Submissions for Diagnostic Protocols

1. General information

Submission number	2021-009
Title of Proposal	Diagnostic Protocol for Drosophila suzukii (Diptera: Drosophilidae)
Submitted by	IPPC Contracting Party New Zealand
Submission supported by	Ministry for primary industries, New Zealand

2. Contact information

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3. Summary of proposal

Summary of justification for the proposal	Spotted-wing drosophila (SWD), Drosophila suzukii, is a pest of soft skin fruits and can infest unripened fruits and are of economic significance. Early detection is the key for a successful management strategy and accurate diagnosis is one of the important factors in this process. Given its very rapid spread in Europe and North America in recent years, it seems likely that D. suzukii will continue to expand its range. Though there are a few diagnostic keys and molecular protocols available for D. suzukii identification, a diagnostic protocol with morphological identification keys and relevant molecular protocols will be a very useful tool for countries where SWD poses a threat via trade pathways.
Proposed priority	1 (high)
Comments	The global fresh fruit trade, and the cryptic nature of the larvae to hide inside the fruit undetected until after transportation, facilitate the increasing distribution of this pest. Though there are a few diagnostic keys and molecular protocols available for D. suzukii identification, a diagnostic protocol with morphological identification keys and relevant molecular protocols will be a very useful tool for countries where SWD poses a threat via trade pathways.

4. Literature review

Literature review	Spotted-wing drosophila (SWD), Drosophila suzukii, is a pest of soft skin fruits and can infest un-ripened fruits and are of economic significance. First detected within the continental United States in 2008, Drosophila suzukii has become a serious threat to fruit crops in over 30 countries spanning North America, South America, Europe and the Pacific (IPPC, 2017). D. suzukii is thought to be native of eastern and southeastern Asia and is widely distributed in China, India, Korea, Myanmar, Russia and Thailand (Toda 1987, Oku 2003, Hauser et al. 2009). It is an economically damaging pest infesting thin-skinned fruits before harvest and the larvae destroy the fruit pulp by feeding. It has a wide host range, including soft fruits such as strawberry, mulberry, cherry, plums, peaches, currants, grapes, blueberry etc. The hard fruits such as kiwifruit, persimmon, loquat, fig, tomato, apple, pear etc. may be attacked if the skin is already broken (CABI). The global fresh fruit trade, and the cryptic nature of the larvae to hide inside the fruit undetected until after transportation, facilitate the increasing distribution

	of this pest. Given its very rapid spread in Europe and North America in recent years, it seems likely that D. suzukii will continue to expand its range. This species has a high reproductive rate and short generation time; D. suzukii can theoretically have up to 13 generations per year, which may contribute towards rapid spread (CABI). Early detection is the key for a successful management strategy and accurate diagnosis is one of the important factors in this process. The distinguishing features of the two sexes (serrated ovipositor and black wing spots) are also present in 150 other Drosophila species, making species identification difficult in areas where they are sympatric. D. subpulchrella males' black spots are very similar in shape and position to those of D. suzukii (Takamori et al., 2006). The occasional lack of wing black spots in teneral male D. suzukii could lead to misidentification with other closely related Drosophila species whose males do not have spots on the wing. Females can also pose problems with identification. On the basis of the shape and length of the ovipositor, D. suzukii can be easily discriminated from related species, such as D. biarmipes, but not easily from other species such as D. immigrans Sturtevant and D. subpulchrella (Takamori et al., 2006), which possess very similar ovipositors (Hauser, 2011). Though there are a few molecular protocols available for D. suzukii identification (Calabria et al. 2012, Kim et al. 2014, Dhami & Kumarasinghe 2014, Murphy et al. 2015), a diagnostic protocol with morphological identification keys and relevant molecular protocols will be a very useful tool for countries where SWD poses a threat via trade pathways. References: • CABI Datasheet for Drosophila suzukii. https://www.cabi.org/isc/datasheet/109283 (Accessed on 23 August 2021) • Calabria G, Maca J, Bachli G, Serra L, & Pascual M. (2012). First records of the potential pest species Drosophila suzukii (Diptera: Drosophilidae) in Europe. Journal of Applied Entomology 136, 139-147. • Dhami MK & Kumarasinghe L. (2014). A HRM real-time PCR assay for rapid and specific identification of the emerging pest Spotted-Wing Drosophila (Drosophila suzukii). PLoS ONE 9, e98934. • Hauser M, Gaimari S, Damus M. (October 2009). Drosophila suzukii new to North America. North American Dipterists Society. • Hauser M, 2011. A historic account of the invasion of Drosophila suzukii (Matsumura) (Diptera: Drosophilidae) in the continental United States, with remarks on their identification. Pest Management Science, 67(11):1352-1357. • IPPC, 2017 . Drosophila suzukii present in Tahi & Moorea. Latest Pest Reports - International Plant Protection Convention (ippc.int) • Kim SS, Tripodi AD, Johnson DT, & Szalanski AL. (2014). Molecular Diagnostics of Drosophila suzukii (Diptera: Drosophilidae) using PCR-RFLP. Journal of Economic En

5. Criteria for prioritization of Diagnostic Protocols

Criteria	Information provided by Submitter
1. Need for international harmonization of the diagnostic techniques for the pest (e.g. due to difficulties in diagnosis or disputes on methodology)	The currently available diagnostic protocols are scattered in different publications and having one diagnostic protocol with morphological (adults and Larval stage) and molecular identification protocols will aid in harmonization of the diagnostic techniques.
2. The relevance of the diagnosis to the protection of plants	Early detection is the key in eradication/management decision making. To achieve that accurate identification plays a key role.

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including measures to limit the impact of the pest.	
3. Importance of the plants protected on the global level (e.g. relevant to many countries or of major importance to a few countries).	This is a pest of soft skin fruits and the countries that rely on their horticulture production will get affected by this pest.
4. Volume / importance of trade of the commodity that is subjected to the diagnostic procedures (e.g. relevant to many countries or of major importance to a few countries).	It is an economically damaging pest infesting thin-skinned fruits before harvest and the larvae destroy the fruit pulp by feeding. It has a wide host range, including soft fruits such as strawberry, mulberry, cherry, plums, peaches, currants, grapes, blueberry etc.
5. Other criteria for topics as determined by CPM that are relevant to determining priorities	Guidelines in surveillance trapping.
6. Th balance between pests of importance in different climatic zones (temperate, tropics etc) and commodity classes.	This is an emerging pest for countries in temperate zone as it has spread over 30 countries in the last decade spanning North America, South America, Europe and the Pacific.
7. Number of labs undertaking the diagnosis.	Though it is not possible to indicate how many labs are undertaking the diagnosis of this species, it is very important for quarantine laboratories worldwide to conduct the diagnosis of this species.
8. Feasibility of production of a protocol, including availability of knowledge and expertise.	There are experts in the USA, Sweden, Italy and Japan, therefore the expertise and the knowledge are available in those countries.