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Studies on heterosis for purple blotch disease and bulb yield using male sterile lines in onion (*Allium cepa* L.)

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ABSTRACT : The study was carried out to estimate magnitude of heterosis over, better parent and commercial check for purple blotch disease resistant and bulb yield in twenty eight crosses resulting from a line x tester mating design of four male sterile lines and seven male fertile as testers in onion. Among the twenty eight crosses, better parent heterosis ranged from L_2 x T_6 (-78.44%) to L_4 x T_4 (-40.63%). All the crosses manifested significant heterosis over standard check Arka Kalyan in the range of L_2 x T_2 (-45.90%) to L_4 x T_2 (-31.14%) for purple blotch disease resistance. For total bulb yield the highest positive better heterosis in the cross L_3 x T_5 (32.58%). Seven crosses exhibited significant positive heterosis of which two crosses L_3 x T_5 (27.44%) and L_2 x T_4 (22.47%) expressed significant positive heterosis over standard check Arka Kalyan.

KEY WORDS : Heterosis, Purple blotch disease, Hybrids, Yield

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Onion (*Allium cepa*. L) is a member of family Alliaceae, is one of the most important bulbous vegetable crop cultivated extensively in India. India ranks first in area (1.06 million hectares) under onion in the world and second in total production with 15.11 million tonnes after China (Anonymous, 2011). Even though India ranks first in area under onions in the world and second in production but its productivity is low (14.2 t/ha) as against the world productivity of (17.47 t/ha). Among several factors, diseases are most important factors associated with low productivity in onion. Purple blotch caused by *Alternaria porri* is one among the serious fungal diseases that affects onion, causing yield loss ranging from 2.5 to 87.8 per cent during *Kharif* season (Srivastava *et al.*, 1994). The fungus attacks both leaves and flower stalk (Bock, 1964), reducing foliar production by 62-92% (Suheri and Prince, 2001). The disease can cause a yield loss of 30% (Everts and Lacy, 1990) and 100% of the seed crop when the weather is favourable (Daljeet *et al.*, 1992; Havey and Randle, 1996). At present there is no purple blotch disease resistant onion variety/hybrid under commercial cultivation in India; hence, there is need to breed a resistant variety, coupled with higher yield. With these points in view, present investigation was undertaken to know extent of heterosis and identification of best combination for purple blotch resistance and bulb yield.

RESEARCH METHODS

The present investigation was undertaken at the Division of Vegetable Crops, Indian Institute of Horticultural Research (IIHR), Hessaraghatta, Bangalore. The experimental field is located at an altitude of 890 meters above MSL, $13^0$58' N latitude and 78^0E longitude. The parents and the hybrids were evaluated during the period between July-2011 to May-2012. The experimental material consisted of four parents *viz.*, PBRMS-317(L_1), PBRMS-318(L_2), PBRMS- 319(L_3) and PBRMS-379(L_4) used as lines and seven testers namely PBRG-282(T_1), PBRG-285(T_2), PBRC-337(T_3), PBRC-338(T_4), PBRC-339(T_5), PBRC-340(T_6) and PBRC-341(T_7). Line x Tester mating design was followed in the study. Thus a total of 28 hybrids were produced by making crosses between lines and the testers during *Kharif* 2011. All the 28 hybrids along with their corresponding 11 parents were evaluated in a randomised block design in three replications during summer 2012. Observations on ten randomly selected plants were recorded for purple blotch disease incidence and various yield attributing traits to see the performance of parents and hybrids.