

## Efficacy of Agro Clean as pesticide in cumin and coriander

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### Abstract

An experiment was conducted during two consecutive *rabi* seasons of 2018-19 and 2019-20 to study the efficacy of Agro Clean as pesticide in cumin and coriander. The product showed maximum effectiveness against cumin blight @ 5ml litre<sup>-1</sup> and inhibited maximum mycelial growth (26.27%) when compared with control. In field conditions also the product showed effectiveness against cumin blight disease and observed the minimum disease (PDI 13.2) at 5ml/litre. In coriander in field conditions the product showed various degrees of effectiveness against coriander powdery mildew disease and observed the minimum disease (PDI 6.9) at 5ml litre<sup>-1</sup>. In cumin Agro Clean @ 2ml litre<sup>-1</sup> significantly reduced aphid, green aphid and thrips population and recorded of 3.84, 1.20 and 1.00 populations per plant. Agro Clean @ 5 ml litre<sup>-1</sup> is promising to control cumin blight and coriander powdery mildew. Agro Clean @ 2 ml litre<sup>-1</sup> could be used to manage aphid, green aphid and thrips in cumin. Agro Clean could be used as pesticide in order to achieve safe and sustainable yield of cumin as well coriander.

**Key words:** Agro clean, cumin, coriander, efficacy, pesticide.

### Introduction

India is known as land of spices from time immorial. Today Indian spices are the most sought - after globally, owing to their exquisite aroma, texture and taste. More than 90% of the spices produced in the country are used for domestic consumption and the rest exported as raw as well as value added products.

cumin and coriander are low input loving crops. Growers are using excessive pesticides in order to manage the pests and diseases specially in cumin, which is major concern of quality. This trend may lead to reduction of export from India. Now a days peoples are more concern about their health as consuming pesticides and other chemicals may cause serious diseases and other ailments.

India is the largest producer, consumer and exporter of seed spices in the whole world. Cumin and coriander are important major seed spices occupying first and second position respectively in term of area. Cumin and coriander contribute 42.08 and 12.32 % share in export of seed spices. Recently export of seed spices from India is gaining momentum due to their unique aroma and flavor. To maintain the this increasing trend of export, the quality of seed spices need to be improved which would attract the demand of seed spices of other countries, resulting in more foreign exchange at global. (Meena *et.al.*, 2019)

In this scenario, there is urgent need of eco-friendly source of pesticide. In the view of this the present

experiment was planned to study the efficacy of Agro Clean as pesticide in cumin and coriander.

Agro Clean, a product of M/s. Shukla Ashar Impex Private Limited, Rajkot is fundamentally an augmented bio-remediation technology derived from a relatively new field of advanced materials science known as organic colloidal chemistry. Using proprietary manufacturing process, renewable, sustainable plant and vegetable oils are blended to create a truly eco-friendly particle that is too small. Agro Clean's strong electromechanical forces directly emulsify the oils, lipids and waxes and disintegrate them. Contaminants' (oils, pesticides, etc.) molecules are broken down. The outer skin of pests (bacteria, fungi, and insects) is emulsified.

### Materials and methods

Field experiment was conducted at experimental farm of NRCSS, Ajmer during consecutive two *rabi* seasons of 2018-19 and 2019-20 in Randomized Block Design with six treatments and three replications to determine the efficacy of Agro Clean as pesticide in cumin and coriander. GC 4 (Cumin) and ACr 1 (Coriander) varieties were selected for the study. Treatments details: T<sub>1</sub>: Untreated control, T<sub>2</sub>: Agro Clean @ 1ml/lit. T<sub>3</sub>: Agro Clean @ 2 ml/lit. T<sub>4</sub>: Agro Clean @ 3 ml/lit. T<sub>5</sub>: Agro Clean @ 4 ml lit. <sup>-1</sup> T<sub>6</sub>: Agro Clean @ 5 ml lit. <sup>-1</sup> T<sub>1</sub>: untreated control was supplied with recommended dose of fertilizers. Other treatments were receiving Agro Clean with given dose at every two weeks interval as pesticide. Agro Clean was sprayed by knapsack sprayer with high

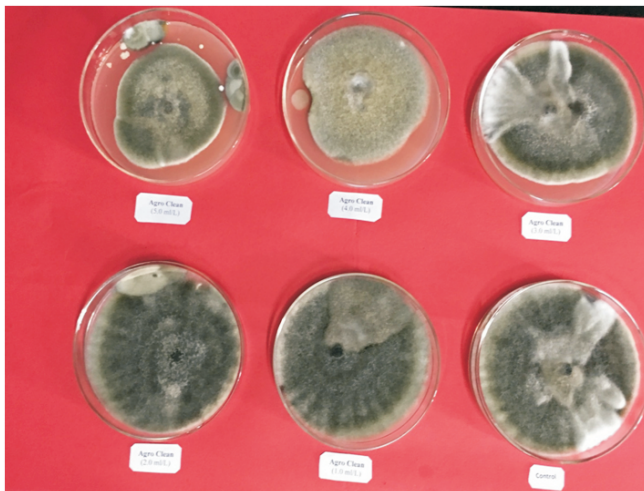
volume fitted hollow cone nozzle. Data of disease and pest were recorded periodically. The data were statistically analyzed as suggested by Gomez and Gomez (1984). A probability of P = 0.05 was considered significant.

## Results and discussion

### Efficacy of Agro Clean against diseases of cumin and coriander

In an experiment comprised of six treatments the bio-efficacy of Agro Clean was tested with five different doses such as 1ml litre<sup>-1</sup>, 2ml litre<sup>-1</sup>, 3ml litre<sup>-1</sup>, 4ml litre<sup>-1</sup>, 5ml litre<sup>-1</sup> and control, in vitro as well as in vivo conditions for seed spices diseases. The product was found effective and managed certain diseases with various degrees of control according to the doses applied.

In vitro conditions the product showed effectiveness against cumin blight causing by *Alternaria burnsii* inhibited maximum mycelial growth (26.27 %) at 5ml litre<sup>-1</sup> followed by (12.19 %) at 4ml litre<sup>-1</sup> when compared with control (table 1 & Fig-1).



**Fig.1** Effect of Agro Clean on mycelial growth of *Alternaria burnsii*

**Table 1.** Efficacy of Agro Clean against *Alternaria burnsii*

S.No.	Treatment	Mycelial Growth (mm)	Mycelial Growth Inhibition (%)
1.	Control	90.2	0
2.	1 ml/ Litre	87.8	2.66
3.	2 ml/ Litre	86.1	4.54
4.	3 ml/ Litre	83.2	7.76
5.	4 ml/ Litre	79.2	12.19
6.	5 ml/ Litre	66.5	26.27

Data (Table 2) showed that in field conditions the product showed effectiveness against cumin blight disease and observed the minimum disease (PDI 13.2) at 5ml litre<sup>-1</sup> followed by (14.2) at 4ml litre<sup>-1</sup> while in the control the disease was maximum (PDI 20.0). These results were in close conformity with the finding of Pandey *et al.* (2020) in tomato for the management of early blight. These finding also in agreement with the results obtained by Sharma *et al.* (2018) in management of *Fusarium oxysporum* in tomato.

**Table 2.** Efficacy of Agro Clean against cumin blight disease in natural conditions

S.No.	Treatment	PDI
1.	Control	20.0
2.	1 ml/ Litre	18.0
3.	2 ml/ Litre	16.2
4.	3 ml/ Litre	16.4
5.	4 ml/ Litre	14.2
6.	5 ml/ Litre	13.2
	SEm±	0.8
	CD 0.5%	0.26

Data (Table 3) depicted that in field conditions the product showed various degrees of effectiveness against coriander powdery mildew disease and observed the minimum disease (PDI 6.9) at 5ml litre<sup>-1</sup> followed by (11.1) at 4ml litre<sup>-1</sup> while in the control the disease was maximum (PDI 18.9). These results in agreement with the finding of Sharma *et al.* (2017) and Osman Mohamed Ali *et al.* (2017).

**Table 3.** Efficacy of Agro Clean against Coriander powdery mildew disease

S.No.	Treatment	PDI
1.	Control	18.9
2.	1 ml/ Litre	16.1
3.	2 ml/ Litre	14.2
4.	3 ml/ Litre	11.3
5.	4 ml/ Litre	11.1
6.	5 ml/ Litre	6.9
	SEm±	0.14
	CD 0.5%	0.44

### Bio-efficacy of Agro Clean against sucking pests in cumin

#### Effect on aphid, *Aphis gossypii*

The data on mean population of aphid before and after seven days of spray of Agro Clean are presented in table 4. The data before spray were found non-significant ranging from 10.05 to 10.89. Data after 7 days of spray of

Agro Clean were found significant. Among the treatments Agro Clean @ 2ml litre<sup>-1</sup> significantly reduced aphid population and recorded 3.84 plant<sup>-1</sup>, whereas in control aphid population was 11.60. In other treatments also aphid population reduced to great extent ranging from 4.00 to 8.16. Agro Clean @ 2.0 ml litre<sup>-1</sup> found superior in order to control the aphid population in comparison to control and other dose of Agro Clean. Looking to the cost effectiveness the growers are advised to use Agro Clean @ 2.0 ml litre<sup>-1</sup> to manage the aphid population in cumin. These results in close conformity with the finding obtained by Zala *et al.* (2016) in *Bt* cotton. Similar results were also obtained by Nzanza and Mashela (2012) in tomato. These naturally occurring substances control pest by non-toxic machanisms (Bardin *et al.*, 2008). Toxic effects of synthetic pesticides cannot be tolerated hence safer insect pest control may be possible by biopesticides application (Adalbert *et al.* 2013).

**Table 4.** Effect of Agro Clean against aphid in cumin

Treatment	Dose (ml litre <sup>-1</sup> )	Before spray	After 7 days of spray
Control	-	10.22 (3.35)	11.60 (3.55)
Agro Clean	1	10.05 (3.32)	8.16 (3.01)
Agro Clean	2	10.75 (3.42)	3.84 (2.20)
Agro Clean	3	10.22 (3.32)	4.08 (2.26)
Agro Clean	4	10.89 (3.45)	4.09 (2.25)
Agro Clean	5	10.72 (3.42)	4.00 (2.14)
C.D.	N/A	0.613	
SE(m)	0.126	0.192	
SE(d)	0.179	0.272	
C.V.	6.48	12.966	

Note: Values are mean population. Figures in parentheses are retransformed values

**Effect on green aphid, *Myzus persicae***

The data on mean population of green aphid before and after seven days of spray of Agro Clean are presented in table 5. The data before spray were found non-significant

ranging from 06.14 to 06.92. Data after 7 days of spray of Agro Clean were found significant. Among the treatments Agro Clean @ 2ml litre<sup>-1</sup> significantly reduced green aphid population and recorded 1.20 per plant, whereas in control green aphid population was 8.20. In other treatments also green aphid population reduced to great extent ranging from 1.33 to 3.28. Agro Clean @ 2.0 ml litre<sup>-1</sup> found superior in order to control the green aphid population in comparison to control and other dose of Agro Clean. Looking to the cost effectiveness the growers are advised to use Agro Clean @ 2.0 ml litre<sup>-1</sup> to manage the green aphid population in cumin. The bio pesticides have been used for almost all field crops and vegetables against bollworms, fruit borers, aphids, jassids, thrips, white fly, diamond black moth etc. by acting as repellent, anti-feedant and its seed contain chemicals, which inhibits the population of insect pests (Ursani *et al.*, 2014). Vekaria and Patel (2000) reported significant results with bio pesticides for the control of aphids in mustard.

**Table 5.** Effect of Agro Clean against green aphid in cumin

Treatment	Dose (ml/litre)	Before spray	After 7 days of spray
Control	-	6.74 (2.77)	8.20 (3.03)
Agro Clean	1	6.14 (2.67)	3.28 (2.06)
Agro Clean	2	6.92 (2.81)	1.20 (1.48)
Agro Clean	3	6.59 (2.75)	1.36 (1.53)
Agro Clean	4	6.24 (2.69)	1.40 (1.54)
Agro Clean	5	6.48 (2.73)	1.33 (1.52)
C.D.	N/A	0.179	
SE(m)	0.057	0.056	
SE(d)	0.081	0.079	
C.V.	3.62	5.21	

Note: Values are mean population. Figures in parentheses are retransformed values

**Effect on green thrips, *Thrips tabaci***

The data on mean population of thrips before and after seven days of spray of Agro Clean are presented in table 6. The data before spray were found non-significant ranging from 04.29 to 04.89. Data after 7 days of spray of Agro Clean were found significant. Among the treatments Agro Clean @ 2ml litre<sup>-1</sup> significantly reduced thrips population and recorded 1.00 per plant, whereas in control thrips population was 6.11. In other treatments also thrips population reduced to great extent ranging from 1.09 to 3.38. Agro Clean @ 2.0 ml litre<sup>-1</sup> found superior in order to control the thrips population in comparison to control and other dose of Agro Clean. Looking to the cost effectiveness the growers are advised to use Agro Clean @ 2.0 ml litre<sup>-1</sup> to manage the thrips population in cumin. Singh *et al.* (2011) reported that bio pesticides treated plots are superior to control treatment in thrips reduction in onion.

**Table 6.** Effect of Agro Clean against green thrips in cumin

Treatment	Dose (ml/litre)	Before spray	After 7 days of spray
Control	-	4.89 (2.33)	6.11 (2.66)
Agro Clean	1	4.56 (2.31)	3.38 (2.09)
Agro Clean	2	4.44 (2.27)	1.00 (1.41)
Agro Clean	3	4.67 (2.36)	1.15 (1.46)
Agro Clean	4	4.45 (2.33)	1.17 (1.47)
Agro Clean	5	4.29 (2.30)	1.09 (1.44)
C.D.	N/A	0.094	
SE(m)	0.194	0.03	
SE(d)	0.274	0.042	
C.V.	14.47	2.90	

Note: Values are mean population. Figures in parentheses are retransformed values

**Conclusions**

Based on the results it can be concluded that cumin blight and coriander powdery mildew could be managed by Agro Clean @ 5 ml litre<sup>-1</sup>. Insect pests of cumin viz.

aphid, green aphid and thrips could be managed by Agro Clean @ 2 ml litre<sup>-1</sup>. Agro Clean, a nano herbal product can be used as safe and eco-friendly pesticide in cumin as well in coriander in order to achieve pesticides/chemicals free produce.

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