مرکز خدمات ترجمه تخصصی ترجمه بازار

نام مشتری

نمونه ترجمه مقاله رشته ---

شماره پروژه ترجمه

نمونه ترجمه

ترجمه مقاله ☒

ترجمه کتاب ☐

واکنش ژنی تنش نسلی و چند نسلی به حشره کش اتوفن پروکس در Folsomia candida

چکیده

قرارگرفتن در معرض حشره‌کش ممکن است اثرات نسلی و چند نسلی بر روی افراد یک جامعه ایجاد کند، اما مکانیسم‌های مولکولی این تغییرات تا حد زیادی نیست. بسیاری از مطالعات بر روی مکانیسم‌های میان‌نسلی و چند نسلی متمرکز شده‌اند و اما از جنبه‌های مقایسه‌ای غافل هستند. این مقاله به بررسی حشره کش پیرتیروئید اتوفن پروکس پرداخته تا متوجه شود ایا آثار میان‌نسلی و چندنسلی بر روی بقا و تولید مثل فولسومیا کاندیدا پدیدار می‌شود یا خیر. در این مطالعه برای کشف این مطلب که اتوفن پروکس بیان ژن‌های وابسته به تولید مثل را در درمان میان نسلی و چند نسلی تغییر می دهد یا خیر، فعال سازی ژن‌های وابسته به تنش را مورد بررسی قرار داده است. یک مطالعه آزمایشگاهی برای سه نسل با ۵ حشره‌کش در خاک لوفا ۲.۲ انجام گرفت. در درمان (تیمار) چند نسلی، نسل والدین (P = Parent) مورد تجزیه و تحلیل قرار گرفت، اما برای نسل های بعد چنین اتفاقی صورت نپذیرفت. در درمان چند نسلی، هر سه نسل به یک شیوه در معرض حشره کش قرار گرفتند. قرار گرفتن در معرض حشره کش منجر به کاهش تولیدمثل در نسل‌ها می شود. اثرات تولید مثل در طول نسل ، نشان می دهد که فولسومیا کاندیدا قادر به سازگاری با افزایش غلظت اتوفن پروکس در طولانی مدت در طی چندین نسل است.

Contents lists available at ScienceDirect

Ecotoxicology and Environmental Safety

journal homepage: www.elsevier.com/locate/ecoenv

Transgenerational and multigenerational stress gene responses to the insecticide etofenprox in *Folsomia candida* (Collembola)

Borbála Szabó[a,c,*], Zsolt Lang[b], Gábor Bakonyi[a], Janine Mariën[c], Dick Roelofs[c], Cornelis A.M. van Gestel[c], Anikó Seres[a]

[a] Department of Zoology and Animal Ecology, Szent István University, Páter K. st. 1, 2100, Gödöllő, Hungary
[b] Department of Biomathematics and Informatics, University of Veterinary Medicine, István st. 2, 1078 Budapest, Hungary
[c] Department of Ecological Science, Faculty of Science, Vrije Universiteit, De Boelelaan 1085, 1081 HV Amsterdam, the Netherlands

ARTICLE INFO

Keywords:
Etofenprox
Stress proteins
Survival
Reproduction

ABSTRACT

Insecticide exposure may cause both transgenerational and multigenerational effects on populations, but the molecular mechanisms of these changes remain largely unclear. Many studies have focused on either transgenerational or multigenerational mechanisms but did neglect the comparative aspects. This study assessed whether the pyrethroid insecticide etofenprox (formulation Trebon® 30 EC) shows transgenerational and/or

ARTICLE INFO

Keywords:
Etofenprox
Stress proteins
Survival
Reproduction
Trebon®

ABSTRACT

Insecticide exposure may cause both transgenerational and multigenerational effects on populations, but the molecular mechanisms of these changes remain largely unclear. Many studies have focused on either transgenerational or multigenerational mechanisms but did neglect the comparative aspects. This study assessed whether the pyrethroid insecticide etofenprox (formulation Trebon® 30 EC) shows transgenerational and/or multigenerational effects on the survival and reproduction of *Folsomia candida* (Collembola). The activation of stress-related genes was studied to detect whether etofenprox modifies the expression of reproduction-associated genes in trans- and multigenerational treatments. A laboratory study was carried out for three generations with five insecticide concentrations in LUFA 2.2 soil. In the transgenerational treatment, only the parent generation (P) was exposed, but the subsequent generations were not. In the multigenerational treatment, all three generations were exposed to the insecticide in the same manner. Multigenerational exposure resulted in reduced reproduction effects over generations, suggesting that *F. candida* is capable of acclimating to enhanced concentration levels of etofenprox during prolonged exposure over multiple generations. In the transgenerational treatment, the heat shock protein 70 was up-regulated and cytochrome oxidase 6N4v1 expression down-regulated in a dose-dependent manner in the F2 generation. This finding raises the possibility of the epigenetic inheritance of insecticide impacts on parents. Furthermore, CYP6N4v1 expression was oppositely regulated in the trans- and multigenerational treatments. Our results draw attention to the differences in molecular level responses of *F. candida* to trans- and multigenerational etofenprox exposure.

1. Introduction

Many soils are receiving inputs from pesticides that can affect the populations of inhabiting species in several ways. The obligatory standard tests developed for determining pesticide effects on non-target organisms are usually short-term and cover only one generation or just a part of the organism's life cycle. These tests are not suitable to detect chronic effects that may occur following exposure over many generations (Leon Paumen et al., 2008). Repeated exposure to the same substance is a common scenario in the environment, especially in case of slowly degrading xenobiotics or the repeated use of pesticides (WHO, 2011a, 2011b). Consequently, there is a need for developing new standard methods and incorporating trans- and multigenerational tests into the risk assessment framework (Shaw et al., 2017).

Here we use the terms transgenerational and multigenerational effect according to Hanson and Skinner (2016). The term transgenerational effect is used when only the parent generation is exposed to the insecticide and offspring are living in a clean environment (without direct exposure to the insecticide). Therefore, only maternal and/or epigenetic effects could manifest in transgenerational groups. The term multigenerational effect is used when both parent and offspring generations are directly exposed to the insecticide. Therefore, it simulates repeated use of the pesticide and the accumulation of the stress effects.

A transgenerational study indicated that when *Folsomia candida* was