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Exposure of Belgian florists to pesticide residues during their professional activities

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Introduction

- Floriculture : strong potential for growth and a major economic weight in international trade



Introduction

- Use of a wide range of pesticides
 - Control diseases and pests
 - Ornamental producers can stay competitive in both national and international markets



Introduction

- Lack of maximum residue limits (**MRL**) for flowers ?
- Florists :
 - Handle a large number of flowers
 - Exposed daily with a potential effect on their health



Objective

- Risk assessment of Belgian florists to pesticide residues :
 - Potential dermal exposure
 - Total exposure



Materials and methods

➤ Potential dermal exposure



- **Twenty** volunteer florists
- **Two** pairs of cotton gloves : worn during two consecutive half days
 - handling flowers and preparing bouquets
 - from min 2 h to max 3 h per day
- **Analyse**
 - Multi-residue , combination of GC-MS/MS and LC-MS/MS

Materials and methods

➤ Total exposure



- **Fourteen** : volunteer florists, **Fourteen** : volunteers of control group
- **Periods** : Valentine's Day, Mother's Day, All saints' Day
- 24h urine sample collection : **84** urine samples
- **Analyse**
 - Multi-residue , LC-MS/MS

Results and Discussion

➤ Potential dermal exposure



•111 pesticide residues :

- Average of **37** pesticide residues per sample
- Average total concentration per glove sample of **22 mg/kg**

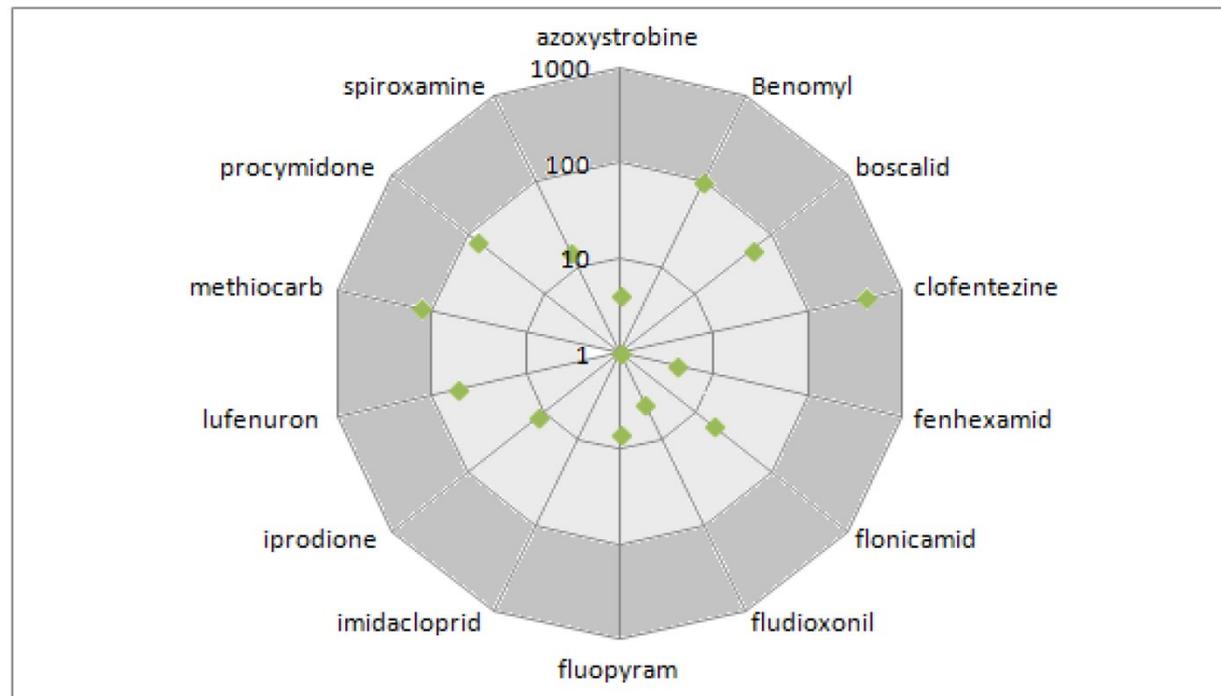
•**CLP** classification : the majority of **active substances** detected : have potential hazardous **acute** and/or **chronic** effects.

Results and Discussion

➤ Potential dermal exposure



- SE_{MAX} (systemic exposure at the maximum concentrations): **worst case**
Clofentezine (**393%** AOEL) : **particularly critical**,
Famoxadone (**117%**), Methiocarb (**126%**), Pyridaben (**120%**)



Among the 14 most frequently detected active substances, two have SE_{MAX} values exceeding the **AOEL**

Results and Discussion

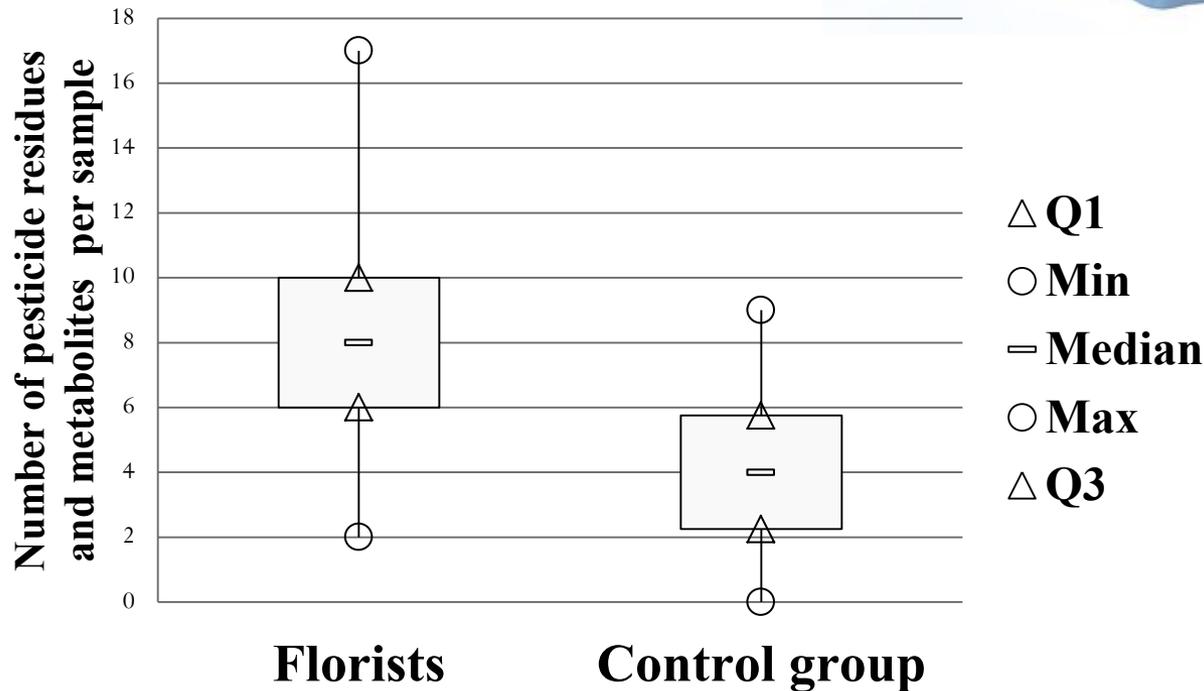


➤ Total exposure

- **70** pesticide residues and metabolites were identified :
 - Average of about **8** pesticide residues and metabolites per florist's urine sample
 - Average total concentration per sample of **4.3 $\mu\text{g/g}$ creatinine**
 - Range : **0.2** to **67 $\mu\text{g/g}$ creatinine**
- **Detection during the three periods :**
 - **Eight insecticides and metabolites** : 3-hydroxy-carbofuran, acetamiprid-n-desmethyl, clofentezine, methiocarb sulfoxid, novaluron, oxamyl, pirimicarb and pirimicarb-desmethyl
 - **Five fungicides** : ametoctradin, boscalid, fenhexamid, furulaxyl and metrafenone
 - **Synergist** : piperonil-butoxide
- ➔ **Linear relationship : dermal exposure / urinary excretion**

Results and Discussion

➤ Total exposure



Significantly **higher urinary excretion** of pesticide residues and metabolites (*t*-test) was found in florists than in control group

Conclusion

- Florists :
 - Exposed to pesticide residues
 - Potential effect on their health
- Reduce the exposure of florists to pesticide residues :
 - Create awareness and changes in attitude among the florists to better practices and hygiene rules
 - A better management of the pesticide used
 - A stronger quality control of imported cut flowers
 - Maximum residue limits for cut flowers ?
 - Use of biological control products



Thank you for your attention