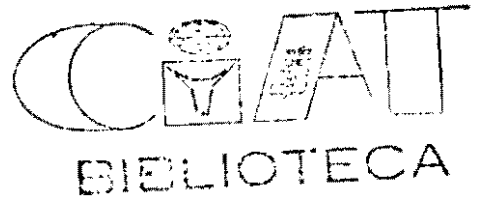
SEVENTH MEETING
HELD AT THE SWAZI INN HOTEL
MBABANE, SWAZILAND
ON 9-10 OCTOBER, 1989



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Southern Africa Development
Coordination Conference
SACCAR
Private Bag 00108
Gaborone
Botswana

Regional Programme on Beans in Southern Africa
Selian Research Centre
Private Bag
Arusha, Tanzania

Arusha, November 13th, 1989

Dear

Please find attached draft Minutes of the Seventh Meeting of the Steering Committee of the SADCC/CIAT Regional Programme on Beans in Southern Africa, held at the Swazi Inn Hotel, Mbabane, Swaziland on 9-10th October, 1989.

Yours sincerely,

for DAVID J. ALLEN
Regional Coordinator

MINUTES OF THE SEVENTH MEETING OF THE STEERING COMMITTEE OF THE SADCC/CIAT REGIONAL PROGRAMME ON BEANS IN SOUTHERN AFRICA, HELD AT THE SWAZI INN, MBABANE, SWAZILAND ON 9-10 OCTOBER, 1989.

Those present :

Mr. Manuel Amane, INIA, C.P. 3658, Mavalane, Maputo, Mozambique (Chairman).
Dr. Joyce M. Mulila-Mitti, Msekera Research Station, P.O. Box 510089, Chipata, Zambia.
Dr. Clemence S. Mushi, Agricultural Research Institute-Lyamungu, P.O. Box 3004, Moshi, Tanzania.
Dr. Alex Mkandawire, Bunda College of Agriculture, P.O. Box 219, Lilongwe, Malawi.
Mr. Francisco Eduardo, Facultade de Ciencias Agrarias, C.P. 236, Huambo, Angola.
Mr. John Pali-Shikhulu, Malkerns Research Station, P.O. Box 4, Malkerns, Swaziland.
Miss. Zodwa Mamba, Malkerns Research Station, P.O. Box 4, Malkerns, Swaziland.
Dr. Garry Massey, Maseru Research Station, P.O. Box 829, Maseru 100, Lesotho.
Mr. Simon Moima, Maseru Research Station, P.O. Box 829, Maseru 100, Lesotho.
Mrs. Thandiwe Nleya, Department of Research and Specialist Services, P.O. Box 81009, Causeway, Harare, Zimbabwe.
Mr. Trevor Sykes, CIDA/SADCC Programme, P.O. Box 2619, Harare, Zimbabwe.
Mr. Cliff Kwalambota, SACCAR, Private Bag 00108, Gaborone, Botswana.
Dr. David J. Allen, SADCC/CIAT Regional Bean Programme, P.O. Box 2704, Arusha, Tanzania. (Regional Coordinator).

Absent

Mr. E. Mosarwe, Sebele Research Station, P.B. 0033, Gaborone, Botswana.

1. Agenda

The Chairman drew attention to the proposed Agenda (Appendix 1). This was ADOPTED for the meeting.

2. Introduction

The Chairman then introduced new members of the Steering Committee (SC), in particular Dr. A.B.C. Mkandawire who has taken over leadership of the Malawi programme; Mr. Francisco Eduardo and Mrs. T. Nleya whom, it was noted, were standing in for Castro Camarada and Olivia Mukoko, respectively; Mr. Trevor Sykes, who has now replaced Dr. J.S. Clark on the CIDA/SADCC programme; and Mr. C. Kwalambota, as SACCAR representative. A particularly warm welcome was given to the Swaziland coordinator, Mr. John Pali-Shikhulu, and to Miss Zodwa Mamba, who is to take over from him,

for this was the first occasion on which Swaziland had been represented on the SC.

3. Minutes of the 5th SC Meeting

In view of their provisional acceptance at the 6th SC, the chairman asked for confirmation that the Minutes were indeed a true and accurate record by those present at the 5th SC. Dr. G. Massey and Mr. S. Molmo proposed their adoption and this was ACCEPTED.

4. Minutes of the 6th SC Meeting

Dr. J.M. Mulila-Mitti proposed their ADOPTION and this was seconded by Dr. C.S. Mushi. The Minutes were duely ACCEPTED.

5. Matters arising from those Minutes

(i) p.3 : The Regional Coordinator (RC) confirmed that he had spoken to Mr. Chris George (CIDA) to determine the possible implications of committing funds for academic scholarships beyond the life of the first phase of the Regional Programme (RP), currently scheduled to end on 31.3.92. Allen reported that George indicated there was unlikely to be any problem in carry-over. This was confirmed by Sykes.

(ii) p.3 : Dr. Mkandawire mentioned that technical/financial reports had been prepared by the Malawi programme and dispatched to the RC, by whom they had not yet been received.

(iii) p.3 : Mkandawire added that funds due to Malawi for the aphid sub-project had not been received. Allen confirmed the money transfer had been requested (a new cheque was immediately issued, on the understanding that if the first transfer was eventually received the sum would be refunded to the RP).

(iv) p.4 : The RC was asked about the outcome of the bruchid sub-project revision, following the Entomology Working Group Meeting in August. Allen replied that, apart from the summarized recommendations from the Working Group (Annexure 2 to RC's Report), he would have to check with the Regional Entomologist. Mrs. T. Nieya confirmed that she had not received advice from Dr. Giga, and she promised to discuss with Mrs. Mukoko.

Postcript : The revised proposal, Appendix 2, was accepted by the Entomology Working Group; who noted that as Dr. Giga was a recent recipient of a Rockefeller award, he intended to disburse a large proportion of the sum awarded (USD 10,000 p.a. requested) to cooperators in the bruchid sub-project, once approved by the SC.

(v) p.4 : With regard to the rejection of the application to travel to Zimbabwe as part of the nematode sub-project, Kwalambota mentioned that SACCAR offered travel grants. This was NOTED by the committee while stressing that the rejection had

been the result of the SC being unconvinced of the technical value of such travel rather than by limitation of funds.

(vi) p.5 : Amane mentioned that Mozambique had decided against drafting a sub-project proposal in favour of giving greatest emphasis to introduction of germplasm, seen as the chief need.

(vii) p.5 : It was CONFIRMED that Zambia had received the seed storage jars; and the balance had been received by Mozambique.

(viii) p.5 : Massey remarked that the thresher received in Lesotho proved unsuitable for whole plants. They needed a large machine (a Vogel ?) : he agreed to check on details and costs and relay this information to the RC. The question then arose as to what to do with the small bundle thresher. Noting that it had proved fully effective in Tanzania, Mkandawire requested that the machine be shipped from Lesotho to Malawi. This was APPROVED.

(ix) p.5 (and Appx 7) : Kwalambota remarked that SACCAR would like country totals to be presented in summaries of equipment orders. This was NOTED by the RC.

(x) p.5 : It was NOTED that a mutually convenient time for Mrs. Nleya's short-term training at CIAT headquarters could not be found during 1989. Allen was requested to start negotiations for her training during 1990.

(xi) p.6 : Dr. Mushi confirmed that he had visited CIAT, and so had Dr. Mkandawire (whose report was received by the RC). Francisco Eduardo confirmed that both Sereno and Ermelinda Conceicao had returned to Angola from CIAT training.

(xii) p.6 : Amane confirmed that he had found his visit to Tanzania very useful. Allen further confirmed that Messrs Ndakidemi, Mukandala and Kanenga had attended a CIMMYT training course in Swaziland.

(xiii) p.6 : With regard to courses elsewhere, Mushi reported that Ms Gondwe had not attended the weeds course in Uganda nor had she re-applied to the annual course at Corvallis.

(xiv) p.6 : Allen was asked to keep SACCAR as well as National Coordinators informed of training opportunities. Allen accepted this, noting that SACCAR representation on the SC Meetings ensured that such information was made regularly available. Sykes added that ISNAR was also running various courses in the region, information on which could also prove useful.

(xv) p.6 : The RC summarized the position concerning academic scholarships, mentioning that Mrs. Pomela had gained acceptance at Univ. Idaho and that Camarada had left for Reading.

(xvi) p.7 : Mkandawire urged the RC to move faster with publication of workshops/working group proceedings.

(xvii) p.8 : Kwalambota drew attention to the SACCAR guidelines for the composition and functions of Steering Committees (Appendix 3) which, the SC CONFIRMED, were being followed. It was remarked that the NC was proud to note that the SACCAR guidelines appeared to be modelled upon our own operation.

(xviii) P.8 : Mkandawire asked about the status of the Regional Breeder to be stationed at Bunda. Allen replied that a lead candidate had again been identified and that his name among others shortlisted was this moment under discussion between K.A. Kirkby and Dr. Martin Kyomo in Botswana.

(xix) p.8 : Kwalambota asked Allen about the procedure over the African Bean Research Prize. Allen reminded members that this was a prize presented by CIAT headquarters, where recommendations from the 3 RP's in Africa were sifted and the winner chosen. Our job in the SC was to review and pass on nominations received from the National Programmes (NP). Allen confirmed that the 1988 winner (Mrs. Theresa Bongooba from Uganda) had been announced in the SACCAR Newsletter (Appendix 4).

6. Regional Coordinator's Report for 1989 and Workplan for 1989/90

Allen presented first his Report (Appendix 5) then his Workplan (Appendix 6) that stimulated the following discussion. Both Report and Workplan are presented here in a revised form.

(i) That copies of observations and evaluations made by RP scientists and other CIAT visitors should be left with NP before their departure. Copies of trip reports are welcomed by NP's. Allen accepted this.

(ii) Mushi said that NP's should be consulted with reference to the Workplan. Allen replied that this was exactly the purpose of this particular session, in which input and needs of NP's were sought.

(iii) Amane said that late April/early May was the most appropriate time for a visit to Lichinga. This was NOTED.

(iv) Pali-Shikhulu asked for a visit by the Regional Cropping Systems Agronomist (CSA), and Regional Pathologist if possible, to visit Swaziland in February. The Rural Sociologist (Millicent Maluza) needs help with the design of a questionnaire to survey farmer/consumer acceptability, perhaps from the Regional Economist. These requests were NOTED, and are included in the revised Workplan.

(v) Massey said that the Regional Economist should plan to visit Lesotho for one week during Jan-March 1990 (in later discussion, it was agreed that CSA also visits at same time).

Massey added that he needed help with the evaluation of the drought nursery, in response to which the RC suggested that Dr. Mkandawire be invited to help. This was a popular proposal fully ENDORSED.

(vi) Francisco Eduardo confirmed that the scheduled visit by the CSA to Angola in Jan 1990 was welcome.

(vii) Nleya asked that the Regional Economist visits Zimbabwe, in late Feb/early March 1990, to give guidance to Olivia Mukoko in designing her on-farm survey for BCMV incidence, as part of her Ph.D research. This too was ADDED to THE WORKPLAN of the RP for 1990.

(viii) With regard to the CIDA/SACCAR mid-term review of the RP, as required in the Contribution Agreement between CIDA and CIAT, and as tentatively scheduled in the Workplan, Sykes said that his first thoughts were that there might be value in a two stage review. Allen said that this could be appropriate, given differences in crop season across the region. Kwalambota said that review teams usually want to meet NP leaders and research directors, but requirements obviously varied with the team leadership. Mushi said that the best time to visit Tanzania was May/June. Much discussion followed; conclusions drawn were that field visits (perhaps in March 1990) should be part of the first stage, during which the need for the review to tour capitals of the SADCC region in the second stage could be assessed and formulated. Sykes stressed that he would urge that the review team was kept small to avoid its becoming cumbersome. It was necessary to reveal to the review team the "wide sweep of influence" that the RP was having on 8 of the 9 SADCC countries. Kwalambota suggested that the topic be presented to SACCAR as an SC discussion topic.

Noting the above, the RC's Report and Workplan were ACCEPTED, CONDITIONAL upon suitable amendment to the Workplan, and upon inclusion of NP reports in the body of the Report.

7. National Programme Progress Reports

National Coordinators presented outlines of their progress and limitations, and some written reports were distributed by certain NPs. Technical details have been abstracted and presented in the revised RC Report (Appendix 5). Supplementary remarks, and problems encountered by NP's are as follows.

Mkandawire drew attention to 4 deficiencies in the Malawi programme, seen as : (i) the 6 sites used are manned by school leavers not by well-trained staff, so the quality of the work was often poor. More technical training is required; (ii) no on-farm research has been conducted and there is need to initiate this, but Government input (to the University-run commodity team) would be necessary. Again, training is needed; (iii) if the NP undertakes management of regional disease nurseries (a topic discussed during the 1st SADCC Regional Bean Research Workshop

during the previous week, without commitments being made) then two additional assistants would be sought; (iv) NP transport remains very limiting.

Mulila-Mitti circulated copies of executive summaries on the work conducted in Zambia, now divided by natural region. She said that major problems her programme faces include the uncertain future of work in Northern Province at Katito, near Mbala. There is a need to transfer atleast one senior staff member to the North (house available at Misamfu), because of the extreme logistical difficulties of effective management from Chipata.

Francisco Eduardo emphasized that the Angolan programme focused on 2 aspects, varietal evaluation and soil fertility. Much new germplasm was being introduced from CIAT, and some through the Red Cross. Work on screening for tolerance to soil infertility among 15 varieties at 2 sites was underway. Equipment needs are being met.

Amane stressed the acute need for better trained manpower, especially at Lichinga (the main bean research site) in Mozambique. Pathology input was needed. The main emphasis was being placed on germplasm introduction and evaluation (progress summarized in RC Report).

Mushi, who confirmed that highlights of research had been compiled, mentioned that a national monitoring tour had helped to further strengthen links between the 3 separate institutions concerned with bean research in Tanzania.

Trials under the Ministry had shown that G 5621 outperforms Lyamungu 85 although there are indications that it is less preferred. TMO 216 has been promoted to pre-release testing by Sokoine University of Agriculture. At Uyole Agricultural Centre, where the breeder is on overseas training, no lines outperformed the released cultivars, Uyole 84 and Kabanima. On farm research proceeds satisfactorily but the assistance of the NP is needed to strengthen OFR in the southern highlands. Further technical progress is reported elsewhere (see Appendix 5).

Among the principal problems confronting the Tanzanian national programme are : (i) restrictions imposed by plant quarantine on introduction of germplasm, and (ii) the lack of housing for NP staff in Arusha, so preventing the move to Selian where the "bean building" is nearing completion. Some progress in overcoming the first obstacle has been achieved through the use of Miwaleni as an open quarantine site under supervision of the National Plant Quarantine Service (NPQS), so permitting the import of materials from Uganda. Assistance is being given by the NP to NPQS to help establish a bacteriological laboratory as part of closed quarantine facilities. As regards housing for NP scientists, the assistance of SACCAR and CIDA is sought.

Pali-Shikhulu said that the main achievement as regards the bean programme in Swaziland had been the recent establishment of a Legumes Section, under Zodwa Mamba. Both equipment and training needs are now anticipated. Research activities on-station (see Appendix 5) have led to multiplication of seed of promising lines and also to the initiation of on-farm trials.

Massey remarked that it had been a good year in Lesotho, where an expanded range of introduced lines had been tested; some (including AFBYAN entries) appeared superior to the Pintos, which continue to be multiplied. On-farm trials are to be extended to mountain sites where the need is acute.

Nleya indicated that a full report from Zimbabwe was held by Mrs. Olivia Mukoko. In it, progress with variety testing had been summarized and promising materials identified.

8. **National Programme Portraits : Swaziland**

It was AGREED that this was no longer necessary, as a full report of the progress made by the Swaziland programme (the only programme not so summarized in previous SC Minutes) had now been presented.

9. **Regional Collaborative Research Sub-projects**

(i) Financial Reports from Malawi

Mkandawire confirmed that both financial and technical reports had been prepared and dispatched to the Regional Coordinator (by whom they had not yet been received) on all three of the established sub-projects (on drought, BNF and angular leaf spot) with the exception of a technical report on BNF. It was agreed that Dr. S.K. Mughogho be asked to report to the soil fertility working group meeting (Nairobi, February 1990), through Dr. O.T. Edje, with a copy to the CIAT Microbiologist (Dr. J. Kipe-Nolt). Mulila indicated that a more comprehensive proposal for the extension of the sub project might consider including a breeding aspect. It was NOTED that the angular leaf spot sub project has funding for a 3 year period, so was able to continue. It was CONFIRMED that the drought sub project should be continued.

Discussion on desired formats for financial reports, drawing upon Kwalamboto's experience, CONCLUDED that sub project accounts should in future follow the format of the budget originally approved by the SC. This would make it easier to see the level of expenditures against individually approved line items.

Mushi presented a brief report from Dr. J. Cuthbert on progress made with the nematology sub-project (Appendix 7). This was ACCEPTED by the SC.

(ii) New and Revised Proposals

Mushi submitted a new proposal on breeding for resistance to beanfly (Appendix 8) which, he said, had received input from the breeder and entomologist in the CIAT Bean Program in Colombia. Discussion led to the conclusion that this was an important topic that warranted support. The COMMITTEE AGREED that, provided the third objective was deleted from p.3 of the proposal (because such work is currently in progress among the entomology network), the sub-project would be awarded USD $7,500 for the first year, extendible thereafter if progress was deemed satisfactory by the SC.

Mulila-Mitti then presented a new proposal, on intercropping (Appendix 9). This inspired long debate. The conclusions drawn were that : it was useful to establish the importance of beans in particular cropping systems and it was preferable that the less well-known areas of the SADCC region be targeted especially; it is important that the objectives of the sub-project be sharply defined; and that individual NP's be left to decide on means of conducting the local questionnaire. It was further agreed that the survey element of the proposal should proceed so as to better formulate a specific research topic on intercropping, to be appraised by the working group on cropping systems. It was proposed and ACCEPTED by the SC that the ceiling for the survey be raised to USD 12,000 for the first year, with the PROVISO that such balance as remained at the end of this period be refunded to the NP. The principle that national funds be contributed to supplement external support from the NP was also ACCEPTED. Mr. Godfrey Mitti was unanimously nominated leader of this sub-project by the SC.

Following recommendations made at the 6th SC and at the Entomologists Working Group Meeting subsequently, Mulila-Mitti submitted a revised proposal (Appendix 10) on the aphid sub-project under the leadership of Dr. S. Sithanantham. Noting that the revision now took into account the inclusion of David Kabungo, in southern Tanzania, it was AGREED that the sub-project be awarded USD $15,400 for the second year, including a $ 4,000 to allow for the inclusion of Tanzania plus 10% as contingency.

(iii) Sub-project Agreements

Discussion began with Kwalambota who reiterated that some kind of agreement was important, because public funds were involved and that adequate accountability was vital. Financial reports from leaders of sub-projects must be explicit, spelling out clearly against what item expenditure was incurred. In the absence of a formal agreement, this was especially important. Discussion concluded with the request that SACCAR provides guidelines, and a model for future use. Sykes confirmed this was important from CIDA's point of view as well.

10. Training

(i) Proposals for short-term training at CIAT in 1990.

Two requests from Tanzania were presented by Clemence Mushi, both from the National Plant Quarantine Station where, it was NOTED, support was justified because this station was new and in need of strenghthening. One request was made for a week's visit to CIAT headquarters by the scientist in-charge, presumably Mrs. Roshan Abdullah, subject to confirmation by the Director of TPRI. The second request was for a 4 week period of training in virology for Miss Grace Olotu.

The SC AGREED to the principle but RECOMMENDED that the periods be extended to 7-10 days in the case of the head of quarantine (whose visit it was NOTED, should be arranged to be part of travel also to the western USA at the invitation of Dr. M.J. Silbernagel, as indicated by Allen who mentioned the opportunity for shared travel costs) and for a period of 2 months for Miss Olotu. Allen was asked to arrange appropriate times.

Francisco Eduardo asked that a graduate from Angola, Gregorio Gongolo, be offered a place in the multidiscipline course in Spanish at CIAT. This was ACCEPTED and Allen was asked to proceed.

The need for training for Swaziland was then discussed. Mushi drew attention to opportunity at CIAT headquarters, with possible value to Zodwa Mamba, and Mkandawire encouraged this. It was CONCLUDED that a suitable opportunity be sought for Miss Mamba at CIAT. Allen was also reminded of the need to find a time mutually convenient for Mrs Thandiwe Nkoya's training in microbiology at CIAT, as already approved.

(ii) Short-term training in the SADCC region.

Mulila-Mitti thought there was a need for another course for technicians. Allen drew attention to the existing plan to run a course aimed at graduate agronomists/socioeconomists during 1990, a proposal (Appendix 11) on which was requested at the 6th SC. It was proposed that this course be held in Arusha in the period 21 May-15 June, 1990 and offered to 15-20 participants. It was noted that these dates would probably overlap with the second phase of the KP mid-term review. Allen asked if the SC saw this as an undesirable conflict and Sykes replied that this was likely to be a positive advantage, in that the course would provide an opportunity for interaction between the participants and the review team. Kwalambota reiterated this, stressing that SACCAR liked review teams to see training in action. The SC requested the Regional Coordinator to notify SACCAR of the KP's commitments in review planning (Note : Commitments approved by SC are given in Work Plan, Appendix 6).

Returning to the proposed training course, then, the theme, venue and numbers were APPROVED, with participants being

allocated according to perceived need by countries, as follows : MW (2), WD(3), ZW (1), MO (1), AN (0), TZ (4), LO (2) and ZA (6). It was further noted that resource persons would include both national and regional scientists.

Attention was then drawn by Mkandawire to a proposal (Appendix 12) to hold an aphid identification course at Bunda, as an extension to the existing sub-project on aphids. Species identification was both important and quite difficult, and there was a need for specialist training, using the specialist knowledge of Dr. A. Autrique from Burundi. Mkandawire said that the University of Malawi would not charge for laboratory use and a total cost of USD 5,000 was all that would be required. This was ACCEPTED.

A request was made by Mulila-Mitti for a graduate training course on bean breeding during 1991. The SC SUPPORTED the suggestion in principle and requested that a detailed proposal be submitted to the 8th SC, preferably as a Pan Africa course that included a monitoring tour. The content should include seed handling and data management.

(iii) <u>New applications for academic scholarships at the master level</u>.

The Chairman asked the Regional Coordinator to remind members of the position. Allen said that provision had been made in a recent revision of the RF budget for one more scholarship at the master's level. Since all scholars to date had opted to attend universities overseas (USA or Europe) rather that to apply locally within the region, fewer scholarships could be expected from the available funds.

On being asked by the Chairman for nominations, Mushi put forward the name of Mr. Simon Slumpa, the entomologist on his team based in Arusha, indicating that he wished him to apply to an American University to work on beanfly. Mkandawire and Kwalambota each asked why he should not apply to a university within the region; Mushi replied that he believed that host plant resistance technology was superior outside. Before discussing further, the Chairman asked if there were other candidates. John Pali-Shikhulu said that one slot should be reserved for Swaziland (Note: nomination Mr. Norman Z. Simelane, MSc in bean breeding): this was noted by the committee as desirable, particularly because no opportunities for training had been given to Swaziland by the RF previously. Noting however that only one place was on offer, Mushi argued forcibly for the support of Slumpa, whose research proposal was made available. Mulila-Mitti suggested that Slumpa be encouraged to look for opportunities within the region, and Allen said that entomologists were fortunate in having the ARPTIS programme at ICIPE as one such local opportunity.

After heavy debate, it was [illegible] that [illegible] was tentatively accepted, subject to Allen's [illegible] the need

financial situation and to scanning the applications of each candidate.

(iv) Workshops and working groups

It was noted that plans proceed well for the legume virus working group, to be run jointly with IITA in Uganda in January 1990 (Appendix 13). Meetings of the Cropping Systems and Soil Fertility Working Groups, it was noted, were proposed to be held in Nairobi in February 1990. The COMMITTEE AGREED that it was important to proceed with these, but it REGISTERS ITS DISPLEASURE at the lack of information on what these working group meetings will entail. The Regional Coordinator was also reminded that the Proceedings of the drought working group were still awaited.

On being asked if further workshops were needed, Mukasy proposed that a Workshop on woods was important. He was asked by the SC to draft an appropriate proposal, which should make suitable links with East Africa.

(v) Monitoring Tours

The Chairman asked for suggestions. Allen replied that a Pan Africa Monitoring tour of the Kagera Basin of western Tanzania, western Uganda and Rwanda was planned to be held in the period of 12-21 November, 1989, as follow-up to an initiative first proposed at the 2nd SC meeting. An outline is attached (Appendix 14). The COMMITTEE NOTED that this tour related closely to the intercrop survey now planned, adding that it was obviously important to Tanzania. It should proceed. Mkandawire asked that a tour report be presented at the 8th SC.

11. **Equipment needs of national programmes**

The Chairman asked the Regional Coordinator to start. He began by drawing the attention of members to the summary in his report (Appendix 5) that shows that all orders are being met. What further items are required : Mushi said that the Tanzania programme needs a moisture metre, a photocopier and an electric typewriter. Allen reinforced this by pointing out that the lack of housing for the NP prevented their move to Arusha, where access was available to such equipment. There was a need for some duplication of office equipment in the interim. Kwalamboto reminded the SC that one of the key roles of the NP was to strengthen NP's : such equipment was part of such "strengthening". But there may be implications for their maintenance. The SC AGREED TO PLACE ON RECORD that most NP's do not have adequate resources with which to meet normal operating costs (which cannot be addressed properly by the NP) Supplementary bilateral support is urgently needed. Maintenance costs represent a potential drain on the regional system.

Francisco Edmundo called for [illegible] (through the NP) of landrover spares, motor cycles and 3 altimeters for Angola (see AOB of 6th SC Minutes) and Malila

Mitti reiterated the Zambian need for an altimeter and a seed store. It was agreed that the exact needs involved in the establishment of an seed store at Msekera would be determined during the RC's visit early in 1990.

Pali-Shikhulu asked the Regional Coordinator to seek specifications for the following items required by Swaziland : a bulk thresher, one precision balance, a seed drier, 2 altimeters and 2 knapsack sprayers. Amane said that Mozambique also requested 2 altimeters, and Francisco Eduardo added that Ermelinda C. requires culture media (PDA). Massey reaffirmed that he would send specifications of the thresher and seed drier Lesotho requires.

12. **Africa Bean Prize : nominations for 1989**

The Chairman asked the Regional Coordinator to give the position. Allen reminded members that the nominee put forward from the SADCC region in 1988 had been Mr. Epimaki Koinange, whose name could go forward again if that was the SC's wish. Mkandawire asked that Dr. O.T. Edje's name again be put forward, in recognition of his contribution to the NP in Malawi, and Mushi proposed also the name of Ms. Betty Gondwe from Tanzania.

13. **Election of Chairman and venue for 8th SC**

It was noted that among the SADCC countries only Angola and Lesotho had not hosted an SC meeting. Francisco Eduardo said he thought it was premature to select Angola. Maseru was duely selected.

On considering timing, the Regional Coordinator asked if members still wanted to hold two meetings a year. Kwalambota said that much use was made of the SC Minutes in SADCC wherein they are regarded as a valuable document : it was important to continue meeting twice. Allen added that CIAT had begun circulating the Minutes more widely also among the donor community from whom appreciation had been received. Sykes suggested that the 8th SC be timed to allow an observer from the mid-term review to attend : this would give useful exposure to the workings of the SC, as well as an opportunity to meet NP leaders. This was warmly ACCEPTED. It was proposed and agreed that the 8th SC be held over 3 days in early March, 1990 (tentatively 4-7th) with a field visit included in the agenda.

With regard to Chairmanship, Kwalambota noted that the SC was now 'out of step' with chairmen in relation to hosting country, and thus contrary to the SC guidelines. Allen said that the SC had recognized this had happened accidentally but that members had come to realise this was useful, because chairmen "at home' were often subject to other pressures. It was AGREED that there was no reason to adjust to bring back chairmanship into phase with venues. Miss Zodwa Mamba was duely elected the new chairman of the SC.

14. Any other business

The Chairman asked if members had items for discussion.

(i) Allen brought to the attention of members a notice from the Social Science Research Council advertising opportunities, and this notice was given to Kwalambota for SACCAR.

(ii) Kwalambota asked to record the need for clearer presentation of the RP budget position in future SC meetings. Allen noted this.

(iii) Mulila-Mitti put forward an application from Mr. Martin Mbewe to attend the Bean Improvement Cooperative (BIC) meeting to be held in Canada shortly. This was discussed. It was recognized that the development of international linkages, as with the BIC, was valuable, but it was also noted that Mr. Mbewe had only just returned to Zambia from the USA where he had been on training. The request was REJECTED by the SC.

(iv) Mushi raised the issue of "out-of pocket" expenses. Are rates used by the RP in accord with SACCAR ? How were they set ? Allen said that the rate of USD 10/day had been set at the first SC meeting of the Eastern Africa programme in Addis Ababa in 1984, in recognition of the need that participants have a little extra cash in hand during meetings at which full board was paid. Allen added that CIAT had recognized the need to standardize entitlements across its programmes in Africa, and this was now normal practice. Kwalambota encouraged the use of the UN rate of per diem, then 'fending for yourself'. This was an internationally accepted rate and gave greater freedom to the individual. Much debate followed. Pali-Shikhulu raised an objection to the adoption of the UN rate : visitors to a country are often guests of government, and leaving people to 'fend for themselves' can pose a security risk. The SC AGREED that CIAT and SACCAR be asked to draft recommendations.

The meeting was closed at 11.00 a.m on 10th October, there being no further business.

APPENDIX 1

7TH SADCC/CIAT STEERING COMMITTEE, MBABANE, 9-10 OCT.

FURTHER TO NOTICES OF 1ST SADCC REGIONAL BEAN RES W/SHOP TO WHICH MEETING WILL BE SATELLITE, HERE IS A TENTATIVE AGENDA, WITH AMANE IN CHAIR.

1. INTRODUCTION
2. AGENDA
3. ENDORSEMENT MINUTES 5TH SC
4. MINUTES 6TH SC
5. MATTERS ARISING
6. REG. COORDS REPORT/WORKPLAN
7. NAT COORDS REPS ON RESEARCH PROGRESS, 1988-89
8. NP PORTRAITS : SWAZILAND
9. REG. COLLAB. RES. SUB-PROJECTS
   A. FINANCIAL REPS FROM MALAWI
   B. NEW PROPOSALS
   C. AGREEMENTS
10. TRAINING
   A. NEW APPLICN/PROPOSALS SHORT-TERM TRAINING
   B. APPLICN FOR MASTERS SCHOLAR
   C. NEW W/SHOP AND MONITOR PROPOSALS
11. NP NEEDS GERMPLASM/CONSULTANCIES/NEW EQUIP
12. NOMINATIONS 1989 AFR BEAN RES. PRIZE
13. VENUE/ELECTION CHAIRMAN 6TH SC
14. AOB

APPENDIX 2

REGIONAL PROGRAMME ON BEANS IN SOUTHERN AFRICA

SADCC Regional Subproject Proposal

BEAN STORAGE : BRUCHID BIOLOGY, ECOLOGY AND CONTROL

Dr Denash P Giga
Department of Crop Science
University of Zimbabwe
PO Box MP167, Mount Pleasant
Harare
Zimbabwe

June 1989

BACKGROUND

Beans are extensively grown in the Southern Africa Development Coordination Conference (SADCC) Region by both small and large scale farming sectors.

Large scale producers tend to sell their crops soon after harvest to central marketing institutions who are equipped with methyl bromide or phosphine to fumigate the crop as it enters storage. However, small farmers often want to try and store relatively small amounts of beans as a useful protein supplement to their mainly cereal or root crop diets from season to season. The crop then falls at risk to attack from the bean weevils Acanthoscelides obtectus and Zabrotes subfasciatus, which leads farmers to store smaller quantities than their families can nutritionally benefit from. This, added to the damage to the quantites stored, represents an area where research could potentially directly contribute to improvements of household food security amongst the rural poor.

While the bruchids Z. subfasciatus and A. obtectus are undoubtedly economic pests of bean production in SADCC, as they are world wide, little is known of the seriousness of this detractor from food security in SADCC. Like other economically important bruchids (Callosobruchus spp.) Z. subfasciatus and A. obtectus can reproduce both in the field crop while the seeds are still enclosed in the pods, and during storage. This study will set out to establish the ecology, species composition, distribution and species interactions (competition) as well as levels of infield and storage infestations. The need for this information has already been established through an intensive literature review in relation to the SADCC Region. Despite the absence of quantitative assessments there are several indicators of significant economic losses by small farmers. It is also likely that field infestation levels will be significant as, frequently, what appear to be wholesome seeds at the point of threshing contain the developing larvae which quickly multiply in storage.

The ability of bruchids to undergo many generations on a single seed source, until the food is exhausted, is well known and consequent levels of damage are well documented in areas other than SADCC.

Despite the prevailing situation in SADCC that large losses and short storage periods cause a major constraint to the availability of legumes for consumption, methods of pest control and effective storage have been slow to emerge. Caswell (1968) showed that traditional methods of storage on untreated cowpeas and beans has little effect on losses (Taylor 1981). Shelling and fumigation are the technically effective solutions presently available but the storage structures in use, dangers to operators

of using phosphine and the potential for development of resistance militate against this with small farmers. Field infestations also tend to be high, often because of the proximity of stores to crops, as has been shown with Callosobruchus maculatus in Nigeria.

Vegetable oils have been tested and found effective as protectants of grain legumes, for instance, palm oil, coconut oil, cottonseed, groundnut, sesame, castor, rapeseed and mustard oils. This is widespread practice in Latin America, Nigeria and India where about 5 ml per kilogramme of stored seed, but is not, as far as can be ascertained, used in the SADCC Region. Laboratory and on farm trials are therefore needed to test, demonstrate and extend this technology if it is to advantage.

Because of the importance of cost effective bruchid control for small scale farmers, work at CIAT is concentrating on producing consumer acceptable varieties with bruchid resistance. Sources of resistance have been identified and samples of new germplasm, eg arcelin protein beans, will shortly be available for collaborative testing.

LINKAGES AND COLLABORATION

Bruchid entomology and bean storage have the potential for high significance in improving food security in SADCC where small scale farmers face common problems which research information, technologies and recommendations can assist in removing.

This regional sub-project will be a collaborative undertaking linking the University of Zimbabwe, Sokoine University, Tanzania and national bean programmes of Somalia, Tanzania and Zimbabwe. Relationships with entomologists in the SADCC region through the SADCC/CIAT entomologist will be developed for the collection of bean bruchids for biological and ecological studies on geographic strains of the different species.

An important aspect of this work will be the formation of a network of researchers collaborating on different aspects of bruichid research and control. A particular aspect here would be the development and implementation of some standardised methjodology in addition to which the exchange of local germplasm would be a benefit.

The institutional linkages in this proposed cooperative programme are:

Dr Denash P Giga — University of Zimbabwe, Department of Crop Science

Ms Olivia Venge-Muksko — Crop Breeding Institute, Zimbabwe

Dr Martha Quentin
Dr Susan Nchimbi — Sokoine University, Tanzania

Mr Simon Slumpa — Tanzania Agric Research Organisation (Taro - Arusha)

Mr Mohamed Handulle — Ministry of Agriculture, Somalia

AIM

The aim of this project is to obtain a detailed knowledge of bean bruchid biology and ecology with which to improve bean storage efficiency amongst small farmers, thereby enhancing their nutritional status and food security.

OBJECTIVES

1. To identify and evaluate the constraints to efficient bean storage faced by small scale farmers in SADCC.

2. To assess crop losses incurred by small farmers through use of traditional bean storage.

3. To assess levels of infestation and species composition and species distribution.

4. To investigate interspecies interactions (competition), reproductive and competitive abilities of Zabrotes subfasciatus and Acathoscelides obtectus under controlled environments.

5. To study in detail, the comparative biology of geographically distinct strains of A. obtectus and Z. subfasciatus from varying agroecological zones.

6. To determine the infestation and damage levels in bruchid resistance nurseries established by collaborators, viz Zimbabwe, Tanzania and Somalia.

7. To screen Phaseolus germplasm from CIAT, national and regional programmes and bruchid resistance nurseries.

8. To develop and evaluate simple and cost effective bean storage technologies for use by small scale farmers.

   (i) to determine the effect of post harvest drying before threshing (optimum threshing time),

(ii) to investigate the efficacy of edible oils as grain legume protectants in laboratory and then on-farm trials,

(iii) to evaluate the efficacy of alternative pest control strategies such as the admixture of ash, sorptive dusts and plant products such as neem, as grain legume protectants.

ANTICIPATED RESULTS AND BENEFICIARIES

This sproject will represent the first concerted bruchid research effort in the SADCC Region of which the main anticipated outputs would be:

formalised links between bruchid specialists in SADCC, accumulaton of knowledge on the biology, ecology and distribution of the two prevalent species of bean bruchid prevalent in bean storage systems in the Region and their constraints. The project would provide data on the efficiency of a selection of control measures, and would facilitate the transfer of research results to extension practitioners while deliberately setting out to strengthen the SADCC researcher and research:extension linkages. Thus beneficiaries would include small scale farmers, extension practitioners and reseachers in SADCC. It is envisaged that scientific publications would ensue, and that further research avenues would be identified in the bean post production systems. A network of bean bruchid workers would be established in the Region.

METHODOLOGY

Objective 1

To identify and evaluate the constraints to efficient bean storage faced by small scale farmers in SADCC. This diagnostic objective will be accomplished through rapid appraisal techniques in major bean growing areas in the respective countries of the collaborators. A questionnaire/checklist will be devised to ascertain small farmer bean storage methods, pesticide use, pest control measures, quantity of beans stored for consumption and for sale, length of storage, farmers' perceptions of storage problems, etc. A full survey is not proposed due to high costs and logistical constraints.

Objective 2

To assess or p losses incurred by bruchids through t

traditional bean storage. Some of the farmers selected from Objective 1 would be used to undertake loss assessment studies. Samples will be collected regularly throughout the normal storage period and will be assessed for damage, weight loss and the insect pest spectrum as well as changes in infestation with time.

Objective 3

To assess levels of infestation and species composition in the maturing crop and in storage. Collections of beans will be made from farmers in the several different agroecological zones. Collections of beans will be made from farmers in different agroecological zones which will then be incubated in the laboratory to enable the species contained therein to be identified. In Zimbabwe, the Department of Agricultural Technical and Extension Services (Agritex) and the national bean breeder will assist in the collection in representative areas. Collaborators in their respective countries may adopt a similar approach. For a more complete picture on species distribution entomologists in other SADCC countries would be approached to make collections of beans and insects therein and submit them to the Department of Crop Science, University of Zimbabwe, for identification. The success of this 'postal survey' would depend on the responses of the national programmes and entomologists in the region.

Objective 4

To investigate interspecies interactions (competition) reproductive and competitive abilities of Z. subfasciatus and A. obtectus. The competitive outcome and competitive abilities of the two bruchids would be determined using the replacement series approach. This design quantifies competitive interactions and enables the prediction of the competitive outcome to be made after a single generation. The effect of species interactions/competitive on biological parameters such as oviposition and development will be determined.

Objective 5

To study in detail, the comparative biology of geographically distinct strains of A. obtectus and Z. subfasciatus from varying agroecological zones. The bruchids collected from different geographical areas and SADCC region will be bred under laboratory conditions. These cultures will provide insects for the biological studies at controlled temperatures of 20°, 25° and 30°C. Parameters to be measured will include adult longevity, rates of reproduction, oviposition periods, egg hatch, incubation period, development time and survival for strains under different temperature conditions. The studies in objectives 4 and 5 will enable a better understanding of bruchid ecology and distribution in SADCC.

Objective 6

To determine the infestation and damage levels in bruchid resistance nurseries established by collaborators viz Zimbabwe, Tanzania and Somalia. CIAT will provide bruchid resistant germplasm (eg arcelin protein) which the national bean research programmes will plant, manage and evaluate for adaptability and agronomic characteristics. After pod initiation plots will be sampled regularly for bruchids using either sweep nets or D-vac samplers (if available to collaborators) to assess population levels. Further samples of pods will be taken two or three times during field drying to assess damage and infestation. Finally, 'hidden' infestation will be assessed by incubation of seeds and assessments of damage made.

Objective 7

To screen Phaseolus germplasm from CIAT, national and regional programmes and bruchid resistance nurseries. CIAT developed methodologies will be used to screen germplasm from several sources in the SADCC Region for bruchid resistance, as will the resistant nurseries. Co-operators will undertake their own screening programmes, while bean germplasm from other national programmes will be evaluated at the University of Zimbabwe. The use of standardised methods will enable the direct comparison of results across the Region, and with CIAT. Variations between results can then be attributed to differences between geographic strains, for instance African as opposed to Latin American.

Objective 8

To develop and evaluate simple and cost effective bean storage technologies for use by small scale farmers.

The studies above would lead into the evaluation of simple methods/products for bruchid control. The objectives will be achieved through a series of controlled and semi-controlled experiments in the laboratory and on farms.

Alternate strategies for pest control such as the use of edible oils and natural substances will be investigated for efficacy and economic suitability for use by small scale farmers. Those which qualify from the laboratory tests will then go forward to on-farm trials. The admixture of edible oils is widely practised in other parts of the world but seems to be largely unknown in the SADCC Region. Thus, if it works technically, considerable effort will follow in demonstration and extension, through the appropriate extension agencies in the collaborators countries.

APPENDIX I

S A C C A R

COMPOSITIONS AND FUNCTIONS OF STEERING COMMITTEES FOR SADCC'S REGIONAL RESEARCH PROGRAMMES AND PROJECTS

A. Composition

Steering Committees for SADCC's Regional Research Programmes and Projects shall comprise the following members:-

1. Scientists working as National Commodity Coordinators (one per country, a total of 9)
2. The Team Leader of the Regional Programme/Project (Secretary of the Committee).
3. Representative of Donors
4. Representative of SACCAR
5. In attendance: Regional staff of programme/project
6. Chairmanship of the Committee: National Coordinator for the country in which meeting is being held.

B. Functions

1. To receive reports of the regional programme/project
2. To plan, approve and guide research and training activities of the Regional Programme/project.
3. To receive reports of national programmes vis a vis the regional programme/project.
4. To identify research and training needs and support required by national programmes/projects.
5. To propose and/or allocate regional resources to national programmes for both research and training activities, including technical support, etc.

6. To act as the basic organisational units for all matters related to the implementation of the regional programme/project.

Frequency of Meetings

The Committee shall meet at least two times a year during the first half to minotor progress of commodity in the field and during the second half to assess success and to plan research activities, exchange of germplasm, etc for the following season.

APPENDIX 4

Centro Internacional de Agricultura Tropical
Apartado Aereo 6713
Cali - Colombia

Southern Africa Development
Coordination Conference
SACCAR
Private Bag 00108
Gaborone
Botswana

Regional Programme on Beans in Southern Africa
Selian Research Centre
Private Bag
Arusha, Tanzania

Arusha, July 1st, 1989
DJA/GOT/89

Mr. Clemence Namponya
SACCAR
Private Bag 00108
Gaborone
Botswana

Dear Clemence,

I am writing to request that you consider publication of the following notice in a future issue of the SACCAR Newsletter :

Mrs. THERESA SENGOOBA

[illegible]

[illegible]

Yours sincerely,

[illegible]

Appendix 5

SADCC/CIAT REGIONAL PROGRAMME ON BEANS IN SOUTHERN AFRICA : REGIONAL COORDINATOR'S REPORT TO THE 7th STEERING COMMITTEE MEETING, MBABANE, 9-10 OCTOBER, 19[illegible]

INTRODUCTION

[illegible]

FUNDING

[illegible]

STAFFING

[illegible]

[illegible]

[illegible]

[illegible]

BUILDING PROGRESS AT SELIAN RESEARCH INSTITUTE, ARUSHA

Development of the building to house both the horticultural activities and regional study have been completed and occupied since the beginning of November. Provision of the necessary equipment and furniture from Kyeamtogo to Arusha is likely to be delayed because of lack of transport.

STEERING COMMITTEE

Only one further Steering Committee Meeting was held during the intervening period since my last report, at Ukiriguru on 1st March, 1966. Unfortunately this was attended by only 4 out of the 10 members, as part of a further drive to economise in expenditure on external travel by ministers or representatives within the country.

Representation at the meetings overall remains good, stability is, and the SC continues to play a key role in setting priorities for regional programme operations and activity.

TRAINING

a) Academic Scholarships

All five of the PhD candidates approved by the SC have now been offered scholarships. Three have taken up their awards and gained acceptance, at the University of Leeds and Wye College respectively. Mr. Lucas Lwoga has also been offered a place at Leeds but is taking an English language course prior to starting his PhD studies in September.

Two further scholarships are available at the moment, but it is now that the Research Fellowship has started acceptances from others on places at present currently awaited or held. In addition there is the prospect of looking for a suitable University appointment for the remaining vacancy once provided through the ODA.

b) Short-term training at UTAL Headquarters

Four scientific assistant (field) positions at the Research Station, three from completed posts for a three month period and one additional was developed at a specific site requirement at Mlingano.

c) Short-term technical training within the SARDP region

A three week course in Agricultural Statistics was held in Kampala, Uganda during March for 27 participants from the SARDP region and Tanzania. The objectives of the course were to provide improved skills in agricultural research and to promote discussion on methodology. The course was held jointly with

CIAT, SADC and ICRISAT, the three executing agencies for the three grain legume crops that comprise SADC/ICRISAT, with additional financial support from the Food Foundation. Considerable use was made of local consultants as resource persons, of which a total of 17 were involved.

The course was regarded widely as a great success, and was given substantial coverage in the local press and other media. An article has been submitted on the course for publication in the SADCAN Newsletter. Participants in this course are listed in Table 5.

Three agronomists received training on data analysis in a CIMMYT course with SADC/CIAT support in Swaziland in June. Further opportunities for short-term training in the region aimed at graduates are under consideration.

WORKSHOPS, WORKING GROUPS AND MONITORING TOURS

A. Regional Workshops

The SADC/CIAT regional programme organized two more workshops and contributed jointly with CIMMYT to a third workshop during the year. Topics covered were: the economy of cereal/legume intercropping, bean breeding and a multidisciplinary workshop. In total, some sixty scientists from the region took part, participation being supplemented by scientists from elsewhere. Such workshops have not only stimulated the exchange of ideas and information and led to development of scientific networks, but they also provided forums for drafting technical recommendations for future research within the region. Details are summarized in Table 6.

B. Working Group Meetings

One Pan African Working Group Meeting was held during the year, on entomology, held in Nairobi. Details are presented in Table 7 and recommendations concerning it can be considered in forthcoming SC.

Plans are well advanced for the Legume Varies Working Group, along lines agreed upon at the 6th SC meeting, and meetings of the Soil Fertility and Cropping Systems Working Groups, established in addis ababa in September 1985, are under consideration for early in 1990.

C. Monitoring Tours

A monitoring tour, supported by a grant from the Ford Foundation, was conducted in Botswana, at the end of the SADC/CIAT training programme. Its purpose and participants are shown in Table 8.

A Harmattan Monitoring tour is scheduled for November 1989,

[illegible]

EQUIPMENT NEEDS OF NATIONAL PROGRAMMES

[illegible]

SEED DISTRIBUTION

[illegible]

REGIONAL AND NATIONAL RESEARCH

[illegible]

ANGOLA [illegible]

[illegible]

promising. Blue Peter was found to be highly susceptible to rust, and long flow was very susceptible to anthracnose. Two from the Garissa type DVRM's grown at Kitale showed, best, the more promising entries apparently resistant to rust, while 12, 13, 14 and 15 from the small White seeded DVRM at Kitale were 13, 14 and 15 from 3 upland promising. In general, the Kitale selections suffered severe anthracnose. Three new material, identified from the old DVRM and Kitale Harvests, Cultivar, but x V2 and DVRM 12.

LESOTHO (Barry Mackay)

Unplowed conditions on the Pitsi and Lesobeng sites, [illegible] considerably outyielded the two 3-year-old type soil selections and were acceptable to farmers and consumers. In the early seed trial at Maseru, NW type produced the most yield 20.1 bushels of seed compared with about 1 bushel for the poorest soybean. Seeds of this cultivar together with M 1-2 and 3 are being increased for release to farmers.

In NFLYVAR 11, the heaviest yield (22.0 bushels) was produced by Gatema, followed by Zim 2nd (Bayano 8 or Opalano 2 with 1 to 1/2 (2521 bushels and 9 (2426 bushels. These are the highest yields yet recorded in Lesotho and offer promise of improvement over the Pinto. Sugar bean and VEI maize cultivars from Kitale also showed promise.

Agronomic trials continued, to develop techniques appropriate for the Pinto beans, including sowing date, fertilizer, plant density and herbicide studies. On a [illegible] very low pH soil at Lesobeng, Pintos were poorer than upland sugar types without lime and NP fertilizer but showed a much greater response to their application.

MALAWI (Mrs. M. Mkandawire, Dr. Robert, Mrs. Phiri, Mrs. Mkoka and Mr. Kanthiti)

The National Bean Variety Trial, with 17 entries including introductions, selections from the National Grain and selections from crosses among local accessions, was grown at 5 sites across the country; the locations were: Chitedze (Lilongwe), Ngabu, Chitipa, Bunda, Dedza Hills and Makwawala. The significant differences in seed yield were found between sites, at four of the five sites from which data were obtained. Differences were found between entries at Makwawala, where the trial mean yield was only 537 kg/ha (8 bushels). The best performer was V 2 (approximately 1 bushel), a cream pinto type, followed by a selection from a cross with V and by V1 (1 bushel), both from Lesotho.

A hydrazide application was evaluated to develop [illegible] acceptable, heavy yielding varieties with [illegible] anthracnose and angular leaf spot. About 20 [illegible] seeded at each site, [illegible]

[illegible]. Similarly, according to [illegible] [illegible] resistance to angular leaf spot and [illegible] [illegible] [illegible] [illegible] and [illegible] [illegible] [illegible] [illegible] [illegible] [illegible], [illegible], [illegible] and [illegible] [illegible] to possess angular leaf spot resistance.

The effects of varying bean plant population and planting pattern on [illegible] with maize were investigated at [illegible]. [illegible] showed that [illegible] [illegible], [illegible], [illegible] [illegible] bean plants/hill in a combination with maize at which beans were planted [illegible] [illegible] maize. In view of the above, it would be recommended that maize and beans be planted in the same [illegible], since it is easier and less laborious.

Forty [illegible] from the [illegible] [illegible] collection were evaluated for nodulating ability. The materials were [illegible] [illegible] for nodules, root and shoot dry matter [illegible] [illegible] [illegible] [illegible] nodules, [illegible] root and shoot [illegible] [illegible], [illegible] [illegible] [illegible], respectively. [illegible] were above average for the parameters [illegible] [illegible]. The evaluation process [illegible] [illegible], [illegible] yield [illegible] in future trials.

MOZAMBIQUE (Manuel [illegible])

The lack of trained personnel remains a major bottleneck to the further development of the national programme, though a good progress in training is now underway. At [illegible], [illegible] [illegible] the [illegible] [illegible] [illegible] research, the programme requires [illegible] [illegible] [illegible] entomologist and one [illegible] [illegible]. [illegible] input is needed.

Local [illegible] from the north of the country, [illegible] [illegible], [illegible], and [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]. The materials from the [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] and are being [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] and [illegible] [illegible] [illegible]. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

[illegible] of a local collection of [illegible] [illegible] [illegible] [illegible] the [illegible] of [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]. [illegible] of the [illegible] [illegible] [illegible].

Studies on the maize-bean [illegible] [illegible] [illegible] [illegible] to determine the [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] maize [illegible] and [illegible] needed.

SWAZILAND (John Matsebula, Zodwa Mamba, Roger Kirby and Graham Mackay).

The dry bean is the most important grain legume produced in Swaziland. Research in progress, both at Malkerns and Luyengo, is aimed at identifying and solving the main constraints to bean production. Results from breeding trials show that white lines have a higher yield potential and be acceptability to the locally prevalent diseases than the local commercial cultivar Jonas, a specialty sugar type.

The National White Bean Cultivar Trial, comprising 11 lines selected from earlier trials including the LUYOT with Jonas as check, was grown at Hebron and Mangerange (highveld), Nhlangano (mid midveld), Malkerns (mid midveld) and Big Bend (lowveld). Data obtained from Hebron, Nhlangano and Malkerns reveal that Carioca was the heaviest yielder (mean yield 750 kg/ha) followed by PVMX 1589 (685 kg/ha) under rainfed conditions. Under irrigation at Big Bend, the heaviest yield (2017 kg/ha) was produced by A 445 followed by Carioca (1917 kg/ha) and Jonas (1619 kg/ha). Among the 16 entries in the National Advanced Bean Cultivar Trial, grown at Malkerns, Nhlangano and Big Bend, the top yielders across sites were A 445, PVA 770, BAT 1514, PVMX 1589 and BAT 1277. Despite a rather poor season, progress remains quite encouraging, and the Carioca and Pinto types seem well-adapted to Swaziland conditions. Future trials at Malkerns will focus on these seed types, to determine their farmer and consumer acceptability, before considering cultivars for release, and a modest start was made during the year with on-farm research on dry beans.

Work on beans at the University of Swaziland at Luyengo was started in 1987 and supplements the work on the Ministry of Agriculture at Malkerns. In 1988, entries in the Preliminary Yield Nursery did not differ significantly in seed yield. However, in the Advanced Yield Nursery, entries were significantly different : the heaviest yielding lines were A 445, NW 3775, AAP 76, PVMX 1589 and the local check, Jonas. In 1989, beanfly infestation was high at Luyengo. The red tree bug, *Nezara viridula*, was noted on the roots of some plants, and entries differed in the degree of infestation.

TANZANIA (Clemence Mushi, Ruth Kamala, Betsy Kondo, Maurice Mduruma, Simon Sechopa and Fredrick Mduruma).

Rainfall was good to excessive at Selian, bean yields ranged up to 0.7 t/ha in small plot trials. In Iringa and Arusha (Ilambarena and Southern Highlands) diseases problems were exacerbated leading to less than normal yields.

The first CIAT breeding materials introduced under the commencement of the regional project were grown in variety trials at Selian and Kambi ya Simba together with several other sources a

In trials at Lambo and Lyamunga to assess the yield loss due to halo blight, seed yields were reduced by 17 and 41% on susceptible cultivars at Lyamunga but there was no effect on seed yields at Lambo.

Inoculation of four differentials with isolates of *Pseudomonas syringae* pv. *phaseolicola* indicated the occurrence of races 1, 2, 3 and 4 of the pathogen. One isolate was appeared to induce symptoms on Kidney and may indicate the presence of a new race. Race 1 from *P. syringae* appeared to be aggressive than Race 1 from *P. savastanoi* when inoculated on to 17 lines from the breeding programme. Only Mexico 142 was found resistant to both races.

Weed control research emphasized the use of residual rates of herbicides applied in combinations. Plots were treatments applied together at 19 days after sowing at Wudu Ithanga and gave broad spectrum long control of most weeds at Lambo, Ilonga controlling broadleaf weeds and Kambala the grasses. Weeds reduced seed yields by upto to 1000 kg/ha. The first 35 days after sowing was the critical period for weed competition.

The national programme continues to make progress in on farm research. Exploratory trials, using the adoption triple, aimed at quantifying constraints to bean production showed that in Kambala declared, Iringa region, seed borne ability was the major constraint. The picture that emerged from the farmers and researchers was less clear. Both short and long term trials, trials also planned to address a soil deficiency problem commonly referred to as "Ukombozi Mottle" (UMD).

The results of bean cultivar variety trials in Mbeya, Iringa, Morogoro and Iringa regions show the superiority of Lyamungu 85 in nearly all locations. Farmers were involved in the assessment of cultivars in the trial for preference, consumption and marketing characteristics and Lyamungu 85 was generally the most preferred variety.

A trial designed to investigate the effect of sowing beans at varying distances from maize rows on grain yield of both crops was conducted at Lambo and Selian. Both crops were planted on ridges as well as on the flat. The maize crop received 50 kg/ha of nitrogen in split applications at 20 and 50 DAE. Beans and maize received respectively plus an additional 20 kg/ha of nitrogen and phosphate respectively. Beans in mixed cultivation with maize were not fertilized. Improved seed yields (1100 kg/ha) of beans in association with maize were obtained when beans were planted 30 cm from maize rows. The results may indicate that benefits may be derived from fertilizer applied only to the maize.

ZAMBIA Edayce Mulenkhiti, A. Kamfwa, C. Mbinda and H. Mbewe

Major attention was given to the evaluation of

germplasm screening, and pest and disease resistance. [illegible] the major activities during the 198[illegible] [illegible] and [illegible] in the medium rainfall [illegible] Valley and [illegible] with those in the high rainfall [illegible] [illegible] and [illegible].

In the national [illegible] Variety Trial, [illegible] and [illegible] continued to perform [illegible] relative to the check, [illegible] [illegible] [illegible] and both [illegible] and [illegible] have [illegible] [illegible]. In the Preliminary [illegible] Variety Trial, [illegible] and [illegible] were among the top performers [illegible] of the [illegible] in the preliminary trial [illegible] with [illegible] [illegible] yield not significantly greater than [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] promising [illegible] [illegible] [illegible] [illegible] [illegible].

[illegible] among cultivar [illegible], which [illegible] accepted [illegible] [illegible], [illegible] performed [illegible] [illegible] National [illegible] Variety Trial. In the [illegible], [illegible] [illegible] performed [illegible] [illegible] and significantly better than [illegible], in [illegible].

[illegible] progenies from crosses made at [illegible] for [illegible] resistance to [illegible], black root and [illegible] were evaluated and [illegible].

[illegible] [illegible] in the [illegible] nursery, [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] and [illegible] [illegible] promising for [illegible] resistance. [illegible] [illegible] [illegible] [illegible] indicated that [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]. In [illegible] [illegible] [illegible] and [illegible] [illegible] [illegible].

3.2 COLLABORATIVE PROJECTS

A. Regional Collaborative Research and [illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible], [illegible] resistance [illegible], [illegible] [illegible] [illegible] and [illegible], [illegible] [illegible] to the [illegible] [illegible] [illegible] [illegible] and [illegible] [illegible] [illegible] [illegible] [illegible] in [illegible]. [illegible] the [illegible] [illegible] [illegible] at the [illegible] [illegible] [illegible] Research Workshop.

[illegible]

tolerance subprojects, as reported by Dr. M.N.K. Bhadauria, was as follows:

Four experiments were conducted testing 50 lines for identify genotypes that are high yielding and give substantial yields under moisture stress conditions. Thirteen best lines and ten poor materials (as provided determined) based on adaptive input from local breeders, complete characterization trial could be made in screening under moisture stress were not as materials with good yield. The number of pods was significantly associated with yield. Further experiment will be conducted testing these lines to study mechanisms that confer drought tolerance. Research will continue to be conducted by the various participating countries.

2. Recent progress with evaluation of chickpea lines for resistance to cold reported by Dr. W.A.R. Reddy and Dr. A. Sarker. 256 lines were screened at Rundu where 40% were reduced from cold tolerance to 54.54, originally Virt and seven of local landraces. Moderate was more common among cultivars and small seeded types. Pathogenic variation was characterized among 7 isolates of *Phaeoisariopsis griseola* collected in Malawi.

3. IBM. 50 materials from the Malawi germplasm collection were evaluated for nodulation. Results obtained by Dr. Sarr. Highlights were reported shortly.

4. Aphids. This is a collaborative research network between scientists from National Programmes in Zambia, Malawi and Southern Tanzania with a scientist from Burundi as a consultant. The principal objectives of the sub project are:

a. To identify the common aphids attacking beans, determine the region and determine which species are capable of vectoring the bean common mosaic virus.

b. To monitor the population dynamics of aphids in relation to BCMV spread

c. To assess losses caused by aphids directly as pests and indirectly as vectors of diseases.

d. To assess the effect of various cultural practices on aphids and BCMV management.

The sub project is in its first year.

5. Irrigation. Scientists from Zambia, Tanzania, Swaziland and Lesotho were collaborating in the [illegible] the objectives were:

a. To monitor the distribution and species composition of bruchids within the region

b. To [illegible]

5. Studies on the biology and distribution of races of bacterial blight (*Pseudomonas syringae* pv. *phaseolicola*) and evaluations of resistance sources to the disease. This CIAT-funded research project, which began in 1985, entered its second phase of three years in 1988. Progress made by Dr. Abdou Taylor and Miss Nadia Saad to date in characterization of the pathogen, in the period May 1987-May 1988, includes the genetics of host/pathogen interaction, epidemiology in the natural ecosystem, and pathogen physiology, especially the response to temperature stress. The main input to date has been in the area of race structure and dynamics; the physiological studies have only recently been initiated. An interesting finding of the epidemiology study is the complete absence of the pathogen from the seed tested for the presence of bacteria originating from three different locations, and the occurrence of race four epiphytic populations at very low frequency in one of the mixtures.

4. Soil factors affecting nitrogen fixation and host nodulation in western Africa. This thesis project was continued in 1988 by Dr. A. Le Roux and Mrs. Dye Gallegly, Londres. This provided funds for what became a collaborative project between Dye Gallegly and Le Roux with input from CIAT. Extensive collections of soil and leaf samples were made from bean growing areas of Rwanda, Burundi and Zambia in 1988. Except in very saturated soils, nodulation was generally poor.

Trials at Ukiriguru and Lambo in 1988 showed that nodulation was excellent, at Ukiriguru with up to 100 nodules/plant while at Lambo the highest number of nodules/plant was 2%. Studies on Lambo subsoil at Ukiriguru using ICM and non nodulating beans in a greenhouse pilot, showed that beans fixed only 2% and 8 kg/ha of nitrogen at Ukiriguru and Lambo, respectively. Drought would be very much a serious problem during the long rains (November). Analysis of plant samples from two locations, Ukiriguru and Mlingano, showed that plants not showing ION symptoms had about three times more potassium than affected plants.

E. African Regional Trials and Nurseries

At the Arusha Workshop in December a system of regional trials and nurseries was agreed for the three principal bean zones in the system already operating in the Great Lakes. Two agroecological zones were identified: zone I, comprising Rwanda and SW Uganda, with participation of the CIAT bean unit based in the Great Lakes; zone II, Ethiopia, southern Uganda, northern Tanzania, Kenya, Somalia and Sudan will be supplied with materials by Kenya, Somalia and Sudan will be supplied with materials by Uganda. Zone I, Southern Tanzania, northern Malawi, northern Mozambique and northern Zambia will be supplied with materials by Zambia. Zone II, Central and southern Malawi, southern Zambia, Zimbabwe, Swaziland, Lesotho and Botswana will be supplied from Rwanda following an historic pattern of seed supply. Entries for the regional trial comprise ten accessions and the introduction of lines for the nurseries and trials in the

D. On-farm research

No. 2. Proceedings of a Workshop on Bean Research in Eastern Africa, Mukono, Uganda, June, 1986 (Smithson, J.B., Ed.)

Working Document Series

No. 1. [illegible] compiled by [illegible], 1987.

Other publications of the regional programme staff during the year are listed below.

Allen, D.J. (1987). The influence of intercropping with cereals on disease development in legumes. CIMMYT/CIAT Workshop on Research Methods for Cereal/Legume Intercropping in Eastern and Southern Africa, Lilongwe, 23-27 January.

Ampofo, J.K.O. (1987). Current trends in insect pest research and control in Africa [illegible]. SADCC Regional Bean Research Workshop, Mbabane, 4-7th October.

Edje, O.T. (1987). Energy, protein and fodder yields as indices of intercrop productivity. CIMMYT/CIAT Workshop on Research Methods for Cereal/Legume Intercropping in Eastern and Southern Africa, Lilongwe, 23-27 January.

Edje, O.T., Mkamba, J., Mbuya, O.S., Ndabitezimana, P. and [illegible] (1987). Progress of [illegible] research in [illegible], Tanzania. 3rd SADCC Regional Bean Research Workshop, Mbabane, 4-7th October.

Mkandawire, A.B.C., Mgwira, L.M. and Edje, O.T. (1987). Fertilizer research in intercrops. CIMMYT/CIAT Workshop on Research Methods for Cereal/Legume Intercropping in Eastern and Southern Africa, Lilongwe, 23-27 January.

[illegible], Allen, D.J., Smithson, J.B. and [illegible] (1987). Identification of [illegible] resistance to [illegible] in Tanzania [illegible]. 6th Bean Research Workshop, Sokoine Univ. Agric., Morogoro, 22-26 September.

[illegible] and Edje, O.T. (1987). The potential impact of [illegible] in northern Tanzania. 3rd SADCC Regional Bean Research Workshop, Mbabane, 4-7th October.

Ndabitezimana, P., Edje, O.T. and Mbuya, O.S. (1987). Effect of distance of bean rows from maize rows on yield of both crops. 6th Bean Research Workshop, Sokoine Univ. Agric., Morogoro, 22-26 September.

[illegible], Edje, O.T. and [illegible] (1987). Intercropping of [illegible] crops in Malawi. CIMMYT/CIAT Workshop on Research Methods for Cereal/Legume Intercropping in Eastern and Southern Africa, Lilongwe, [illegible].

Smithson, J.B. (1978). Utilization of [illegible] by Bighorn Sheep in Desert Environments. Journal of Wildlife Management, Reno, 30 chapters. [illegible] pp.

Scott-Brown, J.M. and Whitney, R. (1979). [illegible] Report to Mercury Corporation, Nevada. Final Report. [illegible] Research Monograph No. [illegible], Albuquerque, 4 + [illegible] pp.

Williams, P.A. and Allen, D.E. (1981). [illegible] Report to the Bighorn Foundation on Wildlife Studies in Arizona, with particular reference to the Sabino Project at Southern Arizona. [illegible] Desert Wildlife Research Monograph, Phoenix, 12 + [illegible] pp.

Table 1. STAFFING OF THE SADCC/CIAT REGIONAL PROGRAMME

D.J. Allen, BSc [illegible], PhD [illegible], Pathologist/Programme Coordinator [illegible].

* J.K.O. Ampofo, BSc (Ghana), PhD [illegible], Entomologist [illegible].

O.T. Edje, BSc, MSc [illegible], PhD [illegible], Cropping Systems Agronomist [illegible].

J.B. Smithson, BSc Hon (Newcastle), PhD [illegible], Breeder [illegible].

* D. Grisley, PhD [illegible], Economist, based at CIAT-Uganda.

* J. [illegible], PhD [illegible] Post-doctoral fellow in plant breeding, based at CIAT-Palmira.

* J. [illegible], [illegible] Training Officer, based at [illegible].

[illegible], Technical Assistant, [illegible].

J. Mattya, Dip. Crops [illegible], Technical Assistant, [illegible].

[illegible], Dip. Farm Manag., Technical Assistant, [illegible].

M. [illegible], Technical Assistant, [illegible].

[illegible], Dip. Agric., Technical Assistant, [illegible].

[illegible], Dip. Hort., Technical Assistant, [illegible].

[illegible], Administrative and Finance Assistant [illegible].

E. [illegible], Data Processor [illegible].

[illegible], Secretary [illegible].

A.H. [illegible], Driver [illegible].

* Position shared [illegible] with other CIAT programmes in Africa.

Table 2. STEERING COMMITTEES

No.	Date	Place	Representation										
			MN	BO	LU	MO	MW	TZ	WU	ZA	ZW	SADCAR	CIDA	CIAT
1	8 Sep 86	Morogoro TZ*		x	x	x		x		x		x	x	
2	1 Mar 87	Lilongwe MW**	x	x	x		x	O		x	x	x	x	x
3	5 & 6 Nov 87	Lusaka ZM	x	x	x	x	O	x		x	x	x		x
4	12-13 May 88	Harare ZW ***	x	x	x		x	x		O	x	x	x	x
5	3-4 Nov 88	Gaborone BO	x	x	x			x		x	O	x	x	x
6	16-17 Mar 89	Maputo, MO ****				x		x		x				x
7	9-10 Oct 89	Mbabane WU*****	x		x	O	x	x	x	x	x	x	x	x

Circles represent Chairmanship.

* Satellite to 5th. Bean Research Workshop, SUA.
** Satellite to SADCC/CIDA technicians training course.
*** Satellite to Drought Working Group.
**** Satellite to SADCC/CIAT training course.
***** Satellite to first SADCC regional bean research workshop.

Table 5. LUNS-ICRM Training Academic Scholarships in 1989

Degree	U.S.	Research Topic	Duration	Name	Country	Sex	Age
PhD	Cambridge, UK	ECMV in tobacco breeding	Jan 89 Dec 91	O. Makoto Umeo	Zo	F	30
PhD	Cornell	Plant breeding	Jan 89 Dec 91	S. Awepo Omoe	Ny	F	34
PhD	Iowa State	Urea Science	Jan 89 Dec 91	O. [illegible]	PN	M	[illegible]
PhD	Idaho	Fotosynthesis	Aug 89 July 91	M.I. [illegible]	Ru	[illegible]	[illegible]
PhD	Reading, UK	Tropical agric. development	Jan 89 Sep 90	L. [illegible]	Ug	F	31

Table 4. SHORT-TERM TRAINING AT CIAT-HEADQUARTERS, 1989

Discipline	Period	Name	Country	Sex
Pathology	Mar-Jun 89	Ermelinda Loncepcion	AI	F
Soil Science	Mar-Jun 89	Jose Adalberto Serrano	GN	M
Physiology	Jul-Aug 89	Dr. A.B.C. Mkandawire	MW	M
Breeding	Aug 89	Dr. C. S. Mushi	TZ	M
Breeding	Sep-Dec 89	Antonio I. Castaño	HN	M

Table 5. SHORT-TERM TRAINING FOR RESEARCH TECHNICIANS WITHIN THE SADCC REGION, 1987

Period	Location	Participants	Course	Name	Country
9-28 March 1987	Maputo, MOZ	LIMA/ZIMA/ ZIMA/MAL/ FAO/ICRISAT	Cereals Legumes Oil crops Training Course on Farming Systems Research	M.E. Aba M. Ali Ibrahim A. Bandiba A. B. de M. Gonçalves A. Bassi A. Chilonda A. Fato A. Gonçalves A. Mondlane A. da Costa A. Nascimento A. Nhantumbo A. Pereira A. Tembo A. Zandamela C. Mabuiane C. Mahanjane C. Mahumane C. Matsinhe C. Mazuze C. Nhantumbo C. Nhatsave C. Nhavoto C. Nhemachena C. Nhongo C. Nkhoma C. Nyirenda C. Pereira C. Sambo C. Sibanda C. Simango C. Tembo C. Zimba	[illegible]
2-13 June 1987	Harare, ZIM	ZIMBWE ZIMFAR	Cereals Legumes	A. Chiwanga A. Chiwaula A. Gwata	[illegible]

Table 6. REGIONAL WORKSHOPS WITHIN THE SADCC REGION, 1989

Subject	Venue	Date	Participants (supported by Sadcc/Cidsa)	Co	Sex	Remarks
Research Methods for Livestock/Cropping Interactions Workshop	Lilongwe, Mw	25-27 Jan, 1989	J. M. Bolton C. Camarada M. Sinoche P. Ndakidemi Dr. S.K.Mughogho Dr.M.B.C. Ndlandawire A. Tembo Z. [illegible] C. Kwayakwawa A. Chalipaya S. De Souza	BW BR Tz Tz Mw Mw Mw Tz Tz Zm MU	M M F M M M M M M M M	Organized jointly by [illegible] Dr. [illegible] Chief participants : [illegible] [illegible] [illegible] [illegible] [illegible]
Procedures' Workshop	Maseru, Ls	30 Jan, - 2 Feb, 1989	C. Camarada S. Notma M. Liphoma [illegible] A. Nokoto M. Chaane J.Pata-Sinxilombo Dr. S. Ntlhomba Dr.P. Mabbeneele Dr. L. Rwehi Dr. J. Nolilla Mbiti M. Mokoko Mpe Venque	BW Ls Ls Ls BW BW MW Tz Tz Tz ZA ZB	M M M M M M M M M M M M	Organized by SADCC/ Chief, [illegible] participants [illegible] S.A.D. [illegible] Chief [illegible] [illegible] [illegible] [illegible]
First SADCC Regional Data Research Workshop	Mbabane, Sd	4-7 Oct, 1989	I. Eduardo J. [illegible] L. Mavarwe Dr.D. Massey Dr.W. Heath Dr.S.Mlambiti Dr.F.Nkomwa Dr. [illegible] Mapongwa L. Kantara [illegible] M. Mwase Prof. A.Chinsinga Dr. S. Ntlhomba Dr.C. Mwanyumba [illegible] Mpeta B. Tshuma [illegible]	MW MW Sd LH NZ MW MW MW MW Sd MW Tz Tz Tz Tz Tz	M M M M F M M M M M M M M M M	Organized by SADCC/ [illegible] Secretariat Programme Chief [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

Table 6. REGIONAL WORKSHOPS WITHIN THE SADCC REGION, 1987 (Cont.)

Subject	Venue	Date	Participants (Supported by SADCC/other)	No.	Sex	Remarks
			M. Gondwe	17	M	
			K. Lubasi	17	M	
			L. Mulundala	17	M	
			S. Sikaonga	17	M	
			M. Vongo-Mwiroto	17	F	
			T. Ntepa	17	M	
			K. Nyemba	17	M	
			S. Kabi	17	M	
			Dr. J.Bulitta			
			Tembo	17	M	
			M. Mowe	17	M	
			Dr. J.Chimanya	17	M	
			Dr. S.			
			Sichamwalwa	17	M	
			K. Lwenge	17	M	
			L. Mwanyama	17	M	
			Dr. K. Tembo	17	M	
			J. Kalinkumba	17	M	
			F. Nyoka	17	M	
			Prof. V.P. Kuo	17	M	
			Dr. M. Mbewe	17	M	

Table 7. REGIONAL WORKSHOPS OUTSIDE THE SADCC REGION, 1989

Subject	Venue	Date	Participants (supported by SADCC unit)	[illegible]	[illegible]	Remarks
Metric Decimal Information Systems Working Group Meeting	Nairobi, Kenya	7-9 Aug 1989	L. Fonseka Dr. I. Chandrasekera D. Lubamba S. Simuko Dr. J.F. Maja	LK ZW ZA ZA LS	F M M M M	Organised by Kenya Bureau of Standards to [illegible] Total Participants 5 Also invited J.F. Smith (Zambia) [illegible] [illegible] [illegible]

Table 6. MONITORING TOURS, 1989

Participants	Co	Location	Date	Purpose	Remarks
M. Durand F. Amade M. Dafiao C. Costa Dr.Bvi. Boko	MU MU MO MO MU	Mozambique	2/-10 March 1987	To review the maize research status and for direct contact, multidisc. with counterparts in rural areas and to consult with provincial	Sponsored by Rural Exten. Development by Natl. Agric. Univ. Morr (Chile)
Dr. E.B. Mwesa Dr.B.C. Ahmane Dr. J. Apaaka E. Rafamoatia A. Calvin [illegible] [illegible]	IZ IZ IZ IZ UN UN UN	Kagera Basin of E. Zaire, Uganda Rwanda	15-21 Nov. 1987	To orient together with Kagera Basin systems and sites for study, to consult other at on station and on farm research in this area, com p ly populated area of Kagera Basin & Burundi production, specifying further collaborative in this main region	Organized jointly by under-utilized [illegible] Plant Genetic Resources Unit, Rome, Italy, Dr. Hoyt R. Wilson, Natl. Seed Storage Lab, Plant Industry Station, Beltsville, Maryland, USA

Table 9. STATUS OF ORDERS OF EQUIPMENT FOR NATIONAL PROGRAMMES

Project item	Date ordered	Cost US$	Supplier/ agents	Shipped	Status/ action
ANGOLA					
Harvester (4)	9/6/88	1619	ICL	10/8/88	Received
Planter (1)	10/6/88	11180	Dev.Corp/ICL	30/12/88	Received
Small bundle thresher (1)	9/7/88	13547	Almaco/ICL	30/11/88	Received
Planter (2)	9/7/88	15370	Almaco/ICL	30/11/88	Received
Precision balance (1)	30/11/88	1255.50	Salter	1/2/89	Awaiting information
Portable type writer		- in process -			
Trinity (1)	11/4/89	1194.00	IPL	5/8/89	Awaiting confirmation
BOTSWANA					
All items received.					
LESOTHO					
Planter	10/6/88	11180	Dev.Corp/ICL	14/7/89	Awaiting confirmation
Small bundle thresher (1)	15/6/88	13547	Almaco/ICL		Received
Ultimaster (1)	14/5/89		ICL		Delivery to Maseru
Precision balance (1)		- in process -			

Table 7. (Cont.) STATUS OF ORDERS OF EQUIPMENT FOR NATIONAL PROGRAMMES

Country Item	Date placed	Cost US$	Supplier/ Agent	Shipped	Status Remarks
MALAWI					
Motorcycles (3)	10/10/87	11,000	Jardine Dubai		Received
Soil steriliser					Available stocks from EU Ref. EU, 12/87 and will be sent when [illegible]
Ultrasonic (1)	14/7/89	Disc	ICI Nairobi		Delivery on
MOZAMBIQUE					
Motorcycles (2)	17/8/90	$4460	Jardines Dubai	24/9/18	Received.
Precision balances (2)	17/8/88	$1440	Salter UK	18/10/88	Received 20/5/89
Tapes (2)	2/9/88	Info.	ICI Nairobi	08/2/89	Received.
Clothing (4)	2/9/88	$502	ICI Nairobi	20/2/89	Received.
Rubboots (6)	2/9/88	$394	ICI Nairobi	20/2/89	Received.
Hand-held projector		$1130	CIAT Arusha	2/3/87	Received.
Fluorescent lamps					Received.
TANZANIA					
Small bundle thresher (1)	9/7/87	$5,447	Almaco/ICA	14/10/88	Received
Precision balance (1)	17/8/89	$747	Salter UK	2/10/89	Received.
Knapsack sprayers (2)					Received

Table 7. (Cont.) STATUS OF ORDERS OF EQUIPMENT FOR NATIONAL PROGRAMMES

Country Item	Date ordered	Cost $'000	Supplier(s)/ agents	Shipped	Status/ remarks
Altimetres (5)	14/9/89	$163	ICC		Delivery on 9/10/89
ZAMBIA					
Altimetre (1)	14/9/89	$163	ICC		Delivery on 9/10/89
Seed storage jars (1'000)					Received.
ZIMBABWE					
Altimeter (1)	14/9/89	$163	ICC		Delivery on 9/10/89

Table [illegible] SEED DISTRIBUTION

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

Table 10. SEED DISTRIBUTION (Cont.)

Alfalfa

Foundation	1
Registered	4
Certified	11
Certified (Experimental Plots)	21

Table 11. REGIONAL COLLABORATIVE RESEARCH SUB-PROJECTS, STATUS AT 30.9.89

	Topic	Investigators	Country	Linkages	Status
1.	Angular leaf spot resistance/ germplasm evaluation	Msolla & Rubaiza	MW	Malawi, Zaire (Phase II)	Approved by 6th SC & revised. Close to the + Tumaini at Chitedze (1.87 and Rubaya (11. (Low fly,ield yield)
2.	Screening for nodulation relative to nitrogen fixation	Kachapila, Kimbi and Chidumayo	MW	Rwanda (Mbanzabugabo)	Approved by 6th SC & revised. (Link to Rubaya work)
3.	Weevil	Mkindi, Kimbi, Kamanga, Kwesiga & Ntawuka	MW/ Zim/ TZ	Members of Biocontrol Work. Group; and Kenya, (Nairobi (Mwanza)	Approved by 6th SC & revised. (Link to Rubaya work)
4.	Host race identification	Chidamo	TZ	Kenya, Ethiopia (Nairobi)	Approved by 6th SC and provisionally revised to recognise. Suspended by 6th SC, pending re-absence of strategy?
5.	Bean common mosaic virus resistance evaluation	Kyaka, Kamukuywa & Kisang, Tsimbo	TZ/ZR, Kenya ZR	Makerere, Uganda (Dr. A)	Approved by 6th SC and Awarded US $15,000, after meeting satisfactorily links established with Uganda.
6.	Pathogen/ germplasm at upper & mid alt. (1,200 MV.	Sperschneider, Kamukuywa, Kimbi, Kamanga, Buruchara & Kwesiga	Zim/Mw, Kenya TZ	CIAT, Zaire (Butare, Rwa) (Butare, Rwa)	Approved by 6th SC and awarded US $15,000, subject to satisfactory revision.
7.	Various improved	Adipala Ngeve, et al.	Uganda/ Zaire/ ZR	Kenya, Ethiopia (Nairobi)	Introduced at 6th SC.
8.	Bean storage/ Practical Entomology, Ecology & Control.	Kimbi,	MW		Under revision
9.	Identity/ distribution of Fusarium on beans, & screening for resistance	Buruchara, Kimbi	TZ, UG	Biotechnology (Kampala)	Submitted, approved at 6th SC and awarded $ [illegible]

Table 11. (Cont.) REGIONAL COLLABORATIVE RESEARCH SUB PROJECTS, 1989

Topic	Investigators	Country	Linkages	Status
10. Economic [illegible]	[illegible]	17	ASEAN and Latin. network: Hawaii, CT (Universities)	Approved by ADC & and [illegible]
11. Swine inter-[illegible]	Nitty [illegible] & [illegible]	28	Cropping NW systems 17 Work. Group	Approved by ADC [illegible]

Table 12. Source and characteristics of cultures received between 1985 and 1987.

Date	Other identity	Country	Seed Type Size	Colour	Plant type
[illegible]	-	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	-	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]		[illegible]	[illegible]
[illegible]	-	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	-	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	-	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	-	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	-	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	-	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	-	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	-	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	-	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	-	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	-	[illegible]	[illegible]	[illegible]	[illegible]

Table 13. Environments in which AFBYAN_I was grown between 1986 and 1989.

Location	Season	Abbreviations	Country	Latitude	Altitude (masl)	Soil class	Sowing date
Melkassa	1987	MELB7	Ethiopia	8°25'	1550	4	30 Jun
Firamanor	1988	FIF88	Madagascar	19°	1500	3	1 Mar
Kachwekano	1987F	KAC7I	Uganda	1°14'	2133	2	5 Apr
Kawanda	1986S	KAW8S	Uganda	0°34'	1196	6	mid Oct
Kawanda	1987F	KAW7F	Uganda	0°34'	1196	6	9 Apr
Kisinda	1987F	KIS7F	Uganda	0°25'	1196	5	Mar
Kubona	1987F	KUB7F	Rwanda	2°29'	1700	4	8 Oct
Mutanga	1987F	MUL7F	Zaire	2°30'	1731	2	Oct
Mbekera	1987	MBK87	Zambia	15°39'	1025	4	8 Jan
Mbekera	1988	MBK88	Zambia	15°39'	1025	5	19 Jan
Mbala	1988	MBA88	Zambia	8°51'	1671	3	15 Jan
Selian	1989	SEL89A	Tanzania	3°20'	1387	1	30 Mar
Selian	1989	SEL89B	Tanzania	3°20'	1387	1	4 Apr
Ifonte	1989F	IKE89F	Tanzania	9°30'	1400	9	15 Apr
Lambo	1989	LAM89	Tanzania	3°16'	1067	1	Mar
Lyamungu	1989	LYA89	Tanzania	3°13'	1260	4	Mar

Table 14. Percentage contributions of sources of variation to total sums of squares in wildfowl in 3 IJ environments between 1980 and 1982.

	Location means (L)	Error (e)	Varieties (V)	V x L	Error (b)
Canopy height	56.0	6.4	5.1	11.9	16.3
Canopy width	41.0	5.2	11.0	11.3	30.0
[illegible]	83.0	2.5	[illegible]	11.8	2.7
Lodging	27.1	0.5	1.2	13.3	8.2
[illegible]	92.0	0.3	[illegible]	3.1	1.7
[illegible]	50.5	1.1	10.0	13.2	17.2
[illegible]	80.2	0.2	1.0	10.3	8.3
[illegible]	76.8	0.3	10.2	11.2	10.5
[illegible]	17.0	1.4	50.0	21.0	20.1
[illegible]	70.8	3.1	[illegible]	10.2	9.2
[illegible]	31.7	3.3	8.1	25.2	50.0
[illegible]	41.9	2.5	6.1	45.6	4.9
[illegible]	73.9	2.4	1.0	12.2	22.5
[illegible]	27.6	9.1	10.2	25.2	23.6
[illegible]	70.5	1.0	2.5	23.2	21.3
[illegible]	8.1	11.4	41.9	18.1	17.0

Table 15 Regression coefficients and coefficients of determination from stability analysis of seed yields of entries in AFRYAN in eleven environments between 1988 and 1989.

Varieties	b Value	R^2
Black Dessia	0.89	0.87
Red Wollaita	0.84	0.90
TVX 1272	0.96	0.93
G 19673	1.26	0.87
G 2816	0.68	0.37
P 9	0.98	0.94
P 23	1.13	0.91
Kabanima	1.15	0.93
K 20	1.19	0.80
ZPV 293	1.06	0.90
Carioca	1.05	0.70
Mistura local	0.91*	0.92
Umubonobano	1.24	0.91
Rurundo	0.88	0.89
Gahinda	1.11	0.95
Kabuma 5	1.32*	0.94
Kabyamakwa	0.56	0.02
X 152	0.91	0.90
Nain do Kyondo	0.66	0.59
Mubirizi	0.84	0.93
PVA 840	0.92	0.92
PVA 845	0.99	0.98
G 19570	1.05	0.83

ANNEXURE 1

SADCC/CIAT

REGIONAL PROGRAMME ON BEANS IN SOUTHERN AFRICA

SENIOR RESEARCH FELLOWSHIP

This position is available within a regional project for the improvement of the common bean (*Phaseolus vulgaris*) and is supported by the Canadian International Development Agency. The fellowship offers the opportunity to acquire new research skills and to conduct research for approximately 5 months at CIAT headquarters in Cali, Colombia or at another CIAT location.

Candidates should be citizens of a country of this region (Angola, Botswana, Lesotho, Malawi, Mozambique, Swaziland, Tanzania, Zambia and Zimbabwe), hold a PhD degree (or a Master's with considerable experience), have been working in research on beans for at least two years and expect to return to their home institution to work on this crop thereafter.

Applications, outlining an outline research proposal (in any discipline) having relevance to agricultural problems of beans in southern Africa, should be addressed to : Dr. David J. Allen, Regional Coordinator, SADCC/CIAT Regional Bean Programme, P.O. Box 2704, Arusha, Tanzania, before 30 November, 1988. A copy of the cv and proposal should be sent simultaneously to : Dr. Martin Kyomo, Director, SACCAR, Private Bag 00108, Gaborone, Botswana. Applications should be accompanied by a recent C.V. and the names/addresses of three professional referees.

Annexure 2: Summary of Recommendations from the meeting on Research Interventions to Control Transmission of HIV

The Meeting was attended by Entomologists from Ethiopia, Somalia, Uganda, Kenya, Tanzania, Zambia, Zimbabwe, Malawi, and Swaziland who reported on the entomological conditions in their countries. Briefly all countries cited Sexually Transmitted and Aphids as the principal modes of Transmission. The factors of vector population dynamics, feeding, reproductive rate, control methods were discussed. The meeting recommended that certain research needs be met to the extent the progress currently in Sero surveys, blood banks and Syndrome in order these problems. Priority and recommended areas of research on the different parts.

1. Aphids

The Meeting observed that Aphids per se may not cause direct problems but may due to indirectly through the transmission of HIV. The Meeting therefore, approved of the proposal collaborative research on "Aphids and the recommended that emphasis be placed on:

a. Species composition of aphids on bean plants and their capabilities to transmit the HIV virus.

b. Determine the precise of aphid vectors of HIV.

c. Encouragement of Insects directly into to aphids and mechanically through HIV virus.

d. To quantitate basic information on HIV epidemiology in relation to aphid activity.

Participating countries on this research are Zambia, Malawi, Tanzania will be under the collaborative

2. Aphids.

The meeting observed that work on Aphid can best plant as evidence to introduce the very much advanced and there the need to start screening for sources of resistance in the recipient. The meeting supported the set up of the proposed research on Aphids and recommended that it should be studied with the aim of, some of the basic and applied aspects.

The general line must be emphasized that breeding for Aphid should focus on:

a. Species diversity.
b. Aphid population dynamics and to some extent to breeding for small farmers in tropics.
c. The search for sources of Aphid resistant varieties.

based on material and effort from [illegible]

the cooperating countries in the bilateral technical [illegible] Zambia, Somalia, Ethiopia, Lesotho, Botswana, Kenya and Swaziland.

5. Specific

The meeting recognized specific as the principal [illegible] of Tsetse in Africa and it was noted that the collection [illegible] emphasized in research on breeding [illegible]

i. Distribution, species composition and population dynamics of breeding and predatory species found with them. Such studies should participate in [illegible] and other aspects.

ii. Identification of species and mechanisms of [illegible] contribution between [illegible] and [illegible].

iii. Obtaining [illegible] on [illegible] due to [illegible]. It was suggested that this be developed [illegible] perhaps in collaboration with the [illegible] required [illegible] programme in [illegible] to [illegible].

6. Other [illegible]

- Research on cultural control in [illegible] as well as on other pests such as [illegible] and [illegible] should be undertaken directly by National Organizations with [illegible] from [illegible] programme.

- Effort should be made to develop linkage between National [illegible] and also with other [illegible] to exchange [illegible] both within and outside the region.

- Training support for short term [illegible] and [illegible] for [illegible] should be made separately from the [illegible] project grants.

- Another meeting should be convened after [illegible] to review [illegible] we are at.

- Visit to Kasaji, Chingola and Mufulira, Zambia
  [illegible]

  Participate in donor conference on [illegible]
  [illegible]

  Plan for second phase of [illegible] project
  review

June 1990

  [illegible]

  Visit to Kasanka, Luapula Province, [illegible]

  Attend [illegible] meeting
  [illegible]

  [illegible]

July 1990

  Plan and [illegible] second mid-[illegible]
  [illegible]

  [illegible]

  [illegible]

August 1990

  [illegible]

  [illegible]

  [illegible]

  [illegible]

  Preparation of [illegible]
  [illegible]

September 1990

  [illegible]

  [illegible]
  [illegible]

APPENDIX V

SADCC/CIAT NEMATOLOGY SUB-PROJECT INTERIM SUMMARY REPORT

Guidance notes on sampling and dispatch and an introductory letter were drawn up and posted as soon as funds became available and as contact names were received. This material has been posted to all contact names received from SADCC/CIAT headquarters.

A literature review on *Phaseolus vulgaris* lines reported as showing "resistance" to *Heterodera* species was completed and a seed request sent off. Seed is being dispatched with appropriate quarantine arrangements.

Higher authorities in Tanzania are keen to see me carry out and complete the sampling and screening for resistance as laid out in the Nematology sub-project programme. Their interest has made some sampling at least possible, and some assurance has been given by the national bean programme that some seed at least is to be made available to me for screening (as no seed has been made available to date from this source). Samples have been processed.

Some necessary equipment has been purchased, some remains outstanding. Funding allocated for sampling remains to be used for seed not as yet sampled.

Dr. A. Castaño
Department of Crop Protection
Faculty of Agriculture

APPENDIX 8

GENETICS OF RESISTANCE TO BEANFLY (*Ophiomyia* spp.) AND DEVELOPMENT OF APPROPRIATE BREEDING METHODOLOGY FOR RESISTANCE TO BEANFLY

By : C.S. Mushi, PhD
Lyamungu Research Institute-Moshi-Tanzania

BACKGROUND :

In Africa, beanflies *Ophiomyia* spp. (Diptera : Agromyzidae) are the most important insect pests of the common bean (*Phaseolus vulgaris* L.). Yield losses of more than 50 percent have been attributed to beanfly in Burundi (Autrique, 1985). In 1936 this pest was recorded in Tanzania where it bored through bean stems and caused total crop loss (Wallace, 1939). At the same time losses of 50% were recorded in snap beans in the Usambara mountains in Tanzania in January 1939, in some cases causing total loss (Walker, 1960). Karel and Matee (1986), recorded seed yield losses of 33 percent in Morogoro -Tanzania. In Njoro, Rongal, Sabukia, and Nairobi in Kenya, up to 100% infestation has been recorded in beans (Wallace, 1939).

All three *Ophiomyia* spp. viz : *O. phaseoli*, *O. spencerella* and *O. centrosematis* have been reported to occur in Africa. In Zambia, these species have been identified at the rates of 8, 88 and 4% respectively (1985-1986 Annual Rpt.). A study of occurrence and distribution of species of beanfly in Kenya showed *O. spencerella* to occur in all sampled plants, associated with the former species. *O. centrosematis* was not observed (Muigai and Pere, 1986). In Tanzania, *O. phaseoli* and *O. spencerella* have been reported to occur but the later appears to predominate (Ampofo, 1989). Lays and Autrique (1987) reported that all three species occur in Burundi.

Beanfly attack bean seedlings as soon as the cotyledon appear until flowering. The damage caused by the adult fly is considered insignificant (Rogers, 1980). Major damage is caused by the larvae. Area surrounding the pupa rots, dries up, and frequently cracks. The presence of the pest to detect the yellowing of the leaves, and the seedling becomes stunted, wilts, and frequently dies. In mature plants the attack is confined mostly to the petioles. When these are cut open, the inner portions in tunnelled and the tissue is partially decayed (Otanes & Quesales, 1918). This means that serious damage is caused only when plants are young. If the attack is severe, leaf wilting may also occur in older plants.

Several control methods have been reported in literature including cultural (Wallace, 1939; Floor et al., 1984), biological (Rogers, 1974; Abul-Nasr et al., chemical (Mate and

Karel, 1983; Jones, 1965; Abul - Nasr et al., 1968; Mote, 1983; El-Nahal and Assem, 1970; Autrique et al., 1986 ...), and plant resistance.

Several studies have been conducted on the resistance of beans and other legumes to *O. phaseoli*. In Melkassa, Ethiopia, of the 177 bean lines evaluated for their resistance to the beanfly, only five lines showed no symptoms of attack nor pupal populations (Abate, 1983). In 1977 and 1978 at the Asian Vegetable Research and Development Center (AVRDC) in Taiwan, 370 bean accessions from CIAT were screened for resistance to the beanfly. Based on the number of insects/plant and the percentage of damaged plants, 48 accessions showed low to moderate levels of resistance. When these accessions were evaluated in identical form for the second time, only eight showed moderate levels of resistance. To confirm their resistance, seven out of the eight accessions, together with two susceptible checks, were planted in a replicated trial in autumn 1979. Two accessions, G 05478 (*P. vulgaris*) and G 35023 (*P. coccineous*), showed a significantly lower attack than the susceptible checks (CIAT, 1983). Screening work done in Morogoro, Tanzania in 1983 to 1985 showed low resistance to *O. phaseoli* in the following lines : A 489, A 429, BAT 1570, TMO 118, BAT 1500, A 476 and TMO 101 (Karel et al., 1983, 1984, 1985). However, no work is reported todate on the confirmation of resistance in these lines. In Chipata, Zambia, TMO 110, TMO 78, TMO 101 and G 5478 had good grain yield which was attributed to resistance to beanfly found in those lines.

Literature above indicated that the initial stage of breeding for resistance has commenced with success in identifying some lines with resistance. While the screening work is in process, lines proved to have some resistance should be utilised to transfer the resistance - genes into our adapted varieties and "candivars". Before such process is effected, the inheritance of resistance need to be establish which will then determine the kind of breeding procedure to follow in developing beanfly resistant varieties. Therefore, the objectives of this proposal are to :

(1) Study inheritance of resistance to beanfly *Ophiomyia* spp. and the type of gene action coding resistance.

(2) Develop an appropriate breeding methodology for developing beanfly resistance varieties.

(3) Continue screening for new resources of resistant in the local landraces, introductions and in *P. polyanthus* and *P. coccineous*.

(The latter two species of Phaseolus, have been claimed to have genes of resistance to *O. phaseoli* (Schmit Baudoin, 1987).

EXPECTED IMPACT

On the completion of the project, the genetics of resistance to beanfly will be known, an appropriate breeding method will be developed and more sources of resistance will be available. Therefore, National Bean Programmes in the region will be able to develop beanfly resistant cultivars.

METHODS

The project is proposed to be conducted in three parts.

PART I :

Experiment 1 :

To study the inheritance of resistance to beanfly.

Materials and Methods : The parent - offspring regression method will be used to study heritability of resistance to beanfly. Crosses will be made between the resistant lines and susceptible adapted cultivars/elite lines. The F1's will be advanced to F2 and F3. The F2 and F3 seeds will be used in the inheritance study. Number of replications, sties and seasons will depend on the availability of seed. However, planting will be done when the population of beanfly is high and at sites known to have high incidence.

Data on the number of larvae, number of black pupae (*O. spencerella*), leaf puncture, number of yellowing/dying plants, and grain yield will be collected.

Experiment 2.:

To study the type of gene action (s) coding for beanfly resistance.

Materials and Methods : The North Carolina Design III will be employed in this study. The sources of resistance will be crossed to susceptible lines, and F1's advanced to F2 population. The material for estimation of genetic parameters will be produced by back crossing randomly selected F2 individuals (using as males) to each of the original parents (used as females). Each set of the test material will be planted in RCB design and replicated several times depending on the seed availability.

Data to be collected is as in Experiment I.

PART II

The breeding method to develop resistant cultivars will be depend very much on the results obtained in the two experiments above. So the details of developing appropriate breeding procedure will come later.

PART III

In collaboration with other scientists in the region, CIAT. Taiwan and Belgium, new sources of resistance from introduced materials, landraces, and germplasm of *P. polyanthus* and *P. cincinnatus* will be identified.

PROPOSED PROGRAM OF ACTIVITIES FOR THE 1st TWO YEARS

YEAR	SEASON	ACTIVITY	PLACE
1	Jan - March	Make crosses for both experiments using pot plants	Lyamungu
	April - June	(1) Verification of F_1 crosses and seed increase to get F_2 seed under full protection	Miwaleni
		(2) Collect local landraces	N. and S. Tanzania
	June - October	(1) Advance F_2 materials to F_3 and multiply seed.	Miwaleni
		(2) Continue screening germplasm for new sources of resistance.	Selian
	Nov. - Dec.	(1) Collect local landraces	W. Tanzania Neighbouring countries.
		(2) Make more crosses using pot plants	Lyamungu
2	Jan. - March	Plant trials	S. Tanzania, Zambia and Malawi
	April - June	(1) Verification of F_1 crosses and multiply seeds	Miwaleni
		(2) Collect local landraces	Morogoro Region
	June - October	(1) Advance materials from F_2 to F_3	Miwaleni
		(2) Plant trials	N. Tanzania
		(3) Continue screening germplasm for new sources of resistance.	

PROPOSED BUDGET FOR THE 1st TWO YEARS

Plastic pots ..... (1000).....	3,300.00
Labels & tags	500.00
Crossing kits (5)	50.00
Harvesting materials/processing	500.00
Nylon mesh (500m)	2,000.00
Plastic sheet	500.00
Benches	1,000.00
Labour	3,000.00
Travelling (Local)	2,000.00
Chemicals for field protection	500.00
Irrigation and miscellaneous	1,650.00
Total	15,000.00

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APPENDIX 9

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22 SET. 1993

TITLE: SADCC/CIAT SUBPROJECT ON INTERCROPPING OF BEAN

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RATIONALE: Increasing Food production in Africa requires putting more land into production and raising yields. The central problem is that both increasingly require material inputs other than those locally available or too expensive for the farmer. Assuming that much can be done without these inputs is against all agricultural experience. An important challenge for agricultural research in Africa is to determine the most that can be done with the fewest external inputs.

A small holder Farmer, who produces the bulk of the food crop in the region is unable to cultivate more than a small fraction of their land at the most appropriate time because of the low capacity of draft animals and hand hoe. Consequently, the bulk of the crops are established at suboptimal times. Mixed cropping, then reduces the need for time consuming weeding operations. Apart from the labour use issues, mixed cropping generally might lead to a technically greater use of environmental resources than single crops.

In the SADCC countries, as in the rest of the tropical agriculture, intercropping is the predominant cropping system. It is practiced traditionally by the resourse poor farmer, who produces the bulk of the food crop and will probably remain so for many years to come. Due to the fast rise of population growth and limited farm-land expansion, higher crop productivity per unit area has become inportant and so intercropping becomes inportant for large-scale agricultural producers as well.

It is concensus that intercropping with a legume has established and speculated advantages such as higher grain yields, greater land use effeciency per unit area, and improvement of soil fertility through the addition of nitrogen by fixation and excretion from the component legume.

Maize is the staple food crop of the SADCC countries. Farmers have traditionally produced the maize under various intercropping systems with other crops, notably pulses. Beans are probably the predominant of the pulses that are grown with maize. A good example could be Malawi, where 94% of all cultivated hectarage was sown to mixture of crops and that 99% of all pulse production was in various forms of intercropping.

BACKGROUND: Intercropping is the simultaneous growing of two or more crops in the same field at the same time. This envolves intensification in both space and time (Sanchez, 1976).

Studies on this topic indicate that intercropping with legumes can be beneficial or detrimental, depending on the nitrogen-fixing capacity of the legume, the degree of compatibility or competition between species, the manner of planting - whether at the same time or relay intercropped and the fertility level of the soil. Competition for light in intercrop among species can be minimized by sound choices of crop combinations, time of planting, planting density and row arrangement. Much less is known about relation ships below the ground, although a consensus exists that competition for water and nutrients is more frequent and severe than competition for light (Hall, 1974; Trenbath, 1974). Agronomic experience also indicates, that water and nutrients are generally more limiting than solar radiation in the tropics.

Very little is known about root development when two or more crops are grown together. Nelliah et ah. (1974) observed that roots of coconuts, cacas, cinnamom, and peneaple in mixed intercropping systems of Southern India occupy different soil volumes. Studies with crops and weeds (Pavlychenks, 1937), show that parts of the root systems of different species tend to mutually avoid each other, particularly at lower depths, but that they do intermingle close to the surface. Trenbath (1974) mentions that such stratification of root systems may be an expression of root avoidance, which forces the root system that develops later to reach greater soil depths. The possibility of horizontal or vertical root system stratification suggests that this may be another fundamental advantage of intercropping. With roots at different soil layers, water and nutrient uptake may increase in relation to single crop stands. Earlier work in Illinois (Kurtz et al., 1947, 1952; Bray, 1954) suggested that, when water and mobile nutrients such as nitrate or sulphate are present in sufficient amounts competition between root systems will be minimal; but if these elements are limiting, competition for them will be strong. Trouse (1975) reported that corn and soybean roots developed freely near each ather in well-aerated soil sufficiently provided with water and nutrients; but when the soil was compacted, the root systems became restricted and competition was intense.

Using varieties of widely different plant types can affect the productivity of intercropped systems. Climbing-type beans are thought to be more productive than bush-type beans at low fertility levels. At a high fertility level, on the other hand, bush beans are thought to be superior to climbing beans, perhaps because the former compete less with corn (Francis et ah; 1976).

Unfortunately, crop varieties have traditionally been bred and selected for single stands. Breeding programs aimed specifically at developing improved varieties for intercropping have not been started in this part of Africa. The specific objectives of such programs could be as follows: more erect leaf habits of tall crops to reduce competition, earlier maturity, photoperiod insensitivity, and flexibility at responding to different plant densities. Such a programme could have a major impact in improving the productivity of intercropped systems.

The foregoing, therefore, clearly leaves the intercropping researcher quite uncomfortable. How much N fertilizer level would be effecient and economic for the system taking into consideration the behaviour of the legume component? Could yields be further increased by mixing species with different tolerances to a limiting factor? And just how much does intercropping decrease the labour peak demand, increase farm income and inprove the nutritional diet of the farm family?

These questions cannot be answered by extrapolating our knowledge on production of single crops. The inter actions when two or more crops are grown simultaneously are fundamental enough. The answers might be obtained by carrying out a net work of research within the region on the system in quention.

Within the SADCC region bean-maize intercrop is grown under diverse ecologies, though exists quite a few relatively comparable ecologies. Therefore, a network, of studies designed to obtain broadbased information on the system is long overdue. The imformation would include compatibility of different bean genetypes with maize, planting geometry of bean in the system, optimal N levels, decrease in labour demand, increase of farm incoome, and nutrition by utilising the underlying biotic (weeds, pests, diseases are "biologically" suppressed) potential of such a mixture.

OBJECTIVES: The network study would have the following objectives;

(i) To evaluate bean and maize genotypes suitable for intercropping in the region.

ii) To determine optimal fertilizer (N) rates for a maize bean intercrop.

iii) To assess suitable planting positions of beans relative to maize.

iv) To assess secondary benefits derived from utilising the underlying biotic environment of intercrop.

ANTICIPATED RESULTS AND BENEFICIARIES: The SADCC/CIAT Maize-bean regional sub-project proposes to seek meduim and long term solutions to maximizing the production effeciency of "under-valued" maize - beans intercrop. This will be achieved by coming out with a recommendation package on comparable genotypes, fertilizer (N) rates, and planting positions of a legume ralative to the Maize. The recommadation package should be appropriate to the resource poor small holder farmer, who is unable to make the jump to high input and more risky sole crop production in the fore-seable future. It would also be possible quantitative and qulitative intercropping benefits. And, finally, the project would help in indentifying future heights of research regarding the system.

WORKPLAN. 1990-91/1991-92. Three on station trials would be carried out to assess bean gynotypes sutable for intercropping, planting positions of beans relative to maize, and optimum N levels for the system.

1992-93/1993-94: One on farm trial to carry out utilising recommedation package agaist farmers practice in a number of locations. At this stage an assessment of any labour use efficienty, increase in farm income, nutritional benefits of the farm family would be carried out.

All the trials would be carried out in R.C.B.D. with 4 replications. The first experiment on genotype evaluation will have 9 treatments: three climbing beans varieties (including a promising local landrace of the country) by three maize varieties, local maize, on improved composite and a hybrid. Spacing would be 80cm x 50 in the same hole. Each plot will cosist of 4 rows, 4m long and two middle rows would be net plots. The sole crop spacing would be as per recommendations of the country (and possibly on stakes).

The second trial, planting positions of beans relative to maize, will have 8 treatments (could use two varieties of each crop?) with the flowing planting relationships, plus sole crops.

1. Same station in 80cm x 50cm spacings, (2 seeds each recommended for Zambia).

2. Two bean stations in between maize (one seed of beans each).

3. One station midway (two seeds of beans).

The third experiment to determine optimum fertilizer in level would have the following levels of N kg/ha 0, 20, 40, 60, 80 and 120. The basal fertilizer rate would be as recommended per country or in a given area. Plot size would be 5 rows 8m long taking middle three rows as net.

The data required would include:

i) NPK Soil status before planting and after harvest (for the fertilizer experiment)

ii) Dates of planting, 50% flowerings, and physiological maturity

iii) Plant density at emergence and at harvest

iv) Pest and disease score (including lodging for maize)

v) Level of weed infestation

vi) No. of pods or ears per plant (beans)

vii) Cob weight and pod weight kg/ha (maize)

viii) 100 seed mass

ix) Grain yield kg/ha

x) L.E.R. (land equivalent ratio).

Possible participating countries can be Malawi, Mozambique, Tanzania and Zimbabwe.

Proposed Budget

	1st Year	2nd Year	3rd Year
	US Dollars		
Labour (plot layout; planting, soil Sampling, Harvesting 480 mandays For three experiments in each country (14) at 1.25 US$/day	600	700	800
Field materials - bags, ropes, agrochemicals stationery and laboratory tests.	1,800	1,800	1,800
TRANSPORT			
Local travel + per diem	1,000	1,000	1,000
International travel for 2 collaborators + per diem at $100 x 10 days.	1,600	1,600	1,600
Publications and Literature	200	200	300
TOTAL	7,800	8,300	8,500
CONTINGENCY 10%	780	830	850
OVERALL TOTAL	8,580	9,130	9,350

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APPENDIX 10

REVISED PROPOSAL FOR SUB PROJECT NETWORK ON BEAN APHIDS AND THEIR MANAGEMENT WITH REFERENCE TO BCMV IN SADCC REGION

This proposal is a revision based largely on comments/suggestions received from the African Bean Entomologists Meeting at Nairobi during 7-9 Aug 1989. This proposal therefore includes Tanzania as additional participant, although not visualised in the initial draft.

NETWORK SCIENTISTS:

a) ZAMBIA:

1. - S. Sithanantham - Legume Entomologist
2. - P.M. Sohati - Legume Entomologist
3. - J. Kannaiyan - Legume Pathologist
4. - M.C. Naciwa - Legume Pathologist

(Food Legume Research Team, Msekera Regional Research Station, Box 510089, Chipata)

b) MALAWI:

5. - L.M. Kantiki - Bean Entomologist

(Bunda College of Agriculture, P.O. Box 219, Lilongwe)

c) TANZANIA:

6. - D. Kabunga - Entomologist

(Uyole Agricultural Centre, Box 400, Mbeya)

COLLABORATION:

a) BURUNDI:

7. - A. Autrique - Entomologist (Aphid identification consultant)

(ISABU, B.P. 795, Bujumbura)

b) OPEN FOR OTHER SCIENTISTS

RATIONALE:

This proposal is intended to facilitate collection of basic information on the distribution/occurrence of aphids and their seasonal population dynamics in relation to incidence of BCMV in the SADCC region. The entomologists from the three national teams (Zambia, Malawi and Tanzania) will mainly undertake these studies, while the Zambian team pathologists will assist in work relating to BCMV to be mostly carried out in Zambia. Collaboration with the aphid identification expert from Burundi is envisaged, while scope exists for including more collaborators especially relating to BCMV strains and BCMV epidemiology.

INTRODUCTION AND BACKGROUND:

The bean aphid, Aphis fabae, is a common insect pest on bean in Africa, including the SADCC region. It can play an important role in the spread of the BCMV disease, which affects beans in several areas of SADCC, and is known to cause substantial yield loss in Zambia (Kannaiyan et al. 1987). Some aspects of its biology and extent of plant damage have been studied in Kenya (Ogenga-Latigo and Khaemba, 1985, 1986), which include net house studies involving aphid numbers, plant growth stage and the resultant direct (feeding) and indirect (BCMV transmitting) losses caused by A. fabae (Khaemba and Ogenga - Latigo, 1984,1985). However, the distribution of A. fabae and its relative role in yield losses in field conditions is not yet clearly studied in Africa. BCMV is considered to be an important disease of bean in the SADCC region and the extent of secondary spread by aphids needs to be assessed. The scope for minimising such losses caused by aphids through cultural practices should be evaluated as a short term management strategy, till we successfully develop locally adapted bean varieties resistant to the disease.

The present project is aimed at filling in gaps in our knowledge on the role of A. fabae and other aphids in causing direct/indirect losses in beans in Africa, especially in the SADCC region. The network consisting of Zambia, Malawi and Tanzania will undertake studies that will provide basic information on this aspect and also on the scope for planting date and intercropping manipulation in minimising such losses. The Zambian team, will in addition, undertake observations relating to the epidemiology of BCMV. The collaborator from Burundi will assist in aphid identification. Scope exists for the specialists interested/involved in BCMV research in the region to be involved in collaborative studies.

Some of the aspects/approaches to methodology in this subproject are based on the suggestions/comments from experts including Dr. M.E. Irwin (U.S.A) and Dr. J.M. Thresh (U.K.). Some of their publications which can offer relevant information include Irwin (1980), Halbert and Irwin (1981), Goodman (1981), Irwin and Schultz (1981), Schultz [Irwin and] (1981), Hall et al. (1981), Schultz, et al.(1985), Irwin [Irwin et al.] (1986), Irwin et al. (1986), Thresh (1986,1987) and Irwin and Irwin (1988). Further document on the ecology of African aphids (Remaudiere and Remaudiere, 1985), and the preliminary CIAT draft in English entitled Bean Common Mosaic also offer some useful related information for this subproject.

OBJECTIVES :

The following shall be the major objectives of the project :

i) To identify the commonly occurring aphids on beans in the three countries (and in the region)

ii) Understand the population dynamics of the aphids in relation to the spread of BCMV and

iii) To explore the scope for cultural practices in management of aphids/BCMV on beans.

EXPECTED IMPACT :

The 3 year study is expected to lead to substantial basic information, which will be useful for both short and long term strategies in minimising the losses due to aphids

i) We shall have clarified the aphids that infest/colonise beans in the region.

ii) We would have understood the seasonal pattern of aphid infestation alone and in relation to the incidence/build up of BCMV.

iii) The possibility for cultural practice manipulation in reducing the loss due to aphids/BCMV would have been explored.

TIME PLAN OF WORK:

In fulfilling the objectives, the following time of plan of work is proposed :

	ZAMBIA	MALAWI	TANZANIA
1. Distribution and Importance of aphids and BCMV :			
a) Survey of farmer's crops for aphid/BCMV incidence	89-91	89-91	89-91
b) Estimation of loss caused by aphids	89-91*	89-91*	89-91*
2. Population Dynamics of Aphids in relation to BCMV (correlation)			
a) Trap Monitoring	89-92	89-92	89-92
b) Bait plants monitoring	89-91	--	--
c) BCMV build up in normal /late planting	89-91	89-91	89-91
3. Other Aspects of Aphid-BCMV Relations			

a) Extent of seed borne BCMV in farmers' seedlots	89-91	-	-
b) BCMV secondary spread in relation to primary source	90-92	-	-
4. Role of cultural practices			
a) Intercropping effect	90-92	90-92	90-92
b) Plant density fertiliser effect	90-92	90-92	90-92

* : Optional, subject to availability of resources/facilities.

METHODOLOGY:

In pursuance of the objectives and the major aspects to be studied, the methodology and the work responsibility of the national teams are as furnished below:

1. a. Surveys of farmers' crops for aphid/BCMV incidence:

On-farm surveys to be undertaken in the major bean areas of the three countries and the net work entomologist will plan and coordinate this work within the country concerned. Assistance for identification of aphids for the first year would be provided by Dr. A. Autrique (ISABU, Burundi).

During the first two years (July'89 - June 91) the surveys will be taken up, to cover major bean growing districts. The bean crop will be inspected during the common crop seasons, once during mid-vegetative to pre-flowering stage. In each district, at least two fields should be sampled. In each such field, chosen at random, at least 5-10 lm away from each, a total of 25 plants will be sampled. This will be done by the surveyor walking in a Z fashion in the field, to observe 5 plants each on the opposite borders and 15 plants diagonally between the two borders. The incidence of aphids (in colonies) and of BCMV severity will be scored on 1-5 rating scale for individual plants, as below:

1 - No incidence
2 - Light "
3 - Moderate "
4 - Heavy "
5 - Very heavy "

The description of this rating scale may be suitably developed based on the system found convenient locally in the country, in consultation with the pathologist concerned and should be clearly documented by the network entomologist.

A suggested proforma for recording these data along with visual field rating for incidence of natural enemies of aphids, the severity of the pests and diseases as well as control and cropping information is furnished in Annexure I.

For identifying the aphids observed during the survey, it is necessary to collect adults, preferably alates (winged aphids). Winged aphids clearly collected from colonies in the bean plants will be in category 'A', while others which are found moving around/resting individually (possibly dispersed from elsewhere or from other plants) will be in category 'B'.

From each field, a maximum of 10 aphids in category A and of 20-30 in category B may be collected, and these will be preserved in 70 percent ethanol (ethyl alcohol) in screw cap vials. From among the fields surveyed in each district, a sample not exceeding 50 specimens in category A and 100 in category B will be taken up (at random) for species identification and the frequency distribution of the aphid species be worked out for each district for the concerned season.

1.b. ESTIMATION OF LOSS CAUSED BY APHIDS:

This study is optional, depending upon resources and opportunities, to be undertaken in the first two years.

i) AS DIRECT PEST:

If any infestation by aphids (mainly A.fabae) is found to occur in large plots, and if these plots are not having BCMV incidence as interfering factor, then the yields can be compared between "aphids-infested" plants and "non-infested" plants or between paired subplots one of which can be sprayed with a specific aphicide and the other kept unsprayed. The difference in seed yields can be calculated as loss (either percentage or in actual units).

ii) AS VECTOR:

By planting diseased seeds (if available) of a susceptible variety, the percentage of plants which acquired BCMV in the field can be monitored by periodical counts. The seed yields of the BCMV affected plants and those that do not acquire the disease can be recorded separately. The actual loss in yield as percentage shall be based on the reduction in yield due to BCMV in the plots over the potential yield if there was no such secondary BCMV spread.

2. POPULATION DYNAMICS OF APHIDS IN RELATION TO BCMV INCIDENCE:

This will be an orientation study.

The main sites for the study will be as below:
Zambia - Chipata (Msekera)
Malawi - Lilongwe (Bunda)
Tanzania - Mbeya (Uyole)

Additional sites, for each country, can be included, with contrasting conditions, depending on the resources of the national programs concerned.

a. Trap monitoring (Zambia, Malawi, Tanzania).

Water pan traps to be installed in each site - near to the experimental fields and away from any obstruction; at least 3 metres around to be kept free from plants; traps to consist of 60x60cm tray of 10cm depth for the first season; these trays be painted dark yellow or orange yellow; for the next 2 seasons these will be replaced by greenish mosaic tiles which are likely to be available. Tray to be installed on a support stand at about 70cm above the ground level; filled with water up to 5cm and drops of detergent (soap liquid) to be added.

Winged aphids in the trap to be collected thrice (Mon, Wed, Fri) and pooled into a weekly sample, stored in vials of 70 ethanol (ethyl alcohol). Identification of the collected aphids, should be done as soon as possible; if required, these may be submitted to the expert for confirmation, at least within 2 months from collection.

The installation of the trap should be done as early as possible in the season; at latest by October/ November 1989 to start with. The trap should be periodically cleaned and the water changed weekly. If the site has facilities for recording the weather data, the temperature, humidity, wind speed and sunshine may be recorded daily.

b. Bait plant monitoring (Zambia only)

In each week during the crop season, bait plants of about 2 weeks after emergence may be placed in a bean field. These can be removed after a week's exposure in the field, sprayed and kept in net house for another 2 weeks. The seeds for raising these plants (about 50 plants per week) should be from a susceptible variety, but disease free. The winged aphids on these bait plants will be collected (just before spraying for each weekly lot) and stored for identification. At the end of 2 weeks in the net house, they will be scored for BCMV symptoms and the percent BCMV incidence noted. The location for keeping the bait plants will be near the infected bean plots. This methodology is comparable to those of Van Hoof (1977) and Van Harten (1983) in potatoes.

c. Aphid/BCMV incidence in early/late planted beans (Zambia, Malawi, Tanzania).

This study will be on-station, to consist of two large plots each of 'early' and 'late' planting of bean in a field adjacent to the location of the water pan trap. The layout will be as below:

Rep 1		Late
Rep 2	Late	Early

Each plot will be nearly square in shape, with about 21 rows, each of about 10 m long, with spacing of 50 cm between rows and 20 cm between plants within the row. The variety chosen shall be susceptible to BCMV. It would be preferable to use BCMV-free seeds. If this is not possible, the extent of seed-borne BCMV in the seed lot should be determined in net house studies (using about 200 - 400 random seeds planted in pots/trays in the net house and scored for BCMV up to 3 weeks after emergence). Before planting, the seeds may preferably be treated with endosulfan (5 g of 50% WP per kg seed) for protection from beanfly damage. The dates for 'early' and 'late' planting may be decided, based on the possibility in the local situation, but with at least 3-4 weeks difference. The management practices - fertilizer, weeding and if needed sprays against fungal diseases/pod damaging insects, shall be kept common for both plantings.

The following observation shall be recorded on row basis on 10 alternate rows (row numbers 2, 4, 6, 8, 10, 12, 14, 16, 18 and 20):

i) Plant emergence-number of plants- 2 weeks after planting (WAP).

ii) Incidence of bean aphids - number of plants with colonies - weekly from 2 WAP till crop maturity.

iii) Incidence of winged aphids - number of plants with winged aphids twice weekly - from 2 WAP till crop maturity.

iv) Plants with BCMV symptoms - number of plants - weekly from 2 WAP till crop maturity.

v) BCMV incidence/severity (row basis) visual rating on 1-9 scale - weekly from 2 WAP till crop maturity.

vi) Incidence of other diseases - row basis- visual rating on 1-9 scale; and of pests other than aphids - once before flowering and again at early/mid podding stage.

vii) At harvest, the seed yield of 'BCMV diseased' and 'BCMV free' plants will be recorded in each row in row numbers 3, 5, 7, 9, 11, 13, 15, 17, and 19 also recording the plants in each category.

viii) The extent of seed-borne BCMV infection from seeds harvested in each plot will also be assessed in the net house, from random sample of 200-400 seeds per plot.

3 RELATED STUDIES ON BCMV (Zambia only)

a) Extent of seed-borne BCMV in farmers' seed lots:

Bean seed samples will be collected from farmers' seed-lots, to assess the extent of seed borne infection by BCMV. The same samples will also be used for studying the occurrence of BCMV strains (if collaborator is available). In Eastern Province, this will be done for crops planted in the rainy season (Dec - Jan planting) and in the dambos in the off season (April - May planting). In Northern Province, this shall be taken up for the two crops - first crop (Nov. planting) and second crop (Feb. planting). In each province, seeds from about 20 farmers will be collected. In each seed-lot, 200 random seeds will be planted in the net house. The number of plants with BCMV symptoms will be scored weekly till 4 weeks after emergence in the net house.

b) BCMV build up in relation to presence/absence of seed-borne BCMV in the plot:

Two plots will be grown of a BCMV susceptible variety in two replications, with two levels of seed-borne infection:

T 1 - Zero infection

T 2 - 20 percent infection

For ensuring the 20 percent seed-borne infection is uniformly spread in the plot, the seeds of BCMV free and BCMV affected plants will be collected in the previous season and planting will be suitably made. The layout of the plots will be as below:

Rep 1	T 1	T 2
Rep 2	T 2	T 1

The plots will be seperated by borders of few rows of non-host (maize) to minimise aphid dispersal between the plots.

The management practices and observations will be similar to the experiment detailed in section 2 c. In addition, the plants showing fresh BCMV symptoms will be tagged weekly (with different coloured tags each week), so to assess the progression of BCMV build-up and the effect of age at onset of BCMV symptoms on the seed yield. At harvest, the seed yield of the health looking plants and those with different weekly tags for BCMV onset will be separately recorded, in each plot. The difference in BCMV incidence between two treatments will be attributed to the primary source of BCMV in one set of plots. plot size of this trial will ideally be similar to that detailed in section 2 c, but may be altered subject to seed availability in the first season.

4. EFFECT OF CULTURAL PRACTICES ON APHID/BCMV INCIDENCE

a) Trial on Intercropping in relation to aphid/BCMV incidence:

This trial will be on-station; to consist of the following treatments:

T 1 - Intercropped bean (1 row maize + 2 rows bean)

T 2 - Intercropped bean (1 row maize + 1 row bean)

T 3 - Intercropped bean (2 rows maize + 1 row bean)

The bean variety to be used should be at least moderately susceptible to BCMV, and preferably of the same growth habit/duration as popular/released variety in the region. The row to row spacing shall be the same for both maize and beans. The within row spacing of bean and maize will be 20 cm and 10 cm respectively. All other management practices will be as recommended. Bean seeds will be treated with endosulfan for protection from bean fly damage. If any pest (other than aphid) or disease (other than BCMV) is severe enough, then protective sprays may be made, but not with chemicals which affect aphids directly.

The plots will consists of at least 12 rows of 4 meters length and there shall be 6 replications, in a randomised block design.

The following observations shall be recorded:

i) Plant emergence: 2 weeks after planting (WAP)

ii) Bean aphid incidence: number of plants with aphid colonies per plot - weekly from 2 WAP till harvest

iii) BCMV incidence: number of plants with BCMV symptoms per plot - weekly from 2 WAP till harvest.

iv) Incidence of the other pests/diseases on beans - visual rating on 1-9 scale, once before flowering and again at mid podding.

v) Plant stand at harvest, seed yield of bean per plot.

vi) Assess the extent of seed-borne BCMV in the harvested seeds (if possible) from each plot.

b) Trial on plant spacing/fertiliser effects on Bean aphid/BCMV incidence:

The following shall be the treatments in a split plot design with 6 replicates.

Main treatments:

S 1 - 50 x 10 cms (20 plants/meter square)

S 2 - 100 x 20 cm (5 plants/meter square)

Sub-treatments:

F 1 - No fertiliser

F 2 - 200 kg D compound/ha (20N, 40P, 20K and 2S - kg/ha)

The subplots shall be of 4 rows (50 cm spacing). This trial will have all other management practices as recommended, and using a variety which is moderately susceptible to BCMV.

All the observations will be similar to those proposed under section 4 a.

BUDGET:

The original proposal consisting of activities for the two countries (Zambia, Malawi) with more activities in Zambia, had a budget content of US $ 10,000, sanctioned already for the first year. Considering the subsequent addition of one more country (Tanzania) in the midway of the first year based on the recommendations at the Bean entomologists meeting and also the inclusion of expanded activities based on the suggestions in the same meeting, it will be inevitable to revise the budget upwards to a total of US $ 16,000 (Zambian - 8,000, Malawi - 4,000, Tanzania - 4,000) at least for the next 2 years (July - June 92), to sustain the objectives/activities of the network. Accordingly the budget already approved for first year (July 1989 - June 1990) is being revised as in Appendix I. Based on the justification for enhanced budget for the next two years, it revised budget proposal for July 90 - June 92 is included in Appendix II for appresal at the earliest occasion, as this revision will be essential for sustaining the activities proposed under the project.

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APPENDIX-I

REVISED BUDGET FOR YEAR 1 (JUL 89- JUN 90)

	AMOUNT IN US DOLLARS			
1. DURABLE EQUIPMENT:	ZAM	MAL	TAN	TOTAL
Net house materials-cages/plastic pots accessories	1000	500	-	1500
2. EXPENDABLE EQUIPMENT:				
Traps/fieldsupplies/ Lab. reagents/vials	1000	500	200	1500
3. LABOUR/ASSISTANCE:				
Skilled/daily rated assistance in field/ net house studies	1500	1000	300	2000
4. TRAVEL/SUBSISTANCE:				
a) for subproject staff for survey/visits	1000	700	300	2000
b) for aphids expert from Burundi to visit for local training of participants in aphid identification.	----	---	---	1000
5. ADMINISTRATIVE:				
Communication/ report/information	500	300	200	1000
TOTAL	5000	3000	1000	10,000

APPENDIX II

REVISED/ENHANCED BUDGET REQUIREMENT FOR YEARS 2 AND 3 (JULY 90-JUNE 92)

	Year 2: 1990-91				Year 3: 1991-92			
	ZAM	MAL	TAN	TOTAL	ZAM	MAL	TAN	TOTAL
1. DURABLE EQUIPMENT:								
Net house materials-cages/plastic pots accessories	1000	500	500	2000	1000	500	500	2000
2. EXPENDABLE EQUIPMENT:								
Traps/fieldsupplies/ Lab. reagents/vials	2000	1000	1000	4000	2000	1000	1000	4000
3. LABOUR/ASSISTANCE:								
Skilled/daily rated assistance in field/ net house studies	2000	1000	1000	4000	2000	1000	1000	4000
4. TRAVEL/SUBSISTANCE:								
a) for subproject staff for survey/visits	2000	1000	1000	4000	2000	1000	1000	4000
5. ADMINISTRATIVE:								
Communication/ report/information	1000	500	500	2000	1000	500	500	2000
Total	8000	4000	4000	16000	8000	4000	4000	16000

ANNEXURE 1

PROFORMA FOR SURVEY OF BEAN APHIDS/BCMV IN FARMERS' FIELDS

I. GENERAL:

Date — District:

Place — Province:

Farmer's Name — Sample No.:

II. CROPPING DETAILS:

Area (ha) — Planting date:

Sole/Intercrop: — Crop growth stage:

If intercrop mention main crops — Plant stand/m^2:

Variety — Fertiliser applied:

Climbing/Erect — Pesticide used:

III. APHID/BCMV INCIDENCE (1-5 RATING) (25 PLANTS/FIELD)

PLANT No.	APHID	BCMV	PLANT No.	APHID	BCMV	PLANT No.	APHID	BCMV
1			11			21		
2			12			22		
3			13			23		
4			14			24		
5			15			25		
6			16					
7			17					
8			18					
9			19					
10			20					

IV. APHID NATURAL ENEMY INCIDENCE (WHOLE FIELD BASIS)

- Ladybird beetles (coccinellids)
  - Larvae NONE/FEW/MANY
  - Adults NONE/FEW/MANY
- Hoverflies (Syrphids)
  - Larvae NONE/FEW/MANY
  - Adults NONE/FEW/MANY
- Wasp parasites:
  - Aphid mummies NONE/FEW/MANY
  - Wasp adults NONE/FEW/MANY
  - Any others (specify) .....
    .....

V. INCIDENCE OF OTHER PESTS (1-5 RATING)

- Beanfly - dead plants
- " - lodged "
- Defoliators (Butterfly)
- " (Others)
- Flower thrips
- Flower beetles
- Pod borers
- Pod bugs
- Others ...(specify)
- .....

VI INCIDENCE OF MAJOR DISEASES/WEEDS (1-5 RATING)

- Rust
- [illegible]
- [illegible]
- Other ..... powd...
- [illegible]
- Any Parasitic Weeds
- .....

APPENDIX 11

FIRST DRAFT OF PROPOSAL

GRADUATE TRAINING COURSE IN CROPPING SYSTEMS WITH BEANS

ARUSHA, TANZANIA
21 May - 15 June, 1990

The SADCC/CIAT Regional Programme on Beans in Southern Africa wishes to announce a four-week training course in cropping systems with beans (*Phaseolus vulgaris* L.) for university graduates in agronomy and socio-economics.

OBJECTIVE

The main objective of the course is to teach techniques for both on-station and on-farm agronomy and socio-economics. About 60% of the course time will be devoted to practical excercises in the field.

SUBJECT MATTER

The topics to be covered will include :

1. Cropping systems (traditional and improved).
2. Genetic resource and breeding.
3. Crop morphology, physiology and development.
4. Abiotic stresses (mineral nutrition, phosphorus, biological nitrogen fixation, drought).
5. Biotic stresses (diseases, insect pests, weed identification and management).
6. Trial design (field book preparation, layout, management and monitoring).
7. On-farm research (concept, stages, trial sequences, case studies, etc.).
8. Calender of activities for on-station and on-farm research.
9. Evaluation of technology (including farmer participatory research).
10. Micro-economics.
11. Data collection and analysis (introduction to micro-computer and MSTAT).
12. Agrometeorology.
13. Writing and presenting scientific papers.
14. Applications for research funds.
15. Field visits.

GENERAL INFORMATION

NOMINATION

Only nominations that are supported by the candidates' employer and processed through the national representative on the Steering Committee will be accepted. Self nominations will not be

acknowledged.

QUALIFICATION

Graduates in agriculture who are either agronomists or socio-economists and are working in cropping systems with beans. Candidates should be in good physical health.

LANGUAGE

The course will be taught in English with lectures and most practicals at the Agricultural Research and Training Institute, Selian, Arusha.

ACCOMODATION AND MEALS

Participants will be accomodated in a moderately priced hotel where they will also have their meals.

STIPEND

Participants will be paid the local equivalent of USD$ 10.00 per day as pocket money, for the first 15 days, thereafter at US$ 5/day. A portion of the stipend is payable instead in USD to assist you during your return travel.

APPENDIX 12

REQUEST FOR FUNDING SUPPORT FROM CIAT/SADCC BEAN PROGRAM FOR A TRAINING WORKSHOP ON IDENTIFICATION OF APHID SPECIES AND FIELD TECHNIQUES FOR APHID-BCMV SUBPROJECT/NETWORK PARTICIPANTS.

The CIAT/SADCC subproject network on bean aphid-BCMV studies, which was proposed to be a Zambia-Malawi joint effort from mid 1989,has now been proposed to be revised to accommodate Tanzania also and the main activities are expected to commence by end of 1989-early 1990.

In the African Bean Entomologists Meeting held in August 1989, the critical importance of training in identification of aphid species being collected either as landing on bean plants or in aphid traps and in related field methodologies of aphid - BCMV studies was highlighted. This project requires to initially ascertain the range of aphid species landing on/infesting beans in the different ecologies and their population dynamics in relation to BCMV incidence. A good knowledge of and training in identification of the different aphid species is therefore very crucial to the progress and soundness of the work envisaged in the project network. Field techniques on aphids relating to BCMV also require familiarisation before the concerned national teams undertake the field studies. A training workshop on these aspects is therefore proposed as being very vital to the progress of the subproject network. The expert in the identification of aphids located in Burundi (Dr. Autrique, ISABU), has agreed to be available in second half of January 1990 for a possible training workshop session. A tentative program for this training workshop to be held at Lilongwe is enclosed in Appendix I, while appendix II indicates the facilities/materials required to be arranged .

Realising the great importance of this training workshop session, the network entomologists have offered to scale down their allocated resources in the subproject so to meet the cost of travel, boarding and lodging (about US $ 1000) towards inviting the resource person to assist with the training program.

To minimise travel costs for the subproject network participants, it is proposed that the Zambian and Tanzanian teams will travel by road. The estimated budget to meet the expenditure towards travel/boarding/lodging/other facilities for the II network participants from within SADCC (Appendix III) works out to US $ 5000 This unforseen expenditure which is not possible to be met by the project funds is therefore being requested for funding support from the CIAT/SADCC program as a special case. It may once again be emphasised that this training workshop would indeed be extremely critical to the success of the bean aphid - BCMV subproject network, which is now in a revised stage with three national teams in SADCC as participants.

S. Sithanantham.

Appendix I

TRAINING WORKSHOP ON IDENTIFICATION OF APHID SPECIES AND FIELD TECHNIQUES FOR BEAN APHID-BCMV SUBPROJECT/NETWORK PARTICIPANTS

Workshop Coordinator:

- Dr. L.M. Kantiki, Bean Entomologist, Bunda College of Agriculture, P. O. Box 219, Lilongwe, Malawi.

Venue: Bunda College of Agriculture, Lilongwe

Date: 21 - 24 January, 1990.

Participants from SADCC/subproject/network:

Zambia

2 entomolpgists, 1 pathologist, 2 technicians

Malawi

1 entomologist, 2 technicians

Tanzania

1 entomologist, 2 technicians

Participants from outside:

Another 5-6 participants can be accommodated, if sponsored, from bean programs in the East Africa/ Great Lakes region.

Resource Person:

- Dr. Autrique (aphid identification expert), ISABU, Bujumbura, Burundi

Tentative Program:

Day 1: Forenoon: (Theory):

- Aphids - General background, biology, ecology, population dynamics and control.

- Aphids collection, preservation and principles of identification - including keys.

Afternoon: (Practical)

- Aphid specimens from crops - identification.

Day 2: Forenoon: (Theory):

- Aphid - BCMV relationship, BCMV symptomatology.

- Field techniques/surveys in aphid/BCMV subproject.

Afternoon: (Practical):

- Survey of fields, visual ratings for aphid/BCMV incidence; other field techniques.

Day 3: Forenoon: (Theory):

- Aphid trap/monitoring/Aphid handling for vector studies.

- Host range/seasonal effects on aphid vector/behaviour.

Afternoon: (Practical):

- Use of keys for identification of aphids

- Preparation of temporary/permanent mounts of aphids

Day 4: Forenoon:

- Verification/identification of aphid collections in traps/crops.

Afternoon:

- Review of the progress/preliminary results in the net network locations.

- Finalising 1990 work plans and collaboration.

Annexure II

Materials/Facilities to be arranged for the Training Workshop:

Field facilities: (Dr. L. M. Kantiki)

- Bean crop for aphid survey/BCMV scoring
- Yellow trap for collection of aphids

Laboratory facilities: (Dr. L. M. Kantiki)

- Dissection microscopes- with illumination
- Handling equipment - needles, forceps, brushes, slides, scissors
- Reagents: Ethanol, KOH, mountants

Illustrations/Information: (Dr.A. Autrique)

- Aphids - wet collections preserved in ethanol
- Aphids - slide mounted specimens
- Aphids - Key for identification.
- Aphids - Host list
- Aphids - Methods of preparing temporary and permanent mounts

BCMV Symptoms/Rating: (Dr. J. Kannaiyan)

- BCMV - Mosaic/black root symptom - specimens
- BCMV - Rating scale for survey/incidence.

ANNEXURE III

Tentative Budget Estimates for the Training Workshop

1. **Expenses for Resource Person/Expert (to be met from sub-project funds)**

- Airfare (excursion fare) Bujumbura - Nairobi - Lilongwe - Nairobi Bujumbura (approx.)	US$ 490.oo
- Boarding/Lodging for 5 nights at Lilongwe US $ 60 per night	300.oo
- Incidental expenses - 2 nights at Nairobi plus out of pocket expenses for 5 nights	210.oo
Total USD$	1.000.oo

II. Expenses for SADCC Network Participants (Funding being requested from CIAT/SADCC Program:)

- Travel for 3 Tanzanian participants by road at US$	600.oo
- Travel for 5 Zambian participants - fuel costs	100.oo
- Boarding/Lodging for participants for 5 nights US $ 300 per person (excludes 2 local participants)	2.700.oo
- Out of pocket allowances for 11 participants for 5 nights (at 10 US$ per night)	550.oo
- Local expenses -(transport/stationary/ communication/ other training materials)	1.050.oo
TOTAL US$	5.000.OO

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* Any sponsored participants from outside SADCC, will arrange to meet their expenses entirely from their own resources.

Appendix IJ

2nd. DRAFT OUTLINE OF THE PROGRAMME FOR CIAT/IITA WORKING GROUP MEETING ON VIRUS DISEASES OF BEANS AND COWPEAS IN AFRICA TO BE HELD AT MAKERERE UNIVERSITY, KAMPALA, UGANDA, 17-21 JAN 1990

OBJECTIVES :

To bring together virologists, and breeder/pathologists concerned with virus disease, from within eastern and southern Africa to focus attention on recent advances made in the identification of viruses naturally infecting legumes in Africa, with particular reference to beans and cowpeas; to establish priorities and a programme for future research; and to develop a network for collaborative research in the region.

BACKGROUND:

Recent work on the distribution of strains of bean common mosaic virus shows, on the one hand, that necrotic strains predominate in Africa and, on the other hand, there are areas (e.g. Ethiopia) where this is apparently not the case (Morales, unpublished; Vetten & Owera, pers. comm. 1989). The origin of necrotic strains remains obscure, but work (Lana et al., 1988) on relationships among strains of BCMV and strains of the closely related blackeye cowpea mosaic virus may possibly prove relevant. Field surveys of beans in Africa also indicate that potyviruses possibly distinct from BCMV are also occasionally found in natural intections.

Cucumber mosaic virus and cowpea mild mottle virus are also commonly identified in natural infections of beans throughout the region (H.J. Vetten, unpublished). Together, these preliminary findings suggest the need for a review of their possible implications for effective virus disease management in both beans and cowpeas and their related viruses.

PROGRAMME :

The meeting is to be designed in such a way as to maximize free discussion and debate from which a clearly defined plan of action should emerge. The format, which follows previous CIAT Pan African Working Groups, will comprise Sessions, approximately as shown below, each with a Lead Discussant and Rapporteur.

Session 1:	Introduction : participants, programme and objectives	Samson Owera David Allen
Session 2:	Virus detection in plant and seed.	
	Lead Discussant :	Gaylord Mink
	Rapporteur :	Allan Femi Lana
Session 3 :	Virus identification and geographical distribution in Eastern & Southern Africa	
	Lead Discussant :	Jupp Vetten
	Rapporteur :	George Thottappilly
Session 4:	Virus strains : origins and implications	
	Lead Discussant :	Francisco Morales
	Rapporteur :	David Allen
Session 5:	Virus ecology and economic importance	
	Lead Discussant :	Hennie Kossel
	Rapporteur :	Howard Gridley
Session 6:	Virus epidemiology : vectors, seed and weeds	
	Lead Discussant :	Allan Femi Lana
	Rapporteur :	D.M. Naik
Session 7:	Development of an action plan : Virologist's perspective	
	Lead Discussant :	David Walkey
	Rapporteur :	Samson Owera
Session 8:	Development of an action plan : Breeder's perspective	
	Lead Discussant :	Howard Gridley
	Rapporteur :	Olivia Mukoko

INVITEES FROM NATIONAL PROGRAMMES :

Dr. Samson Owera	Uganda
Dr. Yusuf Abdulrazak	Ethiopia
Mr. Michael Omunyin	Kenya
Prof. Allan Femi Lana	Tanzania
Mrs. Olivia Venge-Mukoko	Zimbabwe
Ms. Patricia Ngwira	Malawi
Mr. Coy Baciwa	Zambia
Ms. B. Motalaote	Botswana
Mr. James M. Theuri	Kenya
Dr. Theroux Atcham	Cameroun

OTHER INVITED PARTICIPANTS :

* Dr. H.J. Vetten	BMZ/CIAT Special Project, Braunschweig, West Germany
* Dr. G.I. Mink	CRSP/Washington State, Prosser, USA
Dr. Francisco Morales	Virologist, CIAT, Colombia
Dr. H.W. Rossel	Virologist, IITA, Nigeria
Dr. David Allen	Pathologist/Coordinator, CIAT Tanzania
Dr. D.M. Naik	Pathologist/Coordinator, IITA Zimbabwe
Dr. H.E. Gridley	Breeder, CIAT, Uganda
* Dr. D.G.A. Walkey	IHR/CIAT/ODA Special Project Wellesborune, U.K.

* Self Supporting.

IDA
June, 1989.

APPENDIX 14

1st Draft.

CIAT Pan-Africa Monitoring Tour :

Bean Improvement and Agroforestry in Banana-based Cropping Systems of the Kagera Basin of Western Tanzania, South-West Uganda and Rwanda

Organized and Sponsored by :

- CIAT Regional Programme for Eastern-Africa.
- SADCC/CIAT Regional Programme on Beans in Southern-Africa.
- CIAT Programme for the Great Lakes Region of Central Africa.

Objectives :

To bring together national and regional scientists concerned with bean-banana systems and agroforestry to cover the main research sites and contrasting farming systems in this small, densely populated and important area of bean production based on bananas as a staple, spanning three countries at peak season; and
To discuss and devise strategies by which to increase productivity of beans in a low input, sustainable manner.

Itinerary :

Sun 12 Nov.	Assemble in Bukoba with 3 vehicles (one each from Kampala, Rubona and Arusha) (Lake Hotel or Banana Hotel).
Mon 13 Nov.	Visit TARO-Maruku. Briefing on research programme by Director. On-farm trials in Bukoba District.
Tue 14 Nov.	Briefing on agricultural production by Regional Agriculture Development Officer, Bukoba. On-farm trials in Muleba.
Wed 15 Nov.	Bukoba - Kayanga. Briefing by DADO on Karagwe District. Visit TARO-Kituntu. Kayanga - Kakai - Masaka (Hotel?).
Thur 16 Nov.	Masaka - Mbarara - Kabale (Highland Hotel).
Fri 17 Nov.	Visit trials at Kachwekano. Return Kabale.
Sat 18 Nov.	Kabale - Karengyere - Kisoro - Cyanika - Ruhengeri - Gisenyi (Hotel Izuba Meridien).
Sun 19 Nov.	Day free (NP de Volcans ?).
Mon 20 Nov.	Visit trials at Rwerere; to Butare (Hotel Ibis).
Tue 21 Nov.	Briefing on research at Rubona by Director of ISAR. Visit trials. Participants disperse. (KGL-NBO 1440-1700, KQ 471)