*Tropical Pest Management* 26(3): 258–261. 15 Refs.


# Species of Shootflies Reared from Sorghum in Andra Pradesh, India*

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**Summary.** A total of 13 species of shootflies from two genera, *Atherigona* and *Acritochaeta*, were reared over a four-year period from a range of sorghum (*Sorghum bicolor*) cultivars showing typical 'dead heart' symptoms. *Atherigona soccata* Rond. was the dominant species (<99% of the flies reared), while the second most common species was *Acritochaeta orientalis* Schin. An interesting record was *Atherigona eriochloae* Mall. reared from tillers of ratooned sorghum. Three species as yet undescribed were recorded. More females than males were reared in the course of the study – the sex ratio was 1 1.27. It was concluded that only *A. soccata* is likely to be important when considering control of damage to sorghum by resistance breeding or the use of insecticides.

## Introduction

The shootfly *Atherigona soccata* Rond. (Muscidae) (syn. *A. indica infuscata* Emd.), is a serious pest of sorghum in Africa and Asia (Ponnaiya, 1951; Swaine and Wyatt, 1954; Blum, 1969; Jotwani *et al.*, 1970; Deeming, 1971; Granados *et al.*, 1972). However, there appears to have been no detailed rearing work from systematically collected sorghum showing 'dead heart' symptoms. Pont (1972) recorded four species from sorghum; *A. soccata*, *A. approximata* Mall., *A. oryzae* Mall. and *Acritochaeta orientalis* Schin. Deeming (1971) recorded seventeen species from northern Nigeria: *Atherigona varia* var. *soccata* Rond., *A. ponti* sp. n., *A. tomentigera* van Emden, *A. lineata* (Adams), *A. lineata ugandae* van Emden, *Acritochaeta orientalis*, *Atherigona yorki* sp. n., *Lasiosina* sp. n., *Mepachymerus* sp. n. nr. *cornutus*, *Scoliophthalmus micantipennis* Duda, *S. trapezoides* Becker, *S. femoralis* Becker, *Anacamptoneurum obliquum* Becker, *Epimadiza nigriscens* Duda, *Oscinella* spp., *Elachiptera scapularis* (Adams) and *Anatrichus erinaceus* Loew. There was a suggestion by Baliddawa and Lyon (1974) and Taksdal and Baliddawa (1975) that the erratic results with insecticides obtained in shootfly control operations in Uganda (Davies and Jowett, 1968) was due to the presence of up to six species of *Atherigona* (*A. soccata*, *A. campestris* Deeming, *A. gilvifolia* van Emden, *A. tomentigera*, *A.* sp. probably *secrecauda* Segvy and an unidentified species) in sweep net catches from sorghum fields and that evaluation of the role of minor species as pests was important. Clearwater and Othieno (1977) in Kenya, using sweep netting and suction traps, also noted the presence of a range of species in sorghum fields. None of these reports records actual rearing from crop sorghum.

## Methods

From 1974 to 1978, seedlings and tillers from a range of sorghum cultivars showing typical dead heart symptoms were collected throughout each year from both farmers' fields and from the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) Center at Patancheru, Andhra Pradesh, India. The material was placed in the breeding cages and all flies emerging were sexed. Initially only the male flies were identified, as at the start of the study reliable taxonomic characters for the identification of the female were not known. The females were, however, stored in alcohol and when suitable taxonomic characters for the identification of the female of *A. soccata* (Clearwater, 1976) and for the other species (Reddy, Y. V. unpublished) were discovered, these were also identified. Determinations were made at three periods – the first from September 1974 to December 1975, when ICRISAT Centre was being developed and the crop acreage was relatively low compared to the grassed area, the second from

*Approved as ICRISAT Journal Article No. 79 and released for publication.

TABLE 1. SPECIES AND TOTALS OF SHOOTFLIES REARED FROM SORGHUM AT ICRISAT CENTER, PATANCHERU, SEPTEMBER 1974 TO DECEMBER 1975

| Species of flies | Totals | |
|---|---|---|
| | Male | Female |
| *Atherigona soccata* | 644 | 1270 |
| *Atherigona eriochloae* Mall. | 7 | 4 |
| *Atherigona falcata* Thom. | 3 | 1 |
| *Atherigona approximata* | 1 | 6 |
| *Atherigona* spp. | 0 | 5* |
| *Acritochaeta orientalis* | 7 | 33 |
| Grand total | 662 | 1319 |

*Females of *simplex* – 3, *reversura* – 1, *? laeta* - 1.

January 1976 to May 1977 and the third from June 1977 to December 1978 when extensive areas of sorghum were sown in both rainy and post-rainy seasons.

**Results**

In the first period (1974–75), few flies were recorded but this was partly related to the amount of effort put into collection and rearing (Table 1).

Just under one-third of the total flies reared were males, and of these, 97% were *A. soccata*, obtained mainly at the times of seedling growth in the rainy and post-rainy season. Although males of four other species and females of seven species were reared, except for *Acritochaeta orientalis*, the numbers recovered were very low. The vast majority of flies reared were *A. soccata*.

In the second period (1976–77), which spanned two post rainy seasons with an intervening rainy season, the range of species present was very similar to the first (Table 2).

Once more *A. eriochloae* was reared and *A. soccata* was the dominant species; female flies again far outnumbered males.

In more extensive rearing work carried out in the third period (1977–78) a total of 13 species was recorded, three of which are as yet undescribed (Table 3). Again *A. soccata* was the dominant species, just under 99% of those reared, with *Acritochaeta orientalis* accounting for most of the remainder.

TABLE 2. SPECIES AND TOTALS OF SHOOTFLIES REARED FROM SORGHUM AT ICRISAT CENTER, PATANCHERU AND NEARBY FARMERS' FIELDS – JANUARY 1976 TO MAY 1977

| Species of flies | Totals | |
|---|---|---|
| | Male | Female |
| *Atherigona soccata* | 740 | 1052 |
| *Atherigona falcata* | 0 | 6 |
| *Atherigona eriochloae* | 4 | 1 |
| *Atherigona approximata* | 1 | 0 |
| *Atherigona punctata* Kärl. | 1 | 1 |
| *Acritochaeta orientalis* | 3 | 3 |
| Grand total | 749 | 1063 |

TABLE 3. SPECIES AND TOTALS OF SHOOTFLIES REARED FROM SORGHUM AT ICRISAT CENTER AND NEARBY FARMERS' FIELDS – JUNE 1977 TO DECEMBER 1978

| Species of flies * | Totals | |
|---|---|---|
| | Male | Female |
| *Atherigona soccata* | 27,867 | 35,056 |
| *Atherigona falcata* | 16 | 28 |
| *Atherigona punctata* | 5 | 9 |
| *Atherigona pulla* Wied. | 3 | 3 |
| *Atherigona approximata* | 2 | 5 |
| *Atherigona reversura* Villen. | 1 | 2 |
| *Atherigona atripalpis* Mall. | 1 | 1 |
| *Atherigona eriochloae* | 1 | 1 |
| *Atherigona simplex* Thom. | 1 | 3 |
| *Atherigona* sp. III* | 1 | 1 |
| *Atherigona* sp. X* | 1 | 2 |
| *Atherigona* sp. XIV* | 2 | 2 |
| *Acritochaeta orientalis* | 247 | 268 |
| Grand total | 28,148 | 35,381 |

*Needs to be identified.

## Discussion

Clearly over several seasons species of shootflies other than *Atherigona soccata* were insignificant as causes of dead heart damage in seedling sorghum. Overall, 99% of the flies reared were of this species. The sex ratio in the species was 1:1.27. *Acritochaeta orientalis*, which is suspected of being predatory (Deeming, 1971) or a saprophytic species (Pont, 1972), was the second most common species reared. Work is currently underway at ICRISAT to determine whether this species can cause primary damage to sorghum seedlings.

*A. falcata* is the second most important *Atherigona* species reared from sorghum and it was the dominant species in a range of grass hosts at ICRISAT Center, particularly on *Echinochloa colonum* in the rainy season. At this time it was also the most common species in fish meal attractant trap catches (Seshu Reddy and Davies, 1978).

The other species recorded were, over four years of rearing, of very minor importance. *A. eriochloae*, a relatively rare species previously recorded only from *Eriochloa procera* (Seshu Reddy and Davies, 1977), was of interest and occurred in all the three periods. In the first it was associated with ratoon sorghum tillers in the very late rainy season. The record of *A. approximata* (which is normally associated with pearl millet, *Pennisetum americanum*) attacking sorghum, is important but it is clear that sorghum supports only very few of this species and hence is probably not an important host. However, *A. approximata* is apparently becoming an increasingly important cause of loss in millet in some areas of India (Jotwani *et al.*, 1969). *A. punctata*, the main species reared from grass in August and September is clearly not attracted to sorghum. *A. oryzae*, a species which was recorded from sorghum by Pont (1972), was not reared in these studies, but is present at ICRISAT Center, in considerable numbers, particularly on *Digitaria adscendens*. Several of the African species recorded by Deeming (1971) and Baliddawa and Lyon (1974) are not present.

The results show that it is unlikely that species other than *A. soccata* need to be considered when breeding for shootfly resistance or in insecticidal control strategy, at least in Andhra Pradesh. There is a need to confirm that a similar situation applies in Africa.

**Acknowledgements**

The authors are grateful to our field staff for help in collection of shootfly damaged sorghum seedlings.

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