



RESEARCH ARTICLE

SURVIVAL RATES OF THE SUNN PEST (*EURYGASTER INTEGRICEPS* PUT.) (HETEROPTERA; SCUTELLERIDAE) STORED IN DIFFERENT CULTURE MEDIUM

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ABSTRACT

It was determined that the highest survival rate in paper towels stored in different culture media. The survival rate of the Sunn pest cultured with paper towel was 62% and the non live rate was 38%. The survival rate in Sunn pest cultured with straw was determined to be 72%. A 28% live rate was detected in Sunn pest cultured with straw. It was determined that the rate of non alive in the dried oak leaves was 69% and the rate of living individuals was 31%. The survival rate was found to be 66% in individuals who were cultured with pine leaves, and the non alive rate was 34%. In the statistical grouping, while the survival rate of the culture formed by paper towels was in a separate group, it was determined that the survival rate in oak leaf, pine leaf and straw cultures was in the other group.

INTRODUCTION

Wheat, *Triticum aestivum* L., and barley, *Hordeum vulgare* L., are important crops in Turkey and are grown on approximately 14 million ha annually. Wheat, (*Triticum aestivum* L.), the most common produced crop, has advantages of being raised in different climatic and geographical ecosystems owing to its adaptation ability. It is the most important nutrient for human being, constitutes approximately 20% of the calories obtained from the food all over the world (Akaya, 1994). The sunn pest, *Eurygaster integriceps* Put. (Hemiptera: Scutelleridae), is a very damaging insect pest of wheat and barley in Turkey (Lodos 1982). *Eurygaster* spp. (Heteroptera: Scutelleridae) is the most important harmful insect pest on wheat and barley plants, causing them to wither and die prior to spike formation. They also feed at the base of the spike during the early growing period, resulting in greyish white spikes without kernels called "white spikes" (Lodos, 1961; Canhilal et al., 2005). Fourth and fifth nymphal instars and newgeneration adults of the Sunn pest feed on grains (Lodos, 1982; Memisoglu and Ozer, 1992). During feeding, the insect injects digestive enzymes into the grain, reducing the baking quality of the dough. If as little as 2-3% of the grain had been fed on, the entire grain lot may be rendered unacceptable for baking purposes because of poor-quality flour (Lodos, 1982; Dizlek et al. 2008). Sunn pest was first reported in the South Anatolia Region of Turkey in 1927 and there have been many epidemics

from the 1950s to the present. Studies on the Sunn pest were begin in the 1950s in Turkey (Simsek, 1998). The government managed Sunn pest control from 1927 until 2001, when an integrated pest management approach was adopted. Sunn pest management was changed from aerial application to ground spraying, which shifted the responsibility to farmers. Currently, ground sprays for Sunn pest control are conducted on 1 to 2 million ha annually. The government provides technical support and insecticides and farmers are supposed to apply the insecticide with their equipment, as recommended by official technical consultants.

Interest in biological control of this pest is growing because of the concerns about insecticides' adverse effects on the environment. The species of scelionid parasitoids have been used against Sunn pest in both releases and classical biological control programs in Iran, Morocco and the former USSR (Voegelé, 1961; Laraichi and Voegele, 1975 and Shumakov, 1978). Mass rearing and inundative releases of the egg parasitoids attempts in Turkey started in 1990 and continued until 1997. However, it could not succeed because of the timing of releases (Akıncı and Soysal, 1996). Afterwards, new releasing studies started in 2001 and have been continued up to the present. It was determined that parasitoids efficacy has been changed depending on the years and regions (Tarla and Kornoşor, 2003). Sunn pest eggs are used in the mass production of parasitoid eggs. Therefore, the adults gathered in September are stored until February. In February, the Sunn pests remove from the stored and they use for obtain eggs. In this study, The alive, non alive rates of Sunn pests stored in different cultures were investigated.

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MATERIALS AND METHODS

Mass rearing of *T. semistriatus* was carried out using Sunn pest eggs in Turkey, as no other alternative host was available. For this purpose, adults of Sunn pest were collected from infested wheat fields and reared on green wheat plants in the Laboratory of Adana Plant Protection Research Institute, Turkey. The adults were collected by hand picking a sweeping nets from wheat fields at the starting period of their migration towards newly planted wheat fields at Gaziatep Provinces (37° 09' N 37° 07' E). Collected adults were placed in an icebox and transferred to climatic rooms of Adana Plant Protection Research Institute. Sunn pests brought to the climate rooms and they were cultured in plastic container of 50 x 30 x 25 cm. 100 individual of Sunn pest were placed in each of these plastic containers. Straw, dried oak leaf, dried pine leaf and paper towel were placed on the bottom of these plastic containers. Straw, oak leaf, dried pine leaf were sterilized by being autoclaved before being placed on the base of the plastic container. These cultures were placed in climatic room with a temperature of 5 °C and a relative humidity of 85 – 90 %. Cultures were kept in this way for 2 month. Two month later, cultures were opened and alive and non-living Sunn pest were selected and each recorded.

RESULTS AND DISCUSSION

In the laboratory, alive and non-aliving Sunn pest were selected and recorded. The obtained values are given in Figure 1. When Figure 1 is examined; It is observed that the most death in the climate room was in the individuals who are stored in the straw. When cultures are checked from time to time, it has been determined that *Alternaria* spp. and *Verticillium* spp. fungi were developing and spreading rapidly in the straw cultures. Although the straw was sterilized, the development of these fungi could not be prevented due to high humidity. Many of Sunn pest have been found to die among the hyphae of these fungus. *Alternaria* spp. and *Verticillium* spp. were determined in oak and pine leaves as seen as in straw cultures. These fungi were detected in all three cultures and were determined to cause excessive death of the Sunn pest.

The highest alive rate in the Sunn pest stored in different culture media was determined to be in the Sunn pest cultured on paper towels. In this medium, 400 Sunn pest of individuals were cultured with the paper towel and of them was found that 248 individual were alive and 152 individual non-alive. Accordingly, it was determined that the alive rate was 62% and non-alive rate was 38%. The Sunn pest, which was stored in different medium, was determined alive rate lowest in straw with 72% were to be detected. Of the 400 individuals of Sunn pest 112 individuals remained alive, while 288 individuals non-alive. A similar case was observed in dried oak and pine leaves. It was found that the rate of non alive in the oak leaf was 69% and 276 individuals non alive. The rate of aliving individuals was 31% and 124 individuals remained alive were determined. In the last culture, the alive rate was determined as 66% in the individuals who were cultured with pine leaves, and the non-alive rate was 34%. Accordingly, it was determined that the number of surviving individuals was 136 and the number of non-living individuals was 264. The results of the statistical analysis applied to the average number of survivors from the Sunn pests stored in different cultures are given in Table 1.

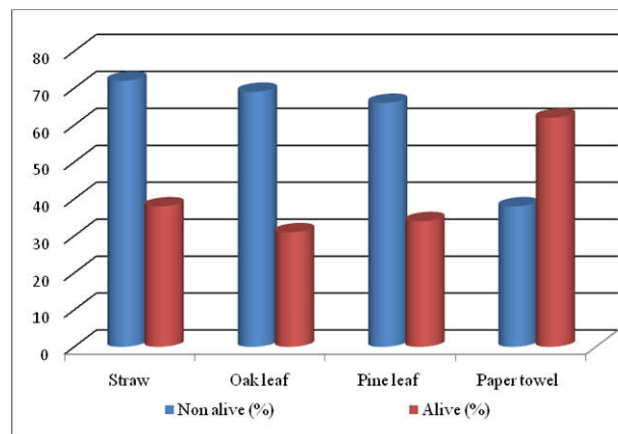


Figure 1. Alive and non-alive rates of the Sunn pest stored in different culture medium

Table 1. Alive and non-alive rates of the Sunn pest stored in different culture medium (Average ± SH)

Medium	Average Value (Average ± SH)	
	Alive	Non - alive
Straw	112±4.65 b	288±7.96 a
Oak Leaf	124±4.95 b	276±8.15 a
Pine Leaf	136±4.86 b	264±7.76 a
Paper Towal	248±8.88 a	112±5.12 b

As a result of the statistical analysis applied, it was determined that the highest alive was in paper towel medium. In the statistical grouping, the alive rate of the cultures formed with paper towels was found in a group, while the live leaves of oak leaves, pine leaves and straw were found to be in the other group. In the studies carried out in our country and world, Yüksel (1968) stated that the most important factor is moisture in artificial overwintering studies. Also he reported that Sunn pest can be at temperatures between +2 °C and +10 °C in well ventilated medium at 90 - 100% relative humidity. Remaudiere (1961), in his studies in Iran, reported that in 1960 the Sunn pest was storing, for this purpose they were stored in boxes of 0.50 x 0.30 x 0.12 m in size and all of them died despite moistening the boxes. The same researcher, Pasteur Institute in 1961, the denomination, + 3 °C and 70%-80% humidity in the storage of 2 months storage rate did not exceed 10%, but the insects have lost excess water stated. He also stated that the cultures they received at the humidity levels of 90% to 100% at + 10 °C and +12 °C were around 10% but the insects had excessive loss of water reserves. Makhotine (1947) determined the effect of temperature on the temperature behavior under laboratory conditions. When the temperature was increased from -3, -4 °C to + 49 °C, the activity was increased due to the temperature and + 49 °C the insect died. He reported that the insect's tolerance to temperature changes was quite good and adapted to a wide temperature period. As a result, the most important factors in the overwintering of Sunn pest were temperature and humidity.

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