RESEARCH ARTICLE

Effect of petroleum ether extract of different plant parts on seed mycoflora and seed health (seed germination, shoot length and root length) of Green gram (*Vigna radiata* L.) by blotter method

Kandhare Ashok S

K.M.C. College, Khopoli.
Email: ashokkandhare@gmail.com

Manuscript details:

Available online on
http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Kandhare Ashok S (2015) Effect of petroleum ether extract of different plant parts on seed mycoflora and seed health (seed germination, shoot length and root length) of Green gram (*Vigna radiata* L.) by blotter method, *Int. J. of Life Sciences,* Special Issue, A5: 100-104.

ABSTRACT

Green gram (*Vigna radiata* L.) is affected by seventeen seed-borne fungi. These fungi case adverse effects on seed health and yield. Application of synthetic fungicides causes damage to consumers and environment. Therefore, petroleum ether plant part extracts of locally available plants are tried to control seed mycoflora of the pulse. Almost all plant extracts showed restrictive effect on seed mycoflora of the test pulse. Significant plants that controlled seed mycoflora in higher percents are *Azadirachta indica* A. Juss., *Cyperus rotundus* L., *Ocimum basilicum* L., *O. americanum* L., *O. sanctum* etc.

Keywords: seed mycoflora, pulses, plant extracts.

INTRODUCTION

Green gram (*Vigna radiata* L.) is important pulse crop in Maharashtra, it is affected by different fungal pathogens as seed mycoflora which is harmful to seed health, seed content and ultimately to yield. Association of the fungi with the seed has found to be harmful to the seed health and seed content. Total seventeen seed-borne fungi (*Alternaria tenuis*, *A. alternate, Aspergillus carbonarius, A. flavus, A. niger, A. nidulans, A. fumigatus, Cladosporium spp., Colletotrichum truncatum, Chaetomium globosum, Curvularia lunata, Drechslera tetramera, Fusarium moniliforme, Fusarium oxysporum, Penicillium spp., Rhizopus stolonifer, Macrophomina phaseolina*) were isolated from the test pulse, on Agar plates and Moist blotters. Agar plates showed more fungal incidence compared to Moist blotters. Among seventeen fungi isolated and identified, six dominant fungi *Aspergillus flavus, A. fumigatus, A. niger, Drechslera tetramera, Fusarium oxysporum* and *Rhizopus stolonifer* taken for the study. These six dominant seed-borne fungi of Green gram were tested against plant extracts of eighteen commonly and locally available plants.

MATERIALS AND METHODS

Preparation of petroleum ether plant extracts:
Five g powder of each of the plant parts was dissolved separately in mixture of 50 ml petroleum ether and 50 ml distilled water; in 250 ml borosil glass conical flasks. The flasks were kept in oven (Metlab) for 24 hours at 60oC and the content was filtered through Whatman filter paper No.1. The filtrates were used as 5% plant extracts.

Evaluation of seed mycoflora and seed health (seed germination, seedling emergence, shoot, and root length) of pulse.
During present studies, the seeds of Green gram were soaked separately in the leaf, stem, and root petroleum ether extracts (petroleum ether and water 1:1) of the selected plants for 24 hours. The effect of extracts on seed health was studied by placing seeds of test pulse on moist blotter plates and incubated for ten days at room temperature. On eleventh day percent seed mycoflora, seed germination, root and shoot length was recorded. The seeds soaked in sterile distilled water served as control.

For seedling emergence, seeds of Green gram were treated as mentioned above and sown in earthen pots containing sterilized soil for ten days; at room temperature. On eleventh day percent, seedling emergence, root, and shoot length was recorded. The seeds soaked in sterile distilled water served as control.

RESULTS AND DISCUSSION

Three plant parts like leaf, stem, and root were used in the experiments. Extracts prepared from leaf of most of the test plants were found more effective against seed mycoflora and stimulatory for seed germination, seedling emergence, shoot and root length of the test pulse. It is evident from the tabulated results that, plant extract of all test plants showed inhibitory effect on seed mycoflora and supporting or stimulating seed germination, shoot and root length of test pulse, with few exceptions. The plants that caused maximum reduction in seed mycoflora were Ocimum basilicum L. (leaf 9 %, stem 10 %), *Ocimum americanum* L. (stem 10 %, root 10 %, and leaf 15 %), *Azadirachta indica* A. Juss (leaf 10 %, stem 20 %, and root 30 %) and *Cyperus rotundus* L. (leaf 10 % and rhizome 30 %). Plants like *Samania saman* (Jacq.) Merr. (root 60 %, leaf 50 % and stem 50 %), *Melingtonia hortensis* (root 60 % and stem 50 %) and *Croton tiglium* L. (stem 50 %) were found to be less effective in controlling seed mycoflora of test pulse.

Enhanced seed germination and stimulatory effect was reported in plant extract of *Ocimum basilicum* L. (leaf 100 %, stem 100 % and root 100 %), *Ocimum sanctum* L. (leaf 100 %, stem 100 % and root 80 %), *Azadirachta indica* A. Juss (leaf 100 %, stem 80% and root 90 %) etc. Seed germination was inhibited due to the extracts of *Ruelia tuberosa* L. (leaf 20 %) and *Acorus calamus* L. (rhizome 50 % and leaf 60%). Root length was maximum due to *Acorus calamus* L. (rhizome 6.7 cm); *Ocimum basilicum* L. (leaf 6.6 cm and root 6.4 cm) and *Croton tiglium* L. (stem 6.3 cm). Root length was suppressed due to *Tagetis erecta* L. (root 2 cm). In majority of the cases there was less growth in shoot length over the control except in few cases like *Ciba pentandra* (stem 4.7 cm), *Ocimum basilicum* L. (stem 4.6 cm) and Ocimum sanctum L. (root 5 cm) and it was at par with control in *Cyperus rotundus* L. (leaf 4.6 cm).

The plant extracts of *Ocimum sanctum* L., *O. americanum* L., *O. basilicum* L., *Azadirachta indica* A. Juss, *Cyperus rotundus* L., *Eucalyptus lanceolatus*, *Ruelia tuberosa* L. etc. reduced seed mycoflora and stimulated seed germination, seedling emergence, shoot and root lengths of pulses in variable degrees. The results also suggest that, none of the test plant extracts could completely inhibited seed mycoflora and plants like *Samania saman* (Jacq.) Merr., *Melingtonia hortensis*, *Tagetis erecta* L. were less effective on seed mycoflora and seed health as well.

Table 1: Effect of petroleum ether extract (petroleum ether and water 1:1) of different plant parts on Seed mycoflora and seed health (seed germination, shoot, and root length) of Green gram (*Vigna radiata* L.) on blotters (after ten days of incubation).

Sr. No	Source plant	50% petroleum ether + 5gm powder	Seed mycoflora (%)	Seed germination (SG)		
				SG (%)	RL(cm)	SL(cm)
1	*Acorus calamus* L.	Leaf	30	60	5.8	2.7
		Rhizome	40	50	6.7	05
2	*Adenanthera pavonia* L.	Leaf	20	60	3.1	2.1
		Stem	40	70	4.1	4.4
		Root	50	100	5.3	4.5
3	*Azadirachta indica* A. Juss.	Leaf	10	100	5.1	3.2
		Stem	20	80	5.6	3.1
		Root	30	90	5.2	4.1
4	*Butea monosperma* (Lam.) Taub.	Leaf	40	70	5.8	03
		Stem	30	90	5.5	4.1
		Root	20	100	5.6	4.5
5	*Carum copticum* Benth & Hook. f.	Leaf	42	90	5.5	3.1
		Stem	20	100	5.2	02
		Root	30	80	4.2	3.3
6	*Ciba pentandra*	Leaf	17	100	5.1	04
		Stem	21	80	06	4.7
		Root	20	90	5.3	3.1
7	*Croton tiglium* L.	Leaf	30	100	5.3	2.2
		Stem	50	90	6.3	4.3
		Root	40	90	5.6	3.8
8	*Cyperus rotundus* L.	Leaf	10	100	5.8	4.6
		Rhizome	30	70	5.2	3.3
9	*Eucalyptus globulus*. Labill.	Leaf	10	100	05	04
		Stem	10	80	4.5	3.3
		Root	20	90	5.1	4.2
10	*Melingtonia hortensis*	Leaf	42	90	05	4.2
		Stem	50	100	5.3	4.3
		Root	60	80	5.3	4.2
11	*Muntangia calabura* L.	Leaf	36	90	06	05
		Stem	20	90	5.1	4.2
		Root	20	80	5.2	03
12	*Murraya koinigii* (L.) Spreng.	Leaf	40	100	06	2.3
		Stem	27	60	04	2.9
		Root	28	100	5.6	4.3
13	*Ocimum basilicum* L.	Leaf	09	100	6.6	4.2
		Stem	10	100	06	4.7
		Root	30	100	6.4	4.1
14	*Ocimum americanum* L.	Leaf	15	80	5.3	4.1
		Stem	10	90	5.2	4.3
		Root	10	100	5.5	3.2
15	*Ocimum sanctum* L.	Leaf	20	100	06	3.1
		Stem	30	100	06	4.2
		Root	40	80	5.7	05

Table 1: Continued…

Sr. No	Source plant	50% petroleum ether + 5gm powder	Seed mycoflora (%)	Seed germination (SG)		
16	*Ruelia tuberosa* L.	Leaf	38	30	4.3	3.3
		Stem	30	90	3.6	3.1
		Root	40	60	4.2	3.3
17	*Samania saman* (Jacq.) Merr.	Leaf	50	100	5.3	3.2
		Stem	50	90	03	2.9
		Root	60	70	5.1	4.2
18	*Tagetis erecta* L.	Leaf	34	60	05	4.2
		Stem	30	100	5.3	4.3
		Root	40	90	02	03
19	Control	Sterile distilled water	60	70	05	4.6

RL – Root length; SL – Shoot length; SG- Seed germination

Similar findings were recorded on different crops by various workers like Gomati et al. (2000), Ahmed and Aquil (2003), Patni et al. (2005), Oana Rosa-Casian et al. (2007) and Duraipandiyan and Ignacimuthu (2007). Umer et.al. (2014) studied Antifungal potential of twenty antagonistic plants was assessed against the most damaging phytopathogenic fungus Macrophomina phaseolina. All the test plants inhibited the growth of *M. phaseolina* significantly to varying levels. Arshad javed et.al (2012) studied antifungal potential of an allelopathic grass *Sorghum halepense* Pers. for the management of *M. phaseolina* isolated from charcoal rot infected cowpea plants. In laboratory bioassays, different concentrations (0, 0.5, 1.0, 3.0 g/ml) of methanolic extracts of shoot, root and inflorescence of the test grass were evaluated for their in vitro antifungal activity against *M. phaseolina*. Extracts of all the three parts of the grass exhibited variable antifungal activity. Emad M. El-Kholie et.al. (2012) shown antifungal effects of ehanolic and methanolic extracts of *Azadirachta* on different fungi. Manoorkar et.al. (2015) reported antifungal effect of ethanol and aqueous extracts of leaf & latex of *Calatropis procera* (Ait.) against ten seed-borne dominant fungi viz., *Curvularia lunata*, *Alternaria alternata*, *Rhizoctonia solani*, *Fusarium solani*, *Penicillium chrysogenum*, *Aspergillus niger*, *A. flavus*, *A. terrus A. fumigatus*, and *Rhizopus* sp were effective. Zakaria et.al. (2015) found that ethanolic extracts of *Datura strumanium*, *Mentha longifolia* and *Malva parviflora* were effective against *Alternaria alternata*, *Botrytis cinerea*, and *Penicillium italicum*.

CONCLUSION

Out of the 15 different powdered samples, four samples were selected for phytochemical analysis because they occur commonly in the selected area. Out of these selected samples, *Ganoderma* is used as folk medicine whereas *Daedalea* is a common wood inhabiting fungus. One of the shop samples was also selected for phytochemical analysis due to its medicinal importance. The results of phytochemical analysis indicated the presence of amino acids like leucine, phynelalnine, and tryptophan in all five samples. The *Ganoderma* samples having brownish colour with a sweet and pleasant odour showed the presence of terpenoids. The *Daedalea* samples having a cream-yellow colour with a sweet odour

showed the presence of sugar alcohol s like mannitol. All samples showed the presence of polyphenols which on hydrolysis formed catechol and salicylic acid. The presence of organic acids like citric, malic, succinic and tartaric acid was also detected. The results of chemical analysis showed that in the *Ganoderma* samples and the shop sample, the values of amino acids, polyphenols and mannitol were close to each other indicating similarities in their active ingredients. Out of 35 species of wood rotting fungi, five samples were analysed. This indicates that there is enough potential for further studies.

REFERENCES

Ahmad I and Aqil F (2003) Broad-spectrum antibacterial and antifungal activities and potency of crude alcoholic extract and fractions of *Delonix regia* flowers. second world congress on "Biotechnological developments of herbal medicine" NBRI, Lucknow, Up, India. page.74, February 20-22.

Arshad Javaid, Syeda Fakehha Naqvi and Amna Shoaib (2012) Antifungal activity of methanolic extracts of *sorghum halepense* against *macrophomina phaseolina*. *Journal of Medicinal Plants Research*, 6(24), pp.4102-4106.

Duraipandiyan V and Ignacimuthu S (2007) Antibacterial and antifungal activity of C*assia fistula*: an ethno-medicinal plant. Ethno-pharmacological communication.

Emad M. El-kholie, Mohammed A, Abdelreheem T and Seham A Khader (2012) *Azadirachta indica* extracts influenced some pathogenic fungi. *African Journal of Microbiology Research*, 6(27): 5645-5649.

Gomati VH, Chitra and Kannabiran B (2000) Changes in antifungal activity of leaf extracts extracted under a range of physico-chemical conditions. proc. 87th indian sci. cong. part iii abst. bot. pp.8.

Manoorkar VB, Mandge SV and Gachande BD (2015) Antifungal activity of leaf and latex extracts of *calatropis procera* (ait.) against dominant seed-borne storage fungi of some oil seeds. Bioscience discovery, 6(1):22-26. http://jbsd.in.

Oana Rosca-Casian, Marcel Parvu, Laurian Vlase and Mircea Tamas (2007) Antifungal activity of *Aloe vera* leaves. *Fitoterapia*, 78(3): 219-222.

Patni, CS, Kolte, SJ and Awasthi RP (2005) Efficacy of botanicals against *Alternaria* blight (*Alternaria brassicae*) of mustard. *Indian Phytopath*., 58 (4): 426-430.

Umer Iqbal, Tariq Mukhtar, Sheikh Muhammad Iqbal (2014) I*n vitro* and *in vivo* evaluation of antifungal activities of some antagonistic plants against charcoal rot causing fungus *Macrophomina phaseolina. Pak. J. Agri. Sci*., 51(3), 689-694.

Zakaria AM Baka, Mamdouh S Serag and Mohamed I Abodobara (2015) Antifungal activity of medicinal plant extracts against the predominant fungi causing spoilage of some fruits collected from markets of Egypt. *Life sciences leaflets*, 69:1-10.