In vitro study of Eruca sativa Mill., seeds in Kalaburagi region, Karnataka, India

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Abstract
Eruca sativa Mill., a plant belonging to family Brassicaceae commonly used as salad vegetable. The cultivation of Eruca sativa plant has most of the Mediterranean countries. Since ancient time Eruca sativa is used for medicinal and commercial plant. It has highest nutrients and minerals. The present study reveals that the germination of Eruca sativa seeds on medium by vitro condition. It shows that there is good germination short interval of harvested seeds than the long day stored seeds.

Keywords: In vitro, Seeds, PDA medium, Eruca sativa, Kalaburagi

1. Introduction
Eruca sativa is an endemic species of the Brassicaceae family which produced mostly in Mediterranean countries such as Italy, Greece and Turkey. The common name of Eruca sativa is of various Viz., Rocket, Gergeer, Jarjeer, Taramera, etc., It is a dark green annual plant, about 20 to 50 cm in height, with a spicy-pungent taste [1, 2]. Since ancient times, the rocket plant has been a source of nutrition, an aphrodisiac and a medical plant, and has other uses [3]. The study of Eruca sativa seeds germination and affected fungi determined in this experiment.

2. Materials and methods
Kalaburagi is a semi-arid region of the Deccan plateau of north-eastern district of Karnataka. Gulbarga University (17°18'46.62"N, 76°52'27.32"E) situated 10km away from the city. The experimental field is located at Department of Botany, Gulbarga University, Kalaburagi. Eruca sativa seeds sample were collected from Saudi Arabia. These Saudi seeds were cultivated in the open field department of Botany, Gulbarga University, Kalaburagi. After the harvest of the Eruca sativa, the newly seeds were named as Indian seeds. From both seeds, the experiments of study of germination of seeds on PDA medium was carried out in Mycology and Plant pathology laboratory, department of Botany, Gulbarga University, Kalaburagi. Saudi seeds and Indian seeds of Eruca sativa samples were initially subjected to surface sterilization with absolute sterile distilled water. The seeds samples were incubated in Petri plate on PDA medium at room temperature for 5–7 days and observed daily. Then, calculate the number of germination of seeds at 3rd day and 5th day of experiment and observed the fungi affected on seeds during the experiment.

3. Results and Discussion
An experiment was conducted on both Indian and Saudi seeds on PDA medium. Total 100 seeds of Saudi and 100 seeds of Indian selected to incubate on 10 Petri plates of 20 seeds per plate. The germination data are record every 24 hours of interval then find out the mean value on 3rd and 5th day. After 5th day, the complete growth of pathogens in the petriplate observed. The number of germination in Indian seeds and Saudi seeds are 66% and 28% and affected by fungi on 20 and 18 seeds on 3rd day of observation. Whereas, the germinated of Indian seeds and Saudi seeds are 24% and 18 % and affected by fungi on 79 and 99 seeds at 5th day. Aspergillus niger, A. flavus, A. fumigates, Pencillium sp., Neurospora sp., fungi are associated, with Indian seeds and A. niger, A. flavus, A fumigates, Mucor sp., Pencillium sp., with Saudi seeds (Table 1 & 2). So, it shows that, the gradually decreased in seed germination and loss of seed viability by affecting the different fungi.
The review of literature shows that, the seed germination is one of the biological processes most sensitive to stress conditions particularly salt stress. For chromosomal study of Rocket, the seeds were germinated on moist filter paper in Petri dishes kept in the dark at room temperature [4], Taramira seeds can be stored at room temperature for two seasons and it maintains the population structure by lessening generation interval [5]. The leaves of *Eruca sativa* used as salad and medicines for stimulant, stomachic, diuretic, and antiscorbutic activity [6]. Tissue culture techniques of genetic improvement, the *Eruca sativa* cultivars are grows from seeds or transplants. Seeds are sown 0.5 to 1 cm deep in rows 15 to 20 cm apart. Soaking of seeds of *E. sativa* in water for 6 h and then sowing in the evenings for improved germination [7]. The mucilaginous seeds of *E. sativa* used as biocontrol agent for the larvae of the insect Culex quinquefasciatus and Aedes aegypti [8]. The seed mucilage of *E. sativa* plant was described to have great potential as a commercial hydrocolloid in food industry [9]. The nutrient elements in *Eruca sativa* was found as 4.32% N, 0.25% P, 5.13% K, 2.95% Ca, 0.58% Mg, 799.88 mgkg-1Na, 350 mgkg-1 Fe, 5.36 mgkg-1Cu, 40.58 mgkg-1 Mn and 64.86 mgkg-1 Zn [10]. The present paper tried to study the germination of seeds in laboratory conditions. So, the comparative study of Indian and Saudi *Eruca sativa* seeds was reported by *in vitro* condition during this experiment.

### Table 1: The description of number of seeds germination and affected fungi on PDA media

| Plate No. | No. of seeds incubated on PDA | Indian seeds (IS) | Saudi seeds (SS) |
|-----------|-------------------------------|-------------------|-----------------|
|           | Total germination | Total effect of seeds by fungi | Name of associated Fungi | Total germination | Total effect of seeds by fungi | Name of associated Fungi |
| 1         | 20 | 16 | 3 | A. niger, Neurospora sp. | 5 | 2 | A. niger, Pencillium sp. |
| 2         | 20 | 11 | 8 | A. niger, A. fumigates, | 7 | 5 | A. niger, A. fumigates, Mucor sp. |
| 3         | 20 | 12 | 2 | A. flavus, Mucor | 3 | 5 | A. niger, Pencillium sp. |
| 4         | 20 | 17 | 1 | A. niger, | 5 | 3 | A. niger, |
| 5         | 20 | 10 | 6 | A. niger, Pencillium sp. | 8 | 3 | A. fumigates, |
| Total     | 100% | 66% | 20 seeds | 28% | 18 seeds |

### Table 2: The description of number of seeds germination and affected fungi on PDA media

| Plate no. | No. of seeds incubated on PDA | Indian seeds (IS) | Saudi seeds (SS) |
|-----------|-------------------------------|-------------------|-----------------|
|           | Total germination | Total effect of seeds by fungi | Name of associated Fungi | Total germination | Total effect of seeds by fungi | Name of associated Fungi |
| 1         | 20 | 5 | 20 | A. niger, Pencillium sp. | 5 | 20 | A. flavus, A. niger, Pencillium sp. |
| 2         | 20 | 3 | 17 | A. niger, A. fumigates, Mucor | 2 | 19 | A. niger, A. fumigates, Mucor sp. |
| 3         | 20 | 6 | 13 | A. fumigates | 4 | 20 | A. niger, |
| 4         | 20 | 4 | 14 | Mucor sp. | 5 | 20 | A. niger, Neurospora sp. |
| 5         | 20 | 6 | 15 | Neurospora sp. | 2 | 20 | A. niger, Mucor sp. |
| Total     | 100% | 24% | 79 seeds | 18% | 99 seeds |

### 4. Conclusion

The experiment proves that, the germination of *Eruca sativa* seeds on PDA medium grows on increase and less affected by fungi after the immediate harvest. But, the seeds are less germinated and high affected by fungi during more interval of time. So it indicates loses the vigor in seeds of *Eruca sativa* at long time from harvest.

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