the *Ootheca.*

The damage by these chrysomelids is done by both larvae and adults. The larvae feed on bean roots and nodules thus interfering with the nutrient transport system and nitrogen fixing ability of the plants. On older plants, sign of damage by larvae can be recognized by weak yellow plants with fewer and shrivelled pods, as a result of premature senescence.

The adults feed on foliage at all crop stages, though seedlings are more vulnerable and severely damaged. They feed on leaves, making interveinal holes and plants become skeletonized, thus impairing photosynthetic activity. In addition, adults of chrysomelids have been implicated as vectors of some viral diseases in cowpea such as cowpea mosaic and cowpea mottle (Gamez, 1980; Singh and van Emden, 1979). In beans, virus transmitted diseases by *Ootheca spp* need to be investigated.

1.2 POSSIBLE CONTROL MEASURES

1.2.1 Cultural control

(i) Delayed planting

prolonged delays may expose the crop to severe infestation by bean stem maggot. But through time of sowing studies is possible to determine a period whereby both insects can be escaped.

(ii) **Intercropping beans with maize**

The population of chrysomelids is said to be reduced by growing bean in an intercropped situation. (Risch, 1980).

(iii) **Development of resistant materials**

Resistance has been implicated as a promising approach for the control of *Ootheca*. The resistance is described as a result of nonpreference and tolerance (Karel, 1985b; Karel and Rweyemamu, 1984).

(iv) **Post harvest plowing.**

Expose eggs, Larvae and diapausing adults to the unfavourable environment to impaire their development. This could be extra cost especially for small scale farmers.

1.2.2 **Natural enemies.**

Two predators (Ants, *Monomorium sp.* (Hymenoptera: Formicidae and Reduviid bug, *Phinocoris bicolar*) of *O.mutabilis* have been identified. The former being predator of eggs and the latter predator of adults (Ochieng, 1977). However, the effectiveness of these natural enemies is not well studied.

1.2.3 **Chemical control.**

The use of insecticides for the small scale farmers tend to be very expensive interms of cash and improper handling. In addition, the use of chemical weapon in Agriculture threatens the health of the environment. However, it is the only control measure we have at hand for the control of *Ootheca*.

2.0 **Justification.**

The above background information indicate that there is limited work done on various aspects, and some of the findings are inconclusive for any inferences to be drawn for recommendations

2.1 Expected impact

Farmers will be able to use technologies developed specifically the IPM package for controlling *Ootheca*. Hence increased yield per unit land area due to increased number of plants at harvest and reduced destruction of photosynthetic active leaf area by *Ootheca*.

3.0 Specific objectives

3.1. To study the biology of the 2 species of bean foliage beetle.

3.2. To determine species composition of these species of bean foliage beetle and their distribution in the bean growing areas of Tanzania.

3.3 To study population dynamics and establish damage levels due to bean foliage beetle.

3.4 To determine yield losses due to bean foliage beetles.

3.5 To investigate on the effectiveness of natural enemies for bean foliage beetle.

3.6 To identify various alternate hosts for bean foliage beetle

3.7 To evaluate different management practices (IPM context) for the control of bean foliage beetle both on farmers fields and on station.

4.0 Materials and methods

Study will be accomplished in three Projects:-

Project 1: Study on the biology of bean foliage beetle species prevailing in Tanzania

Project 2: Study on the emergence pattern, species distribution, composition and population dynamics.

Project 3: Study on the control strategies for the bean foliage beetle.

4.1 **Project 1: Study on the biology of bean foliage beetle species prevailing in the region**

Collect from the fields in Arusha and Kilimanjaro region pairs of freshly emerged adults and monitor their pre-oviposition behaviour in terms of number of time they mate, mating time preovipostion time ie. time between mating and oviposition.

4.1.2 Arrange at least 10 petri dishes. In each dish put small amount of moist soil. In the same petri dishes place fresh young leaves of beans. Then release in each petri dish 3 pairs of mating adults, observe the petri dishes for any oviposition after one day.

4.1.3 On the next day, arrange another set of 10 petri dishes with new soil and fresh leaves as in (ii) and transfer the adults from number (i) into these new set of petri dishes.

4.1.4 Extract and count eggs oviposited in the first set of petri dishes. Also note the number of clusters and number of eggs per cluster. Transfer the eggs to other clean petri dishes with fairly moist filter paper.

Make sure that the dishes are kept slightly moist every morning.

4.1.5 Repeat procedure number (iv) until the females have no more eggs to oviposit.

4.1.6 Sow in a transparent plastic containers two seeds of Lyamungu 85, sow the seeds at the edge/sides of the container so that the growth of the roots and development of the larvae can be observed.

4.1.7 When the plants are at primary/first trifoliolate leaf. Introduce the first instar larvae in the soil about 1.5 - 2.5cm below the soil surface. Place it on the sides near the seedling. This will enable easy monitoring of larva development.

4.1.8 **Data collection and recording.**

(A) Description of eggs.

(i) Observe number of clusters and count number eggs per cluster.

(ii) Count number of eggs per female.

(iii) Count number of eggs which hatched into larvae and day it takes to hatch.

(iv) Note any observations with unhatched eggs.

(v) Describe shape, colour and size of an egg (use a micrometer eyepiece.

(B) Description of larvae

(i) Measure body length (mm) and width (mm)

(ii) Take measurement of the head capsule width (mm)and length (mm)in order to differentiate/discriminate different instars.

This can be done in two ways.

(i) Measuring the head capsule after every moult

(ii) Measuring the head capsule width of all the collected larvae, then put them in a class categories according to their measurements (eg o-o. 1mm, o.11-0.2mm,0.21 - 0.3mm)and plot the frequency distribution of head capsule width against number of larvae falling different categories. Eventually the peaks and depressions of the frequency distribution will determine the number of instars.

(iii) Note any larval mortality, most affected stage and the cause of the mortality.

(iv) Record number of days larva to change into pupa.

(C) Description of the pupa.

(i) Pupa period (days).

(ii) Shape, size and colour.

(D) Diapause stage

Subject some containers to differential dry periods 10, 20, 40, 80, 160 and 320 days and record adult emergence.

(E) Observe life span of the adult beetle.

4.2 Study on the emergence pattern, species distribution, composition and population dynamics.

The locations to conduct this experiment will cover range of weather conditions in terms of altitudes, temperatures, rainfall and soil types. The adults will be collected from the proposed locations before the onset of the long rains. This will proceed continuously including the short rains.

For a start, regions in Northern Zone are proposed

Arusha:

- Selian (1387 masl) Babati (1500 masl)

Kilimanjaro:

- Lambo (1020 masl) Lyamungu (1298 masl)

- Miwaleni (560 masl).

Tanga:

- Soni (850 masl)

- Mabughai (1560 masl)

4.2.1 Data collection and recording

Count adults in demarcated area of $1m^2$, and then collect 10 adults for identification into different species in the laboratory.

Preserve them in glass vial containing alcohol (konyagi) Indicate dates, location, altitude, rainfall, temperature, humidity and previous history of the field.

4.2.2 Make observation on host range

4.2.3 Dig around the bean plants showing sign of damage by *Ootheca* and collect larvae (if any).

4.3 To study and evaluate various control strategies for bean foliage beetle.

4.3.1 **Experiment 1:** Screening bean cultivars for bean foliage beetle resistance.

CIAT materials: A62, A67, A87, BAT 1252 and Uyole materials: Kabanima, Mexican 142, T8, UAC 116 and YB-2 that have shown some tolerance, will be included as checks plus other released varieties. Other materials will be provided from the germplasm in the national programme collection.

4.3.2 **Experiment 2:** Influence of time of sowing on bean foliage beetle *(Ootheca spp)* infestation and damage.

In this section, trials will be conducted in different locations of different weather conditions in Northern zone this will involve several times of sowing commencing from the onset of rains.

4.3.3 **Experiment 3:** Assessment of infestation and damage by bean foliage beetle in different cropping systems.

Bean with Maize, Coffee and Banana cropping systems.

4.3.4 **Experiment 4:** Insecticides screening for the control of bean foliage beetle

Evaluation of various seed dressings and foliar sprays insecticides for their efficacy to control bean foliage beetle.

Data collection and recording.

(i) Count the number of *Ootheca* in a specified area

(ii) Score the damage on a scale of 1-9; where as 1 = no damage and 9 = severe defoliation.

4.3.5 **Experiment 5:** Search on possible natural enemies for the control of bean foliage beetle.

It is important to look and assess the cause of mortality at different stages in the life cycle of the insect.

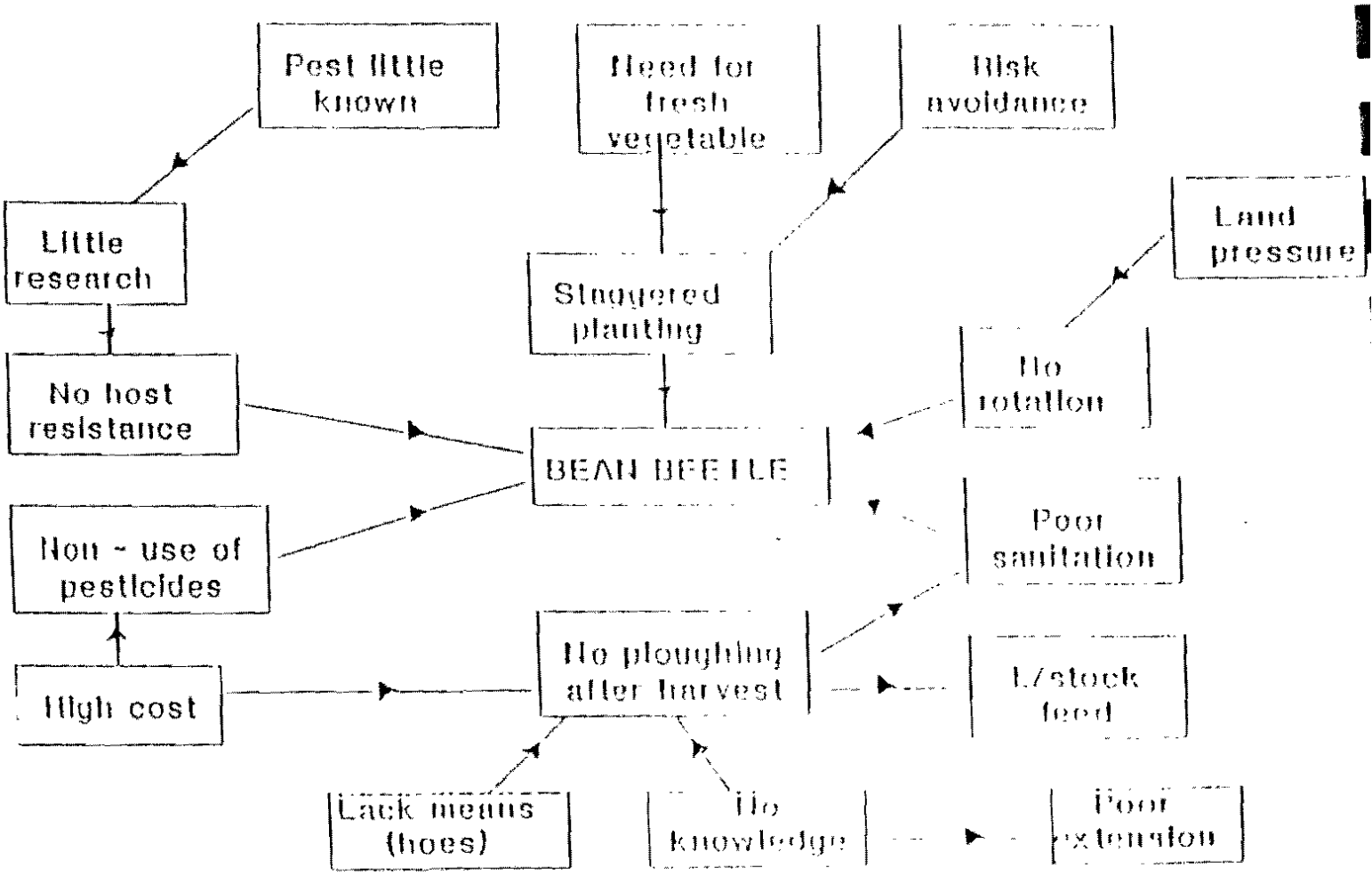
These include - Parasites
- Predators
- Fungus

4.3.6 **Experiment 6:** Access other cultural practice like sowing dates, post harvest ploughing and put together an IPM package based on these findings and information obtained in experiments 1,2,3 and 4.

Table 1. RANKING OF TOP 20 CONSTRAINTS BY ELEVEN PARTICIPANTS

Constraints	1st rank	Ranks by Participants											Total	Final rank
		1	2	3	4	5	6	7	8	9	10	11		
1. BSM	1	1	2	15	3	1	2	3	3	8	4	2	44	1
2. ALS	3	3	4	6	10	2	1	1	2	9	12	5	55	2
3. BRUCHID	2	4	7	2	4	3	4	4	1	10	6	7	52	3
4. RUST	11	8	10	5	13	5	8	11	6	15	14	18	113	8
5. OOTHECA	12	2	6	10	17	10	9	5	7	20	16	13	115	8
6. ANTHRANCOSE	10	7	12	14	2	8	15	12	8	11	11	6	107	10
7. WEED	7	5	14	4	9	7	10	13	11	5	9	3	90	12
8. LOW Y.P	6	6	1	13	1	11	7	10	13	7	5	8	82	12
9. CBB	18	18	18	11	18	19	18	9	12	18	18	14	173	17
10. POD B.	17	17	17	12	20	12	16	14	16	17	19	12	172	19
11. LOW N	5	9	5	7	6	4	3	7	15	6	3	10	75	3
12. SEED AV.	9	16	3	8	11	13	19	2	9	2	10	9	102	5
13. SEED QUAL.	4	15	8	1	6	13	6	4	3	2	1	1	71	5
14. LOW P.	8	10	9	19	5	9	5	15	14	1	1	4	92	5
15. OTHER CHEM	19	19	12	18	14	17	17	17	17	16	20	20	187	10
16. DROUGHT	13	11	11	3	19	14	11	8	5	12	13	15	122	12
17. EROSION	14	12	16	9	15	16	14	18	18	13	7	11	149	17
18. LOW PH	15	14	15	17	7	15	6	16	19	14	15	17	155	19
19. OTHER SOIL INFE.	20	20	20	20	8	20	12	19	20	19	17	19	194	19
20. LAND PREP.	16	13	19	16	16	18	20	20	20	4	8	16	160	19

Figure 1. Factors contributing for the importance of bean foliage Beetle (*Ootheca spp*)



Source: The SADCC/CIAT Regional Bean Research planning workshop held in Mangochi, Malawi.

5.0. WORKPLAN

	ACTIVITIES	DURATION (YEARS)		
		1994	1995	1996
1.	**Study on tbe biology of bean foliage beetle**	x		
	Study on:			
2.	(i) Species composition	x	x	
	(ii) Population dynamics	x	x	x
	(iii) Species distribution	x	x	x
3.	**Yield loss assessment**	x	x	
4.	**Evaluation of different management strategies:**		x	x
	- Cultural control		x	x
	- National enemies		x	x
	- Host plant ressitance		x	x
	- Insecticides		x	x
	- IPM package testing			x
5.	**Data processing**	x	x	x
6.	**Report writing**	x	x	x

6.0 BUDGET ESTIMATES

	ITEM DESCRIPTION	US $		
		1994	1995	1996
1.	Project No.I			
A	Laboratory /screen house equipments	300		
B	Wages and allowances			
	(i) Meal allowences	1000		
	(ii) Temporary labour	500		
C	Office supplies and services	200		
	Sub-total	2000		
2.	Project No.II			
A	Travel			
	(i) Subsistance			
	- Principal investigator	1000	2000	2000
	- Technician	2000	1000	1000
	- Driver	500	500	500
	- Temporary labour	500	500	500
	(ii) Fuel (petrol)	1520	1520	1520
	(iii) Vehicle maintainance	500	500	500
B	Office supplies and services	100	100	100
C	Miscellanous	200	200	200
	Sub-total	9320	9320	9320

	ITEM DESCRIPTION	US $		
		1994	1995	1996
3	**Project No: III**			
A	Wages			
	Temporary labour		1500	1500
B	Farm inputs		30	50
	- Fertilizers		25	25
	- Seeds		100	100
	- Chemicals			
C	Land preparation			
	- cost of plowing		20	20
	- Hand hoe		20	-
	- Weeding		12	12
D	Harvesting material		200	100
E	Office supplies and services		500	500
F	Sprayers		100	-
	Sub-total		2507	2507
	Grand Total	9330	11837	11837

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Farmers Participation in Bean Evaluation of Promising and Released Bean Cultivars in Ruvuma Region.

Introduction

Common beans *Phaseolus vulgaris* is an important grain legume grown in the southern Highlands. Beans constitute one of the staple foods in many parts of the Southern Highlands of Tanzania. Its protein content supplements that of cereals, tubers, and plantain. They are best grown in areas lying between 1000 - 2400 m.a.s.l. where rainfall is between 500 - 2000 m.m. per annum.

Most of the bean varieties produced are local bean varieties. These include Kablanketi, Masusu, Kasukanywele etc. This is evident in the local markets where quantities of Kablanketi and Masusu bean grain are sold. Field observation also has shown that most bean plants type found in farmers' fields are of Kablanketi and Masusu type.

However, yield potential of these local bean cultivars is low as compared to improved bean varieties released by MARTI Uyole. The experimental data have indicated that local bean cultivars can yield between 500 - 1000 kg/ha while released bean cultivars by MARTI Uyole can yield between 900 - 2000 kg/ha. The improved varieties include Uyole 84, Uyole 90, Illomba and Kabanima.

Justification

During bean research planning workshop, use of low yield potential bean varieties ranked number eight as a biotic constraint to bean production in Tanzania. This indicated how important the problem is as far as bean production is concerned.

Continuation of growing local bean cultivars has contributed to low bean yields released from farmers fields (300-500 kg/ha). This could be due to little or no farmers involvement in planning and evaluation of new technologies developed in bean research. Hence no opportunity given for hands on evaluation of the new technologies by the prospective user - the farmer. Therefore, there is no feed back to researchers about farmers criteria for deciding whether and how to use potential innovation depending on weight agronomic and social cultural considerations.

Expectations

With this trial the authors expect some of the tested bean varieties to likely meet farmers criteria for acceptability and thereafter be grown by farmers, thus increasing bean production, welfare and nutritional standards of the people.

important in order to reduce risk involved by using one type of bean varieties.

Cropping systems used by farmers in some areas of the Southern Highlands are suitable for climbing bean production. Such cropping systems, which include relay, and intercropping systems, can provide maize stalk as stakes for the climbing beans when grown in association with maize. This has been done in South America where farmers are now growing climbing beans in relay and intercropping systems.

In areas where land is a limiting factor to crop production such as in Mporolo and Tukuyu, climbing beans can be used to intensify bean production using stakes. This technology have been used in South America and in Rwanda where bean production has increased tremendously.

Objectives:

(1) To increase bean production because climbing beans have been found to yield higher than bush bean varieties.

(2) To intensify bean production in land scarce areas where farmers are unable to expand area for bean cultivation due land limitation.

(3) Diversification purposes in order to reduce risk involved when there is a disease out break.

(4) To increase bean production in relay and intercropping systems by using climbers than bush beans. This is due to the good yield potential of the climbers.

Project Phases

The project will be carried out into three phases.

I. PHASE ONE:

(i) Survey will be carried out in the study area i.e. Ruvuma, Iringa and Mbeya regions.

(ii) Preliminary evaluations for the climbing bean materials available at two locations - i.e. Mitalula and Uyole.

(i) Survey's Objectives

a) To identify farmers' problems encountered in climbing bean production by field observations and discussion with farmers.

b) To collect land races of the climbing bean varieties from farmers. The material collected will be useful in the evaluations.

Methodology of the Survey

The survey will be informal where individual interview using a questionnaire with open ended questions will be used. Farmers to be interviewed will include those who are growing climbers and those who used to grow climbers but stopped for some reasons. Field observations will be done to confirm some of the informations gathered from farmers concerning climbers.

Seed collection of the land races will be done at random from farmers' seed lots. Thus representative sample will be obtained. Sampled will be collected from each farmer interviewed.

Expectations from the Survey Excise

The authors expect that information derived from the survey will help the bean scientists to design experiments to solve farmers problems as identified during the survey. These farmers will easily be adopted the technology, hence increasing bean production.

Duration of the Survey

4 - 6 weeks during the growing season.

Locations

Ruvuma, Iringa, Rukwa and Mbeya Regions.

Investigators

Bean programme team, (Pathologist, Entomologist, Breeder, Agronomist), Extension Staff in respective areas, Farmers in respective home steady.

(ii) Objectives of Preliminary Evaluations

(a) To increase seeds of the climbing bean materials available so that next season more sites will be included in testing them.

(b) To test the performance of the climbing materials available at high and medium altitudes.

(c) To assess farmers opinion concerning growing climbers with stakes and with maize associated.

(d) To evaluate the performance of these climbers under intercropping systems.

Location

Uyole - high altitude
Mitalula - medium altitude

Material and Methods

Treatments:

Main plots : Staking materials
- Bamboo stakes
- Maize stalks (intercropping)

Sub-plots : 10 bean climbing varieties, to be named later.

Experimental Design

Split plot design with two replications.

Plot size 6 m x 2.5 m

Date of commencement: 1993/1994

Duration: One season

Data to be collected:

- data of planting, farmers assessment, yield and yield components, 50% flowering date, days to physiological maturity, descriptive data for the site etc.

(ii) Extension staff are expected to advise farmers to accomplish the planned farm activities.

(iii) Farmers are expected to do all the farm operations except planting and harvesting which will be done in collaboration with researchers and extension staff.

Plan of Work:

Timing of field work will follow the calendar of farm operations for beans i.e. from February to July.

Data Analysis:

- There will be statistical analysis for yield and yield components.

- Farmers assessment report.

- Economic analysis.

Principal Investigators:

- M. Mkuchu/C. Madata
- Extension staff
- FSR staff

Principal Investigators:

- M. Mkuchu
- C. Madata

Collaborators:

- FSR
- Soil Scientist
- Extension
- Farmers.

II. PHASE TWO: EVALUATION PHASE

This phase will be a continuation of the preliminary evaluation phase except that more materials will be included from and outside the country e.g. Malawi and Rwanda. Lyamungu research station.

Also the materials in this phase will be tested in one more site, Mbimba representing low altitude.

III. PHASE THREE

This is a phase of on-farm trials which will start in 1995/1996.

Objective

To evaluate the performance of the climbing bean varieties on farmers conditions. These materials will be tested on-station for two seasons and assessed by farmers that they would like to test them on their farms.

Material and methods plus the budget and location will be planned later after, at least materials selected to be tested on-farm have been tested for not less than two years on-stations.

Investigators

- Margaret Mkuchu - Agronomist
- Catherine Madata - Breeder

Collaborators

- Frederica Mwalyego - Pathologist
- David Kabungo - Entomologist
- Soil Science Department
- Lyamungu Research Station
- Malawi.

6. Farmers Evaluation at Flowering Stage:

Fuel: 200 litres @ 300/=	60,000.00
Night Allowances:	
3 R.O. x 6 days x 5,000/=	90,000.00
Driver x 6 days x 4,000/=	24,000.00
Extension x 6 days x 4,000/=	24,000.00

7. Farmers Evaluation at Physiological Maturity:

Fuel: 200 litres @ 300/=	60,000.00
Night Allowances:	
2 R.O. x 10 days x 5,000/=	100,000.00
Driver x 10 days x 4,000/=	40,000.00
Extension x 10 days x 4,000/=	40,000.00

8. Harvesting July/June 1994:

Fuel: 200 litres @ 300/=	60,000.00
Nigh Allowances:	
2 R.O. x 6 days x 5,000/=	60,000.00
Driver x 6 days x 4,000/=	24,000.00
Extension x 6 days x 4,000/=	29,000.00

9. Taste Interviews July 1994:

Fuel: 200 litres @ 300/=	60,000.00
Night Allowances:	
3 R.O. x 6 days x 5,000/=	90,000.00
Driver x 6 days x 4,000/=	24,000.00
Extension x 6 days x 4,000/=	24,000.00

10. Materials Required:

Fertilizers: CAN 3 bags of 50 kg	15,000.00
TSP 3 bags of 50 kg	15,000.00
Insecticides: Actelic 1 litre @ 10,000/=	10,000.00
Harvesting Materials	50,000.00
TOTAL BUDGET =	**1,385,000.00**

BUDGET FOR EVALUATION PHASE 1994/1995

Uyole Agricultural Centre Station:

Land preparation		20,000.00
Stakes		10,000.00
Fertilizers and chemicals		20,000.00
Labour		150,000.00
Harvesting materials		30,000.00
Costs for inviting farmers		50,000.00
	Total	280,000.00

Mitalula Station:

Land preparation		20,000.00
Stakes		10,000.00
Fertilizers and chemicals		20,000.00
Labour		100,000.00
Transport		150,000.00
Costs for inviting farmers		60,000.00
Night allowances		100,000.00
	Total	460,000.00

Mbimba Station:

Land preparation		20,000.00
Stakes		10,000.00
Fertilizers and chemicals		40,000.00
Labour		100,000.00
Harvesting materials		20,000.00
Costs for inviting farmers		100,000.00
Night allowances		150,000.00
Transport		200,000.00
	Total	640,000.00
Vehicle maintenance		30,000.00
	Total	670,000.00

BUDGET SUMMARY

Phases	Activities	1993/1994	1994/1995	1995/1996
I	Survey	730,000/=	-	-
	Preliminary Evaluation at:			
	UAC	175,000/=	-	-
	Mitalula	371,000/=	-	-
II	Evaluation of more material at more sites:			
	UAC		280,000/=	280,000/=
	Mitalula		460,000/=	460,000/=
	Mbimba		670,000/=	670,000/=
III	Phase of on-farm trials starting in 1995/1996			Yet budget to be planned
		1,276,000/=	1,410,000/=	Not yet known.

THE ROLE OF NARS IN THE MANAGEMENT AND EXECUTION OF REGIONAL RESEARCH AND TRAINING NETWORK PROJECTS/PROGRAMMES[1]

Roger Kirkby[2]

Introduction

National Agricultural Research Systems (NARS) face a large number of constraints - technical, administrative and financial - in addressing the needs of their client groups. This paper takes as its starting point the assumption that a significant number of these constraints can be overcome more effectively and/or efficiently by well organized collaboration among countries, and that NARS leaders and scientists are convinced that a network approach is appropriate. This conviction has implications not only for the sharing of results but also for resource management within a NARS. This leads to the following definition of a network as:

> "...a voluntary association of research organizations with sufficient common objectives to be willing to adjust current research programmes and invest resources in network activities in the belief that they will meet their objectives more efficiently than conducting all research alone." (Banta, 1982)

An efficient network of this type requires NARS, as a matter of self-interest, to take an active part in decision-making and also, whenever feasible, in implementation. These roles are important regardless of how coordination among NARS is arranged.

Setting Regional Priorities

A key decision taken by SADC member countries was the division of responsibilities among them for leading the implementation of a set of distinct regional projects or programmes, on the basis of national comparative advantage conferred by agroecological conditions and/or research infrastructure and experience. Even then, it is unlikely, in most regional programmes, that the lead country will have comparative advantage in all areas for which potential exists for collaborative activities. Further division of responsibilities with a programme is therefore beneficial.

In the SADC Bean Programme, agreement on this division of labour is reached in a multi-step process that starts with a series of national strategic planning workshops on bean research (see Figure). Ideally, each national commodity plan should be based, in the case of large or diverse countries, on a prior step of zonal planning across commodities so as to ensure a strong

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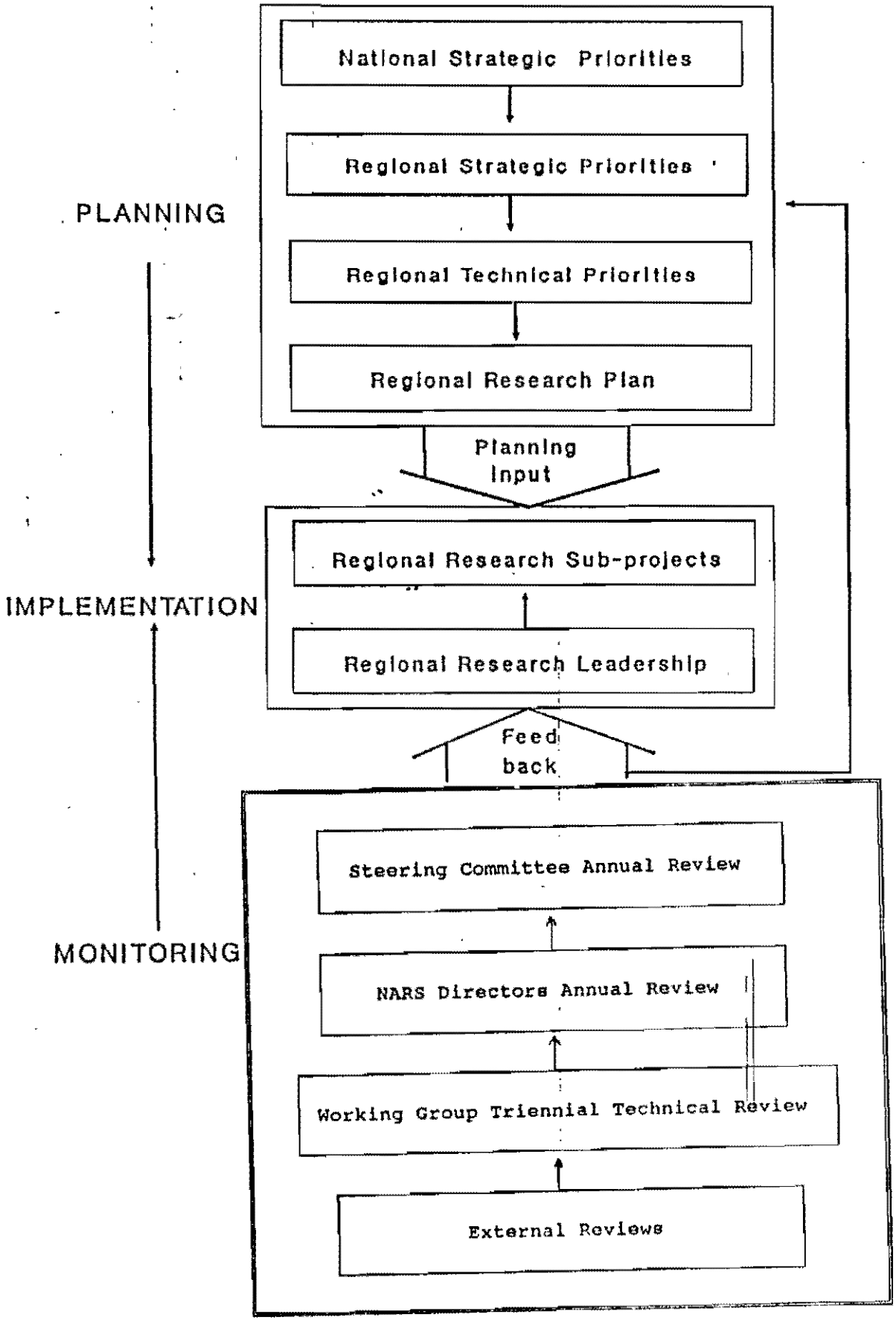
[1] Invited paper at Annual Meeting of Team Leaders of Regional Projects, Donors and Board of SACCAR; Mbabane, Swaziland, 22-24 November, 1993.

[2] Pan-Africa Coordinator, CIAT, P.O. Box 23294, Dar es Salaam, Tanzania.

OPERATIONAL ORGANIZATION

OF A COLLABORATIVE RESEARCH NETWORK



input from on-farm researchers, extension agents and farmer surveys. In our first round of strategic planning, national workshops were held by Malawi and Tanzania, while other countries also contributed at the regional workshop. Experience from the longer-established bean network (RESAPAC) in the Great Lakes region suggests that repeating these workshops after three years and using participatory planning by objectives (e.g. ZOPP) lead to much enhanced commitment to networking at the scientist level.

The strategic plan should identify potential research topics that form the core of the network, and the essential enabling activities such as training for specific skills and strengthening of linkages to secure that research results reach the user.

Evidence for the existence of a functional research network is provided by national research plans (including annual programme planning in all countries) in which limited resources are concentrated upon those problems that the country is best placed to solve, and activities in which information may be expected from network partners are explicitly reduced or eliminated. In the area of training, NARS similarly might emphasize training for key collaborative research activities over unfocussed training dispersed throughout a programme. In summary, programme priority setting at regional and national levels needs to become an interactive and iterative process led by NARS' managers and by their more experienced scientists, who themselves are likely to be leaders of regional research sub-projects.

Implementation of Research Sub-Projects

Collectively through a steering committee mechanism, the NARS approve a portfolio of sub-projects in response to proposals prepared by individual scientists and submitted by NARS representatives. The steering committee should have a set of guidelines for judging proposals, and it could be appropriate if NARS directors were to harmonise these guidelines across programmes: besides removing possible sources of distortion within individual NARS, it is important for NARS to ensure that such proposals have already received national approval. Also, agreement among NARS on a minimum national financial contribution to each sub-project could be useful in emphasizing "ownership".

Responsibility for implementation should include administration of regional funds allocated for each activity, a role that at an earlier stage of network development might have been managed by an IARC or regional entity. The SADC Bean Programme still retains, if specifically requested by a NARS, any funds approved for national equipment imports but, with liberalization of currency controls, even this role should be increasingly manageable by NARS. Regional sub-project funds should pass through NARS accounting channels. The institutional nature of the commitment and the desirability of developing accountability among researchers would be well served by presentation of sub-project financial reports that are co-signed by the NARS accounting department and by the sub-project leader.

An explicit part of a regional research role is responsibility for sharing the results and obtaining feedback from colleagues in other countries. A particularly effective way of achieving these objectives is to hold monitoring visits or small informal travelling workshops. Bean network steering committees in Africa encourage sub-project leaders themselves to take the initiative in convening and organizing these gatherings. It is also proving a useful step in the important process of developing NARS scientists to become regional resource persons.

Implementation of Training

Although the responsibility for upgrading the skills of graduate researchers and research technicians ultimately rests with NARS, there has been a tendency for regional programmes to assume this role, and directly mount short courses. Most well-established SADC programmes have probably completed a necessary first round of basic training, and are now engaged in more specialized training, involving smaller numbers of scientists.

This first phase has not eliminated the need for further basic courses (e.g. due to staff turnover), but has improved the capacity of the more experienced NARS scientists to train others, either within the country or regionally.

A technical course sponsored by a regional programme, if implemented in a national setting, can also be used to help build institutional capacity for training. The host NARS needs to be involved in its planning and organization, with a local organizing committee, preferably had by the NARS training officer, being responsible for drawing up a detailed draft budget, developing and distributing the course outline and organizing resource persons. An important aspect of the work of CIAT's regional training officer, during a three-year period ending in 1992, was to work with such groups the first time around; a specific objective was that, in subsequent courses, they would take the leading role and the regional programme would revert primarily to the role of providing resource persons not readily available from elsewhere.

One common constraint to doing this in many countries is the lack of a training facilitator/course director within the NARS - whose training officers often seem to be administrators engaged mostly in processing postgraduate scholarships. This absesnce also leads to an ad hoc approach to organizing short courses nationally, and requires institutional resolution.

A second problem is that many scientists are not well versed in communicating; this is gradually being addressed (e.g. the 1992 SADC/ICRISAT/CIAT course), but also would be more effectively overcome by systematic training conducted nationally.

A third area of difficulty, once the regional programme steps back from assuming primary responsibility for organizing training, can be maintaining the momentum of in-house training. This requires a culture of institutional self-reliance, by which

acquired knowledge or skills are routinely passed on to one's technical assistants, scientific colleagues and national extension staff. Examples where this has successfully occurrred include the computer literacy achieved by every scientist in Ethiopia's NARS as a result of a single central course for leaders from all stations, followed by within-station courses conducted entirely by these local resource persons; and the practical training of plant pathology technicians in Uganda by a NARS scientist and several fellow technicians who had participated in a regional course on this topic.

These examples also serve to illustrate the underrated value for a NARS in simultaneously tapping several regional programmes so as to mount a national activity across commodities. For training in topics that are not commodity-specific, this in-country approach also allows a NARS to make considerable cost savings over regional training, and to tailor the training content to the national situation. This kind of coordination, while often discussed among IARCs, is much more effectively stimulated and coordinated by each NARS.

Monitoring and Evaluation

Along with everyone else, regional programmes are under pressure to do more to document and assess their activities.

Monitoring and self-evaluation by NARS scientists can be built into sub-projects. Their leaders can be asked to respond in annual progress reports to such questions as: what divergences were made from the workplan? what have been the principal benefits for the region, so far? what important regional objectives remain to be met in this topic?

More objective criticism is also needed, and can be expected from annual reviews by the Steering Committee (especially if there is active competition among proposals for a limited total budget) and from periodic meetings of experienced scientists in the region. In the bean networks in Africa, triennial meetings of specialist working groups have been valuable in advising steering committees whose memberships are often less than fully interdisciplinary.

Similarly, there is also much scope for NARS to undertake adoption and impact studies that can contribute to assessments of a regional programme. Regional programmes might assist the related technical programmes within NARS to start routine collection of indicator information for entry in a common database, in place of the present tendency to rely upon regional coordinators for information on most regional activities.

Coordination

This is perhaps the area in which there is least experience of NARS involvement, yet eventually the coordination of a large number of networks in Africa will probably pass to one or more of their member NARS or to a regional institution. Important

characteristics in a coordinating institution, as in the selection of a person to be coordinator, include regional impartiality (able to be viewed by all members as an "honest facilitator" and not as a competitor) and efficient organizational capacity.

Permanent coordination by a leading member NARS may be the simplest solution, but can pose certain problems, including new problems for that NARS. Can the national commodity coordinator take on the additional duties and also maintain an impartial regional role, without neglecting national interests? If, on the other hand, a regional coordinator position is established by the coordinating NARS, what is that person's relationship to the national coordinator? Yet there is much to be said for coordination by NARS, which have the greatest vested interest in ensuring technical success of the network.

One possible low-cost solution could be for the member NARS of a network to agree on rotation of coordination duties among them for fixed periods of time. This would be a logical development of our present practice of rotating chairmanship of steering committees. A next step might be for the current chairperson to be invited to represent the network, complementing the representation of the regional programme as a whole by the implementing organization or the IARC that provides technical input, at meetings such as this one. This practice has started in Eastern Africa. Continuity in financial responsibilities, such as legal acceptance of donor funds and making disbursements among countries, might be more easily handled by their separation from coordination proper, and placed at a regional body such as SACCAR under a single regional administrator (covering all networks), who would act on instructions from the coordinator.

Concluding Remarks

This paper aims to raise a few thoughts and to stimulate further discussion of issues; it does not pretend to be comprehensive in any way. Undoubtedly, many other relevant experiences with NARS management of network activities exist, and a period of experimentation with those approaches that most appeal to member NARS appears warranted.

Advancing this process will depend not only upon policy decisions by NARS concerning administrative issues, but also the continued encouragement and development of scientific leadership among NARS scientists and its systematic utilization by networks. There might be value in the development of a regional database of widely recognized NARS scientists who have a proven record in service as regional resource persons.

Réseau pour l'Amélioration du haricot (*Phaseolae*) dans la région de l'Afrique Centrale

(RESAPAC)

Poste à pourvoir

Nous cherchons un/une

Coordinateur/Coordinatrice du réseau

Notre réseau regroupe les chercheurs burundais, rwandais et zaïrois qui travaillent sur le haricot avec l'objectif de mettre au point et de diffuser des technologies adéquates et susceptibles d'augmenter la productivité de cette culture.

Tâches:	Coordination des activités de recherche et de formation Suivi scientifique de ces activités Coordination des essais et pépinières régionaux Gestion du réseau en accord avec son Comité Directeur
Profil souhaité:	Dix ans d'expérience dans la recherche agricole Expérience en gestion de la recherche De préférence de la région (des Grands Lacs) Langue française avec maîtrise de l'anglais
Avantages:	Salaire très compétitif au niveau régional

Engagement: à partir du 1. Octobre 1994

Nous attendons votre **offre d'emploi** accompagné du *Curriculum vitae* détaillé, des attestations de services rendus, d'une liste de publications et deux publications récentes jusqu'au 30 Novembre 1993. Veuillez indiquer les adresses complètes de trois personnes de référence. Adresser les offres au Coordinateur, Projet CIAT, B.P. 259, Butare, Rwanda (téléphone 250-30446, fax 250-30599).

Renseignements additionnels:
ISABU, B.P. 795, Bujumbura, Burundi (Programme Haricot)
ISAR, B.P. 138, Butare, Rwanda (Programme Haricot)
INERA, B. P. 2037, Kinshasa, Zaire (Direction Générale)
INERA, Station Mulungu, B.P. 496, Bukavu, Zaïre (PNL)

ANNOUNCEMENT OF THE FOURTH CROP MANAGEMENT RESEARCH TRAINING COURSE FEBRUARY 14 - AUGUST 12, 1994

The Kenyan Agricultural Research Institute (KARI), Egerton University (EU) and The International Maize and Wheat Improvement Center (CIMMYT) have jointly established a training course in Crop Management Research (CMR). The fourth such course will concentrate on Maize Crop Management Research with secondary emphasis on Beans Crop Management Research. The course will stress the importance of on-farm research. This course will be conducted at the campus of Egerton University, Njoro, Kenya and will be of six months' duration. Field research conducted as part of the training course will be located at the university farm (experiment station) and in farmers' fields in Kenya. Visits will be made at appropriate times to KARI Research Centres and other research institutes to discuss Crop Management Research activities.

A major goal of the CMR course is to develop the participants' skills, capacities and confidence so that when they graduate they will be able to organize and conduct farmer-oriented CMR programs directed at solving the main production problems faced by farmers in their countries. Their farmer-oriented research will include awareness of farmer circumstances including gender awareness.

The course is modelled on the Maize Production Agronomy Training Courses conducted by CIMMYT in Mexico for more than two decades but with emphasis on crop management research needs in Eastern and Southern Africa. The course will be approximately half in the classroom and laboratory and about half in the field conducting different stages of the research process.

Instruction will be in English. A brief outline of the curriculum is attached. While the curriculum appears to be listed in a disciplinary fashion, the importance of integration of various facets of an overall research program will be emphasized. This will be achieved by an interdisciplinary approach involving on-station experiments and on-farm research with a farming systems perspective. On-farm research activities will include contributions from both biological and social scientists.

Maize and beans are often intercropped in cropping systems in the region. CIAT staff will make presentations on the bean plant, bean diseases and insect pests, cropping systems, bean seed production and socio-economic aspects of bean production.

Core training staff will comprise 2 KARI, 2 Egerton University and 1 CIMMYT staff with experience and training in the area of Crop Management Research. Their inputs will be supplemented by other staff from the three institutions and others as needs and opportunities arise.

Egerton University has an attractive campus at Njoro, near Nakuru about 200 km from Nairobi. The participants will be housed and the classroom training will be conducted in the Agricultural Resources Centre (ARC) of Egerton University in a new building for the CMR training project which is complete.

The fourth Crop Management Research Training (CMRT) course is planned for the period February 14-August 12, 1994. *You are invited to nominate candidates for the training course as soon as possible in order to process the necessary documentation. Please ensure that full documentation is in our hands by November 30, 1993.*

Fees for the course will be US$7,500 + round-trip airfare economy class from your country to Nairobi. The above fees will cover all training and accommodation charges at Egerton University and during field trips, books and training materials, medical and life insurance premiums and a small stipend for incidentals.

There are a limited number of fellowships available through CIMMYT, CIAT and donors. However, preference will be given for acceptance of candidates who come funded by their governments, bilateral donor-funded projects, or other sources. Payment must be made in advance of the course starting date in U.S. dollars or other convertible currency. Cheques should be made payable to The Crop Management Research Training Project.

The International Centre for Tropical Agriculture (Centro Internacional de Agricultura Tropical -- CIAT) is also collaborating in the CMRT course through its Regional Bean Programmes in Eastern and Southern Africa. CIAT regional staff will contribute as instructors in the course. A limited number of fellowships for bean researchers in Eastern and Southern Africa will be available through the regional bean program steering committees. Candidates should contact their national bean research coordinator, and copy their application form to Dr. Roger Kirkby, Regional Coordinator, CIAT Regional Bean Programme in Eastern Africa, P.O. Box 23294, Dar es Salaam, Tanzania.

All nominations for the fourth regional CMRT course in 1994 should be sent to the following address as soon as possible:

CMRT Project (for attention of the Project Coordinator)
P.O. Box 677
NJORO.,
Kenya.

Telex: 33075

Telefax: 254-37-61145
254-37-61527
254-37-61183

Telephone: 254-37-61261
254-37-61368
254-37-61620 Ext. 3433

OR

CIMMYT (for attention of Dr. A.F.E. Palmer)
P.O. Box 25171
NAIROBI.
Kenya.

Telex: 22040 ILRAD
Telefax: (254-2) - 630164 or 631499
Cable:CENCIMMYT, Nairobi
Telephone: 254-2-632054/632151/632206/630003/630004

(copies of nominations of bean researchers should also be sent to CMRT Project).

Please send immediately to the above address, name, age, position held, degree(s) held, gender, field of research activity, citizenship, passport number, date of issue and expiry of passport and probable source of funding.

Several copies of a KARI/Egerton/CIMMYT training application form and medical examination form are enclosed. Please have your nominees fill these forms and have the training application form endorsed as requested. The completed forms should be returned to Dr.A.F.E. Palmer, CIMMYT, Nairobi or CMRT Project, Njoro, Kenya.

As a guide, KARI/Egerton/CIMMYT envisage the profile of a typical participant to be as follows:

a) National of a country of Eastern or Southern Africa.

b) B.Sc. degree holder or equivalent, preferably in an agricultural subject.

c) Proficient in English

d) Aged 22-40 years

e) Employee of a national agricultural research institute or national extension service, or similar parastal bodies. Occasionally may be from a private sector organization.

f) Nominated by national government in most cases.

g) Assurance from parent organization of continued activity in crop management research upon completion of training.

h) Physically fit as the course will involve considerable fieldwork.

August 27, 1993.

1994 CROP MANAGEMENT RESEARCH COURSE

CURRICULUM

		NO. DAYS
A.	**FIELD ACTIVITIES**	
1.	DIAGNOSTIC, SURVEY	11
2.	ON-FARM RESEARCH EXPERIMENTS*	28
3.	ON-STATION EXPERIMENTS (OSR)	8
4.	VISIT TO OTHER PROGRAMS' EXPERIMENTS	5
5.	CASE STUDIES IN FARMERS FIELDS	8
	TOTAL	60
B.	LECTURES**, LABORATORY, STUDY SESSIONS AND MISCELLANEOUS ACTIVITIES.	
1.	ON-FARM RESEARCH	30
	. General research philosophy and methodology	
	. OFR philosophy	
	. Planning	
	. Gender awareness in research planning	
	. Execution	
	. Evaluation	
	. Farmer participation	
	. Diffusion of technology	
	. Research-extension-farmer linkages	
2.	SOCIO-ECONOMICS	50
	. Assessing farmers' circumstances	
	. Analysis and interpretation of secondary data	
	. Data collection methods (informal and formal surveys)	
	. Analysis and interpretation of survey data	
	. Economic analysis (partial budgets, risk, dominance)	

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* Participants will plant, manage and harvest a sizeable number of experiments in farmers' fields, ranging from exploratory trials, designed to investigate technologies aimed at solving the main production constraints, to experiments designed to verify the validity and acceptance of improved technologies.

** All topics refer to maize and crops grown in association with it. Small adjustments to the contents will have to be made as other crop species are included in the curriculum.

		HOURS
3.	**PREPARATION OF FIELD EXPERIMENTS:** . Design . Field books . Seed and other input preparation . Logistics in OSR and OFR	30
4.	**STATISTICS & EXPERIMENTAL DESIGN:** . Field plot techniques . Basic biometric concepts . Statistical hypotheses . Experimental designs and analyses . Factorial experiments and interactions . Comparison of means . Across locations/years analyses for various designs. . Regression analysis . Yield stability analysis	50
5.	**THE MAIZE AND BEAN PLANTS** . Botanical descriptions . Variability, plant and grain types . Climatic requirements . Stages of growth and development . Physiological aspects of growth, development and production . Corn production techniques	25
6.	**SOILS AND CROP NUTRITION** . Soils of Eastern and Southern Africa . Physical properties . Chemical properties . Fertilizers and soil fertility . Management in monocrop and multiple cropping systems . Crop nutrient requirements . Management in conventional and minimum tillage systems	25
7.	**CROPPING SYSTEMS:** . Maize-based cropping systems . Socio-economic factors . Competition, interactions and complementarity in multiple cropping . Sustainability in Agricultural systems . Design of research for multiple cropping	25
8.	**WEEDS:** . Biology . Identification . Control methods in monocropping and intercropping . Design of weed control experiments	20

9.	**DISEASES AND INSECTS** . Identification of important diseases and insects . Damage and losses caused by diseases and insects . Effects of crop management on diseases and insects . Integrated pest management	20
10.	**SEED AND GRAINS:** . Maize production statistics in Eastern and Southern Africa . Cultivars for Eastern and Southern Africa . Seed production and seed quality . Storage and losses in storage	10
11.	**USE OF MICROCOMPUTERS (PC):** . Getting acquainted with computers . Learning basics of disk operating systems . Use of statistical, spreadsheet, and word processing software.	30
12.	**FARM EQUIPMENT:** . Calibration . Use and practice including maintenance . Planning equipment needs and specifications . Small-scale and large-scale equipment	25
13.	**SEMINARS:** . Presented by participants on crop production systems in their countries and other special topics	
14.	**DISCUSSIONS ON FIELD EXPERIMENTS:** . Observations and data to be collected . Progressive study and analysis of results . Planning following visits . Planning of future experiments . Reporting experimental results.	20
15.	**STUDY SESSIONS:** . Directed and supervised . Extra-curricular assignments	50
16.	**MISCELLANEOUS ACTIVITIES:** . Registration . Welcome to participants . Administrative matters . Preliminary and final evaluations . Orientation to life at Egerton University . Other (ot be programmed)	15
	TOTAL OR	455 HRS 65 DAYS

Centro Internacional de Agricultura Tropical
Apartado Aéreo 6713
Cali - Colombia

Southern Africa Development Community
SACCAR Private Bag 00108
Gaborone Botswana

Regional Programme on Beans in Southern Africa

Bunda College of Agriculture
P.O. Box 219
Lilongwe, Malawi

SADC NARS BEAN BREEDER`S ANNUAL PLANNING MEETINGS

JUSTIFICATION:

Currently each NARS plans its breeding program independent of other NARS. Some NARS have stronger programs than others. The weaker NARS can benefit from stronger NARS if annual programs can be developed jointly. A joint planing meeting would indentify areas of common interest and reduce duplication of activities.

OBJECTIVES:

To have full understanding of what each NARS is undertaking in order to:

1) To assist each other in developing a sound research program.

2) To cut down on duplicated effort on similar problems with similar solutions.

WHEN:

September of each year. Preferably when the SADC/ICRISAT (groundnut or pigeon pea) NARS coordinators have their planing meetings.

DURATION: 4 days

VENUE: To be decided every year.

COST :

Per diem 10 scientists x $100/day x 4 days =$4000.00
Air fare 10 scientists x $600/ticket = $6000.00

V. B. Aggarwal
(VAS Aggarwal)
Bean Breeder

Tel: 277222; 277349 Fax: 277251 / 782835 Tlx: 43622 BUNDA MI, 43055 ROCKFND MI

AGRICULTURAL RESEARCH FUND
FORMAT FOR COLLABORATIVE RESEARCH PROPOSAL

Rationale Behind the Agricultural Research Fund(ARF):-

The guiding principles for ARF funding are that: 1. The identified problem is a key constraint to agricultural production; 2. The Department of Research and Training(DRT)'s capacity to conduct the activity is limited and would be enhanced through a collaborative research project and 3. The research activity is on one of DRT's priority commodities.

Thus, a collaborative Research Proposal should, as much as possible, be in the following format:-

1. **Project Title:**

2. **Statement of the Problem:**

3. **Background information, including Literature Review/Review of Past Related Research:**

4. **Project Justification:**
   a) Purpose
   b) Reasons for undertaking the research project and the expected target group(s)
   c) Specific Problem definition
   e) Objectives/ Hypothesis

5. **Time Frame:** . In general, the proposed research activity should be completed within a ***minimum of 3 year phase with a maximum total costs not exceeding USD*** 30,000.

6. **Work Plan:**
   . Project description
   . Research Design and Location
   . Expected Statistical analysis
   . Activity/Time schedule
   . Collaborating Institutions and their respective roles, and timing of their actual involvement in the research activities.

7. **Assumptions(risks/uncertainties)**

8. **Outputs:** Indicate verifiable outputs/benefits from the proposed project and how they will improve existing problem areas and/or fit into the

on-going research activities/Priority Programmes,and impact on the environment.

9. **Inputs:** Facilities; Human Resource and Funding:-
   - List facilities/equipment/human resource available to you.
   - List other funding agencies presently supporting your proposed activities, and extent of financial, physical and human resource support

10. **Budget Justification :**
Specific justification will be required for expensive equipment, travel and extra human resource needed and why the research cannot be carried out within the DRT research system. Except where the nature of the research dictates otherwise, the DRT is always expected to be the principal, and co-ordinating, partner in the collaboration.

11. **Proposed Budget**
a) Equipment (specify)
b) Expendable Supplies (specify)
c) Local Travel schedule(specify)
d) Extra human Resource(specify)
e) Publication costs
f) other costs(specify)
g) Grand Total (a+b+c+d+e+f above)

h) Proposed quarterly financial disbursement schedule

12. **Progress Reports and Final Report:**
Quarterly and annual progress reports are expected to be submitted to DRT. Quarterly progress reports *must be sent, and received within the initial 6 weeks of the following quarter.* **Additional financial disbursement will automatically cease if progress reports are not received within the stated period.** A final report is expected within 3 months after the end of the project.

13. **Bibliography/Literature cited:**

14. **Curriculum vitae of the investigators/researchers.**
Indicate the principal investigator/researcher.

15. **Three copies of the proposal should be submitted to:-**
The ARF Secretariat, KILIMO,Research and Training Department, P.O. Box 2066 Dar Es Salaam.

16. Research Proposals will be submitted to the ARF Secretariat *on a cycle basis*, as will be advertised regularly.

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