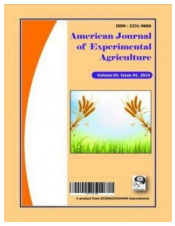

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Effect of Antibiotic and Bio-fungicide for Control of Seed Borne Fungi of Wheat

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Authors' contributions

This work was carried out in collaboration between all authors. All authors read and approved the final manuscript.

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ABSTRACT

The present study aimed to evaluate the effect of antibiotic and bio-fungicide for control of seed borne fungi of wheat during November to April. 2015-2016. In this study, two treatments *viz.* Control, Aureofungin (Antibiotic) with 100 ml water, and *Allium sativum* leaf extract with cow urine (Bio-fungicide) for control of seed borne fungi of wheat, In the pot experiment, The result was obtained as a control 63.20%, and disease incidence of 23.30% which were recorded from *Allium sativum* leaf extract with cow urine (Bio-fungicide) in the Treatment 3 whereas control 47.41% and disease incidence 33.33% were recorded from 4 gm. Aureofungin (Antibiotic) with 100 water in the Treatment 2. In the pots, the control was 68.75%, and as disease incidence 20% which were recorded from *Allium sativum* leaf extract with cow urine (Bio-fungicide) in the Treatment 3 whereas control was 52.09% and disease incidence was 30.66% which were recorded from 4 gm. Aureofungin with 100 ml water (Antibiotic) in the T 3. Bio-fungicide was found to be superior in controlling of seed borne fungi of wheat comparing with antibiotic. A bio-fungicide is composed of beneficial microorganisms, such as specialized fungi that attack and control plant pathogens and the diseases.

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Keywords: Antibiotic; bio-fungicide; seed borne; wheat.

1. INTRODUCTION

Antibiotic, the bio-fungicide produces a chemical compound such as an antibiotic or other toxin that kills the target organism. Because of their specificity of action against plant pathogens, relatively low phytotoxicity, absorption through foliage and systemic translocation and activity in low concentration, the use of antibiotic is becoming very popular and very effectively used in managing several plant diseases.

Antibiotic is defined as the inhibition or destruction of the microorganism by substances such as specific or nonspecific metabolites or by the production of anti-biotic that inhibit the growth of another microorganism [1,2,3,4].

Aureofungin is a systemic antifungal antibiotic research product of H.A. (Hindustan Antibiotic) Ltd. It is the only Antifungal Antibiotic in the market. Aureofungin is used for seed treatment as well as for sprays. It is also used for root application. It is either used alone for fungal diseases control or combined with streptocycline when bacterial diseases control is needed.

Seed-borne diseases can seriously affect yield and quality. The most effective means of control is by exclusion and reduction of the inoculums during seed production [5]. Seed-borne diseases have been found to affect the growth and productivity of crop plants [6,7,8]. Seed-borne mycoflora of wheat reported recently included *Alternaria alternata, Drechslera sorokiniana, Fusarium moniliforme, F. avenaceum, F. graminearum, F. nivale, F. culmorum, F. equiseti, F. sporotirchioides, Cladosporium herbarum, Stemphylium botryosum* [9,10,11].

Bio-fungicide means fungicides of biological origin. It may be microorganisms such as bacteria, fungi and animal or plant based product like secondary metabolite. Indian economy is dependent upon agriculture and agriculture has major problems of fungal diseases. Fungi can cause serious damage in agriculture, resulting in critical losses of yield, quality and profit [12].

The present investigation has been undertaken to the study the effect of antibiotic and bio-fungicide for control of seed borne fungi of wheat with emphasis for further controlling of seed borne fungi using antibiotic and bio-fungicide.

2. MATERIALS AND METHODS

The present studies were carried out at Bhargava Agricultural Botany laboratory, Department of Botany, University of Allahabad, Allahabad**,** Uttar Pradesh, India, during Nov. to April 2015-2016. To evaluate the effect of antibiotic and bio-fungicide in the control of seed borne fungi of wheat.

2.1 Collection of Seed Samples

Seed samples were collected from different seed corporations, companies and farmer's seed lots from two Districts in Allahabad and Varanasi. Then these were properly labeled, kept in polythene bags and stored for further studies in a freezer at 10°C for further studies until ecological testing and other processing [13]. Ten varieties including have been selected, each variety 10 seeds taken in the experiment. Seeds were disinfected with Clorox 1% for 1-2 minutes and then washed three times with distilled water [14].

2.2 Agar Plate Method

Agar plate method [15] as suggested by International Seed Testing Association [16] was used for the isolation of fungi. Seeds were incubated on Agar plates [17]. Potato dextrose agar (PDA) was used for the isolation of mycoflora ten seeds per plate were inoculated and incubated at 22 ± 2°C. After 7 days, incubated seeds were examined under stereo binocular microscope for fungi and then the isolated mycoflora were sub-cultured by single spore technique for macro and microscopic studies.

2.3 Identification of Fungi

Fungal morphology was identified on the basis of colony characteristics and microscopic examinations. Standard books and research papers were consulted during the examination of these fungi [18,19,16]. The fungi were identified with the help of keys, monographs and text provided by several authors [20,21].

2.4 Procedure of Treatments

In the experiment, ten seeds tested with three replications in pot a randomized arrangement and also 100 seeds were tested with three replications in plot. 8 varieties of wheat has been taken as test selected to 3.06 × 2.07 meter plot

Table 1. Isolation of fungi from wheat seed, collected from three sites market seed, Govt. seed storage and farmer seed in Allahabad

Sr. no.	Verity	Market seed	Govt. seed storage	Farmer seed
1	HUW-468	*A. niger,* *A. flavus*	*Penicillium spp.,* *A. flavus*	*A. flavus,* *A. niger*
2	WH - 147	*A. niger,* *A. flavus*	*A. fumigates,* *A. flavus*	*A. niger,* *P. oxalicum*
3	Malavashree (H.I.-8381)	*A. fumigates,* *A. niger*	*A. candidus,* *Penicillium spp.*	*A. fumigates,* *P. oxalicum*
4	Gomati (K -9465)	*P. griseofulvum,* *A. fumigatus*	*A. fumigates,* *P. griseofulvum*	*Mucor spp,* *Penicillium spp.*
5	Prasad (K-8434)	*A. niger,* *F. oxysporum*	*F. oxysporum,* *P. oxalicum*	*Penicillium spp.,* *A. flavus*
6	Malveey-234	*A. flavus,* *A. alternate,* *C. lunata*	*A. niger,* *A. alternata*	*A. niger,* *C. lunata*
7	UP-1109	*A. niger,* *A. ochraceus*	*A. niger,* *A. ochraceus,* *A. candidus*	*A. fumigates,* *A. niger*
8	R.R.-21 (Sonalika)	*A. fumigates,* *A. niger*	*A. flavus,* *A. fumigatus*	*A. flavus,* *A. fumigatus*

** (Seth et al. 2015 [22])*

with plant to plant distance 18 cm as a distance between plants and 23 cm between rows [23]. The treatments were respectively applied:- T_1 = Control, T_2 = 3.500 gm Aureofungin with 100 ml water (Antibiotic) at 4 hours for 100 dipping seeds, T_3 = *Allium sativum* leaf extract with cow urine (Bio-fungicide), the wheat seeds were treated from leaf extract of *Allium sativum* with cow urine, dipping seeds in 1:2 ratio preparations [24]. Control percentage and disease incidence of fungal pathogens was calculated by applying these formulas:-

Control % = (Maximum infected seed – Minimum infected seed / Maximum infected seed) × 100

Disease Incidence (D.I.) % = (No. of Infected plants / Total No. of plants) × 100

3. RESULTS AND DISCUSSION

In this experiment, two treatments were applied for controlling the seed borne fungi of wheat in the pots. The result was obtained as a control 63.20%, and disease incidence of 23.30% which were recorded from *Allium sativum* leaf extract with cow urine (Bio-fungicide) in the Treatment 3 whereas control 47.41% and disease incidence 33.33% were recorded from 4 gm. Aureofungin (Antibiotic) with 100 water in the Treatment 2 (Table 2).

The two treatments were also applied for controlling of seed borne fungi of wheat in the plots. The result was obtained as control 68.75%, and disease incidence 20% which were recorded from *Allium sativum* leaf extract with cow urine (Bio-fungicide) in the Treatment 3 whereas control 52.09% and disease incidence 30.66% were recorded from 4 gm. Aureofungin with 100 ml water (Antibiotic) in the Treatment 3 (Table 3).

It had been observed that, the disease percent had been increased under control treatment, while the treated plants were found to have reduced disease per plant. In a later paper, workers at the same station reported obtaining control of bunt with cycloheximide by means of a 1- minute soaking period, or with dust treatments [25]. Griseofulvin as a antibiotic the causative agent of powdery mildew of wheat, *Piricularia oryzae*, *Ascochyta pisi* [26] and silver-leaf disease in plums [27]. Its efficacy has been summarized by [28]. Mycostatin has successfully been used a post-harvest dip-treatment against peach decay [29]. Seeds were treated with the antibiotic aureofungin on Rhizobium strain of groundnut [30]. The treatments of bio-fungicide significantly control percent of seed borne fungi of wheat. They worked on controlling the bacterial leaf blight disease of mango and found that bio-fungicide is an effective control measure and also by [31,32]. The findings of the present study have been supported by [33] as she also found that the bio-fungicide an effective control measure against bacterial leaf blight disease of litchi.

Table 2. Control of seed borne fungi of wheat by different seed treatment in pots

Treatment	Total no. of plants	No. of infected seeds in pots			Mean ±SD	Disease incidence (D.I.%)	Control %
		P_1	P_2	P_3			
T_1	10	6	7	6	6.33±0.57	63.33	0.00
T_2	10	3	2	3	3.33±0.57	33.30	47.41
T_3	10	2	1	2	2.33±0.57	23.30	63.20

Table 3. Control of seed borne fungi of wheat by different seed treatment in plots

Treatment	Total no. of plants	No. of infected seeds in plots			Mean ± SD	Disease incidence (D.I. %)	Control %
		P_1	P_2	P_3			
T_1	100	62	66	64	64.00±2.00	64.00	0.00
T_2	100	32	30	30	30.66±1.15	30.66	52.09
T_3	100	22	18	20	20.00±2.00	20.00	68.75

4. CONCLUSION

Allium sativum leaf extract with cow urine (Bio-fungicide) was found to be superior in controlling of seed borne fungi of wheat compared to Aureofungin with 100 ml water (Antibiotic).

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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