Express PRA for *Manduca sexta* – Research and Breeding –

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Initiation: Application for an Express-PRA by the Federal State Thuringia resulting from a request for a special authorisation for the movement and use of the organism for research and breeding purposes.

Express PRA	***Manduca sexta***		
Phytosanitary risk for Germany	**high** ☒	**medium** ☐	**low** ☐
Phytosanitary risk for EU-Member States	**high** ☒	**medium** ☐	**low** ☐
Certainty of assessment	**high** ☒	**medium** ☐	**low** ☐
Conclusion	*Manduca sexta* is endemic to the USA, Central America and the Caribbean. The hawk moth is not present in Germany and the EU. In 2003, there was one occurrence in two tomato greenhouses in Berlin probably, by moths that escaped from the nearby university. The occurrence was successfully eradicated. So far, *Manduca sexta* is not listed in the Annexes of Regulation (EU) 2019/2072 or by EPPO. *Manduca sexta* infests plants of the nightshade family (Solanaceae), like tobacco, tomato, eggplant, paprika, potato, and sacred datura (*Datura wrightii*). Due to appropriate climatic conditions, it is assumed that *Manduca sexta* can establish outdoors in Germany. The establishment in southern European EU-Member States is possible, too. The presence in glasshouse crops is possible, at least temporarily. Due to its high damage potential for tobacco and partly for tomatoes and potatoes, *Manduca sexta* poses a significant phytosanitary risk to Germany and other EU-Member States. Based on this risk analysis, it is assumed that *Manduca sexta* can establish in Germany or another Member State and cause significant damage. Thus, measures for the prevention of the release of this potential pest should be taken according to Article 29 of Regulation (EU) 2016/2031.		
Preconditions for an Express PRA fulfilled?	Yes, it is a pest. It is not listed and so far, it is not established in Germany.		

Express PRA	*Manduca sexta*
Taxonomy, common name, synonyms	Order: Lepidoptera; Class: Sphingidae; Genus: *Manduca*; Species: *Manduca sexta* Linnaeus, 1763 Carolina Sphinx, Tobacco Hornworm, Six-Spotted Hawkmoth, Tabakschwärmer Synonyms: *Manduca carolina* (Linnaeus) *Phlegethontius carolina* (Linnaeus) *Phlegetontius sexta* Johannsen *Protoparce carolina* Linnaeus *Protoparce sexta* Johannsen and other.
EPPO Code	MANDSE
Does a relevant earlier PRA exist?	No.
Distribution and biology	USA, Central America and the Caribbean; in the USA, the species is wider distributed in the Southern states; in the Northern USA a related species is present, the five-spotted hawkmoth (*Manduca quinquemaculata) (Byron & Gillett-Kaufman, 2017).* In great parts of the USA, the species has two or three generations per year, in more southern distribution regions four generations. The hawk moths (Fig. 4) are mainly nocturnal. They feed on nectar and pollen. The larvae (Fig. 2) feed on and cause damage to plants of the nightshade family (Solanaceae) like tobacco, tomato, eggplant, paprika, potato and sacred datura. The caterpillars can cause significant economic losses to tobacco and occasionally, to tomatoes and potatoes. The females lay the eggs mainly on the leaves of the host plant (Fig. 1). The caterpillars (L1) emerge after approx. two to four days. Five subsequent larval stages develop in about 20 days. The pupal stage lasts about 18 days. In daylight of less than 12 hours, the pupae (Fig. 3) go into a diapause lasting several months. The development cycle lasts from 30 to 50 days (EoL, o.D.; CABI, 2019).

Express PRA	*Manduca sexta*
Are host plants present in the PRA area? If so, which?	All aforementioned host plants are present in Germany and Europe. In Europe, some thorn apple species, including *Datura wrightii*, are cultivated as ornamental plants.
Is a vector/further plant needed for host alternation? Which one? Distribution?	No
Climate in the distribution area comparable to PRA area?	The climatic conditions in Germany are partly comparable to those in the USA. West and South Europe could be attacked and the hawkmoth could establish.
If no, are host plants present in protected cultivation?	Tomatoes in greenhouses might be relevant. In 2003, tomatoes were infested in two greenhouses in Berlin, Germany. It is assumed that the moths escaped from a research institute of the nearby university. The presence was successfully eradicated (EPPO, 2004).
Expected damage in the PRA area	Economic damage to tobacco and occasionally, to tomato and potato can be expected.
Remarks	When the organism is transported and used, release must be prevented.

Fig. 1: Eggs of *Manduca sexta* on tomato plant (Photo: Peter Baufeld; JKI)

Fig. 2: Larva (L 5) of *Manduca sexta* on tomato plant (Photo: Peter Baufeld; JKI)

Fig. 3: Pupa of *Manduca sexta* (Photo: Peter Baufeld, JKI)

Fig. 4: Adult *Manduca sexta* (Photo: Peter Baufeld, JKI)