



Review of pesticide residues in crops in the Caribbean

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Introduction

Agrochemicals are widely used across the Caribbean region, although many countries lack adequate and up-to-date legislation regulating pesticide use as well as consistent long-term monitoring programmes. One particularly growing concern has been food safety issues related with pesticide residues on food commodities. Indiscriminate use of pesticides may result in high levels of chemical residues, which can pose health risks to consumers. A limited number of studies on pesticide residues in crops have been published in the Caribbean. The objective of this review is to determine the state of pesticide residues in different crops from selected studies in the region.

Methodology

This poster presents results from a focused literature review of published research articles and reports from studies carried out in Trinidad and Tobago, Saint Lucia, Guyana and Suriname, between 1998 and 2020, on pesticide residues in crops. The studies reviewed used different sampling protocols warranting caution when comparing across studies. Moreover, the degree to which these results can be generalized will differ across studies.

Results

Table 1. Overview of crops with pesticide residues exceeding Maximum Residue Limits (MRLs) from selected studies in the Caribbean (based on MRL levels established at the time of the study)

Ref	Crop	Active ingredients exceeding MRL (mean concentrations mg/kg)
(1)	Celery	Diazinon (14.8); Methamidophos (0.78-15.74); Pirimiphos (0.02-4.11); Profenofos (0.65-8.52); Triazophos (12.27-40.2)
	Lettuce	Metamidophos (0.61); Pirimiphos (0.03); Profenofos (0.18); Triazophos (4.88)
	Pak-choi	Dimethoate (0.92); Ethion (0.21-1.63); Profenofos (0.19; 0.67); Triazophos (0.16-4.74)
	Spinach	Methamidophos (0.17-10.47)
	Culantro	Methamidophos (3.99)
(2)	Cabbage	4,4 DDE (0.15); Endosulfan (0.316)
	Celery	Aldrin (0.16); Heptachlor (1.17)
	Cucumber	Aldrin (0.24)
	Lettuce	Aldrin (0.30); Ethion (0.43); Heptachlor (0.31); Lindane (0.51)
	Hot pepper	Ethion (0.43)
	Tomato	Diazinon (0.50)
	Apple	Aldrin (0.08); Delta-lindane (0.14); Endosulfan (2.17)
(3)	Grape	Aldrin (0.22; 0.05); Lindane (0.014)
	Yard long bean	Imidacloprid (0.062-3.691)
	African eggplant	Imidacloprid (1.908)
(4)	Aubergine	Imidacloprid (1.779)
	Tannia	Endosulfan (0.07); Lindane (0.02; 0.03)
	Chinese cabbage	Lambda-cyhalothrin (1.08)
(5)	Tomato	Cypermethrin (0.32)
	Tomato	Cypermethrin (0.23); Triazophos (0.12)

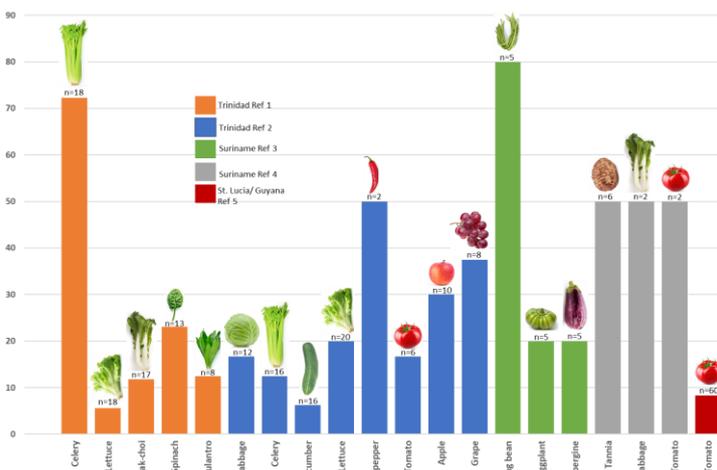


Fig 1. Percentage of samples exceeding at least one MRL (MRLs based on levels established at the time of the study)

Results

Table 2. Summary state of pesticide residues in crops by country based on selected Caribbean studies

	Trinidad		Suriname		St. Lucia	Guyana	Summary
	Ref (1)	Ref (2)	Ref (3)	Ref (4)	Ref (5)		
Tot. no. of samples analyzed	200	112	20	22	20	40	414
Tot. no. of crops sampled	17	10	4	9	1	1	26
% of samples detected with pesticide residues	22%	15%	55%	23%	35%	23%	22%
% of tot. samples above MRLs	10%	14%	30%	23%	0%	13%	13%

Results from studies show that:

- Crops with highest amounts of pesticide residues exceeding MRLs include: celery, lettuce, cabbage, tomato, bean, and spinach. Many crops contained multiple pesticide residues (Table 1);
- Crops with highest percentage of samples exceeding MRLs include: celery, hot pepper, bean, tannia, Chinese cabbage, tomato and grape (Fig 1);
- Organophosphates, organochlorines, neonicotinoids and pyrethroids are some of the chemical classes detected above MRLs (Table 1);
- Up to 55% of produce had detectable amounts of pesticide residues, with an average of 22% (Table 2);
- Up to 30% of produce contained pesticide residues exceeding MRLs, with an average of 13% (Table 2). 73% of the positive samples were found to be above MRLs.

Conclusion

Pesticide residues were detected on a wide range of crops, with majority substantially exceeding the MRLs. Some produce had detectable amounts of banned and highly hazardous pesticides. The results suggest a need for consistent long-term monitoring of pesticide use and residues in food crops to reduce potential risks to the environment and public health. National monitoring programs for pesticide residues in crops are absent in most Caribbean countries. Further analysis of pesticide residues in locally produced and imported crops is essential for a solid baseline to support a long-term monitoring strategy.

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