



# PESTICIDE RESIDUE MANAGEMENT IN DRY SMALL CARDAMOM, *Elettaria cardamomum* Maton.

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## Introduction

- Small cardamom (*Elettaria cardamomum* Maton) is a major spice in Kerala which acts as a source of foreign exchange earnings to the state.
- The use of pesticides in high quantities with a dire drive to protect the crop produce resulted in multiple pesticide residues in the cured produce at unacceptable levels.
- Of late, cardamom farmers are in a perturbed state due to the alarming situation in the near future in connection with the return of consignments from foreign countries. It is high time to standardize simple, cost effective and rugged methods in the management of pesticide residues in cardamom

## Objectives

- To evaluate the effect of different decontamination methods for the removal of pesticide residues. from dry small cardamom capsules

## Materials and methods

- The study was conducted in Pesticide Residue Research and Analytical Laboratory (PRRAL), AINP on Pesticide Residue,, College of Agriculture, Vellayani and Cardamom Research Station, Pampadumpara, Kerala Agriculture University, during June 2019-February 2020.
- Organically grown cardamom plants were uniformly treated with a mixture of ten pesticides . Capsules were harvested and cured for 15 hours. The cured samples were collected and treated with following household practices.

T1-Dipping for 10 minutes in 2% suspension of commercial tamarind

T2-Dipping for 10 minutes in 2% solution of common salt

T3-Dipping for 10 minutes in 2% synthetic vinegar solution

T4-Decortication

T5-Washing capsule in water for three times + Cooking (closed pan)

T6-Washing in tap water three times

T7-Untreated control

- Samples were analyzed using Gas Chromatography (GC), Gas chromatography–mass spectrometry (GC-MS) and Liquid Chromatography- Tandem spectrometry (LCMS/MS).

## Results

- Decortication (32.75-100%) and washing and cooking in closed pan for ten minutes (23.41-79.77%) showed maximum reduction in pesticide residues (Table 1).
- The major portion of the pesticides sprayed to the crops undergo very restricted movement through the outer wall and residues remain on the outer regions (Holland *et al.*,1994)
- Decortication removed 100 per cent residues of quinalphos, lambda cyhalothrin and cypermethrin.
- The next best treatment was dipping the capsules in 2% vinegar solution which removed upto 44.55 per cent residues (Figure 1)

**Table.1 Effect of decontamination practices on the extent of removal of pesticide residues from dry cardamom**

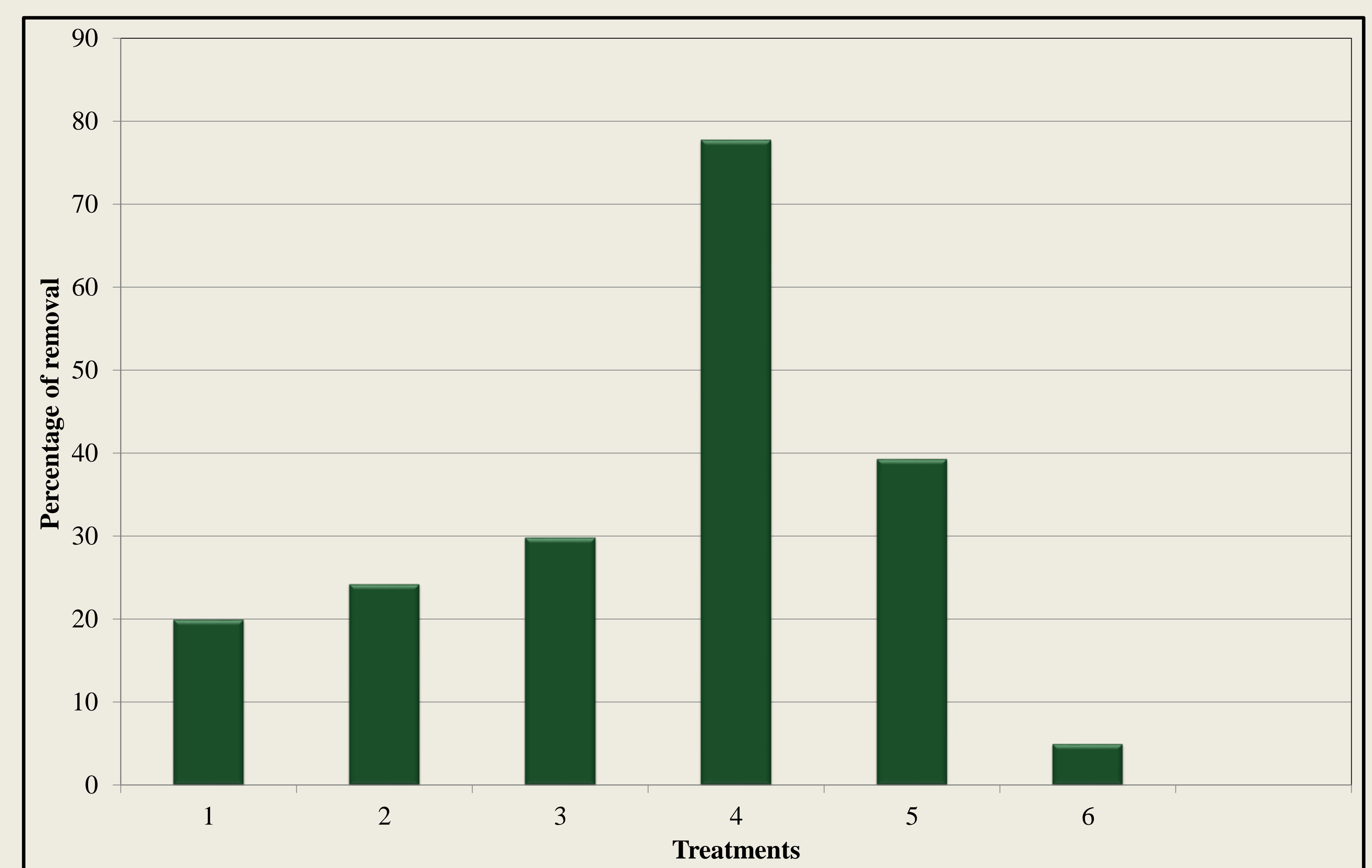
Pesticides	Mean per cent removal of pesticides**						CD (0.05)
	Tamarind 2%*	Salt 2%*	Synthetic vinegar 2%*	Decortication *	Washing+ Cooking*	Washing*	
Dimethoate	8.90(15.82) <sup>b</sup>	5.98(13.65) <sup>b</sup>	3.23(10.35) <sup>b</sup>	32.75 (34.81) <sup>a</sup>	37.95 (37.99) <sup>a</sup>	00(0.58) <sup>c</sup>	(7.381)
Chlorpyriphos	18.28 (25.31) <sup>b</sup>	18.10 (24.81) <sup>b</sup>	29.54 (32.91) <sup>ab</sup>	42.00 (40.43) <sup>a</sup>	36.09 (36.90) <sup>a</sup>	00(0.58) <sup>c</sup>	(8.148)
Quinalphos	22.73(28.14) <sup>c</sup>	24.79(29.79) <sup>c</sup>	35.67(36.66) <sup>b</sup>	100(89.41) <sup>a</sup>	24.83(29.78) <sup>c</sup>	00(0.58) <sup>d</sup>	(5.079)
Profenophos	13.17(19) <sup>d</sup>	20.32(26.79) <sup>cd</sup>	31.24(33.98) <sup>bc</sup>	76.22 (60.87) <sup>a</sup>	33.92 (35.60) <sup>b</sup>	00(0.58) <sup>d</sup>	(8.009)
Ethion	22.05 (27.19) <sup>c</sup>	30.15 (33.04) <sup>c</sup>	44.55 (41.87) <sup>b</sup>	87.31 (69.17) <sup>a</sup>	52.69 (46.54) <sup>b</sup>	00(0.58) <sup>d</sup>	(7.374)
Lambda cyhalothrin	10.91 (19.14) <sup>c</sup>	11.53 (18.97) <sup>c</sup>	25.49 (30.32) <sup>b</sup>	100 (89.41) <sup>a</sup>	29.99 (33.17) <sup>b</sup>	00 (0.58) <sup>d</sup>	(5.299)
Cypermethrin	14.7 (22.49) <sup>cd</sup>	13.99 (20.34) <sup>d</sup>	30.66 (33.62) <sup>b</sup>	100 (89.41) <sup>a</sup>	23.41 (28.93) <sup>bc</sup>	00 (0.58) <sup>d</sup>	(6.840)
Fenvalerate	30.98 (33.82) <sup>b</sup>	25.66 (30.21) <sup>b</sup>	37.12 (37.48) <sup>b</sup>	96.41 (79.13) <sup>a</sup>	33.87 (35.59) <sup>b</sup>	00 (0.58) <sup>d</sup>	(7.480)
Imidacloprid	9.90 (17.25) <sup>c</sup>	40.67 (39.58) <sup>b</sup>	18.441(25.35) <sup>c</sup>	71.14 (57.50) <sup>a</sup>	40.27 (39.26) <sup>b</sup>	23.37 (28.30) <sup>bc</sup>	(12.610)
Carbendazim	47.88 (43.78) <sup>cd</sup>	51.00 (45.57) <sup>c</sup>	42.44 (40.64) <sup>d</sup>	70.90 (57.35) <sup>b</sup>	79.77 (63.28) <sup>a</sup>	25.65 (30.41) <sup>c</sup>	(4.224)

Values shown in parentheses are  $\sin^{-1}\sqrt{x/100}$  transformed values

\* Subjected to dipping in treatment solutions for ten minutes followed by three normal washings

\*\* Mean of three replications

**Fig. 1. Effects of different treatments on dry cardamom**



1: 2% Tamarind, 2: 2% Salt, 3: 2% Vinegar, 4: Decortication, 5: Washing + cooking, 6: Washing with water

## Conclusion

- The study could be concluded that decortication was the effective treatment for removing pesticide residues from dry cardamom.

## References

Holland, P. T., Hamilton, D., Ohlin, B., and Skidmore, M. W. 1994. Effects of storage and processing on pesticide residues in plant products. *Pure Appl. Chem.* 66(2): 335-356.