

Express PRA for *Pagiocerus frontalis*

– Interception –

Prepared by: Julius Kühn-Institute, Institute for national and international Plant Health; Dr Gritta Schrader, Dr Cornel Adler (Institute for Ecological Chemistry, Plant Analysis and stored Product Protection); on: 15-09-2021. (translated by Elke Vogt-Arndt)

Initiation: Interception in Hamburg on maize from Peru

Express PRA	<i>Pagiocerus frontalis</i> (Fabricius, 1801)		
Phytosanitary risk for Germany	high <input type="checkbox"/>	medium <input checked="" type="checkbox"/>	low <input type="checkbox"/>
Phytosanitary risk for EU-Member States	high <input type="checkbox"/>	medium <input checked="" type="checkbox"/>	low <input type="checkbox"/>
Certainty of the assessment	high <input type="checkbox"/>	medium <input checked="" type="checkbox"/>	low <input type="checkbox"/>
Conclusion	<p>The bark beetle <i>Pagiocerus frontalis</i> is endemic to South America and so far, it does not occur in Germany. An occurrence in Italy could not be confirmed. So far, it is not listed in the Annexes of Regulation (EU) 2019/2072 or by EPPO.</p> <p><i>Pagiocerus frontalis</i> infests seeds of Avocado, other plants of the Laurel family (Lauraceae) and maize, especially soft maize.</p> <p>Due to unsuitable climate conditions, it is assumed that <i>P. frontalis</i> cannot establish in the field in Germany, but possibly in maize storage facilities. Establishment in the field in warmer EU-Member States and establishment in maize storage facilities cannot be excluded.</p> <p>Due to its high damage potential for maize kernels (maize for consumption, forage maize and seed maize), <i>P. frontalis</i> poses a phytosanitary risk for Germany and other EU-Member States.</p> <p>Based on this risk analysis, it is assumed that the pest can establish especially in warmer Member States and can cause considerable damage. Therefore, measures against the introduction of this potential quarantine pest according to Article 29 of Regulation VO (EU) 2016/2031 should be taken. Hence, the intercepted consignment must be destroyed, treated or rejected.</p>		
Preconditions for Express PRA fulfilled?	Yes, the beetle is very likely not yet present in the EU and it could be a pest of plants.		
Taxonomy, synonyms, common name	Coleoptera, Curculionidae, Scolytinae, <i>Pagiocerus</i> , <i>Pagiocerus frontalis</i> (Fabricius, 1801).		

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EPPO Code	PAGIFR
Does a relevant earlier PRA exist?	Yes, an unpublished (preliminary) Finnish PRA.
Distribution and biology	<p>Argentina, Belize, Bolivia, Brazil, Chile, Costa Rica, Dominican Republic, Ecuador, El Salvador, French-Guiana, Guadeloupe, Guatemala, Honduras, Jamaica, Lesser Antilles, Colombia, Cuba, Mexico, Nicaragua, Panama, Paraguay, Peru, United States of America (Southeast, individual findings in California, current status unknown), Trinidad and Tobago, Venezuela (Schedl, 1965, Bark and Ambrosia Beetles of North and Central America database, 2021, there also photos of the beetle).</p> <p>References to occurrence in Italy (Bark and Ambrosia Beetles of North and Central America database, 2021) could not be confirmed. The beetle was introduced to Switzerland but has been eradicated (Sanchez et al., 2020).</p> <p>Females of <i>P. frontalis</i> lay up to 80 eggs into maize kernels in the field or into avocado seeds and other Lauraceae-seeds (Yust, 1957, according to Eidt-Wendt & Schulz, 1990, Leathers, 2015, Downey et al. 2020). Larvae develop after harvest in dry maize kernels and under optimal conditions can conclude their life cycle within 3 to 4 weeks (Leathers, 2015, Okello et al., 1996a). If the storing conditions are suitable, probably <i>P. frontalis</i> can produce several generations per year and thus quickly establish large populations. The stored maize can be destroyed within 3-4 months (Eidt-Wendt & Schulz, 1990).</p>
Are host plants present in the PRA-area? If so, which?	<p>Seeds of the laurel family (Lauraceae), especially avocado (<i>Persea americana</i>), fresh and dried maize kernels (<i>Zea mays</i>) with preference of soft varieties (Eidt-Wendt & Schulz, 1990; Okello, 1994, Leathers, 2015; Downey et al., 2020). In laboratory trials with many different host plants, the beetle could only develop on chips of maize, avocado and manioc (<i>Manihot esculenta</i>) (Eidt-Wendt & Schulz, 1990; Okello et al., 1996a).</p>
Transfer pest consignment → host plant	When infested maize kernels are stored, the pest can spread to non-infested maize.
Is a vector/further plant needed for host alternation? Which? Distribution?	No.

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Climate in distribution area comparable to PRA-area?	<p>In laboratory trials by Okello et al. (1996a) <i>P. frontalis</i> produced offspring on maize at temperatures between 13° and 30°C. Three larval stages were observed. Above and below these temperatures the development was not completed. There was emergence at 12°C but the larvae did not develop to the pupal stage. At 10°C, no larvae emerged. From 32°C on, the mortality was 100 %. In laboratory trials by Eidt-Wendt & Schulz (1990), no oviposition took place at 10°C. In the trials by Okello et al. (1996a) the optimal temperature for the development of <i>P. frontalis</i> was 25°C, but according to reports from South America it is between 18 and 20°C (Okello et al., 1996a and quotations included there). <i>Pagiocerus frontalis</i> could produce offspring in the range of 20-75% relative humidity. However, mortality was very high at low humidity levels (Okello et al., 1996b). Eidt-Wendt and Schulz (1990) observed the highest emergence rate of F1-larvae at 20°C and 80% relative humidity.</p>
If no, are host plants present in protected cultivation?	<p>(Temporary) occurrence in Germany cannot be excluded especially in storage facilities with soft maize, especially under warmer and humid conditions. Overwintering at temperatures below 8.5°C is unlikely, but in storage facilities with larger quantities of products (e.g. in feed silos in halls) temperatures can easily be maintained above 13°C even in winter.</p>
Damage to be expected in the PRA-area?	<p>Yes, in storage facilities, in southern EU-Member States possibly also in the open field if temperatures and air humidity allow it. Downey et al. (2020) found that the beetles could kill both mature and developing seeds of Lauraceae while still on the tree, which can drastically reduce plant fertility. They showed that individual plants could lose up to 90 % seed harvest to seed feeders before dispersal.</p>
Is an infestation easy to eradicate?	<p>Treatments with deltamethrin in maize fields showed to be a good control measure against <i>P. frontalis</i> (Aldana, 1994).</p>
Remarks	<p>Primarily this pest is a storage pest, but it infests living plants (seeds), hence, it is still classified as a potential quarantine pest.</p>
Literature	<p>ALDANA, H. M. (1994): Eficiencia de la Deltrametrina en polvo (K-Obiol) en el control de los gorgojos del maíz <i>Sitophilus oryzae</i> (L.) y <i>Pagiocerus frontalis</i> (F.) en la zona maicera de Caqueza (Cundinamarca). Agronomía Colombiana, 11(1), 20-33.</p>

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	<p>BARK AND AMBROSIA BEETLES OF NORTH AND CENTRAL AMERICA DATABASE (2021): <i>Pagiocerus frontalis</i> (F. 1801). Last update 24 August 2021. Online available: https://www.barkbeetles.info/regional_chklist_target_species.php?lookUp=695 accessed on 15-09-2021.</p> <p>DOWNEY, H., LEWIS, O. T., BONSALE, M. B., WARD, A., GRIPENBERG, S. (2020): Assessing the potential for indirect interactions between tropical tree species via shared insect seed predators. <i>Biotropica</i>, 52(3), 509-520.</p> <p>EIDT-WENDT, J., SCHULZ, F.A. (1990): Studies on the Biology of <i>Pagiocerus frontalis</i> (Fab.) (Coleoptera: Scolytidae) infesting stored maize in Ecuador. In: 5. International working conference on stored-product protection, Bordeaux (France), 9-14 Sep 1990, 61-68. Online available: http://bru.gmprc.ksu.edu/proj/iwcspp/pdf2/5/61.pdf accessed on 15-09-2021.</p> <p>LEATHERS, J. (2015): California Pest Rating for <i>Pagiocerus frontalis</i> (Fabricius): A Scolytid Weevil Coleoptera: Cucurliionidae. Online available: https://blogs.cdafa.ca.gov/Section3162/?p=553 accessed on 15-09-2021.</p> <p>OKELLO, S. (1994): Investigation on the pest potential of <i>Pagiocerus frontalis</i> (Fabricius) (Coleoptera: Scolytidae) upon possible introduction to Kenya. Dissertation. Humboldt-Universität Berlin, xi+96 pp.</p> <p>OKELLO, S., REICHMUTH, C., SCHULZ, F.A. (1996a): Observations on the biology and host specificity of <i>Pagiocerus frontalis</i> (Fabricius) (Coleoptera: Scolytidae) at 20°C and 25°C and 75% rh. <i>Untersuchungen zur Biologie von Pagiocerus frontalis</i> (Fabricius) (Coleoptera: Scolytidae) bei 20°C, 25°C und 75% r.F. <i>Zeitschrift für Pflanzenkrankheiten und Pflanzenschutz</i> 103(4): 377-382.</p> <p>OKELLO, S., REICHMUTH, C., SCHULZ, F. A. (1996b): Laboratory investigations on the developmental rate at low relative humidity and the developmental temperature limit of <i>Pagiocerus frontalis</i> (Fab.)(Col., Scolytidae) at high and low temperatures. <i>Anzeiger für Schädlingkunde, Pflanzenschutz, Umweltschutz</i>, 69(8), 180-182.</p> <p>SANCHEZ, A., CHITTARO, Y., GERMANN, C., & KNÍŽEK, M. (2020): Annotated checklist of Scolytinae and Platypodinae (Coleoptera, Curculionidae) of Switzerland. <i>Alpine Entomology</i>, 4, 81.</p> <p>SCHEDL, K. E. (1965): The genus <i>Pagiocerus</i> Eichh. Important pests of maize -240- Contribution to the</p>

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	<p>morphology and systematic of the Scolytidae. Rivista di Agricoltura Subtropicale e Tropicale. [Istituto Agronomico per l'Africa Italiana], 59, 7-9.</p> <p>YUST, H.R. (1957): Biology and habits of <i>Pagiocerus fiorii</i> in Ecuador. J. econ. Ent. 50, 92-96.</p>