

The 1998 Monitoring Results of *Diabrotica virgifera virgifera* LeConte (Coleoptera: Chrysomelidae) in Bosnia and Herzegovina

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The western corn rootworm (WCR), *Diabrotica virgifera virgifera* LeConte, is a destructive pest of corn in the United States and Europe. To monitor the spread of WCR in Bosnia and Herzegovina, Csalmoson pheromone traps and Multigard traps were placed in eastern and western municipalities in 1998. According to the data, the WCR population spread approximately 15–20 km towards the central region of Bosnia and Herzegovina. The spread occurred in areas of monocultural corn as well as in areas where corn is grown continuously.

Keywords: *Diabrotica virgifera virgifera*, western corn rootworm.

In Bosnia and Herzegovina, western corn rootworm (WCR), *Diabrotica virgifera virgifera* LeConte, was first discovered in 1997 (Festic et al., 1998). It is assumed that this pest was present before 1997, due to the vicinity of its initial origin in Europe: the Surcin airport in Serbia. In earlier papers, it was reported that the spread of WCR occurred from eastern and northern parts of Bosnia and Herzegovina, i.e. from Serbia (Baca, 1993) and Croatia (Maceljiski, 1994) where corn is grown over larger contiguous areas. Approximately 200,000 to 250,000 ha of corn are grown on a yearly basis throughout Bosnia and Herzegovina. In 1998, WCR populations were spreading mainly along traffic lines, rivers, and in cornfields located between mountains. It is estimated that WCR adults spread approximately 15 to 20 km per year. This spread is generally observed in areas of monocultural corn, although a higher rate of spread has occurred in locations where continuous corn is grown. WCR larval damage on roots has yet to be observed in Bosnia and Herzegovina. Although this damage has not been detected, it is quite possible that larval damage is present. Adult damage was mainly observed on leaves, tassels and silks. The areas where these observations were made include Posavina, Tuzla, Una-Sana and Zenica-Doboj cantons. In order to prevent and slow the spread of WCR, adequate measures of eradication are being considered. The Regulation on Mandatory Eradication Measures in the Federation of Bosnia and Herzegovina could possibly be adopted soon. Also, seminars, in which experts point out the severity of this pest, are constantly being held at the cantonal and Federation levels.

Materials and Methods

Monitoring for the WCR began at the end of June and ended on late September. The monitoring tools used in this program were the Hungarian Csalomon pheromone traps and the Multigard traps. Traps were placed in Posavina, Tuzla and Una-Sana cantons. Two traps, one pheromone trap and one Multigard trap, were placed at a distance of 50–100 m apart in each field. Traps were checked once or twice a week. Adults were removed from the traps and placed in a test tube that contained alcohol. The number of captured adults, as well as trap number and location was recorded. Both trap types were removed after 25 days and replaced. The number of traps in one municipality was determined on the basis of corn coverage and 1997 WCR captures. Traps in Posavina canton were placed in Orasje and Odzak on 1 July, 1998. In Orasje, there were four pheromone traps and four Multigard traps, while in Odzak there were three of each. In Tuzla canton, 57 pheromone traps and 57 Multigard traps were initially established in fields from 29 June to 4 July, 1998. In Una-Sana canton, three pheromone traps and three Multigard traps were placed on 8 July, 1998.

Results and Discussion

In 1998, monitoring for the spread of WCR in the Federation of Bosnia and Herzegovina was conducted. Further spread of WCR was observed. During the trapping period (late June through September), WCR adults were discovered at 55 locations. The first captured adult in 1998 was on 5 July in Brka (Tuzla canton). In Posavina canton, WCR adults were trapped at all seven locations. The WCR population significantly increased in 1998, as compared to 1997, in the municipality of Orasje. Compared to Orasje, the WCR population was lower in the municipality of Odzak. In Orasje canton, no root damage was observed. Only minor silk damage was noted in Odzak.

During the month of July in Tuzla canton, the first adults were observed in Kalesija, Teocak and Sapna. In August, adults were recorded in Doboj-Istok and Gracanica. In 1998, the presence of WCR adults was recorded in Brcko, Brcko-Ravne, Gradacac, and Srebrenik. The total area of these municipalities is 1,516 km². The production area is 15,000 to 18,000 ha. In the municipalities of Banovici, Kladanj, Tuzla and Zivinice, with a total area of 1,533 km² no WCR were noted. The spread of this pest into these municipalities is expected to occur in the next couple of years. The spread of WCR has been observed along traffic lines and water streams. Mountain ranges have either slowed down or stopped the spread of this pest. No WCR adults were noted in Una-Sana canton.

In 1998, at the location of Bukova Greda, municipality of Orasje (Posavina canton), 201 adults were recorded on the pheromone traps. Over the three month trapping period, this was the highest trap catch throughout the entire trapping area. In Tuzla canton, the highest trap catch (66 adults) was in the municipality of Kalesija, trapping location 2 (Markovici). In this location, monoculture corn has been grown for three years.

In 1998, Multigard traps caught considerably less adults in comparison to the pheromone traps. Higher trapping percentages have been noted in areas where the pest is present in larger number.

The largest number of adults was captured in the first decade of August followed by the 3rd decade of July (*Table 1*). In July and August, when the daily temperatures ranged between 30 and 37 °C, adult activity was reduced. After a heavy rain period, between 10 August to 24 August, the number of adults capture decreased which leads to the conclusion that rain had a negative impact on WCR activity.

Table 1

Trapping percentage of WCR adults in Bosnia and Herzegovina, 1998

Data	(%)
July 1st decade	2.16%
July 2nd decade	10.70%
July 3rd decade	16.84%
July total	29.70%
August 1st decade	34.53%
August 2nd decade	23.82%
August 3rd decade	6.73%
August total	65.08%
September 1st decade	3.36%
September 2nd decade	1.20%
September 3rd decade	0.60%
September total	5.16%

Conclusion

WCR was first discovered in the Federation of Bosnia and Herzegovina in 1997 and it is assumed that the initial infestation occurred in 1996. Monitoring the occurrence, spread and damage of WCR continued in 1998.

In 1998, out of 67 traps (pheromone traps and Multigard traps) WCR adults were recorded on 55 pheromone traps (82%) and on 5 Multigard traps (7.5%). The first adult was collected in Brka (Tuzla canton) on 5 July, 1998.

The highest trapping percentage of WCR was recorded from the last decade of July to the 2nd decade of August. No WCR adults were noted in Una-Sana, which is located in the western part of the Federation of Bosnia and Herzegovina.

In Posavina canton, this pest was captured on all pheromone traps. In this canton, a noticeable increase in the rootworm population was observed.

In Tuzla canton, the rootworm has spread into other municipalities, while in the municipalities, where the population has already been established, its number has increased. In this canton, WCR was captured in the municipalities of Brcko, Celic,

Doboj-Istok, Gradacac, Gracanica, Kalesija, Srebrenik, Brcko-Ravne, Teocak and Sapna. The area of these municipalities is 1,516 km² and the production area is between 15,000 to 18,000 ha.

The main directions of rootworm spread in 1998 were along the Orasje-Tuzla road and upstream from the Drina river. Finally, in 1998, the total spread of WCR in Bosnia and Herzegovina was approximately 15–20 km.

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