This is the story of three fruit fly complexes and a suspected complex of significant economic importance. These pests, all of which can cause major yield losses and by their very presence keep a horticultural sector from exporting, are known scientifically as *Anastrepha fraterculus* (South American fruit fly complex), *Bactrocera dorsalis* (Oriental fruit fly complex), *Ceratitis FAR* (fruit fly complex from the African region), and *Zeugodacus cucurbitae* (formerly *Bactrocera cucurbitae*), the melon fly suspected complex.

Accurate fruit fly taxonomy makes it possible to assess which species are present or absent in a given area which, in turn, provides a scientific basis for countries to set up their import regulations according to international phytosanitary standards, and to develop appropriate and effective fruit fly surveillance and control methods. For example, using the sterile insect technique (SIT), a species-specific and cost-effective environmentally friendly method of controlling fruit flies, requires a substantial initial capital investment. Thus, before embarking on such an endeavour, it is essential for governments and industry to know exactly which species are present in the area of interest.
For example, over the years, taxonomists identified and named several closely related species of *Bactrocera dorsalis*, to a point where it became the “dorsalis complex”. The *Bactrocera* species are native to Southeast Asia, but when one of its species arrived in East Africa from Sri Lanka in 2003, taxonomists identified it as a new species, naming it “*B. invadens*” because it spread quickly and aggressively across more than ten African countries. In response, regulatory authorities of importing countries required exporters from the African countries to certify that their horticultural produce originated from *B. invadens*-free areas or that the produce was free of the pest – but this required stringent post-harvest treatments that were not readily available for this supposedly new species. As a result, the exporting African countries dealt with years of trade restrictions that seriously affected their mango and banana exports.

The Joint Division, with participating scientists from 20 countries, decided to take another look at the fruit fly complexes, including the case of *B. invadens* and other suspected species. With the availability of new, more precise tools to identify species, the scientists began the processes of comparing morphology, e.g. of wings, antennae and organs; checking at the genetic level for consistency; and checking propensity for mating compatibility, all of which are accepted designations for identifying species.

**Study tunes in on what may be evolution in the making**

With research going on in several laboratories, the researchers reached extremely valuable conclusions. For example, they found the *B. invadens* and *B. dorsalis* were morphologically and genetically close and mating propensity was high. In other words, they proved these two species were actually the same *dorsalis* species – *B. invadens* did not really exist as a separate species. This insight will now enable the African fruit growers and export industry to use technologies already available for pre- and post-harvest control of *B. dorsalis*. In fact, the researchers determined that four of the species in the dorsalis complex – *B. dorsalis*, *B. papayae*, *B. philippinensis* and *B. invadens* – were all the same biological species. Looking forward, this means that growers and industry will be much better able to target their control programmes and provide phytosanitary certification to importers.

The research conducted on the *Ceratitis* FAR complex from the African region identified five different species. *C. capitata*, *C. fasciventris*, *C. anonae* and *C. rosa* were confirmed as individual biological species thus, for the most part, *Ceratitis*’ taxonomy remains unchanged, although they did identify a new species related to *C. rosa*. It will be known simply as R2 until taxonomically described and a proper Latin name has been chosen. As for the *Zeugodacus cucurbitae*, it was concluded that the melon fly does not represent a cryptic species complex in regards to its geographic distribution or its host range.

And finally, the study of the *Anastrepha*, specifically the South American fruit fly complex and its one species, the “*fraterculus*”, proved quite surprising. Four morphotypes with their geographical distribution were defined as “distinct biological species”. This might be an indication that the fraterculus complex has been in the act of separating into distinct species, and that the researchers have actually tuned in during its process of evolution. As a follow-up, scientists will meet again in 2016 to sort out issues on three Brazilian morphotypes and the description of the new species, and to choose a name for the new “*fraterculus*”.