Available online at www.pelagiaresearchlibrary.com

Pelagia Research Library

European Journal of Experimental Biology, 2014, 4(5): 138-142

ISSN: 2248 –9215
CODEN (USA): EJEBAU

Effect of plant leaf extract on fungal diseases of carrot in spore germination

Pramod Kumar Singh, Vikash Pandey, Harendra Singh and D. N. Shukla

Bhargava Agricultural (Plant Pathology) Laboratory, Department of Botany, University of Allahabad, Allahabad, Uttar Pradesh, India

---

ABSTRACT

The present investigation with deals effect of leaf extract in spore germination of some major fungal diseases of Daucus carota in vitro condition. Leaf extracts use of Strychnos nux-vomica I, Allium cepa, Azadirachta indica, Occimum sanctum and Allium sativum, 50, 75 and 100 ppm concentration antifungal activity against of different fungi in root vegetable viz. Alternaria dauci, A.radicina, Botrytis cinerea, Cercospora carotae, and Sclerotium rolfsii.

INTRODUCTION

The carrot (*Daucus carota* L.) belongs to the family Apiaceae. The Carrot plant is a biennial crop and requires 14 months to complete its life cycle in a "seed-to-seed" production system, i.e. it grows vegetative in the first season and produces seed in the second. For root production the plant is grown as an annual. Integrated Fungal Disease Management Programme emphasis the use of eco-friendly cost effective and easily available components like plant extracts for control of fungal disease and reduces the use of chemical fungicides (Gaikwad *et al.* 2014).

Germination of fungal spores is essentially a process during which the normal metabolic and physiological activity is restored after dormancy. "Germination is the process by which a spore is transformed from a dormant state of low metabolic activity done of high metabolic activities [3]. Formation of the germ tube is the out ward and visible sign that the metabolic change is complete". He further stated that an alternation should be brought in the conventional concept that absorption of water with consequent swelling of the spores, causing the cell wall to rupter the formation of germ tube. In fact it is a multifactorial phenomenon. Antifungal property of several plant extracts has been reported by various workers [8], [6], [1]. Mode of spore germination and effect of various factors viz. effect of nutrients, pH, fungicides and leaf extracts of various Indian medicinal plants on spore germination was studied hanging drop technique [4].

The present study reports the effects of different plant leaf extracts on fungal disease spores germination of carrot *viz; Strychnos nux-vomica* I, *Allium cepa*, *Azadirachta indica*, *Occimum sanctum* and *Allium sativum* against fungal pathogens of carrote like *viz; Alternaria dauci*, *A.radicina*, *Botrytis cinerea*, *Cercospora carotae*, and *Sclerotium rolfsii* caused by some important fungal disease in carrot Alternaria leaf blight, Black rot (black carrot root dieback), Watery soft rot, Cercospora leaf spot, Southern blight.

MATERIALS AND METHODS

Plant collection

The plants were collected from the non-irrigated cultivated lands in and around Allahabad (district), Uttar Pradesh. Plants species such extract *Strychnos nux-vomica I, Allium cepa, Azadirachta indica, Occimum sanctum* and *Allium sativu*m were collected from Department of Botany, University of Allahabad Uttar Pradesh for the study.

Sterilization of Plant Materials

The disease free and fresh plants were selected. About 2g of fresh and health leaves were taken for each solvent extraction. They were washed with distilled water for three times. Then surface sterilized with 0.1% mercuric chloride for 20 seconds. Again the leaves were washed thoroughly with distilled water (three times).

Preparation of Plant Extracts

Two grams of sterilized plant leaves were kept in the 10ml organic solvents such as methanol and ethanol. Then grounded well with the help of mortar and pestle. The plant materials were subjected to centrifugation, for 10-15 min (at 10000 rpm) again it was filtered through Whatman No.1 Filter paper. The supernatant was collected and made to known volume, by adding sterile distilled water concentration percentage *viz.* 50, 75,100 stored for further antimicrobial screening purpose.

Microbial Cultures and Growth Conditions

The plant extracts were assayed in the Bhargava Agriculture Laboratory, Department of Botany, University of Allahabad, Allahabad for antifungal activity against the fungal strain *Alternaria dauci, A.radicina, Botrytis cinerea, Cercospora carotae,* and *Sclerotium rolfsii*. This fungus was grown on PDA plate at 28°C and maintained with periodic sub-culturing at 4°C.

Potato Dextrose Agar [PDA] Medium [pH – 6.7]

Potato - 250g, Dextrose - 15g, Agar - 18g, Distilled water – 1000 ml.

The potato tubers were peeled off and weighed for about 250g tubers were chopped in to small pieces in to the sterile conical flask. After boiling the supernatant were collected and dextrose (15g) with agar (18g) to dissolve the ingredients. The medium was mentioned and adjusted to 6.5 pH. Finally the medium was sterilized in autoclave for 20 min.

RESULTS AND DISCUSSION

The effect of leaf-extract of various plants on spore germination is presented in table-1. Three types of concentration 50 ppm, 75 ppm and 100 ppm was used to test the spore germinate on seed of *Daucus carota*. There were 100 seeds used to carry out this test.

Table-1Test of spore germination on seed of carrot (*Daucus carota* L.) by various plant leaf extract

Leaf-extract	Concentration	*Alternaria dauci*	*A.radicina*	*Botrytis cinerea*	*Cercospora carotae*	*Sclerotium rolfsii*
Strychnos nux-vomica Linn.	50	45	55	45	40	55
	75	35	40	35	30	35
	100	00	03	02	05	05
Allium cepa L.	50	50	45	35	55	45
	75	35	30	30	40	35
	100	00	03	05	05	03
Azadirachta indica A.Juss.	50	05	04	20	10	15
	75	00	02	02	00	03
	100	00	00	00	00	00
Occimum sanctum L.	50	55	40	35	45	40
	75	35	30	20	20	20
	100	15	13	05	15	10
Allium sativum L.	50	06	05	07	10	10
	75	04	05	05	03	02
	100	00	00	00	00	00
Control	00	90	80	92	85	90

Figure-1

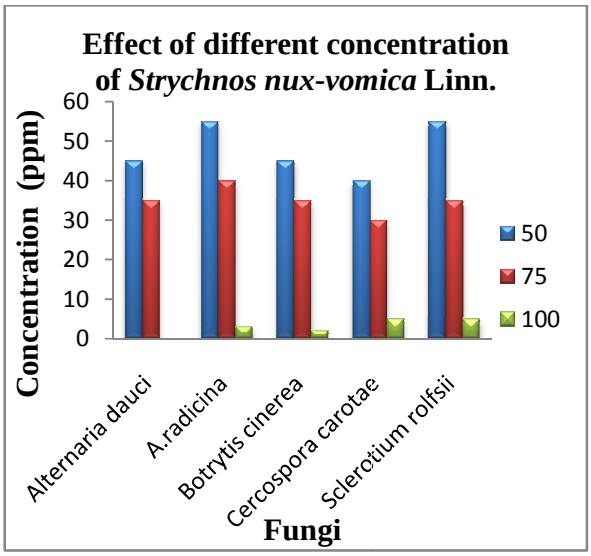


Figure-2

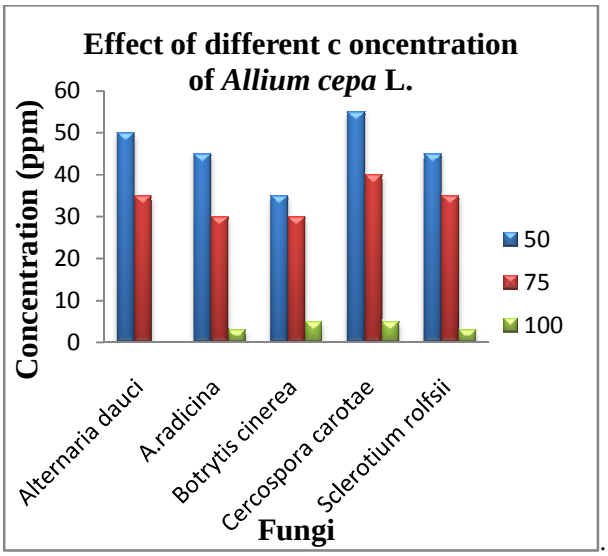


Figure-3

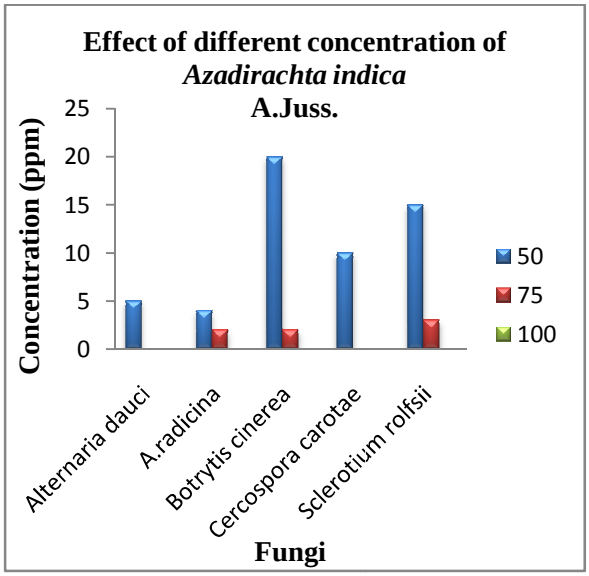
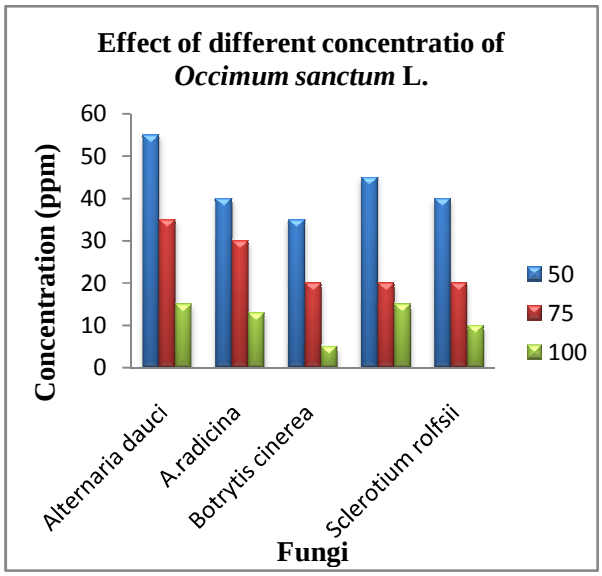


Figure-4

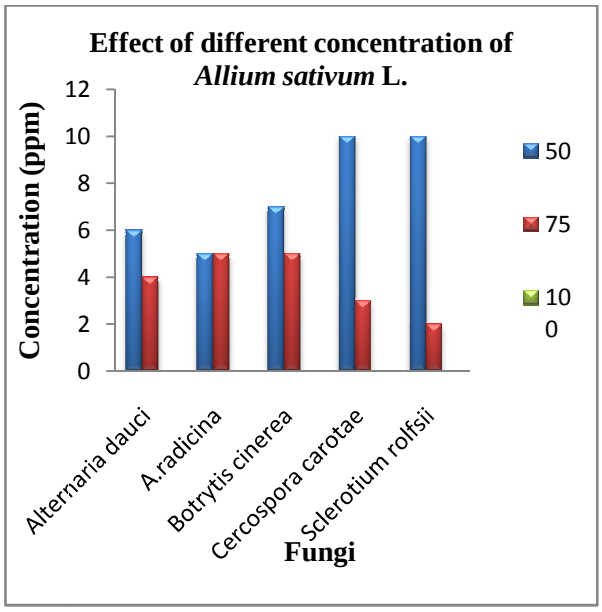


When the leaf-extract taken from *Strychnos nux-vomica* on 50 ppm concentration 45 spores of *Alternaria dauci*, 55 spores of *A.radicina*, 45 spores *Botrytis cinerea*, 40 spores *Cercospora carotae* and 55 spore of *Sclerotium rolfsii* were found. On 75 ppm concentration 35 spore of *Alternaria dauci*, 40 spores of *A.radicina*, 35 spores *Botrytis cinerea*, 30 spores *Cercospora carotae*, and 35 spore of *Sclerotium rolfsii* were found. On 100 ppm concentration no spore of *Alternaria dauci*, 03 spores of *A.radicina*, 02 spores *Botrytis cinerea*, 05 spore *Cercospora carotae* and 05 spore of *Sclerotium rolfsii* were found (figure-1).

When the leaf-extract from *Allium cepa* on 50 ppm concentration 50 spores of *Alternaria dauci*, 45 spores of *A.radicina*, 35 spores *Botrytis cinerea*, 55 spores *Cercospora carotae*, and 45 spore of *Sclerotium rolfsii* were found. On 75 ppm concentration 35 spore of *Alternaria dauci*, 30 spores of *A.radicina*, 30 spores *Botrytis cinerea*, 40 spores *Cercospora carotae* and 35 spore of *Sclerotium rolfsii* were found. On 100 ppm concentration no spore of *Alternaria dauci*, 03 spores of *A.radicina*, 05 spores *Botrytis cinerea*, 05 spore *Cercospora carotae*, and 03 spore of

Sclerotium rolfsii were found (figure-2). When the leaf-extract from *Azadirachta indica* on 50 ppm concentration 05 spores of *Alternaria dauci*, 04 spores of *A.radicina*, 20 spore *Botrytis cinerea*, 10 spore *Cercospora carotae*, and 15 spore of *Sclerotium rolfsii* were found. On 75 ppm concentration no spore of *Alternaria dauci*, 02 spores of *A.radicina*, 02 spores *Botrytis cinerea*, no spore *Cercospora carotae* and 03 spore of *Sclerotium rolfsii* were found. When was used on 100 ppm concentration there is no spore was found with any fungi (figure-3).

Figure -5



When the leaf-extract from *Occimum sanctum.* On 50 ppm concentration 55 spores of *Alternaria dauci*, 40 spores of *A.radicina*, 35 spores *Botrytis cinerea*, 45 spore *Cercospora carotae* and 40 spore of *Sclerotium rolfsii* were found. On 75 ppm concentration 35 spore of *Alternaria dauci*, 30 spores of *A.radicina*, *20* spores *Botrytis cinerea*, 20 spores *Cercospora carotae* and 20 spore of *Sclerotium rolfsii* were found. On 100 ppm concentration 15 spore of *Alternaria dauci*, 13 spores of *A.radicina*, 05 spores *Botrytis cinerea*, 15 spores *Cercospora carotae* and 10 spore of *Sclerotium rolfsii* were found (figure-4). When the leaf-extract from *Allium sativum*. On 50 ppm concentration 06 spores of *Alternaria dauci*, 05 spores of *A.radicina*, 07 spores *Botrytis cinerea*, 10 spore *Cercospora carotae* and 10 spore of *Sclerotium rolfsii* were found. On 75 ppm concentration 04 spore of *Alternaria dauci*, 05 spores of *A.radicina*, 05 spores *Botrytis cineream*, 03 spore *Cercospora carotae* and 02 spore of *Sclerotium rolfsii* were found. When was used on 100 ppm concentration there is no spore was found with any fungi (figure-5).

Different workers investigated the effect of leaf extract of various medicinal plants on spores germination of pathogenic fungi. The tried leaf extract of *Melia azadirachta*, *Ocimum santum* and *Allium sativum* against 41 species of pathogen fungi out of which *Curvularia penniseti* and *Helminthosporium* spp. were found unable to germinate on *Melia* and *Ocimum* leaf extract [8]. Reported complete inhibition of spore germination of *C. lunata* and *H. graminicola* in leaf extract of *Melia* and *Ocimum* respectively [6]. They have also reported similar observations for the fungi studied by them [5]. Leaf extract of some medicinal plants which were found effective during spore germination were also tried for controlling the wilt of plants at the seedling stage [7],[9],[2].

REFERENCES

[1] Bhargava, S.N., Pandey, R.S., and Shukla D.N., **1981**, *National Academy Science Latter*, 4: 277.
[2] Dwivedi, B.P. and Shukla, D. N., **2000**. *Karnataka J. Agric. Sci*., 13(1): 153-154.
[3] Gottlieb, D., **1964**, *Endeavour*, 23: 85-89.
[4] Hofman , H., **1860**, *Journal of Swiss Botany*, 2: 267-337.
[5] Khanna , K.K. and Chandra, S., **1972** Antifungal activity in some plant extracts. *Proceeding of the National Academy of Science, India*, 42 (B): 300-302.

[6] Mishra, S.B., Mishra, R.R. and Dixit, S.N., **1974**. Antifungal spectrum of some plant extracts. *Proceeding of the National Academy of Sciences*, India, 44 (B): 174
[7] Mishra, K.P., **1992**, Studies on pathogenic fungi of fruit trees. *D. Phil. Thesis*, University of Allahabad, Allahabad.
[8] Sekhawat, P. S., and Prasad, R., **1971**. *Indian Phytopathology*, 24: 800-802.
[9] Shukla, D. N., **2000**, Biological relationship and effect of environmental factors on disease development of pulses and oil crops. D. Sc. Thesis, University of Allahabad, Allahabad.