IAPPS

INTERNATIONAL ASSOCIATION FOR THE PLANT PROTECTION SCIENCES

HELLENIC SOCIETY OF PHYTIATRY

AGRICULTURAL UNIVERSITY OF ATHENS

XX International Plant Protection Congress

Healthy Plants Support Human Welfare

1-5 JULY 2024

MEGARON ATHENS INTERNATIONAL CONVENTION CENTER

ATHENS GREECE

Abstract Book

SE33 C03

ROLE OF PUSH-PUSH COMPANION PLANT VOLATILES IN THE MANAGEMENT OF THE INVASIVE FALL ARMWORM (*SPODOPTERA FRUGIPERDA*) PEST

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Fall armyworm, *Spodoptera frugiperda*, is a serious invasive pest in Africa but "Push-Pull" companion cropping can substantially reduce infestation. Our study elucidates the underpinning chemical ecology mechanisms. Headspace volatiles were collected from companion plants (*Desmodium intortum, Desmodium uncinatum* and *Brachiaria mulato II*) and used in bioassays and electrophysiological recordings with *S. frugiperda* and parasitoid wasps. Insect populations, plant damage and herbivore parasitism were assessed under field conditions. Coupled GC-electroantennogram (GC-EAG) recordings showed robust responses to certain aromatic and terpenoid volatile compounds. In wind tunnel bioassays, maize volatiles mixed with *Desmodium* volatiles were less attractive to moths than maize alone. In oviposition bioassays, *S. frugiperda* laid fewer eggs on maize when *Desmodium* volatiles were present. In an olfactometer bioassay, parasitoid wasps were attracted to the scent of both *Desmodium spp.* (intercrop) and the *Brachiaria* border crop. Our data provide evidence of the mechanisms underpinning the reduced *S. frugiperda* infestation in the Push-Pull companion cropping system i.e. volatiles from companion crops repel *S. frugiperda* while attracting its parasitoid natural enemies. These findings explain why Push-Pull field plots had fewer *S. frugiperda* larvae and lower crop damage than monocropped maize.

SE33 C04

POTENTIAL OF SELECTED ESSENTIAL OILS FOR THE CONTROL OF THE EUROPEAN TRUFFLE BEETLE (*LEIODES CINNAMOMEUS*)

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The bioactivity of 14 essential oils extracted from semi-industrial pilot plant (table 1), were tested *in vitro* against one of the most important emergent pests of truffle plantations nowadays, the so-called European Black Truffle beetle *Leiodes cinnamomeus* in terms of repellent activity and contact toxicity. First, a preliminary screening was conducted using filter paper as carrier in both assays, in order to select the most promising plant species. For this purpose, 0.5% (v/v) and 400µg/insect were the initial doses. From this screening, *Mentha rotundifolia*, *Satureja montana*, *Tanacetum vulgare* and *Origanum virens* were the most effective in contact toxicity (100%); regarding repellent activity, this effect was observed, with a certain knock-down effect in most of the species chosen due to neurotoxicity of essential oils. In the light of these results, a follow-up toxicity dose-response experiment was undergone for filter paper formulation, in parallel with different formulations (alginate encapsulation and application on cellulose microfiber dishcloth) of the above mentioned 4 essential oils for the same doses. Activity assessed on cellulose microfiber dishcloths remained the highest after lowering doses to 100µg/insect. Also, another follow-up experiment was designed to better asses repellent activity. Dose was doubled in such oils where the knock-down was the lightest and halved in those where the knock-down was stronger. Nearly every oil saw its repellent activity enhanced following this strategy, thus dose-response experiments were undergone in those where the knock-down had been the greater. Again, the same 4 essential oils returned the best bioactivity and were diluted to 1/10 of the original dose. The same alternative formulations as for the toxicity assays were tested for such 4 essential oils, with remarkable differences in the bioactivity presented.

Essential oils	Essential oils
Artemisia absinthium	Rosmarinus officinalis
Dittrichia graveolens	Salvia lavandulifolia x officinalis
Lavandin grosso	Salvia officinalis
Lavandin super	Satureja montana
Lavandula luisieri	Tanacetum vulgare
Mentha rotundifolia	Thymus vulgaris
Oreganum virens	Thymus zygis

Table 1.- Plant species from which the essential oils tested were obtained.

Acknowledgements: The realization of this work was possible thanks to the project: Nuevas estrategias de control del escarabajo de la trufa en Teruel.ColeopTE: I+D+i CIBR - FITE 2021

SE33 C05

METABOLOMIC AND AGRONOMIC CLUSTERING OF BIOACTIVE ESSENTIAL OILS FROM CULTIVATED SPANISH AROMATIC PLANTS

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Essential oils (EOs) are volatile natural components extracted from aromatic plants with many biological activities including these related to plant protection against pests and diseases and are being considered as an alternative to synthetic pesticides. In this work, aromatic plants from 19 species belonging to different genera have been adapted to cultivation in preliminary field trials located in Aragon, Spain. These fields, with 50 plants of each species, were supplemented with drip irrigation from June to August (4 L h^{-1}, 5-6 h $week^{-1}$) for 3 years. Plants were manually harvested at 75% of blooming to evaluate yearly biomass production to be distilled in a steam distillation pilot plant, and the essential oil yield (EOY) (%)