Acta Biol. Univ. Daugavp. 11 (2) 2011
ISSN 1407 - 8953

COMMONLY FOUND SPECIES OF *CEUTORHYNCHUS* (COLEOPTERA: CURCULIONIDAE) ON THE OILSEED RAPE IN LATVIA

Ingrida Grantiņa, Ilze Apenīte, Ināra Turka

Grantiņa I., Apenīte I., Turka I. 2011. Commonly found species of *Ceutorhynchus* (Coleoptera: Curculinoidae) on the oilseed rape in Latvia. *Acta Biol. Universit. Daugavpil., 11 (2): 260-264.*

The occurrence of *Ceutorhynchus* was studied in four commercial field of winter oilseed rape in Zemgale region. Weevils were sampled in 2008 and 2009 using Moericke's type yellow water traps during the period from April to July. A total of 1872 specimens were recorded in the winter oilseed rape fields. Five *Ceutorhynchus* species were identified: *C. picitarsis* (Gyllenhal, 1837), *C. obstrictus* (Marsham, 1802) syn. *C. assimilis* (Paykull, 1792), *C. sulcicollis* (Paykull, 1800), *C. pallidactylus* (Marsham, 1802) syn. *C. quadridens* (Panzer, 1795) and *C. typhae* (Herbst, 1795) syn. *C. floralis* (Paykull, 1792). Dominanting weevil species on the oilseed rape were indicated. One of the dominating species is *C. pallidactylus* was found in all winter oilseed rape fields in the Zemgale region.

Key words: winter oilseed rape, *Ceutorhynchus*, the sum of accumulated effective temperatures (AET), weevil.

Ingrida Grantiņa, Ināra Turka, Institute of Soil and Plant Science, Latvia University of Agriculture, Lielā 2, Jelgava, LV-3001, Latvia; e-mail: ingrida.grantina@llkc.lv

Ilze Apenīte, Latvian Plant Protection Research Centre, Lielvardes iela 36/38, Rīga, LV-1006, Latvija; e-mail: ilze.apenite@laapc.lv

INTRODUCTION

The production of oilseed rape (Linnaeus, 1753) has significantly increased in the recent years in Latvia. The number of farms cultivating oilseed rape has increased along with the areas – in 2009. the areas under oilseed rape was 100 000 ha with the harvested yield of 300,000 t.

Oilseed rape is attractive to a large number of insect species, both beneficial and pests (Winfered 1986, Narits 2006). The most important pests of winter oilseed rape are pollen beetles (*Meligethes aeneus* (Fabricius, 1775), *M. viridescens* (Fabricius, 1787)), cabbage seed weevil (*Ceutorhynchus assimilis* (Paykull, 1792)), cabbage stem weevil (*Ceutorhynchus pallidactylus* Marsham, 1802.), rape stem weevil (*C.napi* (Gyllenhal, 1837)), brassica pod midge (*Dasineura brassicae* Winnertz, 1853), cabbage stem flea beetle (*Psylliodes chrysocephala* (Linnaeus, 1758)) (Williams et al. 2004, Hansen 2004, Tarang et al. 2004). Weevils are the second most important group of pests on winter oil seed rape.

Weevils (Coleoptera: Curculionoidae) on oilseed rape are specific group of insects, because of the period of their activity and different ways they

damage the plants (Milovac et al. 2010). More than one third of the existing *Ceutorhynchinae* are monophagous or oligophagous on Brassicaceae species (Toshova et al. 2009).

C. picitarsis – weevil, which damage the stems of the *Brassicaceae* during the autumn. A. Evans and S. Oxley (2007) have noticed severe damage caused for winter oilseed rape. It is important to continue the research on pest damage on the winter oilseed rape and to further develop the control measures.

The *C. sulcicollis* larva most likely inhabits the stems of *Brassicaceous* herbs, like other *Ceutorhynchinae*. The adults feed on several members of the *Brassicaceae* (Milovac et al. 2010).

C. typhae feeds mainly on stems of non-cultivated wild cruciferous species (Bürki et al. 2001, Toshova 2009) but infestations on oilseed rape (Hiiesaar et al 2003, Toshova 2009) was also reported. Veromann et al. (2006) observed a relative abundance of beetles of this species in winter oilseed rape in Estonia (Toshova 2009).

C. pallidactylus is univoltine, and adult beetles migrate to oilseed rape fields in spring, the first beetle found in start of April, when oilseed rape is in the bud stage (BBCH 18) and onwards, and oviposit on the underside of the petioles where the larvae tunnel into the stems (Alford 2003).

C. obstrictus move into the winter oilseed rape field starting with the beginning of the flowering of the plants (Hiiesaar et al. 2003). During the second decade of May, 2009 when the air temperature reached +13 ºC and AET 449 ºC, flowering of the oilseed rape started (BBCH 60) cabbage seed weevil was observed. The female of cabbage seed weevil makes an oviposition bite in the pod with its mouthparts, deposits one egg and marks the place by a deterrent pheromone to prevent a second egg-laying on the same spot. Young pods of 20-40 mm are preferred for oviposition, and a single female can lay 25-240 eggs during one season (Hiiesaar et al. 2003). Larvae feeding inside oilseed rape pods destroy 3-6 seeds/pods (Cárcamo et al. 2007). Egg to adult development takes 31-58 days in southern Alberta (Dosdall & Moisey 2004, Cárcamo et al. 2007). The last instar larva leaves the pod and moves into the soil for pupation. Adult weevils die during June and then a new generation is observed in July – August, feeding on yet unripe pods, or moving onto wild cruciferous plants to form a fatbody for hibernation (Alford 2003).

During the last years a higher, more serious invasion of *Brassicaceae* weevil has been observed in the winter oilseed rape fields, but until now there has not been sufficient research on the occurrence of different pest species is in the oilseed rape fields in Latvia.

MATERIAL AND METHODS

Weevils were collected in 5 - 30 ha fields of winter oilseed rape, which located in central part of Latvia in 2008 and 2009. The previous crop was maize (for silage), winter wheat and winter barley. The field borders were: maize, winter wheat and winter barley fields and a road.

The counts for estimating the occurrence of *Ceutorhynchinae* in the Zemgale region was done twice during the vegetation season. First time was to identify the average number of imago per 50 plants, and second time was to identify the rate of invaded plants (%).

Insects were collected using the Moericke's yellow water type traps (210 mm in diameter and 70 mm in height). ¾ of the trap was filled with water and active substance was added. Yellow water traps have been used extensively to sample pests (Williams et.al. 2003), as yellow is the most effective colour for trapping oilseed rape pests (Veromann et.al. 2006). Eight traps were placed randomly, positioned at least 10 – 20 m away from the field's edge, in two rows, keeping a 20 meter distance between the traps. The container was installed on a white metal rod, and was set according the height of the central flower head of the oilseed rape plant.

Counting of imago of *Brassicaceae* stem weevils and pod weevils were start in late August with

the beginning of attaining of genuine leaves (BBCH 11 of Meier 2001) until the end of September 2008, when the air temperature dropped below +5 °C.

When the air and soil temperatures started to increase in the third decade of April, a large part of entomofauna started abandoning their hibernation areas, and the migration of the first specimens was observed in the field. In 2009 the counting of imago was carried out from April, when the average day temperature reached +5 °C, until July – the seed ripening phase (BBCH 70 -85) (Dosdall 2006).

Trapped insects were collected from traps once a week and put in into marked container. Samples were sorted and *Ceutorhynchus* were stored in 70% ethanol for later identification and counting of key species. The identification of species was carried out in cooperation with entomologists from University of Latvia. In this paper we were follow the systematics suggested by Silferberg (2004).

The aim of the current research is to clarify *Ceutorhynchus* species occuring in winter oilseed rape crops in Latvian climatic conditions.

RESULTS AND DISCUSSION

In 2008/9 total of 1872 weevils were collected in the winter oilseed rape fields. Five *Ceutorhynchus* species were identified: *C. picitarsis* (Gyllenhal, 1837), *C. obstrictus* (Marsham, 1802) syn. *C. assimilis* (Paykull, 1792), *C. sulcicollis* (Paykull, 1800), *C. pallidactylus* (Marsham, 1802) syn. *C. quadridens* (Panzer, 1795) and *C. typhae* (Herbst, 1795) syn. *C. floralis* (Paykull, 1792).

In springtime early April cabbage stem weevil (*C. pallidactylus)* (18 beetles), blue stem weevil (*C. sulcicollis*) (12 beetles) and *C. typhae,* 2 beetles, (Figure 2) were observed first. The beetles have been observed when the air temperature reached +6.4 ºC and the sum of accumulated effective temperatures (AET) 86 ºC – oilseed rape plants at this time were forming side shoots (BBCH 30).

Form the observed species major damage is caused by *C. pallidactylus* (Alford 2003), which has been dominating of the recorded weevils (62%). Major activity of *C. pallidactylus* has been observed starting with April 27 until May 18. After 3-5 weeks the larvae vacate the host plant and pupate in the soil. After hatching in

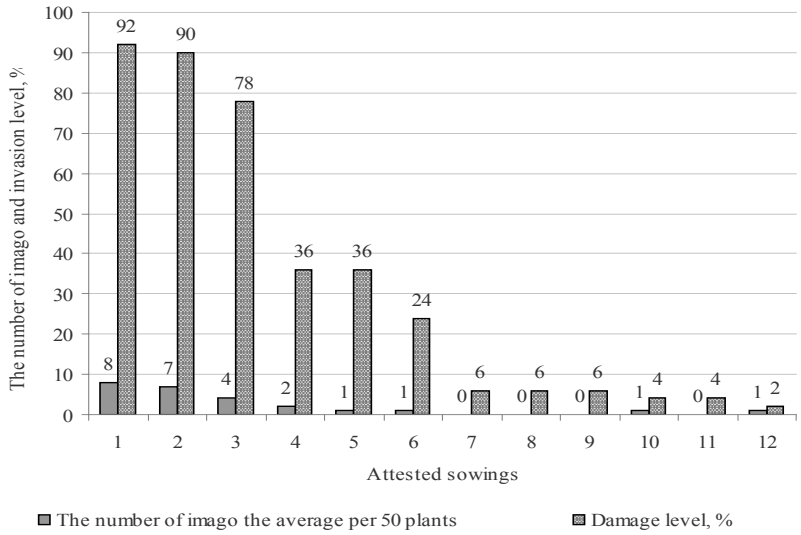

Fig.1. The number of *C. pallidactylus* (imago) and invasion level (%) in Zemgales area

Major activity of *C. obstrictus* was observed during the flowering stage of oilseed rape (BBCH 60-70), when the trapped insects constituted 32% of all weevils.

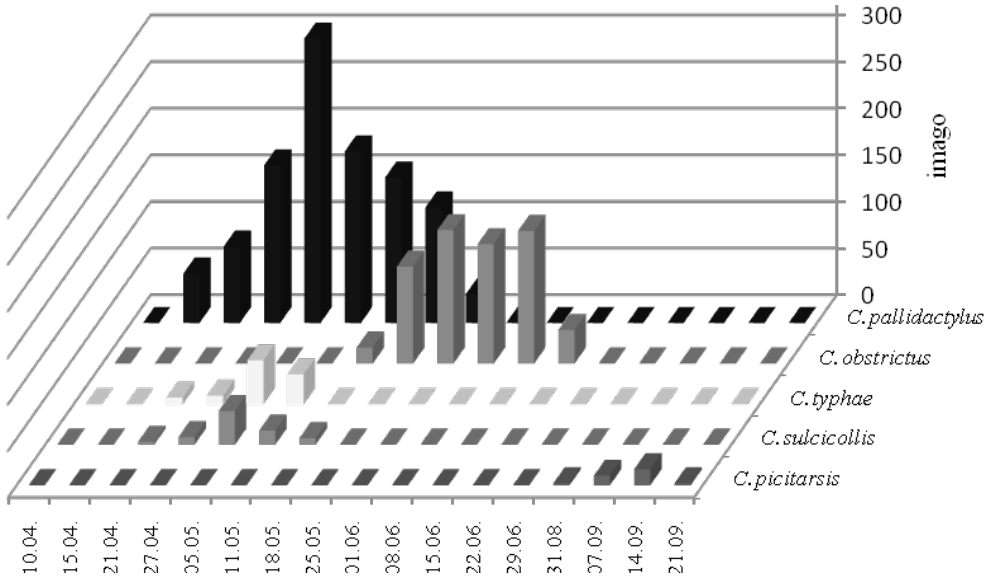

Fig. 2. Monitoring of adults of *Ceutorhynchus*, 2009.

summer, adults feed on the leaves of other species of the *Brassicaceae* family before hibernation (Alford 2003, Moser et al. 2009).

Monitoring of 12 winter oilseed rape fields in Zemgale region showed that *C. pallidactylus* was identified in all farms. The peak of invasion was during the second decade of May, winter oilseed rape reaching "green bud" stage (Flower buds visible from above - BBCH 51). Number of pests on 40 plants in 3 farms was well above the critical threshold set in Latvia – one insect per 40 plants (Priedītis 1999). The pest had invaded 2 – 92% of the plants decreasing the seed yield by 0.5 - 0.8 t ha^{-1}.

C. picitarsis – weevil was observed starting with September 2, with the formation of true leaves. The number of trapped insects was low (3 weevils collected during 1 week).

ACKNOWLEDGEMENTS

We express our sincere gratitude to Assoc. Professor V. Spuņģis, University of Latvia, Faculty of Biology, and his colleagues for assistance in identification of *Ceutorhynchus.*
The research is supported by the project „Support for doctoral studies in LUA" Nr 2009/01 80/1DP/1.1.2.1.2/09/IPIA/VIAA/017

REFERENCES

*A*lford, D.V.(2003) Insect pests in oilseed rape crops. In: Biocontrol of Oilseed Rape. Alford, D.V. (ed.) Blackwell Science Ltd.: 9-42

Augu attīstības stadiju noteicējs.(1997) LR Zemkopības ministrija, Rīga: 68-83 [in Latvian]

Bürki H.-M, Lawrie J., Greaves M.P., Down V.M., Jüttersonke B., Cagán L., Vráblová M., Ghorbani R., Hastsan E.A., Schroeder D.(2001).- Biocontrol of Amaranthus spp. in Europe: state of art. BioControl, 46 (2): 197-210.

Cárcamo H.A., Dunn R., Dosdall L.M., Olfert O. (2007) Managing cabbage seedpod weevil in canola using a trap crop- A commercial field scale study in western Canada. Crop Protection 26:1325-1334.

Colonnelli E. (2004) Cataloue of Ceutorhynchi-

nae of the world, with a key to genera (Insecta: Coleoptera: Curculionidae). Argania edition, Barcelona, Spain.

Dosdall L., Moisey D. (2003) Developmental Biology of the Cabbage Seedpod Weevil, Ceutorhynchus obstrictus (Coleoptera: Curculionidae), in Spring Canola, Brassica napus, in Western Canada. Annals of the Entomological Society of America 97(3): 458-465.

Dosdall L., Ulmer B., Gibson G., Carcamo H. (2006) The spatio- temporal distribution Dynamics of the cabbage seedpod weevil, Ceutorhynchus obstrictus (Coleoptera: Curculionidae), and its larval parasitoids in canola in western Canada. Biocontrol Science and Technology 16 (10): 987-1006.

Evans A., Oxley S. (2007) Winter oilseed rape pests and diseases.- [www.document]http://www.sac.ac.uk/consulting/.

Ferguson W., Klukowski Z., Walczak B., Clark J., Mugglestone A., Perry N., Willams H. (2003). Spatial distribution of pest insects in oilseed rape: implications for integrated pest management. Agriculture, Ecosystems and Environment 95:509-521.

Hansen L. M.(2004) Economic damage threshold model for pollen beetles (Meligethes aeneus F.) in spring oilseed rape (Brassica napus L.) crops. Crop Protection, Volume 23, Issue 1: 43-46.

Hiiesaar K., Metspalu L., Lääniste P., Jõgar K. and Jõudu J. (2003) Insect pests on winter oilseed rape studied by different catcing methods. Agronomy Research, 1:17-29.

Meier, U. (ed.) (2001) Growth stages of mono- and dicotyledonous plants. 2nd ed., www.bba.de/veroeff/bbch/bbcheng.pdf.

Milovac Ž., Pešic S., Kereši T., Marinković R. (2010) Weevils (Cleoptera: Curculionoidea) – important members of rapeseed entomofauna in vicinity of Novi Sad. Kragujevac J.Sci. 32: 141-148.

Moser D., Drapela T., Zaller J., Frank T. (2009) Interacting effects of wind direction and resource distribution on insect pest densities. Basic and Applied Ecology 10:208-215.

Priedītis A. (1999) Kultūraugu kaitēkļu kritiskie sliekšņi ķīmisko un bioloģisko aizsardzības pasākumu pamatošanai. Jelgava: 16. [in Latvian].

Silfverberg H. 2004. Enumeratio nova Coleopterorum Fennoscandiae, Daniae et Baltiae. Sahlbergia, 9: 1 - 111.

Tarang T., Veromann E., Luik A., Williams I. (2004) On the target entomofauna of an organic winter oilseed rape field in Estonia. Latvijas entomologs 41:100-110.

Toshova T., Subchev M., Toth M. (2009) The diversity of species of Ceuthorhynchinae captured in traps in the region of Sofia, Bulgaria. Bulletin of Insectology 62 (1):27-33.

Veromann E., Luik A., Metspalu L., Williams I. (2006) Key pests and their parasitoids on spring and winter oilseed rape in Estonia. Entomologica Fennica 17:400-404.

Williams I.H., Büchs W., Hokkanen H., Kliukowski Z., Luik A., Menzler – Hokkanen I., Nilsson C., Ulber B. (2004) The EU project MASTER (MAnagement STrategies for European Rape pests): a review of progress. Integrated Protection in Oilseed Crops IOBC/wprs Bulletion Vol 27(10): 3-16.

Williams, I.H., Büchi, R.& Ulber, B. (2003) Sampling, trapping and rearing oilseed rape pests and their parasitoids.- In: Alford, D.V. (ed), Biocontrol of Oilseed Rape Pests: 145-160. Blackwell Science, Oxford.

Received: 20.04.2011.
Accepted: 01.08.2011.