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A soybean germplasm evaluation study for agronomic, disease, and seed quality traits in Rwanda

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The Government of Rwanda has designated soybean a priority crop through its crop intensification program (CIP) under the Ministry of Agriculture. Soybean is cultivated in the East, West and Central regions of Rwanda and contributes to food security and combating malnutrition. There currently exists a need to develop improved soybean varieties that are adaptable, and meet quality and agronomic attributes for small holder farmers in Rwanda. The objectives of this study are to a) develop a genome-wide association mapping study for seed composition and agronomic traits, b) understand and quantify U.S. soybean adaptability in Rwanda, and c) develop KASP SNP markers for known soybean rust resistance genes. In the 2016 season (Sept-Feb), 1007 diverse plant introductions (PI) ranging from MG III to MG X, were grown in Rwanda to determine the most useful PI's to be grown in a replicated, multiple year and location field experiment during the 2017 and 2018 seasons. Phenotype data such as seed color, protein and oil content, plant height, maturity date, flowering date, lodging, and seed weight were collected. 492 of the best performing lines were selected for a genome-wide association study (GWAS) using the publicly available 50K SNP chip and whole genome sequence data. Of the 492 lines selected, 147 have elevated protein, 109 have elevated oil and 103 contain previously identified rust resistance genes. We shall simultaneously conduct an adaptability study to determine suitable germplasm for the Rwanda environment of 1000-1500 meters above sea level, 2° 36' S, 29° 44' E, annual rainfall of 800 – 1000 mm and temperature ranging from 18 °C to 24 °C. Kompetitive Allele Specific PCR SNP markers are to be developed for known rust resistance genes for use in marker assisted selection. This germplasm set will serve as a source for agronomic, disease resistance and seed composition traits to Rwanda and the East African region.