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Effect of Fungicide Bavistin on Growth and Chlorophyll Content in Triticum Aestivum L

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ABSTRACT

Fungicide Bavistin is widely used to control pests in crop plants. However, it has been reported that different fungicide may have negative effects on crop on growth and physiology of plant. An alteration in photosynthesis might lead to a reduction in photo assimilate production, resulting in a decrease in both growth and yield ofcrop plants. Systemic fungicides such as benzimidazoles, anilides, and pyrimidine are also phytotoxic, whereas azolesstimulate photosynthesis. Carbendazim is used for the control of a wide range of fungal diseases such as mold, spot, mildew, scorch, rot and blight in a variety of crops. In the present study, seeds of Triticum aestivum L. were treated with different concentration of Bavistin 0.2%, 0.4%, 0.6%, 0.8% and 1%., for the period of 12h. After three days germination percentage recorded, whereas 10 days seedling height and root shoot ratio recorded. After sowing seeds in small pots after 15 days chlorophyll content was recorded. The data obtained indicates that germination percentage of seeds and root shoot length of seedlings was decrease with increase in concentration of bavistin. The result showed that the percentage of germination, seedling growth and chlorophyll contentwas found to be decreasedas there is increase in concentration.

Keywords: Triticum aestivum, bavistin, fungicide, germination, seedling height and chlorophyll.

I. INTRODUCTION

Agriculture is evolve as a parallel system to nature in order to satisfy the ever-increasing needs of man. Large amounts of fungicides and pesticides are being used in modern agricultural practices to cure insects and pests. Most of those chemical agents are not only kills fungus or pest but also cause serious damage to crop plants. In present days, high utilization of fungicides taken place which shows their direct impact on the crop yield production in is the form of reduction in percent seed germination, seedling growth as well as chromosomal abnormalities in the crop plant also affect physiology of plant (Pandey and Upadhyay, 1997).

Fungicide application is the common practice in modern agriculture for the control of fungal pathogen. Bavistin is a systematic fungicide from the benzimidazole group. It may act either by killing or inactive the pathogen or by increasing resistance in the host pant or by interfering with pathogenic processes which may block the symptoms development. (Diamond, 1965; Grossam, 1965 and Wood Cock, 1971).Wheat (*Triticum*

aestivum L.) is the second most important cereal crop of India next to Rice. It is rich in proteins, vitamins and carbohydrates and provides balanced food. Fungicides do their best work in fighting the yield-limiting effects of diseases such as stripe rust, head scab and powdery mildew all diseases that can wreak havoc on a crop. The test system used was hexaploid Wheat (*Triticumaestivum*2n=6X=42). It has relatively large chromosome and has been extensively used in radiation and induced mutation studies. It has well known relatively simple, quick, inexpensive and easy protocol. Therefore the effect of bavistin fungicide on germination, seedling growth and total chorophyll content was investigated.

II. MATERIALS AND METHODS

Materials

Commonly cultivated hexaploid wheat *(Triticum aestivum* L. var. Kalyansona 2n= 6X=42) seeds were used as the experimental material in the present investigation. The effect carbendazim (Bavistin) on germination, seedling height, root shoot ratio and chlorophyll content was investigated.

Preparation of test solutions and treatment:

The seeds were treated with different concentrations of Bavistin solution i.e. 0.2%, 0.4%, 0.6%, 0.8% and 1.0%. The test solutions were prepared by diluting 2ml of Bavistin in 100ml of distilled water. Rest of the concentrations (0.4%, 0.6%, 0.8% and 1.0 %) was prepared accordingly. The seeds were washed with distilled water then treated with 1% mercuric chloride for sterilization for 5min. 30 seeds in triplicate were soaked in distilled water for the control and for treatments; the seeds were soaked in 0.2%, 0.4%, 0.6%, 0.8% and 1.0 % Bavistin solution for 12 hrs. After the completion of the treatments the seeds were thoroughly washed under tap water for 3-4 times to remove the excess of fungicides sticking to seeds. An individual control was also maintain in distilled water.

Germination: For germination, 30 seeds were kept in pertriplates lined with moist blotting paper (fig.1). Germination counts were taken after 3 days. Germination percentage was calculated by following formula (Rehman *et al.* 1998 and Rangwala *et al.,*2013).

$$\textbf{\textit{Germination percentage}}\ (\%) = \frac{No.of\ seeds\ germinate}{No.\ of\ seeds\ sown} \times 100$$

Fig. 1: Seeds treated with different concentrations of Bavistin solution and untreated control.

Shoot Length (cm): The seedling height was measured after 10 days for each concentration along with control (Fig.2). The seedling height and root length was taken from root stem transition region to the tip in cm. (Kabir, 2008 and Rangwala *et al.,* 2013).

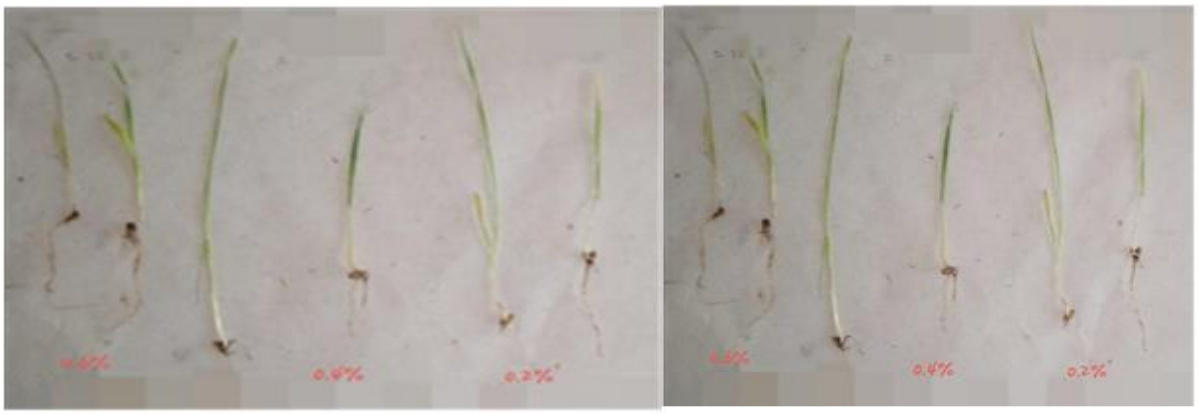


Fig.2: Effect of fungicide (Bavistin) on Root and Shoot length of *Triticum aestivum* L.

Estimation of Chlorophyll content: Chlorophyll b , Chlorophyll a and Total chlorophyll was calculated after 15 days following the protocol prescribed (Manickam, 2006).

Calculation:

Amount of chlorophyll present in the extract mg chlorophyll per g tissue using the following equations:

$$mg\ Chlorophyll\ a\ /\ gm\ tissue\ = 12.7\ (A\ 663) - 2.69\ (A645) \times \frac{v}{1000 * W}$$

$$mg\ Chlorophyll\ b\ /\ gm\ tissue\ = 22.9(A\ 645) - 4.68(A663) \times \frac{v}{1000 * W}$$

$$mg\ Chlorophyll\ Total\ /\ gm\ tissue\ = 20.2(A\ 645) + 8.02(A663) \times \frac{v}{1000 * V}$$

Where,

A = absorbance of specific wavelengths

V = final volume of chlorophyll extract in 80% acetone

W = fresh weight of tissue extracted.

III. RESULTS & DISCUSSION

In the present investigation, the effect of bavistin (fungicide) on germination rate, root and shoot length, chlorophyll content of *Triticum aestivum* (L) was studied. The effect of different concentrations of fungicide bavistin after 12 hours exposure of the seeds at the intervals of 10 and 15 days. The result obtained in the present study has been tabulated in Table, 1, 2, 3 and Figure, 1.2,3,4 &5. Thus, germination percentage was recorded significantly decrease with increase in concentration of bavistin (Fig.3).

Table No.1: The effect of fungicide (Bavistin) on germination and seedling growth (root and shoot length) of *Triticum aestivum* (L.) after 10 & 15 days of interval.

Sr. No.	Concentration	No. of seeds sown	No. of seeds germinated	Germination rate (%) 10 days	Germination rate (%) 15 days	Root length (cm)	Shoot length (cm)
1	Control	30	28	93.33	96.68	8.2	21.2
2	0.2%	30	21	70	73.33	7.4	19.8
3	0.4%	30	18	60	70	7.2	18.4
4	0.6%	30	16	53.33	55.70	6.5	17.3
5	0.8%	30	12	40	46.48	5.5	13.5
6	1.0%	30	10	33.33	35.30	4.0	10.2

Fig. 3. Effect of Bavistin on germination percentage

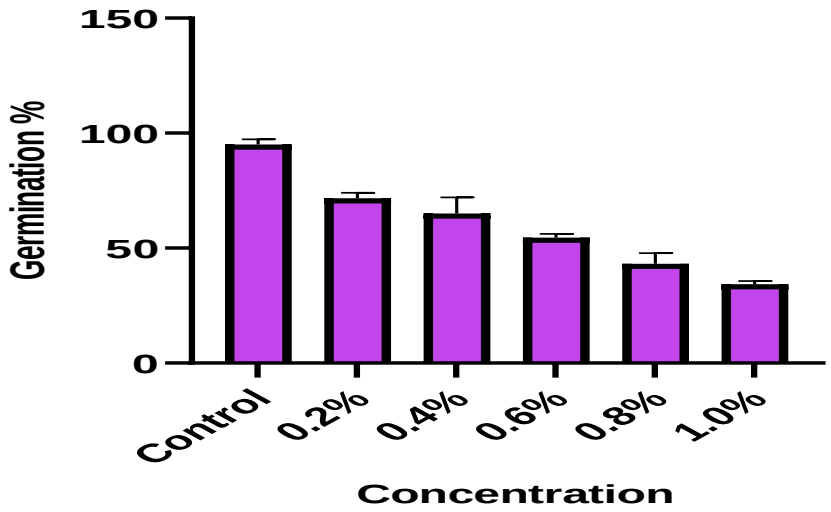


Table.2. Summary of One Way Analysis of Variance for the Data on Seed Germination of different concentrations of bavistin with control.

Source of Variance	Sum of Square	Degree of Freedom	Mean Sum of Square	F-ratio
Between the Groups	4710	5	941.9	65.03****
Within Group	86.90	6	14.48	

P<0.0001 P value summary ****

Seedling height was 8.2 cm in control and root length was 21.2cm. It reduced with increasing concentration of Bavistin. Data for bavistin treatment indicated that seedling height 7.4cm, 7.2cm, 6.5cm, 5.5cm, 4.0cm and root length 19.8cm, 18.4cm, 17.3cm, 13.5cm and 10.2cm. decreased with in 0.2, 0.4, 0.6, 0.8 and 1.0% concentrations, respectively (Table. 1).

The effect of various concentrations of Bavistin on chlorophyll content of seedling exhibited that the content of chlorophyll a was found to be decreasing when there is increase in concentrations. The highest content of chlorophyll a was recorded in control as compared to the various concentrations of fungicide. The results are tabulated in (Table.2,3 and Fig.4 &5).

Table No. 3: Effect of fungicide (Bavistin) on chlorophyll content of *Triticum aestivum* (L.) after 10 days interval.

Sr. No.	Concentration	Chlorophyll a mg/g	Chlorophyll b mg/g	Total chlorophyll mg/g
1	Control	2.86	1.64	4.50
2	0.2%	2.83	1.64	3.45
3	0.4%	2.40	1.55	3.15
4	0.6%	1.45	0.84	1.91
5	0.8%	1.03	0.66	1.90
6	1.0%	1.08	0.45	0.91

Fig. 4: Estimation of Chlorophyll content from *Triticum aestivum* L. seedlings after 10days interval.

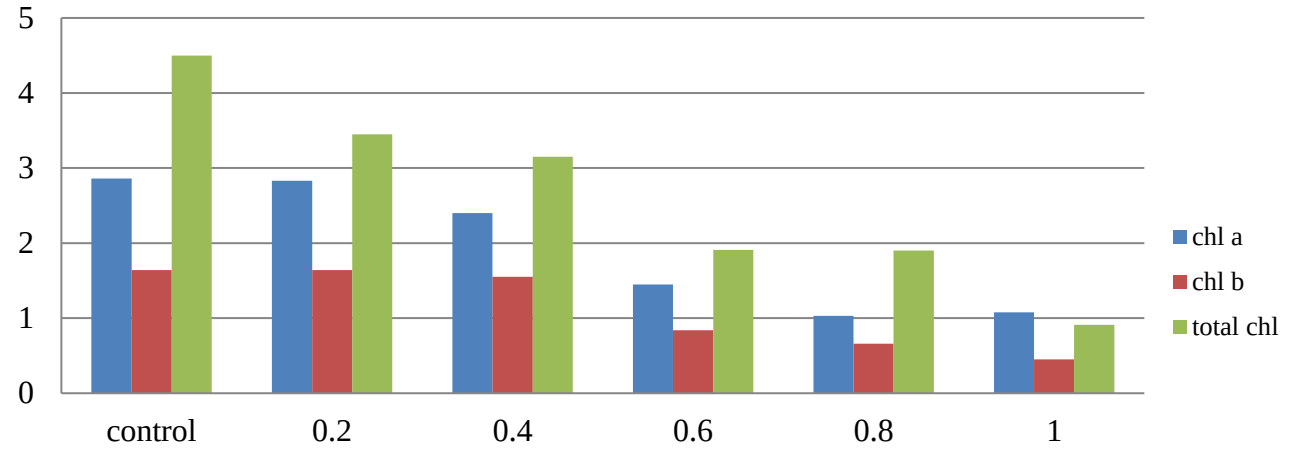
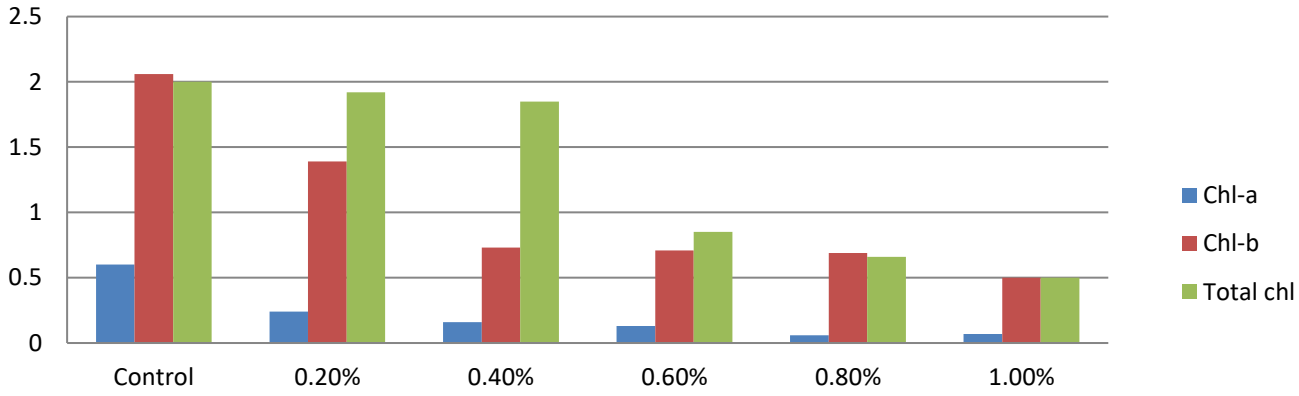


Table No. 4: Effect of fungicide (Bavistin) on chlorophyll content of *Triticum aestivum* (L.) after 15 days interval.

Sr. No.	Concentration	Chlorophyll a mg/g	Chlorophyll b mg/g	Total chlorophyll mg/g
1	Control	0.60	2.06	2.00
2	0.2%	0.24	1.39	1.92
3	0.4%	0.16	0.73	1.85
4	0.6%	0.13	0.71	0.85
5	0.8%	0.06	0.69	0.66
6	1.0%	0.07	0.50	0.50

Fig. 5:Estimation of Chlorophyll content from *Triticum aestivum* L. seedlings after 10th day interval.



Seeds considered being as a suitable host to maintain the pathogenic microorganisms even inthe absence of the host. Treating such seeds with fungicides/bactericides will protect them from being attack by fungi, nematodes

or other pests (Buss *et al.,* 2001). Treating vegetable and crops seeds with fungicides will protect them against soil-borne fungi which could cause diseases, especially root-rot (Pimentel and Greiner 1997). Therefore,there was a crucial need to study the effect of fungicides on growth parameters of plants and ultimate effect on soil pH and moisture content.

It has been observed that the use of pesticide cause serious detrimental effect on the seed germination and seedling growth. It has been reported that the pesticides used viz., Captaf, Bavistin, Blitox, Sitara and Domarck have inhibitory effect as well as growth promoting effect on the germination and seedling growth of radicle and plumule of *Cicer arietinum* and *Zea mays*. In both the cases of *Cicer arietinum and Zea mays*. The improvement in growth parameters may be because of its application suppressed and /or elimination of pathogenic population and the other factors. Growth stimulation may also be due tothe increase in the growth promoting factors i.e. increase in cytokinin or gibberellins production etc.

IV. CONCLUSION

Data showed that the recommended concentration of Bavistin favors growth of seedling but concentration higher than recommended could be unfavorable for proper growth of seedling. The chlorophyll content observed to decrease as the concentration of fungicide increases, which shows that Bavistin fungicide had harmful effect on chlorophyll content of the wheat plant.It suggest that, it should be used at concentration, which would not inhibit growth and chlorophyll degradation. This study has direct application in the fungicide management programme.

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