PRA

Rhabdoscelus obscurus

Plant Protection Service, The Netherlands

September 2009

FORMAT FOR A PRA RECORD (version 3 of the Decision support scheme for PRA for quarantine pests)

	European and Mediterranean Plant Protection Organisation		
	Organisation Européenne et Méditerranéenne pour la Protection des Plantes		
	Guidelines on Pest Risk Analysis		
	Lignes directrices pour l'analyse du risque phytosanitaire		
	Decision-support scheme for quarantine pests Version N°3		
PEST RISK ANALYSIS FOR			
Pest risk analyst:	Dirk Jan van der Gaag[1] Brigitta Wessels-Berk[2] [1] Plant Protection Service, Plant Health Strategy & Development, P.O. Box 9102, 6700 HC Wageningen, The Netherlands [2] Plant Protection Service, National Reference Laboratory, P.O. Box 9102, 6700 HC Wageningen, The Netherlands Date: September 2009		
Stage 1: Initiation			
1 What is the reason for performing the PRA?			In The Netherlands, adults, pupae and larvae of *Rhabdoscelus obscurus* were found in one greenhouse in an imported consignment of *Phoenix* palms from Indonesia in 2007. The species is a pest of sugar cane and palm trees in its current area of distribution. Emergency measures were taken to eradicate the pest. The pest is not listed as a quarantine pest for the European Community at present. **Note** *R. obscurus* is a quarantine pest in the USA and listed as an A1 pest by COSAVE, OIRSA, East Africa, Southern Africa, Argentina, Brazil and Paraguay (EPPO database on geographical distribution and host plants of quarantine pests, version 4.6).

2 Enter the name of the pest		*Rhabdoscelus obscurus* (Boisduval) **Other Scientific Names (CABI, 2007a; Zimmerman, 1994)** *Rhabdocnemis interruptocostatus* Schaufuss *Rhabdocnemis maculata* Schaufuss *Rhabdoscelus maculatus* Schaufuss *Rhabdocnemis obscura* (Biosduval) *Sphenophorus insularis* Boheman *Sphenophorus nudicollis* Kirsch *Rhabdocnemis nudicollis* (Kirsch) *Sphenophorus sulcipes* Karsch *Sphenophorus promissus* Pascoe *Rhabdocnemis promissus* (Pascoe) *Sphenophorus tincturatus* Pascoe *Sphenophorus Beccarii* Pascoe Rhabdocnemis Beccarii (Pascoe) *Sphenophorus interruptecostatus* Schaufuss *Rhabdocnemis fausti* Gahan *Sphenophorus obscurus* Boisduval *Rhabdocnemis obscura* Boisduval *Rhabdoscelis obscura* Boisduval *Calandra obscura* Boisduval **Common Names (CABI, 2007a)** **English** sugarcane weevil borer New Guinea cane weevil borer beetle borer cane weevil borer New Guinea sugarcane weevil weevil borer, cane sugarcane borer, Hawaiian weevil, New Guinea sugarcane

2A Indicate the type of the pest		Insect
2B Indicate the taxonomic position		Taxonomic Tree Class: Insecta Order: Coleoptera Family: Curculionidae Subfamily: Rhynchophorinae Genus: *Rhabdoscelus* Marshall Species : *obscurus* (Boisduval)
3 Clearly define the PRA area		Netherlands
4 Does a relevant earlier PRA exist?		No
5 Is the earlier PRA still entirely valid, or only partly valid (out of date, applied in different circumstances, for a similar but distinct pest, for another area with similar conditions)?		NA (not applicable)
Stage 2A: Pest Risk Assessment - Pest categorization		
6 Specify the host plant species (for pests directly affecting plants) or suitable habitats (for non parasitic plants) present in the PRA area.		<u>CABI (2007a) lists the following host plants:</u> *Major hosts*: *Saccharum, Saccharum officinarum* (sugar cane) *Minor hosts*: *Areca catechu* (betelnut palm), *Carica papaya* (papaw), *Cocos nucifera*

		(coconut), *Metroxylon sagu* (sago palm), *Musa* (banana), *Musa x paradisiacal* (plantain), *Zea mays* (maize). *Wild hosts*: Arecaceae (plants of the palm family), Poaceae (grasses), *Strelitzia reginae* (Queen bird-of-paradise). It is noted that grasses other than sugar cane are, at best, infrequent hosts. <u>Host plants according to Zimmerman (1993):</u> Sugarcane, coconut, sago, *Areca catechu*, *Chrysalidocarpus lutescens*, *Phoenix canariensis* and other palms, occasionally in other host plants such as banana, papaya, maize, and other grasses. See Q 1.6 for notes on palm trees (Arecacea) as host plants. *R. obscurus* is currently present in tropical and subtropical areas and the climate in the Netherlands is probably not suitable for establishment outdoors. However, glasshouse conditions are probably suitable for establishment and palm species and *Musa* spp. are grown in glasshouses. The Netherlands has a glasshouse area with palm trees of about 20-30 ha (Van der Gaag & Scholte, 1996).
7. Specify the pest distribution		*R. obscurus* is present in parts of Asia, Oceania and the USA (Hawaii) (CABI, 2007a).
8. Is the organism clearly a single taxonomic entity and can it be adequately distinguished from other entities of the same rank?		Yes
9. Even if the causal agent of particular symptoms has not yet been fully identified, has it been shown to produce consistent symptoms and to be transmissible?		NA
10. Is the organism in its area of current distribution a known pest (or vector of a pest) of plants or plant products?		Yes

11. Does the organism have intrinsic attributes that indicate that it could cause significant harm to plants?		NA
12 Does the pest occur in the PRA area?		No
13. Is the pest widely distributed in the PRA area?		No
14. Does at least one host-plant species (for pests directly affecting plants) or one suitable habitat (for non parasitic plants) occur in the PRA area (outdoors, in protected cultivation or both)?		Yes
15. If a vector is the only means by which the pest can spread, is a vector present in the PRA area? (if a vector is not needed or is not the only means by which the pest can spread go to 16)		NA
16. Does the known area of current distribution of the pest include ecoclimatic conditions comparable with those of the PRA area or sufficiently similar for the pest to survive and thrive (consider also protected conditions)?		Yes, glasshouse conditions in the PRA area are probably sufficiently similar for survival.
17. With specific reference to the plant(s) or habitats which occur(s) in the PRA area, and the damage or loss caused by the pest in its area of current distribution, could the pest by itself, or acting as a vector, cause significant damage or loss to plants or other negative economic impacts (on the environment, on society, on export		Yes

markets) through the effect on plant health in the PRA area?		
18. This pest could present a risk to the PRA area.		Yes
19. The pest does not qualify as a quarantine pest for the PRA area and the assessment for this pest can stop.		

Section 2B: Pest Risk Assessment - Probability of introduction/spread and of potential economic consequences

Question	Rating + uncertainty	Explanatory text of rating and uncertainty
		Note: If the most important pathway is intentional import, do not consider entry, but go directly to establishment. Spread from the intended habitat to the unintended habitat, which is an important judgement for intentionally imported organisms, is covered by questions 1.33 and 1.35.
1.1. Consider all relevant pathways and list them		I. <u>Commercial import of plants for planting of palm trees (Arecaceae), other than fruits, seeds, seedlings of *Howea* sp. and plant tissue culture plants from areas where the pest occurs</u> *R. obscurus* attacks a wide variety of palm species. "Most of the palm species commonly grown in Australian nurseries are recorded hosts of sugar cane weevil" (NIAA, 1998). Therefore, we consider all palm species imported from regions where the pest is present as potential pathways in this PRA. From 2005 - 2007, palm trees (other than seedlings) were imported from the following countries where the pest is present: Cook Islands, Indonesia, Malaysia, Japan and Taiwan (according to the distribution list of CABI (2007a)). Plants are also imported from the USA but according to CABI, the pest is only present on Hawaii. Plants imported from the USA into the Netherlands originate probably from Florida and not from Hawaii (information from a Dutch company importing palm trees). II. <u>Commercial import of plants for planting of *Musa* spp. including vegetative propagation material (stems) from areas where the pest occurs</u> No interceptions are known of *R. obscurus* on banana plants. However, another palm weevil, *Metamasius hemipterus*, has been intercepted on banana stems in 1924 and 1925 in the USA (CABI, 2007b), and banana stems and banana plants may be a pathway for *R. obscures* since *Musa* spp. is listed as a host plant.

Question	Rating + uncertainty	Explanatory text of rating and uncertainty
		Musa sp. have been imported from the following countries into the Netherlands where the pest is present during the period 2005 - 2007: Australia (20 plants in 2005), USA (about 700 plants in 2005 and 70 plants in 2007). In the USA, the pest is present on Hawaii, but palm plants are probably not imported from Hawaii into the Netherlands (information from a Dutch company). Import of Musa spp. by other EU-countries is not known (see EPPO PRA of Metamasius hemipterus available at http://www.eppo.org/QUARANTINE/Pest_Risk_Analysis/PRA_documents.htm; accessed October 2009) The plants imported by the Netherlands are (usually) small plants (20 to 40 cm) grown in potting soil and probably grown in protected conditions (NPPO of the Netherlands, pers. comm., 2008). Like for *Metamasius hemipterus* the probability of these *Musa* spp. plants to be contaminated or infested is assessed to be very low (see EPPO PRA of *Metamasius hemipterus*). This pathway is therefore not considered further. Note: *Musa* sp. is listed as a host plant by several authors but has never been seen as a pest on bananas in Queensland, Australia (CABI, 2007a). III. Commercial import of banana fruits from areas where the pest occurs In the USA, another palm weevil *Metamasius hemipterus* has been intercepted on imported fruits of host plants in 1920 and 1940 (CABI, 2007b). Banana fruit might also be a pathway for *R. obscurus*. In literature, one record was found of an interception of R. obscurus on bananas from Central America (Maskew & Strong, 1920). This may, however, a misidentification since *R. obscurus* is not known to occur in Central America. The method of banana import at the time of the records of *M. hemipterus* and the questionable record of *R. obscurus* (1920 and 1940) was very different from nowadays. At that time, whole bunches were imported, while nowadays, bananas come as boxes in hands, and are treated in a bath and then covered, and spend some time in a maturation chamber (see EPPO-PRA on *M. hemipterus*). Moreover, banana fruits are mainly

<table>
<tr><th>Question</th><th>Rating + uncertainty</th><th>Explanatory text of rating and uncertainty</th></tr>
<tr><td></td><td></td><td>imported from Central and South America. This pathway is, therefore, considered very unlikely and is not considered further.

IV. <u>Commercial import of sugar cane from areas where the pest occurs</u>
R. obscurus has probably been introduced into new areas by trading of infested sugar cane (Muniappan et al., 2004). According to FAOSTAT, sugar cane was imported into the Netherlands from 2003 – 2005 (Table 2). Sugar cane was not imported from countries where the pest occurs except the USA. In the USA, R. obscurus is only present on Hawaii and sugar cane imported from the USA is probably imported from continental USA. Moreover, the probability that the pest will transfer from imported sugar cane to a host plant in a glasshouse is considered very low. For these reasons, this pathway is not considered any further in the present PRA.

Table 1. Tonnes of sugarcane imported into the Netherlands in 2003, 2004, and 2005 (source: FAOSTAT), with exporting countries listed for 2005:
<table>
<tr><th>Country</th><th>2003</th><th>2004</th><th>2005</th></tr>
<tr><td>Netherlands</td><td>391</td><td>75</td><td>79 (Costa Rica 24, USA 36, China 5, Columbia 7, Ecuador 1, Ghana 2, Kenya 3, Suriname 1)</td></tr>
</table>

V. <u>Commercial import of seedlings of Howea sp. from areas where the pest occurs</u>
Large numbers of Howea seedlings are imported from Australia into the EU. For example about 2.2 million seedlings were imported via or into the Netherlands per year in the period 2005 – 2007 (source: NPPO of the Netherlands). These seedlings are very small and usually not more that a sprouting seed. The risk of this pathway having infestations of R. obscurus is considered negligible.</td></tr>
</table>

Question	Rating + uncertainty	Explanatory text of rating and uncertainty
		VI. Hitchhiker on products other than palm trees, palm seedlings, *Musa* spp, sugar cane, and banana fruits imported from areas where the pest occurs. *R. obscurus* might enter as a hitchhiker on consignments other those mentioned above. No such interceptions are, however, known and this pathway is not considered any further in this PRA. VII. Passenger's luggage Private persons could import (parts of) host plants including fruits or other products from areas where the pest is present. This pathway will be much less relevant than commercial import because of the very low volumes and is, therefore, not considered any further in this PRA.
1.2. Estimate the number of relevant pathways, of different commodities, from different origins, to different end uses.	**Not relevant**	
1.3. Select from the relevant pathways, using expert judgement, those which appear most important. If these pathways involve different origins and end uses, it is sufficient to consider only the realistic worst-case pathways. The following group of questions on pathways is then considered for each relevant pathway in turn, as appropriate, starting with the most important.		The pathway "Commercial import of plants for planting of palm trees (Arecaceae), other than fruits, seeds, seedlings and plant tissue culture plants from areas where the pest occurs" is the most important one. Other pathways identified under 1.1 are much less important. Movement of infested plant material is probably the main way by which the pest is spread over large distances and has been introduced into new areas: "Within Queensland (Australia) infected plant material cannot be moved between districts, especially from northern and central Queensland, northern New South Wales and Western Australia" (CABI, 2007a). The Plant Protection Service found/intercepted *R. obscurus* twice in 2007: - one finding in a glasshouse on *Phoenix* palms imported from Indonesia - one interception on *Phoenix* palms imported from Indonesia These finding and interception show that *R. obscurus* can enter the Netherlands with

Question	Rating + uncertainty	Explanatory text of rating and uncertainty
		import of palm plants from areas where the pest is present.
Pathway n°: **This pathway analysis should be conducted for all relevant pathways**		
1.4. How likely is the pest to be associated with the pathway at origin taking into account factors such as the occurrence of suitable life stages of the pest, the period of the year?	**Moderately likely** **Uncertainty: high**	Little information is available on the abundance of the pest on palm nurseries from which palms are grown for export to the Netherlands. The pest has been found/intercepted twice on *Phoenix* palms originating from a palm nursery in Indonesia. It is, however, unknown if the pest is (generally) occurring on palm nurseries in countries where the pest is present. According to CABI (2007a), the pest has a restricted distribution in for example Malaysia, Indonesia and Japan. These countries have (regions/islands with) (sub)tropical climates where palm plants are present outdoors throughout the year. Thus, suitable life stages can be present throughout the year. The period of the year may affect the prevalence of the pest. The pest is causing more damage in areas with heavy rainfall than in drier areas (CABI, 2007a) and during wet seasons plants may be more stressed and vulnerable for attack by the species than during dry seasons.
1.5. How likely is the concentration of the pest on the pathway at origin to be high, taking into account factors like cultivation practices, treatment of consignments?	**Moderately likely** **Uncertainty: high**	See also Q 1.4: little information is available and we do not know if the pest is present on palm nurseries (at high prevalence). If the pest is present in areas where the palms are grown it is almost impossible to grow palms completely free of the pest because of hidden life stages and difficulties to control these life stages (see also Q 2.4).
1.6. How large is the volume of the movement along the pathway?	**Moderate** **Uncertainty:**	In 2005 - 2007, palm plants have been imported into the Netherlands (database PPS) from the following countries/regions where the pest is present: Australia, Cook Islands, Indonesia, Malaysia, Japan and Taiwan (according to the distribution list of CABI (2007a)). Plant were also imported from USA but according to CABI, the pest is only present on Hawaii and plants imported from the USA into the Netherlands originate probably not from Hawaii.

Question	Rating + uncertainty	Explanatory text of rating and uncertainty
	medium	Table 2. Import volume of palm species, other than Howea seedlings, from countries/regions where *R. obscurus* is present (source database PPS):

Country	Palm genus	Mean number of plants per year (2005-2007)	Recorded host (see notes below the table)
MALAYSIA	*RHAPIS*	55,748	No
INDONESIA	*RHAPIS*	36,577	No
MALAYSIA	*LIVISTONA*	4,592	No
INDONESIA	*PHOENIX*	3,389	Yes
MALAYSIA	*RAPHIS*	1,984	No
COOK ISLANDS	*PHOENIX*	546	Yes
MALAYSIA	*CHRYSALIDOCARPUS*	434	Yes
MALAYSIA	*CARYOTA*	336	Yes
INDONESIA	*RAVENEA*	283	No
MALAYSIA	*LICUALA*	119	Yes
TAIWAN	*RHAPIS*	100	No
INDONESIA	*CHAMAEDOREA*	60	No
INDONESIA	*ARECA*	52	No
INDONESIA	*LIVISTONA*	50	No
JAPAN	*MASCARENA*	7	No
MALAYSIA	*CHAMAEDOREA*	4	No
INDONESIA	*CHRYSALIDOCARPUS*	3	Yes
INDONESIA	*THRINAX*	3	No

Notes on host plants
Possibly, all palm species can be attacked by *Rhabdoscelus obscurus*; plants of the palm family (Arecaceae) are recorded as minor hosts by (CABI (2007a). However, some palm species may be more attractive than others. In literature, the following palm species are mentioned as being attacked by *R. obscurus*:

Question	Rating + uncertainty	Explanatory text of rating and uncertainty
		Zimmerman (1993) has listed the following palm species/genera in Queensland in Australia: *Aphanes caryotifolia* *Archontophoenix alexandra* *Archontophoenix cunninghamiana* *Areca catechu* *Bactris gasipaes* *Carpentaria acuminata* *Caryota mitis* *Cocos nucifera* *Chrysalidocarpus lutescens* *Chrysalidocarpus madagascariensis* *Dictyosperma album* *Dypsis* *Euterpe* *Hyophorbe lagenicaulis* *Licuala* *Metroxylon sagu* *Metroxylon salmonense* *Neodypsis decaryi* *Normanbya normabyi* *Phoenix canariensis* *Phloga nodifera* *Pifagetta filaris* *Ptychosperma elegans* *Roystonea regia* *Syagrus romanzoffiana* *Wodyetia bifurcata* NIAA (1998) has listed the following palm species as recorded hosts in Australia:

Question	Rating + uncertainty	Explanatory text of rating and uncertainty
		Archontophoenix alexandrae and *A. cunninghamiana* *Caryota urens* *Cocos nucifera* *Pritchardia martii* *Ptychosperma elegans* *Roystonea regia* *Sabal palmetto* *Ravenala madagascariensis* *Phoenix canariensis* *Hyophorbe lagenicaulis* *Dypsis lutescens (*syn. *Chrysalidocarpus lutescens)* *Neodypsis decaryi* *Carpentaria acuminata* *Normanbya normanbyi* *Wodyetia bifurcata* *Dictyosperma album* *Syagrus romanzoffiana* *Licuala spp.* Muniappan et al. (2004) list the following palm species as the most affected plants on Guam (island in the Pacific): *Areca catechu, Cocos nucifera, Hyophorbe lagenicaulis, Pritchardia pacifica, Phoenix roebelenii, Archontophhoenix alexandrae, Roystonea regia and Phoenix canariensis.* No records are known of the pest on *Howea* sp., *Rhapis* spp., *Chamaedorea* spp. and *Mascarena* spp. and these palm species might be minor hosts. Thus far, the pest has been found/intercepted twice on *Phoenix* palms imported from Indonesia and no record are known on other palm species imported into the Netherlands

Question	Rating + uncertainty	Explanatory text of rating and uncertainty
		Uncertainty/lack of information: it is unknown if the pest is present on palm nurseries in Malaysia, Japan, Taiwan and Cook Islands from which palm trees are imported.
1.7. How frequent is the movement along the pathway?	**Often** **Uncertainty: low**	Palm species are imported during the whole year into the Netherlands in sea containers without climate control
1.8. How likely is the pest to survive during transport/storage?	**Very likely** **Uncertainty: low**	After pupation the adults remain active for about 12 days within the cocoon before they emerge (CABI 2008a). The pest remains viable even if the host plant is not alive. Adults can survive in the field for at least 25 weeks (Van Zwanenburg & Rosa, 1940). According to CABI (2008a) adults can live for about 10 months. The pest has been intercepted/found twice on Phoenix palms imported from Indonesia showing that the pest can survive during transport.
1.9. How likely is the pest to multiply/increase in prevalence during transport /storage?	**Very Unlikely** **Uncertainty: low**	The lifecycle is 3 to 4 months and transport takes about one month.
1.10. How likely is the pest to survive or remain undetected during existing management procedures (including phytosanitary measures)?	**Very likely** **Uncertainty: low**	It is very difficult to detect the pest when plants are lightly attacked since the larvae are inside the stem and they can usually not be observed without destruction of the palm tree (e.g. splitting of the stem/trunk).
1.11. In the case of a commodity pathway, how widely is the commodity to be distributed throughout the PRA area?	**Moderately widely** **Uncertainty: low**	See the PRA on *Darna trima* (Van der Gaag & Scholte, 2006): "Palm species are grown on about 20 – 30 ha in glasshouses in the Netherlands. Most of these glasshouses are located in glasshouse areas the western part of the Netherlands (regions: Aalsmeer and Westland). Some of the glasshouse productions sites are located in the southern and eastern part of the Netherlands (G. van Leeuwen, Applied Plant Research, the Netherlands, pers. communication to D.J. van der Gaag, May 2005)."

Question	Rating + uncertainty	Explanatory text of rating and uncertainty
1.12. In the case of a commodity pathway, do consignments arrive at a suitable time of year for pest establishment?	**NA**	Not relevant. The pest is introduced on a suitable host and is place in glasshouses with other host plants.
1.13. How likely is the pest to be able to transfer from the pathway to a suitable host or habitat?	**Moderately likely** **Uncertainty: medium**	Plants for planting are imported by nurseries or may be directly sold to end-consumers. In both cases, palms are likely to be placed near other host plants which can be infested by adults emerging from the imported plants. In all cases, at least one mated female or one female and one male beetle will need to be present to start a breeding population. An infested palm tree can harbour hundreds of specimens of *M. hemipterus* (e.g. Giblin-Davis *et al*, 1996b) and in case one or more infested trees are imported, it is very likely that at least one male and female beetle (or larvae) are present.
1.14. In the case of a commodity pathway, how likely is the intended use of the commodity (e.g. processing, consumption, planting, disposal of waste, by-products) to aid transfer to a suitable host or habitat?	**Very likely** **Uncertainty: low**	See above When palms are planted outdoors or located in nurseries, *M. hemipterus* could fly and colonize other palms.
1.15. Do other pathways need to be considered?		No

Question	Rating + uncertainty	Explanatory text of rating and uncertainty
Conclusion on the probability of entry. Risks presented by different pathways.		The pest can enter The Netherlands by import of infested palm plants as shown by finds/interceptions on 2 Phoenix consignments imported from Indonesia. Uncertainty: it is difficult to assess the probability on entry for palm species other than Phoenix and for countries/areas other than Indonesia. For example, relatively many Rhapis palms are imported from Malaysia and Taiwan but information is lacking about the presence/abundance of the pest on palm nurseries in those countries. **Probability of entry: low - medium (uncertainty: medium)**
1.16. Estimate the number of host plant species or suitable habitats in the PRA area (see question 6).	**Moderate number** **Uncertainty: low**	Palm plant species of more than 20 genera are grown in commercially glasshouse production sites in the Netherlands (Anonymous, 2008): *Phoenix canariensis* and *Chrysiladocarpus lutescens* are recorded hosts in Queensland (Australia) (NIAA, 2007). *Phoenix roebelenii* and *P. canariensis* are among the most affected plants on Guam, an island in the Pacific (Muniappan, 2004). No records are known of *Howea* or *Chamaedora* as host plants of *R. obscurus*.
1.17. How widespread are the host plants or suitable habitats in the PRA area? (specify)	**Moderately widely** **Uncertainty: medium**	See the PRA on the palm pest *Darna trima* (Van der Gaag & Scholte, 2006): "Palm species are grown on about 20 – 30 ha in glasshouses in the Netherlands. Most of these glasshouses are located in glasshouse areas the western part of the Netherlands (regions: Aalsmeer and Westland). Some of the glasshouse productions sites are located in the southern and eastern part of the Netherlands (G. van Leeuwen, Applied Plant Research, the Netherlands, pers. communication to D.J. van der Gaag, May 2005)."
1.18. If an alternate host or another species is needed to complete the life cycle or for a critical stage of the life cycle such as transmission (e.g. vectors), growth (e.g. root symbionts), reproduction (e.g. pollinators) or spread (e.g. seed dispersers), how likely is the pest to come in contact with such species?	**NA**	Not applicable

Question	Rating + uncertainty	Explanatory text of rating and uncertainty
1.19. How similar are the climatic conditions that would affect pest establishment, in the PRA area and in the current area of distribution?	**Not similar for outdoor circumstances** **Similar for protected cultivation** **Uncertainty: low**	Not similar for outdoor circumstances Moderately similar for protected cultivation
1.20. How similar are other abiotic factors that would affect pest establishment, in the PRA area and in the current area of distribution?	**Not relevant**	Abiotic factors other than climate conditions are probably of minor importance for establishment
1.21. If protected cultivation is important in the PRA area, how often has the pest been recorded on crops in protected cultivation elsewhere?	**Very rarely** **Uncertainty: low**	The pest has been recorded on Phoenix palms in a glasshouse in the Netherlands once. The palms had recently (about one month before detection) been imported from Indonesia. No other records are known of the pest in protected cultivation.
1.22. How likely is it that establishment will occur despite competition from existing species in the PRA area?	**Very likely** **Uncertainty: low**	No competitors are known in the PRA area.
1.23. How likely is it that establishment will occur despite natural enemies already present in the PRA area?	**Very likely** **Uncertainty: low**	Pathogens, parasitoids and predators that are natural enemies in the area of origin are not established in the PRA area. Larvae of predaceous Elateridae, that are present in the PRA area, and several fungi may act as natural enemies but it is very unlikely that they can prevent establishment.

Question	Rating + uncertainty	Explanatory text of rating and uncertainty
1.24. To what extent is the managed environment in the PRA area favourable for establishment?	**Slightly favourable** **Uncertainty: medium**	Plants that are imported are usually sold shortly (8 – 12 weeks, information obtained from a Dutch company) after import or are even sold directly via auctions (Anonymous, 2008). Napompeth et al (1972) studied the duration of the life cycle of *R. obscurus* in laboratory experiments at a mean daily temperature ranging from 25 – 31ºC. *R. obscurus* completed its life cycle in 3 – 4 months. We are not aware of any study of life cycle duration in living palms trees. Results of interviews and surveys on palm nurseries in Australia suggested 2 generations of the weevil per year (Halfpapp & Storey, 1991), and *R. obscurus* will probably need at least 3-4 months to complete its life cycle on palm trees. The relatively long life cycle of the weevil and the short growing period of palm trees in glasshouses of palms will not aid to establishment. The pest may even be fully removed from the glasshouse when all plants of the infested consignment have been sold. The pest will only remain and possibly establish when beetles mate and deposit their eggs on host plants from other consignments when the infested consignment is still present and/or when beetles remain in the glasshouse after removal of the infested consignment. Beetles can live for more than 25 weeks (Van Zwanenburg & Rosa, 1940; Napompeth et al., 1972). Because of the short growing period, the probability that beetles from infested consignments will attack other palm plants present in the same glasshouse is for these reasons estimated to be low to moderate and it is considered unlikely that large populations will be built op in glasshouses.
1.25. How likely is it that existing pest management practice will fail to prevent establishment of the pest?	**Likely** **Uncertainty: low**	In the Netherlands, insecticides are used at low frequencies at palm production sites. Moreover, the pest is difficult to control since the larvae are present inside the stem and also the beetles are secretive and usually shelter in cracks, debris, under leaves etc during the day (CABI, 2007A). Larvae and beetles will, therefore, be difficult to hit by insecticides. Soil-drenches/drip irrigation of imidacloprid which may kill the larvae inside are generally not used in palm nurseries.
1.26. Based on its biological characteristics, how likely is it that the pest could survive eradication programmes in the PRA area?	**Unlikely** **Uncertainty: low**	The pest can probably not survive outdoors in the PRA area. Foliar application of insecticides in combination with soil drenches of systemic insecticides and removal of visibly infested plants will possibly be sufficient to eradicate the pest in a glasshouse. Otherwise all infested consignments can be destroyed to eradicate the pest from a

Question	Rating + uncertainty	Explanatory text of rating and uncertainty
		glasshouse.
1.27. How likely is the reproductive strategy of the pest and the duration of its life cycle to aid establishment?	**Moderately likely** **Uncertainty: medium**	The relatively long life cycle (3-4 months) and the short growing period makes it difficult for the pest to establish (see Q 1.24)
1.28 How likely are relatively small populations to become established?	**Likely** **Uncertainty: medium**	It is assumed that in principle one female beetle and one male beetle is sufficient to establish a new population. This is, however, uncertain. Up to several hundreds of larvae can, however, be present in a single palm tree (Halfpapp & Storey, 1991) and one single infested tree with several larvae is probably sufficient to start a new population.
1.29. How adaptable is the pest?	**Low** **Uncertainty: medium**	The pest can attack a large range of host plant species (CABI, 2007A), but cannot survive outdoors in the PRA area.
1.30. How often has the pest been introduced into new areas outside its original area of distribution? (specify the instances, if possible)	**Often** **Uncertainty: low**	As far as known, the pest has been introduced once in a glasshouse in the Netherlands and subsequently eradicated. In that particular case the pest was found on *Phoenix* plants that had been imported from Indonesia. Some plants were found heavily infested with more than 100 beetles present in one plant (observations inspector Dutch NPPO). *Rhaphis* palm plants were also present in the glasshouse but the pest was not observed on these plants. The pest is native to New Guinea from which it has spread by human activity to other areas (CABI, 2007a). The pest is now present in a large number of countries/isles in the western Pacific (CABI, 2007a).

Question	Rating + uncertainty	Explanatory text of rating and uncertainty
1.31. If establishment of the pest is very unlikely, how likely are transient populations to occur in the PRA area through natural migration or entry through man's activities (including intentional release into the environment) ?	**Moderately likely** **Uncertainty: high**	The pest may be introduced with the import infested plant material and be removed when the plants are sold (no disease symptoms) or destroyed (visibly infested plants).
Conclusion on the probability of establishment		The pest can possibly establish at palm production sites in the Netherlands. The climatic conditions in the glasshouses and the presence of host plants throughout the year make establishment possible. However, the generally short growing period of imported palms together with the relatively long life cycle could make it difficult for the pest to become established after entry in a glasshouse. **Probability of establishment: low to moderate in commercial palm glasshouses; very unlikely outdoors**
1.32. How likely is the pest to spread rapidly in the PRA area by natural means?	**Unlikely** **Uncertainty: medium**	Van Zwaluwenburg & Rosa (1940) released marked specimen of which some were found up to about 0.5 km from the release point (greatest distance was about 1670 feet). Beetles moved further down-wind than up-wind. Natural spread in the PRA area is, however, unlikely to occur. The outdoor conditions are unfavourable for the pest most time of the year and host plants (palms) are only incidentally present outdoors. Grasses are commonly present outdoors but are known as infrequent hosts, at best (CABI, 2007a). Spread between glasshouses with palm species might occur but this is not likely to happen since the conditions within the glasshouse will be more favourable to the pest (warmer). Moreover, the number of glasshouses with palm plants is limited (total glasshouse area with palm trees is 20-30 ha) and distances between glasshouses will be usually more than several km's. Beetles may fly up to or even more than 0.5 km (Van Zwaluwenburg & Rosa, 1940), but it is not likely that beetles will find another glasshouse with palms located several km's away.
1.33. How likely is the pest to spread rapidly in the PRA area by human assistance?	**Unlikely** **Uncertainty:**	The pest can remain undetected and be spread by movement of infested plants. Halfpapp & Storey (1991) stated for the situation in Queensland (Australia) that "although there is no direct evidence, we believe that *R. obscurus* infestations in newly established nurseries

Question	Rating + uncertainty	Explanatory text of rating and uncertainty
	medium	primarily come from infested plants received from older established nurseries." Palm trees are usually sold to end-consumers and placed inside buildings. If the tree is infested the tree may grow badly or even die. It is, however, unlikely that the pest will establish in buildings where the palm trees are placed. Some palm importers sell palm trees to other glasshouse companies by which the pest can spread to other glasshouses
1.34. Based on biological characteristics, how likely is it that the pest will not be contained within the PRA area?	**Unlikely** **Uncertainty: medium**	The pest will probably not spread rapidly (see Q 1.32 and Q 1.33)
Conclusion on the probability of spread		**Probability of spread: low**
Conclusion on the probability of introduction and spread **The overall probability of introduction and spread should be described. The probability of introduction and spread may be expressed by comparison with PRAs on other pests.**		The pest can enter glasshouses in the PRA area by import of infested trees. These trees are, however, sold usually within 8-12 weeks after import and the probability that the pest will attack other plants seems low since the pest has a relatively long life cycle (3-4 months) and the pest is attracted to plants that are already infested and/or damaged. The pest can probably not establish outdoors in the PRA area but only in glasshouses. **Probability of introduction: low – moderate** Natural spread between glasshouses is unlikely to occur due to unfavourable climate outdoors and because of the fact that glasshouses with palm plants are usually located several km's apart and palm trees are only incidentally growing outdoors. Spread may occur by movement of infested palm trees between glasshouses. Some palm importers sell palm trees to other glasshouse companies by which the pest could be spread to other glasshouses **Probability of spread: low - moderate**

Question	Rating + uncertainty	Explanatory text of rating and uncertainty
Conclusion regarding endangered areas 1.35. Based on the answers to questions 1.16 to 1.34 identify the part of the PRA area where presence of host plants or suitable habitats and ecological factors favour the establishment and spread of the pest to define the endangered area.		Glasshouse production sites that import palm plants from countries where the pest is present are the most endangered area. Glasshouse production sites that grow palm plants (but do not import plants from areas where the pest is present are the less endangered area.
2. In any case, providing replies for all hosts (or all habitats) and all situations may be laborious, and it is desirable to focus the assessment as much as possible. The study of a single worst-case may be sufficient. Alternatively, it may be appropriate to consider all hosts/habitats together in answering the questions once. Only in certain circumstances will it be necessary to answer the questions separately for specific hosts/habitats.		
2.1. How great a negative effect does the pest have on crop yield and/or quality to cultivated plants or on control costs within its current area of distribution?	**Minor - Moderate** **Uncertainty: medium**	Quantitative estimates of yield losses are available for sugar cane but little information is available for palms (CABI, 2007a). Because sugar cane is not grown in the PRA area, we only discuss the damage on palms and Musa sp. In literature most information is available on the situation in Queensland (Australia): Halfpapp & Storey (1991) performed a survey on 22 palm-nurseries in Queensland and interviewed the growers of these nurseries. Seventeen out of the 22 growers had problems with *R. obscurus* ranging from mild to severe. The 5 nurseries without the problems with the palm weevil were either recently established or had heavy chemical control programs which suggested that frequent application of insecticides may sufficiently control the weevil. The weevil killed young palms and older palms of some species, e.g. *Neodypsis decaryi* and *Chrysalidocarpus madagascariensis*. It appeared from comments made by

Question	Rating + uncertainty	Explanatory text of rating and uncertainty
		growers and the numbers of enquiries received that the problems with *R. obscurus* in palms were increasing. According to NIAA (1998): *R. obscurus* is a serious problem to palm growers in Queensland and causes a loss of public confidence in palms in public and private landscaping. The pest can kill seedlings and may weaken older palms. Older palms can become unsaleable and heavy infestations can lead to the death of older palms. Mungomery (1937 cited in Halfpapp & Storey, 1991) did not know any attack of bananas in Queensland. Fay (2001) reported that palm nurseries in north Queensland has had to face increasing problems with R. obscurus since 1991. Presently, the palm nursery industry in Queensland and New South Wales report minor occurrence of this pest on a cyclical basis. Palm growers use organophosphate insecticides when *R. obscurus* is encountered and consider it a minor pest (pers. comm. M. Ashton, Biosecurity Queensland, Australia). Bianchi & Owen (1965) performed a survey on several islands in the Great Pacific Ocean: on Babelthuap (Palau group) and on Saipan (Mariana group), the pest was found but mainly on sugar-cane. On Guam, 100% damage was observed on coconut palm and nuts had not been obtained for several months. Typhoons and another disease may had contributed to these yield losses as stated by the authors. In Indonesia, the pest is mostly attacking sugar cane, banana, coconuts, wild palms and oil palm. Damage in oil palm is still limited according to Desmier de Chenon et al. (2001). No records could be found on damage levels in banana in literature. In this PRA, *R. obscurus* is assessed to be a minor pest in bananas and a minor - moderate pest in palm trees in its current area of distribution.
2.2. How great a negative effect is the pest likely to have on crop yield and/or quality in the PRA area without any control	**Minor** **Uncertainty:**	The effect is expected to be limited since it seems unlikely that large populations will be build up in glasshouses and most damage will be caused by the import of infested plants from areas where the pest is present and not from new infestations in the PRA area (see

<table>
<tr><th>Question</th><th>Rating + uncertainty</th><th>Explanatory text of rating and uncertainty</th></tr>
<tr><td>measures?</td><td>medium</td><td>also Q 1.24).

Note: impact for the EU
The pest will have a higher impact for southern EU-countries where the pest can likely establish outdoors. In southern EU, palms are widely present and grown on nurseries and as amenity trees in public and private gardens and in forests (see the EPPO PRA on Metamasius hemipterus). The impact will be mainly or only for palm trees since sugar cane and banana are minor crops in the EU (Tables 3 and 4). Moreover banana does not seem to be an important host plant of R. obscurus (see question 2.1). For the southern part of the EU it is expected that R. obscurus will have a similar effect on palm trees as it presently has in its present area of distribution and its impact is assessed as “moderate” for the whole EU with a medium uncertainty (see question 2.1).

Table 3: areas in ha covered by harvested sugar cane in 2005, 2006, 2007 in the EU.
<table>
<tr><th>Country</th><th>2005</th><th>2006</th><th>2007</th></tr>
<tr><td>Portugal</td><td>50</td><td>50</td><td>60</td></tr>
<tr><td>Spain</td><td>614</td><td>950</td><td>1000</td></tr>
</table>
(source FAOSTAT)

Table 4. Area (ha) covered by harvested bananas in 2004, 2005 and 2006:
<table>
<tr><th>Countries</th><th>2004</th><th>2005</th><th>2006</th></tr>
<tr><td>Spain</td><td>9715</td><td>9553</td><td>10000</td></tr>
<tr><td>Portugal</td><td>1204</td><td>1206</td><td>1206</td></tr>
<tr><td>Cyprus</td><td>262</td><td>250</td><td>260</td></tr>
<tr><td>Italy</td><td>11</td><td>8</td><td>8</td></tr>
</table>
(source FAO STATS)</td></tr>
</table>

Question	Rating + uncertainty	Explanatory text of rating and uncertainty
2.3. How easily can the pest be controlled in the PRA area without phytosanitary measures?	**With much difficulty** **Uncertainty: medium**	The pest is difficult to control because of the hidden life stages (see Q 1.25).
2.4. How great an increase in production costs (including control costs) is likely to be caused by the pest in the PRA area?	**Minor** **Uncertainty: low**	The pest is difficult to control. Foliar sprays of deltamethrin or neonicotinoids (both registered in the Netherlands at present) are probably not very effective because of the hidden life stages. In the Netherlands, living adults were still found after about 3 months of repeated spray application of insecticides on Phoenix palms. (imidacloprid, deltamethrin, carbofuran and fipronil; the latter two are not registered in the Netherlands anymore). Soil drenches with imidacloprid may be more effective. Soil-drenches with this compound has given good control of larvae of the related species *Rhynchophorus ferrugineus* in (semi-)field experiments (Kaakeh, 2006). Giblin-Davis et al (1996b) poured an imidacloprid solution onto stems on infested *Phoenix* palms about 3 m high (crown drench) and got a larval mortality of about 100% after a single application (2.5 L, 1.2 g a.i. per L). Such an application method and high dosage is not registered in the Netherlands but drip irrigation of imidacloprid is registered as a treatment in ornamentals grown in a closed irrigation system (9.8 g a.i. per 1000 plants). Experiments will be needed to determine the efficacy of such a treatment against *R. obscurus*. Thus, production costs will increase due to extra applications of crop protection agents and due to plant losses (symptomatic plants can not be sold and will have to be destroyed). Costs for crop protection in glasshouse horticulture are, however, relatively low. For pot plants in general the costs for crop protection agents are about 0.4% of the total production costs (Lauwere and Bremmer, 2006). Costs for crop protection (including labour and fertilizers) are about 1 and 2 % of the total production costs for Chamaedorea and *Chrysalidocarpus lutescens* (Van Woerden, 2005). Thus increase in productions will be mainly determined by the loss of plants due to the pest. These losses are, however expected to be mainly limited to plants that had already been infested prior to import (See Q 1.24).

Question	Rating + uncertainty	Explanatory text of rating and uncertainty
2.5. How great a reduction in consumer demand is the pest likely to cause in the PRA area?	**Minor** **Uncertainty: medium**	The pest can be present without visible symptoms. Thus, consumers can buy palm trees that later on show disease symptoms and may even die. This may lead to a reduction in consumer demand. For example, it was stated that the price of certain palm tree species had decreased in 2007 in the Netherlands especially because of poor quality of the palm trees caused by a short growing period after import resulting in poor-rooted plants (Anonymous, 2008). It is, however, expected that the number of infested trees that will be sold to end-consumers will be very low.
2.6. How important is environmental damage caused by the pest within its current area of distribution?	**Minor** **Uncertainty: medium**	The pest is recorded as a pest of ornamental palms. No data are available on the amount of damage the pest is causing in urban and natural areas. There are no reports of the pest having large effects on the natural vegetation.
2.7. How important is the environmental damage likely to be in the PRA area (see note for question 2.6)?	**Very unlikely** **Uncertainty: low**	Very unlikely, since the pest can probably not establish outdoors (see conclusion on establishment) and very few palms are present outside glasshouses in the PRA area
2.8. How important is social damage caused by the pest within its current area of distribution?	**Minor** **Uncertainty: medium**	There are no reports that he pest causes social damage by attacking palms. In general, the pest does not seem to cause much social damage. According to NIAA (1998): *R. obscurus* is a serious problem to palm growers in Queensland and causes a loss of public confidence in palms in public and private landscaping. Thus, the pest may have some social damage for example by changes in landscaping, e.g. planting less palm trees than people actually would have liked.
2.9. How important is the social damage likely to be in the PRA area?	**Minimal** **Uncertainty: low**	Not important.
2.10. How likely is the presence of the pest in the PRA area to cause losses in export markets?	**Unlikely** **Uncertainty: low**	See the PRA on the palm pest *Darna trima* (Van der Gaag & Scholte, 2006): Palms are sold as final product to consumers in the Netherlands and are exported to various European countries including Russia and Southern Europe (information from an exporting company). Young plants are also exported to growers in southern Europe where

Question	Rating + uncertainty	Explanatory text of rating and uncertainty
		they are further raised (pers. comm. G. van Leeuwen, Applied Plant Research – Glasshouse horticulture, the Netherlands). In the Netherlands, the total turnover of palm species via auctions was about 54 million euro in 2007 (Anonymous 2008). Export figures are not known but most plants are probably exported (information obtained from a company which exports plants). Plants may not cause any clear symptoms at low levels of infestation and, therefore, infested plants may be sold. At consumer's places the plants may finally show the disease symptoms which will negatively affect the image of palm plants in general and from Dutch glasshouse production sites in particular. This may affect export markets but it is not believed that it will have large effects as it is expected that most plants that are exported will be healthy.
As noted in the introduction to section 2, the evaluation of the following questions may not be necessary if the responses to question 2.2 is "major" or "massive" and the answer to 2.3 is "with much difficulty" or "impossible" or any of the responses to questions 2.4, 2.5, 2.7, 2.9 and 2.10 is "major" or "massive" or "very likely" or "certain". You may go directly to point 2.16 unless a detailed study of impacts is required or the answers given to these questions have a high level of uncertainty.		

Question	Rating + uncertainty	Explanatory text of rating and uncertainty
2.11. How likely is it that natural enemies, already present in the PRA area, will not reduce populations of the pest below the economic threshold?	**Very likely** **Uncertainty: low**	See Q 1.23
2.12. How likely are control measures to disrupt existing biological or integrated systems for control of other pests or to have negative effects on the environment?	**Very unlikely** **Uncertainty: low**	The use of natural enemies for the control of pests in palm tree glasshouses is limited at the present time.
2.13. How important would other costs resulting from introduction be?	**Minor** **Uncertainty: low**	Cost for pest control may increase but crop protection costs are relatively low (see Q 2.4)
2.14. How likely is it that genetic traits can be carried to other species, modifying their genetic nature and making them more serious plant pests?	**Unlikely** **Uncertainty: low**	No reports are known about transfer of genetic traits from palm weevils to other species.
2.15. How likely is the pest to cause a significant increase in the economic impact of other pests by acting as a vector or host for these pests?	**Very unlikely** **Uncertainty: low**	Not relevant
2.16. Referring back to the conclusion on endangered area (1.35), identify the parts of the PRA area where the pest can establish and which are economically most at risk.		Glasshouse production sites that import palm plants from areas where the pest is present are economically most at risk.
Degree of uncertainty **Estimation of the probability of introduction of a pest and of its economic**		**Probability of entry** Palms are imported into the PRA area from several countries where the pest is present. It is, however, unknown to which extent the pest is present on palm nurseries from which

Question	Rating + uncertainty	Explanatory text of rating and uncertainty
consequences involves many uncertainties. In particular, this estimation is an extrapolation from the situation where the pest occurs to the hypothetical situation in the PRA area. It is important to document the areas of uncertainty (including identifying and prioritizing of additional data to be collected and research to be conducted) and the degree of uncertainty in the assessment, and to indicate where expert judgement has been used. This is necessary for transparency and may also be useful for identifying and prioritizing research needs. **It should be noted that the assessment of the probability and consequences of environmental hazards of pests of uncultivated plants often involves greater uncertainty than for pests of cultivated plants. This is due to the lack of information, additional complexity associated with ecosystems, and variability associated with pests, hosts or habitats.**		palm trees are imported. Sofar, only two interceptions/finds of the pest are known. Both interceptions/finds were on *Phoenix* palms originating from the same nursery in Indonesia. However, the pest may have entered the PRA more often as the pest is difficult to detect during import inspections because of the hidden life stages. For these reasons is difficult to assess the probability of entry. **Probability of establishment** Glasshouse conditions are probably suitable for establishment. The probability of transfer of the pest from infested plants that have been imported to other plants is estimated to be low to medium. This is, however, uncertain. Experiments in glasshouses are needed to determine the probability of transfer in a more reliable way. **Control of the pest** Good control of the pest may be achieved by drip irrigation with the systemic insecticide imidacloprid. Experiments are needed to test this hypthesis.
Evaluate the probability of entry and indicate the elements which make entry most likely or those that make it least likely. Identify the pathways in order of risk and compare their importance in practice.		Two interceptions/finds on Phoenix palms from Indonesia show that the pest can enter the PRA area. Import volume of Phoenix palms from Indonesia is relatively low and about 3400 plants per year (average number per year from 2005-2007). Interceptions/finds are not known on palm species from other countries where the pest is present. It is unknown if the pest is present on nurseries in those countries that grow palms for export. **Probability of entry: low to medium**

Question	Rating + uncertainty	Explanatory text of rating and uncertainty
Evaluate the probability of establishment, and indicate the elements which make establishment most likely or those that make it least likely. Specify which part of the PRA area presents the greatest risk of establishment.		Glasshouse conditions are probably suitable for establishment. The probability of transfer of the pest from infested plants that have been imported to other plants is estimated to be low to medium because of the generally short growing period after import (8-12 weeks) and the relatively long life cycle of the pest (3-4 months). **Probability of establishment: low to medium**
List the most important potential economic impacts, and estimate how likely they are to arise in the PRA area. Specify which part of the PRA area is economically most at risk.		The pest will lead to plant losses but losses are expected to be limited because it seems unlikely that large populations of the pest will be built up in glasshouses. The pest can probably not survive outdoors and the probability that it will spread in the PRA area between palm glasshouses seems low. Glasshouses that import palms from areas where the pest is present are economically most at risk. It is, however, possible to eradicate the pest from a glasshouse as shown by a previous eradication action. **Economic impact: minor**
The risk assessor should give an overall conclusion on the pest risk assessment and an opinion as to whether the pest or pathway assessed is an appropriate candidate for stage 3 of the PRA: the selection of risk management options, and an estimation of the associated pest risk.		*Rhabdoscelus obscurus* is considered a pest with low phytosanitary risk for the Netherlands because of the limited impact it will probably have after the pest has entered a glasshouse. **Pest risk for the Netherlands: low (uncertainty: low)** **Note**: The pest will have a higher impact for southern countries in the EU than in northern countries because the pest can likely establish outdoors in southern EU. Sugar cane is a minor crop in the EU but palm trees are present widespread as amenity trees in public an private areas, at palm nurseries and in forests (see also the EPPO PRA on *Metamasius hemipterus*) For the southern part of the EU it is expected that *R. obscurus* will have a similar effect on palm trees as it presently has in its present area of distribution and, therefore, its impact is assessed as "medium" for the whole EU with a medium uncertainty (see also the answer on Q 2.1) comparable to the impact assessed for another palm weevil, *Metamasius hemipterus* (EPPO PRA available at http://www.eppo.org/QUARANTINE/Pest_Risk_Analysis/PRA_documents.htm; accessed October 2009)

Question	Rating + uncertainty	Explanatory text of rating and uncertainty
		R. obscurus is a quarantine pest in the USA and listed as an A1 pest by COSAVE, OIRSA, East Africa, Southern Africa, Argentina, Brazil and Paraguay (EPPO database on geographical distribution and host plants of quarantine pests, version 4.6). **Pest risk for the EU: medium (uncertainty: medium)**

References

Anonymous, 2008. Palmen. Staalkaart. Vakblad voor de Bloemisterij 21A: 88.

Bianchi, F.A., Owen, R.P., 1965. Observations on Rhabdoscelus obscurus (Boisduval) And Rhabdoscelus asperipennis (Fairmare) in Micronesia (Coleoptera : Curculionidae). Proceedings of the Hawaii Ent. Society 19: 77-81.

CABI, 2007a. Rhabdoscelus obscurus. Crop Protection Compendium. CAB International 2007.

CABI, 2007b. Metamasius hemipterus. Crop Protection Compendium. CAB International 2007.

Desmier de Chenon, R., Purnomo, R.E., Sudharto, P.S., 2001. A new pest borer on oil palm bunches in Indonesia (Rhabdoscelus obscurus Boisduval, Coleoptera Curculionidae). In : MBOP. *Cutting-edge technologies for sustained competitiveness. Agriculture conference : Proceedings of the 2001 PIPOC International palm oil congress, 20 - 22 August 2001, Mutiara Kuala Lumpur, Malaysia* . MPOB : Kuala Lumpur, p. 633-640.

Fay, H.A.C., 2001. Developments in horticulture and entomology in North Queensland since 1991. Technical Bulletin Department of Primary Industry and Fisheries, Northern Territory of Australia 288: 11-14.

Giblin-Davis, R.M., Oehlschlager, A.C., Perez, A., Gries, G., Gries, R., Weissling, T.J., Chinchilla, C.M., Pena, J.E., Hallett, R.H., Pierce, Jr. H.D., Gonzalez, L.M., 1996a. Chemical and behavioral ecology of palm weevils (Curculionidae : Rhynchophorinae). Florida Entomologist 79: 153 – 167.

Giblin-Davis, R.M., Pena, J.E., Duncan, R.E., 1996b. Evaluation of an entomopathogenic nematode and chemical insecticides for control of Metamasius hemipterus sericeus (Coleoptera: Curcilionidae). Journal of Entomol. Science 31: 240 – 251.

Kaakeh, W., Toxicity of imidacloprid to developmental stages of Rhynchophorus ferrugineus (Curculionidae: Coleoptera): Laboratory and field tests. Crop Protection 25: 432-439.

Lauwere, C., Bremmer, J., 2006. Sociaal-economische aspecten van het Nederlandse gewasbeschermingsbeleid. Tussenevaluatie Nota Duurzame Gewasbescherming. Deelrapport Economie 1. Rapport 2.06.10, LEI, DenHaag.

Maskew, F., Strong, L.A., 1920. Quarantine Division. Reports September – December. Monthly Bulletin California Department of Agriculture. 9: 721-735.

Muniappan, R., Bamba, J. Cruz, J., Reddy, G.V.P., 2004. Field response of Guam Populations of the New Guinea Sugarcane Weevil, Rhabdoscelus obscurus (Boisduval) (Coleoptera: Curculionidae), to aggregration pheromones and food volatiles. Micronesica 37: 57-68.

NIAA, 1998. Getting control of weevil borers and leaf beetles in palms. The Nursery Papers Issue no 1998/02.

Van der Gaag, D.J., Scholte, E.J., 2006. Pest Risk Analysis *Darna trima.* Plant Protection Service, Wageningen, the Netherlands. http://www.minlnv.nl/portal/page?_pageid=142,2267942&_dad=portal&_schema=PORTAL&p_document_id=1949462&p_node_id=2023114&p_mode=BROWSE; accessed September 2009.

Van Woerden, S.C., 2005. Kwantitatieve informatie voor de Glastuinbouw 2005-2006. Report no 594. Applied Plant Research, Wageningen.

Van Zwaluwenburg, R.H., Rosa, J.S., 1940. Field movement of sugar cane beetle borer adults. Hawaiian Planters Record. 44: 3-6.

Zimmerman, E.C., 1993. Australian weevils III. CSIRO Publications, East Melbourne, Australia.