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ANTHONOMUS RUBI (HERBST, 1795) (COLEOPTERA: CURCULIONIDAE) A NEW DANGEROUS PEST IN THE ECOLOGICAL CROPS OF STRAWBERRY IN THE SOUTHERN REGIONS OF ROMANIA

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Abstract

In Romania mostly of 70% of strawberry ecological plantations were cultivated with specific commercial cultivars like Premial, Red Gauntlet, Dana and Elsanta. In the last years became to be cropped cultivars with increased resistance to various pest insects, specially in the first stages of vegetation period like Honeoye, Elsanta, Camorosa, Marmolada, Chandler, Darselect, Clery and Sonata. On the little individual farms with small surfaces the cultivars Senga Sengana, Marmolada, Elsinore should be the primary source of infestation with Anthonomus rubi.A study of distribution, density and the degree attack of Anthonomus rubi was carried out in the period 2006-2007 in the Vidra and Comana localities, Giurgiu district in the southern part of Romania. The study and observations that was made showed that this species is increased in density in the new ecological plantations of strawberry from some individual farms. The strawberry blossom weevil is not a common pest of strawberry plantations in Romania but some cultivars cropped in ecological system became more sensitive to the weevil attack by increasing in density. Observations and researches were carried out on 4 cultivars and showed that the degree of damage caused by A. rubi depends of cultivar morphological characteristics (small fruits) or phenophases (time of ripening and duration of budding and blossoming).

Key words**:** *Curculionidae, ecological crops, new pest, strawberry blossom weevil*

INTRODUCTION

One of the most important aspects of the plant protection domain related to the ecological crops is determined of the two factors: climate change which is combining a multitude of drivers and the existent local biodiversity. In the new conditions created by a multistage combination of such a drivers some of the species belonging to the local, common biodiversity became by enhancing their biological activity the main factors to crop reduction [9] [4] [2]. This phenomenon is usually named the appearance of the new emergent species. Local attacks enhancing in the Southern Romania of a new important strawberry pest *A. rubi* is caused ones more by the proliferation of little individual farms which are cultivate different strawberry cultivars in ecological crops. The strawberry blossom weevil is a little insect belonging taxonomically of weevils (Curculionidae family) that feeds of some Rosaceae species and is considered in such special cases like an common and important pest of strawberry and raspberry (*Rubus idaeus* L.) in Eurasia. This insect is particularly problematic pest of strawberry in Europe, in some cases responsible for up to 80% loss of fruits crop [6]. Adults feed on strawberry foliage, and females lay one egg per flower bud, the larvae hatching and develop inside the buds. In

Romania in the treated strawberry crops using chemical pesticides the insect were not caused any crop losses up to the treshold because of the low densities involved and the very low pesticide resistance of the insect. After the large scale introduction of ecological crops (in the free field or in greenhouses) the rapidly increase of insect populations densities and wide spreading had appear [7] [11].In the present paper field studies were conducted to examine the relationships between population dynamics of adult of strawberry blossom weevil and to establish economic injury levels at the highest densities.

MATERIALS AND METHODS

The strawberry plants observed in the course of the 2011-2012 study were for resistance testing against *Anthonomus rubi* attack at four cultivars. Each variety was represented by 10 plants planted in variation rows and treated in compliance with conventional agro technical methods. Resistance was measured in percent isolating 10 model plants by economic injury estimation. Data are analyzed by an appropriate variation – statistical method. Adult weevils were sampled weekly in untreated and insecticide-treated plots using a sweep net.

RESULTS AND DISCUSSIONS

Description

Adult is 2 to 4 mm long, dull black covered with a fine grey pubescence (Fig.1). Rostrum long and slightly curved. Antennae slender, inserted in the third terminal of the rostrum. Pronotum white, with a fine and very dense punctuation. Elytra short, with marked stripes.
Eggs are white, smooth, shiny, slightly oval, 0.50 x 0.35 mm.
Larva: 3.0 to 3.5 mm long, curved, white; head brown.
Biology
Host plants in Romania: raspberry, strawberry, bramble (*Rubus*), rose (*Rosa*) and wild rose (*Rosa canina*).
Imago: directly after its emergence, it feeds a few days on the young leaves and the corollas then enters diapause, sheltered under bark or in various other situations. It emerges in spring, feeds for a few days and mates. Oviposition occurs immediately after mating: with its rostrum, the female bores through the unopened flower bud; then turns round and introduces an egg in the centre of the floral tissue, on the young anthers or the stamens. It then incises the flower stalk, thus preventing sap circulation. Egg: Embryonic development lasts 5 to 6 days.
Larva: growth lasts 18 to 22 days. Pupation occurs in the bud and adults emerge 8 days later, having perforated the bud.

Fig. 1. *Anthonomus rubi* Herbst., sexual dimorphism (♂♀)

Life cycle

One generation per year. The young adults appear in the late spring and then; after a few days of activity, enter into summer-winter diapauses and reappear in the following spring.

Damage

Strawberry is the main host, and suffers from the very characteristic attacks of this insect: flower bud containing an egg does not develop but dries up, hangs on the peduncle and finally drops off. The damages caused to strawberry by *Anthonomus rubi* varied depending on several factors: morphological characteristics of cultivars, agrotechnical equipment and weather conditions during the period of laying eggs [6]. In the opinion of some authors small fruits yield losses per year are quite considerable, varying from 15% to 60% [1] [5]. More important damages are reported from Scandinavia and some Northern

European countries. For example in Denmark the yield losses are bigger up to 80% [8] [10].Field experiments showed that increasing the release rate by approximately five times marginally increased attractiveness but a four times reduction in the release rate significantly decreased attractiveness. It was concluded that the standard release rate was satisfactory. Male *A. rubi* weevils were shown to produce the R enantiomer of lavandulol, but it was also demonstrated that the S enantiomer is not repellent and that low-cost racemic (±)-lavandulol is equally attractive. Although (−)-germacrene-D showed a weak synergistic effect when added to the pheromone components, inclusion in a commercial lure was uneconomic. Two further experiments examined the effect of reducing the amount of grandlure I, a costly chemical, in the blend [3].In Romania, in the period of investigations the weather related to the vegetation period and strawberry ripening was very dry and favourable for pest attack. The degree of resistance to the pest attack was negative correlated with the quality of production. The Premial cultivar seems to be more tolerant to the pest attack and the yield of good quality was not affected (Table 1).

Table 1. The main strawberry cultivars tested which express different resistance degree against *Anthonomus rubi* Herbst. in the experimental field at Vidra Experimental Agricultural Station – Giurgiu district

Cultivar	ORIGIN	RESISTANCE DEGREE	PRODUCTION
Premial	Romania, RDIP	Medium degree of pest resistance	High production; high quality
Redgauntlet	UK	High resistance against pest attack	High production but perishable
Cardinal	USA	Small degree of pest resistance	High production and fruit quality
Marmolada	Italy	Small degree of pest resistance	High production and fruit quality
Pandora	Italy	High resistance against pest attack	High production but perishable

The imported cultivar expresses different degree of resistance to pest attack, two of them Redgauntlet from UK and Pandora from Italy had High resistance against pest attack correlated with high production but the fruits are very perisable. On the opposite the cultivars Cardinal from USA and Marmolada from Italy had a small degree of resistance but high production and fruit quality. The attack of the pest was thus correlated with the resistance or tolerance presented by the different cultivars tested in the specific weather conditions. Very little tolerance of the *Anthonomus rubi* attack was presented by cultivars Pandora and Redgauntlet instead Marmolada and Cardinal was small resistant to the insect attack (Table 2).

Table 2. Attack degree of strawberry blossom weevil *Anthonomus rubi* damaging on four cultivars in the Southern Romania at Băneasa Giurgiu Agricultural Station

CULTIVAR	ATTACK DEGREE %	LEAVES	BUDS
Redgauntlet	8.10±0.99	4.30	2.70
Cardinal	10.30±0.75	1.90	14.10
Marmolada	18.40±0.88	4.87	16.60
Pandora	6.70±0.78	1.40	5.70

CONCLUSIONS

In the weather conditions from Southern Romania (driest and warm conditions) *Anthonomus rubi* could be considered the new emerged pest of strawberry ecological crops.
The degree of resistance to the pest attack was negative correlated with the quality of production.
The Premial cultivar was more tolerant to the pest attack and the yield of good quality was not affected.
The imported cultivar expresses different degree of resistance to pest attack, two of them Redgauntlet from UK and Pandora from Italy had High resistance against pest attack correlated with high production but the fruits are very perisable.
The cultivars Cardinal from USA and Marmolada from Italy had a small degree of resistance but high production and fruit quality.

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