IPPC Draft Diagnostic Protocol For *Bactrocera dorsalis* (2006-026)

Standards Committee Response to Objection received

(*Prepared by Technical Panel on Diagnostic Protocols, approved by the Standards Committee during their SC Nov 2018 meeting*)

Background

[1] The Standards Committee (SC) added the diagnostic protocol (DP) for *Bactrocera dorsalis* complex (2006-026) to the *List of topics for IPPC standards*[1] in May 2006.

[2] In October 2016 the draft DP was submitted to the Expert Consultation. The discipline lead and the drafting group considered the expert comments and revised the draft accordingly. At the February 2017 meeting[2] the Technical Panel on Diagnostic Protocols (TPDP) discussed and revised the draft DP. The TPDP recommended the draft DP for the SC to approve for the consultation via a TPDP e-decision (2017_eTPDP_May_01). The SC approved the draft DP for the July 2017 consultation period via SC e-decision (2017_eSC_Nov_01). A total of 146 comments were received in the consultation period and the discipline lead and DP drafting group revised the draft accordingly and provided responses to the comments. The draft DP was then presented to the TPDP during the 2018-02 TPDP meeting in Paris[3], where the TPDP agreed to submit the revised draft and responses to comments to the SC. The SC approved the draft DP for to the 45-day DP notification period for adoption through an e-decision (2018_eSC_May_06).

[3] During the July 2018 DP notification period, China submitted an official objection to the adoption of the draft DP[4]. The drafting group provided responses to the objection and revised the draft DP accordingly. The TPDP reviewed the revised draft DP for *Bactrocera dorsalis* (2006-026) and the drafting group's responses to the objection in an e-forum (2018_eTPDP_Sep_04), and agreed to the responses to the objection and on the text of the draft DP, and recommend the revised draft DP to the SC for approval for adoption. The SC in its November 2018 meeting approved the revised draft DP and the responses to the objection received.

Revision to draft DP in response to official objection

[4] The revised draft DP now reads as for "*B. dorsalis*" and not for the "*B. dorsalis* complex", in order to minimize the confusion as indicated by the objection comments. The word "complex"

[1] List of Topics for IPPC standards: https://www.ippc.int/en/core-activities/standards-setting/list-topics-ippc-standards/

[2] 2017-02 TPDP meeting report: https://www.ippc.int/en/publications/84892/

[3] 2018-02 TPDP meeting report: https://www.ippc.int/en/publications/85736/

[4] 2018-08_Objection for Draft DP for *Bactrocera dorsalis* complex (2006-026) available at: https://www.ippc.int/en/publications/86238/

is not consistently applied for insect groups and its inclusion in the title does not enhance understanding of the DP' scope. The DP is to identify *B. dorsalis*, a species that appears very similar to other species within a complex that is called the *B. dorsalis* complex. The change to title should facilitate understanding of the protocol and address the objection that it does not provide sufficient protocols to identify many of the over 80 species in the complex. A change to the text has been made to explain the intended scope and can be found in paragraph 40 of the revised DP.

[5] In addition, the revised DP now contains an extra Figure 3 showing oviposition puncture marks on fruit (as suggested by New Zealand as a comment, not an official objection). Figure numbering has been adjusted according to this addition of Figure 3 but the figure order has not changed in the revised DP.

[6] The responses to the objection provided by the drafting group, agreed with by the TPDP and approved by the Standards Committee (SC) are inserted into the text of the objection below.

OBJECTION AND RESPONSE OF TPDP

China formally submits an objection on < Draft annex to ISPM 27: *Bactrocera dorsalis* complex (2006-006)>

[7] To the Secretariat of the International Plant Protection Convention:

[8] China formally submits an objection on < Draft annex to ISPM 27: *Bactrocera dorsalis* complex (2006-006)>. China believes that the draft is unable to guarantee the effective diagnosis of *Bactrocera dorsalis* complex. The reasons are as follows:

1. The debate for the taxonomy revision of *Bactrocera dorsalis* complex has been lasted in recent years.

[9] The synonymous status of *B. dorsalis s.l.* is still argued by different experts (Schutze et al. 2017, Drew and Roming 2016, Schutze et al. 2015). The taxonomy status for the described 6 species in this draft is also uncertainty, for example, the hybridization between *B. dorsalis* with *B. carambolae*, *B. kandiensis* with *B. dorsalis* are known（Doorenweerd et al. 2018.

[10] ***TPDP response***: The species status and names of the three aforementioned species are not in question. The Doorenweerd *et al.* publication states that "*Bactrocera dorsalis* is known to hybridize with *B. carambolae* and genetic evidence suggests that there is historic hybridization with *B. kandiensis* (Schutze *et al.*, 2015b)." Evolutionary biology of insects have shown that hybridization does not invalidate species status. The names used in the protocol are valid and the protocol for identification to the known variation of the species is described. The issue of hybrids and introgression are acknowledged in the protocol. It is currently not possible to use a standard protocol to reliably detect evidence of hybridization and introgression; and consequently those methods are not included in the protocol. The impact of introgression on morphological and genetic variation is not well understood and will require advanced molecular data sets to accomplish. Not having that information does not preclude identification to species level for specimens but the protocol could fail to detect historical gene transfer between species.

2. The draft standard is few practicable.

[11] There are more than 80 species within *B. dorsalis* complex. The adult morphology characters and key in the protocol are just provided for diagnosis the 6 economic significant species which the category of severity is quite different (Vargas et al., 2015). The diagnosis key can not be used to distinguish the other species of the complex which is also considered as the target regulated pest in international commodity quarantine. The content of this draft is not consist with the topic.

[12] ***TPDP response:*** The scope of the protocol was limited to the six most important regulated pests in terms of confusion in identification and reported pest status. Development of a protocol for the entire complex would not be practical using morphology and is not possible using molecular methods because the complex is not monophyletic. To clarify the scope of the protocol it is possible to change the name of the protocol from "*Bactrocera dorsalis* complex" to "*Bactrocera dorsalis*". This would reflect the true scope of the protocol and that the five additional species are included because of confusion in identification of the oriental fruit fly.

3. The draft need more revision in the further development.

[13] Many logistic problems had been found in the draft. For example, 1) Figure 2(a), 2(b) were found at para.107 and Figure 1 was first listed as referenced at para. 122.

[14] ***TPDP response:*** Figure 1 is first referenced at para 39.

[15] 2) The diagnostic morphological characters of adult in Table 3 had not been described by head, thorax, abdomen as the other taxonomic publications. Therefore, the logistic confusion had found from Figure 3 to Figure 18 in the protocol.

[16] ***TPDP response:*** There is not sufficient detail in the objection to understand what is incorrect between the Table and other taxonomic publications to provide an answer. The experts selected those characters that were important to discriminate the species in the table.

[17] 3) The origin of specimen of complex, identification expert in Figure 3, the relevant information of *B. dorsalis s.l.* specimen used in this protocol had not provided.

[18] ***TPDP response:*** The objection is that the geographic source of the *B. dorsalis* specimen is not provided. As the protocol is to diagnose the species, the protocol does not report the collection information or geographic variants of specimens.

[19] 4) According to the great concerns and the new technology (e.g. second sequence technology) for the research of *B. dorsalis* complex by international experts, the taxonomy debates will be clarified by more new publications. It is suggested that this draft should be pended, revised and adopted when new scientific evidences are provided.

[20] ***TPDP response:*** The scientific literature has provided several arguments on the taxonomy of *B. dorsalis* that it is one large and morphologically diverse species and that *B. papayae*, and *B. invadens* are not separate species. New scientific data have not been released in peer-reviewed journals to refute that. The protocol uses the name *B. dorsalis* s.l. to avoid the debate on the current taxonomic status of *B. dorsalis*. The name *B. dorsalis* s.l. fits with both taxonomic hypotheses. It can either represent a group of species (i.e., *B. dorsalis* s.s., *B. papayae*, and *B.*

invadens) or one species (i.e., *B. papayae*, and *B. invadens* are synonyms). The new molecular data would not alter the utility of the protocol to diagnose the oriental fruit fly, *B. dorsalis* s.l. As is true for all diagnostic protocols, if new information is published that formally changes the taxonomy of this species, then the protocol will be reviewed in subsequent revisions.

References

Doorenweerd C., Leblanc L., Norrbom AL., Jose MS., Rubinoff D. 2018. A global checklist of the 932 fruit fly species in the tribe Dacini (Diptera:Tephritidae). Zookeys 730:19-56. HTTP:// doi.org/10.3897/zookeys.730.21786

Vargas R. I., Pinero J. C., Leblanc L. 2015. An overview of pest species of *Bactorcera* fruit flies (*Diptera: Tephritidae*) and the integration of biopesticides with other biological approaches for their management with a focus on the pacific region. Insects, 6, 297-318; dio:10.3390/insects6020297