

Paysandisia archon

Scientific Name

Paysandisia archon (Burmeister)

Synonyms:

Castnia archon Burmeister

Castnia josepha Oberthür

Common Names

No common name, a palm borer,
South American palm borer, castniid
palm borer, palm moth

Type of Pest

Borer

Taxonomic Position

Class: Insecta, **Order:** Lepidoptera,

Family: Castniidae

Reason for Inclusion

CAPS Target: AHP Prioritized Pest List
for FY 2012

Pest Description

Eggs: “they are oblong (5 mm long),
cream-coloured and with longitudinal ribs” (Drescher and Dufay, 2002).

Larvae: “Just after hatching, the larva
is pink-coloured and less than 1 cm
long, but turns white as it grows. It
reaches 6–7 cm at the end of its
development, looking a bit like a grub,
and with four pairs of pseudopods”
(Drescher and Dufay, 2002). The
thorax is larger than the head with the
head partially retracted into the
prothorax (Redford et al., 2010).

Adults: The moths have “a large
wingspan of 9–11 cm. The fore-wings
are olive brown-coloured and the hind-



Figure 1. *Paysandisia archon* adults (female on top) (Image courtesy of Victor Sarto i Monteys, Servei de Proteccio dels Vegetals, Bugwood.org)



Figure 2. Later instar larvae retreating into gallery (Image courtesy of Victor Sarto i Monteys, Servei de Proteccio dels Vegetals, Bugwood.org)

wings are brightly coloured with red, black and white. The antennae are clubbed. Females are a little larger and are easily recognizable by their chitinous ovipositor at the end of the abdomen” (Drescher and Dufay, 2002).

Biology and Ecology:

In France, adults can be observed from June to September and are active during the day (Drescher and Dufay, 2002). Males are territorial and are known to fly in hot, sunny weather (Sarto i Monteys and Aguilar, 2005). Females may release a short-range pheromone to attract males but it seems as though there is not a long-range pheromone for this species (Sarto i Monteys and Aguilar, 2005).

After mating, females use their long ovipositor to lay eggs singly within the fibers that are close to or within the crown of the palm (Sarto i Monteys and Aguilar, 2005). They may also be laid at the base of the leaf or the terminal bud (Drescher and Dufay, 2002). Eggs hatch in 12-21 days, depending on temperature (Sarto i Monteys and Aguilar, 2005).

Once hatched, the larvae bore through the stem or young leaves, starting a gallery (Drescher and Dufay, 2002). The larvae feed on the inside of the trunk, although the first instar may feed partly on the outside of the trunk (Sarto i Monteys, 2002). Larvae are territorial and cannibalistic (Sarto i Monteys and Aguilar, 2005). They feed within the trunks and branches of several palm species (Sarto i Monteys et al., 2005) with tunneling occurring near the crown of the host plants (Sarto i Monteys and Aguilar, 2005). Larvae go through seven to nine instars (Sarto i Monteys and Aguilar, 2005). When larvae feel threatened, they can discharge a reddish-brown substance through their mouths (Sarto i Monteys and Aguilar, 2005). Palms are weakened and can die if several larvae simultaneously bore into the same stem (Drescher and Dufay, 2002).

Larvae make false cocoons which may be used to confuse predators or parasites (Sarto i Monteys and Aguilar, 2005). Pupation occurs within a cocoon made of plant fibers (Drescher and Dufay, 2002). The remains of the chrysalis often remain attached to the exit hole after adult emergence (Drescher and Dufay, 2002).



Figure 3. Pupal exuviae on Chinese windmill palm (*Trachycarpus fortunei* (Hook.) H. Wendl.) (Image courtesy of Victor Sartos i Monteys, Servei de Protecció dels Vegetals, Bugwood.org)

In its invasive range in Europe, the life cycle can range from 1 year (with 10.5 months spent as a larva) to 2 years (with 18.5 months spent as a larva) (Sarto i Monteys and Aguilar, 2005). Adults are found from mid-May to late September, peaking during June and July (Sarto i Monteys and Aguilar, 2005).

An extensive account of the biology of *P. archon* can be found in Sarto i Monteys and Aguilar (2005).

Symptoms/Signs

Larvae can severely damage trunks as they bore galleries (Sarto i Monteys et al., 2005). Gallery damage may result in slowed growth and/or crown deformation; heavy attack often leads to death of the affected palms (Reid and Moran, 2007). Another sign that larvae are present is the presence of plugs of debris (sawdust) which are found at the outermost extremity of the gallery (Drescher and Dufay, 2002).

Sarto i Monteys and Aguilar (2005) give a list of symptoms that may be present from an infestation of *P. archon* palms including: “(1) presence of sawdust on the palm crown and/or palm trunk; (2) presence of perforated or nibbled leaves (non specific); (3) presence of gallery holes (axial and transversal) within the palm trunk (observable when the palm trunk is cut in slices); (4) abnormal development of axillary leaf buds; (5) deformation and abnormal twisting of palm trunks; (6) abnormal drying up of the palms, especially the core leaves.”

It can be difficult to detect an infestation when adults are not present due to the endophagous nature of the larvae (Drescher and Dufay, 2002). Palms with larvae may not initially have symptoms of the infestation (Vassiliou et al., 2009).

Pest Importance

This species is not considered a pest in its native range. This may be due to the presence of natural enemies or because *P. archon* primarily infests wild palm trees as opposed to planted trees in its native range (EPPO, 2008). However, this species has caused damage and tree death in areas where it has been introduced, including France, Italy, and Spain (EPPO, 2008; Sarto i Monteys and Aguilar, 2005; Riolo et al., 2004; EPPO, 2002). In Southern Europe, ornamental



Figure 4. Damage on Chinese windmill palm (*Trachycarpus fortunei* (Hook.) H. Wendl.) (Image courtesy of Victor Sarto i Monteys, Servei de Proteccio dels Vegetals, Bugwood.org)

palm nurseries have reported serious damage as well as plant mortality (Reid and Moran, 2007). Europe's only native palm, *Chamaerops humilis*, is being seriously threatened by this pest (Reid and Moran, 2007).

Known Hosts

Paysandisia archon can feed on a wide variety of palm species and has expanded its range in non-native areas.

Brahea armata (blue fan palm), *Brahea edulis* (Guadeloupe palm), *Butia capitata* (jelly palm), *Butia yatay* (yatay palm), *Chamaerops humilis* (dwarf fan palm), *Cocos yalai*, *Latania* spp., *Livistona chinensis* (Chinese fan palm), *Livistona decipiens* (ribbon fan palm), *Livistona saribus* (serdang palm), *Livistona* spp., *Phoenix canariensis* (Canary Island date palm), *Phoenix dactylifera* (date palm), *Phoenix reclinata* (Senegal date palm), *Phoenix roebelenii* (miniature date palm), *Phoenix* spp. (date palm), *Phoenix sylvestris* (date sugar palm), *Phoenix theophrasti*, *Sabal mexicana* (Mexican palmetto), *Sabal minor* (dwarf palmetto), *Sabal palmetto* (cabbage palmetto), *Sabal* spp. (palmetto), *Syagrus romanzoffiana* (queen palm), *Thrinax campestris* (thatch palm), *Trachycarpus fortunei* (Chinese windmill palm), *Trachycarpus wagnerianus* (miniature chusan palm), *Trithrinax campestris* (Carandy), *Washingtonia filifera* (desert fan palm), *Washingtonia robusta* (Washington palm), and *Washingtonia* spp. (fan palm) (Kenis and Branco, 2010; Lopez-Vaamonde et al., 2010; EPPO, 2008; Vassarmidaki et al., 2006).

Pathogens Vectored

This pest is not currently known to vector any pathogens or other associated organisms, but damage by this pest can lead to secondary infections by fungi and other microorganisms (Sarto i Monteys et al., 2005).

Known Distribution

This pest is a neotropical species and is known to occur in: Argentina, Brazil, Cyprus*, France, Greece, Italy (including Sicily), Paraguay, Slovenia*, Spain, United Kingdom, and Uruguay (EPPO, 2009; EPPO, 2008; Vassarmidaki et al., 2006).

*Populations are either considered present or transient and are under eradication.

Potential Distribution within the United States

This pest is a neotropical species that is indigenous to South America (EPPO, 2008). If introduced into the United States, this species is likely to establish in areas with high concentrations of host plants and similar climates, like California and Florida.

Pathway

This species was most likely introduced from Argentina into both Spain and France as larvae in imported palm trees, mostly *Butia yatay* (Yatay palm), *Thrinax campestris* (Campestre palm) and *Trachycarpus fortunei* (Chusan palm) (Sarto i Monteys and Aguilar, 2005). This species has since spread to other European countries most likely through commercial shipments of palms (Sarto i Monteys and Aguilar, 2005). Natural dispersal may also occur as the adults are strong fliers (Sarto i Monteys and Aguilar, 2005).

This species has not been intercepted at United States ports of entry (AQAS, 2011). This is not unusual, as *P. archon* has only recently (within the last decade or so) become a pest species in its introduced range. Larvae are also difficult to detect as they are cryptic in nature.

Survey

CAPS-Approved Method*:

Visual inspection. Damage may be similar to other palm borers like *Rhynchophorus ferrugineus* (red palm weevil).

Literature-Based Methods:

Survey site selection

Surveys can be conducted in areas with a high concentration of host material. This can occur in nurseries and public areas where palms are used as ornamentals.

Time of year to survey

In its introduced range in Europe, adults have been reported from mid-May to late September, with a peak during June and July (Sarto i Monteys and Aguilar, 2005). The larval stage can last from 10.5 to 18.5 months, depending on if it is on a one or two year development cycle (Sarto i Monteys and Aguilar, 2005).

Visual survey

Infestations throughout Europe have been found through visual surveys. Surveyors look for characteristic symptoms (see above in symptoms/signs) of an infestation of *P. archon*. Light traps are not useful in trapping *P. archon* as adults are active during the day (Sarto i Monteys and Aguilar, 2005).

Attractants

Research has been conducted to identify long-range sex pheromones for *P. archon* (Acin Viu et al, 2009; Sarto i Monteys and Lluís Aguilar, 2005). Results indicate that *P. archon* uses visual cues and a short-range, pheromone to locate mates; however, this species does not utilize a long-range pheromone (Acin Viu et al, 2009; Sarto i Monteys and Aguilar, 2005).

Identification

CAPS-Approved Method*:

Morphological. The underside of the forewing is bright red; the hindwing is bright orange with a series of white spots on a dark background. The wingspan is 9-11 mm and no eyespots are present (Redford et al., 2010). Use Passoa (2009) as a screening key.

A description of *P. archon* life stages can be found in Sarto i Monteys and Aguilar (2005).

*For the most up-to-date methods for survey and identification, see Approved Methods on the CAPS Resource and Collaboration Site, at <http://caps.ceris.purdue.edu/>.

Easily Confused Pests

In the Mediterranean region, signs of *P. archon* damage could be confused with native Lepidoptera that have been occasionally observed feeding on palm trees such as *Phoenix canariensis* and *Trachycarpus fortunei*. These include *Ostrinia nubilais* (European corn borer) and *Sesamia nonagrioides* (Mediterranean corn stalk borer) (Sarto i Monteys and Aguilar, 2005). These species are usually pests crops in the grass family but occasionally feed on the tender growing points of palms, producing perforations on the leaves similar to those made by *P. archon* (Sarto i Monteys and Aguilar, 2005).

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