SOUTHERN GREEN STINK BUGS (*NEZARA VIRIDULA* L.) A NEW PEST OF TOMATO CROPS IN WESTERN ROMANIA

Ioana GROZEA, Ramona ŞTEF, Ana Maria VIRTEIU, A. CĂRĂBEŢ, L. MOLNAR

Banat University of Agricultural Sciences and Veterinary Medicine Timisoara, Calea Aradului, 119, Timisoara, Timis, Romania
ioana_entomol@yahoo.com

Abstract: *The last two years (2010 and 2011) tomato crops from west of Romania have been invaded a new pest species known as Nezara viridula (southern green stink bugs). This pest is dangerous both stage adult and larva, too. The fruits of tomato are quantitatively and qualitatively affected. First, on fruits appear smaller yellow spots, in time these get bigger and may include entire surface. Injuries occur on young fruits (green tomato stage) and mature fruits (red tomato stage). From observations made in last two years larva of southern green stink bugs prefer especially green tomato stage while the adults of this pest attack more mature tomato. In all cases studied al individuals were observed on the basal part near the stem. During feeding, the bugs injected the toxic saliva; following the affected zone of green tomatoes is stopped in developing and red fruits are unfit for consumption because their bad flavor. Regarding the period of day with great activity of feeding it can be mentioned that adults and larva were present on the plant especially in middle of day (between 11 and 16 h). This aspect is confirmed by information from available specialty literature who said that the stink bug is native from an equatorial zone of Africa. The highly temperature and drought in the last years could be the main cause of appearance and increasing of pest population. Besides tomatoes plants the adults of southern green stink bugs was observed on other plants (legumes and ornamental plants). This work is an informational work scientifically papers which aims to bring in attention of specialists and tomatoes producers the importance of this invasive species known Nezara viridula. Knowledge of species through the morphological, feeding, behaviors and ecological aspects helped the clarify uncertainties about this pest and also taking measures to reduce their highly population at below economically damaging. This is the first scientifically information of occurrence of invasive species Nezara viridula in Romania.*

Key words**:** *Nezara viridula, tomatoes, adult, larva, injury.*

INTRODUCTION

Nezara viridula (southern green stink bugs) is a species of Hemiptera originated from equatorial region. Origin of species is uncertain; there are two versions. One, which says that the pest is presumably originated in southern Asia; this is an old version (DEWITT and GODFREY, 1972). The other more credible variant shows that it is originated from Ethiopia of East Africa (JONES, 1988; PANIZZI, 2008); from where it is expanding in other regions (Asia, America and Europe) (TODD, 1989). First reports of pest occurrence in Europe seem to be made in 1998, in Italy (CABI/EPPO, 1998).

The pest is a cosmopolitan and highly polyphagous species on many crops, able to feed plants from over 30 families (TODD, 1989). It have an economically importance because especially of preference of legumes, soybean and beans (SCHAEFER and PANIZZI, 2000). The stink bugs damage the fruits of crops by inserting their piercing sucking mouthpart into tissue and introducing digestive enzymes (JONES and CAPRIO, 1990). The resulting damages include drop and malformation of fruits (PANIZZI, 1997). This work paper has more an informational nature and meant to bring in attention of a new species in west of Romania because the poor knowledge existing.

MATERIAL AND METHODS

Idea of studying of this stink bug comes accidentally in August, 2010 after a routine observation in tomatoes crops from a place of western country (Timisoara, Timiş, Romania). Many morphological aspects needed for indentify were studied on this new species known as *Nezara viridula*. Of course, observations were made on the plants injuries. Next year, 2011 we continued studies of population dynamic, damage and identify stages of development in the same places on different variants. Each variant was represented by a single tomato variety (var. I- autochthonous type and II- Cherry type). There were taken samples of adults, immature stages and damaged fruits (can be seen in the images from this paper).

RESULTS AND DISCUSSIONS

Like any other invasive pest this new species requires a special attention reflected by indentify studies (morphological, biological and injuries aspects). After many observations it can be recognized as *Nezara viridula* (common named southern green stink bugs in America or green shield bug in UK). We chose to named American variants because the complete information available.

Systematic description: Phylum Arthropoda, Class Insecta, Order Heteroptera, Family Pentatomidae, Genus Nezara, Species *Nezara viridula* Linnaeus, 1758, Common name Southern Green stink bug or other names, Originated from East of Africa (based on old descriptions of stink bugs and information available, many authors mentioned at Introduction chapter).

Short morphological description based on our observation. The adults are green (pall green), great dimension of body (approximately 1 cm length). On top of scutellum it can be observed three white spots and two black spots arranged linearly. Top antenna and top legs are yellow brown (see the pictures from figure 1, picture 1.1).

The larvae are dark at the beginning (blackish-brownish), then becomes gradually greenish dark and in finally greenish pale. They have like shape adults and differ only by color and the length. All instars have a lot of white spots arranged in three parallel lines on dorsal side (see image from figure 1, pictures 1.3, 1.4).

Short bio-ecological description. The southern green stink bugs are present in tomatoes crops in period May-October depends of temperature. Originated from equatorial zone (when develop until 4 generations per year) is clearly understood that is a species what develop very well in warm conditions; which explain preferences of this species for Romanian regions with highly temperatures. Last three years the weather was warmer which probable led to their appearance of visible.

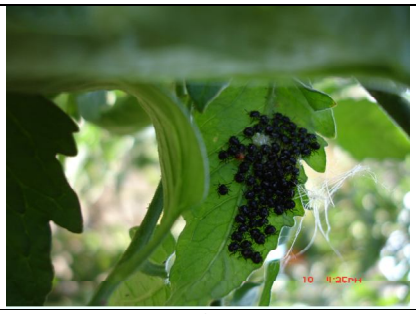
From our observations the level of number of individuals/ population/variety was certainly higher in 2011 year comparative 2010 year. Regarding the number of stink bugs on different variants it can be said that this was and higher on autochthonous variety comparative with Cherry variety. The individuals were observed overall on plant but focused especially on the basal part near the stem.

It could observe the preference of females lays eggs on leaves of on autochthonous variety, too. Number of eggs various between 68-95 eggs/leaf. All eggs are laid on the underside of the leaves. At beginning the young larvae live in groups (see the figure 1 picture 1.2) then leaving the place of hatching and spread the entire plant.

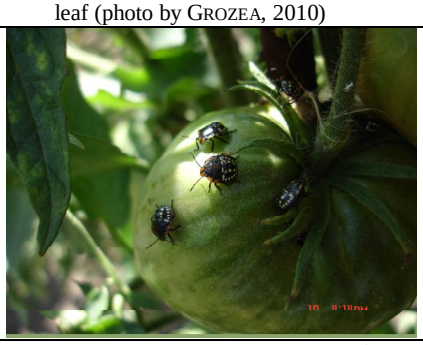
Short description of the damage aspects. The tomatoes fruits are attacked both larva and adult. The larvae were observed more on green stage comparative with adults who preferred red fruit of tomatoes. The explanation could be one based on overlapping of stages; in stink bugs population the larvae are numerous comparative adults who appear more lately

(in the same time of maturity of fruits). However, larva and adults are important in damages causing. Effect of their injuries is quantitatively and qualitatively nature.

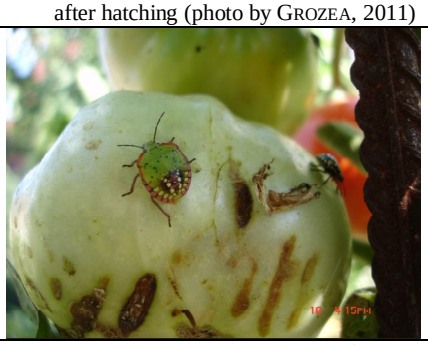
Picture 1.1 Adult of *Nezara viridulla* on tomato leaf (photo by GROZEA, 2010)



Picture 1.2 Group of young larvae immediately after hatching (photo by GROZEA, 2011)



Picture 1.3 Middle instar larvae on tomato fruits (photo by GROZEA, 2011)



Picture 1.4 Mature larvae on tomato fruit (photo by GROZEA, 2011)

Figure 1. - Morphological aspects of *Nezara viridula species*

Picture 2.1 Injuries of larvae on tomato fruits Cherry variety (photo by GROZEA, 2011)

Picture 2.2 Injuries of larvae on tomato fruits autochthonous variety (photo by GROZEA, 2011)

Figure 2. - Damage aspects of *Nezara viridula species*

We believe that there is a general principle like other species from Heteroptera axed on idea that during feeding, the bugs injected the toxic saliva; following the affected zone of

green tomatoes is stopped in developing and red fruits are unfit for consumption because their bad flavor. As the results of this attack mechanism, on fruits appear smaller yellow spots, in time these get bigger and may include entire surface. Initially, the spots are concentrated in basal part of fruits near stem, after short time spreads al entire fruits. In many cases, red tomatoes fruits become yellow (with fading aspect).

In the same measure, injuries occur on young fruits (green tomato stage) and mature fruits (red tomato stage). It could find even a preference of larvae especially on green tomato stage while the adults of this pest attack more mature tomato.

In figure 2, pictures 2.1 and 2.2 it can see very well the harmful effect of destructive attack of both varieties (Cherry variety and autochthonous variety).

Beside the direct injuries this pest can cause indirect damages by dirty or spotted aspects of fruits. The surface of the fruits becomes sticky and heavy washing.

Regarding the period of day with great activity of feeding it can be mentioned that adults and larva were present on the plant especially in middle of day (between 11 and 16 h) when temperature are highly and luminous intensity is sufficient their feeding activity.

Control measures. Not taken any officially measures of control until now in Romania.

CONCLUSIONS

Two years ago, in 2010, in tomatoes crops from western Romania was detected new invasive species (*Nezara viridula* common named southern green stink bugs).

The fruits of tomatoes are quantitatively and qualitatively affected by adults and larvae.

The number of stink bugs was higher on autochthonous variety comparative with Cherry variety.

Beside the direct injuries this pest can cause indirect damages by dirty or spotted aspects of fruits.

BIBLIOGRAPHY

1. CABI/EPPO, 1998, Nezara viridula. Distribution map of plants pest. Map no.27. 2nd revision. Wallingford, UK, CAB International.
2. DEWITT N.B, GODFREY G.L, 1972, A bibliography of Southern Gren Stick Bug, *Nezara viridula* (Hemiptera-Pentatomidae), Biological Notes, No. 78, Illinois Natural History Survey, March.
3. JONES W.C, CAPRIO L.C., 1990, Biology and control of insects attacking macadamia nuts in Hawaii, Man. Nut. Asoc., 30:24-36.
4. JONES W.A., 1988, World review of the parasitoids of the Southern Green Stick Bug, *Nezara viridula* (L.) (Heteroptera-Pentatomidae), Entomology paper from other sources, paper 70.
5. PANIZZI A.R., 2008. Southern green stink bug, *Nezara viridula* (L.) (Hemiptera: Heteroptera: Pentatomidae). pp. 3471-3471. *In* Encyclopedia of Entomology. Capinera JL (editor). Springer, Heidelberg.
6. PANIZZI A.R. 1997, Wild host of pentatomids: Ecological significance and role their pest status on crops. Ann. Rev. Entomol.42:99-122.
7. SCHAEFER C.W, PANIZZI A.R., 2000, Sting bugs (Pentatomidae), Heteroptera of economic importance. Boca Raton, CRC Press, 828 p.
8. TODD W.J., 1989, Ecology and Behavior of *Nezara Viridula*, Annual Review of Entomology, Vol. 34: 273-292.