THE EVOLUTION OF THE POPULATIONS DYNAMICS OF CEREALS SUNN PESTS, DURING AUTUMN, AT THE WINTERING PLACES (FORESTS), IN BRĂILA COUNTY, DURING 2007, 2008 AND 2009

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Abstract

One of the most dangerous pests for wheat crop, in our country, is cereals sunn pest - *Eurygaster* sp. *Eurygaster genus* comprises many species (Filipescu C et col., 1993). For our country, the following species present economic importance: *E. integriceps*, *E. maura and E. austriaca* (Tâlmaciu M. 2005). The species mentioned present many similarities in what concerns the anatomy, being quite difficult to differentiate them from aspectual point of view. Their biology and ecology is very similar. All these three mentioned species of *Eurygaster* migrate into forests, from the areas that had been cultivated with wheat, during August (Perju T., 1995). Here they spend their hibernating rest after which, during spring, they migrate again into the straw cereals crops, especially into wheat crops. After migration and after a period of feeding, the copulation takes place and then eggs spawn (Boguleanu Gh. et col. 1980). The incubation lasts between 7 – 14 days, and then the larvae appear. The larva state lasts for approximately one month, after which the new adults appear. After a period of feeding with wheat beans, they start migrating to the forests, during August (Manolache C., Boguleanu Gh., 1967). After 15th of September, entire population of sunn pests retires into the forests for wintering until the spring of the next year. Due to the fact that the damages produced by this pest can significantly affect the production and quality of the wheat, cereals' sunn pest is considered a pest of highly importance for agriculture. To this extent, surveys are performed in each forest from the county, during autumn (15th of September – 15th of October) and spring (15th of March – 5th of April), in order to determine the reserve of hibernating adults. In Brăila County, these surveys are performed in 11 forests that sum up an area of 3633 ha. They are situated on different types of soil and they have a different floristic composition. Following to the surveys performed, there had been found significant differences in what concerns the number of hibernating adults. The surveys' results present special importance for the farmers that cultivate straw cereals. The surveys that had been performed for several years had shown that the cereals sunn pest population had suffered high numerical fluctuations.

Key words: *Eurygaster,* larva state, migration

Cereals sunn pest (*Eurygaster* sp.). is a very damaging pest for wheat crop. The damages appear once spring comes, from the moment the hibernating adults become active. At the beginning, the leaves and the basis of the stem are affected, as the hibernating adults sting them. The leaves attacked will dry above the sting (Manolache C. et al, 1969). The stem's attack can lead to drying the central leaf and even the stem. In more advanced stages of vegetation, the symptoms are different. Accordingly, if the attack takes place at the basis of the spike, it partially or totally aborts. (Manolache C. et al, 1982). After coming into blossom, the attack takes place exclusively on the beans. The beans are attacked during entire period of their development. The younger the beans, the greater the damage. The damages are quantitative and qualitative. Beans' spoilage following to sunn pests' attack leads to weight's reduction, to decreasing the crop value of seeds and bread manufacturing quality (Boguleanu Gh. et al, 1980). In Brăila County, the area cultivated with wheat estimated for the year 2010 is 81978 ha, with a total production of approximately 331800 tons. For this reason, pest's attack presents a great economic importance for Brăila County.

MATERIAL AND METHOD

Elaborating the potential attack of cereals' sunn pest is a complex activity. Therefore, it is required to evaluate the number of hibernating adults that had withdrawn during autumn into the forests. The number of hibernating adults is determined by performing some surveys in each oak forest, during the period 15th of September – 15th of October. To this extent, 40 surveys are performed in each forest, diagonally. For each survey, it is allotted an area of 0,250 m^2.

Table 1

Survey sheet Regarding cereals' sunn pest density at the hibernating place during 2007 winter

No	Forrest	Place	Area ha	Date of survey	No. of sunn pests		Density (m^2)		Total specimens (sp) / forest Tens of thousands
					Alive	Dead	Alive	Dead	
1	Camniţa	Şuţeşti	808	24 sept.	15	0	1,5	0,0	1212
2	Carcaliu - Titcov	I.M.B.	950	28 sept.	24	3	2,4	0,3	2280
3	Colţea	Roşiori	15	23 sept.	50	0	5,0	0,0	75
4	Corbu	Măxineni	50	25 sept.	13	0	1,3	0,0	65
5	Gradiştea	Gradiştea	308	17 oct.	30	0	3,0	0,0	924
6	Jirlău	Jirlău	200	16 oct.	21	1	2,1	0,1	420
7	Racoviţa	Racoviţa	325	26 sept.	130	0	13,0	0,0	4225
8	Stejaru	Chiscani	40	18 oct.	18	0	1,8	0,0	72
9	Tătaru	Dudeşti	200	1 oct.	72	2	7,2	0,2	1440
10	Tichileşti	Tichileşti	237	4 oct.	11	0	1,1	0,0	260,7
11	Viişoara	Însurăţei	500	27 sept.	102	0	10,2	0,0	5100
			3633		16073,7/ 3633 = 4,4 sp/m^2				16073,7 sp/m^2

Table 2

Survey sheet Regarding cereals' sunn pest density at the hibernating place during 2008 winter

No	Forrest	Place	Area ha	Date of survey	No. of sunn pests		Density (m^2)		Total specimens/forest Tens of thousands
					Alive	Dead	Alive	Dead	
1	Camniţa	Şuţeşti	808	9 oct.	170	0	17,0	0,0	13736
2	Carcaliu-Titcov	I.M.B.	950	20 oct.	147	0	14,7	0,0	13965
3	Colţea	Roşiori	15	13 oct.	270	0	27,0	0,0	405
4	Corbu	Măxineni	50	14 oct.	75	0	7,5	0,0	375
5	Gradiştea	Gradiştea	308	8 oct.	158	1	15,8	0,1	4866,4
6	Jirlău	Jirlău	200	15 oct.	116	1	11,6	0,1	2320
7	Racoviţa	Racoviţa	325	24 sept	200	3	20,0	0,3	6500
8	Stejaru	Chiscani	40	30 sept	40	0	4,0	0,0	160
9	Tătaru	Dudeşti	200	16 oct.	160	1	16,0	0,1	3200
10	Tichileşti	Tichileşti	237	7 oct.	95	1	9,5	0,1	2251,5
11	Viişoara	Însurăţei	500	10 oct.	360	1	36,0	0,1	18000
			3633		65778,9/3633 = 18,4 sp/m^2				65778,9

Table 3

Survey sheet Regarding cereals' sunn pest density at the hibernating place during 2009 winter

No	Forrest	Place	Area ha	Date of survey	No. of sunn pests		Density (m^2)		Total specimens/forest Tens of thousands
					Alive	Dead	Alive	Dead	
1	Camniţa	Şuţeşti	808	22 sept	350	4	35,0	0,4	28280
2	Carcaliu - Titcov	I.M.B.	950	9 oct	80	4	8,0	0,4	7600
3	Colţea	Roşiori	15	15 sept	650	6	65,0	0,6	975
4	Corbu	Măxineni	50	29 sept	110	3	11,0	0,3	550
5	Gradiştea	Gradiştea	308	24 sept	120	3	12,0	0,3	3696
6	Jirlău	Jirlău	200	30 sept	40	4	4,0	0,4	800
7	Racoviţa	Racoviţa	325	23 sept	420	4	42,0	0,4	13650
8	Stejaru	Chiscani	40	8 oct.	138	2	13,8	0,2	552
9	Tătaru	Dudeşti	200	16 sept	350	2	35,0	1,0	7000
10	Tichileşti	Tichileşti	237	25 sept	75	2	6,5	0,2	1541
11	Viişoara	Însurăţei	500	14 sept	440	6	44,0	0,6	22000
			3633		86644/3633 = 23,8 sp/m^2				86644

Table 4

Variation of sunn pests' density per m^2 according to the type of forest (floristic composition) and the type of soil on which the forest is situated

No.	Forest	Sup (ha)	Type of soil	Floristic composition	Sunn pests density /m^2					
					2007		2008		2009	
					Alive	Dead	Alive	Dead	Alive	Dead
1	Camniţa	80 8	Alluvial soil	White poplar 60% Acacia 20% Oak 15 % Ash tree 5 %	1,5	0	17	0	35	0,4
2	Carcaliu -Titcov	950	Alluvial soil	Willow tree 35% Euro-American Poplar 35% White + black poplar 20 % Pennsylvania Ash Tree 10%	2,4	0,3	14,7	0	8	0,4
3	Colţea	15	Chernozem	Oak 80% Acacia 20%	5	0	27	0	65	0,6
4	Corbu	50	Alluvial soil	Willow tree 70% Poplar 20% Acacia + honey locust 10%	1,3	0	7,5	0	11	0,3
5	Gradiştea	308	Alluvial soil	Oak 10% Acacia 30% White + black poplar 60%	3	0	15,8	0,1	12	0,3
6	Jirlău	200	Alluvial soil	Honey locust 10% Oleaster (*Eleagnus angustifolia*) 80 % Oak 10%	2,1	0,1	11,6	0,1	4	0,4
7	Racoviţa	325	Alluvial soil	White poplar 80% Oak 20%	13	0	20	0,3	42	0,4
8	Stejaru	40	Chernozem	Oak 80% Miscellaneous: acacia, ash tree, sycamore maple 20%	1,8	0	4	0	13,8	0,2
9	Tătaru	200	Chernozem	Oak 60% Acacia 40%	7,2	0,2	16	0,1	35	1
10	Tichileşti	237	Alluvial soil	Willow tree 40%¤ American poplar 40% White poplar 10% Black poplar 10%	1,1	0	9,5	0,1	6,5	0,2
11	Viişoara	500	Psamosoil	Acacia 90 % Oak 10 %	10	0	36	0,1	44	0,6

On this area, fallen leaves layers are removed step by step until they reach to the soil. There are noted down the alive and dead sunn pests which are found, then it is calculated the adults average density per m^2 (0,250m^2 x 40 = 10m^2). After finishing the surveys, sunn pests' reserve will be calculated from all controlled forests. In order to do that, the area (in m^2) of each forest is multiplied by the average density of adults per m^2 **(**-)**. At the end, it is divided the total number of sunn pests calculated for the total forest area of the County (m^2). Accordingly, it will be obtained the sunn pests' annual average reserve of the county per m^2 of forest. Determining the hibernating sunn pests' adults' reserve in forests, during winter, is especially important for the farmers. This allows evaluating the risk of cereals' sunn pest attack during spring, on wheat.

RESULTS AND DISCUSSIONS

The surveys performed during the years lead to the conclusion that sunn pest population had had large variations. It varies the general average/m^2 of hibernating adults, as well as the average of hibernating adults/m^2 in each forest studied. Accordingly, in 2007, the average of hibernating adults in the forests, during autumn, was: 4,4/m^2, 18,4 sp/m^2 in 2008 and 23,8 sp/m^2 in 2009. It is observed an accelerated increase of the average number of specimens/m^2, during the period of those 3 years analyzed. Also, from the analysis of figure 1, it is observed an important variation of the density of hibernating adults, during autumn, per m^2, during the interval 1993 – 2009. From the analysis of table 4, it is observed a large variation of the density of hibernating adults per m^2, during autumn, into the forests. For example, this density had large values in Brăila County, in 1995 (40,9 sp/m2), 1996 (39,6 sp/m2), 2002 (22,6 sp/m2), 2008 (18,1 sp/m2) and 2009 (23,4 sp/m2). Small values had been recorded in: 1998 (5,8 sp/m2), 2003 (8,1 sp/m2), 2004 (1,8 sp/m2), 2005 (3,1 sp/m2), 2006 (2,8 sp/m2), and 2007 (4,4 sp/m2). Also, there is a certain correlation between the number of hibernating adults /m^2 and the floristic composition of the forest + its type of soil. The highest density of adults /m^2 of forest, in all

mentioned years - 2007, 2008 and 2009, had been recorded in the following forests: Viişoara (sandy soil - psamosoil + oak 10% and acacia 90%) – 10 sp/m^2, 36 sp/m^2 and 44 sp/m^2, Colţea (chernozem + oak 80% and acacia 20%) – 5 sp/m^2, 27 sp/m^2 and 65 sp/m^2, Racoviţa (alluvial soil + oak 20% and poplar 80%) – 13 sp/m^2, 20 sp/m^2 and 42 sp/m^2. The smallest densities of adults/m^2 of forest, in all years mentioned, 2007, 2008 and 2009, had been recorded in the forests: Jirlău (alluvial soil + honey locust 10%, oleaster 80% and oak 10%) - 2,1 sp/m^2, 11,6 sp/m^2 and 4 sp/m^2, Carcaliu – Titcov (alluvial soil + willow tree 35%, poplar 55 % and ash tree of Pensylvania) – 2,4 sp/m^2, 14,7 sp/m^2 and 8 sp/m^2, Tichileşti (alluvial soil + willow tree 40%, poplar 60%) – 1,5 sp/m^2, 9,5 sp/m^2 and 6,5 sp/m^2, Corbu (alluvial soil + willow tree 70%, poplar 20%, acacia and honey locust 10%) - 1,3 sp/m^2, 7,5 sp/m^2 and 11 sp/m^2.

CONCLUSIONS

The studies that had been performed for three years, in the forests from Brăila County, lead to the conclusion that the number of sunn pests' adults varies very much from one year to another and from one forest to another. Accordingly, it was observed a step-by-step increase of the hibernating adults density/m^2 of forest starting with 2007. This fact can be explained by the reduced number of wheat areas where phytosanitary treatments had been performed, in vegetation, against the pest. There are some hypotheses that assert that decreasing the number of sunn pests' parasites and natural plunderers had lead to increasing pest's density, in certain years (1995, 1996, 2002 and 2009).

It is important to underline that there are major differences in what concerns the densities per m2 from one forest to another. For example, there are major differences between the forests that contain oak and which are situated on medium and light soils and the forests situated on cold, wet soils and which contain different species of poplar and willow tree. All forests situated on light (sandy) and medium soils (chernozems), which have in their composition oak and acacia, present high densities of hibernating adults/m2. These forests become warmer easier during spring and do not present humidity in excess. It seems that they offer the best conditions for sunn pests' adults to survive during the cold period of winter. The forests situated on colder, more wet soils (alluvial soils) and which have in their composition poplar and willow tree, present in all years mentioned lower densities of hibernating adults /m2. They do not offer optimum conditions for adults hibernating. Nevertheless, in rare cases, some forests situated on chernozem and which have oak in their composition, present smaller densities of hibernating adults (for example, Stejaru forest). The forests situated on cold and wet soils, but which have oak in their composition, present high densities of hibernating adults (for example, Racoviţa forest). The studies that had been performed during many years lead to the conclusion that the presence of oak and acacia species is determinative in the density of hibernating adults /m2 of forest. After that, next is oak plus the type of soil factor. The presence of poplar and willow species, along with alluvial soils, determines small densities of hibernating adults /m2 of forest. Periodically, some poplar and willow tree forests are flooded during spring. This leads to a significant reduction of the density of hibernating adults. The wheat crops, from the neighborhood of oak forests situated on light and medium soils, are the most exposed to the attack of hibernating adults during spring.

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