Submissions for topics for Standards and Implementation

1. General information

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| **Submission number** | 2021-0XX |
| **Title of Proposal** | Vapor heat treatment of dragon fruit (Selenicereus undatus (Haworth) D.R. Hunt) for Planococcus lilacinus (Cockerell) |
| **Submitted by** | IPPC Contracting Party  China |
| **Submission supported by** | China |

1. Contact information

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| **Name** | Lili Ren |
| **Position and organization** | Institute of Technical Equipment, Science and Technology Research Center of China Customs |
| **Mailing address** | No.6, Tianshuiyuan Street, Chaoyang District, Beijing 100020, P. R. China |
| **Phone** | +86-15210246562 |
| **Email** | [ippc@agri.gov.cn](mailto:ippc@agri.gov.cn) |

1. Summary of proposal

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| **Summary of justification for the proposal** | Planococcus lilacinus Cockerell is listed as quarantine pest by European and Mediterranean Plant Protection Organization (EPPO), Comité de Sanidad Vegetal (COSAVE), the United States and Australia. P. lilacinus is infested more than 100 species, 35 families plants and widely distributed in Thailand, the Philippines, Indonesia, Malaysia and many Asian and African countries, which caused considerable economic loss. The proposal was recommended an optimal heat treatment schedule for dragon fruit infested with P. lilacinus. Time-mortality of previous study suggested that adult female P. lilacinus was the most heat-tolerant stage. The time–response test and large-scale confirmatory test suggested that vapor heat treatment at 49 °C for a duration of 70 min for disinfesting P. lilacinus in dragon fruit. The efficacy level of disinfestation was 99.9910% at 95% confidence level. This proposal could offer a practical alternative disinfestations treatment to facilitate access of fruits to mealybugs-free markets and provide quarantine security for international trade. |
| **Expected outcome of standard / implementation resource** | This standard will develop phytosanitary vapor heat treatment against P. lilacinus to promote the import and export of fresh fruit all over the world. |
| **Contribution to filling gaps in the Framework for Standards and Implementation** | This proposal will help fill the gaps in the No. 28 and No. 42 standards and implementation frameworks, and promote the global application of phytosanitary temperature treatment. |

1. Type of proposed material

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| **Proposed material** | Standards |
| **Type** | New ISPM or component to an existing ISPM  Appendix to ISPM 28 |

1. Literature review

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| **Literature review** | Planococcus lilacinus Cockerell is listed as quarantine pest by European and Mediterranean Plant Protection Organization (EPPO), Comité de Sanidad Vegetal (COSAVE), the United States and Australia. P. lilacinus is infested more than 100 species, 35 families plants and widely distributed in Thailand, the Philippines, Indonesia, Malaysia and many Asian and African countries, which caused considerable economic loss. Vapor heat treatment was conducted to disinfest P. lilacinus on dragon fruit and the quality of dragon fruit was evaluated. Adult female P. lilacinus was the most heat-tolerant stage at 47, 48 and 49°C. The death kinetic model and probit model were used to predict LT99.9968 at the three temperatures. The treatment times predicted by the kinetic model that could effectively disinfest adult female P. lilacinus females were 120.84, 78.06, and 67.96 min at 47, 48, and 49°C, respectively. In a confirmatory test of vapor heat treatment at 49°C for 70 min, complete mortality was recorded for 33,195 adult females infesting in 148 dragon fruits, thus the efficacy level of disinfestation was 99.9910% at 95% confidence level. The quality of dragon fruit was generally not affected by heat treatment, fruit firmness was remarkably increased and respiration rate was significantly decreased. Vapor heat treatment at 49°C for a duration of 70 min is an effective phytosanitary treatment for control of P. lilacinus on dragon fruit that minimally impacts fruit qulity. This proposal could offer a practical alternative disinfestations treatment to facilitate access of fruits to mealybugs-free markets and provide quarantine security for international trade.  References:  Lili Ren, Qian Lu, Meiling Xue, Caiyun Peng, Naizhong Chen, Guoping Zhan and Bo Liu. Vapor heat treatment against Planococcus lilacinus Cockerell (Hemipter：Pseudococcidae) on dragon fruit.2021. Pest Management Science. Doi: 10.1002/ps.6616. |

1. Criteria for justification and prioritization of proposed topics
   1. Core criteria

| **Core Criteria** | **Information provided by Submitter** |
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| **1. Contribution to the purpose of the IPPC as described in article I.1** | P. lilacinus is has become a quarantine concern that infested more than 100 species in 35 families of tropical and subtropical fruits, vegetables, beverage crops and garden trees. P. lilacinus is widely distributed in Thailand, the Philippines, Indonesia, Malaysia and many Asian and African countries, which caused considerable economic loss. It is also listed as quarantine pest by European and Mediterranean Plant Protection Organization (EPPO), Comité de Sanidad Vegetal (COSAVE), Argentina, Brazil, Paraguay, Uruguay, Australia, the United States, South Africa and many Asian countries. It can hide in the leaf axils, fruit calyxes as well as cracks and crevices of trunks, and be easily transported via international trade. The infestation by P. lilacinus is characterized by leaf yellowing and defoliation, transmission of plant viruses and production of honeydew that promotes the development of sooty molds. This standard proposal can promote the prevention and control of pests, reduce the spread and harm of pests, and ensure global agricultural security. |
| **2. Linkage to IPPC SOs and Organizational results demonstrated** | Heat treatment was recommended by ISPM No. 42 as an effective phytosanitary measure in eradicating regulated pests. The formulation of standards on phytosanitary treatment plays an important role in protecting plant resources from pests and promoting trade facilitation. This is closely related to the strategic objectives of IPPC. |
| **3. Feasibility of implementation at the global level** | Heat treatment has been widely used as phytosanitary treatment since 1929 and approved by Australia, the United States, Thailand, Philippines and other countries. Phytosanitary heat treatment has the characteristics of easy implementation, low technical complexity, strong implementation ability of NPPO and high correlation with multiple regions. |
| **4. Clear identification of the problems that need to be resolved through the development of the standard or implementation resource** | P. lilacinus is has become a quarantine concern that infested more than 100 species in 35 families of tropical and subtropical plants and widely distributed in Thailand, the Philippines, Indonesia, Malaysia and many Asian and African countries. Phytosanitary heat treatment could be an effective measurement to provide quarantine security against infestation of quaratine mealybugs and guarantee the phytosanitary security of fresh fruit. |
| **5. Availability of, or possibility to collect, information in support of the proposed standard or implementation resource** | Mealybugs are not completely dislodged by inspection, high-pressure water or brushes, so phytosanitary treatment is used in situations where it is impossible to deal with the request of the partner country to be exported. It was recommended by ISPM No. 42 as an effective phytosanitary measure in eradicating regulated pests. Follett reported that using of generic vapor heat treatment at 47°C required 45 min and at 49°C required 10 min to kill Maconellicoccushirsutus Green. Dentener (1996) reported that hot air treatment at 44 °C for 12.4 h, 47 °C for 4.5 h and 50 °C for 3.8 h were required to achieve 99% mortality of the long-tailed mealybug, Pseudococcus longispinus (Targioni-Tozzetti),on persimmons. APHIS recommended immersion in 49°C hot water for 20 min to disinfest Pseudococcidae and other surface pests on limes. Heat treatments also can impact the respiration rate of fruit, and then affect fruit quality. The research paper with the title of “Vapor heat treatment against Planococcus lilacinus Cockerell (Hemiptera：Pseudococcidae) on dragon fruit” has been published in Pest Management Science. 2021. Doi: 10.1002/ps.6616. |

* 1. Supporting criteria

| **Supporting Criteria** | **Information provided by Submitter** |
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| **Practical** | No, there isn’t a regional standard and/or implementation resource on the same topic already available and used by NPPOs, RPPOs or international organizations. 2) This proposal is required necessary test platforms and expertise, including the establishment of large-scale pest, time–response test, fruit quality evaluation, and large-scale confirmatory test to determine the effectiveness of heat treatment. |
| **Economic** | Dragon fruit, Hylocereus undatus (Haw) is a tropical fruit native to Mexico, Central and South America. In 2020, the global dragon fruit planting area is about 470,000 hectares with an increase of 1.7% each year. The global production of dragon fruit is about 13.955 million tons. The main production areas are Malaysia, Philippines, Thailand, Vietnam, Myanmar, Indonesia, Cuba, India, Central and South America and Australia. In recent years, the output and international trade of dragon fruit have increased significantly. 2) The volume of new trade affected by the proposed standards will increase and the estimated value of trade will increase accordingly. |
| **Environmental** | Vapor heat treatment at 49 °C for a duration of 70 min isan effective phytosanitary treatment for control of P. lilacinus on dragon fruit that minimally impacts fruit qulity. This proposal offers a practical alternative disinfestations treatment to facilitate access of fruits to mealybugs-free markets. Heat treatment is an efficient, environmentally friendly, and safe alternative to QPS of methyl bromide use that can quickly and effectively disinfest quarantine pests without chemical residues. |
| **Strategic** | P. lilacinus is listed as quarantine pest by European and Mediterranean Plant Protection Organization (EPPO), Comité de Sanidad Vegetal (COSAVE), Argentina, Brazil, Paraguay, Uruguay, Australia, the United States, South Africa and many Asian countries. This pest hase been concerned as quarantine pest in bilateral or multilateral discussion agreements by the more than 5 countries’ NPPOs. The relevance and utility to developing countries are the same as those to developed countries. The proposed standard is applicable to a wide range of countries. The proposed standard is potential for the standard to be used as part of a systems approach for P. lilacinus. P. lilacinus is a widespread quarantine pest, therefore this proposed standard is Urgent. |