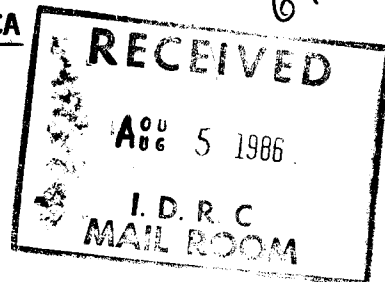


PROGRESS AND PROSPECTS ON INTEGRATED PEST MANAGEMENT
OF CASSAVA GREEN MITES IN EASTERN AFRICA

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7-029



1. Introduction

Most of the participants present at this meeting also contributed to the previous regional workshop on this topic, in Nairobi two years ago (Greathead et al, 1984). Perhaps we should start this meeting by reviewing the implementation of the concluding recommendations made on that occasion. Before I attempt to do that, however, let us remind ourselves that the management of cassava pests in this region has become further complicated during the intervening two years by the arrival of the cassava mealybug. The first report of mealybug in Eastern Africa was from Gisenyi, western Rwanda, late in 1984; infestations were found in Malawi and in Mozambique in 1985. This predicted spread of mealybug from West Africa now makes the target pest complex in Eastern and Southern Africa similar to that of other cassava-growing areas of the continent.

The four concluding recommendations of the 1984 workshop were: firstly, to initiate a program of collaborative research among countries and institutions in Eastern Africa; secondly, to introduce integrated pest management principles for controlling cassava green mite through crop loss assessments for planning purposes, identification and release of resistant varieties of cassava, and implementation of biological control using phytoseiid mites from South America; thirdly, to intensify training in IPM for national programs staff; and finally, to develop effective cooperation between the two principal international research institutions involved in cassava pest biocontrol in Africa (the Commonwealth Institute of Biological Control, CIBC, and the International Institute of Tropical Agriculture, IITA) in such a way that their activities would become more responsive to the needs of national programs in this field.

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2. Progress on Cassava Integrated Pest Management

I will now review briefly what I perceive to have been progress made on implementing each of the first three recommendations; the final recommendation will be discussed under future prospects.

a) Regional Collaborative Research

In view of the very wide range in the agroecology of cassava production in Eastern Africa, from sealevel to 2000 metres elevation and from semi-arid to humid rainfall regimes, some national programs were encountering difficulty in ascribing priorities for the use of very scarce resources on improving this extensively grown crop. In addition, some national programs reported difficulty in persuading administrators and policy makers of the severity of the cassava pest situation and of the consequent need for action-oriented research. Each of the six countries represented at the 1984 meeting (Burundi, Kenya, Malawi, Rwanda, Tanzania including Zanzibar, and Uganda) agreed to conduct a uniform set of cassava yield loss field trials, which were planned in detail during that workshop. CIBC agreed to provide coordination and technical backup functions, through regular visits from their base at the Kenya Agricultural Research Institute and by collating results across the region so as to obtain better information on environmental effects that could be readily achieved by a national program working in isolation.

From my own observations of these trials in several countries, it is clear that there are indeed considerable differences in infestation levels and in yield losses within the region. One of the specific functions of this second workshop is to assess collaboratively this series of trials that have been conducted in the field on a country-by-country basis.

b) Other Components of Integrated Pest Management

(i) Cassava Varieties Resistant to Green Mite

Most national cassava improvement programs are now taking observations on severity of green mite damage to leaves, as one among several important criteria for selection of new varieties. The Rwanda national program, in collaboration with IITA's regional coordinator for cassava improvement, is giving particular emphasis to the introduction and screening of exotic germplasm mostly from IITA, for adaptation and green mites resistance at medium and high elevation sites. The Kenya program at Msabaha Coastal Research Station, on the other hand, is complementing this by assembling a large collection of local varieties, which are being evaluated in collaboration with CIBC. Additionally, the regional yield loss trials will have produced comparative information on susceptibility of a few local and exotic varieties.

Later during this workshop it will be important to assess whether sufficient progress is being made in the area of genetic resistance or tolerance to pests, while bearing in mind always that other varietal characteristics are also very important to the producer and consumer of cassava. How close are we in each country to releasing good new varieties that combine these desirable characteristics?

Work has also started in Rwanda to assess cassava materials for resistance to the mealybug, for which purpose a new trial site has been established by the national program near Gisenyi. These results will be of compelling interest to other countries facing this new pest for the first time.

(ii) Biocontrol

As a result of official requests from several countries during the past two years, releases of introduced natural enemies onto farmers' fields have been made in five countries. Phytoseiid predatory mites have been introduced for cassava green mite control in Burundi, Kenya, Rwanda and Zambia, while the parasitic wasp Epidinocarsis lopezi has been used against cassava mealybug in Malawi, Rwanda and

Zambia. Releases have been made in each case as a joint exercise between staff of the national programs and of CIBC and/or IITA.

Whether these releases should be considered experimented or operational is beside the point, since the early stages of a biocontrol release program always require monitoring for followup activities or amendments to procedures. For our workshop it is important to note that certain limitations to the immediate effectiveness of the present biocontrol programs in Africa are becoming evident. This should come as a surprise only to those who may have seen biocontrol as an easy, quick remedy, whereas biocontrol can be expected to show similar basic characteristics to other new agricultural technology in requiring to be adapted to local conditions. In this instance, apparent limitations are being imposed by the slow establishment and dispersal behaviour after release of phytoseiid predatory mites against green mite, and reportedly in Senegal by poor adaptation of E. lopezi to local environmental conditions.

We can now appreciate the foresight of the Africa-wide Biological Control Project coordinated by IITA, which commissioned renewed searches for biocontrol agents in other cassava growing areas of South America that might better represent ecologically the range of conditions under which this crop is grown in Africa. As a result, a large number of new species have been assembled and screened for potential biocontrol efficacy (e.g. fecundity and life cycle duration at a controlled range of temperatures, and host range) in the laboratory at the International Centre for Tropical Agriculture (CIAT) in Colombia. About a dozen new species of phytoseiid predatory mites, specific to feeding on plant-feeding mites, are now ready for airfreighting to CIBC's quarantine facilities in London. From there, they are sent to IITA for supply to national programs and/or for intermediate multiplication at CIBC's new rearing laboratories in Kenya for subsequent use by Eastern African countries.

I believe that my comments two years ago on the need for a cropping systems perspective to cassava IPM (Kirkby, 1984) are still valid. More consistent application of this approach now would enable us either to anticipate or to overcome more quickly whatever limitations in effectiveness may occur with the present biocontrol procedures. In particular, we need to monitor the releases of

biocontrol agents in a way that allows us to understand where and why they are most effective: which aspects of the physical environment or of the cropping systems (planting date, intercropping pattern, crop canopy, weeding practices, etc) are effecting establishment and dispersal behaviour on farmers' fields? How much monitoring is required in the immediate future, and how should the information be collated and made available to all who need it?

(iii) Training

Much has happened in this area, with specific training courses on cassava biocontrol at IITA in Nigeria and a more intensive course on the principles and practice of biocontrol at CIBC in Kenya. Complementary regional training has been available this year in insect taxonomy, an area crucial to correct identification of pests and to effective monitoring of biocontrol releases, from the National Museums of Kenya in conjunction with the Commonwealth Institute of Entomology.

Several entomologists from national cassava improvement programs in Eastern Africa are now working towards postgraduate degrees on different aspects of cassava pest IPM, either through IITA or through the International Centre for Insect Physiology and Ecology (ICIPE) in Nairobi, which receives funds for this purpose under the Africa-wide Biological Control Project.

Informal training on-the-job has also become an important function of regional program staff, in support of formal training courses.

3. Institutionalization of Cassava IPM

As cassava IPM reaches its operational phase, concerns have grown over its effective institutionalization within countries. At least three issues can be raised here:

a) Centralized or national facilities

Considerable discussion has taken place among proposers and donors of the Africa-wide Biological Control Project on the desired degree of decentralization of facilities and operations. From an original proposal for fully centralized

mass rearing of biocontrol agents in Nigeria and their dissemination from centrally-operated aircraft, the consensus now is that more sustainable progress can be made by developing in all aspects the capabilities of national programs. Aircraft may perhaps be necessary only for reaching very large and isolated areas or for urgent treatment of the most severely affected areas.

The selection of the appropriate strategy has implications for rearing and release to techniques as well as for the type of funding support needed. National-level rearing requires the development of relatively simple, inexpensive rearing units and the staff training necessary to operate these units and to monitor the releases. Some work has already been started in both areas, but more is probably required. International support for assisting these operations can come through bilateral projects, such as that supported by IFAD in Zambia. IDRC has added a biocontrol component this year to the new phases of bilateral projects for cassava improvement in Rwanda and Zanzibar, complementing an earlier and continuing project of this type in Uganda.

b) International and National Priorities

International support for cassava pests biocontrol, while being less than requested by international technical organizations, has been relatively good at a time of many competing demands. This may reflect a changed perception of a crop, such as cassava, that is generally grown and consumed by poorer people in Africa.

It is less clear whether all governments within the region also perceive this problem to be a priority. There was an active debate at the recent donors' meeting of the Africa-wide Biological Control Project as to the usefulness of supporting proposed project activities in two of the largest cassava producers, Angola and Tanzania, in view of situations in those countries that are sometimes seen as structural limitations to agricultural development.

In this context I cannot help noticing that mainland Tanzania is once again unable to send an entomologist to accompany their very able cassava breeder to this meeting. In such circumstances of manpower limitations, would a more centralized approach to biocontrol be more appropriate?

c) National Organization of Biocontrol Operations

Another debate within the Africa-wide Biological Control Project concerns the selection of the preferred type of national organization that can be encouraged and supported to develop a local capability in biocontrol work. The normal choice would be between a national plant protection service or department within the Ministry of Agriculture, and a national cassava improvement program or section within the agricultural research organization.

This choice is one that clearly should be taken in each instance by national policy makers, and is unlikely to lead to the same result in every country. The national decision should be an informed one, however, and I would suggest that national participants to this workshop attempt to appraise relevant authorities of the implications.

The two alternatives offer different potential advantages: development of cassava biocontrol capability within a plant protection service is likely to facilitate the implementation of biocontrol of another crop pest in the future; on the other hand, a cassava improvement program is likely to be better staffed to develop complementary IPM strategies. Either alternative is likely to require a non-conventional role for the organization selected, because of the "action research" nature of initial biocontrol operations.

4. Future Prospects for Cassava IPM in Eastern Africa

The Africa-wide Biological Control Project has developed and evolved considerably during the past two years. It appears to me, however, that an Eastern Africa base is more than ever necessary if decentralization forms of support are to be offered in a responsive manner to national programs of this region. As this workshop brings to an end another phase of support from IDRC for cassava green mite biological research through CIBC in Eastern Africa, I should like to take the opportunity offered by the workshop to discuss with you the proposed continuation phase.

CIBC is proposing a US \$225,000 operational budget for 18 months of regional support in three areas. This proposal has been carefully discussed and agreed in principle with the Africa-wide Biological Control Project, so as to ensure full collaboration between CIBC, IITA and other international institutions such as ICIPE. The three specific objectives of the new phase would be as follows:

a) to assist the development of national programs capacity:

- up to 9 national programs of Eastern and Southern Africa would benefit;
- a minimum set of rearing and monitoring equipment would be offered to those countries not already scheduled to benefit from the Africa-wide Biological Control project or from bilateral projects;
- a more intensive program of regional technical visits will aim to provide trouble-shooting and on-the-job training;
- a scheme for visiting Scientists will make provision for six entomologists to spend up to three months each at CIBC regional laboratories to learn new techniques and exchange experiences.

b) to ensure an adequate supply of predators to national programs:

- five new phytoseiid predators of green mite, now ready for shipment from South America, will be mass reared by CIBC in Kenya;
- a starter colony of predators and simply rearing equipment will be offered to all national programs of the region that wish to take responsibility for their own rearing and release (large-scale releases will continue to be made, upon request, directly from IITA, Nigeria).

c) to develop appropriate technology for the local production and distribution of predators:

- simple rearing cages suitable for operation by national programs will be developed in collaboration with IITA and tested with national programs;
- work with national programs in assessing alternative release strategies that may improve rates of predator establishment and dispersal;
- provide limited funding support to national programs for action research carried out in a collaborative manner.

The above outline has been favourably received by IDRC, but your views on this proposal are sought. If you are in agreement, we would suggest that time be allocated during this workshop to discuss the collaborative aspects of implementation, to ensure that national program needs are being met. While I can make no guarantees at this stage, the proposal is scheduled to be presented to IDRC's Board of Governors in June and, if approved, could start in July 1986. Its completion date is deliberately intended to coincide with that of the present phase of the Africa-wide Biological Control Project, to facilitate merging of activities in Eastern and West Africa. IDRC is unlikely, however, to continue funding this work beyond 1987; its support to CIBC for this project since 1974 is considered seed money enough!

You are all aware also of the IITA regional program in cassava improvement, coordinated by Dr. Alvarez from Rwanda. A new phase of this project is also currently under discussion with IDRC, and would be based on the planning workshop of national cassava improvement program leaders, held in Lilongwe in December 1985 (most of whom are present at this meeting, of course). The proposed new phase will also introduce a collaborative research work, involving most of the same countries involved in biocontrol. Your active participation in planning and implementing both projects should ensure their effective integration for IPM.

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