

## EFFECT OF DIFFERENT TRAPS ON CAPTURES OF ADULT CORN ROOTWORM BEETLES (*Diabrotica virgifera virgifera* LeConte) IN EAST SLAVONIA

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### SUMMARY

*In 1995 the corn rootworm (*Diabrotica virgifera virgifera* LeConte) was detected for the first time in east Slavonia, Croatia. Its expansion to the west part has been very fast and from year to year populations of the pest are higher, especially when corn is planted after corn. The aim of this investigation was to find the best trap for monitoring *Diabrotica*. The studies were conducted by using three types of traps: the USA Trece lure trap, Multigard yellow sticky trap and Hungarian pheromone trap. The treatments were replicated four times in a maize field located in the east of Croatia, very near to the Yugoslavia border. The traps were placed in the field on the 23rd of June and the experiment continued until the 15th of September. Pheromone and Multigard sticky traps were replaced with new ones each month. Traps were positioned 60 m apart within a row and 70 m apart across maize rows. Silking occurred from 30 June to 8 August (exposed silk thoroughly brown and dry). This year was extremely dry, and the first beetles were noticed on the 15th of June. It was 20 days earlier than in 1999. Adult rootworm beetles were removed from the traps once weekly. Pheromone traps captured the most beetles (2263), Multigard sticky traps caught the second most (214) and lure traps the fewest (182) for the whole period. After the replacement of pheromone and Multigard traps, the capture of beetles increased. Of the total number of beetles caught, 85.10% was caught by the pheromone traps, 8.05% by the Multigard sticky traps and 6.85% by the lure traps. Due to this year's dryness (50% less rainfall than the 20 year average), the investigation should be continued in the future to get more precise results.*

**Key-words:** Corn, *Diabrotica virgifera virgifera*, USA Trece lure traps, Multigard yellow sticky traps, Hungarian pheromone traps

### INTRODUCTION

*Diabrotica virgifera virgifera* LeConte, the western corn rootworm, is a New World insect species discovered in the U.S. in the late 1800s. It spread throughout the U.S. Corn Belt during the mid 1900s, and it is the most serious pest insect attacking field corn. It is called a «billion dollar insect» since it is estimated to cost U.S. farmers billion dollars each year in yield loss and control costs (Metcalf, 1986). The larvae cause the main damage by feeding on roots of corn plants. This leads to a reduction in growth and, in cases of severe root damage, corn lodging and loss of ears during harvest. Adults cause secondary damage by feeding on silks, which results in insufficient pollination and thus reduces corn seed production. Anticipation of subsequent populations of WCR by comparison of adult and egg sampling were investigated by Tollefson (1990), Hein & Tollefson (1984).

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The western corn rootworm was introduced in Europe in 1992. It was discovered in Yugoslavia near the Belgrade airport (Bača, 1993). Since then, the insect has spread from Serbia into Hungary, Croatia

(1995), Bosnia and Hercegovina, Romania, Albania and, in 1998, into Italy. Because of its economic importance in Europe, the Western corn rootworm is regulated as a quarantined pest.

Croatia started monitoring the corn rootworm in 1995. It is estimated that 12750 sq km were infested by *Diabrotica* in 1999 (Igrc-Barčić et al., 2000). In 2000, 182358 ha were sown by corn in east Slavonia and Baranja. That is 47% of all production in Croatia. In these 5 counties, private corn farming varied from 70 to 92%. In Gunja in 1999, monitoring for *Diabrotica* adults was conducted using pheromone and Multigard yellow sticky traps. 90,50% of the beetles were caught by the pheromone trap and 9.50% by the Multigard traps. The aim of this study was to continue the comparison of these two traps and a new one, the Trece lure trap, for capturing adult WCR (*Diabrotica virgifera virgifera* LeConte) in east Slavonia.

## MATERIAL AND METHODS

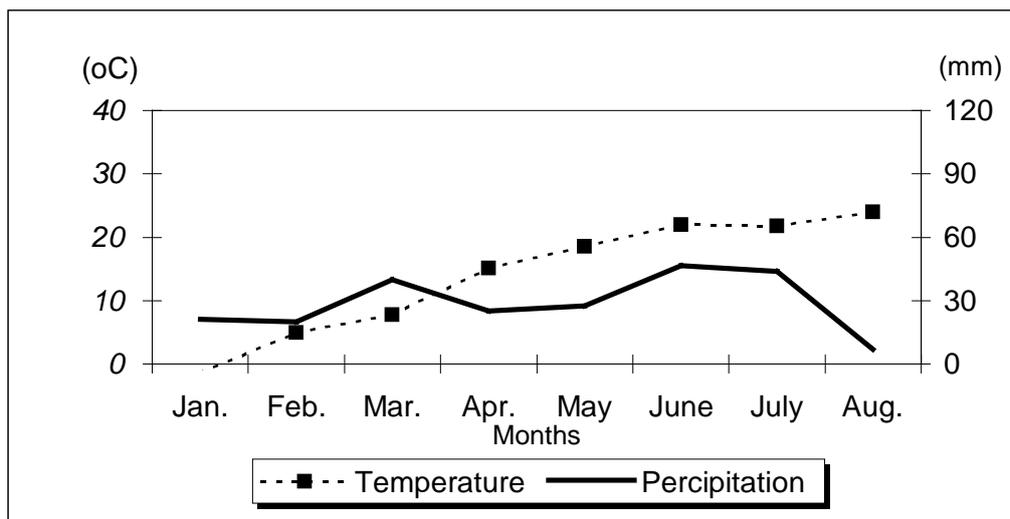
The studies were conducted by using three types of traps: USA Trece lure traps, Multigard yellow sticky traps and Hungarian pheromone traps. The traps were compared in a 2.5 ha field located in the east of Croatia, very near to the Yugoslavia border. Corn, planted at the rate of 63000 plants/ha, had been grown in monoculture in the field for four years.

Traps were placed in the field on the 23rd of June and monitoring continued until the 15th of September. Pheromone and Multigard sticky traps were removed and replaced with new ones each month (on the 21st of July and 17th of August); lure traps remained in the field for the whole sampling period. Treatments (traps) were replicated four times. Traps were positioned every 60 m along a cornrow and there were 70 meters between the trap lines. Silking occurred from the 30th of June to the 8th of August (exposed silk through thoroughly brown and dry silks). Every week the number of beetles was counted on each trap. Data were subjected to an analysis of variance (ANOVA) and means were compared by using Fisher's (1949) LSD tests.

## RESULTS AND DISCUSSION

In our study we wanted to compare three different traps: USA Trece lure traps, Multigard yellow sticky traps and Hungarian pheromone traps, for the capture of adult corn rootworms.

This year was extremely dry (Fig. 1). The first WCR beetle was noticed on the 15th of June. It was by 20 days earlier than in 1999.

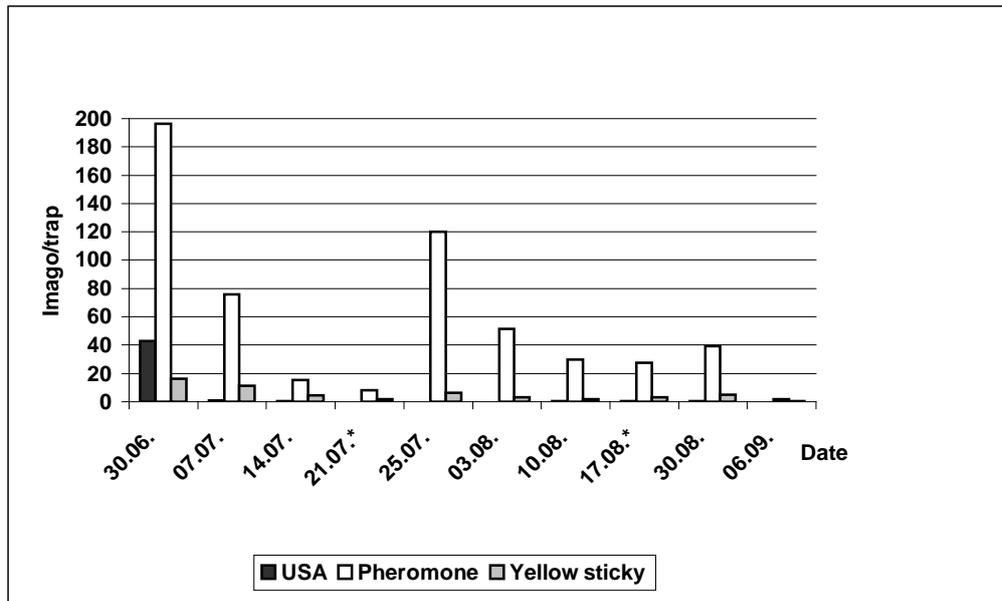


**Figure 1. Climate diagram (Walter) for 2000 in Gradište**

Grafikon 1. Klima dijagram po Walteru za 2000. godinu (Gradište)

Rootworm beetles were removed from the traps once weekly. Pheromone traps captured the greatest number of beetles, 2263, over the whole period. Multigard sticky traps caught 214 and lure traps 182 during the same period (Fig. 2). After the replacement of the pheromone and Multigard traps, the

capture of beetles increased. Of the total number of beetles caught, 85.10% were caught by the pheromone traps, 8.05% by the Multigard sticky traps and 6.85% by the lure traps.



**Figure 2. Average number of corn rootworm beetles per trap**

Grafikon 2. Prosječan broj imaga kukuruzne zlatice po mamcu

The USA Trece traps containing the feeding lure were most effective at the beginning of the sampling period, while the Pheromone and yellow sticky traps effectively caught beetles during the entire period.

Pheromone traps captured significantly more WCR beetles than the yellow sticky and USA Trece lure traps ( $F= 47.19$ ;  $df =2.9$ ;  $P> 0.01$ ). This year was very dry (50% less rainfall than the average for 20 years), so the investigation should be continued in the future to get more representative results.

## CONCLUSIONS

Five counties in east Croatia produce 47% of the country's corn every year. The same east part of the country has been infested with corn rootworms since 1995. Since its introduction, the pest has been monitored by traps. The efficiency with which three different traps captured adult WCR (*Diabrotica virgifera virgifera* LeConte) were studied in east Slavonia during 2000. Pheromone traps captured the beetles throughout the sampling period. The yellow sticky trap was also effective throughout the sampling period but caught significantly fewer beetles. The USA Trece lure traps effectively caught beetles at the beginning of the emergence period, but their efficiency declined as the season progressed. Beetle captures were greatest for the pheromone traps which caught 85.10% of the beetles. The Multigard sticky traps caught 8.05% and the Trece lure traps 6.85% of the beetles, respectively.

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## **UTJECAJ RAZLIČITIH MAMACA NA ULOV IMAGA KUKURUZNE ZLATICE (*DIABROTICA VIRGIFERA VIRGIFERA* LECONTE) U ISTOČNOJ SLAVONIJI**

### **SAŽETAK**

*Kukuruzna zlatica (Diabrotica virgifera virgifera LeConte) otkrivena je u istočnoj Slavoniji (Hrvatska) u 1995. godini. Štetnik se širi vrlo brzo prema zapadu i iz godine u godinu populacija je sve veća. Cilj ovoga istraživanja je utvrditi najbolji mamac za monitoring kukuruzne zlatice. Istraživanje je provedeno koristeći tri tipa mamaca: USA Trace lure trap (hranidbeni mamac), Multigard žute ljepljive ploče te mađarski feromonski mamac. Istraživanje je provedeno u četiri ponavljanja, na području istočne Hrvatske. Mamci su postavljeni u polje 23.06.2000. te u polju ostali do 15.09.2000. godine. Feromonski i Multigard mamci zamjenjivani su novima jednom mjesečno. Mamci su postavljeni u polju na 60 m udaljenosti u redu te 70 m između redova. Sviplanje kukuruza trajalo je od 30.06. do 08.08. Godina je bila ekstremno suha te je prvi imago uočen 15.06. Kukuruzne zlatice uklanjale su se s mamaca jednom tjedno. Nakon zamjene peromonskih i Multigard mamaca novima, ulov je porastao. Od ukupnog broja ulovljenih zlatica, 85,10% bilo je na feromonskim mamcima, 8,05% na Multigard mamcima te 6,85% u hranidbenim mamcima.*

*Ključne riječi: kukuruz, Diabrotica virgifera virgifera, USA Trece - hranidbeni mamac, Multigard žute ljepljive ploče, Mađarski feromonski mamac*

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