Express-PRA for *Curculio* sp. (North America) – Interception –

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Initiation: Interception of acorns intended for planting from the USA by the Plant Protection Service Hesse

Express-PRA	*Curculio* sp. LINNÉ		
Phytosanitary risk for Germany	**high** ☐	**medium** ☒	**low** ☐
Phytosanitary risk for EU-Member States	**high** ☐	**medium** ☒	**low** ☐
Certainty of assessment	**high** ☐	**medium** ☒	**low** ☐
Conclusion	The genus of the acorn weevil or hazelnut borer *Curculio* sp. with app. 350 species is distributed almost worldwide. This risk analysis relates to North American species on oaks (*Quercus* sp.). So far, the genus is neither listed in the Annexes of Directive 2000/29/EG nor by EPPO. The species considered here develops in acorns (seeds of the genus *Quercus* sp.) and reduces their germinability significantly. Due to suitable climatic conditions, it is assumed that the North American acorn weevil is able to establish widely outdoors in Germany. Dependant on the present species, an establishment in the Northern or Southern EU Member States is also possible. Because of low eradication possibilities in the event of an occurrence, as well as due to the high damage potential for acorns and thus, for the commercial and natural reproduction of oaks, *Curculio* sp. presents a considerable phytosanitary risk for Germany and other EU-Member States. Due to this risk analysis, it is assumed that *Curculio* sp. is able to establish in Germany or another Member State and to cause considerable damage. Thus, protective measures against the introduction of this potential quarantine pest should be met according to § 4a of the Plant Inspection Order. The intercepted consignment must be destroyed or be rejected.		
Preconditions for an Express-PRA fulfilled?	Could be a pest, is not listed. So far, it is not established in the area covered by the reporting plant protection service.		
Taxonomy, common name, synonyms	Coleoptera, Curculionidae, *Curculio* sp. LINNÉ, acorn weevil, hazel-nut borer. Only North American species are considered that may develop in seeds of the genus *Quercus*: *C. aurivestis, C. confusor, C. fulvus,*		

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	C. humeralis, C. iowensis, C. longidens, C. nasicus, C. occidentis, C. orthorhynchus, C. pardalis, C. pardus, C. probuscideus, C. sulcatulus, C. victorienensis, C. strictus, C. longinasus.
Does a relevant earlier PRA exist?	No
Distribution and biology	The females of the genus *Curculio* bore a hole into the acorns by means of their noticeably extended mouth-parts and deposit one or several eggs by means of their ovipositor. The egg quantity depends on the species. The quantities from 6 (*C. occidentis*) to 96 (*C. caryae* on chestnut) are known. Up to 19 eggs were found in individual acorns with up to 16 holes through oviposition. The mortality of the eggs within the acorn seems to be high, those of the larvae low (ROHLFS, 1999). The holes through oviposition heal on the plant later on. The larvae feed on seed leaves within the acorns. In general, the larvae of the genus *Curculio* go through four larval stages (ROHLFS, 1999). After 3-4 months, the larvae bore a hole into the acorn and emerge. At that time, the acorns have already mostly fallen from the tree. The larvae dig into the ground and hibernate there. Parts of the population extend this hibernation over one or several years (HIGAKI, 2016). The pupation takes place in the soil. The adult animals emerge over a period of 3-4 months. The different species usually have a single oak species as the preferred host. If this species is missing or produces only a few acorns in the year, they infest less suitable hosts and compensate the higher mortality of the larvae via higher infestation rates (GOVINDAN & SWIHART, 2014).
Are host plants present in the PRA-area? If so, which?	The North American species of the genus *Curculio* develop on host plants of the families Fagaceae and Betulaceae (RHEINHEIMER, 2006). They are also known as pests on acorn or nut producing host trees (on pecan nut *C. caryae*; on hazelnut *C. neocorylus*; on chestnut *C. caryatrypes* and *C. sayi*) (WHITEHEAD et al., 2018). Only species are considered that develop in seeds of the genus *Quercus*. Germany has more than 1.1 million hectares of oak forests (10.4% of the tree stand) (THUENEN-INSTITUTE, 2012). The common oak (*Quercus robur*) is endemic throughout Europe. The sessile oak (*Quercus petraea*) mainly is distributed in Central Europe from Northern Italy to South Scandinavia. Mainly in Southern Europe further endemic and region-specific oak species like *Quercus pyrenaica, Q. cerris* and *Q. pubescens* are present.

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Transfer pest from consignment →host plant	The use of infested seeds may lead to the infestation of existing crops. The beetles are able to fly. No data is available on their distribution capacity.
Is a vector/further plant needed for host alternation?	No
Climate in distribution area comparable to PRA area?	The considered species are present in North and Central America from Canada to Honduras. It is assumed that Germany and large parts of the European Union are climatically suitable for establishment.
If no, are host plants present in protected cultivation?	No
Damage to be expected in the PRA-area?	Neither the beetles nor the larvae damage the trees. The damage is caused by the frass of the developing larvae in the acorns. Thus, damage has to be expected in the natural and commercial reproduction of oaks. In British Columbia (West Canada) infestation rates of 43-58% of the acorns of *Quercus garryana* due to *C. occidentis* were detected. Two or three larvae per acorn are sufficient to hollow out the acorn completely. When about 50% of the embryos are destroyed, about 13% of the acorns of *Q. garryana* are still viable (ROHLFS, 1999). In a study over several years at various locations in the eastern United States and Canada on acorns of *Quercus rubra* (considered invasive in Europe), the genus *Curculio* sp. (represented by *C. proboscideus, C. sulcatulus, C. orthorhynchus, C. nasicus, C. longidens*) was the most important harmful insect group. On 100 acorns per year and location, approximately a maximum of 300 adults developed (GIBSON, 1982). In Ohio, damage on 10-100% of the acorns on *Quercus alba* is documented, caused by insects, mainly *Curculio* sp. (*C. pardalis*, *C. sulcatulus*, *C. confusor*, *C. probosideus*, *C. strictus*, *C. iowensis*, *C. orthorhynchus*) (GIBSON, 1972). Acorns of *Quercus macrocarpa* in Ohio showed insect damage of 6-97% (1961-1964), 94% of the damage was caused by six *Curculio* species (*C. pardalis, C. strictus, C. sulcatulus, C. iowensis, C. proboscideus, C. confusor*) (GIBSON, 1971) No data is available on the survivability and the damage potential of North American *Curculio*-species on oaks endemic in the EU. The establishment could lead to competition with endemic species of acorns. Additional damage on acorns may reduce the

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	propagation ability of the oaks, mainly in forest habitats. *Quercus* sp. is the most important tree genus for invertebrate animals in the Red List of Threatened Species and thus, plays an important role in the conservation of biodiversity in Europe (JONSELL *et al.*, 1998).
Is an infestation easy to eradicate?	A successful eradication is not expected in case of an establishment outdoors. The optical differentiation from endemic species is difficult. So far, also the molecular-biological identification often is not possible due to lack of reference data (HUGHES & VOGLER, 2004). An efficient control would be conceivable only at an early discovery. The long emerging period of the adult insects and the facultative extended diapause make a chemical control difficult (MENU & DEBOUZIE, 2009). Insecticides are only used against the adult insects. In commercial seed production, damaged acorns can be sorted out because infested acorns float in water.
Remarks	Due to the broad range of species considered, there is a medium uncertainty regarding the endangered area and the damage potential. The risk analysis was prepared based on a non-completed taxonomic identification. The analyses of the PCR and the sequence analysis showed the highest concordance with the North American species *Curculio sulcatulus* (93,8%) and *Curculio strictus* (92,3%). Thus, it is assumed that it is a North American species, even if the species has not been determined so far. A definitive identification via the emergence sample might last months or even years.
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