

FOREWORD

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ALTHOUGH there are no detailed statistics on sorghum economic losses due to pests and diseases, it is recorded by a general consensus that the sorghum shootfly, *Atherigona soccata*, is the single most important pest of this crop in Africa and Asia.

The importance of sorghum in Africa lies in the fact that, although the crop does not feature at all in a major way as a crucial element in the international or intercountry trade in the continent, it certainly features—together with maize, millet, cassava and sweet potato—as a principal staple diet in the continent. Indeed, in the Sahelian and Sudanic zones, sorghum is the primary staple food crop; rice is yet to have a major expansion programme in the continent as a whole; and wheat has only come relatively recently into the continent.

So far, however, the management and control of sorghum pests has only attracted cursory or secondary interest, the primary interest having been devoted to the pests and diseases of maize and cash crops (such as cotton, coffee, cocoa, tea and sisal). The sorghum crop is not grown on a plantation scale, as maize is often grown in many parts of Africa; it is the subsistence, resource-poor farmer who usually grows sorghum mainly for his food needs, with only a small surplus going into the rural market outlets. Consequently, in considering pest management strategies for such a crop, which moreover is more often than not grown under a mixed cropping system, one must consider seriously the development of strategies which employ relatively cheap and simple techniques, which often imply little or no pesticides.

The International Centre of Insect Physiology and Ecology (ICIPE) adopted a research project on the sorghum shootfly 5 years ago—at the instigation of its Policy Advisory Committee (PAC). The PAC, which was phased out last year, consisted of the UNDP, UNEP, FAO, WHO, IAEA and the International Agricultural Research Centres organised under the umbrella of the Consultative Group on International Agricultural Research (CGIAR); and was charged with the task of advising the ICIPE Governing Board on the relevance of the ICIPE's research programmes to major tropical insect problems. In 1974, and again in 1975, the PAC recommended, as a matter of priority, that the ICIPE develop a research programme on cereal stem-borers and the sorghum shootfly. It took some time for the ICIPE to implement this proposal in full, but in late 1975 the ICIPE initiated a small research project on the sorghum shootfly at Kibos (on the Kano plains, near Lake Victoria) and Nairobi; and in late 1978, the Crop Borers Research Programme, incorporating the sorghum shootfly, came into being.

THE DIRECTION AND RELEVANCE OF SHOOTFLY RESEARCH

The ICIPE has felt that the sorghum shootfly project has now gone on long enough for the Centre to have a much clearer idea where it wants to go. The close collaborative arrangements with the Kenya Ministry of Agriculture (at Kibos), ICRISAT (at Mbita Point Field Station), and the subsistence farmers we are working with in South Nyanza, have enabled the ICIPE to test its first ideas on the sorghum shootfly, and to point to the direction the institute will be taking now and in the medium-term future—and has added greatly to the relevance of the work the ICIPE is undertaking. Already, the ICIPE can point to some notable achievements:

(1) We know that there are some 20 species of *Atherigona* which could, and were, confused with *A. soccata* (the sorghum shootfly) in East Africa, and we have developed means for distinguishing these from the true sorghum shootfly. This facility has enabled us to start working on the ecology and physiology of the sorghum shootfly confidently knowing that our work can be repeated successfully by others.

(2) A wild sorghum species, *Sorghum verticelliflorum*, has recently been recognised as a widely distributed alternative host plant for *A. soccata* in Kenya (and probably also in other parts of Africa). It seems that the presence and endurance of this wild sorghum during the dry season enables the sorghum shootfly to survive during the 'off-season'.

(3) Female shootflies tend to lay a single egg per sorghum shoot. Preliminary observations seem to indicate that physical and chemical cues are involved, and attempts are now being made by the ICIPE chemists to isolate this 'oviposition-marking pheromone'.

(4) Female shootflies prefer to lay their eggs on sorghum shoots younger than 30 days old. Shortly after this stage, the sorghum plants become resistant to infestation by first-instar larvae. The factors involved in the selection of oviposition sites by female shootflies, and of feeding on host-plants by larvae, are now being investigated in detail.

I have given a few particularly apt examples of some of the highlights of ICIPE's sorghum shootfly research so far. The work in the next 2 years or so is quite clear to us—to determine in greater detail the seasonal development, population fluctuations, and shootfly survival during the so-called off-season; to identify the oviposition-marking pheromone, oviposition selection factors, and the host-plant selection mechanisms; to determine the larval movement within the sorghum plant, factors for larval survival and development, and the mechanisms for selection of

alternate hosts; to analyse sorghum resistance to the shootfly; to develop population sampling and monitoring methods; to determine economic injury levels, including that for sorghum grown under mixed cropping; and to propose components for an integrated shootfly management system. This is quite a challenge.

NATURE OF THE STUDY WORKSHOP

This is one reason why the ICIPE, together with the International Fund for Agricultural Development (IFAD), felt it important to convene an International Study Workshop on the Sorghum Shootfly to enable the ICIPE, within an international forum, to review its work so far as well as to consider its intentions for the future. A second significant reason was to bring together active practitioners in the field of pest management and active sorghum shootfly studies to review the global progress in sorghum shootfly research, and examine its relevance to the practical problems of shootfly control.

A first review of this nature was undertaken a decade ago in India, and resulted in a book edited by JOTWANI and YOUNG (1972), which became the stan-

dard reference on the sorghum shootfly over the last decade. We are fortunate to have both editors with us during this second international review, as a sort of 'elder scientists' in the field of sorghum shootfly research.

Research on the sorghum shootfly is quickening. An International Study Workshop such as we held in Kenya is a sure way to assess our achievements so far and to erect new signposts to the future. I hoped that the ICIPE and IFAD would help in this task by convening this small but important forum. I wished Professor Perry L. Adkisson, who kindly consented to chair this scientific meeting, all the best in steering the important discussions which took place during the Workshop—and hoped that all the participants, from Africa, Asia and the ICIPE would find this international forum for knowledge exchange of scientific progress and problems both rewarding and a challenge for the tasks ahead.

REFERENCE

- JOTWANI M. G. and YOUNG W. R. (Eds) (1972) *Control of Sorghum Shootfly*. Oxford & I.B.H., New Delhi.