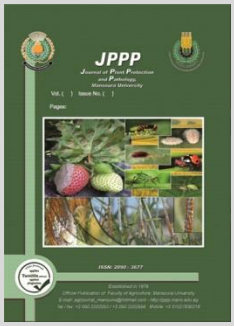
Journal of Plant Protection and Pathology

Journal homepage: www.jppp.mans.edu.eg
Available online at: www.jppp.journals.ekb.eg

Effect of some Botanical Fungicide and Chemicals As Forest Seed Dressing on Quality of The Seeds

Shler Hassan Mahmood* and Jalal Hama Salih Ismael*

Department of Horticulture, College of Agricultural Engineering Sciences, University of Sulaimani, Sulaimani, Kurdistan region, Iraq



ABSTRACT

An experiment was conducted to study the antifungal activity of different concentrations aqueous extracts from three local plants, *Hypericum triquetrifolium, Salix alba, Salvia rosmarinus* and also different concentrations of fungicide (Captan) and Salicylic acid were evaluated for their efficacy as seed dressing on Catalpa and Albizia that seeds were soaked separately for 30 mints in various concentrations of aqueous extract and fungicide. Forest seeds were grown in pots which were inoculated by *Sclerotinia sclerotiorum* and *Fusarium oxysporum* that one petri plate/pot in 2018 in a greenhouse at the University of Sulaimani, College of Agricultural Sciences Engineering. The results showed that seed germination percentage, shoot length, root length and number of leaves was significantly ($p \leq 0.05$) increased with all the treatments. Captan (0.5%) was more effective in comparison with Captan (0.3%) and seed germination, shoot length, root length and number of leaves was gradually increased with increase of the doses of fungicides. It can be suggested that fungicide Captan have antifungal effect and can be used to treat seed against seed borne pathogens of forest, increase seed germination and shoot length, root length and number of leaves.

Keywords: Seed, Botanical, Chemical, Fungicide, Quality

INTRODUCTION

Seed is the essential input in agriculture (Ntare *et al*, 2008). Seed truth is an important factor in the control of diseases, since an infected seed is less viable, has low germination (Van Gastel, 1996). Plants produce many secondary metabolites which constitute a vital source of microbicides, pesticides and many pharmaceutical drugs. (Bobbarala *et al.*, 2009). Plant extracts have significant roles in the inhibition of seed-borne pathogens, in the improvement of seed quality (Patel *et al*., 2007). Plants are wealthy in a wide variety of secondary metabolites such as, essential oils, tannins, terpenoides, alkaloids, flavonoid, saponins and phenolic compounds which have been found *in vitro* to have antimicrobial properties extracts of numerous plants are presently known and exhibit antimicrobial activity (Dewanje *et al.*, 2007 and Rani *et al*., 2008). Although plant-based pesticides are cheap, locally available, non-toxic and easily biodegradable, limited efforts have been made to screen plants that are suspected to possess antimicrobial properties for effect against pathogenic microorganisms. Higher plants may contain secondary compounds that could effectively control plant diseases, but which are yet to be exploited and used as pesticides. (Nduagu *et al*., 2008). Several fungicides have been recommended for control of seed-borne fungi Chemical methods of disease management can affect the beneficial microbial population present in the ecosystem. Natural plant extracts important sources of new agrochemicals and non-selective pesticides for control of plant diseases (Tripathi and Dubey 2004).

The present investigation was undertaken to evaluate the efficacy of botanical fungicide and chemicals as forest seed dressing on germination, shoot length, root length and number of leaves.

MATERIALS AND METHODS

Isolation and Identification fungi

All seed samples were pre-treated with sodium hypochlorite 1% solution for 5 minutes then washed three times with sterilized distilled water and dried between tow filter papers. The seed samples were then plated in the sterilized glass Petri-dishes on potato dextrose agar medium (PDA). The plates were incubated for seven days at 270C. The fungi associated with forest seed have been diagnosed to the species level depending on the morphological characteristics of developing colonies in dishes, conidia and conidiophores were diagnosed by using to the taxonomic basis approved and use taxonomic keys and microscopic examinations contained in (Barnet and Hunter, 1999). Fungi identified and their percentage frequency (PF) of occurrence was calculated by applying the following formula: = (No. of the colonies (for each fungus)/ Total No. of all fungal colonies) X 100.

Collection of botanical fungicide materials

Mature plants of *Hypericum triquetrifolium, Salix alba* and *Salvia rosmarinus* collected from different areas of Sulaimani. Plant species and parts used in the study are presented in Table 1.

* **Corresponding author.**
E-mail address: shler.mahmood@univsul.edu.iq & jalal.ismael@univsul.edu.iq
DOI: 10.21608/jppp.2020.124893

Table 1. Plants that were used for antifungal activities assay

English name	Scientific name	Family	Part Used*
John`s wart	*Hypericum triquetrifolium*	Hypericaceae	F+L+S+R
Willow tree	*Salix alba*	Salicaceae	L
Rosemary	*Salvia rosmarinus*	Lamiaceae	L+S

*** Part Used: F= Flower, L= Leaf, S= Stem, R= Root**

Preparation of botanical fungicide and chemical

Plant spread on to the cardboard carton in the shade to air dry indoors at ambient temperature and then cut into small pieces and later preserved 4ºC. Extract concentrations of 5% and 10% were prepared by dissolving 50g, 100g of powder *Hypericum triquetrifolium*, *Salix alba* and *Salvia rosmarinus* in 1 liter of distilled water for 24hour, extract was filtered using filter paper. Aqueous Captan solution of 0.3% and 0.5% were prepared by dissolving 3g and 5g of powder in1 liter of distilled water. Aqueous Salicylic acid solution of 0.05% and 0.1% were prepared by dissolving 0.5g and 1g of powder in 1 liter of distilled water.

Seed dressing

Seed of two forests, Albizia and Catalpa were obtained from Sulimani in May 2018. Seeds were treated by dipping them separately in different concentrations of aqueous 30 minutes. The following concentrations; %5 and %10 for *Hypericum triquetrifolium*, *Salix alba* and *Salvia rosmarinus*. Seeds were soaked Captan solutions in 0.3% and 0.5%. Seeds were soaked Salicylic acid solutions in 0.05% and 0.1% and the same time as the treatment with plant extracts with untreated seeds (seeds soaked in distilled water).

Potted experiment:

Isolation of Sclerotinia *sclerotiorum* and *Fusarium oxysporum* was propagated on PDA at 27°C, pots (15cm) contained 3kg sterilized soil were inoculated by one petri plate / pot,

except of control without fungi was prepared by sterilized soil only. The pots watered, and after two days of resting and bioactivities of the fungi from 5 seed/ pot were planted which were treatment by plant extract and fungicide. Percentage seed germination, Shoot length, Root length, and Number of leaves were evaluated three months after sowing.

Statistical analysis

Statistical Analysis for this research was conducted designed by simple CRD, and Duncan's Multiple Range test was used to separate means at the level of significance $P<0.05$.

RESULTS AND DISCUSSION

1. Isolation and identification:

Four different fungal were isolated and identified as *Aspergillus flavus*, *Sclerotinia sclerotiorum*, *Fusarium oxysporum.*, *Penicillium* sp. It was observed in Table (2). The highest frequency of *Sclerotinia sclerotiorum* (46.67%) was isolated of Albizia in Rania followed by *Penicillium* sp. (33.33%) of Catalpa while the lowest frequency was isolated of *Aspergillus flavus* and *Fusarium oxysporum* (20%) of Albizia and Catalpa. The results also corroborate this of Khan and Bhutta, 1994 who reported the occurrence of *Aspergillus*, *Penicillium* and *Fusarium* spp. were common associates of seeds crops.

Table 2. Percentage of frequency of fungi isolated from seeds forest.

location	Seed forest	Scientific name	Fungi	% Frequency
Rania	Albizia	*Albizia lebbeck*	*Aspergillus flavus*	20.00
			Sclerotinia sclerotiorum	46.67
Dokan	Catalpa	*Catalpa bignonioides*	*Penicillium* sp.	33.33
			Fusarium oxysporum	20.00

2. Effect of some botanical fungicide and chemical on Albizia

Results on the effect of seed treatment with aqueous plant extracts on seed germination; shoot length, root length, Number of leaves in Table 3. Seed germination of Albizia was highly influenced by the fungicide used. Albizza seeds treated with Captan at 0.5% gave the highest germination percentage (86.6), followed by those treated with Captan at 0.3% and control without fungi, Salicylic acid at 0.1% and Salix at 10% respectively, It is naturally produced from the salicylic substance found in the bark of the willow tree (Mauch-Mani and Metraux, 1998) . The lowest germination percentage was recorded in control with fungi. This result is in conformity with the findings of Mahal, (2014) who observed Seed germination percentage was significantly ($p\leq0.05$) increased with both the treatments. Captan (1.2%) was more viable in comparison with Dithane M-45 (1.4%) and seed germination (%) was steadily expanded increment of the measurements of fungicides. Albizia seeds treated with Captan at 0.5% gave the highest Shoot length, followed by those treated with Captan at 0.3%, Salicylic acid at (0.05% and 0.1%) respectively since Salicylic acid may be characteristic phenolic compound contain monohydroxybenzoic acid with para position of OH-group (Huang *et al*.,2009) that have inhibitory impact on microbial which the reason to toxic effect on fungus (Abad *et al*.,2007). Albizza seeds treated with Captan at 0.5% gave the highest Root length, followed by those treated with Captan at 0.3%, Salicylic acid (0.05% and 0.1%) respectively, because Salicylic acid is a phenolic compound and endogenous phytohormone that plays an important role in plant growth and development (Farahbakhsh, 2012). The lowest germination percentage was recorded in control with fungi. Albizia seeds treated with Captan at 5% gave the highest number of leaves, followed by those treated with Captan at 3 %, Salicylic at (0.05% and 0.1%) respectively. The lowest germination percentage was recorded in control with fungi.

Table 3. Effect of some chemical and botanical fungicide as seed dressing on Albizia seed germination; shoot length, root length and Number of leaves

Treatments (%)	Germination rate (%)	Shoot length (cm)	Root length (cm)	Number of plant leaves
Rosemary extract 5%	53.2 c	14.56 ef	3.73 de	11.00 e
Rosemary extract 10%	66.6 bc	15.63 e	4.30 c	11.33 de
Salix extract 5%	60 bc	14.56 ef	3.500 e	11.33 de
Salix extract 10%	73.2 abc	15.56 e	4.10 cd	12.33 cd
Hypericum extract 5%	53.2 c	13.46 g	3.66 de	12.33 cd
Hypericum extract 10%	66.6 bc	14.33 f	4.06 cd	12.66 bc
Salicylic acid 0.5 g/L	66.6 bc	20.33 d	5.16 b	12.66 bc
Salicylic acid 1 g/L	73.2 abc	23.30 c	5.83 a	13.66 b
Captan Aria 50% WP 3g/kg	80.0 ab	39.50 b	5.83 a	16.33 a
Captan Aria 50% WP 5 g/kg	86.6 a	40.53 a	6.03 a	17.33 a
Control without fungi	80.0 ab	14.33 f	3.66 de	10.33 e
Control with fungi	26.6 d	7.06 h	2.300 f	4.66 f

- Columns followed by different letters are significantly different according to Duncan's Multiple Test (P≤0.05).
-- Each number is the average of three replicates.
--- The soils in all treatments were sterilized and then contaminated with the fungus *Sclerotinia sclerotiorum* (one petri plate / pot).

3. Effect of some botanical fungicide and chemical on Catalpa

Results on the effect of seed treatment with aqueous plant extracts on seed germination; shoot length, root length, Number of leaves in Table 3. Seed germination of Catalpa was highly influenced by the fungicide used. Catalpa seeds treated with Captan at 0.5% gave the highest germination percentage (80.0), followed by those treated with Captan at 0.3%, Control without fungi, Salicylic acid at 0.1%. The lowest germination percentage was recorded in control with fungi. In similar observation, Singh *et al*. (2002) reported that Captan, Dithane M-45, Vitavax, Bavistin were effective in control of *Fusarium* spp. on mungbean. Catalpa seeds treated with Captan at 0.5% gave the highest Shoot length, followed by those treated with Captan at 0.3% and Salicylic acid at 0.1%. Catalpa seeds treated with Captan at 0.5% gave the highest Root length, followed by those treated with Captan at 0.3%, Salicylic acid at (0.05% and 0.1%) respectively because Salicylic acid could be a phenolic compound containing a hydroxyl bunch and is synthesized by plants (Chandra and Bhatt, 1998). Phenolics have been found to have several capacities. They work in lignin biosynthesis, regulation of plant responses to a biotic stimulus, function in pigmentation, development, reproduction, resistance to pathogens (Hayat *et al*., 2007). The lowest germination percentage was recorded in control with fungi. Catalpa seeds treated with Captan at (0.5% and 0.3%) respectively gave the highest number of leaves, followed by those treated with Salicylic at (0.05% and 0.1%) respectively.

The lowest germination percentage was recorded in control with fungi. Fungicides such captan and thiram that were registered for control of Fusarium root rot in the green- house are not effective on crops such as cucumber (Kathryne *et al*., 2014).

Table 4. Effect of some chemical and botanical fungicide as seed dressing on Catalpa seed germination shoot length, root length and Number of leaves

Treatments	Germination rate (%)	Shoot length (cm)	Root length (cm)	Number of plant leaves
Rosemary extract 5%	53.20 bc	3.83 ef	2.20 e	7.33 e
Rosemary extract 10%	60.00 abc	4.16 ef	2.53 de	8.33 cd
Salix extract 5%	53.20 bc	4.50 def	2.40 de	7.67 de
Salix extract 10%	66.60 abc	4.90 cde	2.80 cd	8.66 c
Hypericum extract 5%	53.20 bc	4.50 def	2.56 de	7.67 de
Hypericum extract 10%	66.60 abc	5.16 cd	2.50 de	8.66 c
Salicylic acid 0.5 g/L	60.00 abc	5.33 cd	3.16 bc	10.33 b
Salicylic acid 1 g/L	66.60 abc	5.66 bc	3.43 b	11.00 b
Captan Aria 50% WP 3 g/kg	73.20 ab	6.43 b	3.60 b	12.33 a
Captan Aria 50% WP 5 g/kg	80.00 a	7.36 a	4.20 a	12.66 a
Control without fungi	73.20 ab	3.73 fg	2.10 e	7.00 e
Control with fungi	26.6 c	3.06 g	1.23 f	5.33 f

- Columns followed by different letters are significantly different according to Duncan's Multiple Test (P≤0.05).
-- Each number is the average of three replicates.
--- The soils in all treatments were sterilized and then contaminated with the fungus *Fusarium oxysporum* (one petri plate/pot).

CONCLUSION

The result of the present investigation revealed that seed dressing with different chemicals will be helpful to prevent germination failure. Among different seed treating agents, captan and salicylic acid has been proven as the best seed treating agent in controlling different seed borne fungi which is considered as effective disease management strategy. Also, the authors suggest testing the activity of *Hypericum triquetrifolium*, *Salix alba*, *Salvia rosmarinus* with other solvents.

REFERENCES

Abad, M. J., Ansuategui, M., & Bermejo, P. (2007). Active antifungal substances from natural sources. *Arkivoc*, *7*(11), 6-145.

Barnett, H. L. (1999). *Illustrated genera of imperfect fungi. by HL Barnett and Barry B. Hunter* (No. QK625. A1. B3713 3A ED.). Burgess. Minneapolis, Minnesota. 1972.3. ed..

Bobbarala, V., Katikala, P. K., Naidu, K. C., & Penumajji, S. (2009). Antifungal activity of selected plant extracts against phytopathogenic fungi Aspergillus niger F2723. *Indian Journal of Science and Technology*, *2*(4), 87-90.

Chandra, A., & Bhatt, R. K. (1998). Biochemical and physiological response to salicylic acid in relation to the systemic acquired resistance. *Photosynthetica*, *35*(2), 255-258.

Dewanje, S., M. Kundu, A. Maiti, R. Majumdar; A. Majumdar and S. C. Mandal, (2007). In Vitro Evaluation of Antimicrobial Activity of Raphanus sativus. Pak. J. Bot. 40(4): 1793-1798.

Everts, K. L., Egel, D. S., Langston, D., & Zhou, X. G. (2014). Chemical management of Fusarium wilt of watermelon. *Crop Protection*, *66*, 114-119.

Farahbakhsh, H. (2012). Germination and seedling growth in un-primed and primed seeds of Fenel as affected by reduced water potential induced by NaCl. Inter Res J Appli Basic Sci. 3(4): 737- 744.

Hayat, S., Ali, B., & Ahmad, A. (2007). Salicylic acid: biosynthesis, metabolism and physiological role in plants. In *Salicylic acid: A plant hormone* (pp. 1-14). Springer, Dordrecht.

Huang, W. Y., Cai, Y. Z., & Zhang, Y. (2009). Natural phenolic compounds from medicinal herbs and dietary plants: potential use for cancer prevention. *Nutrition and cancer*, *62*(1), 1-20.

Khan, M. Q., & Bhutta, A. R. (1994). Seed-borne fungi of wheat cultivars in Pakistan. *Pakistan Journal of Scientific and Industrial Research*, *37*(9), 397-398.

Mahal, M. F. (2014). Effects of fungicides and plant extracts on seed germination and seed associated mycoflora of Lens arietinum L. and Lathyrus sativus. *Journal of Bio-Science*, *22*, 101-110.

Mauch-Mani, B., & Métraux, J. P. (1998). Salicylic acid and systemic acquired resistance to pathogen attack. *Annals of Botany*, *82*(5), 535-540.

Nduagu, C., Ekefan, E. J., & Nwankiti, A. O. (2008). Effect of some crude plant extracts on growth of Colletotrichum capsici (Synd) Butler & Bisby, causal agent of pepper anthracnose. *Journal of Applied Biosciences*, *6*(2), 184-190.

Ntare, B. R. Diallo, A. T. & Waliyar, F. (2008). Groundnut seed, production manual. ICRISAT Institute of Crop Research and Technology. pp 1-2.

Patel, S. J., Venugopalan, N., & Pradeep, S. (2007). Screening for antimicrobial activity of weeds. *Int. J. Microbiol*, *4*(1), 50-54.

Rani, I., Akhund, S., & Abro, H. (2008). Antimicrobial potential of seed extract of Raphanus sativus. *Pakistan Journal of Botany*, *40*(4), 1793-1798.

Singh, S. D., Rawal, P., Shekawat, N. S., & Lodha, P. C. (2002). Management of mungbean (Vigna radiata (L.) Wikzek) seed mycoflora by seed dressing fungicides. *J. Mycol. Plant Pathol*, *23*(1), 149.

Tripathi, P., & Dubey, N. K. (2004). Exploitation of natural products as an alternative strategy to control postharvest fungal rotting of fruit and vegetables. *Postharvest biology and Technology*, *32*(3), 235-245.

Van Gastel, A. J. G. V., Pagnatta, M. A. & Porceddu, E. (1996). Seeds Science and Technology, ICARDA, Aleppo, Syria, pp 289–295.

تأثير بعض مبيدات الفطريات النباتية والمواد الكيميائية كعلاج لبذور الغابات على جودة البذور

شليرحسن محمود و جلال حمه صالح اسماعيل

قسم البستنة ، كلية علوم الهندسة الزراعية ، جامعة السليمانية ، السليمانية ، إقليم كوردستان ، العراق

اجريت التجربة لدراسة النشاط المضاد للفطريات لمستخلصات مائية مختلفة من ثلاثة النباتات المحلية هي *Hypericum triquetrifolium* و *Salix alba* و *Salvia rosmarinus* وكذلك تم تقييم تركيزات مختلفة من مبيدات الفطريات (كابتان) وحامض الساليسيليك من حيث فعاليتها كمعاملة للبذور في الكتالبا و الألبيزا أن البذور تنقع بشكل منفصل لمدة 30 دقيقة بتركيزات مختلفة من المستخلص المائي ومبيدات الفطريات. نمت بذور الغابات في أصص التي تم تلقيحها من قبل *Sclerotinia sclerotiorum* و *Fusarium oxysporum* التي طبق واحد / وعاء بتري في عام 2018 في داخل البيت الزجاجي في جامعة السليماني - كلية هندسة العلوم الزراعية. أوضحت النتائج زيادة نسبة إنبات البذور وطول الساق وطول الجذور وعدد الأوراق بشكل معنوى ($p\leq0.05$) مع كل من المعاملات. كان الكابتان (0.5٪) أكثر فعالية مقارنة بالكابتان (0.3٪) وإنبات البذور وطول الساق وطول الجذور وعدد الأوراق زادت تدريجياً مع زيادة جرعات مبيدات الفطريات. يمكن الإشارة إلى أن مبيد الفطريات كابتان له تأثير مضاد للفطريات ويمكن استخدامه لعلاج البذور ضد مسببات الأمراض التي تنقلها البذور في الغابات ، وزيادة إنبات البذور وطول الساق وطول الجذور وعدد الأوراق.