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Genetic enhancement for resistance to Asian Soybean Rust in India

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Asian soybean rust caused by *Phakopsora pachyrhizi* Syd*.,* is one of the most threatening diseases of soybean in major soybean production areas around the world. In spite of the availability of chemical control with fungicides, the increase in production costs as well as operational difficulties and health hazards associated with fungicide usage for disease management has prompted the search for development of durable resistance to *Phakopsora pachyrhizi*. It is a major problem especially in southern parts of India causing significant yield losses ranging from 30-100 per cent. Most of the popular cultivars (JS 335, JS 93-05, DSb 1 and MACS 450 etc.) are highly susceptible to rust in India. Under these circumstances, the most effective and long term strategy would be breeding resistant cultivars or incorporating resistance into popular susceptible cultivars. Keeping these things in view, a long term breeding programme was initiated at the University of Agricultural Sciences, Dharwad, India to develop rust resistant genotypes. After rigorous screening of more than 2000 germplasm lines, two rust resistant germplasm lines *viz*., EC 241778 and EC 241780 were identified during rainy season of 2002-03 and were utilized in hybridization with agronomically superior but rust susceptible cultivars (JS 335, JS 93-05 and DSb 1). Out of 582 advanced breeding lines developed from these crosses were screened under natural epiphytotic condition as well as artificially inoculated glass house condition. One line from each cross i.e., JS 335 x EC 241778 (DSb 21), JS 335 x EC 241780 (DSb 23-2) and JS 93-05 x EC 241780 (DSb 28-3) exhibited highly resistant reaction with high yield potentiality for more than six years at hot spots for rust. Under rust prone condition, these genotypes recorded more than 150 per cent increased seed yield compared to the popular and best check JS 335. Further, there was significant reduction in seed size of JS 335 (6.43 g) due to severe disease pressure whereas there was no reduction in seed size of these rust resistant lines. DSb 21, DSb 23-2 and DSb 28-3 have recorded 17, 19 and 20 per cent higher yield respectively over JS 335 in All India Coordinated Trials over years (2011-16). Owing to its rust resistance, high yield and tolerance to pod shattering up to 8-10

days after maturity, DSb 21 has been released and notified for Southern Zone of India during 2015. This variety is becoming popular in southern states of India and recorded highest yield (5250 kg/ha) in one of the large scale demonstrations conducted in farmers field of Karnataka state. DSb 23-2 has been recommended for release and notification for Southern Zone of India. All these genotypes are having distinct advantage of yield superiority in addition to rust resistance over JS 335. Definitely, these varieties are a boon to soybean growing farmers by preventing significant yield losses due to soybean rust and also suitable for organic cultivation.