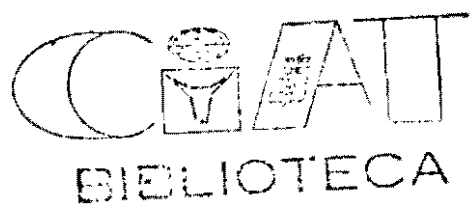


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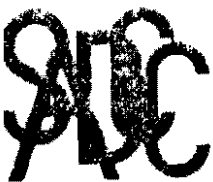


SEVENTH MEETING
HELD AT THE SWAZI INN HOTEL
MBABANE, SWAZILAND
ON 9-10 OCTOBER, 1989



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Centro Internacional de Agricultura Tropical

Apartado Aéreo 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, November 13th, 1989

Dear

Please find attached draft Minutes of the Seventh Meeting of the Steering Committee of the SADC/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, Faculdade 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 Kwambota, 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. Kwambota, 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. Moimo 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 duly 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. Nleya confirmed that she had not received advice from Dr. Giga, and she promised to discuss with Mrs. Makoko.

Postscript : 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) : Kwambota 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 : Kwambota 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 SC 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 : Kwambota 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 sited 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 NP 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) Amana 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 Malaza) 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. Kwambota 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 NP was having on 8 of the 9 SADCC countries. Kwambota 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 at least 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 Uyolet Agricultural Centre, where the breeder is on overseas training, no lines outperformed the released cultivars, Uyolet 84 and Kabanima. On farm research proceeds satisfactorily but the assistance of the RP 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 RP to NPQS to help establish a bacteriological laboratory as part of closed quarantine facilities. As regards housing for NP scientists, the assistance of SACCAK and CIITA 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. Kiper-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 Kwambota'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. Sithanatham. 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 Arrangements

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 strengthening. One request was made for a week's visit to CIAT headquarters by the scientist in-charge, presumably Mrs. Koshan Abdullah, subject to confirmation by the Director of TPKI. 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 Nleya's training in microbiology at CIAT, as already approved.

(ii) Short-term training in the SADC 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 RP 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. Kwambota reiterated this, stressing that SACCAR liked review teams to see training in action. The SC requested the Regional Coordinator to notify SACCAR of the RP'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 frame, 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. Aurique 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) New applications for academic scholarships at the master level.

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 RP 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 than 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 RP 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 ARPPIS programme at ICIPE as one such local opportunity.

After heavy debate, it was CONCLUDED that the proposal was tentatively accepted, subject to Allen's approval. The grant

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, Muesy proposed that a Workshop on weeds 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. Kwalambota reminded the SC that one of the key roles of the RP 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 RP). Supplementary bilateral support is urgently needed. Maintenance costs represent a potential drain on the regional system.

Francisco Eduardo asked for approval of the purchase (through the RP) of landrover spares, motor cycles and 3 altimeters for Angola (see AOB of 6th SC Minutes) and Guinea

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. Amano 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 duly selected.

On considering timing, the Regional Coordinator asked if members still wanted to hold two meetings a year. Kwambota 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, Kwambota 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 venue. Miss Zolwa Mamba was duly 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 Kwambota for SACCAR.

(ii) Kwambota asked to record the need for clearer presentation of the KF 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 EP 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. Kwambota 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. HIG. COORDS REPORT/WORKPLAN
7. HAT 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 GERPLASM/CONSULTANCIES/NEW EQUIP
12. NOMINATIONS 1989 AFJ BEAN RES. PRIZE
13. VENUE/ELECTION CHAIRMAN 8TH SC
14. ADJ

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 quantities 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 SADC 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 SADC 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 SADC region through the SADC/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 bruchid research and control. A particular aspect here would be the development and implementation of some standardised methodology 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 Acanthoscelides 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 project 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, accumulation 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 researchers 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 crop losses incurred by small farmers through the

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 SADC 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 SADC region will be bred under laboratory conditions. These cultures will provide insects for the biological studies at controlled temperatures of 20^o, 25^o and 30^oC. 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 SADC.

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.

S A C C A RCOMPOSITIONS AND FUNCTIONS OF STEERING COMMITTEES FOR
SADCC'S REGIONAL RESEARCH PROGRAMMES AND PROJECTSA. 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, equipment

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

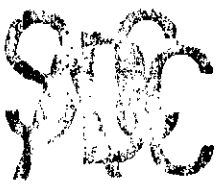
Frequency of Meetings

The Committee shall meet at least two times a year during the first half to monitor 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.



Centro Internacional de Agricultura Tropical

Apartado Aéreo 6713
Cali - Colombia



Southern Africa Development
Coordination Conference
SACCAR
Private Bag 00108
Gaborone
Botswana

Regional Programme on Beans in Southern Africa

Soil and Research Centre
P.O. Box 100
Arusha, Tanzania

Arusha, July 1st, 1989
DJA/807/89

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 SENGGOBA

*Co-ordinator of the Regional Bean Production in Tanzania
Research Station*

has been nominated the winner of the CIAT award for Bean Production in Tanzania in recognition of her long and successful work in the region. She is currently working on the production and distribution of the bean and the chickpea in the region.

The award is given to the person who has made a significant contribution to the development of the bean production in the region.

The award is given to the person who has made a significant contribution to the development of the bean production in the region.

Yours sincerely,

Director, CIAT
Cali, Colombia

SAUCELOZAI REGIONAL PROGRAMME ON BEARS IN SOUTHERN SWITZERLAND
REGIONAL COORDINATOR'S REPORT TO THE ZOO STEERING COMMITTEE
MEETING, MORGATE, 9-10 OCTOBER, 1989

INTRODUCTION

The 11 months since the last report to the Steering Committee has been a period of considerable activity. Work has been done mainly with regard to the way of preparing the programme and the participation of the public. The main part of this report attempts to summarize some of the work done in the various centres on the subject of bears. The principal national programmes which reports have been received are highlighted in the following pages.

FINDINGS

A proposed revision of the programme was accepted by the Steering Committee in October 1989. The project is to be held in the place of the first and second sessions.

STAFFING

The 1989 season will be a full-time one with the summer occupied by the 1989-90 season. The Bear Breeder position on the programme in 1989 has been filled with a full-time position which will be held by the person and will take the form of a full-time position. The 1989-90 season will be a full-time one with the summer occupied by the 1989-90 season. The Bear Breeder position on the programme in 1989 has been filled with a full-time position which will be held by the person and will take the form of a full-time position.

Under the programme manager's supervision, the 1989-90 season will be a full-time one with the summer occupied by the 1989-90 season. The Bear Breeder position on the programme in 1989 has been filled with a full-time position which will be held by the person and will take the form of a full-time position.

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BUILDING PROGRESS AT SELIAN RESEARCH INSTITUTE, ARUSHA

Development of the building to house initial office functions and regional staff has been completed and is having use since the beginning of November. Progress of the major office and national programme activities from Lysochrome to analysis is likely to be delayed because of lack of materials.

STEERING COMMITTEE

One further Steering Committee meeting was held during the intervening period since my last report, at UDA in Dar es Salaam on 17th March, 1969. Unfortunately this was attended by only 4 of the 10 members, in part a reflection of a general tightening up on external travel by ministers or institutions within the country.

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

TRAINING

a) Academic Scholarships

All five of the PhD candidates approved by the SC have now left for overseas training. One (Pete) from Lysochrome has received general acceptance at the University of London for observation of an insect. His Lysochrome candidate has also just left for Kenya where he is taking an English language course prior to returning to the PhD studies.

Two further scholarships are available at the time. It is felt now that the revised 1st budget has gained acceptance from UDA in place of previously submitted to the SC because of the progress of looking for a suitable university application for the remaining vacancy are invited through the SC.

b) Short-term training at IRI Headquarters

Five personnel visited UDA-Dar es Salaam during the period including three from Mombaasa each for a three month period. A full work schedule was drafted at a specific discipline table top.

c) Short-term technical training within the SABB region

A three week grasshopper identification course was held at headquarters in Mombaasa during the period 27th November to 17th December 1968. The objectives of this course were to provide improved methods for identification of species and to provide a uniform methodology. The course was a joint venture between

CIAT, IITA and ICRISAT, the three executing agencies for the three grain legume crops that comprise SABULZ/CIAT, with additional financial support from the Local Foundation. Considerable use was made of local consultants as resource persons, of which a total of 19 were involved.

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

Three agronomists received training on data analysis in a CIAT/CIAT course with SABULZ/CIAT support to establish the direct 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 SABULZ/CIAT regional programme organized two major workshops and contributed jointly with CIAT/CIAT in a third workshop during the year. Topics covered were: the agronomy 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. Both workshops were well organized, stimulated the exchange of ideas and information and led to development of scientific networks, but they also provided a basis for drafting technical recommendations for future cooperative research within the region. Details are summarized in Table 6.

B. Working Group Meetings

One Pan American Working Group Meeting was held during the year, on entomology, held in Havana. Details are presented in Table 7 and recommendations emerging from this meeting are summarized in Annexure 2.

Plans are well advanced for the Legume Virus Working Group, along lines agreed upon at the 6th SA meeting, and meetings on the host fertility and cropping systems Working Groups, established in Addis Ababa in September 1967, are under consideration for early in 1970.

C. Monitoring Tours

A monitoring tour, supported by a grant from the Local Foundation, was conducted in Hecan type, at the end of the SABULZ/CIAT training course. Its purpose and participants are shown in Table 8.

A Pan American Monitoring tour is scheduled for Hecan type, 1969.

promising. Blue Peter was found to be highly susceptible to rust, and Long Bow was very susceptible to anthracnose. Free from the Caribea type IBYRD is grown at Uthanga, which is highly promising but the more promising entries apparently include BH 32, BH 35, BH 36, BH 37 and BH 38. From the small white-eyed IBYRD at Uthanga, BH 19 and BH 4 appear promising. In general, the IBYRD material suffered severe antheridium blight damage. Promising material collected from the IBYRD include IBYRD 14, BH 32, BH 38, BH 43, BH 47 and BH 49.

LESOTHO (Garry Macleay)

Implications continue to be on Pinot and Pinot Noirs which is considerably outyielded the top type IBYD types on a few well stations and are acceptable to farmers and consumers. The early season trial at Baseri, BH 59c produced the most yield of 20.1 t/ha of total compared with about 1 ton/ha for the specified sugars. Seeds of this cultivar together with BH 125 and BH 126 are being increased for release to farmers.

In IBYRD 11, the highest yield (22.6 t/ha) was produced by Calima, followed by ZPV 202 (Gayaqa B. or Gupama), 22.0 t/ha, (6.1% C2571, 4.4% C3272 and 52.2% C173 (C2571 type). The highest yields yet recorded in Lesotho and other provinces of improvement over the Pinot. Sugar beet and ML material from Uthanga also showed promise.

Agronomic trials continued to develop technology appropriate for the Pinot Noirs, including sowing date, fertilizer, plant density and herbicide studies. In a trial on a very low pH soil at Leribe, Pinots were poorer than specified sugar types without lime and HP fertilizer but showed a much greater response to their application.

MALAWI (A. B. G. Bhandari, J. S. Bhow, A. E. Phogotho, W. S. Banda and L. Jantso)

The National Bean Variety Trial, with 17 entries including introductions, selections from the national assembly and selections from crosses among local accessions, was grown at 19 sites across the country. The locations were: the Districts of Lilongwe, Uthungwa, Bunda, Dedza Hill, and Palapudwa. The highest and lowest entries in seed yield were found between entries 1 and 10, of the 17 entries from which data were obtained. Differences were found between entries at Lilongwe, 2.6% above the national mean yield was entry 5, 5.9% below was entry 10. The second performer was entry 9 (approximately 5.5%) above the national level. Entry 11 followed by a selection from a cross with 10/2 and 10/5, BH 1022/21, 1022/19 from 10/2/22.

A hybridization programme was initiated to develop a variety acceptable to many yielding well to anthracnose, anthracnose, anthracnose and angular leaf spot, about 100 crosses among resistant and susceptible parents of 10/2 and 10/5.

advantages. Microbiology is a common core introduction to the field, relevant to agricultural biotechnology. This introduction is in a general format, and is followed by two more advanced courses. The first is an introductory survey of the history and development of the field, and the second is a more focused, systematic study of the biological and chemical aspects of the field. A paper-based, text-based, and video-based format is used.

The objectives of this course are to provide a broad overview of the field of microbiology, and to introduce students to the various methods used in the study of microorganisms. It will be assumed that the students have had an introductory biology course, and have had some experience with the laboratory techniques used in microbiology. The course will cover the history of the field, the various methods used in the study of microorganisms, and the various applications of the field. The course will be taught in a lecture format, and will include laboratory work.

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MOZAPROURE (Monoclonal antibody)

The field of monoclonal antibodies is a major area of research in the field of immunology. The production of monoclonal antibodies is a complex process, and the study of monoclonal antibodies is a major area of research in the field of immunology. The production of monoclonal antibodies is a complex process, and the study of monoclonal antibodies is a major area of research in the field of immunology. The production of monoclonal antibodies is a complex process, and the study of monoclonal antibodies is a major area of research in the field of immunology.

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SWAZILAND (John Fairbankhulu, Zedwa Mando, Roger Smith and
Greenman Masinga)

The dry bean is the most important grain legume produced in
swart Nataland. Research in progress, both at Makhems and
Luyongo, is aimed at identifying and solving the main constraints
to bean production. Results from breeding trials show that elite
lines have a higher yield potential and less susceptibility to
the locally prevalent diseases than the local commercial cultivar
Bomas, a speckled sugar type.

The National Elite Bean Cultivar Trial, comprising 6 lines
selected from earlier trials including the BOMAS with Bomas as
check, was grown at Hebron and Manguro (highveld), Mhlangano
(cool middleveld), Makhems (moist middleveld) and Big Bend
(lowveld). Data obtained from Hebron, Mhlangano and Makhems
reveal that Carroca was the heaviest yielder (mean yield 1577
kg/ha) followed by PVMX 1507 (863 kg/ha) under rainfed
conditions. Under irrigation at Big Bend, the heaviest yield
(2017 kg/ha) was produced by 6947 followed by Carroca (1817
kg/ha) and Bomas (1619 kg/ha). Among the 16 entries in the
National Advanced Bean Cultivar Trial, grown at Makhems,
Mhlangano and Big Bend, the top yielders across sites were 6947,
EVA 2007, B61 1514, PVMX 1507 and B61 1777. Despite a rather poor
season, progress remains quite encouraging, and the Carroca and
Pinto types seem well-adapted to Swaziland conditions. Future
trials at Makhems 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 Luyongo was
started in 1987 and supplements the work on the Ministry of
Agriculture at Makhems. In 1989, entries in the Preliminary
field Nursery did not differ significantly in seed yields.
However, in the advanced Yield Nursery, entries were
significantly different: the heaviest yielding lines were 6947,
NW 395, X61 79, PVMX 1507 and the local check, Bomas. In 1989,
beanfly infestation was high at Luyongo. The red tea bug, *Arida
picturata*, was noted on the roots of some plants, and entries
differed in the degree of infestation.

TANZANIA (Clemence Mushi, Ruth Kamata, Betty Gendin, Yvonne
Mhandeme, Simon Simpa and Leonard Rutanda)

Rainfall was good to excessive at Seltan. Bean yields
ranged up to 6.7 t/ha in small plot trials. In highland areas
(Uwambao and Southern Highlands) disease problems were
exacerbated leading to less than normal yields.

The first CIM breeding materials introduced since the
commencement of the regional project were grown in sample plots of
3 m length at Seltan and Lamba together with available genotypes as

From 1980, 1990 and 1995, the employment elasticity of GDP (the ratio of the change in the number of employees to the change in GDP) was 0.11, 0.12 and 0.13, respectively, and the average level of employment was 1.06 million employees, or 10.6% of the population. The level of the unemployment rate was 10.4% in 1992.

The third criterion is the rate of turnover and mobility of the labour system (the ratio of the number of employees who changed from one job to another in a given period to the number of employees who remained in the same job). The rate of turnover was 1.12 in 1992, 1.13 in 1993 and 1.14 in 1994.

The relationship of the number of employees to the number of jobs is the difference between the number of employees and the number of jobs. The number of jobs and vacancies in the labour market in 1992, 1993 and 1994 was 1.06 million, 1.07 million and 1.08 million, respectively, or 10.6%, 10.7% and 10.8% of the population.

The average number of employees per job is the ratio of the number of employees to the number of jobs. The average number of employees per job was 1.06 in 1992, 1.07 in 1993 and 1.08 in 1994. The average number of employees per job was 1.06 in 1992, 1.07 in 1993 and 1.08 in 1994. The average number of employees per job was 1.06 in 1992, 1.07 in 1993 and 1.08 in 1994.

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In trials at Lamba and Lyamungu to assess the yield loss due to halo blight, seed yields were reduced by 12% and 31% in susceptible cultivars at Lyamungu but there was no effect on seed yields at Lamba.

Inoculation of four differentials with isolates of *Pseudomonas syringae* pv. *phaseolicola* indicated the occurrence of Races 1, 2, 3 and 4 of the pathogen. Race 1 (R1) appeared to induce symptoms on Edmund and may indicate the presence of a new race. Race 1 from *B. mungo* appeared to be aggressive than Race 1 from *B. vulgaris* when inoculated on to 47 lines from the breeding programme. Only Nkasa Red was noted resistant to both races.

Weed control research emphasized the use of reduced rates of herbicides applied in combination. Fluridan herbicide applied together at 19 days after sowing at 0.25 t/ha was given reasonable long control of most weeds at Lamba, but controlling broadleaf weeds and facilitating the grasses. Weeds reduced seed yields by 20% to 150% t/ha. The first 25 days after sowing was the critical period for weed competition.

The national programme continues to make progress in on farm research. Experiment 1 (early), using the early maturing, aimed at quantifying constraints to bean production, short and long cycle, drought, long region, soil fertility, etc. The main constraint, the picture that emerged from on-farm and laboratory experiments was less clear. Both short and long term on-farm trials are planned to address a soil deficiency problem currently referred to as "Uzambar's Plot 10" (UP).

The results of bean on-farm variety trials in new long, medium, and short cycle and long region, show the superiority of Lyamungu 25 in nearly all locations. Lines were involved in the assessment of entries in the trial for production, consumption and marketing characteristics and Lyamungu 25 was generally the most preferred variety.

A trial designed to investigate the effect of varying levels of varying distances from manure rows on grain yield of both crops was conducted at Lamba and Serenje. Both crops were planted in monoculture as well as in association. The maize crop received 20 t/ha of nitrogen in split applications of 10 and 10 t/ha of urea and side dressing respectively plus an additional 20 t/ha of hydrogen and phosphorus, respectively. Beans in association with maize were not fertilized. Heavier seed yields (11.5 t/ha) in beans in association with maize were obtained in close association, suggesting that beans may benefit from fertilizer applied only to the maize.

ZAMBIA (Joyce Muli Kasumba, Dr. Emmanuel M. M. Mthembu and H. P. Bwalya)

Report submitted to the Director of the Agricultural Research Council, Lusaka, Zambia.

groupings, α -chloromethyl, and β -alkyl and α -alkoxy groups. These studies show the need for a systematic study of the effect of these groups on the reaction of the epoxy resin with the epoxy hardener and initiator.

In the present study, the effect of various groups on the reaction of the epoxy resin with the epoxy hardener and the epoxy initiator was studied. The effect of the following groups on the reaction of the epoxy resin with the epoxy hardener and the epoxy initiator was studied: α -chloromethyl, β -alkyl, and α -alkoxy groups. The effect of the following groups on the reaction of the epoxy resin with the epoxy hardener and the epoxy initiator was studied: α -chloromethyl, β -alkyl, and α -alkoxy groups. The effect of the following groups on the reaction of the epoxy resin with the epoxy hardener and the epoxy initiator was studied: α -chloromethyl, β -alkyl, and α -alkoxy groups. The effect of the following groups on the reaction of the epoxy resin with the epoxy hardener and the epoxy initiator was studied: α -chloromethyl, β -alkyl, and α -alkoxy groups. The effect of the following groups on the reaction of the epoxy resin with the epoxy hardener and the epoxy initiator was studied: α -chloromethyl, β -alkyl, and α -alkoxy groups.

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2. COLLABORATIVE PROJECTS

2.1. REACTION OF COLLABORATIVE RESEARCH WITH EPOXY RESIN

The reaction of the epoxy resin with the epoxy hardener and the epoxy initiator was studied: α -chloromethyl, β -alkyl, and α -alkoxy groups. The effect of the following groups on the reaction of the epoxy resin with the epoxy hardener and the epoxy initiator was studied: α -chloromethyl, β -alkyl, and α -alkoxy groups. The effect of the following groups on the reaction of the epoxy resin with the epoxy hardener and the epoxy initiator was studied: α -chloromethyl, β -alkyl, and α -alkoxy groups. The effect of the following groups on the reaction of the epoxy resin with the epoxy hardener and the epoxy initiator was studied: α -chloromethyl, β -alkyl, and α -alkoxy groups.

tolerance sub-project, as reported by Dr. WALTER HUYBANDER, is as follows:

Four experiments were conducted during 1971 to identify genotypes that are high yielding and give substantial yields under moisture stress conditions. Fifteen best lines and ten poor materials (to provide reference) have been identified apart from local farmers' samples that were found that could be used in screening under moisture stress conditions as correlated with seed yield. Further experiments will be conducted testing these lines to study mechanisms that confer tolerance. Drought nurseries will continue to be conducted by the various participating countries.

2. Recent progress with evaluation of amphiploid lines for resistance is reported by Dr. WALTER HUYBANDER and Dr. G. S. SINGH. 235 lines were screened at Bunda where 40% were found resistant including 65454, inbred to Vert and several local landraces. Resistance was more common among 11 landraces and one hybrid type. Pathogenic variation was demonstrated among 2 landraces in *Phaeocephala sp. gr. tricolor* collected in Malawi.

3. 100 local materials from the Malawi germplasm collection were evaluated for nodulation. Results obtained by Dr. G. S. SINGH are expected shortly.

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

- a. to identify the common aphids affecting maize within the region and determine which species are capable of vectoring the local common maize variety.
- b. to monitor the population dynamics of aphids in relation to BPHV 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 BPHV management.

The sub-project is in the final stages.

5. Landraces. A research team from Zambia, headed by a consultant of the University of Edinburgh, is conducting a survey of the objectives are:

- a. to monitor the distribution and genetic composition of landraces within the region.
- b. to appraise current and future uses of local varieties.

would include the general and the specific objectives of the proposed research, a description of the proposed methodology, and a list of references.

- (c) The student must submit a written proposal to the Director of the program or to the appropriate faculty member.

(d) The student must submit a written report to the Director of the program or to the appropriate faculty member. The report should include a description of the research project, a list of references, a list of the student's activities during the project, and a list of the student's findings. The student must also submit a written report to the appropriate faculty member. The student must also submit a written report to the appropriate faculty member.

4. Special Projects

The special project program has been revised in the following paragraphs. The student must submit a written proposal to the Director of the program or to the appropriate faculty member. The student must also submit a written report to the appropriate faculty member.

The distribution and importance of studies in the field of international relations, *theoretical*, *analytical*, and *empirical*, are discussed in the following paragraphs. The student must submit a written proposal to the Director of the program or to the appropriate faculty member. The student must also submit a written report to the appropriate faculty member. The student must also submit a written report to the appropriate faculty member.

The student must submit a written proposal to the Director of the program or to the appropriate faculty member. The student must also submit a written report to the appropriate faculty member. The student must also submit a written report to the appropriate faculty member.

3. Studies on the biology and distribution of races of late blight (*Pseudomonas syringae* pv. *phaseolicola*) and evaluation of resistance sources. The disease race - three race model - special project, which began in 1981, entered its second phase of three years in 1982. Progress made by Dr. John Taylor and Bruce Hamer reveals to date (2) a number of observations. The first phase of study, the the period Nov. 1982-May 1990, includes the genetics of host/pathogen interaction, epidemiology in several continents, and pathogen physiology, especially the response to temperature. The main input to date has been in the area of race structure and genetics; the physiological studies have only recently been initiated. An interesting finding of the epidemiology study is the complete absence of specific race resistance in the populations of resistant materials from these continents. The occurrence of race non-specific resistance at a very low frequency in one of the mixtures.

4. Soil factors affecting nitrogen fixation and leaf nodulation in coastal areas. This three year special project was initiated in 1986 by Dr. John Taylor and Dr. G. G. Oye, College, London. We provided funds for what became a collaborative project between the College and IITA with support from IITA. Extensive collections of soil and leaf samples were made from bean growing areas of Tanzania, Nigeria and Zambia in 1987. Except in rich volcanic soils, nodulation was generally poor.

Trials at Belian and Lumbo in 1988 showed that nodulation was excellent at Belian with up to 100 nodules/plant, while at Lumbo the highest number of nodules/plant was 20. Studies on Lusaka District using IBB and non nodulating hosts, as a reference plant, showed that beans fixed only 2% and 3% of their nitrogen at Ulu and Mumbi, respectively. Ulu and Mumbi IBB was a serious problem during the long rainy period. Analysis of plant samples from two localities, Ulu and Mumbi, showed that plants not showing IBB symptoms had about three times more potassium than affected plants.

E. African Regional Trials and Nurseries

1. The Director's Workshop in Lusaka to review and recommend trials and nurseries was agreed for the three projects. Several in the system already operating in the field were reviewed. Ecological zones were identified - some are complete IBB. The zones and the locations, with participants on the IBB and leaf roll of the Great Lakes. Zone A (Tanzania), central, Burundi, Malawi and eastern Tanzania, Tanga, Shinyanga and Morogoro with the support of an abundance, Uganda. Zone C (southern Tanzania), and those of safety, northern Malawi, northern Mozambique and impact of IBB is supported by Malawi in Zambia. Zone B (central and southern Malawi), central Malawi, Malawi, Mozambique, Lesotho and southern Africa is funded from Bunda College in Malawi. Phosphorus fertilizer and supply referred to the appropriate centers for description and distribution of seeds for the nurseries, central Malawi, Lesotho

number of villages and towns. The situation is similar to that of the population explosion in the developing countries. The population growth is rapid and is not controlled by any means. The population growth is not controlled by any means. The population growth is not controlled by any means.

D. The Farm Research

The traditional programme has been to provide a general education to the students. The students are given a general education in the fields of science, mathematics, and history. The students are given a general education in the fields of science, mathematics, and history. The students are given a general education in the fields of science, mathematics, and history.

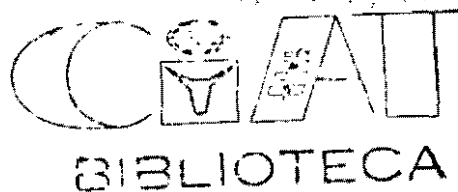
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PUBLICATIONS

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Dr. J. M. G. G. G.

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No. 2. Proceedings of a Workshop on Food Research and Development in the Great Lakes, Uganda, June, 1980. Entebbe, Uganda, 1980. Working Document Series.

No. 3. Empowered Policy of Improved Food Systems and Better Quality - compiled by R. G. Lalonde, U. I. 1980, 20 p.

Other publications of the regional programme have appeared that you are interested in.

Allen, D. L. (1979). The influence of international industry development on development in Uganda. U. I. 1979, 14 p. Available from Research Methods for Development and Extension, the Centre and Agricultural University, Entebbe, 2-27 September.

Angoro, J. E. (1979). Current trends in poultry production and control in Africa. U. I. 1979, 20 p. Available from Research and Development, Entebbe, 2-27 September.

Allen, D. L. (1979). Energy, protein and feed yields of different varieties of sorghum produced by U. I. 1979, 14 p. Available from Research Methods for Development and Extension, the Centre and Agricultural University, Entebbe, 2-27 September.

Allen, D. L., Plummer, S. J., Blaxter, J. S., Ndabandem, P. and Doherty, D. L. (1979). Advances in nutrition research in relation to poultry. In: Proceedings of the 1st International Poultry Research Workshop, Entebbe, 2-27 September.

Manderson, A. R. G., Roper, J. D. and Allen, D. L. (1979). Food and nutrition in Uganda. U. I. 1979, 14 p. Available from Research Methods for Development and Extension, the Centre and Agricultural University, Entebbe, 2-27 September.

Allen, D. L., Allen, D. L., and Blaxter, J. S. and Doherty, D. L. (1979). Identification of a disease in a chicken in Uganda. U. I. 1979, 14 p. Available from Research Methods for Development and Extension, the Centre and Agricultural University, Entebbe, 2-27 September.

Allen, D. L. and Allen, D. L. (1979). The potential impact of a dynamic life on the health of animals. U. I. 1979, 14 p. Available from Research Methods for Development and Extension, the Centre and Agricultural University, Entebbe, 2-27 September.

Ndabandem, P., Blaxter, J. S., and Blaxter, J. S. (1979). The effect of a disease on the health of a chicken in Uganda. U. I. 1979, 14 p. Available from Research Methods for Development and Extension, the Centre and Agricultural University, Entebbe, 2-27 September.

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Smithson, D.M. (1989). Utilization of on-farm variability by sheep on rough improved in 1980-81. *Journal of Agricultural Improvement, Halifax*, 20 January - 2 February.

Smithson, D.M. and Gifford, W. (1990). An on-farm study of adaptation to rough by sheep. *Proceedings of the 1990 Conference on Sheep Production, Perth*, 1-3 October.

Smithson, D.M. and Gifford, W. (1992). Effects of a deboning diet on the utilization of rough by sheep. In *Proceedings of the 1992 Conference on the Sheep Production of South Australia*, 1-3 October, Perth, 1-3 October.

Table 2. STEERING COMMITTEES

No.	Date	Place	Representation											
			BN	BD	LU	MO	MW	TZ	WD	ZH	ZW	SADC/CRK	CIAB	CIAT
1	8 Sep 86	Norqoro TZ*		x	x	x			x			x	x	
2	11 Mar 87	Lilongwe MW**	x	x	x		x	0		x	x		x	
3	5-6 Nov 87	Lusaka TZ	x	x	x	x	0	x			x			x
4	12-13 May 88	Harare ZW***	x	x	x		x	x		0	x	x	x	x
5	3-4 Nov 88	Gaborone BD	x	x	x			x		x	0	x	x	x
6	16-17 Mar 89	Napato, MO****					x		x					x
7	9-10 Oct 89	Mbabane WD*****	x		x		0	x	x		x	x	x	x

Circles represent Chairmanship.

- * Satellite to 5th. Bean Research Workshop, SDA.
- ** Satellite to SADC/CIAT technicians training course.
- *** Satellite to Brought Working Group.
- **** Satellite to SADC/CIAT training course.
- ***** Satellite to first SADC regional bean research workshop.

Table 3. LUNB-TERM TRAINING (Academic Scholars): DIFFERENTIAL 1st 1989

Degree	Univ.	Research Topic	Duration	Name	Country	Sex	Age
PhD	Cambridge, UK	BMV reproductive breeding	Jan 89 Dec 91	G. Mutsaers	Netherlands	F	30
PhD	Cornell	Plant breeding	Jan 89 Dec 91	S. Jacques	France	F	36
PhD	Iowa State	Wheat science	Jan 89 Dec 91	H. J. G. van den Berg	Netherlands	M	33
PhD	Idaho	Entomology	Aug 88 July 91	M. L. Samadpour	Iran	F	31
PhD	Reading, UK	Protein nutrition development	Jan 89 Sep 90	G. G. G. G. G.	India	M	31

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

Description	Period	Name	Country	Sex
Pathology	Mar-Jun 89	Emelinda Conceicao	AI	F
Soil Science	Mar-Jun 89	Jose Adalberto Lorenz	IN	M
Physiology	Jul-Aug 89	Dr. A. G. C. Mbandawire	HW	M
Breeding	Aug 89	Dr. E. S. Mushi	IZ	M
Breeding	Sept-Dec 89	Antonio L. Castaño	MI	M

Table 5. SHORT-TERM TRAINING FOR RESEARCH TECHNOLOGIANS WITHIN THE SADC REGION, 1989

Period	Location	Participants	Course Title	Host Country	Country of Origin	Number
19-28 March 1989	Bapato, MD	UNIZULU/ ZSUSU/ FOD/ FOSB	Grasshopper Control	Botswana	1	1
				Malawi	1	1
				Zambia	1	1
				Zimbabwe	1	1
				Lesotho	1	1
				Swaziland	1	1
				South Africa	1	1
				Botswana	1	1
				Botswana	1	1
				Botswana	1	1
				Botswana	1	1
				Botswana	1	1
				Botswana	1	1
				Botswana	1	1
				Botswana	1	1
				Botswana	1	1
				Botswana	1	1
				Botswana	1	1
				Botswana	1	1
				19-26 June 1989	Harare, MD	UNIZULU/ ZSUSU
Zimbabwe	1	1				
Botswana	1	1				

Table 5. REGIONAL WORKSHOPS WITHIN THE SADC REGION, 1987

Subject	Venue	Date	Participants (Organized by Sub-Region)	LO	Sex	Remarks
Research Methods for Lime Fertilization Inter cropping Workshop	Lilongwe, Ml	26-27 Jan, 1987	M. M. Ndlovu	HM	M	Organized jointly by SADC and ICRISAT
			E. A. Mlambo	HM	M	
			M. Mlambo	LM	F	
			P. Ndlovu	LM	M	
			Dr. S. K. Mlambo	HM	M	
			Dr. M. B. Mlambo			
			M. Mlambo	HM	M	
			Dr. Mlambo	LM	M	
			Z. Mlambo	LM	F	
			C. Mlambo	LM	M	
			Dr. Mlambo	LM	M	
Production Workshop	Nasaret, LU	30 Jan, 2 Feb, 1987	G. Mlambo	HM	M	Organized by SADC
			S. Mlambo	LM	M	
			H. Mlambo	LM	F	
			J. Mlambo	LM	M	
			M. Mlambo	LM	M	
			M. Mlambo	LM	M	
			J. Mlambo	LM	M	
			Dr. M. Mlambo	LM	M	
			Dr. M. Mlambo	LM	M	
			Dr. M. Mlambo	LM	M	
			M. Mlambo	LM	F	
Forest SADC Workshop	Harare ZB	4-7 Dec, 1987	L. Mlambo	HM	M	Organized by SADC and ICRISAT
			J. Mlambo	HM	M	
			L. Mlambo	LM	M	
			Dr. M. Mlambo	LM	M	
			Dr. M. Mlambo	LM	F	
			Dr. M. Mlambo	LM	M	
			Dr. M. Mlambo	LM	M	
			L. Mlambo	LM	M	
			M. Mlambo	LM	F	
			M. Mlambo	LM	M	
			Dr. M. Mlambo	LM	M	
			Dr. M. Mlambo	LM	M	
			Dr. M. Mlambo	LM	M	
			Dr. M. Mlambo	LM	M	
			Dr. M. Mlambo	LM	M	
			Dr. M. Mlambo	LM	M	

Table 8. REGIONAL WORKSHOPS WITHIN THE BARCEL REGION, 1969 (Contd.)

Subject	Venue	Date	Participants (supported by SARDA/ICD)	Cost	Remarks
			R. Gondwe	12	1
			R. Louwre	12	1
			L. Mulondato	12	11
			S. Mumpo	12	11
			M. Mwangi-Mutolo	12	1
			L. Njiru	12	1
			R. Nyumba	12	11
			S. Ratta	12	11
			Dr. J. Bulira		
			" " " "	12	1
			R. Hosiwe	12	11
			Dr. J. O. Sinyala	12	11
			Dr. S. S.		
			" " " " " "	12	11
			K. Loungo	12	11
			L. Mwangi	12	11
			Dr. K. Mulu	12	11
			J. Pata	12	11
			L. Rumba	12	11
			Prof. G. P. Rao	12	11
			Dr. M. Rumbala	12	11

Table 7. REGIONAL WORKSHOPS OUTSIDE THE SADC REGION, 1989

Subject	Venue	Date	Participants (supported by UNDP/UNEP)	EU	USA	Remarks
Abolish Death Penalty (opted)	Nairobi, Kenya	7-9 Aug 1989	L. J. Jacobs Dr. J. J. M. van der P. J. van der Dr. J. J. M. van der	EU	USA	Organized by UNEP
Working Group on ...						UNEP/UNEP/UNEP
						Participants: J. J. M. van der J. J. M. van der J. J. M. van der J. J. M. van der J. J. M. van der J. J. M. van der

Table 2. STATUS OF ORDERS OF EQUIPMENT FOR NATIONAL PROGRAMS

Country	Date ordered	Cost US\$	Supplier/Equip	Delivered	Status
ANGOLA					
Generator (4)	09/07/88	1619	ILL	09/07/88	Received
Projector (1)	10/6/88	41180	Dev. Corp/ILL	10/12/88	Received
Small bundle Printer (1)	9/7/88	43547	Almaco/ILL	10/11/88	Received
Printer (2)	9/7/88	45370	Almaco/ILL	10/11/88	Received
Reception balance (1)	08/11/88	4250.50	Sattler	1/2/89	Received
Portable type writer					In process
Security (1)	11/4/89	4094.00	ILL	5/8/89	Received

BOTSWANA

All items received.

LESOTHO

Generator	10/6/88	41180	Dev. Corp/ILL	10/12/88	Received
Small bundle Printer (1)	11/10/88	43547	Almaco/ILL		Received
Printer (1)	11/5/88		ILL		Received
Reception balance (1)					Received
Portable type writer					In process

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

Country	Date ordered	Total Qty	Supplier	Approved	Status
MALAWI					
Motorcycles (1)	10/10/87	112.00	Jactys Babat		received
port sterilizer					ordered code from UN 13.11. 1977 and sent by mail 25.01. 1978/88
millimetre (1)	14/2/88	01.00	ICC Nairobi		delivery on
MOZAMBIQUE					
Motorcycles (2)	17/6/88	445.00	Jactys Babat	20/9/88	received.
Precision balance (2)	17/6/88	414.00	Salter Int.	18/10/88	received 19/5/88
lamp (3)	2/9/88	161.00	ICC Nairobi	02/2/88	received.
Clothing (4)	2/9/88	1592.00	ICC Nairobi	20/2/88	received.
Boats (4)	2/9/88	1394.00	ICC Nairobi	20/2/88	received.
hand - tide projector		111.00	EURO brusha	2/2/88	received.
projector lamp					received.
MOZONIA					
Small bundle firecher (1)	9/7/88	13.42	Blanca/ICC	14/8/88	received
Precision balance (1)	17/6/88	1742.00	Salter Int.	24/10/88	received.
knapsack specimens (2)					received

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

Country Item	Date ordered	Last bill	Supplier's reports	Shipped	Status/ date
ZAMBIA					
attractra (5)	14/9/89	4123	ICC		Delivery on 27/10/89
ZAMBIA					
attractra (1)	14/9/89	4123	ICC		Delivery on 15/10/89
seed storage rack (1/100)					received.
ZIMBABWE					
attractra (1)	14/9/89	4123	ICC		Delivery on 27/10/89

Table 10. SEED DISTRIBUTION

ADULTS

HYPER	5
Unpaired (non-society)	17

EGGHO

HYPER	1
Unpaired (non-society)	1
of total JJ (see 4th report)	1
of total (total)	1

INFANTS

Unpaired (non-society)	1
of total (total)	1

IMMATURE

HYPER	2
Unpaired (non-society)	1
of total (total)	1
of total JJ (see 4th report)	1
of total (total)	1

SUBADULTS

of total JJ (see 4th report)	1
------------------------------	---

ADULTS

of total JJ	
Unpaired (non-society) (ADULTS)	15
HYPER	5
Unpaired (non-society)	
of total (total)	15
of total (total)	15
of total (total) (see 4th report)	5
of total (total) (see 4th report)	15
of total (total) (see 4th report)	5
of total (total) (see 4th report)	15
of total (total) (see 4th report)	15

ADULTS

Unpaired (non-society) (ADULTS)	15
of total (total)	15
of total (total)	15

Table 10. SEED DISTRIBUTION (Cont.)

Alphagran

Family nursery	1
Project nursery	1
WV nurseries	11
Seagrass and populations (cont'd)	21

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

Topic	Investigators	Country	Contact(s)	Status
1. Angular leaf spot resistance/geroplate evaluation	Hadiji & Bostad	GR	Nikougo, Larre (Pyrone)	approved by ICRISAT & received letters to the following: China, USSR and Kenya. (Larre PI, 100 paid)
2. Screening for mutation relative to nitrogen fixation	Chakrabarti, Ghosh, Ghosh, Ghosh	IN	Roorda (Mumbai)	approved by ICRISAT & received. (Chakrabarti, 100 paid)
3. Mosaic	Hijab, Ghosh, Ghosh, Ghosh, Ghosh	GR, IN	Hijab, Ghosh, Ghosh, Ghosh, Ghosh	approved by ICRISAT & received. (Hijab, 100, 100, 100)
4. Host race identification	Hadiji	IN	Nazari, Ethiopia (Addis)	approved by ICRISAT and provincial government. (Hadiji, 100) to request suspension by ICRISAT, owing to absence of funding.
5. Bean common sheath virus resistance evaluation	Ueno, Fahnstyan, Ueno, Ueno	IN, JP, CA	Makino, Inoue (Ueno)	approved by ICRISAT and awarded US \$1,000, after being satisfactory terms established with Ueno.
6. Ecology/interference of aphids with root nodules	Srinivasan, Ghosh, Ghosh, Ghosh, Ghosh	IN, IN, IN	Ueno, Ghosh, Ghosh (Ghosh, JP)	approved by ICRISAT and awarded US \$1,000, subject to satisfactory results.
7. Earliest improved material	Hadiji, Ghosh, Ghosh	IN, IN, IN	Nazari, Ethiopia (Addis)	letterhead at ICRISAT.
8. Bean storage/seed biology, ecology & control	Hadiji	IN	-	Under revision
9. Identity/distribution of beetles on beans, & screening for resistance	Ghosh, Ghosh	IN, IN	Hadiji, Ghosh (Ghosh)	based contract, approved at ICRISAT and received 1000.

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

Topic	Investigators	Country	Linkages	Status
10. Beauty in science teaching	Hyatt	17	affin and infra. networks Harvard, CT (Isenberg)	approved by AB 12 and awarded in 4/1/89
11. Inter- cultural systems	Nath Laranga & Koshy	16 17	Cropping systems Work. Group	approved by AB 12 in priced with surveys awarded but failed

Table 12. Source and characteristics of information on woodlice (1985 and 1989).

Index	Origin	Country	Wood type		Plant type
			Size	Colour	
1	"	Chad	5	Black	Shrub
2	"	Chad	5	Red	Shrub
3	"	Kenya	5	Red/white (F) (C)	Tree
4	"	Kenya	1	Green/black (F) (C)	Tree
5	Barotsi	Zambia	2	Green	Shrub
6	"	Zambia	2	Red	Shrub
7	Kyambiji	Zambia	1	Red/white (F) (C)	Tree
8	"	Zambia	1	Red/white (F) (C)	Tree
9	"	Uganda	1	Red/white (F) (C)	Tree
10	Ngazun	Benin	1	Purple/black (C)	Shrub
11	"	Zambia	5	Brown/green (F) (C)	Shrub
12	"	Zambia	1	Red/white (F) (C)	Shrub
13	"	Zambia	1	Red/white (F) (C)	Shrub
14	"	Zambia	1	Yellow	Shrub
15	"	Zambia	1	Red/white (F) (C)	Tree
16	"	Zambia	2	Red/white (F) (C)	Tree
17	"	Zambia	2	Black	Shrub
18	"	Zambia	1	Purple	Shrub
19	"	Zambia	1	Green	Tree
20	Uganda	Zambia	5	White	Tree
21	"	Zambia	2	Black/white (F) (C) (F) (C)	Shrub
22	"	Chad	2	Red/white (F) (C)	Tree
23	"	Chad	3	Red/white (F) (C)	Tree
24	"	Zambia	1	Purple/white (F) (C)	Tree
25	"	Zambia	2	Brown	Shrub

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

Location	Season	Abbreviations	Country	Latitude	Altitude (masl)	Soil class	Sowing date
Mekassa	1987	MEL87	Ethiopia	8°23'	1500	4	30 Jun
Fitamabor	1988	FIF88	Madagascar	19°	1500	5	1 Mar
Kachwekano	1987F	KAC7F	Uganda	1°14'	2133	5	5 Apr
Kawanda	1986S	KAW6S	Uganda	0°34'	1196	6	mid Oct
Kawanda	1987F	KAW7F	Uganda	0°34'	1196	6	9 Apr
Kisindi	1987F	KIS7F	Uganda	0°25'	1196	5	Apr
Kubona	1987F	KUB7F	Rwanda	2°29'	1700	4	3 Oct
Mutungu	1987F	MUL7F	Zaire	2°38'	1731	5	Oct
Msekera	1987	MSK87	Zambia	13°39'	1025	5	6 Jun
Msekera	1988	MSK88	Zambia	13°39'	1025	5	12 Jun
Mhala	1988	MH88	Zambia	8°51'	1673	3	12 Jun
Selian	1989	SEL89A	Tanzania	3°20'	1307	1	30 Mar
Selian	1989	SEL89B	Tanzania	3°20'	1307	1	4 Apr
Irenge	1989F	IRE89F	Tanzania	4°50'	1400	2	15 Apr
Lambo	1989	LAM89	Tanzania	3°16'	1667	1	13
Lyamungu	1989	LYA89	Tanzania	3°13'	1268	4	16

Table 14. Percentage contributions of sources of variation to total sum of squares in all yield in 7-11 environments between 1960 and 1967.

	Environ- ments (I)	Error (a)	Varieties (V)	V x E	Error (b)
Genotype	53.3	6.4	3.1	11.9	13.3
Genotype x environ- ment	41.0	3.2	11.9	10.3	20.0
Error	42.5	2.5	0	9.0	2.2
Environ- ment	27.7	0.5	1.2	12.3	0.2
Error	93.0	0.3	2.2	3.1	1.2
Genotype ²	30.3	2.4	19.0	13.2	17.2
Genotype x environ- ment	30.2	0.2	13.0	10.3	10.3
Error	25.0	0.3	30.2	11.2	10.3
Genotype ² x environ- ment	17.0	1.4	25.0	4.0	26.2
Error	20.0	3.1	2.2	10.2	9.2
Genotype x environ- ment ²	3.2	3.3	3.1	25.2	50.3
Error	61.2	2.5	0.1	45.0	19.9
Environ- ment	25.2	2.4	11.0	32.2	22.2
Error	92.6	0.1	19.2	25.2	25.6
Genotype	26.3	1.0	25.3	23.2	21.3
Error	42.1	11.4	19.4	30.4	17.0

Table 15 Regression coefficients and coefficients of determination from stability analysis of seed yields of entries in ACHYAN in eleven environments between 1986 and 1989.

Varieties	b Value	R ²
Black Dussia	0.89	0.87
Red Wabunda	0.84	0.90
TYA 1272	0.96	0.88
G 13673	1.20	0.87
G 2616	0.83	0.87
T 9	0.98	0.84
T 23	1.13	0.91
Kabandira	1.15	0.93
K 20	1.19	0.80
ZPV 293	1.08	0.90
Caricaa	1.05	0.70
Mbala local	0.81 [†]	0.92
Orubonobono	1.04	0.91
Orundo	0.98	0.89
Salina	1.01	0.85
Ribona 5	1.02 [†]	0.94
Kalyamukwo	0.85	0.82
A 197	0.81	0.90
Baba do Kyanda	0.86	0.89
Puhanga	0.84	0.92
FYA 360	0.92	0.92
FYA 363	0.99	0.98
G 12470	1.05	0.88

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 9 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, enclosing 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, 1989. A copy of the cv and proposal should be sent simultaneously to : Dr. Martin Kyomo, Director, SACCAK, Private Bag 00166, Gaborone, Botswana. Applications should be accompanied by a recent C.V. and the names/addresses of three professional referees.

Annexure 1: A Summary of Recommendations from the Intercountry Research Entomological Working Group Meeting

The meeting was attended by Entomologists from Thailand, Malaysia, Cambodia, Uganda, Kenya, Germany, Tanzania, Zambia, Zimbabwe, and Swaziland. Country reports highlighted the entomological constraints to bean production in the different countries. Nearly all countries noted *A. gossypii* to be the principal pest of bean crops. The status of other pests, esp. *D. fabae* spp., *D. fabae* spp. complex, etc. varied across countries. The meeting therefore recommended that country-specific research networks be set up across the regions (mainly in term of key bean pests and suitable to tackle their problem severity and proposed areas of emphasis) to research on the different pests.

1. Aphids

The meeting observed that aphids, per se may not cause direct production losses but may do so indirectly through the transmission of *BPPV*. The meeting therefore approved of the formation of laboratory research sub-project on "Aphids and the role of *BPPV* spread" and recommended that emphasis be placed on:

- a) species composition of aphids to bean crops and their population dynamics in relation to *BPPV* incidence;
- b) determining the vector of aphid vectors of *BPPV*;
- c) assessment of losses directly due to aphids and indirectly through *BPPV* since 1994;
- d) to generate basic information on *BPPV* epidemiology in relation to aphid activity.

Participating countries in this network are Zambia, Malawi, Tanzania with Burundi, Kenya and Uganda as observers.

2. Weevils

The meeting observed that work at field on host plant resistance to weevils has very much advanced and there is no need to build consensus for weevils of resistance in the region. The meeting supported the set up of the proposed sub-project on "Resistance and recommendation that it should be carried with care and scope, since resistance and control of weevils are not *Orthoptera*.

The general line was to request that "biological research should focus on:

- a) species distribution;
- b) impact of weevils for crop production and losses due to be related to the number of crops systems;
- c) the impact of crop management control measures.

based on material assembled from 1964.

The cooperation contracts in the bilateral, bilateral, and
Zimbabwe, Somalia, Ethiopia, Tanzania, Rwanda, Congo and
Liberia.

2. Beauty

The meeting recognised beauty as the principal objective of
of beauty in art and recommended that the following areas be
emphasised in research on beauty:

- i. Distribution, spectral composition and population dynamics of
beauty and perception associated with them. Research
should particularly involve selection of diverse ways to
- ii. Identification of sources and mechanisms of aesthetic
contribution between 1964 and 1972.
- iii. Methods, measurement of beauty due to beauty. It was
suggested that this be developed as a pilot study to develop
process perhaps in collaboration with the IAEA for the
development of standards for beauty in future to come (1972).

3. Other Recommendations

- Research on cultural tradition of beauty as well as on
other people such as, art, poetry, music and painting should be
undertaken directly by national programmes with support from the
Regional Programme.

- Effort should be made to develop linkage between the world
forum and also with other specialised institutions of
expertise both within and outside the region.

- Funding support for short term training and consultancy needs
for subproject should be made annually from the approved sub-
project grants.

- Another meeting should be convened after 2-3 years to review
progress made.

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2. of mutual and basic and development of science and technology in the primary and secondary sectors and the education of agriculture, forestry and professions	0011110
Chairman: First phase of IDA/UNEP co-operation review	001
Chair: Meeting to give both economic and scientific assistance	00111111
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December, 1979

Program for Community Development
Project # 100-1000

100-1000-100

Community Development Program
Project # 100-1000-100

100-1000

APPENDIX 7

SADCC/CIAT NEMATODOLOGY 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 *Phascolus rotundus* lines reported as showing "resistance" to *Heterodoyne* 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 had been made available to date from this source). Samples have been procured.

Some necessary equipment has been purchased, some research outstanding. Funding allocated for sampling remains necessary for several months yet unapplied.

Dr. D. G. G. G.
Nematology Unit, CIAT, P. O. Box 548
Dar es Salaam

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

12829
22 SET. 1993

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 (Otanés & 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. coccineus*), 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 to date 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. coccineus*.

(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, sites 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. coccineus* 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	<u>15,000.00</u>

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22 SET. 1993

TITLE: SAUCE/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 resource 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 important and so intercropping becomes important for large-scale agricultural producers as well.

It is consensus that intercropping with a legume has established and speculated advantages such as higher grain yields, greater land use efficiency 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 hectareage was sown to mixture of crops and that 99% of all pulse production was in various forms of intercropping.

Intercropping is the simultaneous growing of two or more crops in the same field at the same time. This involves 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 relationships 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 al. (1974) observed that roots of coconuts, cacao, cinnamon, and pineapple in mixed intercropping systems of Southern India occupy different soil volumes. Studies with crops and weeds (Pavlychenko, 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. Trowse (1975) reported that corn and soybean roots developed freely near each other 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 al., 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 efficient 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 improve the nutritional diet of the farm family?

These questions cannot be answered by extrapolating our knowledge on production of single crops. The interactions 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 question.

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 information would include compatibility of different bean genotypes with maize, planting geometry of bean in the system, optimal N levels, decrease in labour demand, increase of farm income, 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 medium and long term solutions to maximizing the production efficiency 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 relative to the Maize. The recommendation 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 foreseeable future. It would also be possible quantitative and qualitative 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 genotypes suitable 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 recommendation package against farmers practice in a number of locations. At this stage an assessment of any labour use efficiency, 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 5 treatments: three climbing bean varieties (including a promising local landrace of the country) by three maize varieties, local maize, an improved composite and a hybrid. Spacing would be 80cm x 50 in the same hole. Each plot will consist 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 following 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 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.

22
The following 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

	<u>1st Year</u>	<u>2nd Year</u>	<u>3rd Year</u>
	<u>US Dollars</u>		
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
<u>TRANSPORT</u> 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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REVISED PROPOSAL FOR SUB PROJECT NETWORK
ON BEAN APHIDS AND THEIR MANAGEMENT
WITH REFERENCE TO BCMV IN SADC 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.

- X -----
- NETWORK SCIENTISTS:
-
1. - S. Sithanathan - Legume Entomologist
1
2. - P.H. Sogati - Legume Entomologist
3. - J. Kannaiyan - Legume Pathologist
4. - H.C. Hachiwa - Legume Pathologist
- (Food Legume Research Team, Msekera Regional Research Station, Box 510089, Chipata)
- b) MALAWI:

5. - L.M. Kantiki - Bean Entomologist
- (Banda College of Agriculture, P.O. Box 219, Lilongwe)
- c) TANZANIA:

6. - D. Kabunga - Entomologist
- (Uyole Agricultural Centre, Box 400, Mbeya)
- COLLABORATION:
-
7. - A. Autrique - Entomologist (Aphid identification consultant)
- (ISARU, B.P. 795, Bujumbura)
- b) OPEN FOR OTHER SCIENTISTS
- X -----

NATIONALE:

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 SADC 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 SADC region. It can play an important role in the spread of the BCMV disease, which affects beans in several areas of SADC, 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 SADC 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 SADC 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), Halbert et al. (1981), Schultz, et al. (1985), Irwin (Irwin and) (1986), Irwin and Irwin (1986), Thresh (1986, 1987) and Goodrich and Irwin (1988). An IADP document on the ecology of African aphids (Gemeahere and Dubreque, 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) To 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 (contestation)			
a) Trap Monitoring	89-92	89-92	89-92
b) Bail plants monitoring	89-91	--	--
c) BCMV build up in normal /late planting	89-91	89-91	89-91
3. Other Aspects of Aphids-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 the work within the country concerned. Assistance for identification of aphids for the first year would be provided by Dr. A. Sautrique (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 m 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 the source of work as general, and as specific to the field, crop, etc. is furnished in annexure 1.

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 "aphid-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 disease free 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 observation study.

The main sites for the study will be as below:

- Zambia - Chipata (Mwelewa)
- Malawi - Lilongwe (Rood)
- Tanzania - Dweya (Nyala)

Additional sites, for each country, can be included, with contrasting ecologies, depending on the resources of the national program 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 to 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 least 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 seed 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 Perten (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	Early	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 4 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 2-4 weeks difference. The management practices - fertiliser, 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 separated 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 consist 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)

Side treatments:

- T 1 - No fertiliser
- T 2 - 200g D compound/ha (20N, 40P, 20K and 20S - kg/ha)

The subplots shall be of 6 rows (50 cm spaces). This trial will have all other management practices as recommended, and to try a variety which is moderately susceptible to BCMV.

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

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APPENDIX I

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

AMOUNT IN US DOLLARS

	ZAM	MAL	TAN	TOTAL
1. DURABLE EQUIPMENT:				
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	500	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

25/7/92

APPENDIX 11

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. <u>DURABLE EQUIPMENT:</u>								
Net house materials- cages/plastic pots accessories	1000	500	500	2000	1000	500	500	2000
2. <u>EXPENDABLE EQUIPMENT:</u>								
Traps/fieldsupplies/ Lab. reagents/vials	2000	1000	1000	4000	2000	1000	1000	4000
3. <u>LABOUR/ASSISTANCE:</u>								
Skilled/daily rated assistance in field/ net house studies	2000	1000	1000	4000	2000	1000	1000	4000
4. <u>TRAVEL/SUBSISTANCE:</u>								
a) for subproject staff for survey/visits	2000	1000	1000	4000	2000	1000	1000	4000
5. <u>ADMINISTRATIVE:</u>								
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 stages:
If intercrop mention 2 Plant stand/m^2:
main crops 3
Variety Fertiliser applied:
Climbing/Erect Pesticide used:

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

Table with 10 columns: PLANT No., APHID, BCMV, PLANT No., APHID, BCMV, PLANT No., APHID, BCMV. Rows 1-10.

IV. APHID NATURAL ENEMY INCIDENCE (ORBIT 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 Flower beetles
- " - lodged " Red borers
- Detritivores (Gnats) Red bugs
- " (Others) Others ... (specify)
- Flower thrips

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

- ALS DISEASES
-
- B. W. WEEDS
-
- Other Weeds
-

FIRST DRAFT OF PROPOSAL
GRADUATE TRAINING COURSE
IN
CROPPING SYSTEMS WITH BEANS

ARUSHA, TANZANIA
21 May - 15 June, 1990

The SADC/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 exercises 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. Calendar 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 unforeseen 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.

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 entomologists, 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

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.

Materials/Facilities to be arranged for the Training Workshops

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, EOH, mountants

Illustrations/Information: (Dr. A. Aubrique)

- 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.

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

- Airfare (excursion fare) Bujumbura - Nairobi - Lilongwe - Nairobi Bujumbura (approx.)	US\$ 490.00
- Boarding/Lodging for 5 nights at Lilongwe US \$ 60 per night	300.00
- Incidental expenses - 2 nights at Nairobi plus out of pocket expenses for 5 nights	210.00

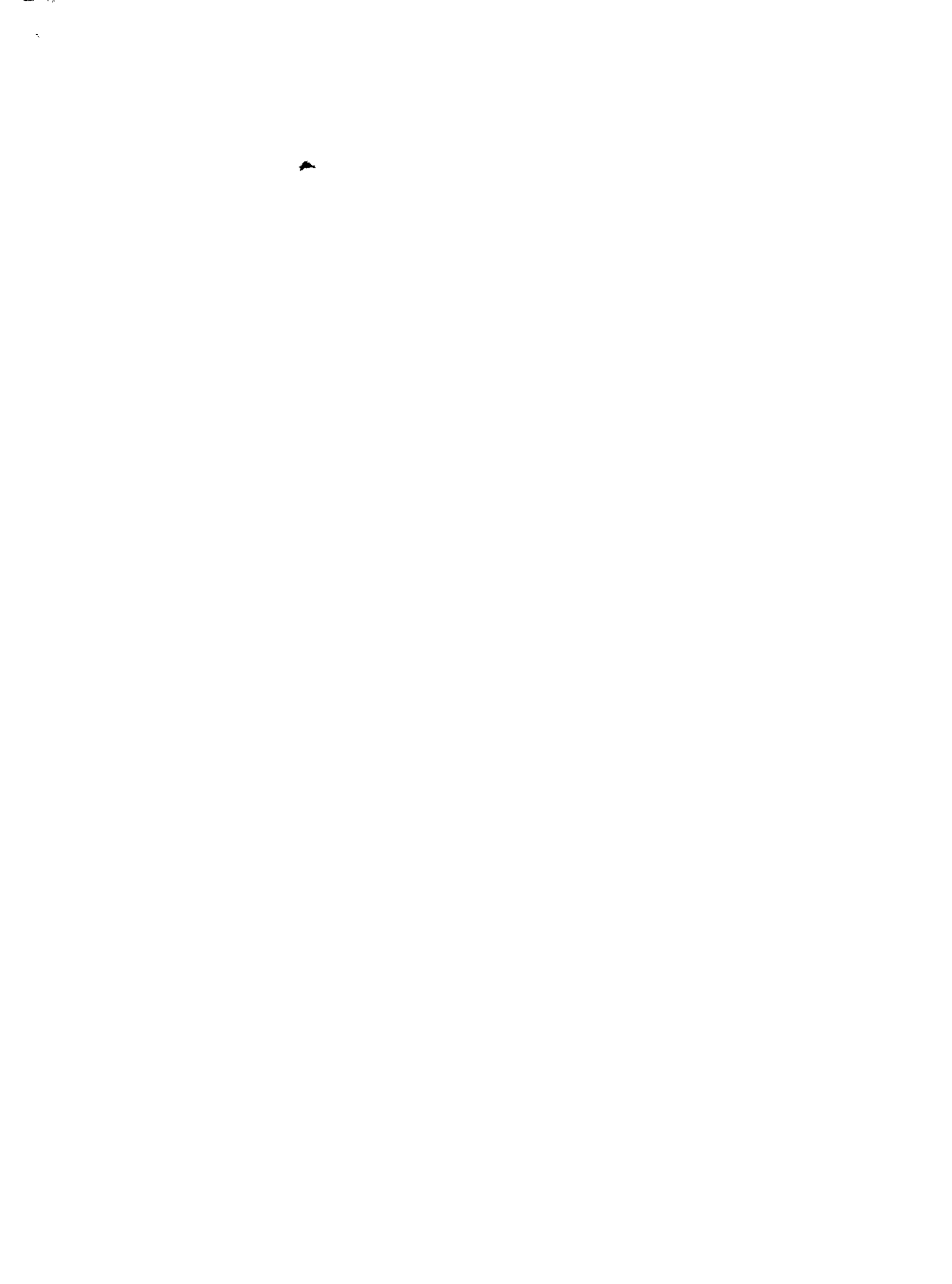
Total USD\$	1.000.00

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

- Travel for 3 Tanzanian participants by road at	US\$ 600.00
- Travel for 5 Zambian participants - fuel costs	100.00
- Boarding/Lodging for participants for 5 nights US \$ 300 per person (excludes 2 local participants)	2.700.00
- Out of pocket allowances for 11 participants for 5 nights (at 10 US\$ per night)	550.00
- Local expenses - (transport/stationary/ communication/ other training materials)	1.050.00

TOTAL US\$	5.000.00

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



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 polyviruses possibly distinct from BCMV are also occasionally found in natural infections.

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.

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

INVITEES FROM NATIONAL PROGRAMMES :

Dr. Samson Owera	Uganda
Dr. Yusuf Abdulrazak	Ethiopia
Mr. Michael Ogunyin	Kenya
Prof. Allan Femi Lana	Tanzania
Mrs. Olivia Venge-Mukoko	Zimbabwe
Ms. Patricia Ngwira	Malawi
Mr. Coy Hachiwa	Zambia
Mr. B. Motlalo	Botswana
Mr. James M. Theuri	Kenya
Dr. Therese 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 Wellesbourne, U.K.
* Self Supporting.	

DJA
June, 1969.

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 - Kayunga. Briefing by DADO on Karagwe District. Visit TARO-Kituntu. Kayunga - 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 Kwerere; 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)

