

Cicada orni L. in the Food of Wild Boar in the Regional Park Maremma - Toscana, Italy

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Abstract. The study was conducted in the period 1991-2000, in the Regional Park Maremma - Toscana, Central Italy. The park area is about 9800 ha, covered by Mediterranean vegetation: *Pinus halepensis* Mill., *Pinus pinea domesticus* L., *Quercus ilex* L., *Q. pubescens* Willd., *Arbutus unedo* L., *Phyllirea latifolia* L., *Erica multiflora* L., *Pistacia lentiscus* L., *Rosmarinus officinalis* L. *Juniperus phoenicea* L., *Juniperus oxycedrus macrocarpa* L. During the food analysis (faeces) of wild boar it was established that one of the main parts for it during the winter and spring are the larvae of *Cicada orni* L. In one of the faeces were detected 132 pairs of front legs of those larvae. This was the reason to start a detailed investigation of cicada's life and its role as a food source for wild boar. It was interesting to understand the influence of wild boar on the cicada's life. The initial hypotheses were three: there is a significant influence on its number; there is no influence, or increases its number significantly. In order to achieve the aim the first and the last song of the male cicadas were registered within a period of 10 years. To investigate the number of larvae flying during the summer, in the first spring were randomly chosen 23 pine stems and an area of about 1 m around them. On this area every 15th day after the first registered song (8-10) June the empty skins were collected. This way the number of cicadas was established and their dynamics, which ended about 10-15 August. The last song registered was about 10-15 September. Each year, starting the observation the soil under the trees was divided into two categories - rooted by the wild boar or not. This way was established the influence of wild boar on the cicada's number. T-Student analysis showed that it exists only during some of the years (1995 and 1997). This result gave an answer to the first hypothesis - that the wild boar does not influence significantly the number of cicadas. It was confirmed by the soil samples taken from different places with dimensions 50x50x30 cm.

Key words: cicada; Regional Park Maremma; wild boar; food

Introduction

The interest to *Cicada orni* L. appeared during investigation of wild boar food in the Park (MASSEI & GENOV, 1995; MASSEI *et al.*, 1996). This insect is food for the wild boar but not only for it. When it starts flying from the soil it becomes a pray from the ants to the wild boar. But before it goes out from the land for its larvae look the fox and the badger as well (CIAMPALINI & LOVARI, 1985). Despite the many enemies this insect sings around the forests and is part of the

food for the wild boar which roots large areas for it under the crowns of *Pinus halepensis* Mill. And *Pinus pinea domesticus* L. It was the reason to start the investigation of the influence of wild boar on cicada's number in the Regional Park Maremma. The initial hypotheses were three: there is a significant influence on its number; there is no influence, or increases its number significantly.

The main aim was to establish the influence of wild boar on the cicada's

number. In order to achieve it the following tasks were set: investigate the density of cicada in the soil depending on the activity of wild boar with soil samples; study the cicada's number during the fly from the land depending on the integrity of the soil under the pine trees chosen.

Material and methods

The investigations were realized during the period 1991-2000, in the Regional Park Maremma – Toscana, Central Italy. The Park is with an area of 9800 ha, covered by Mediterranean vegetation: *Pinus halepensis* Mill., *Pinus pinea domestica* L., *Quercus ilex* L., *Q. pubescens* Willd., *Arbutus unedo* L., (*Olea europea* L.), *Juniperus oxycedrus macrocarpa* L., *Juniperus phoenicea* L., *Phyllirea latifolia* L., *Erica multiflora* L., *Erica arborea* L., *Pistacia lentiscus* L., *Rosmarinus officinalis* L.

In order to study the influence of wild boar, randomly chosen sample plots in the soil under the pine crowns were used, with dimensions 50x50x30 cm – not-rooted 20 and rooted - 30. During the work we had to over-dig the dry soil to reach a depth of 30-40 cm where the pine roots were. Due to the high level of underground water they did not penetrate deeper and the larvae from their cells sucked assimilates from the roots. The larvae found were with three dimensions – small, medium and large, the last one being with well developed head, thorax and abdomen, the front legs adapted for digging, covered by chitin. 23 pine trees were randomly chosen and from an area of about 1 m around their stems the larvae skins were collected during 10 years. The

collections took place every 15 days after the first song between 5 and 10 June was recorded or every year 5 controls were done (Fig.). Depending on the integrity of the soil under the crown each year they were divided into two categories – rooted and non-rooted. The collected by tow methods samples (soil and skins) was processed statistically by t-Student test in order to establish if there is a significant difference between them.



Fig. 1. *Cicada orni* - empty chitin exoskeleton remain after metamorphosis

Results and Discussion

After taking soil samples (Table 1) during 2 years and it was established that there was no significant difference between then. Despite of this we decided that 2 years is not enough long period to have a reliable answer and followed sampling.

Table 1. Number of *Cicada orni* larvae found in rooted and non-rooted by wild boar soil.

Year	1990	1990	1991	1991
parameters	Rooted	Non-rooted	Rooted	Non-rooted
N	20	10	20	10
Number	399	213	368	142
Mean	19.9	21.3	18.4	14.2
DS	10.97	10.17	11.35	9.06
t-Student	n.s.			n.s

The high drought in the summer sometimes did not allow to wild boar to

look for food under the ground. As it was mentioned in the Park it feeds on *Cicada orni*

larvae and in addition with *Melolonta* in 1993, 1995 and 1999 the soil under the trees was not rooted and these years were not included in the analysis.

The influence of the wild boar on the number of cicada was established by both types of soil – rooted and non-rooted. t-Student's t-test analysis showed that it only existed only in some of the years (Table 2). As it could be seen only in two years there is significant difference between both groups of soil. The wild boat feeds on adult insects.

melolonta L. larvae. This was the reason that The female cicadas lay eggs under the tree bark and from them larvae appear. They fall on the ground and have to penetrate to the tree root to suck assimilates. It is clear that is much easier that if the soil is rooted than the dry and solid substrate. These results give an answer to the three of the hypotheses that the wild boar does not influence significantly the number of cicada. But on the contrary in the dry months it help penetrating the larvae into the soil.

Table 2. Difference in the number of *Cicada orni* skins in rooted and non-rooted by wild boar ground.

Parameters Years	Soil	Number of trees	Number of skins	Mean	SD	P at level 95%
1991	rooted	12	767	63.9	30.7	-
	non-rooted	11	883	80.8	26.9	
1992	rooted	11	420	38.2	11.5	-
	non-rooted	12	461	38.4	16.2	
1995	rooted	7	247	35,3	15,5	P ≤ 0,01
	non-rooted	16	952	59,5	18,2	
1996	rooted	13	1628	125,2	53,6	-
	non-rooted	10	1739	173,9	60,0	
1997	rooted	7	89	12,7	8,03	P ≤ 0,05
	non-rooted	16	413	25,8	14,11	
1998	rooted	12	906	75,5	23,9	-
	non-rooted	11	828	75,3	45,0	
2000	rooted	6	198	33	11,7	-
	non-rooted	17	379	22,3	19,8	

Conclusion

The above mentioned results give an answer to the hypotheses that the wild boat does not influence significantly the cicada number. Even in the dry months it helps penetrating the larvae into the soil.

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