*Bulletin OEPP/EPPO Bulletin* (2015) **45** (1), 112–118 ISSN 0250-8052. DOI: 10.1111/epp.12190

# Report of a pest risk analysis for *Platypus parallelus* (Fabricus, 1801) for Turkey

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Invasive bark and ambrosia beetles (Curculionidae: Scolytinae and Platypodinae) are increasingly responsible for damage to forests, plantations and orchards worldwide. They are usually closely associated with fungi, which may be pathogenic causing tree mortality. Stressed or weakened trees are particularly subject to attack, as is recently felled, non-treated wood. This PRA report concerns the ambrosia beetle *Platypus parallelus (Euplatypus parallelus*, Fabricus, 1801) (Coleoptera: Scolytidae), which was detected in official controls. The PRA area is Turkey. *P. parallelus* is not on the A1 or A2 list for Turkey but the Regulation on Plant Quarantine (3 December 2011-OJ no: 28131) Article 13 (5) indicates that pests which are assessed to pose a risk for Turkey following PRA that are not present in the above lists and plants, wood, plant products and other materials contaminated by these organisms are banned from entry into Turkey. This risk assessment follows the EPPO Standard PM 5/3(5) *Decision-support scheme for quarantine pests* and uses the terminology defined in ISPM 5 Glossary of Phytosanitary Terms. This paper addresses the possible risk factors caused by *Platypus parallelus (Euplatypus parallelus*, Fabricus, 1801) in Turkey.

## Introduction

Invasive bark and ambrosia beetles (Curculionidae: Scolytinae and Platypodinae) are an increasing problem in many parts of the world (e.g. Haack, 2003, 2006; Gao *et al.*, 2005; Alfaro *et al.*, 2007; Kirkendall & Odegaard, 2007; Wood, 2007; Kirkendall & Faccoli, 2010; Hulcr & Dunn, 2011), and can be responsible for major economic damage to forests, plantations and orchards. These beetles are usually closely associated with fungi, which may be pathogenic causing tree mortality (e.g. Fraedrich *et al.*, 2008; Lu *et al.*, 2009; Harrington *et al.*, 2011; Hulcr & Dunn, 2011). The Platypodinae is a subfamily of weevils (Curculionidae) (Alonso-Zarazaga & Lyal, 2009), which occurs almost entirely in tropical and subtropical areas where some species can be important forest and tree plantation pests (Browne, 1968). Few species attack healthy trees, but stressed or weakened trees are particularly subject to attack, as is recently felled, non-dried wood.

In this context, the ambrosia beetle *Platypus parallelus* (Synonymn: *Euplatypus parallelus*, Fabricus, 1801) (Coleoptera: Scolytidae), which was detected in official controls by the Republic of Turkey Ministry of Food, Agriculture and Livestock Kocaeli Provincial Directorate and identified by Izmir Agricultural Quarantine Directorate, was subject to PRA using the EPPO Standard PM 5/3(5) *Decision-support scheme for quarantine pests* (available at http://archives.eppo.int/EPPOStandards/pra.htm) and uses the terminology defined in ISPM 5 Glossary of Phytosanitary Terms (available at https://www.ippc.int/index.php). The PRA area is Turkey.

The initiation point for this PRA was *Tetraberlina bifoliata* logs from Cameroon (Africa) imported into Turkey. The pest of concern *Platypus parallelus* is not in the A1 list for Turkey (PRA area) but Regulation on Plant Quarantine (3 December 2011-OG no: 28131) Article 13 (5) indicate that pests which are subject to quarantine that are listed in Annex-1 and Annex-2 of this Regulation and pests that are assessed to pose a risk for Turkey following the risk analysis for pests that are not present in the above lists and plants, plant products and other materials contaminated by these organisms are banned from entering Turkey.

## Pest risk assessment

*Platypus parallelus* (Fabricius, 1801) is in the subfamily Platypodinae, part of of the very large Curculionidae (weevil) family. Wood & Bright (1992) consider it to be the most destructive and most widely distributed platypodine in the world.

### Identity of pest, name and taxonomic position

One of the keys to effective management of an exotic species is clarification of its taxonomic position. The pest is most often referred to in the literature as *Platypus parallelus* (Fabricus, 1801). Wood (1993) transferred the species to the new genus *Euplatypus.*

  

Other names are:

- *Euplatypus* F. 1801
- *Bostrichus parallelus* F. 1801.
- *Platypus poeyi* Guerin Meneville 1825.
- *Platypus linearis* Stephens 1830.
- *Platypus praeustus* Dejean 1837. Cat.
- *Platypus testaceus* Dejean 1837. Cat.
- *Platypus subcostatus* Jacquelin Duval 1857.
- *Platypus compressus* Fabricus, 1865.
- *Platypus dejeani* Fabricus, 1865.
- *Platypus difficilis* Fabricus, 1865.
- *Platypus emarginatus* Fabricus, 1865.
- *Platypus erichsoni* Fabricus, 1865.
- *Platypus lebasi* Fabricus, 1865.
- *Platypus maeklini* Fabricus, 1865.
- *Platypus marseuli* Fabricus, 1865.
- *Platypus oblongus* Fabricus, 1865.
- *Platypus praevius* Fabricus, 1865.
- *Platypus proximus* Fabricus,1865.
- *Platypus punctulatus* Fabricus, 1865.
- *Platypus regularis* Fabricus, 1865.
- *Platypus reticulatus* Fabricus, 1865.
- *Platypus rotundatus* Fabricus, 1865.
- *Platypus rugulosus* Fabricus, 1865.
- *Platypus subaequalis* Fabricus, 1865.
- *Platypus wesmaeli* Fabricus, 1865.
- *Platypus congoanus* Duvivier 1891.
- *Platypus triquetus* Brethes 1909.
- *Platypus mattai* Brethes 1919.
- *Platypus bellus* Schedl 1933 (Padil, 2014).

*Platypus parallelus* is small, <5 mm long, and looks superficially like *Bostrichoidea* (powder-post beetles); that is, they are elongate and mostly cylindrical in shape, and sometimes the head is pointed downward and almost invisible from above. This is particular character of Scolytinae. (Figs 1 and 2).

Ambrosia beetles such as *Platypus parallelus* generally breed in large diameter host material. Galleries are initiated by male *Platypus parallelus,* each male is joined by a single female and the gallery is continued by the female after mating has occurred. This creates a radial gallery leading to branching galleries more or less in one transverse plane. Adults emerge through the original entry hole. *Platypus flavicornis* and *P. quadridentatus* are restricted to pines and oaks respectively. *Platypus compositus* and *P. parallelus* are extremely polyphagous and will breed in most trees within their geographical ranges.

*P. parallelus* tends to attack large logs or the trunks of trees that are dying or that recently died, but can also breed in smaller stems down to about 10 cm diameter (Schedl, 1965).

### Geographical distribution

It is not known whether *P. parallelus* in Asia originated from America or Africa. The only molecular study carried out on the species (Wang *et al.*, 2010) used mitochondrial DNA from South American (Surinam), African (Congo) and Asian (Cambodia, Malaysia, Thailand) specimens. In all the phylogenetic analyses, the specimens from Asia were grouped together separately from the American and African specimens, which were more closely related to each other (Wang *et al.*, 2010). It seems likely that *P. parallelus* was introduced to Asia some years prior to the first record in Sri Lanka in 1975, when Wood (in Krombein, 1981) found it in 'destructive numbers' in the wet zones of that country below 1200 m altitude. Its spread since then, presumably largely via human activities, has been rapid and extensive. It is speculated that it was first introduced in the decade following the Second World War, when commercial trade between Asia and both Africa and America revived, and the movement of timber, and wooden crates and pallets increased. This time period would allow for the spread and multiplication of the species to economically important levels by 1975 in Sri Lanka.


**Fig. 1** Common ambrosia beetle (*Platypus parallelus*) **Adult(s)**© Pest and Diseases Image Library (Anonymous, 2014a).

Despite its early presence and abundance in Sri Lanka (Krombein, 1981), this country may not have been the main centre from which *P. parallelus* spread through the region. The species was not recorded from neighbouring India until 2012. The available data (Table 1) suggest instead that the spread of the species may have been largely northwards and eastwards from the Malaysian peninsula. It spread northwards to Thailand, and probably from there to Cambodia and Laos. During the same time period, it also spread eastwards to Borneo, the Philippines, Sulawesi and New Guinea. The northern limit of its distribution is at present in Taiwan. The species can probably not survive and breed in the current climate of the main islands of Japan, where it has been frequently intercepted in imported timber (Browne, 1980; Ohno *et al.*, 1986; Ohno, 1990), but is not known to have established a breeding population.

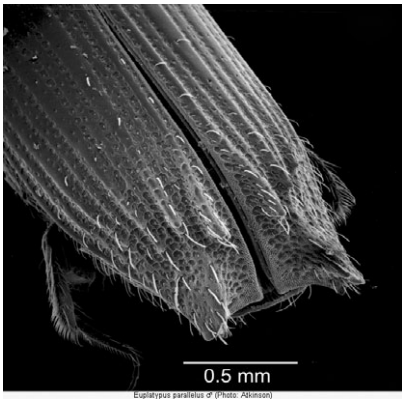


**Fig. 2** Male declivity in *Platypus parallelus* (Fabricius). ©T.H. Atkinson, University of Florida. 2.

*Platypus parallelus* is now distributed very widely within the Oriental region (Table 1), and is often abundant. It has been intercepted in China in timber from Myanmar and Vietnam (Zhang *et al.*, 2011), although the authors have found no actual records of the species in those countries. It has not yet been recorded from Java or neighbouring eastern islands or from the Moluccas, but this may reflect a lack of forest entomologists rather than the absence of the species.

### Host plants

*Platypus parallelus* is a widely-ranging species both in tropical and subtropical America from Argentina to Texas, and throughout Tropical (and according to Schedl, Southern) Africa. The species is strongly polyphagous without any preference for particular families of trees (e.g. Schedl, 1965; Atkinson & Equihua, 1986; Ohno, 1990; Abreu *et al.*, 2002). It has been recorded from a large number of host-trees, especially in the latter continent—at least 82 species in 25 families such as Anacardiaceae (Astronium graveolens), Mangifera (indica), Metopium (brownei), Spondias (purpurea), Apocynaceae (Aspidosperma) megalocarpon; Arecaceae Bignoniaceae, Bombacaceae, Burseraceae, Caesalpinaceae, Euphorbiaceae Leguminosae, Meliaceae, Mimosaceae, Moraceae, Cecropia, Ficus, Nyctaginaceae, Oleaceae, Papilionaceae, Pinaceae, Polygonaceae, Sapindaceae, Taxodiaceae, Ulmaceae, Celtis Verbenaceae. Browne (1980) writes that it is essentially a secondary borer in the wood of dying or recently cut trees, and when found in apparently healthy ones (for the most part weakened by drought, etc.) it usually fails to breed; and that it shows no marked host preferences. No records were found of its entry into Europe, but it is thought that such a species could be introduced with wood from time to time (Magarey *et al.*, 2008).

This species is likely to be transported with host material as it spends approximately 9 months of its life within the host tree during its various life stages (Alfaro *et al.*, 2007). It can be carried in recently felled wood; debarking does not eliminate the possibility of moving the pest. It may also be moved with host plants for planting, provided they were large enough to be attacked (EPPO, 2009). Movement is most likely through trade of planting stock, logs, sawn wood, and wood-based packaging (Allegro & Griffo, 2008).

It is also likely that the pest is introduced into new areas through untreated wood packaging based on data from interceptions associated with solid wood packaging material (reviewed in Alfaro *et al.*, 2007).

The main pathways for introduction are plants for planting of woody hosts, wood and wood products from countries where *P. parallelus* occurs. According to the literature the pest, as is the case for other Ambrosia beetles, usually only attacks plants of more than 10 cm diameter (Etiennot *et al.*, 1998). Trade of large plants presents a risk, but not young woody plants. plants for planting of host plants, round wood of host plants of more than 10 cm. The risk presented by sawn wood was perceived to be lower because the survival of larvae in sawn wood will be lower as humidity declines.

## Pest risk management

Studies on other ambrosia beetles such as *Megaplatypus mutatus* indicate two approaches can be used for their control. The first is early detection and destruction of infested trees (Santoro, 1967; Toscani, 1990), while the second is chemical control by injecting insecticides into the galleries or spraying trunks (Santoro, 1962, 1965b, 1967) during adult emergence in spring (Santoro, 1963). Carbaryl, cypermethrin (Bascialli *et al.*, 1996), chlorpyrifos and lambdacyalothrin (Giménez & Etiennot, 2002; Giménez *et al.*, 2003) have proved to be highly effective against *M. mutatus*. However, such chemical treatments are costly and potentially harmful to the environment, only likely to be carried out in high-value trees and in small defined areas. They are not advisable in woodlands. Recently, the sex pheromones of the male of *P. parallelus* have been identified (Gonzàles Audino *et al.*, 2005) and are now being tested in the field with different kind of traps to assess their effectiveness in attracting females. Their use in mass trapping strategies or, at least, in monitoring population peaks could be a valuable help in the control of the pest. Preliminary field tests with non-specific attractants gave unsatisfactory results (Alfaro *et al.*, 2007).

## Conclusions

Bark and ambrosia beetles are among the most important groups of wood-boring insects and are major economic pests in all forest communities (Atkinson & Equihua, 1986). They occur in Platypodinae of the very large family of weevils (Curculionidae). They are abundant in the tropics, and responsible for severe economic damage to timber and the wood industry. As a result of the transport of infested timber between countries, some of

**Table 1** Earliest collection years of *Platypus parallelus* in the oriental region Wallacea and New Guinea (adapted from Beaver, 2013)

| Country | Earliest year collected | Details | Reference |
|---|---|---|---|
| Sri Lanka | 1975 | [Central Province], Peradeniya, ii.1976, *A. Anderberg*, 1 X NHRS. Also collected in Western Province (1985) | Wood in Krombein (1981) |
| West Malaysia | 1980 | Johore, Pontian, Benut, caught on durian, 5.i.1980, *Jabat Pertanian*, 2 YY, NHML. Earliest record of locally collected specimens. Also recorded from rubber wood imported to Japan from West Malaysia in 1980 (Browne, 1980). Collected in the states of Selangor (1981), Pulau Pinang (1987), Negeri Sembilan (1993), Pahang (1993, 1997–1999, 2007), Perak (1998, 1999, 2008), Kelantan (2008) | Beaver (2013) |
| Singapore | 1982 | Tampines Road, 18.v.1982, on *Pterocarpus indicus*, [no collector], 1 X, NHML. Earliest record from Singapore. Later records from mangrove trees in Murphy (1990) | Beaver (2013) |
| Indonesia (Sumatra) | 1982–1984 | Sumatra-N, nahe Prabat, Holzweg, 2°47′N, 98°56′E, 1050 m, 13.vii.1992, *Buchsbaum,* 1 Y, NKME. Earliest record of locally collected specimen | Ohno *et al.* (1986) (no precise year given) (imported to Japan in timber) |
| East Malaysia (Sabah) | 1986 | Sabah, [Tenom District], 16 km NE Tenom, Agr. Res. Station, 5°11′N, 115° 59′E, 180 m, vi.1986, *J. Huisman*, 8 YY, 2 XX, NMNHL. New record for Sabah. Also collected in Sipitang (1987–1988), Ranau (1992–1993), and Keningau (2000) Districts | Beaver (2013) |
| Thailand (South) | 1988 | | Murphy & Meepol (1990) |
| Thailand (North) | 1991 | Chiang Mai Province], Chiang Dao, 19°22′N, 98°57′E, 350 m,9–14.v.1991, *V. Kubán*, 1 X, NHMB. Earliest record from northern Thailand. Later records from Thailand are included in Beaver & Liu (2013) | Beaver (2013) |
| Philippines | 1991 | Basuanga Island, Coron Town, 7–18.iii.1991, *M. Borri & C. Volpi*, 18 YY, 2 XX, MSNF. New record for Philippines | Beaver (2013) |
| Brunei Darussalam | 1992 | | Beaver (1999) |
| Bangladesh | 1997 | | Kirkendall & Islam (2003) |
| Indonesia (Irian Jaya) | 1998 | Irian Jaya, Jayapura, Lake Sentani, Südufer, 100 m, vi.1998, *M. Balke*, 1 Y, NKME. New record for Papua (=Irian Jaya). Also collected in West Papua Province (2004) | Beaver (2013) |
| East Malaysia (Sarawak) | 1998 | Sarawak, Lambir Hills, 200 m, at light, 3–5.xi.1998, *B. Jordal*, 1 Y, 1X, BHJ. New record for Sarawak | Beaver (2013) |
| Papua New Guinea (New Britain I.) | 2000 | East of New Britain Province, 30 km SW Kokopo, Arabam, 4°35′75″S, 152°06′64″E, 200 m, 21.ii–4.iii.2000, *A. Weigel*, 13 YY, 22 XX, NKME. New record for Papua New Guinea | Beaver (2013) |
| Laos | 2001 | Kham Mouan pr[ovince], Ban Khoun Ngaun, 18°07′N, 104°29'E, c.200 m, 24–29.iv.2001, *Pacholátko*, 1 Y, 1 X, NHMB. New record for Laos. Also collected in Luang Namtha Province (2005), Salavan and Attapeu Provinces (2010) | Beaver (2013) |
| Cambodia | 2003 | Oddar Meanchey Province, 8 km N of Sre Noi, road to Anlong Vaeng, light trap, 29.v.2003, *Constant & Smets*, 10 YY, 3 XX, IRSNB. New record for Cambodia. Also collected in Siem Reap Province (2006) | Beaver (2013) |
| Taiwan | 2006 | Taitung Co., Taimali, multiple funnel trap, 3.ii.2006, *Liu, L-Y.*, 4 YY, LYL. New record for Taiwan. Also collected in Nantou, Pingtung and Tainan Counties (2006) | Beaver (2013) |
| Indonesia (Sulawesi) | 2008 | North Sulawesi, 1km W of Toraut, Dumoga-Bone NP, 0°34'17"N, 123°54'19"E, 200-300m, 2.ii.2008, A. Weigel, 1 Y, NKME. New record for Sulawesi. Also collected in North Sulawesi (2009). | Beaver (2013) |
| India (Goa) | 2012 | Ponda, 15°24′N, 74°01′E, ex cashew stems [*Anacardium occidentale*], ix.2012, *R. Maruthadurai,* 1 Y, RM. New record for India | R. Maruthadurai(pers. comm. in Bevaer, 2013) |

these beetles are becoming widespread in tropical and subtropical regions. *P. parallelus* is on the quarantine lists in Japan and Korea and China (Atkinson & Equihua, 1986).

The economic damage is caused by: (1) the adult beetles, which bore gallery systems that may extend deeply into the wood; (2) the ambrosia fungi that the beetles introduce into the galleries that serve as food for both adults and larvae (Browne, 1961; Schedl, 1965, 1972). The galleries leave 'pinholes' in the wood surrounded by a blackened area caused by the ambrosia fungi. This damage can greatly reduce the value of wood, especially if it is intended for a specialised purpose, such as furniture or veneer. Damaged wood therefore has a lower market value (Alfaro *et al.*, 2007) and is too poor quality for export (Girardi *et al.*, 2003). This pest also reduces yield (in wood volume) (EPPO, 2009). *P. parallelus* has been studied to determine what types of control methods would be effective. Due to the insect's cryptic lifestyle, insecticides are not considered a good control option (Funes *et al.*, 2011) and in addition, the adults, which are accessible to treatment during flight, are not very sensitive to insecticides. When the total wood importation into PRA area is considered it can be concluded that the following conditions support the introduction and establishment of *Platypus parallelus:*

The host range of the pest, the location of the processing plants, climate conditions, movement with debarked wood, possibility of infestation during transport.

The control of the pest is difficult since most of its life cycle takes place within wood, there is also insensitivity to insecticides and uncertainty on reproduction conditions. All above indicate that Mediterranean coastal areas of Turkey are most likely to be at risk.

Even if bark causes difficult impregnation of fumigants and the pest bores vertically to the core, measures can be applied for timbers and wood packaging materials originating countries considering the Plant Quarantine Regulation in Turkey Annex 4 1.4 (Anonymous, 2014d), EPPO recommendations for another ambrosia beetle *Megaplatypus mutatus* and ISPM 15 Standards.

The authors' recommendations for possible measures are the following:

| | |
|---|---|
| Pathway 1: Plants for planting of host plants of more than 10 cm diameter originating in countries where *P. parallelus* occurs | Pest free area for *Platypus sp.*<br>AND<br>Place of production freedom for *Platypus sp.* must be indicated on Phytosanitary certificate<br>OR<br>Heat treated (commodity is heated until the core temperature reached at least 56°C for at least 30 min according to an officially recognized technical specification) according to EPPO Phytosanitary Procedure PM 10/8 |
| Pathway 2: Round wood of host plants of more than 10 cm diameter originating in countries where *P. parallelus* occurs | Pest free area for *Platypus sp.*<br>AND<br>Place of production freedom for *Platypus sp.* must be indicated on Phytosanitary certificate<br>OR<br>Heat treated (commodity is heated until the core temperature reached at least 56°C for at least 30 min according to an officially recognized technical specification) according to EPPO Phytosanitary Procedure PM 10/8 |
| Pathway 3: Sawn wood of host plants of more than 10 cm diameter originating in countries where *P. parallelus* occurs | Pest free area for *Platypus sp.*<br>AND<br>Place of production freedom for *Platypus sp.* must be indicated on Phytosanitary certificate<br>OR<br>Heat treated (commodity is heated until the core temperature reached at least 56°C for at least 30 min according to an officially recognized technical specification) according to EPPO Phytosanitary Procedure PM 10/8 |

## Rapport de l'analyse du risque phytosanitaire pour *Platypus parallelus* (Fabricus, 1801) en Turquie

Les scolytes (Curculionidae: Scolytinae et Platypodinae) sont de plus en plus souvent responsables de dégâts aux forêts, plantations et vergers à travers le monde. Ils sont généralement étroitement associés à des champignons, qui peuvent être pathogènes et provoquer la mort des arbres. Les arbres stressés ou affaiblis sont particulièrement attaqués, tout comme le bois récemment abattu et non traité. Ce rapport d'ARP concerne le scolyte 'à ambrosia' *Platypus parallelus* (*Euplatypus parallelus*, Fabricus, 1801) (Coleoptera: Platypodinae), qui a été détecté lors de contrôles officiels. La zone ARP est la Turquie. *P. parallelus* ne figure pas sur la liste A1 de la Turquie, mais l'Article 13 (5) de la Réglementation pour la quarantaine végétale (3 décembre 2011- OJ no: 28131) indique que

l'entrée des organismes nuisibles suivants en Turquie est interdite: organismes nuisibles soumis à quarantaine énumérés aux Annexes 1 et 2 de la réglementation; organismes nuisibles qui présentent un risque pour la Turquie selon une ARP, mais qui ne sont pas énumérés dans lesdites listes; les végétaux, bois, produits végétaux et autres matériauxcontaminés par ces organismes. Cette évaluation du risque suit la Norme OEPP PM 5/3 (5) Schéma d'aide à la décision pour les organismes de quarantaine et utilise la terminologie définie dans la NIMP 5 (Glossaire des termes phytosanitaires).

## Отчет об Анализе Фитосанитарного Риска в отношении *Platypus parallelus* (Fabricus, 1801) для Турции

Во всем мире инвазивные короеды и древесинники (Curculionidae: Scolytinae и Platypodinae) все больше и больше наносят ущерб лесам, плантациям и садам. Как правило, они тесно связаны с грибами, которые могут являться патогенами, вызывающим гибель деревьев. Деревья под стрессом или ослабленные особенно сильно подвержены их атакам, также как и свежесрубленная необработанная древесина. Данный отчет об АФР касается короеда *Platypus parallelus* (*Euplatypus parallelus*, Fabricus, 1801) (Coleoptera: Scolytidae), который был обнаружен в ходе официальных проверок. Зоной АФР является Турция. *P.parallelusis* не входит в перечни A1 и A2 для Турции, однако статья 13(5) правил по карантину растений (3 декабря 2011-OG, номер: 28131) указывает, что в Турцию запрещен ввоз вредных организмов, которые были оценены как представляющие опасность для Турции в ходе выполнения АФР, но не присутствуют в упомянутых перечнях, а также растений, древесины, растительных продуктов и других материалов, зараженных этими организмами. Эта оценка риска соответствует Стандарту ЕОКЗР РМ 5/3 (5) «Схема поддержки принятия решений для карантинных вредных организмов» и использует терминологию, определенную в «Глоссарии фитосанитарных терминов» МСФМ 5.

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