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# Study of Associated Fungal Pathogens on Seeds of *Eruca sativa* Mill., (Gargeer)

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## ABSTRACT

The aim of the present study is to identification and classification of different associated fungi from the seeds of *Eruca sativa*. Total 10 species of fungal pathogens belonging to 7 genera are isolated from the Saudi (Ss) and Indian seeds of *Eruca sativa*. Saudi seeds affected by the fungal pathogens namely, *A. niger, A. flavus, A fumigates, Mucor spp., Pencillium spp*., while Indian seeds affected by *Aspergillus niger, A. flavus, A. fumigates, Aspergillus terreus, Pencillium spp., Mucor spp., Rhizopus stolonifer, Humicola insolens, Colletotrichum gloeosporioides, Fusarium oxysporum***.** However, many of the soil borne or seed borne associated fungal pathogens spread the diseases in plants as well as in human beings. So the present study reveals that, the proper identification of fungal pathogens and their symptoms are easily recognized. Then the prevention care could be taken during the agriculture and high yield produced before the spread of symptoms and diseases.


**Key words:** *Aspergillus spp., Eruca sativa*, Fungal pathogens, Gargeer, *Pencillium spp*.

## INTRODUCTION

*Eruca sativa* plant is belonging to Brassicaceae family. It is a dark green annual plant, about 20 to 50 cm in height, with a spicy-pungent taste (Morales and Janick, 2002). Since times immemorial, the rocket plant has been used as source of nutrition and medicine for various diseases (Yaniv *et al.,* 1998). Rocket is used as salad vegetable in many developing countries. It is used for high content of phytochemicals such as flavonoids and glycosinolates which treat the cancer disease. Rocket is also used as medicine for diabetes, anti ulcer, aphrodisiac, treatment of eye infection and other uses (Gunther, 1968; Gomez-Campo, 1980; Jin *et al.,* 2009; Ambrosone and Tang, 2009). *Eruca sativa* is grown in India, the state of Rajasthan, Gujarat and Haryana. Rajasthan cultivated about an area of 26,746 ha with an annual production of 10,033 tones. Seeds are used for making oil and oilcake (Anonymous, 2002). However the present study reveals that, the occurrence of associated fungal pathogens during the cultivation from sowing to harvest, storage, marketed, transports of seeds, leaves or any part of the plant. So, associated mycoflora of *Eruca sativa* seeds were isolated, identified and characterized for further use.

## MATERIALS AND METHODS

### Collection of seeds sample

*Eruca sativa* seeds sample are collected from Saudi Arabia on 14 September 2018 and named as Saudi seeds (Ss). These Saudi seeds are cultivated in the open field Department of Botany, Gulbarga University, Kalabuagi. Then, *Eruca sativa* seeds are harvested on 20 March 2018 and named as Indian seeds (Is). From both seeds, the experiments of isolation, identification and classification of different associated fungi were carried out in Mycology and Plant Pathology Laboratory, Department of Botany, Gulbarga University, Kalabuagi.

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### Inoculation and Isolation

Isolation of associated fungi from the Saudi seeds (Ss) and Indian seeds (Is) of *Eruca sativa* are carried out based on method of Samson *et al.* (2010). Seeds samples were initially subjected to surface sterilization with absolute ethanol and rinsed two to three times with sterile distilled water and excess water on the sample were mopped by using sterile filter paper. The seeds samples were incubated by standard blotter technique in 9mm Petri plate at room temperature for 5-7 days and observed daily.

### Identification and Classification of fungi

Then mounting and identification of fungal pathogens was done by using cotton blue and observe under Stereo microscope with reference of Barnett and Hunter, (1992). Afterward the fungi transfer into the PDA media to obtain colony of pure culture. Classification of fungi based on the micro morphological and macro morphological character of

color, shape and size of colonies, spores, conidia and setae (if present) were recorded. The front and reverse colony pure cultures photography was done after 7 days and microscopic photos taken by stereomicroscope.

## RESULTS AND DISCUSSION

During the study, 10 petriplates of Saudi (Ss) and 10 petriplates Indian seeds of *Eruca sativa* were inoculated 100 seeds of each plates on PDA medium. Total 10 species of fungal pathogens belonging to 7 genera were isolated from the Saudi (Ss) and Indian seeds of *Eruca sativa*. Indian seeds affected by the fungal pathogens namely - *Aspergillus niger, A. flavus, A. fumigates, Aspergillus terreus, Pencillium sp., Mucor sp., Rhizopus stolonifer, Humicola insolens, Colletotrichum gloeosporioides, Fusarium oxysporum*. While Saudi seeds affected by *A. niger, A. flavus , A fumigates , Mucor sp., Pencillium sp*., During the study, some species were present only in Indian seeds such as *Aspergillus terreus, Rhizopus stolonifer, Humicola insolens, Colletotrichum gloeosporioides* and *Fusarium oxysporum* and other species observed on both seeds of *Eruca sativa* (Table 1). Identification and classification of fungi were record based on the micro morphological and macro morphological character. The microscopic spores or conidial structures, shape was observed by stereomicroscope. The front and reverse colony pure cultures photography was taken after 7 days (Fig 1).

Seven pathogenic fungi were isolated from infected parts of vegetables of Turmeric, Potato, Pumpkin, Cabbage and Lady's finger from the Mantha taluka of Jalna district. The fungal isolates were *C. capsici, Phytopthora infestans, F. oxysporum, F. moniliforme, Taphrina maculans, Alternaria alternata* and *A. solani* (Pawar and Nasreen, 2016). Some pathogenic fungi are completely depending on the environmental factors for their survival. Soil borne fungal pathogens can live on for long time in soil and plant debris. *Fusarium* wilt is one of the strong inoculums stay several weeks in soil (Higgins *et al.,* 2007; Katan, 1971; Nelson, 1981). One hundred thirteen pathogens were isolated from 24 samples of cereals such as couscous, macaroni, wheat

**Table 1:** Frequency of occurrence of fungal pathogens on Indian seeds (IS) and Saudi seeds (SS) of *Eruca sativa.*

| Name of associated Fungi | Indian seeds (IS) | Saudi seeds (SS) |
|---|---|---|
| *Aspergillus niger,* | + | + |
| *A. flavus* | + | + |
| *A. fumigates,* | + | + |
| *Aspergillus terreus,* | + | - |
| *Pencillium spp.,* | + | + |
| *Mucor spp.,* | + | + |
| *Rhizopus stolonifer,* | + | - |
| *Humicola insolens,* | + | - |
| *Colletotrichum gloeosporioides* | + | - |
| *Fusarium oxysporum* | + | - |

Note: (+) presence, (-) absent.




**Fig 1:** Some photographs of front and reverse colony features on PDA medium after 7 days with microscopic features on both Saudi and Indian seeds of *Eruca sativa.*

flour and rice from the local markets of West of Tripoli, Libya. Overall, 113 species pathogens belonging to 9 genera *viz., Penicillium, Aspergillus, Fusarium, Alternaria, Paecilomyces, Rhizopus, Mucor, Cladosporium* and *Scopulariopsis* were identified (Alkenz *et al.,* 2015). Influence of thermophilic fungi *Humicola insolens* strain IBKF-519 stimulated the growth of some mushrooms *viz., A. bitorquis, A. bisporus* and *A. brasiliensis* (Bilay and Ivashchenko, 2011). Total 212 fungal pathogens were identified from 13 weed plants of wide geographical region of Turkey. Eight *Fusarium spp.,* were isolated from dicotyledonous plants based on the morphological characters (Hacer Handan Altinok, 2013). Saprolegnia parasitica, Saprolegnia diclina and S. ferax of pathogenic fungi were most common in the ponds of stagnant water than the running water (Avdhesh Kumar *et al.,* 2017). *Fusarium oxysporum* f.sp. *albedinis* (Foa), fungal pathogen is identified on the date palm (*Phoenix dactylifera* L.) in Morocco and Algeria. *Fusarium oxysporum* f.sp. *albedinis* cause the Bayoud disease and which leads to high loss in date palm (Mezouari *et al.,* 2019). The soil borne pathogens *Trichoderma sp.* eight isolates were collected from different locations of clusterbean (*Cyamopsis*

*tetragonoloba* L.) fields in western Rajasthan During the antagonistic study in the laboratory found 70 per cent of inhibition of mycelial growth of different clusterbean pathogen *viz*., *Macrophomina phaseolina, Fusarium oxysporum, Sclerotinia sclerotiorum* (Anand Kumar *et al.,* 2016). However, the great diversity of fungal study was recorded from the review paper. So, there is the need to investigate the different associated fungi present in the seeds and plant parts to control the diseases.

## CONCLUSION

The present study reveals that, to isolation and identification of different associated fungi from the seeds of *Eruca sativa*. Total 10 species of fungal pathogens belonging to 7 genera were isolated from the Saudi (Ss) and Indian seeds of *Eruca sativa*. However, the seed borne fungi are occurs at the post harvest stage, storage or other transport period. Most of the fungi are pathogenic to produce mycotoxins which are harmful to the plants and human beings cause various diseases. Some soil borne or seed borne fungal pathogens spread the infection. So the study reveals that, the proper identification of fungal pathogens and their symptoms are easily recognized. Then the prevention care could be taken before the spread of symptoms and diseases. During the agricultural practices it prevents contamination in the spread of pathogens from anthropogenic activities.

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