

## Screening for Amino Acid Content in Peanut (*Arachis hypogaea* L.) Using Raman Spectroscopy.

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Nutritional enhancement of plant-based proteins is becoming increasingly important in the quest to feed our increasing population. Peanut is an excellent protein source but is lacking in the amino acids Lysine and Methionine. Although produced at low levels these two essential amino acids (EAA) are in amount below nutritional requirements. We are using Raman Spectroscopy (RS) to compile chemometric fingerprints of the Texas A&M AgriLife wild and cultivated germplasm collection. Raman Spectroscopy is a noninvasive, nondestructive laser-based scan that provide phenotypic information. Raman spectroscopy uses a laser to interact with the chemical bonds present in the sample. The initial phase of the project involves collecting spectra from cultivated breeding lines ( $2n=4x=40$ ) and validating the amino acid content using Gas Chromatography-Mass Spectroscopy (GC-MS). Once RS is correlated to GC-MS in cultivated germplasm, we will collect additional scans from wild *Arachis* accessions ( $2n=2x=20$ ) to validate the finding in the diploid relatives. The final portion of phase one will be screening our entire germplasm collection for elevated levels of the limiting EAA. Phase two of the project will be to determine where the genetic pathways in question are affected to develop a plan for incorporating the trait into cultivated germplasm. We will then use traditional introgression, Marker Assisted Selection, Raman Based Selection or Gene Editing to transfer the elevated EAA levels into elite breeding material.