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Short Communication

Identification of purple blotch and thrips resistant lines of onion (*Allium cepa* L.)

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Onion is susceptible to foliar diseases that reduce bulb yield and quality (Cramer 2000), among foliar diseases purple blotch disease caused by *Alternaria porri* (Ellis). Cif. major threat for onion production, purple blotch infected leaves are reddish brown septate non-sporulating mycelium (Datar 1994), air borne spores of *A. porri* were responsible for increased disease incidence of onion cultivar Creamish-golden coloured leaves with required leaf wetness duration at 5 ˚C for 16 h and 8 h at 10-25 ˚C. The numbers of lesions are increased with increase of leaf wetness duration and temperature reported by Suheri and Price (2001). It was first reported by Ajrekar (1921) from Bombay state of India, and it is a major onion disease across the world (Chaput 1995, Cramer 2000, Schwartz et al. 2005) prevalent in warm humid climate (Suheri and Price 2001). The infestation causes on leaves and flower stalks (Bock 1964), reduces onion tops yield by 62–92 % (Suheri and Price 2001), loss of bulb yield by 30 % (Everts and Lacy 1990), and seed yield by 10 % under congenial environmental conditions (Daljeet et al. 1992, Schwartz 2004), causing heavy yield loss ranging from 2.5 to 87.8 % during *kharif* season (Srivastava et al. 1994). The maximum percentages of incidence surveyed in Indian states are Karnataka (60%) in *kharif* and Maharashtra (90%) in *rabi* seasons (Gupta et al. 1994). The cultivars evaluated for resistance to purple blotch disease namely VL-1, PBR-1, PBR-5, PRR and Arka Niketan were rated relatively resistant (Daljeet et al. 1992). Three breeding lines namely, MS-65-268, PBR-287 and Arka Kalyan-704 were identified as resistant, line PBR-287 was identified as a good source of resistance and the inheritance revealed to be a single dominant gene for resistance and further essentially Purple blotch resistance effectively can be utilized for heterosis breeding for exploitation of disease resistance. Among several insect pest onion thrips (*Thrips tabaci* Lindeman, Thysanoptera: Thripidae) pose severe problem (Gupta et al. 1994) and major limiting factor affecting yield, larvae and adults were rasping of leaves and sucking of sap from plant parts could lead to the chlorotic spot of leaves, deformities of foliage and finally it led to reduced size and yield of bulb (Salas 1994). The highest infestation recorded from 35 to 100% thrips incidence and 3.5-30.3 nymphs per plant, both nymphs and adults of thrips by rasping of leaves, suck the exuding sap (Chhalrola et al. 2003). *T. tabaci* Lindeman densities increased matured plant and low on young plants on which higher numbers of larvae gathered than adults at the base of plants as hiding place (Mo et al. 2008), as cryptic life style (Capinera 2001) stay under the leaf surface and places far from reach control problematic, and consequently difficult to control by means of cultural and chemicals and cause yield losses estimated due to the incidence of thrips in onion has to the tune of 40 to 50% (Gupta et al. 1994). Therefore, there is need for screening of resistance genotype towards thrips in onion.

During *kharif* 2017 and 2018 (May-September) an experiment was conducted at the Vegetable Research Block, Department of Vegetable Science, College of Horticulture, Bengaluru, University of Horticultural Sciences, Bagalkot, Karnataka, India. The experiment was laid on red sandy loam soil with plots size of the length of 1.5 m with width of 1.2 m with plant spacing 15×10 cm apart. Production and management practices were according to established practices (UHS 2013) except plant protection measures, no chemicals were sprayed during the experimentation. The seedlings were raised in May-June, and the experiment was established by the planting of 45 days old seedling and arranged in a

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randomized block design (RBD) with 30 open-pollinated genotypes in 2 replications. The observation on disease incidence of purple blotch and thrips incidences was recorded at full crop growth stage at 60 days after transplanting. The data was analyzed by using OPSTAT open-access software (Sheoran et al. 1998). An individual cultivar or genotype was grown in separate plots. Thrips damage and purple blotch incidence were recorded under natural epiphytic condition. The purple-blotch disease incidence (PBDI) was recorded in the *kharif* season on zero to five rating scale based on the plants damaged due to the disease, 0=Immune without infection, 1=Resistant (1-10% of infected plants), 2=Moderately Resistant (11-20%), 3=Moderately Susceptible (21-40%), 4=Susceptible (41-60%) and 5=Highly Susceptible (>61%). The purple-blotch disease incidence was estimated as given by Dhiman et al. (1986).

Purple Blotch Disease Incidence (%) =

$$\frac{\text{Number of infected plants}}{\text{Total number of plants observed}} \times 100$$

Thrips Incidence (TI) was noted in the *kharif* season on zero to five rating scale on the basis of damage occurred due to the thrips feeding, injury on the plant leaves, data on the thrips incidence were analyzed as per guidelines given by Bhangale and Joi (1985).

$$\text{Thrips Incidence (\%)} = \frac{\text{Number of infected plants}}{\text{Total number of plants observed}} \times 100$$

The experimental data on purple-blotch disease incidence and thrips incidence on the genotypes and their selfed lines in first generation (S_1) were found significant during *kharif* 2017 and 2018 are presented in Table 1. The minimum percentage of purple blotch disease incidence was recorded from variety Bhima Super (11.25%), the genotype COHBONC34 (11.25%), COHBONC23 (12.50%), COHBONC04 (14.59%) and COHBONC08 (16.25%), the S_1 lines COHBONC23-S_1 (13.75%), COHBONC27-S_1 (13.75%), COHBONC34-S_1 (14.17%) and COHBONC04-S_1 (15.84%) which are found to be moderately resistant, and thus could be probably due to genetic mechanism of resistance expression (Figure 1) during crop production could lead to higher production

Table 1: Field resistance of onion genotypes for purple blotch and thrips

Genotypes	Purple blotch incidence (%)			Thrips incidence (%)		
	2017	2018		2017	2018	
COHBONC01	17.09	18.34	MR	18.34	19.59	MR
COHBONC02	19.59	20.84	MR	19.59	20.84	MR
COHBONC03	22.92	25.42	MS	25.00	26.25	MS
COHBONC04	14.59	15.84	MR	13.75	17.50	MR
COHBONC05	17.50	21.25	MR	14.58	18.33	MR
COHBONC06	20.84	22.09	MS	20.84	22.09	MS
COHBONC07	18.75	20.00	MR	21.25	22.50	MS
COHBONC08	16.25	17.50	MR	22.09	23.34	MS
COHBONC09	21.25	22.50	MS	22.50	23.75	MS
COHBONC10	20.42	23.34	MS	22.92	24.17	MS
COHBONC11	25.00	26.25	MS	23.34	24.59	MS
COHBONC12	42.92	44.17	S	27.09	30.84	MS
COHBONC14	27.50	28.75	MS	21.67	22.92	MS
COHBONC15	26.25	27.50	MS	21.25	22.50	MS
COHBONC17	31.67	32.92	MS	22.50	23.75	MS
COHBONC18	25.00	26.25	MS	21.25	22.50	MS
COHBONC19	16.67	17.92	MR	22.50	23.75	MS
COHBONC20	50.42	51.67	S	31.67	32.92	MS
COHBONC21	32.08	33.33	MR	21.25	22.50	MS
COHBONC22	17.50	18.75	MR	22.92	24.17	MS
COHBONC23	12.50	13.75	MR	13.34	14.59	MR
COHBONC24	42.09	43.34	S	33.75	39.17	MS
COHBONC25	20.84	22.09	MS	19.59	20.84	MR
COHBONC26	20.42	21.67	MS	20.00	21.25	MR
COHBONC27	12.50	13.75	MR	11.67	12.92	MR
COHBONC28	28.75	30.00	MS	29.59	30.84	MS
COHBONC32	32.50	33.75	MS	20.00	21.25	MR
COHBONC33	41.25	42.50	S	20.42	21.67	MS
COHBONC34	11.25	14.17	MR	12.50	13.75	MR
COHBONC35	44.17	45.42	S	34.59	35.84	MS
Bhima Super	11.25	14.17	MR	13.33	14.58	MR
S.E.m±	2.11	1.91		1.57	1.35	
C.D. at 0.05	6.11	5.56		4.56	3.93	
C.V. (%)	12.13	11.05		10.36	9.60	

of bulb yield, in spite of high rainfall coupled with cloudy weather and wind favoured the sporulation and spread of disease during peak vegetative growth stage of crop, similar result were reported by Kumari et al. (2011), Tripathy et al. (2013), Suhas et al. (2016) and Lakshmipathi (2016). The minimum thrips incidence was recorded from the genotype COHBONC27 (11.67%), COHBONC34 (12.50%), variety Bhima Super (13.33%), COHBONC23 (13.34%), COHBONC04 (13.75%), COHBONC05 (14.58%). The S_1 lines COHBONC27-S_1 (12.92%) and COHBONC34-S_1 (13.75%) which was found to be moderately resistant. The results are lined with the reports of Gupta et al. (1994), Chhalrola et al. (2003) and Salas (1994), this could be due the inherent capacity of the genotypes for thrips resistance, which could be attributed by the morphological characters like glossy foliage, compact growth habit, non-spreading of leaves correlates with the high bulb yields reveled by Alimousavi et al. (2007) in onion.

The field screening provided us the genotypes with variable responses to purple blotch disease and thrips incidences could leads to the identification of resistant sources. It is required to be further confirmed through artificial inoculation and molecular assay and their genetic inheritance need to be revealed with use of identified resistant lines.

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