

IPVM *in Africa*

Perceptions of ICIPE's Training Programme in IPVM in Africa

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The International Centre of
Insect Physiology and Ecology



African Research Postgraduate
Programme in Insect Science

IVPM in Africa

Impact of the ICIPE's Training Programme on Capacity Building in Integrated Pest and Vector Management in Africa

**Perceptions of NARS,
African Universities and
Participants**

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**IMPACT OF THE ICIPE'S TRAINING
PROGRAMME ON HUMAN CAPACITY
BUILDING IN INTEGRATED PEST
AND VECTOR MANAGEMENT (IPVM)
IN AFRICA**

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AFRICAN UNIVERSITIES AND
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Development of the human capital for science and technology in Africa is now a priority of priorities if African agriculture is to achieve its targeted output growth of 4% a year over the medium and long run. Technical assistance by itself in Africa has failed, over the last quarter century, to create the necessary conditions for sustainable agriculture in Africa (Odhiambo, 1987). New technologies can only be developed through the building up of a scientific and technological capacity in the coming decade for four critical purposes:

- (i) to create a knowledge-discovering capacity, particularly for the tropical environment in Africa;
- (ii) to develop the ability to identify priority problems of national development requiring scientific and technological solutions;
- (iii) to promote indigenous ability to choose between alternative technological pathways to the solution of these problems; and
- (iv) to create the national expertise required to implement the relevant solutions, whether the technologies are indigenous or modified from foreign technologies already in the market (Odhiambo, 1980).

These factors are also relevant to developing human resources for the preparation, validation and implementation of IPVM programmes for different environments, cropping systems and socio-economic conditions.

1. NEED FOR DEVELOPMENT OF AN INDIGENOUS SCIENTIFIC AND TECHNOLOGICAL CAPABILITY FOR IPVM

Pests and diseases cause heavy pre-harvest and post-harvest losses in Africa ranging from 10% up to 80%. To reduce these losses in future, there will be an increasing demand for chemical pest- and disease-control materials, much of which has undesirable environmental effects. Planned pest control programmes, using limited quantities of pesticides but increasingly relying on cultural and biological control, are therefore necessary.

Only highly qualified researchers and practitioners can provide extension workers and farmers with new information, efficacious technology, and ecologically acceptable and sustainable integrated pest and vector management systems. The new IPVM systems should be completely consonant with Africans' traditional knowledge base and socio-cultural frameworks, and yet they must lead to enhanced production of crops and livestock and reduce the hazards caused by medical vectors (Odhiambo, 1989).

Our questionnaire, distributed to six selected countries, confirms the actual shortage of qualified staff working on crop pests and vectors in the agricultural research systems in Africa (Table 1).

In the past there were few opportunities for human resource development in IPVM in Africa. The majority of M.Sc. and Ph.D. students were sent to developed countries, following a general trend in the donor policy for advanced education and training. This trend is no longer valid for many disciplines. As a UNDP/IBRD (World Bank) technical mission found out in 1985, donors were collectively spending US\$ 100 million a year in Somalia to support 1,200 foreign technical assistance personnel and on the training of Somali nationals in America and Europe. This model of technical assistance of using expatriate advisors and training in environments unrelated to national problems, is reported to have had no effect on the development of the national capacity of Somalia, nor does it address the long-term need for developing national institutions (The World Bank, 1989).

On the other side, the World Bank is reporting that agricultural institutions in most African countries are presently providing inadequate training to students. After graduation students usually prefer to join the public service rather than to become farmers. Jobs in the private agricultural sector are scarce. The costs of training are high and the training itself is often too broad and theoretical. For example, universities in the Sahel (Burkina Faso, Mali, Niger and Senegal) provide a 4-5 year training programme with 3 or 4 options: agriculture, forestry, animal husbandry or veterinary sciences.

In the overall training of the specialisation in agriculture, crop protection disciplines are only one of the many subjects taught. Some specific knowledge of one aspect of crop protection may be obtained during a short practical training period. Most of the staff of extension services, crop protection services, and research and training centres dealing with crop protection have received such general training. A specialisation in crop protection can only be obtained outside the Sahelian zone (Van Huis et al., 1987).

2. THE ICIPE MODEL OF CAPACITY BUILDING

The ICIPE, since its inception in 1970, has continuously been working on establishing an alternative capacity-building model based on training in a proper environment. This is done in partnership with African universities (as well as with universities in the developed countries) and by networking with national research institutions. It is based on the utilisation of indigenous resources to train scientists within the environment of the developing countries on pest problems of the tropics. An important feature of the model is the association of the scholars throughout their training period with both extension workers and farmers.

As a Centre of Excellence, the ICIPE contributes to the African development effort in two ways, through (i) research and (ii) training in the management of major insect pests of crops and vectors of both human and livestock diseases. The ICIPE's goal in research is to develop an integrated management system, clearly understanding that this technology system is a containment, long-term measure rather than a pest or vector eradication measure.

The ICIPE's training and educational philosophy is based on the premise that, ultimately, Africans themselves must provide the solutions to the challenges of economic development, and specifically to problems posed by insect pests and human and livestock disease vectors. It is for this reason that for the past twenty years, the ICIPE has occupied a frontline position in the development of capacities in insect science leadership and practice. Training and education programmes at the ICIPE are tailored to suit the needs of national agricultural research and extension systems (NARS), universities and resource-poor rural communities. The following are ICIPE's current education and training thrusts: (i) Ph.D. degree (leadership) training, (ii) non-degree training, (iii) professional development schemes, and (iv) interactive on-site (applied research) training. These programmes have been planned and established in partnership with the users both in identifying the needs of the people and in developing programme activities.

2.1 Leadership Training Through the African Regional Postgraduate Programme in Insect Science (ARPPIS)

ICIPE, currently together with 22 African universities, have established the African Regional Postgraduate Programme in Insect Science (ARPPIS) a three-year Ph.D. training programme in insect science and related areas. Begun in 1983, it is a programme in which scholars register for a Ph.D. degree at an ARPPIS Participating University but continue working at the ICIPE. In the past, 8-10 students joined the ARPPIS programme each year, but more recently the enrollment has increased to 15. From 1983 to 1991, 86 students from 18 African countries registered in the ARPPIS Programme (Fig. 1).

The students undertake a six-months' programme of coursework which is examined and which assures that the students, who come from a wide background of disciplines, achieve a reasonable understanding of subjects relevant to insect science. Research projects on the biology, ecology, physiology and behaviour of insect pests and vectors that attack man, his crops or livestock in Africa are undertaken and supervised at the ICIPE (Table 2).

The success of ARPPIS in building scientific leadership in Africa is demonstrated by four major accomplishments:

Of the 48 Ph.D. scholars who completed the course by March 1991, all are working in Africa; thirty ARPPIS graduates have been awarded their Ph.D. degree from the Participating Universities; 8 have submitted their theses and are waiting to defend their work; and 10 are finalising their theses prior to submission.

Indeed, a critical mass of well-trained scientists is being created. All ten students registered for the M.Phil. in Biological Control at the Rivers State University of Science and Technology, Port Harcourt, Nigeria have been awarded the M.Phil. degree. This programme was supported by the IITA Africa-wide Biological Control Project.

As an expansion of ARPPIS and to improve its impetus, the universities collaborating with the ICIPE are forming four Sub-Regional Centres to assist groups of universities offering the M.Sc. in Insect Science.

ARPPIS is an effective Africa-wide network and it is currently seeking financial resources for a Postdoctoral Award Scheme to support its graduates with aid for scientific travel, research or teaching materials, and preparation of manuscripts for publication. Grants are needed for this scheme which is a sure way of stemming the brain-drain from Africa.

2.2 Non-Degree Training

The short practitioner courses provide training in specialised areas of insect science for which the ICIPE has expertise. They present up-to-date knowledge and practical experience in field and laboratory, and in research and IPVM technology development and implementation. A proportion of places in the courses is offered to past ICIPE graduate students to sustain and encourage their commitment to research.

Since 1977, the ICIPE has provided training to 534 practitioners from Africa and the tropical developing world. The majority of courses organised between 1987-1991 were on integrated pest and vector management; 188 practitioners and scientists from 17 developing countries have attended the ICIPE courses (Table 3). The courses, consisting of lectures, laboratory, field practicals, and field excursions, are given by ICIPE staff and collaborating institutions (ILRAD, African universities, European universities, national agricultural and veterinary research institutes). Course programmes include seminars and lectures given by trainees to build up their experience as future trainers in their national programmes. The list of courses on pest and vector management given at the ICIPE is given in Table 3.

2.3 Professional Development Scheme

Postdoctoral research fellowships are offered to young scientists from all over the world to provide an opportunity to work with ICIPE scientists for periods of up to 2-3 years on some of the major insect pests and vectors of Africa, thereby stimulating specialised skills and knowledge of ICIPE's research programmes. A welcome consequence of the scheme is the continuous creation of a world-wide network of future collaborators.

Since 1987, 20 postdoctoral research fellows from twelve countries have worked at the ICIPE: Canada (1), Ghana (2), India (2), Kenya (5), Nigeria (2), Poland (1), Sudan (2), Tanzania (1), Uganda (1), United Kingdom (1), USA (1), Zaire (1). They were attached to the following research programmes and units: Crop Pests (8), Medical Vectors (2), Livestock Ticks (3), Tsetse (2), Chemistry and Biochemistry (3), Cell Biology (1), Sensory Physiology (1), Social Sciences (2). One postdoctoral fellow from India, attached to the Crop Pests Research Programme, has worked on the ICIPE/IRRI collaborative project on rice rollers, based at IRRI, Philippines.

The Research Associate Scheme gives scientists from national research programmes and universities the opportunity to work at the ICIPE for a period of six months. Its objective is to improve the exchange of knowledge and to strengthen inter-African collaboration. Participants are involved in research development and validation of pest and vector management packages.

2.4 Interactive On-site (Applied Research) Training

In this programme, ICIPE researchers and their counterparts within the national agricultural research and extension systems (NARES) work jointly on specific insect pests or vector management problems. The programme is undertaken under the auspices of the Pest Management and Development Network (PESTNET), and aims at promoting interaction and synergism in the search for ecosystem-specific and socio-economic pest management technologies. Since its establishment in 1987, the programme has significantly contributed to strengthening national research capabilities through collaborative research programmes in Somalia, Zambia, Rwanda and Ethiopia. The second phase of the project will establish four operational zones (Eastern, Southern, Central and West-Coastal Africa). Training will be undertaken in IPVM-related disciplines, and in documentation and information. To meet urgent training needs of the PESTNET countries, IBIRU has developed selected courses upgrading the skills of national scientists in IPVM for the next five years. We are aware, however, that pest management is a dynamic system and needs to be revised and up-dated continuously, hence training requirements are assessed periodically and modified according to new developments in IPVM technologies.

3. GROUP TRAINING COURSES - PERCEPTIONS OF DONORS

Only UNEP has made an attempt to systematically follow up UNEP-sponsored trainees in the 1986 and 1987 ICIPE courses in an attempt to assess the quality and utility of the courses and the impact made on IPVM-related national environmental management practices. The short-term objective of the courses "Training for Self-Reliance in Ecological Pest Management in the Tropics (Phase 1 - Africa)", was to provide selected countries in Africa with the capacity to design practical programmes for IPVM which would achieve optimum yields with minimal hazardous effects on human beings, livestock and the agro-ecosystem.

In May 1988, the UNEP commissioned an in-depth evaluation by an independent consultant who visited two countries to interview graduate trainees and also analyse the questionnaire completed immediately at the end of the course, and again after a period of nine to twelve months.

This time lapse allowed for assessing the impact of the course in the countries from which the trainees came (UNEP, 1988).

It has been found that immediately after training, some trainees were able to devise new programmes applying newly gained expertise, although the examples were not very numerous (UNEP, 1988). In terms of management; however, trainees appeared to apply new skills fairly consistently. A significant number of trainees indicated that they had trained co-workers or wider audiences, e.g., in colleges and universities through lectures and short courses.

The UNEP consultant concluded that short-term objectives have been met, in as much as the trainees were imparting information and new skills that gave them the capacity to design practical programmes for IPVM. However, the prospects for achieving the long-term objective of actually designing and implementing such programmes were not so promising because the trainees were not always in an appropriate decision-making position (UNEP, 1988).

The UNEP-supported courses of 1986 and 1987 should be seen as one of a series of similar courses held by the ICIPE, designed to build up the capacity of developing countries in IPVM. In this sense, the courses have made an appropriate contribution to the broad strategy for long-term control of pests and vectors.

4. THE ARPPIS - PERCEPTIONS OF NARS

Dr. C.G. Nderitu, Director, Kenya Agricultural Research Institute (KARI), acknowledged that "more than a dozen indigenous Kenyans who have been through the ARPPIS Programme are teaching at local universities, conducting research in KARI's research centres, sister institutes, government ministries, and are also working in ICIPE."

"Besides the generation of qualified manpower, the project research work conducted by ARPPIS scholars has relevance to the Kenyan situation. Most of the project work is undertaken in Kenya, and it directly or indirectly makes available basic and applied information pertaining to the problem being investigated. For instance, a lot of information on the biology, ecology and control strategies of the cassava green mite, *Monocyclus tanajoa* (Bondar) has been generated and it is very useful in designing future management strategies of this pest. This is just one example of many areas in which ARPPIS scholars have conducted research and we hope more will be done in fields we are currently experiencing problems" (Nderitu, 1991).

There are numerous examples available on how graduates of the first five ARPPIS Classes (1983-87) have made important contributions to innovations in curriculum development in their universities, in redesigning the teaching courses and practicals based on ARPPIS-taught courses, and in research and technology development for IPVM (Table 4). I wish to give only one example: Dr. J.H.P. Nyeko (1983 ARPPIS Class), presently Principal Research Entomologist at the Tsetse Control Department, Uganda, and currently the only specialist with a Ph.D. in vector management in that country. This fact is a major drawback to tsetse control activities in Uganda. Although tsetse control forms a department of its own in the Ministry of Animal Industry and Fisheries, it seriously lacks qualified entomologists. Currently there are 14 B.Sc. graduates working in the department and 3 of these are doing their M.Sc. training in entomology. These scientists are not specialists and they are unable to collect scientific data on the ecology, behaviour, trapping response and the vectorial capacity of the 9 tsetse species found in Uganda. This fact had limited tsetse control activities in the country to insecticide application only. However, Dr. Nyeko has recently used Lancien traps in an experiment for the control of Sleeping Sickness (SS) in the Busoga region.

Dr. Nyeko informed participants in the ARPPIS Graduate Conference that: "On the side of animal trypanosomiasis, we have recently carried out surveys in several districts in the country to determine the disease prevalence and the trypanosome species involved. There has been tremendous improvement in the surveillance, detection and treatment of infections in humans. This has led to significant reductions in human SS cases from over 6700 in 1987 to less than 500 in 1989/1990" (Nyeko, 1991).

The examples cited above and opinions expressed by visitors confirm that the ARPPIS contribution is making an unprecedented contribution to human resource development in insect science, including training for integrated pest and vector management in national research systems in Africa.

5. THE ARPPIS - PERCEPTION OF AFRICAN UNIVERSITIES

ARPPIS is continuously being evaluated by visiting academicians, politicians and donor representatives. Participants of the Seventh General Conference of the Association of Faculties of Agriculture in Africa (AFAA), held in June 1991 in Nairobi, made the following observations on ARPPIS:

"... The Founding Fathers of the Institute (ARPPIS) are commended for their foresight. The research topics made available to the visitors are very relevant to the African situation. The most outstanding research (of the ARPPIS scholars) is that on mosquitoes. The institute seems to be well equipped for the research topics undertaken." Prof. S.C. Achinewhu, Dean, Rivers State University of Science and Technology, Port Harcourt, Nigeria.

Dr. J.L. Tommy, Dean, University of Sierra Leone observed: "... I was extremely fascinated with the remarkable research facilities of the institute and more important, the thought-provoking qualities of the staff and students are deeply involved in a myriad of research activities on worldwide insect problems. Listening to the brief presentation of a few of the students on their research, I was very much pleased with the tenacity and dedication of these young people in their attempt to find answers to tomorrow's insect problems. I was equally thrilled to find a lady at the institute, who is making a major contribution to the role of women in research and development".

"... It was a pleasure for me to visit ICIPE once again, after several years. I was immensely impressed by the development that has taken place, especially the institution of ARPPIS. The ARPPIS Postgraduate Training Programme to Ph.D. degree level, attracting students from all over Africa, is playing a vital role in research capability building, a major prerequisite for high-calibre research in Africa. As Deans of Faculties of Agriculture in Africa, the least we can do is to pledge our unequivocal support and collaboration in ICIPE's efforts. The group of ARPPIS trainees we met looked very happy, contented, enthusiastic and knowledgeable about their respective research projects. One wishes more students could be recruited into the programme to accelerate the achievement of a critical mass of quality researchers to generate new technologies for IPVM". Prof. J.S. Mugerwa, Dean, Makerere University, Uganda.

Dr. O. Onayemi, Coordinator, Food and Nutrition Project, Association of African Universities, Accra, Ghana noted: "I am highly impressed by the research projects of the ARPPIS students and the facilities available at ICIPE. I believe that the institution's objectives will help the "true" development of academic work in Africa and assist in finding solutions to some of the social and academic problems in the continent (affected by brain-drain of academicians)."

"...ARPPIS students are bright, intelligent and apparently deeply motivated. The research projects they have been working on have evident relevance to health and crops. They merit congratulations and encouragement for conducting their research work. This programme should be known by the scientific community, especially in Africa", noted Prof. P. Ndabeneze, Dean, University of Burundi (translation from French).

Professor Moussa Fall, Directeur de l'Ecole Nationale Supérieure d'Agriculture de Thies, Republic du Senegal added that "... ARPPIS activities should be further extended to Francophone countries in West Africa"

Professor K. El Shazly, retired President of AFAA and Dean, University of Alexandria "... was very impressed by the facilities available and at the method of multidisciplinary approach by ARPPIS scholars in solving problems of vector control using biocontrol methods. The standard of research of the few students that I was able to meet, the methodology and the results presented were outstanding. I am worried about the evaluation of their contribution to the research and development in their home countries. I hope some programmes could be devoted toward a follow-up of their activities in their home countries". Finally,

Professor M.L. Firdaway, present AFAA President and Principal, Institut Agronomique et Veterinaire, Hassan II, Rabat, Morocco, summarised the Dean's opinion in the following way: "It is the kind of network formula I would like to see expanded in other fields and disciplines where many universities could join their efforts. Very good facilities, flexibility and quality".

The Third Periodic External Review Team, composed of selected, internationally recognised scientists, managers and representatives of donors reviewing the ICIPE and ARPPIS in February, 1990 stated that they were "... impressed by the quality of research and motivation of the ARPPIS students, and would like to commend ICIPE for having spearheaded this innovative approach for the practical training of applied entomologists for the ever-increasing demand at the national level".

6. THE ARPPIS - PERCEPTION OF PARTICIPANTS

The pest and vector problems of Africa, and of the whole developing world, are peculiar to the countries concerned, and yet so many students go outside the tropics for their degree training. They go to benefit from the knowledge and expertise in specialist departments in overseas universities and because funds are available. These benefits cannot be ignored (Smalley, 1987).

University training is designed to enable students to identify, analyse and discuss a problem, and the processes learnt outside the tropics are equally applicable to problems in the student's home country when the student returns.

Experience has shown that students trained abroad do indeed receive an excellent education and develop a wider outlook on their work than may be achieved from continuous training in a single local university. But developing countries are, rightly, in a hurry to solve their own problems and there is need for more of their young scientists to have the opportunity to gain relevant research experience in their own agricultural and ecological systems.

As Dr. S. Kyamanywa (1983 ARPPIS Class) observed during the first ARPPIS Follow-up Conference organised in December 1990, "the postgraduate training abroad served well but had one in-built disadvantage: those trained in overseas countries found it difficult to re-orient themselves towards the Ugandan (African) needs and priorities. This has had two main impacts. Firstly, the graduates from abroad find themselves more comfortable working in developed countries whose problems are familiar, hence encouraging the brain drain phenomenon. Secondly, the graduates, at the time of their creative growth and innovation, are exposed to principles and problems of developed systems, so that those who come to teach in our universities perpetuate the same principles. Not that the principles are bad; no. They are just not suitable for our situations" (Kyamanywa, 1991).

Dr. J. B. Okeyo-Owuor (1983 Class) went to Somalia as the PESTNET scientist and at the same time, Mr. Ali Nur Duale from Somalia joined the ARPPIS programme (1989 Class). Dr. J.B. Okeyo-Owuor has made the following observations regarding the relevance of ARPPIS to the needs of national progress: "Training is an important investment in agricultural research in Somalia. However, this was done very much at the expense of pest management research. It still remains a challenge that the country should train adequate nationals in this field. Over the past 10 years only 3 entomologists in Somalia have been trained with M.Sc. degrees and the first Ph.D. graduate is yet to come out of the ARPPIS class. The rest of the entomology staff in the country are either young graduates or technicians, yet the challenge is on them to provide thorough research and implement appropriate pest control methods. Thus the expatriates, though they had highly qualified entomologists amongst them, did not leave behind trained local staff, but rather encouraged the staff to continue insecticide screening even though no meaningful reports have been produced over the years. Again, no trained technicians are available in this field. The relevance of training and expertise is an important challenge to pest management in Somalia."

"One would not blame expatriates from abroad for their lack of consistency with Somalia's pest control challenges. Clearly they are in a strange world, having trained in a different environment and they therefore need further training in tropical agriculture, especially pest management techniques and extension. This consumed time, limiting opportunities for training local staff to enable continuity" (Owuor, 1991).

"One question needs to be answered: how can a locally trained expert contribute to these challenges and how does ARPPIS contribute to this? In setting research priorities in an African country like Somalia, a locally trained expert is an obvious choice due to his/her wide indigenous experience and total integration. For a local expert, the concept of "tourism" and inhibitions in traditions and cultures are negated; the local training brings familiarity with pest management problems and ease of selection of relevant research projects. Currently pest management research and technology development requires a totally integrated approach that often eludes foreign expatriates posted to strengthen research programmes in Africa. ARPPIS-trained graduates, all of them Africans and all trained in a typical African atmosphere, are well-poised to meet these challenges. Secondly, because of the rigorous research work and interaction at the national and international level at the ICIPE, the ARPPIS scholars are well-placed to meet these challenges. In terms of training, the time scale for ARPPIS training is appropriate and, throughout the training programme, the trainees meet with a high concentration of scientists, some of whom are former ARPPIS graduates and technicians. The importance of training others at the national level is in-built and becomes a continuous mandate for a local expert from ARPPIS. In Somalia, for instance, training in pest management R&D has over the last two years been a major priority. ARPPIS trains within a limited budget that conditions the potential experts to conduct research within very limited funding resources, characteristic of African research stations. Our experience is that ARPPIS prepares candidates for harsh conditions in selecting research priorities, training and funding, all major limiting factors in a country like Somalia" (Owuor, 1991).

As one of the ARPPIS first group (1983-1986) of graduates, Dr. W.S. Forawi's career started as a lecturer of parasitology and invertebrate zoology, first as a part-time lecturer at the School of Hygiene and Environmental Studies at the University of Khartoum, then as a full-time lecturer at Omdurman Islamic University. Omdurman University is a relatively newly-established University, and had no proper laboratories or research facilities.

At the School of Hygiene and Environmental Studies, Dr. Forawi developed the new curriculum and taught a course on medical entomology and vector management, based on the lecture notes done during her ARPPIS studies and on literature reviews on integrated vector management. For the first time, the course was taught as 'integrated vector management' instead of just 'vector management'.

Dr. Forawi's research in ARPPIS was on leishmaniasis, a real problem in Sudan when she returned. Dr. Forawi has joined the Leishmania Group of the Medical Research Council, Khartoum, working on epidemiology, pathology and characterisation. More work is being done on the pathology and clinical manifestation of the disease, but the work on epidemiology and characterisation is limited due to lack of funds. Grants were offered by some agencies and more grants and collaboration are expected from WHO in 1991 (Forawi, 1991).

ARPPIS graduates re-joining universities bring new ideas in terms of techniques, approaches and skills in modern teaching and research. Dr. I.G. Aniedu (1985 class) summarised the role of ARPPIS training for future university lecturers as follows, "... ARPPIS is influencing the universities, especially those participating ones, to adopt more innovative methods and curricula for their own training programmes. This is so, because the ARPPIS Academic Board is made up mostly of senior academic staff of participating universities. Their experiences on the Board are bound to influence their contribution and decisions in their own institutions. Besides, a good number of the ARPPIS students are colleagues. In this connection, it is gratifying to note that the two Nigerian universities mentioned above, Rivers State University of Science and Technology (RSUST) and Anambra State University of Technology (ASUTECH), are closely associated with ARPPIS and were greatly influenced by it when designing their own programmes."

Professor R. Kumar, who is probably the longest-serving member of the ARPPIS Academic Board, was the Dean of the Postgraduate School and Head of the Department of Biological Sciences at RSUST when the innovative M.Phil. course in Applied Entomology was introduced and affiliated with ARPPIS. Also, Professor R. Ekwuatu, who has been a member of the ARPPIS Academic Board since 1986, was the Dean of the Faculty of Applied Biological Sciences when the Department of Parasitology and Entomology was created, and played a major role in drawing up its academic programmes. "I am proud to say that since my return to ASUTECH after graduating from ARPPIS, I have been pursuing the ideals of this young department with total commitment, strongly convinced that it is the best in Africa. As more and more ARPPIS graduates get involved in university teaching and administration in the future, the role of ARPPIS in influencing curricula of African universities in the training of insect scientists will be more prominent" (Aniedu, 1991).

"One other area in which ARPPIS should play a leading role is tackling the acute shortage of adequate textbooks for the study of entomology in Africa. At present, entomologists in Africa are faced with the choice of either attempting to adapt textbooks written for temperate countries to their local situations or to teach theoretically about tropical entomology. The role of ARPPIS in redeeming this situation could best be played by the proposed ARPPIS Alumni Association or Network. This body should organise seminars and workshops on a regular basis on various aspects of insect science. Small groups of members, according to their interests and areas of specialisation, should be commissioned to produce textbooks from the proceedings of such workshops" (Aniedu, 1991).

DISCUSSION

ARPPIS graduates are confronted with a variety of problems in their capacities as insect scientists or lecturers after returning to their home institutions. More often than not, they are expected to solve problems in fields of knowledge outside their area of specialisation. In most cases they have to accomplish their tasks with minimum resources (Dabrowski, 1991).

The ARPPIS Academic Board has recently approved introduction of a new curriculum for the ARPPIS Ph.D. programme. The new courses should provide students with an array of course offerings that will ensure their receiving a broad background not only in insect science, but also in ancillary courses that interface with insect science (e.g. research and development management; social science and technology development; directed studies in specific areas) (Odhiambo et al., 1991).

To intensify graduate training in Insect Science at the Masters Degree level, the ARPPIS Academic Board approved the establishment of four Sub-Regional Centres at selected universities in Africa. The University of Zimbabwe is planning to start the new programme in 1992 and will admit candidates from Southern Africa. The University of Ghana, Legon, will act as the centre for West Africa (English-speaking countries); Dschang University Centre (Cameroon) for French-speaking Africa and Addis Ababa University (Ethiopia) for Eastern and North-Eastern Africa.

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TABLE 1. SCIENTIFIC STAFF ENGAGED IN RESEARCH ON IPVM OR CROP PESTS AND VECTORS

	Crop Pests					Tsetse					Livestock Ticks				
	Ph.D.	M.Sc.	B.Sc.	S.Tech	Tech	Ph.D.	M.Sc.	B.Sc.	S.Tech	Tech	Ph.D.	M.Sc.	B.Sc.	S. Tech	Tech
Ethiopia	3	6	15	20	25	1	2	-	-	-	-	-	-	-	-
Rwanda	-	-		-	-	-	-	-	-	-	1	-	-	-	-
Somalia	-	1	5	2	2	-	-	-	-	-	-	-	-	-	-
Uganda	2	7	8	-	-	1	1	1	1	-	-	1	2	2	-
Zambia	3	4	3	6	10	1	4	3	-	11	1	3	3	1	15
Zimbabwe	3	7	2	-	6	6	2	7	3	8	-	1	2	1	4

TABLE 2

Attachment of ARPPIS Scholars to ICIPE Research Programmes

Programme /Unit	1983	1984	1985	1986	1987	1988	1989	1990	1991
Crop Pests	3	5	-	7	2	2	7	4	1
Livestock Ticks	2	1	1	-	3	1	1	1	-
Tsetse	1	2	3	1	2	2	-	1	-
Medical Vectors	1	-	2	-	2	3	-	2	-
Chemistry/Bio-chemistry	-	-	1	-	-	-	-	1	4
Sensory Physiology	-	-	-	-	-	1	1	1	2
Termites	1	-	-	-	-	-	-	-	-
Locust	-	-	-	-	-	-	-	3	1
Biological Control	-	-	-	-	-	-	-	1	3
Total	8	8	7	8	9	9	9	14	11

TABLE 3

**ICIPE International Group Training Courses in Pest and
Vector Management 1987 - 1991**

YEAR	COURSE TITLE	COURSE DURATION	NO. OF PARTI-CIPANTS	NO. OF COUNTRIES REPRESENTED
1987	Essential Components for Ecologically Sound Pest and Vector Management Systems	3 weeks	26	10 countries and India
"	Insect Endocrinology	3 weeks	9	Egypt, Ghana, Kenya, Nigeria Sudan, Tanzania
"	Use and Safe Handling of Radioisotopes in Insect Sciences	3 weeks	10	Zambia, Uganda Tanzania, Kenya
"	Use of Microbial Pathogens in the Control of Insect Pests and Vectors	3 weeks	9	Egypt, Ethiopia Kenya
1988	Group Training Course on Pest and Vector Management Systems	3 weeks	33	14 tropical developing countries
1989	Tick Management Course	4 weeks	9	Kenya, Uganda Zambia
"	Regional Training Course on Insect-Related Data Management	2 weeks	8	Burundi, Rwanda Tanzania, Uganda
1990	Tsetse Management Course	6 weeks	7	Kenya, Sudan Zambia
"	Livestock Ticks Management Course	6 weeks	8	Kenya, Sudan Zambia
1991	Management of Tsetse for the Control of Trypanosomiasis in Livestock Production	4 weeks	8	Ethiopia, Kenya Sudan, Zambia
"	Livestock Ticks Management Systems	4 weeks	9	Kenya, Sudan, Zambia

Table 3 cont'd

Table 3, continued

YEAR	COURSE TITLE	COURSE DURATION	NO. OF PARTICIPANTS	NO. OF COUNTRIES REPRESENTED
1991	Methodologies for Plant Resistance to Insect Pests for IPVM	1 week	8	Burundi, Kenya Malawi, Uganda Tanzania
"	Pest Management, Documentation and Information System and Service (PMDISS) Information Training Workshop	1 week	21	Mozambique, Kenya, Uganda Zambia, Zimbabwe
"	Efficient Data Collection, Analysis and Interpretation in Pest Management	3 weeks	23	Nigeria, Kenya Uganda, Zambia, Burundi, Namibia Ghana, Malawi, Mali, Mauritius Mozambique, Chad Rwanda, Senegal Swaziland, Tanzania, Sudan

TABLE 4

Subsequent Careers of the ARPPIS Graduates 1983-88 classes

Number	Present Position	Location
7	Lecturers	Universities
5	Postdoctoral Fellows	International Institutions
18	Researchers	National Research Institutions
2	Scientific Officers	Ministries
7	Scientists	International Institutions
7	Researchers	International Networks
1	Entomologist	National Insect Museum
1	Manager	Large Agricultural Schemes

