Influences of Pesticide Residue on attaining Food Security in Mauritius

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Introduction

**Agriculture**

- Food security
  - Food Sufficiency
- Demand to feed 7.8 billion people

- Incidence of pests and diseases

- Crop productivity at risks

- Pesticide application to control crop losses

- Application of chemical fertilizers

- Pests resistance: Increase dosage

- Increasing pressure on the Environment

- Ban on important group of pesticides

- Pyrethroid: The Saviour
1) To conduct a survey on cultivation practices among farmers in Mauritius who are growing mainly food crops.

2) To analyze different cultivation practices following the survey in terms of pesticides, fertilizers, manure and municipal solid waste compost uses and applications for the growth of *Daucus carota*.

3) To assess the soil quality under different cultivation practices in terms of nutrient content and heavy metals in the two selected agro-climatic regions.

4) To assess the environmental impacts of the different cultivation practices in terms of midpoint and endpoint categories.
Farmer’s Survey

- 300 farmers interviewed
- 60 farmers from each region

- Pyrethroids most widely used: 95%
- Many malpractices detected
- 44 % farmers exceeded the dosage of pesticides unknowingly
- Factor analysis: influence from fellow farmers

Use of measuring device

- Measuring cylinder: 28.6
- Syringe: 27.3
- Cap of pesticide: 44.1

Use of measuring device – 297 farmers
Use of PPE – 105 farmers
Conducted in Sub Humid and Super Humid Regions
Carrots grown under 7 treatments randomly replicated 4 times

Cypermethrin: 0.5 & 1.5 mL/L
Deltamethrin: 0.5 & 1.5 mL/L
**Results and Discussions**

**Highest yield** – T6 Conventional treatment

**Heavy metals** – Cd exceeded the limits at Super humid Region

**Presence of pesticide in carrots**
- Where three fold pesticides were applied: Residue limits exceeded the MRL
- 2 times higher for cypermethrin
- 3 times higher for deltamethrin

**Maximum Residue Levels (MRL)**
- Cypermethrin = 2µg/g
- Deltamethrin = 0.2µg/g
A life cycle assessment was carried out to assess the environmental impacts of producing 1 ton of *Daucus carota* under two different scenarios (functional unit):

<table>
<thead>
<tr>
<th>Scenarios</th>
<th>Description</th>
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<tbody>
<tr>
<td>Scenario 1</td>
<td>Conventional practice (Baseline): Chemical fertilizer and Manure – T6</td>
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<tr>
<td>Scenario 2</td>
<td>Recommended treatment: Municipal solid waste compost – T3</td>
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On the whole, it was found that both scenarios have a negative impact on human health and the environment.

However, in both cases the most hazardous substance to use was pesticides.
Conclusions, Recommendations and future work

- Pesticide was detected in carrots where the dosage was exceeded
- Crops with excessive Pesticides cannot be consumed
- Hence excessive pesticide application has a negative impact on Food Security
- Investigation and continuous monitoring of pesticide residue on edible crops
- Tighter regulations in food crops
- More sensitization campaigns regarding dangers of pesticide usage
- Use of AI to detect pesticide at early stage
- Future of Agriculture lies in Organic Farming
References


