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Short Communication

Field-efficacy of fungicides for the management of purple blotch of onion in Jalandhar, Punjab

Ritu Raj * and Balvir Kaur

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Onion (*Allium cepa* L.) is one of the most important vegetable crop grown worldwide. It is called as "Queen of the Kitchen" belongs to family *Alliacea*. It is a rich source of carbohydrates, proteins, vitamin C besides minerals like phosphorus and calcium (Scott 2007). It is also used as medicine in controlling human and plant diseases (Slimestad et al. 2007, Yadav et al. 2017). India is the second largest producer of onion in the world, next to China with an area of 1.31 million ha with a production of 22.1 million tonnes and productivity of 16.87 tonnes ha-1 (FAOSTAT 2018). Onion is cultivated on an area 10.35 thousand hectare having annual productivity of 246.52 thousand tonnes with average yield of 238.27 quintal per hectare in Punjab (Anonymous 2021a). The purple blotch of onion which is caused by a fungal pathogen-*Alternaria porri* (Ellis) Ciffer) is one of the major diseases of onion, affecting the foliage and results in losses ranging from 30 to 100 per cent in bulb and seed crop (Suheri and Price 2000). This pathogen is capable of resulting losses to the tune of 100 percent under high relative humidity (80-90 per cent) and optimum temperature around 25 - 30 °C (Yadav et al. 2013). Purple blotch of onion is known to occur in Punjab on bulb and seed crop resulting in yield losses (Sharma 1986, Cramer 2000). The perpetual demand of onions within the state and for the export has made it essential to supply onions round the year either from fresh harvest or from stocks (Kumar et al. 2017). Onion has also the advantage of being less perishable and enters into the marketing channels for inter-state and foreign trade, to a considerable extent because of added advantage that it can stand rough handling and long distance shipment (Kumar et al. 2020). In view of the above economic importance of the crop and the devastating nature of the disease, the present study was carried out to test the efficacy of different fungicides in District Jalandhar of Punjab.

The On Farm Trial (OFT) was conducted to test the field efficacy of seven fungicides treatment viz., T_1- difenoconazole 25 EC @ 0.10, T_2- tebuconazole 25 WG @ 0.10, T_3- trifloxystrobin 25% + tebuconazole 50% @ 0.06 per cent, T_4- tebuconazole 250 EC @ 0.1 per cent, T_5- propiconazole 25 EC, T_6- mancozeb75 WP @ 0.25 per cent and T_7-Control in managing the purple blotch of onion on bulb (Variety Punjab Naroya) under randomized block design with three replications per treatment. The experiment was carried out at Krishi Vigyan Kendra, Jalandhar for two successive years during the year 2018-2019 and 2019-2020 *Rabi* season respectively. Krishi Vigyan Kendra, Nurmahal, Jalandhar is geographically situated at 31°09'N latitude, 75°59' E longitude and at an altitude of about 237 m above mean sea level. The nursery of onion was sown on raised beds using seed rate 10 kg ha-^{1}in last week of October in both the years. The transplanting of the onion seedlings in the field was done in first fortnight of January in both the years following 15cm row to row spacing and plant to plant spacing followed was 7.5 cm. The crop was raised with recommended package of practices by Punjab Agricultural University, Ludhiana (Anonymous 2018).

Foliar application of fungicides was started as soon as first symptoms of the disease were observed. Three sprays were followed at 10 days interval. Untreated plot was kept as control. Twenty-

Krishi Vigyan Kendra, Jalandhar, Punjab

*Corresponding author; Email: rituraj1610@gmail.com

five plants from each plot were randomly tagged for disease assessed on the 0 to 5 rating scale given by Sharma (1986) as follows:

Score	Disease description
0	No disease symptom
1	A few spots covering 10 per cent leaf area
2	Several purplish brown patches covering up to 20 per cent of leaf area
3	Several patches with paler outer zone covering up to 40 per cent leaf area
4	Leaf streaks covering up to 75 per cent leaf area or breaking of the leaves from centre
5	Complete drying of the leaves or breaking of leaves from centre

The observations on disease severity were recorded 10 days after last fungicidal spray and the per cent disease index (PDI) was computed as per the formulae given by Islam et al. (1999)

$$PDI = \frac{\text{Sum of all numerical ratings}}{\text{Number of observations X Maximum disease rating scale}} \times 100$$

The uprooting of the bulbs was done manually in the first week of May during *Rabi* 2018 and last week of April during *Rabi* 2019. After harvesting, the bulbs were cured and then leaves were cut 1-2 cm above the neck and bulb yield was recorded. Data on fresh bulb yield (q/acre) was recorded from ten randomly selected plants from each plot. The data collected on various parameters under study were statistically analysed with CPCS1 software and comparisons were made at 5 per cent level of significance.

The data presented in the Table 1 revealed that all the test fungicide treatments significantly reduced the severity of purple blotch of onion as compared to control under the field conditions. During the *Rabi* 2018-19 the plant disease index (PDI) varied from 4.3 to 10.67 per cent whereas during the year *Rabi* 2019-2020 PDI varied from 4.2 to 11.3 per cent as compared to control which were 23.3 and 22.6 per cent. During the year 2018 and 2019 Foliar application of Nativo 75WG (trifloxystrobin 25% + tebuconazole 50%) @ 0.06 per cent was recorded with lowest disease severity (5.5, 4.2 percent) followed by Caviet 25WG (tebuconazole 25WG) @ 0.1 per cent with PDI (4.7, 4.5 percent), Folicur 250EC (tebuconazole 250 EC) @ 0.10 per cent PDI (5.0, 4.5 percent), Score 25 EC (difenconazole 25EC) @ 0.10 per cent PDI (5.5, 5.9 percent),

Table 1: Field efficacy of different fungicides against purple blotch of onion during *Rabi* 2018-19 and 2019-20

S. No.	Treatment (Fungicides)	Concentration (%)	*Rabi* 2018-19		*Rabi* 2019-20	
			Per cent disease Index (PDI)	Fresh bulb yield (q/acre)	Per cent disease Index (PDI)	Fresh bulb yield (q/acre)
1	Score 25EC (Difenconazole 25EC)	0.10	5.5	131.9	5.9	a133.2
2	Caviet 25WG (Tebuconazole) 25WG	0.10	4.7	135.0	4.5	136.9
3	Nativo 75WG (Trifloxystrobin 25% + Tebuconazole 50%)	0.06	4.3	137.7	4.2	138.6
4	Folicur 250EC (Tebuconazole 250 EC)	0.10	5.0	132.8	4.5	135.6
5	Tilt 25 EC (Propiconazole)	0.10	8.0	127.3	8.1	126.7
6	IndofilM-45 (Mancozeb 75WP)	0.25	10.67	110.9	11.3	109.8
7	Control	-	23.3	95.8	22.6	96.80
	CD (p=0.05)		6.7	4.5	6.02	5.5

Tilt 25 EC (propiconazole) @ 0.10 PDI (8.0, 8.1 per cent) and Indofil M-45 (mancozeb 75 WP) PDI @ 0.25 per cent (10.67, 11.3 percent) respectively, whereas in control PDI recorded was 23.3 and 22.6 per cent. Younas et al. (2021) also revealed significant difference regarding Percent Disease Index (PDI) among fungicide treatments in onion crop.

The pooled data for the two successive years revealed that the fungicidal treatments were significantly effective in lowering the disease severity and obtaining fair bulb yield (Figure 1). Nativo 75WG (trifloxystrobin 25% + tebuconazole 50%) was found to be most effective in reducing the disease severity *i.e* 4.25 per cent and highest bulb yield of 132.55 q/acre followed by Caviet 25WG (tebuconazole 25WG) and Folicur 250EC (tebuconazole 250 EC), which were almost at par in reducing the PDI i.e 4.6 and 4.7 per cent and the respective yield obtained was 135.95 q/acre and 134.2 q/acre. Score 25 EC (difenconazole 25 EC), Tilt 25 EC (propiconazole) and Indofil M-45 (mancozeb 75 WP) where PDI recorded was 6.1, 8.05 and 10.98 per cent respectively whereas the bulb yield recorded was 132.55 q/acre, 127 q/acre and 110.35 q/acre respectively. These findings are in agreement with the records published by Aujla et al 2013. Different fungicides were tested in which Nativo 75 WG (trifloxystrobin 25% + tebuconazole 50%) and Folicur 250 EC (tebuconazole 250 EC) provided 85 per cent and 77.7 per cent disease control (Aujla et al. 2020). Uddin et al. (2006) also worked out that propiconazole was effective in

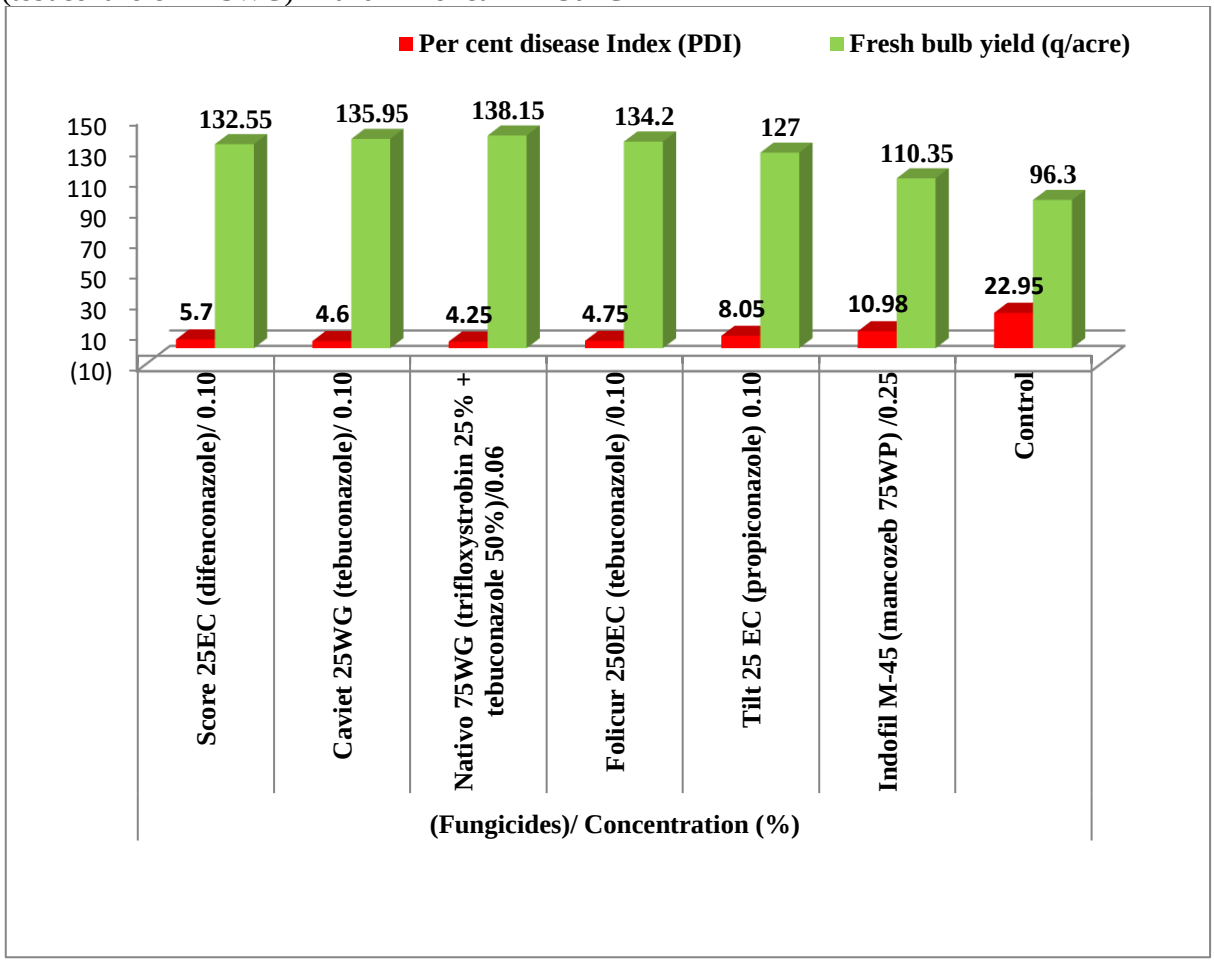

Figure 1: Efficacy of tested fungicides for the successive years 2018-19 and 2019-20

managing purple blotch of onion also proved effective. Beiget al. (2008) also reported the effectiveness of tebuconazole, propiconazole and difenconazole against purple blotch of onion. Bhatia and Chahal (2014) also reported in their work the superiority of tebuconazole, difenconazole,

propiconazole etc. over the conventional fungicides applied in managing the disease. Hill et al. (2013) has also signified the effectiveness of tebuconazole and trifloxystrobin in controlling the purple blotch of onion.

In conclusion, trifloxystrobin 25% + tebuconazole 50% was found to be most effective in reducing the disease severity *i.e* 4.25% followed by tebuconazole 25 WG and tebuconazole 250 EC, which were almost at par in reducing the percent disease index/PDI *i.e* 4.6 and 4.7 per cent. difenoconazole 25 EC, propiconazole 25 EC and mancozeb75 WP where PDI recorded was 6.1, 8.05 and 10.98 per cent respectively.

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