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Efficacy of purple blotch of onion incited by *A. porri* (Ellis)

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Abstract
Onion (*Allium cepa* L.) is one of the oldest bulb crop belongs to family Amaryllidaceae. It contains a phytochemical called quercetin, which is effective in reducing the risk of cardiovascular diseases, an anticancer and has promise to be an antioxidant. It is one of the most important vegetable cum condiment crop grown throughout the world. *A. porri* destructs the leaf tissue which destroys the stimulus for bulb initiation and delays bulbing and maturation. Severe attack on flowering alliums can completely girdle flower stalks with necrotic tissue, causing their collapse and total loss of seed production capacity. Further, seed infection causes more severe economic loss in seed production. fungicides have been used in agriculture to protect crops against the losses caused by plant diseases and are recognized as an essential element in crop protection programmes for longlasting. The present experiment were used contact, systematic fungicides and their combinations at different concentrations under In-vitro conditions for inhibition towards *A. porri* to confirm for future sprayings to manage disease incidence of purple blotch of onion.

Keywords: Purple blotch of onion, *A. porri*, fungicides

Introduction
Purple blotch disease is the main destructive foliar disease of genus Allium, widespread in many parts of the world, causing significant losses in bulb and seed yield of the crops (Abo-Elyousr *et al*. 2014) [1]. On onion, the disease causes severe damage on onion seed crop more than the bulb crop resulting more than 80% (Thind, T and Jhooty J. (1982) [8] and sometimes 100% loosing of the seed yield (Abo-Elyousr *et al*. 2014) [1]. Under favourable condition, the pathogen develops brownish-purple necrotic lesions in the leaf tissues which breaks the stimulus for bulb initiation, thereby delaying bulb formation and maturation (Black *et al*., 2012) [2]. Severe attack on flowering *Alliums* causes complete girdling of the flower stalks with necrotic tissues, leading to their collapse and loss of seed production capacity. Bulbs are infected through the neck by forming a bright yellow to red infected area leading to complete drying and decay of the bulb scales (Black *et al*., 2012) [2]. Nowadays farmers are not interested in onion cultivation due to yield loss which reduces the national production, making the country demand for importing enormous quantity of onion bulb every year at the cost of huge foreign exchange. Proper disease control measures can improve the quality of onion bulbs and significantly increase the yield. In limited attempts have been made to find out the suitable control measures of this disease for bulb and seed production. Though many researchers have worked on this pathogen and its management the disease still remains a major bottleneck in onion cultivation. In view of this, an investigation was undertaken by carrying out *in vitro* evaluation of different fungicides for their efficacy against *A. porri* and is most essential so as to incorporate the effective ones in the management package (Priya R.U.2015) [6]. The present investigation on purple blotch (*Alternaria porri*) of onion was undertaken effect of chemicals in minimizing the disease under *in vitro* condition.

Material and Methods
Collection of diseased plants
The plants showing typical symptoms on leaf were collected from Horticulture field J.N.K.V.V. Jabalpur as well as the adjoining areas of Jabalpur. The infected leaves were carefully removed from the plant, the samples were kept in clean polythene bag and brought to the laboratory for isolation. The samples were washed with tap water and dried with the help of blotter paper to remove traces of water before isolation.

Source of fungicides

The fungicides viz.,Carbendazim (0.1%), copper hydroxide (0.3%), Carbendazim + Mancozeb (0.3%), Captan + Hexaconazole (0.2%), Mancozeb (0.3%), Captan (0.2%), Copper Oxychloride (0.3%) were tested against purple blotch causing pathogen.

Poisoned food method technique

The test fungicides were evaluated employing poison food method (Nene and Thapliyal 1993) [5]. Potato dextrose agar (PDA) medium was prepared, equally distribution measuring 100 ml in 250 ml conical flask and sterilized in autoclave. Requisite quantity of each of the fungicides was added in sterilized melted (45 ^{0}C) PDA separately so as to obtain desired concentration. Flask containing poisoned medium was shaken well to have even and uniform distribution of fungicides. About 20ml of melted poisoned PDA was poured in each sterilized petriplate and allow to solidify. These petriplates were inoculated by test fungus separately. Five mm disc of one week old fungus culture was cut with sterilized cork borer, lifted and transferred aseptically in the center of petriplate containing the medium poisoned with test fungicide. The control plates were kept with culture disc and allow to grown in same condition on PDA, without fungicides. Inoculated plates were incubated at room temperature (25± 2 ^{0}C) for a period of seven days. Colony diameter was recorded in mm and per cent mycelial growth inhibition was calculated as per (Vincent's 1947) [9] formula based on the average colony diameter. The data was subjected to statistical analysis wherever necessary. The efficacy of fungicides against the pathogen in laboratory (*in vitro*) by Poisoned food technique was tested. The radial growth of the colony were recorded at 7th days when maximum growth was observed in control and per cent inhibition was calculated using the formula given by Vincent's (1947) [9].

$$I = \frac{C - T}{C} \times 100$$

Where,

I = Percent inhibition

C = Radial growth of fungus in controls

T = Radial growth of fungus in treatments

The details of the fungicides used against the pathogen *Alternaria porri* are given in the following Table no: 1

Results and Discussions

Table 1: Efficacy of fungicides against *Alternaria porri* (poisoned food method)

Sr. No.	Fungicides	Concentration (%)	Mean radial growth(mm)	Mycelial inhibition (%)
1	Carbendazim	0.1	3.7	95.64
2	Copper hydroxide	0.3	7.5	91.17
3	Carbendazim+ Mancozeb	0.2	6.9	91.88
4	Captan + Hexaconazole	0.2	00	100.00
5	Mancozeb	0.25	9.4	88.94
6	Captan	0.3	10.16	88.04
7	Copper Oxychloride	0.3	7.9	90.70
8	Control	-	85.00	-
	SE(m)±	-	0.264	-
	CD(P=0.01)	-	0.799	-

Efficacy of fungicides against *Alternaria porri* by Poisoned food method

The results presented in Table:1 indicates that, among all the systemic and non systemic fungicides tested, Captan+Hexaconazole (0.2%) and Carbendazim (0.1%) were found most effective for arresting 100 per cent and 95.64 per cent mycelial growth of *Alternaria porri*. respectively. Thaware *et al*. (2011) [7] reported that different fungicides against the fungus *Alternaria alternata* under *in vitro* condition. Among all of those fungicides, Mancozeb (0.2 per cent) and Propiconazole (0.05 per cent) completely inhibited the growth of the test fungus. Mishra and Gupta (2012) [4] evaluated eight fungicides against *Alternaria porri* under *in vitro* condition. Out the fungicides evaluated, Mancozeb at 0.2 per cent completely inhibited the growth of the pathogen followed by Azoxystrobin (0.1 per cent) and Antracol (0.2 per cent). Manoj kumar *et al*. (2012) [3] tested fungicides under *in vitro* condition, Carbendazim, Mancozeb, Chlorothalonil, Carboxin and Thiram completely inhibited the growth of *Alternaria alternata* causing leaf spot of chili.

Conclusion

The Efficacy of Seven fungicides are significant effect on *Alternaria porri* among Seven fungicides of Captan + Hexaconazole is higher inhibition to the pathogen it can be recommended for foliar sprays.

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