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O 38. DOES FOOD PREFERENCE AFFECT MOVEMENT: *TARAXACUM OFFICINALE* CONSUMPTION IN *DROSOPHILA* MODELS?

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ABSTRACT: *Taraxacum officinale* Weber (dandelion) can grow in urban environments on metal-polluted sediments deposited in the gutters. We hypothesized that food choice affects motor actions in climbing *Drosophila* in order to understand its adaptation to polluted environments. Polluted environments alter food choice, climbing and locomotion in response to bitter compounds in the diet. In our study, commercial dry plants at different ways (powder-0.025 to 1 g/L and brew- 100 to 200 microliter/ml) were added to insect diet. It was found that flies prefer food prepared with powder groups more than the control. While the first group (0.025 g/L of powder) was increased mobility, there was no statistically significant difference in climbing behavior between the groups except the first group.

Keywords: Bioaccumulator plant, Dandelion, *Drosophila*, Climbing ability, Two-way choice.

INTRODUCTION

Taraxacum officinale Weber (dandelion: Asteraceae) is a wide geographic distribution, and often found in degraded soils in urban environment (Benvenuti, 2004; Keane et al., 2005). Some authors reports, dandelion is able to take up a variety of metals into their tissues, and proven to react quantitatively to pollution as bioindicator plant (Bini et al., 2012). Pollution induces oxidative stress producing reactive oxygen species (ROS). Therefore, to counteract this damage, plant and animal cells deactivate this metal stress inducing highly efficient antioxidant defense mechanisms or dead (Bretzel et al., 2014). Heavy metals have been a problem due to bioaccumulation in a worldwide. Exposure to heavy metals may be one of the main causes of health problems, such as nervous system diseases, and enter by the digestive system (Lisiak-Zielińska et al., 2021). The climbing assay with model organisms has proven useful in the study of many nervous system diseases (Triphan et al., 2010; Madabattula et al., 2015). *Drosophila* is a model organism used for diseases and nutrition, and behavioral responses can be easily observed in generations. In addition, *Drosophila melanogaster* is mostly used to evaluate the potential of pollutants (do Amaral et al., 2005; Zamberlan et al, 2020). In the heavy metal / pollutant environment, the individual either changes the food preference or improves the continuation of her life and generation. Based on these opinions, commercial dry dandelion (powder 0.025-1 g / L and brewing 100-200 µl / ml) was added to the insect diet in different ways, and food preference and climbing behavior were evaluated.

MATERIAL AND METHOD

D. melanogaster (W¹¹¹⁸) culture is fed in the University laboratory with a standard culture medium (SM) at incubator (25 ± 2°C and 60–70% humidity for 12/12 dark/light photo periods, Güneş and Büyükgüzel, 2017). Culture foods are renewed every 3-4 days. Commercially available dandoline was added to food by powder (0.025-1 g / L) and infusion (100-200 µl / ml). Groups: Control (1) consists of 0.025 g / L powder (2), 1 g / L powder (3), 100 µl / ml infusion (4) and 200 µl / ml infusion (5) (Güneş et al, 2017). Climbing experiments were carried out according to Grover et al. (2019), taste orientation experiments were performed by revising from Dus et al. (2011). For climbing and taste orientation, 5 female / 5 male individuals were taken into two opposite tubes with control and experimental groups in taste experiments and their feeding was monitored for 24 hours.

One-way "Analysis of Variance" (ANOVA) was used to determine the within-group variation, and "LSD Test" was used to determine the significance of the difference between averages.

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RESULTS AND DISCUSSION

It is known that movement increases in response to stress and resistance (Curtis et al., 2007). Under environmental stress and pollution conditions, ROS production, lipid peroxidation and antioxidant enzyme activity are increased in flies (Dhar et al., 2020). The aggression and climbing behavior may increase due to the increased stress on the flight muscles of the insect. And aggressive behavior is associated with the gustatory, olfactory, and hearing ability of fruit flies (Versteven et al., 2017). While the second group (0.025 g/L of powder) was increased the flies mobility, there was no statistically significant difference in climbing behavior between the other groups compared with control ($p < 0.05$; Figure 1).

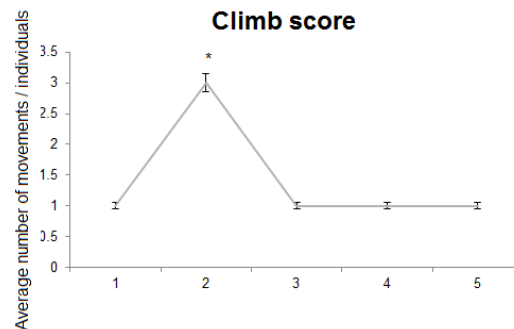


Figure 1. A food-dependent climbing behavior of flies

The taste and smell in the food can trigger the insect's disgust behavior, but due to the odor substances in heavy metals, the insects may be exposed to toxicity by decreasing their memory ability (Zamberlan et al., 2020). Thus, even if the result ends with death, the insect may want to feed on indicator food. It was determined that the food preferences of flies were mostly 5 and the second group compared to control (Table 1).

Table 1. A two way choice taste preference table of flies

Groups	First-last weighing (control/experimental group)	Food preference
1 or 2	1.03/1.05	Second group
1 or 3	1.02/0.97	First group
1 or 4	0.82/0.52	First group
1 or 5	0.72/1.09	5 th group

In accordance with the fact that the low dust applied according to previous studies (Güneş et al., 2017) does not have a negative effect on the development of the insect's survival; In this study, the second group showed that although they may cause some disgust, they can be chosen in terms of food preference.

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