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# RESEARCH

## POTENTIALITY OF SOME PLANT EXTRACTS AS PRETREATMENT OF SEED PRIOR TO STORAGE IN REDUCING FUNGAL INFECTION

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**Abstract:** Experiments were carried out to ascertain the potentiality of some plant extracts as pre-treatment of seeds in controlling fungal infection during storage. Based on the encouraging results of the in-vitro as well as pottrials conducted in author's laboratory, ethanolic leaf extracts of *Vitex negundo, Mimosa pudica, Piper beetle* and *Alamanda cathartica* were tested on mustard seeds prior to control. Seedling emergence (germination %) was studied after one month as well as one year of storage of treated seeds. Results indicated that the leaf extracts of *Piper beetle* and *Alamanda cathartica* were quite effective in controlling fungal infection as the germination percentage were higher than the control. Further investigations on other seeds were also needed to exploit the potentiality of these plant extracts.

**Keywords:** Fungal infection, Mustard, Plant extracts, Seed germination

### INTRODUCTION

Mustard (*Brassica campestris* L.) is widely grown oilseed crop in India which suffers from various fungal diseases. Crop loss between 30-100% due to these diseases has been reported. Efforts have been and are still being made to control the disease by developing resistance in the host. In absence of resistant-sources, the farmers have been using foliar fungicides specially chemicals that provoke environmental pollution.

Seed treatment is the mixing, coating or soaking of protectants or chemicals, hormones, nutrients, non growth regulators into seeds. They are exposed to a variety of energy (radiation, heat, electricity) in order to repel pests and other insects that attack seeds or seedlings. Controlling pests while the seed is storage and after it has been sown / planted is also part of seed treatment. Various factors directly influence seed physiological potential, including storage conditions, which are fundamental for maintaining viability and vigor. This is significantly affected by initial seed physiological quality, seed water content, relative humidity, temperature action of microorganisms and insects and storage period.

Antifungal activity of some isolated principles from plant extracts may be more effectual than some commercial synthetic fungicides. Now-a-days some synthetic as well as semi-synthetic antimicrobial agents have been developing, among which very few have broad spectrum activity and most of them are environmentally hazardous in nature. The extensive use of agrochemicals especially fungicides, resulted more carcinogenic risk than other pesticides, which may give rise to undesirable biological effects on animals and human beings (Osman and Abdulrahman, 2003).

Sood and Dohroo (2003), while studying the efficacy of 16 plant extracts in controlling the leaf spot in ginger caused by *Phyllostica zingiberis* found that growth inhibition of fungi increased with increasing concentration of extracts. Pretorius *et al*. (2003) studied extracts of 26 plant species against *Colletotrichum* sp. and *Rizhoctonia solani* among other pathogenic fungi. In reference to *S. scelerotiorum* as specific pathogenic fungi, study was carried out by Das and Das (2006). They screened 12 angiospermic plants extracts in and around the same locality of Sonitpur district. Out of these six plants extracts *Mikania scandence, Eupatorium odoratum, Cassia sophera, Leucus plunketii, Occimum basilicum* and *Clitoria ternate* were found effective in total inhibition of mycelial growth of *S. scelerotiorum.*

Based on the encouraging results of the *in-vitro* trials as well as field trials conducted so far, it has been planned to conduct a series of experiments to ascertain the potentiality of antifungal plant extracts as pretreatment of seeds in controlling fungal infection during storage as well as in field condition while cultivating. The pretreatment method may be useful in controlling those pathogens that come in contact with the seeds, particularly the seed borne and soil borne fungi, as they may fail to infect the seed due to antifungal coating. Therefore, this study was

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planned to find out the effectiveness of plant extracts as pre-treatment of seeds of mustard prior to storage in controlling the fungal infection. The treated seeds would be stored for different duration and to be grown in field.

## MATERIALS AND METHODS

Seeds were grown periodically after a storage period of 1 month, 3 months, 6 months and 1 year to evaluate the extracts in restraining their efficacy to control. Seeds were collected from the farmers of different localities which are not coated with any fungicides. These seeds were mixed to form a composite sample, washed and surface sterilized by soaking in 70% ethanol for 5 minutes. The seeds were dipped in the test extracts separately for 60 minutes and allowed to air dry in room temperature. The treated seeds were packeted separately and stored in room temperature.

Four plant extracts, namely *Vitex negundo, Mimosa pudica, Piper beetle* and *Alamanda calhartica* at two different concentrations (100% and 50%) were used to study the efficacy. Pots were filled with sterilized soil and then inoculated with *S. sclerotium* 2% (w/w) and allowed to establish in the soil for 7 days prior to sowing of seeds. 20 treated seeds were sown in each pot. Data were recorded from the 1st day of sowing to 9th day.

## RESULTS AND DISCUSSION

The mustard seeds showed a variation in germination percentage which are previously treated with plant extracts of *Vitex negundo, Mimosa pudica, Piper beetle* and *Alamanda cathartica*. Seeds showed variation in germination at two different concentrations (i.e. 100% and 50% concentration).

After 1 month of storage of treated seeds, 100% concentration of *Vitex negundo, Mimosa pudica, Piper beetle* and *Alamanda cathartica* showed 47.05%, 11.74%, 05.88%, 17.64% of germination respectively whereas in the 50% concentration of *Vitex negundo, Mimosa pudica, Piper beetle* and *Alamanda cathartica* showed 64.70%, 35.29%, 23.52% and 35.29% germination respectively.

After 1 year of storage of treated seeds, 100% concentration of *Vitex negundo, Mimosa pudica, Piper beetle* and *Alamanda cathartica* showed 40%, 70%, 75%, 65% germination respectively. Similarly, 50% concentration of *Vitex negundo, Mimosa pudica, Piper beetle* and *Alamanda cathartica* showed 25%, 50%, 55% and 50% germination respectively. 100% concentration of *Mimosa pudica, Piper beetle* and *Alamanda cathartica* were quite effective in sustaining capability of enhancing the germination and seedling growth.

The results of this study illustrated that the leaf extract of *Vitex negundo* show antifungal properties justifies its use as a medicinal plant. The inhibition of the growth of the pathogenic fungi is due to the active ingredients predominantly found in the plant (Shetty *et al*., 1989). The present studys are in line with the investigations carried out by other workers (Sarvamangala *et al*., 1993).

**Table 1.** Effect of plant extracts on mustard seedlings emergence after 1month storage of treated seeds

| Treatment/(20 seeds/pot) | Conc. | | No. of seedling emerged (Day) | | | | | | | | G% | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (%) | 1 | | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | |
| 1.Inoculated | 0 | | 0 | 1 | 1 | 3 | 3 | 4 | 5 | 5 | 25.0 | 70.59 |
| Control | | | | | | | | | | | | |
| 2.Uninoculated | 0 | | 4 | 6 | 9 | 11 | 13 | 16 | 17 | 17 | 85.0 | - |
| Control | | | | | | | | | | | | |
| 3.*Vitex negundo* | 100 | 0 | 0 | 1 | 2 | 4 | 6 | 7 | 9 | 9 | 45.0 | 47.05 |
| | 50 | 0 | 0 | 1 | 1 | 1 | 3 | 5 | 6 | 6 | 30.0 | 64.70 |
| 4.*Mimosa pudica* | 100 | 0 | 0 | 4 | 8 | 10 | 13 | 14 | 15 | 15 | 75.0 | 11.74 |
| | 50 | 0 | 0 | 0 | 4 | 7 | 8 | 10 | 11 | 11 | 55.0 | 35.29 |
| 5.*Piper beetle* | 100 | 0 | 0 | 4 | 7 | 9 | 11 | 14 | 16 | 16 | 80.0 | 05.88 |
| | 50 | 0 | 0 | 2 | 3 | 6 | 8 | 13 | 13 | 13 | 65.0 | 23.52 |
| 6.*Alamanda cathartica* | 100 | 0 | 0 | 2 | 4 | 7 | 11 | 12 | 14 | 14 | 70.0 | 17.64 |
| | | | | | | | | | | | | |
| | 50 | | 0 | 0 | 4 | 6 | 9 | 10 | 11 | 11 | 55.0 | |
| G%: Germination percentage | | | | | | | PD: Percent difference with control | | | | | |

**Table 2.** Effect of plant extracts on mustard seedlings after1year storage of treated seeds

| Treatment/(20 seeds/pot) | Conc. | No. of seedling emerged (Day) | | | | | | | | G% | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | |
| 1.Inoculated | 0 | 0 | 1 | 1 | 2 | 3 | 3 | 4 | 4 | 20.0 | 75.00 |
| Control<br>2.Uninoculated | 0 | 4 | 5 | 8 | 10 | 12 | 14 | 16 | 16 | 80.0 | - |
| Control | | | | | | | | | | | |
| 3.*Vitex negundo* 100 | 0 | 0 | 1 | 2 | 4 | 6 | 7 | 8 | 8 | 40.0 | 50.00 |
| 50 | 0 | 0 | 1 | 1 | 1 | 3 | 4 | 5 | 5 | 25.0 | 68.75 |
| 4.*Mimosa pudica* 100 | 0 | 0 | 4 | 7 | 9 | 12 | 12 | 14 | 14 | 70.0 | 12.50 |
| 50 | 0 | 0 | 0 | 4 | 6 | 8 | 9 | 10 | 10 | 50.0 | 37.50 |
| 5.*Piper beetle* 100 | 0 | 0 | 4 | 6 | 8 | 11 | 13 | 15 | 15 | 75.0 | 06.25 |
| 50 | 0 | 0 | 2 | 3 | 5 | 7 | 10 | 11 | 11 | 55.0 | 31.25 |
| 6 *Alamanda cathartica* 100 | 0 | 0 | 2 | 4 | 6 | 11 | 12 | 13 | 13 | 65.0 | 18.75 |
| 50 | 0 | 0 | 3 | 4 | 5 | 7 | 9 | 10 | 10 | 50.0 | 37.50 |

G%: Germination percentage PD: Percent difference with control

**Fig. 1** Pot trial after 1month storage of treated seeds

**Fig. 2** Pot trial after 1year storage of treated seeds

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