Use of the Crop Circle™ sensor to estimate peanut (*Arachis hypogaea* L.) best maturity time for harvesting

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ABSTRACT

The peanut (*Arachis hypogaea* L.) is a subterranean crop and a very important crop for USA. This fact makes it visually impossible to estimate the best digging time for crop harvesting. Various techniques are used today including visual observation of the pods, sampling and modern technology as means to predict the best time. This study aims to present a technological tool useful to farmers which can aid them in selecting the most appropriate time to harvest their crops.

The specific objective of this study is to use the CROP CIRCLE™ sensor to estimate the best maturity time for harvesting peanuts, based on Normalized Difference Vegetation Index (NDVI) measurements, as well as potential yield for peanuts. A field experiment was conducted at Tifton, GA, USA to evaluate 10 peanut varieties, under two planting dates. The sensor was used to record the NDVI and was regressed with visual peanut samples, using the Peanut Profile Board, taken at the same time as the sensor readings. The results of simple linear regression analysis provided good insight and the relationships developed present valuable methods for farmers to use in order to save time and other costs associated with harvesting. Finally, equations were developed that can predict the maturity stage of peanuts, or to estimate the time peanuts will be ready to harvest.

This study provides food for thought for many similar future projects and applications in other crop species, and recommendations for future project improvement are stated below. The first recommendation is addressed to farmers, who cultivate peanuts, to use the provided equations, or justify them according to their peanut cultivars or to other similar studies. Farmers can benefit and it would be also wise to examine the degree to which those equations are reliable, by independently testing them in their own fields and conditions.

The second recommendation concentrates on other people conducting similar experiments. Future experiments can be improved by examining more details about the weather conditions and the environment, as well as other properties such as soil texture and moisture, fertilizer application, etc. By examining more factors in a project, there are more possibilities for these projects to be correct and highly accurate. Multiple regression equations can then be developed and evaluate more variables, to predict yield and/or maturity.

The third recommendation is a more general one, and suggests that since maturity and yield of peanuts can be predicted by NDVI, other crops' properties can be predicted as well. In other words, scientists and experiment conductors can examine if NDVI is related to other crops (local or not) such as tomatoes, oranges, and other fruits and vegetables.