

SPREADING OF RED PALM WEEVIL (*Rhynchophorus ferrugineus* [Olivier]), A DEVASTATING PEST OF PALMS IN MONTENEGRO

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ABSTRACT

Red palm weevil *Rhynchophorus ferrugineus* (Olivier) is originated from in southeastern Asia. It is a notorious pest of palms in all areas where it has established. The main palm affected is the canary date palm (*Phoenix canariensis*) and date palm (*Phoenix dactylifera*). International trade of palm trees resulted in the rapid spreading of this pest from its native range. Its introduction into the Mediterranean area was in the 1990s and first detection in Europe in Spain in 1994. Since then it has spread to many European countries. Infested palms are hard to detect since the larvae feed on the internal tissues. At high infestation levels symptoms resembling drought stress are common, although the most typical is “umbrella-like” damage which usually indicates death of infested palm. *R. ferrugineus* was detected for the first time in Montenegro in October 2012 on Canary Island date palm. The “umbrella-like” symptom and symptoms resembling drought stress were found in hotel complex in coastal area of the city of Ulcinj. Until October 2014 the pest was restricted only in this area when the first signs of spreading was noticed and pest found in area of the city of Budva. Spreading was continued in the following year and in 2016 *R. ferrugineus* was registered along the whole seacoast. All infested palms in Montenegro are *Ph. canariensis*, except one *Trachycarpus fortunei* found in the city of Ulcinj in August 2016. Presence and spreading of the pest along Montenegro seacoast resulted in devastation and death of many palms and extreme changing of our traditional urban landscape. Up to November 2016 around 100 canary date palm have been eradicated. Aggregation pheromone Rhy lure 400 is used for monitoring.

Key words: damage, Montenegro seacoast, red palm weevil, spreading

1 INTRODUCTION

Red palm weevil *Rhynchophorus ferrugineus* (Olivier) (Coleoptera: Curculionidae) is originating in southern Asia and Melanesia, where it is a serious pest of coconuts. From area of origin it has been advancing westwards very rapidly since the mid 1980's (Ferry and Gómez, 2002). Spread of *R. ferrugineus* in the Middle-Eastern and the Mediterranean region has been rapid since 1985 (Abraham *et al.* 2000, Faleiro *et al.* 2012). In early 1990's it crossed the Red Sea and was recorded in Egypt in 1992

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(Cox, 1993). Its first detection in Europe was in 1994 in Spain (Barranco *et al.* 1996). The pest is regulated within the EU (Commission Decision 2007/365/EC).

R. ferrugineus is essentially a pest of palms (Arecaceae), and the most important pest of date palm (*Phoenix dactylifera*) in the world as well a serious pest of coconut (*Cocos nucifera*). As a highly invasive pest of palms can have a significant economic, environmental and social impact when introduced into new geographical areas. International trade of palm trees resulted in the rapid spreading of this pest from its native range. After it was introduced in the Mediterranean region the two main palm species of concern are date palm and Canary Island date palm (*Phoenix canariensis*). It also attacks several other ornamental palms such as chusan palm (*Trachycarpus fortunei*) (Malumphy *et al.*, 2016).

The main damage is caused by the larvae which feed on the growing tissue in the crown of palms. They boring tunnels inside and destroy the apical growth area. In cases of severe infestations palms can completely loss leaves followed by rotting of the trunk, which results in the death of the tree.

R. ferrugineus was detected for the first time in Montenegro in October 2012 on Canary Island date palm in area of the city of Ulcinj (Hrnčić *et al.*, 2012). The aim of this paper is to present the current situation of the red palm weevil in Montenegro.

2 MATERIAL AND METHODS

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After the first detection of *R. ferrugineus* in Montenegro (Hrnčić *et al.*, 2012), a visual inspections of infested area was immediately done. This observations included detection of early symptoms such as an eccentric growing crown, divided crown and bending of old leaves, beginning of leaves drying, symptoms resembling lack of water (wilting, desiccation and necrosis of the foliage) and feeding damage to palm foliage, presence of late symptoms ("umbrella like"). In order to check if the larvae, cocoons and adults were present inside the infested palms, suspected leaves were pull out and checked on the presence of tunnels in leaf bases or cavities filled with frass. In addition, four bucket pheromone traps were set up. In the following years visual inspections were done once per month and included whole Montenegro seacoast. Besides visual inspections, since 2015 aggregation pheromone Rhy lure 400 (4-methyl-5-nonanol 90% and 4-methyl-5-nonanone 10%) has been used on the whole Montenegro seacoast and checked in two week intervals (once per month during a winter). Traps were placed in the base of palm trees (Fig 1). Apart from inspections directly done on sites, samples of leaf bases containing larvae and cocoons were collected for further morphology examinations in laboratory. Adults were collected also. In most cases, photographs of living specimens and injury symptoms were taken. The localities of findings were marked using GPS coordinates.

3 RESULTS AND DISCUSSION

In October 2012 inspections of 50 years old of Canary Island date palm (26 trees) in hotel complex in area of the city of Ulcinj (GPS 41° 54' 43" N, 19° 14' 31" E) were done. Nine palms were detected suspicious because of symptoms resembled an infestation caused by *R. ferrugineus*: umbrella-like symptoms, dried foliage, falling

leaves. During detailed inspections *in situ* we found tunnels inside the bases of leaves, large cavities filled with frass, several larvae and cocoons (Fig. 2).



Fig. 1: Bucket pheromone trap.

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According morphology features of larvae and adults that we found in cocoons, identity of the pest was confirmed (Fig. 3). After this finding Phytosanitary Inspections ordered eradication measures. In following immediate visual inspections of area of Ulcinj symptoms of infestations were not found on other palms. In November 2012 we found four captured adults in pheromone traps which were already installed in the place of the first finding. As results of visual inspections of area of Ulcinj in October and November 2013 infested palms with typical symptoms were found in four new sites (Fig. 4). In rest part of Montenegro seacoast symptoms were not detected. In 2014-2016 spreading of the red palm weevil was registered on *Ph. canariensis* in area of Ulcinj. The first finding out of this area was in October 2014 when three Canary Island date palms were found in several sites in center of the city of Budva (GPS 42° 16' 53", 18° 51' 30" E). In 2015 gradual spreading of the pest within area of Budva, the first detection in area of the city of Tivat (GPS 42° 26' 8" N, 18° 41' 18" E), as well in a wider area of city of Bar (Dobre Vode) (GPS 42° 1' 55" N, 19° 8' 49" E), and in area of city of Herceg Novi (Bijela GPS 42° 26' 44,89" N, 18° 38' 30,31" E) was confirmed in the first half of May, first half of July and second half of October. Spreading was continued in 2016 when *R. ferrugineus* was found along the whole seacoast. In pheromone traps both sexes were captured, although dominantly females. Adults were captured during a whole year. In years of monitoring we found that all infested palms are *Ph. canariensis*, except one tree of *Trachycarpus fortunei* which was found in the city of Ulcinj in August 2016. Following symptoms on infested *Ph. canariensis* trees were found: drying of infested leaves, tunneling of palm tissue by larvae, presence of cocoons and adults at the base of leaves, cocoons around infested palms, feeding damage to palm foliage (chewing symptoms of ">" shape), "umbrella like" symptoms on crown, drying of outer leaves and in cases of severe infestations complete drying of the tree. Infested leaves have

strong fermented odour. Infestations are usually detected after the palm tree has been seriously damaged.



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Fig. 2: Infested palm tree: a) “umbrella like” symptom, b) tunnels inside the bases of leaves, c) large cavities filled with frass, d) larvae, e) cocoons.



Fig. 3: Adults of *R. ferrugineus*.

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Fig. 4: Symptoms of infested palms: a) divided crown and dried leaf, b) chewing symptoms of “>” shape, c) collapse of crown.

Palm trees which were found infested have been the regular part of our coastal landscape for decades. They are grown in hotels complex, urban greenery, public or private gardens and parks. The only exceptions are new villas complex in the city of Budva and “Porto Montenegro” in the area of Tivat where infestations were recorded in Canary Island date palms imported in 2014. Presence and rapid spreading of *R. ferrugineus* on the Montenegro seacoast resulted in devastation and death of many palms and extreme changing of our traditional coastal urban landscape, not only because of general appearance of infested palms, but also because heavy infested palms quickly collapsed and died (Fig. 5). Up to November 2016 around 100 Canary Island date palm have been eradicated, while in 2017 more than 100 additional palms have been destroyed. According Dembilio and Jacas (2011) in the Autonomous Community of Valencia 19,677 palms, mostly *Ph. canariensis*, have been documented as killed by *R. ferrugineus* from 2004 to 2009. Once infested by *R. ferrugineus*, palms usually collapse or die because of serious damages of meristematic tissue. Weevils do the greatest damage when they enter palms via the crown, where they damage growth of new fronds, eventually killing the palm. Signs to look out for are new leaves in the centre of the crown that look sparse, lean or weak, or that show signs of having been eaten (<http://www.savealgarvepalms.com/en/signs-and-symptoms>).

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Fig. 5: Quick collapsed and died palm tree: a) 08.08.2015., b) 15.09.2015., c) 12.10.2015.

4 CONCLUSIONS

After the first detection in 2012, *R. ferrugineus* showed, not only a high rate of spread, but also caused serious damages, particularly destroying the Canary Island date palm in Montenegro. Considering a large number of infested palms have been irretrievably damaged and cut down, it resulted in dramatic changes of the traditional coastal landscape. There is a serious concern that in a future it can switch to another palm species present on our coastal area, such as *Washingtonia*, *Butia*, *Chamerops*.

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