



## COMPARATIVE STUDY OF CONTROL OF SEED MYCOFLORA OF *CORIANDRUM SATIVUM* L. BY HERBAL AND CHEMICAL METHODS

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### Abstract

This study was carried out on the mycoflora associated with seeds of *Coriandrum sativum* L. Seed material was collected from the Punjab Agricultural University that is approved by different companies and one was collected from local market in loose packing. For the isolation of fungi Blotter paper method and Agar plate method were used. A total of 7 types of fungi including *Aspergillus flavus*, *Aspergillus niger*, *Aspergillus fumigatus*, *Penicillium* spp., *Rhizopus* spp., *Fusarium solani* and *Mucor* spp. were isolated from the seeds of coriander. These fungi were belonging to 3 Families and three orders. For control of isolated Seed Mycoflora, two methods i.e. Herbal and Chemical such as Garlic, Clove (Herbal), Thiram, Carbendazim (Chemical) were used. All these Herbal and Chemical fungicides significantly reduced with population of all fungi present in naturally infected seed samples. Garlic and Thiram were found suitable for the control of Seed Mycoflora of *Coriandrum sativum* L.

**Keywords :** *Coriandrum sativum* L., Potato Dextrose Agar, Seed Mycoflora, Blotter paper.

### Introduction

The Coriander word is derived from a Greek word "Koris". Koris is meant to bedbug as it has unpleasant smell like green herbs and immature fruits. Cilantro, Dhania, Chinese parsley are the other names of Coriander. All over the world Coriander is the most common and more demanded spice crop which belongs to Apiaceae family. Coriander plant is small about 25 to 30 cm in length which contains branches and umbels. It is thin stemmed and bushy herb (Jones *et al.*, 2011). Leaves of coriander plant are alternate and compound and have pleasant smell. The fruit of Coriander plant has delicate odour and smell. Colour of seeds is light brown. Dried seeds are used as spice (Anwar *et al.*, 1994). The colour of mature seeds is yellowish brown which has longitudinal ridges.

Coriander can be affected by various kinds of diseases which may be bacterial, viral or fungal. But mainly with four important fungal diseases like *Aspergillus flavus*, *Aspergillus niger*, *Aspergillus fumigatus*, *Penicillium* spp., *Rhizopus* spp., *Fusarium solani*, *Mucor*, the most widely studied in Seed Mycoflora. (Agrawal *et al.*, 1996; Garcia *et al.*, 2006).

### Material and Method

Two procedures are used for the isolation of seed mycoflora:-

1. Agar Plate method (PDA)
2. Blotter paper method.

1. **Agar Plate Method:** - Prior to use, cell culture petri-plates were washed thoroughly, autoclaved and dried in oven. In case of agar plate method, potato dextrose agar (PDA) was aseptically poured in the sterilized glass Petri dishes, at the rate of 15 ml per Petri plate. After the medium was solidified, 10 seeds per Petri plate were plated. Before plating on PDA the seeds were surface sterilized by emerging in 0.1% mercuric chloride solution for 30 sec and then rinsed for three times in sterilized distilled water. Then the Petri plates were

incubated at 25±1°C for 7 days under 12 hours alternating cycle of light and darkness. The seeds were examined after five or eight days of incubation for the presence of fungal growth.

### Composition of PDA

Ingredients	Amount per litre
Potato (peeled)	200g
Dextrose	20g
Agar	20g
Water	To make the final volume 1 litre

The Petri plates were covered with Para-film in order to avoid contamination. After 3-4 days the prevalence of fungal growth on the seeds were observed and recorded as percentage using this formula:-

$$\% \text{ incidence} = \frac{\text{No. of infected seed}}{\text{No. of plated seed}} \times 100$$

### 2. Blotter Method:-

Three layers of sterilized blotter paper were jointly soaked in sterilized distilled water and kept in sterilized Petri dishes of 8.5 cm diameter. The seeds were first surface sterilized by emerging in 0.1% mercuric chloride solution for 30 sec and then rinsing in sterilized distilled water for at least 3 times. 10 seeds per Petri dish were placed on blotter paper at equal distance. The Petri dishes were incubated for 7 days at 25±1°C under 12 hrs. alternating cycles of darkness and near ultra violet (NUV) light. The seeds were observed on fifth or eighth day under steriobinocular microscope for the presence of seed borne fungi.

### Result

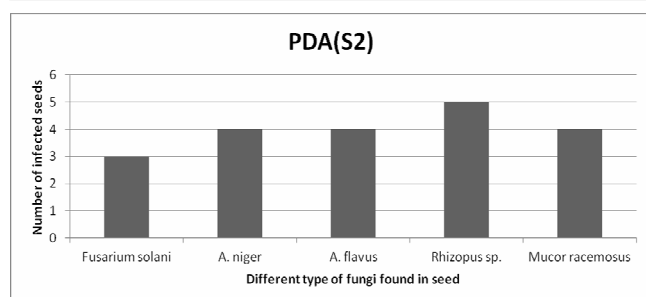
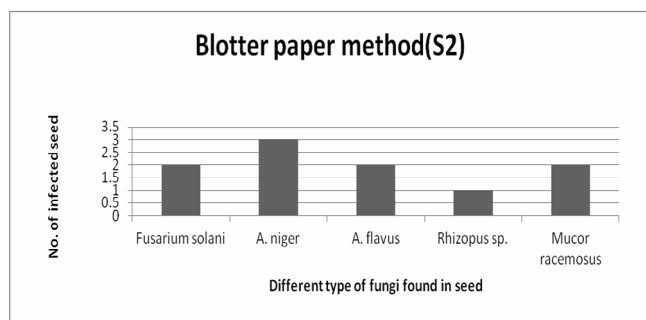
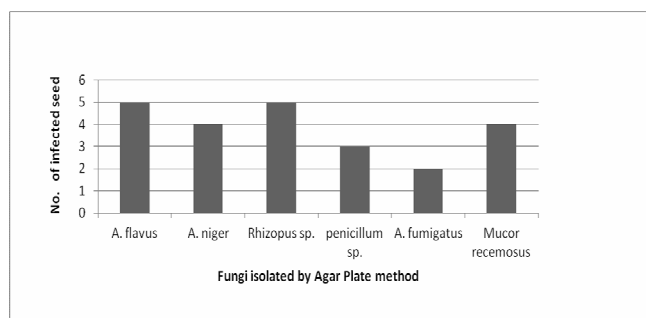
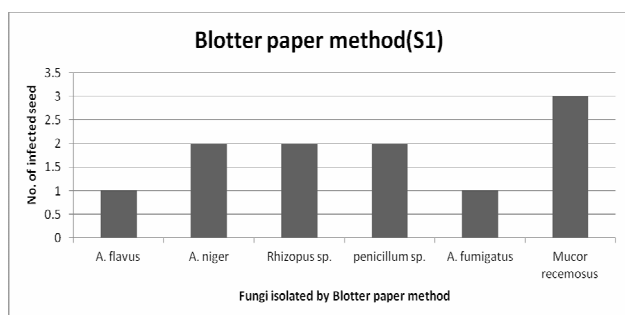
**To study the Seed Mycoflora of *Coriandrum sativum* L.**

**Isolation of Fungi:** - A total of 5 genera and 7 species of fungi were isolated from the seeds of coriander.

It was found that higher numbers of fungi were found on Agar plate method as compared to Blotter paper method.

**Table 2 :** Seed mycoflora of coriander on Blotter paper and PDA

Samples	Fungi Identified	Blotter paper method (Number of infected seeds)	PDA (Number of infected seeds)
Sample 1.	1. <i>Aspegillus flavus</i>	1	5
	2. <i>Aspergillus niger</i>	2	4
	3. <i>Rhizopus sp.</i>	2	5
	4. <i>Penicillum sp.</i>	2	3
	5. <i>A. fumigatus</i>	1	2
	6. <i>Mucor racemosus</i>	3	4
Sample 2	1. <i>Aspergillus flavus</i>	2	3
	2. <i>Aspergillus niger</i>	3	4
	3. <i>Fusarium solani</i>	2	4
	4. <i>Rhizopus spp.</i>	1	5
	5. <i>Mucor racemosus</i>	2	4



**Fig. :** Different type of fungi and number of infected seeds with blotter paper method and PDA.

**Control of Seed Mycoflora with the help of Herbal and Chemical Treatment.**

Control of seed mycoflora was done by fungicidal treatment. Two chemical fungicides (Carbendazim and Thiram) and two herbal fungicides (clove and garlic) were taken for seed dressing to control seed mycoflora.

A total of three genera and four species of fungi including *Aspergillus flavus*, *Aspergillus niger*, *Rhizopus* spp., *Mucor racemosus* were isolated from the seeds of *Coriandrum sativum* L.

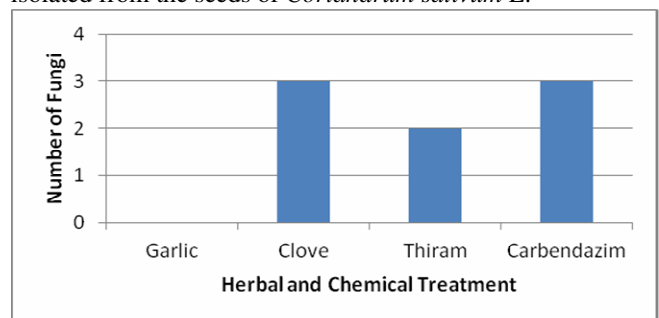
**1. Herbal Treatment:** - To prepare herbal fungicide, ten grams of garlic and clove crushed by using pestle and mortar. 50 ml of water was added to it. The content was filtered through a clean muslin cloth. To obtain the concentration 10% the volume of the mixture was made up to 100 ml.

**Table 5 :** Comparative study of Seed mycoflora of coriander with two different Methods

Sample	Fungi Identified	Blotter paper method (Number of infected seeds)	PDA (Number of infected seeds)
Sample 1.	1. <i>Aspegillus flavus</i>	4	3
	2. <i>Aspergillus niger</i>	3	2
Sample 2	1. <i>Aspergillus niger</i>	3	1
	2. <i>Rhizopus sp.</i>	4	2

**2. Chemical Treatment:** - 2.5 gm. powder of two different fungicides, viz. Thiram and Carbendazim was added in two transparent plastic bags containing one kg of *Coriandrum sativum* L. seeds and thoroughly mixed by shaking plastic bag until getting the uniform mixture. Little amount of water was also added and thoroughly mixed in order to facilitate proper coating and the seeds were allowed to dry under shade.

A total four type of fungi including *Aspergillus niger*, *Rhizopus sp.*, *Aspergillus flavus*, *Mucor racemosus* were isolated from the seeds of *Coriandrum sativum* L.



**Fig. :** Comparative study of Seed mycoflora of coriander with two different Methods

Through the study we can conclude that thiram was found better as chemical fungicide while garlic was found better as herbal fungicide. Among these two fungicides garlic showed the best results and was very helpful in controlling most of the fungi from coriander.

**References**

Agrawal, V.K. and Sinclair, J.B. (1996). Principles of Pathology, CRC Press Inc. Boca Raton, FL., (2): 539.  
 Carley Ledbetter (Dec 6, 2017) "Science Explains Why Cilantro Tastes Like Soap for Certain People". Huffington Post.

- Chaudhary, R.G. and Kaur, A. (2002). Wilt disease as a cause of shift from lentil cultivation in Sangod Tehsil of Kota, Rajasthan. *Indian J Pulses Res.*, (15): 193–194.
- Cram, M.M. and Fraedrich, S.W. (2010). Seed disease and seedborne pathogens of North America. *Tree Planters' Notes*. 53(2): 35–44.
- Cotty, P.J. (1990). Effect of atoxigenic strains of *Aspergillus flavus* on aflatoxin contamination of developing cottonseed. *Plant Disease* 74: 233–235.
- Copping, L.G. and Menn, J.J. (2000). Biopesticides: a review of their action, applications and efficacy. *Pest Manag Sci.*, 56: 651–676.
- Elashafie, A.E.; Al-Rashdi, T.A.; Al-Bahry, S.N. and Bakheit, C.S. (2002). Fungi and aflatoxins associated with spices in the Sultanate of Oman. *Mycopathologia*, 155(3): 155-160.
- Francisco, D.C.; Freire, O.; Kozakiewicz, Z. and Paterson, R.R.M. (2001). Mycoflora and mycotoxins in Brazilian black pepper, white pepper and Brazil nuts. *Mycopathologia*, 149: 13-19.
- [https://www.researchgate.net/publication/40804879\\_Chemical\\_composition\\_of\\_leaf\\_and\\_seed\\_essential\\_oil\\_of\\_Coriandrum\\_sativum\\_L\\_from\\_Bangladesh](https://www.researchgate.net/publication/40804879_Chemical_composition_of_leaf_and_seed_essential_oil_of_Coriandrum_sativum_L_from_Bangladesh) Anonymous. 2001. Annual Report for 2000-2001. Spices Research Centre, Shibganj, Bogra. P. 37. [krishikosh.egranth.ac.in/bitstream/1/.../5/5.%20Ch.%201%20Introduction](http://krishikosh.egranth.ac.in/bitstream/1/.../5/5.%20Ch.%201%20Introduction)
- [https://www.researchgate.net/scientific-contributions/2087517167\\_B\\_Krka](https://www.researchgate.net/scientific-contributions/2087517167_B_Krka)
- <https://www.sciencedirect.com/science/article/pii/S0308814600002545>
- [https://www.researchgate.net/.../248284472\\_Natural\\_infection\\_of\\_cowpea\\_Vigna\\_ungu...](https://www.researchgate.net/.../248284472_Natural_infection_of_cowpea_Vigna_ungu...)
- <https://www.omicsonline.org/.../detection-of-fungi-infecting-maize-zea-mays-l-seeds-i...>
- Jones, D. (2011). Roach, Peter; Setter, Jane; Esling, John, eds. *Cambridge English Pronouncing Dictionary* (18th ed.). Cambridge University Press. ISBN 978-052-115255-6.
- Jones, D. (2011). Roach, Peter; Setter, Jane; Esling, John, eds. *Cambridge English Pronouncing Dictionary* (18th ed.). Cambridge University Press. ISBN Bruce Smallfield (June 1993). "Coriander – *Coriandrum sativum*". Archived from the original on 4 April 2004
- Jardine, D. (2010). The evolution of seed treatment. *Phytopathol News* 47: 22 (2013).
- Buffington, B. and Gaul, A. Category 4, Seed treatment, in *Iowa Commercial Pesticide Applicator Manual*, Kansas State University, Manhattan, KS, p. 40.
- Khan, T.N. (1976). Papua New Guinea; A centre of genetic diversity in winged bean (*Psophocarpus tetragonolobus* (L.) DC.) *Euphytica* 25 : 693-706.
- Lal, C.B. and Raizada, B.S. (1975). Report of some fungi from some of the condiments of daily use in storage. *Def. Soil. J.*25: 159-161.
- Lewis, C. (2012). T. "coriandrum". *A Latin Dictionary*. "Coriander (*Coriandrum sativum*)". Gernot Katzer Spice Pages. Retrieved 1 July 2018.
- Lanzotti, V. (2006). The analysis of onion and garlic. *J Chromatogr A* 1112: 3–22.
- Mandeel, Q.A. (2004). Fungal contamination of some imported spices. *Mycopathologia*, 159: 291- 298.
- Magnoli, C.E.; Astoreca, A.L.; Chiacchiera, S.M. and Dalcero, A.M. (2007). Occurrence of ochratoxin A and ochratoxigenic mycoflora in corn and corn based foods and feeds in some South American countries. *Mycopathologia*, 163: 249-260.
- McGee, H. (2010). "Cilantro Haters, It's Not Your Fault". *The New York Times*. Retrieved 24 July 2012. Some people may be genetically predisposed to dislike cilantro, according to often-cited studies by Charles J. Wysocki of the Monell Chemical Senses Center in Philadelphia.
- Miller, T. and Quenard, R.S. (1987). Cone and seed disease of North American conifers. *North American Forestry Commission*. Pub. 1. Victoria, British Columbia, Canada. 77 p.
- Nelson, E.B. (2004). Microbial dynamics and interactions in the spermosphere. *Annu Rev Phytopathol* 42: 271–309.
- Panchal, V.H. and Dhale, D.A. (2011). Isolation of seed-borne fungi of sorghum (*Sorghum vulgare* pers.) *J Phytol.*, 3: 45–48.
- Pathak, N. and Zaidi, R.K. (2013). Studies on seed-borne fungi of wheat in seed health testing programme. *Archives of Phytopathology and Plant Protection*, 46: 389- 401.
- Walters, D.; Walsh, D.; Newton, A. and Lyon, G. (2005). Induced resistance for plant disease control: maximizing the efficacy of resistance elicitors. *Phytopathology* 95:1368–1373.