Field Phenotyping of Biotic and Abiotic Stress in Peanut for Increased Genetic Gains in Ghana.

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Peanut is an essential crop in Ghana with subsistence and commercial value. However, production is limited by a myriad of abiotic and biotic factors. Current breeding methods such as genomic and marker assisted selection have tremendously contributed to overcoming these challenges, but the lack of accurate phenotypic data reduces their usefulness. Application of sensor technologies for phenotyping may overcome the flaws of conventional phenotyping through multi-trait evaluation and automatic measurements. As a first step of sensor technologies use in peanut breeding in Ghana, this work reports on the genetic variability for abiotic and biotic stress responses using sensors and conventional phenotyping. An experiment targeting abiotic stress phenotyping was conducted under irrigation using six contrasting genotypes for drought tolerance. A second experiment, targeting biotic stress phenotyping, included 60 genotypes selected from the African germplasm collection planted at Nyankpala and Fumesua. Data on plant density, seedling vigor, plant height, canopy width, days to 50% flowering, leaf area, disease severity, canopy temperature, chlorophyll content and fluorescence, and days to maturity, was taken using sensor and conventional phenotyping techniques. The data was analyzed using R statistical package. It is expected that, a high-throughput protocol for phenotyping will be developed for enhanced genetic gains in peanut breeding.