Report to IAEA

Contract No.: 16140

Title of Project: Definition of major pest species in the dorsalis complex of fruit flies (Diptera: Tephritidae).

Research Institute: International Centre for the Management of Pest Fruit Flies, Griffith University, Brisbane.

Chief Scientific Investigator: Professor R.A.I. Drew


Background

During previous research planning meetings for the CRP project, it was decided that the staff of the ICMPFF in Griffith University should undertake the following program of work:

1. Collaborate with Dr Qinge Ji in China to enhance the research activities in that country.
2. Obtain new field-collected samples of Bactrocera dorsalis (Hendel) from China to map morphological characters and variations in that population. This aspect of the project research is essential as some genetic researchers, such as Gaspari and Malacrida (Italy), believe that the real B. dorsalis originated in China. As a result of their findings, they are using the China B. dorsalis population as baseline data against which molecular data on other sibling species in the dorsalis complex can be prepared.
3. Undertake a new morphometric study of the genitalia and other body characters of males and females of all pest species.
4. Review the extensive host plant records held in the Griffith University database.
5. Identify morphologically, specimens from cultures being developed at IAEA, Seibersdorf, Austria, by other project researchers.
6. Identify specimens collected in Africa, especially those presumed to be Bactrocera invadens.
7. Organise the Second Research Coordination Meeting to be held in Brisbane in January 2012.

Progress

1. Unfortunately, specimens of Bactrocera dorsalis (Hendel) from China were only received at ICMPFF during the second RCM held in Brisbane, 30 January – 3 February 2012. We still plan to collaborate with Dr Qinge Ji in China to obtain morphological and host data on B. dorsalis in China which we believe could be the place of origin of this fruit fly species.
2. Please see as per above.
3. These studies will now continue as planned and will include morphometric analyses of all *dorsalis*-complex pest species. We will also include new specimens of the invasive population of *Bactrocera papayae* in Papua New Guinea.

4. An analysis of all host plant records has begun.

5. Specimens of various cultures held in IAEA, Seibersdorf, Austria, have been identified for Dr Mark Schutze and others.

6. An extensive morphological study has been carried out on new material of *Bactrocera invadens* from various localities in Africa. In summary, *B. invadens* in Africa is identical to the *B. invadens* population in Sri Lanka. We cannot confirm this species from any other geographic locality, at present. *Bactrocera invadens* is morphologically distinct from *B. dorsalis*, particularly on the scutum colour patterns. Whereas the scutum of *B. dorsalis* is mostly or entirely black, in *B. invadens* 62%-68% of specimens studied had a red-brown scutum with minor infusions of dark colouration. The prominent colour type of *B. invadens* is similar to *Bactrocera cacuminata* which occurs in eastern Australia. While there is a possibility that this *B. invadens* population in Africa and Sri Lanka is a unique colour form of *B. dorsalis*, this appears highly unlikely based on present knowledge. Reports that *B. dorsalis* and *B. invadens* have been successful hybridised in the Seibersdorf laboratories indicate that cross breeding experiments in captivity should be viewed with caution. Whilst laboratory breeding experiments designed to elucidate male and female 'choice' can be helpful, there are a number of examples of pre- and post-zygotic isolation experiments where separate species have been successfully hybridised in the laboratory and have indicated little or no isolation, viz. *B. tryoni* and *B. neohumeralis*.

7. The second RCM was organised by the ICMPFF staff. It was held at the Ecocentre on the Griffith University Campus, Brisbane, from 30 January to 3 February, 2012.

### Future Plans

1. Study *B. dorsalis* material received from China.

2. Obtain new specimens of *B. papayae* from Papua New Guinea and carry out morphological and morphometric analyses of all pest species in the *dorsalis* complex.

3. Continue a review of host plant records.

4. Review data generated by other CRP researchers on the *B. dorsalis* complex in order to make an informed decision re synonymising species.