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FACILITATING DISTINCTNESS, UNIFORMITY AND STABILITY TESTING OF SOYBEAN VARIETIES: ESTABLISHING CRITERIA FOR THE USE OF SINGLE NUCLEOTIDE POLYMORPHISM DATA

*Document prepared by an expert from the Seed Association of the Americas (SAA)*

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It is becoming increasingly challenging to evaluate the Distinctness (D), Uniformity (U), and Stability (S) eligibility criteria for the grant of Plant Breeders' Rights (PBR) for varieties of soybean [*Glycine max* (L.) Merr.]. Challenges include a relative lack of morphological differences, correlated expression patterns among different characteristics, and the inability of some expressed characteristics to reveal genetic differences. Difficulties are compounded by Genotype x Environment (GxE) interactions affecting expression of characteristics and burgeoning reference collections. Several concerns have been raised regarding the use of DNA data in DUS testing. We addressed these concerns through the examination of associations among 187 publicly available U.S. soybean varieties with expired PBR certificates using Single Nucleotide Polymorphisms (SNP) BARCSoySNP 6k profiles, pedigrees, and morphological data. We propose a 96% similarity SNP threshold, below which SNP data will be considered as grounds for distinctness, although varieties >96% similar with distinct morphological or physiological attributes would continue to be declared distinct. We also examined levels of intra-variety SNP heterogeneity (mean 1.8% SNPs) and conclude that breeding strategies and comparisons of readily observable morphological characteristics have resulted in levels of residual SNP heterogeneity that are consistent with the ability to stably reproduce soybean varieties.

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