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Effect of fungicides and plant extracts on growth and yield of Onion (*Allium Cepa* L.)

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ABSTRACT

A field experiment was conducted during the rabi season to study the management of Purple blotch of onion through some chemicals and plant extracts. The experiment was laid out in a Randomized Complete Block Design (RCBD) with 3 (three) replications of each treatment. There were 11 treatments in the experiment comprising Dithane M-45, Rovral, Bavistin, Cupravit, Proud, Champion, Tilt, Ridomil, Neem extract, Alamanda extract and Control. There was a positive and significant impact of fungicides and plant extracts on plant height, bulb diameter and bulb yield of onion. All the plant parameters were increased with applying different fungicides and plant extracts with their effectiveness. The highest bulb yield (8.767 t/ha) and highest bulb diameter (3.787 cm) were obtained with Rovral treated plot. The application of Dithane M-45 gave the highest plant height (44.74 cm), which was statistically similar with Rovral (44.33 cm). The shortest plant (38.76 cm), the minimum bulb yield (5.8 t/ha) and the lowest bulb diameter (3.053 cm) were recorded in control treatment.

KEY WORDS: Fungicides, plant extracts, growth, Onion (*Allium Cepa* L.)

INTRODUCTION

Onion (*Allium Cepa* L.) is one of the most important and familiar spices crop specially bulb onion through the world. It is a member of the family Alliaceae. It is also used as popular vegetable in many countries of Asia and very common and favourable spice in Bangladesh. The major onion growing areas are Faridpur, Comilla, Manikgonj Dinajpur, Jessore, Pabna, Rajshahi, Mymensingh Jamalpur and Rangpur. Recently, Bunching onion (*Allium fistulosum*) is coming up as a popular vegetable too. It does not form bulbs but grow in clusters with long white stems (Benoit and Coustermans, 1987). In terms of global weight of vegetable produced, nearly 28 million tons onion bulbs per annum next to tomatoes and cabbages bears importance (FAO, 1991). In Bangladesh, the production of onion is nearly 1,27,000 metric tons from 34,000 hectares of land

(BBS, 2001). The present production of onion is nearly 1,50,000 metric tons from 36,800 ha of land (BBS, 2003). The national annual yield is only 4.07 t/ha (BBS, 2003) which is quite low compared to other onion growing countries of the world.

Onion crops are affected by a number of diseases (Munoz *et al.,* 1984; Ahmed and Hossain, 1986; Meah and Khan, 1987). Among those diseases purple blotch, commonly known as leaf blotch, caused by *Alternaria porri*, is noted as the major disease throughout the world including Bangladesh (Ahmed and Hossain, 1986; Munoz *et al.*, 1984; Meah and Khan, 1987; Bose and Som 1986 and Castellanos-Linares *et al.*, 1988). Now days, Stemphyllium botryosum, the causal agent of white blotch of onion are being considered as an organism involved indirectly with the causation of purple blotch of onion. It is considered that *Stemphyllium botryosum* initiate the infection and *Alternaria porri* facilitates for causing purple blotch and hence the disease is treated as purple blotch.

The cultivars Faridpuri and Taherpuri are susceptible to the disease (Rahman, 1990). Onion production in Bangladesh is gradually decreasing due to the disease (BBS, 2001). For its less production Bangladesh are being depended to the neighbouring countries like India, Barma, Pakistan for importing onion to meet up the nutrient demand. The disease is characterized with small water-soaked lesions initially on leaves and seed stalk that quickly develop white centre. As lesions enlarged, they become zonate, brown to purple, surrounded by a yellow zone and extents upward for some distance. Under humid condition, the surface of the lesion may be covered with brown to dark gray structures of the fungus. A few large lesions have been formed, in a leaf or seed stalk, which may coalesce and girdle of the leaf or seed stalk and tissues, distal to the lesions, will die. Usually the affected leaves fall down and die within four weeks if the environment favours the disease (Gupta *et al*., 1991).

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In Bangladesh, no resistant source is available. The varieties grown in the country are highly susceptible to the disease. Role of environmental factors on disease development has not yet been studied systematically. Therefore, quite a little information is available on fungicidal control; and mostly those are on bulb production only (Ashrafuzzaman and Ahmed, 1976 and Rahman *et al.,* 1988) but not on seed production. Further, People globally are conscious about environmental deterioration due to use of costly and toxic spray chemicals. So, to save the nature and getting balanced environment, a judicial use of fungicides, plant extracts are to be employed. So the present study was undertaken with the following objectives: to identify the effective fungicides in controlling purple blotch complex of onion for seed production to screen the effectiveness of fungicides for management of the purple blotch complex of onion and to evaluate the performance of some plant extracts in controlling purple blotch disease of onion.

MATERIALS AND METHODS

A field experiment was conducted during the rabi season to study the management of Purple blotch of onion through some chemicals and plant extracts.The experiment was laid out in a Randomized Complete Block Design (RCBD) with 3 (three) replications of each treatment. The experimental site was located at 23077' N latitude and 9003' E longitude with an elevation of 1.0 meter from sea level. The soil of the experimental site belongs to Tejgaon series under the Agro-ecological zone, Madhupur Tract (AEZ -28). The unit plot size was 1.5 m x 2 m and experimental plot size was 10.5m x 19.5 m. The row to row and bulb to bulb distance was maintained 30 cm and 15 cm, respectively. There were 11 treatments in the experiment comprising T_1= Dithane M-45, T_2= Rovral, T_3= Bavistin, T_4= Cupravit, T_5= Proud, T_6 = Tilt, $T_{7=}$ Champion, $T_{8=}$ Ridomil, $T_{9=}$ Neem extract, $T_{10=}$Alamanda extract (*Azadirachta indica*), $T_{11=}$(Control).

At recommended dose suspension/solution of fungicides and plant extracts were prepared by mixing thoroughly with requisite quantity of chemical with normal clean water. The concentration of the spray solution (for 5 decimal land) of the fungicides or plant extracts used in the experiment where presented below (Table.1).

Table 1. The concentration of the spray solution of the fungicides

Treatments	Concentration
1. Dithane M-45	10L/45g
2. Rovral	10L/20g
3. Cupravit	10L/70g
4. Bavistin	10L/10g
5. Proud	10L/10g
6. Tilt	10L/10ml
7. Champion	10L/20g
8. Ridomil	10L/20g
9. Neem extract	1 : 4 (Leaf : water)
10. Alamanda extract	1 : 4 (Leaf : water)
11. Control	No concentration(only water)

Statistical analysis of data

The recorded data on different characters were statistically analysed to find out the significant differences among the treatment means. Data were analysed statistically using MSTAT Computer Program. Data were transformed, whenever necessary, following Arcsine transformation. Means of treatment were separated using Duncan's Multiple Range Test (DMRT).

RESULTS AND DISCUSSIONS

Plant height

The effect of fungicides and plant extracts on plant height of onion was significantly different and that ranged from 38.76 cm to 44.74 cm (Table 2). Significantly enhanced plant height (44.74 cm) was recorded in plants where Dithane M-45 was applied, which was statistically similar with Rovral. Shortest plant (38.76 cm) was found in control treatment, where plain water was sprayed. It was observed that plant height gradually decreased with the application of Dithane M-45, Rovral, Tilt, Bavistin, Ridomil, Champion, Cupravit and Proud respectively. The application of plant extracts had no significant effect on plant height. Further Champion was identical with Ridomil and Bavistin was identical with Tilt.

Table 2. Effect of fungicides and plant extracts on growth and yield of onion

Treatment	plant height (cm)	Bulb diameter (cm)	Bulb yield (t/ha)
T_1= Dithane M-45	44.74 a	3.700 a	7.600 abc
T_2= Rovral	44.63 a	3.787 a	8.767 a
T_3= Bavistin	43.62 ab	3.507 cd	7.300 bc
T_4=Cupravit	40.15 cd	3.303 f	7.433 bc
T_5=Proud	40.12 bcd	3.423 c-f	6.433 cd
T_6= Tilt	43.76 ab	3.407 def	7.367 bc
T_7= Champion	43.29 abc	3.493 cde	6.767 cd
T_8= Ridomil	42.35 abc	3.710 ab	8.367 ab
T_9= Neem extract	39.90 cd	3.430 c-f	7.033 bcd
T_{10}=Alamanda extract	39.75 cd	3.347 ef	6.333 cd
T_{11}= Control	38.76 d	3.053 g	5.800 d
CV (%)	4.78	2.45	9.95
LSD $_{(0.01)}$	3.431	0.1425	1.220

Figure in column, having same letter(s) do not differ significantly at 1% level of significance

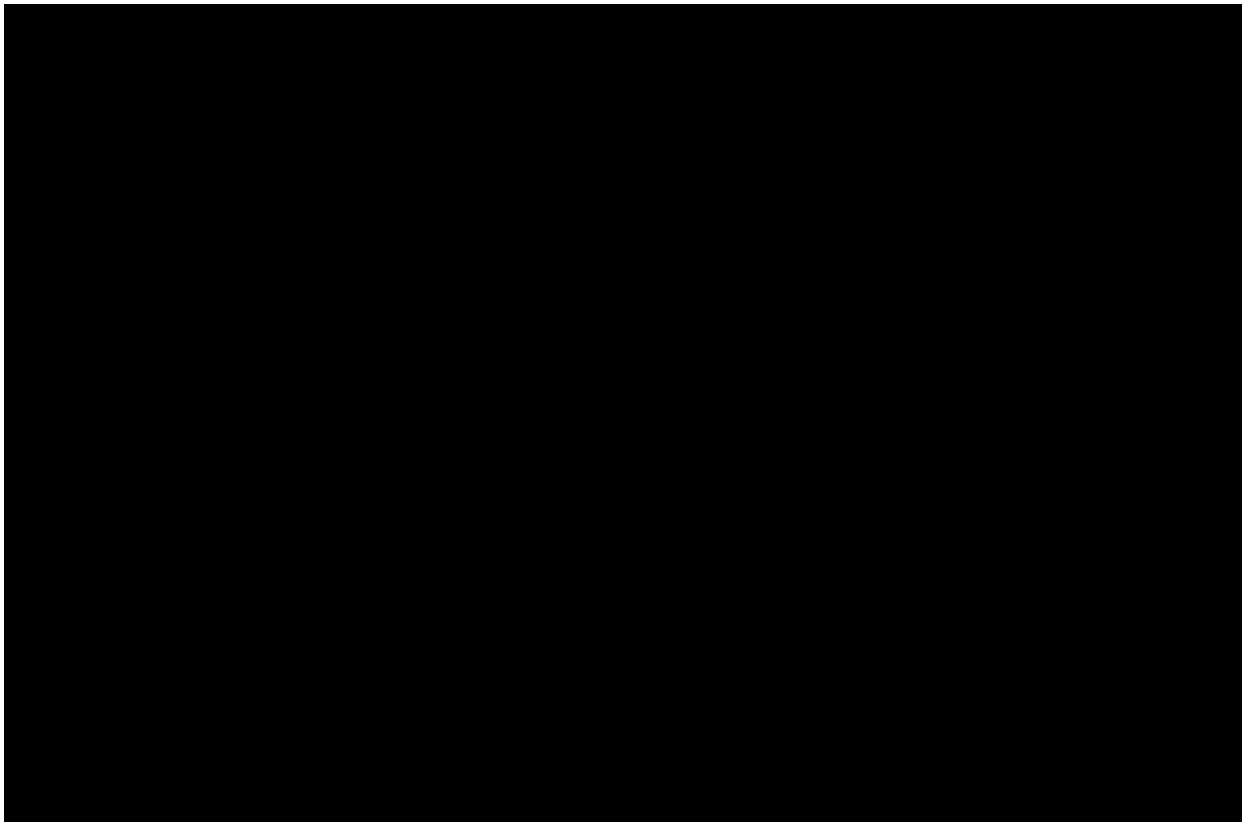
Bulb diameter (cm)

There were significant differences among the fungicides and plant extracts on bulb diameter of onion (Table 2). The bulb diameter was ranged from 3.787 cm to 3.053 cm. The highest bulb diameter was recorded in the application of Rovral, which was identical with Dithane M-45 and the lowest one (3.053 cm) was found in control treatment. In case of bulb diameter, the effectiveness of fungicides in descending order were Rovral, Dithane M-45, Ridomil, Bavistin, Champion, Proud, Tilt and Cupravit. Between two plant extracts application of Neem extract is more effective in relation to bulb diameter of onion.

Bulb yield

The bulb yield of onion differed statistically due to the effect of different fungicides and plant extracts (Table 2, Fig.1). Mean bulb yield of onion ranged from 8.767 t/ha to 5.8 t/ha. The highest bulb yield (8.767 t/ha) was recorded in plant treated with Rovral, which was not statistically different with Dithane m-45 and Ridomil. The lowest bulb yield (5.8 t/ha) was obtained in control plots, which were treated with plain water. Bavistin, Cupravit and Tilt had statistically similar effect on bulb yield. A similar trend was found between Champion and Proud. In case of plant extracts the highest bulb yield was found in plants treated with Neem extract.

Fig. 1 Effect of different fungicides and plant extracts in controlling purple blotch of onion in response to bulb yield



Conclusion

On the basis of the above findings of the present investigation the effects of fungicides and plant extracts on plant height, bulb diameter and bulb yield was found positive and significant. The maximum bulb yield (8.767 t/ha) was recorded in treatment T_2, where Rovral was applied, which was statistically similar with Ridomil treated plot (8.367 t/ha). The minimum bulb yield (5.8 t/ha) was recorded in control treatment. The bulb yield (7.033 t/ha), recorded from Neem extract treated plot was higher than Alamanda extract treated plot (6.33 t/ha). Further research works at different regions of the country are needed to be carried out for the confirmation of the present findings.

REFERENCES

Ahmed, H.U. and Hossain, M.M. (1986). Final report of project crop disease survey and establishment of a harbarium at BARI, Plant, Path. Divn., BARI, Joydepber. PP. 170.

Ashrafuzzaman, M. and Ahmed, M.U. (1976). Control of foliage disease of onion by spray fungicides. *Bangladesh Hort*. 4(2): 25-30.

Bangladesh Bureau of Statistics. (2003). Year Book of Agricultural Statistics of Bangladesh, 2002-03. Statistics Division, Ministry of Planning, Dhaka.

Bangladesh Bureau of Statistics. (2001). Year Book of Agricultural Statistics of Bangladesh, 2000-2001. Agriculture Statistics Division, Ministry of Planning, Dhaka.

Benoit, F. and Ceustermans, N. (1987). Japanese stem onion, Possibilities of the crop. horticultural Abstr. 058-02097.

Bose, T.K. and Som, G.M. (1986). Vegetable crops in India. Naya Prokash, Calcutta, India. 567-569pp.

Castellanes-Linares, J.J., Auchet-Jencens, F. and Garcia-Correosa, I. (1988). Effect of *Alternaria porri*. (Ell.) Cif. On onion seed production under experimental condition in Cuba. In Rev. PI. Pathol. 67:2730.

FAO. (1991). Production Year Book for 1990. Food and Agriculture Organization, Rome.

Gupta, R.P., Srivastava, V.K. and pandey, U.B. (1987). Effect of different fungicides on the control of purple blotch disease of onion bulb crop. pesticides (1987) 21(5): 33-34 pl. Path. Lab. Associated. Agic. Dev. Foundation East Kailash, New Delhi 110065, India.

Meah, B. and Khan, A.A. (1987). Checklist of vegetables and fruit diseases in Bangladesh. Dept. of Plant Path. Bangladesh Agril. Univ., Mymensingh. 22pp.

Munoz, D.C.L., Martinez, J.J.P. and Perez, A.P. (1984). Onion seed production under tropical conditions. Humbalst Inst. Fund. Res. Trop. Agric. Acad. Sci. 10(2): 42-45.

Rahman, M.L. (1990). Efficacy of fungicides in controlling purple leaf blotch (*Alternaria porri*) of onion (*Allium cepa*). M.S. Thesis in Plant Pathology.

Rahman, M.L., Ahmed, H.U. and Mian, I.H. (1988). Efficacy of fungicides in controlling purple leaf blotch of onion. *Bangladesh J. Plant Path.* 4(1&2): 71-76.