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Nitrogen Distribution Analysis for All Seeds of Cowpea (*Vigna unguiculata*) Using Single-Seed near Infrared Spectroscopy

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Abstract

Cowpea is an important crop for food security, as it is a primary source of protein and cash income for farmers in the dry savannah areas of sub-Saharan Africa. Improved varieties should contain reasonable amounts of protein in the grains, and to ensure this, timely and cost-effective analytical methods are strongly required. Recently, a procedure for estimating the cowpea grain nitrogen (protein) content in single seed using near infrared (NIR) spectroscopy was developed. The technique was able to estimate nitrogen content in intact seed within 20 sec. It was expected that the developed technique would be able to evaluate the protein content in new varieties and/or for nutritional screening in cowpea breeding program. However, nitrogen distribution in a plant is still poorly understood. In this study, evaluation of nitrogen content with all seeds in one plant was performed using single seed NIR technique. A total of 4,005 seeds were collected from five plants (Tvu456) according to location information, such as a peduncle position node, number, and position of seed in the pod. Then, nitrogen content of each seed was evaluated. Average seed number was 801±487.1, maximum seed number was 1600 and minimum seed number was 373 per plant. Average nitrogen content was 3.79±0.53 %N, and maximum and minimum N% were 6.52 and 3.42 per seed, respectively. Nitrogen content had positive correlation with seed weight and the seed weight varied widely (average:112.6mg±88.5). However, it was thought that there was no particular relation between N content and node position or seed position in the pod. These relationships will be discussed in the presentation.

Keywords: Cowpea, near infrared spectroscopy, nitrogen content, protein content, single-seed measurement

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