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Development and evaluation of NAM and MAGIC population for yield and attributing traits in soybean

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A nested association mapping (NAM) population was developed by hybridizing JS335, a popular variety of central India with 20 diverse soybean genotypes for mapping and improving towards drought and water logging tolerance, YMV and rust resistance, early maturity and higher yield. Truthfulness of the F<sub>1</sub> plants was confirmed through morphological markers viz., stem pigmentation, flower color, pubescence color, etc. The populations in F<sub>3</sub> generation consisting of 2385 progenies were evaluated for seed yield and yield-attributing traits. Enormous variability was observed in the plants for all the traits under consideration. The crosses viz., G-11 x JS335 (27.78 g) and JS 97-52 x JS 335 (22.50 g) had highest mean seed yield amongst all. Plant with highest seed yield (82.7 g) was also recovered from the cross JS 97-52 x JS 335. Plants from the cross JS 335 x EC 656641 were the earliest to mature (92 days) as compared to rest of the crosses. An eight parent based multi-parent advanced generation intercross (MAGIC) population was developed by intercrossing four popular high yielding varieties namely, JS 335, JS 95-60, NRC 37, NRC 86 and four promising high yielding exotic lines EC546882, EC333901, EC572109 and EC572136 in order to accumulate and analyze quantitative trait loci (QTL) for yield and yield-attributing traits. A total of 544 F<sub>2</sub> plants derived from eight way hybrids i.e., [EC546882x NRC37] / [EC333901 x NRC86] X [EC572109 x JS95-60] / [EC572136 x JS335] were multiplied for further genetic studies. Analysis of six combinations of 4-way intercrosses-derived 1641 F<sub>3</sub> individual plants for yield and attributing traits indicated creation of higher variability for the target traits. Plants from the cross [EC546882 x NRC 37] X [EC572136 x JS 335] recorded highest population mean for seed yield per plant (19.29 g) with mean maturity duration of 105 days. The highest seed yield per plant (54.10 g) was recorded in the plants from the cross [EC546882 x NRC 37] X [EC333901 x NRC 86]. The NAM and MAGIC population developed in this study will constitute useful genetic material for genetic improvement of soybean in India.