

IDENTIFICATION OF MUNGBEAN (VIGNA RADIATA (L) WILCZEK)  
COWPEA (VIGNA UNGUICULATA (L) WALP) AND SOYBEAN  
(GLYCINE MAX (L) MERRILL) VARIETIES BY MORPHOLOGICAL  
CHARACTERISTICS AND STARCH GEL ELECTROPHORESIS

By

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SRI LANKA

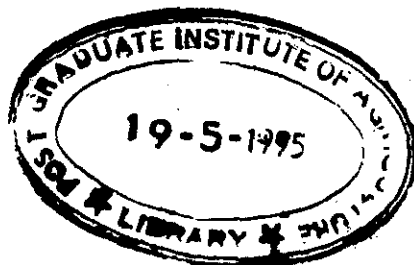
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## ABSTRACT

Grain legume crops are a major source of dietary proteins through out the world. In Sri Lanka mungbean, cowpea and soybean are considered as major legumes.

With the introduction of new cultivars of grain legumes in the seed industry, development of rapid and reliable methods for cultivar identification became essential. Therefore, the objectives of this study are to 1) Characterize mungbean, soybean and cowpea cultivars using morphological characteristics and isoenzyme techniques and to 2) Use these characteristics to develop testing system to identify mungbean, cowpea and soybean cultivars.

This study consists of two parts, a field experiment and a laboratory experiment. The objective of the field experiment was to examine morphological differences in plants and seeds of 16 mungbean, 10 cowpea and 10 soybean cultivars available in Sri Lanka to obtain characters that are useful in identifying them. In the field experiment three qualitative morphological characters (flower, hilum and seed coat colour) and six quantitative morphological characters (seed weight, plant height, pod length, number of pods per plant, number of seeds per pod and number of trifoliolate leaves per plant) were examined to differentiate cultivars in each species.

Qualitative morphological characters( seed coat colour, hilum colour, and flower colour ) and three quantitative morphological characters (seed weight, pod length and plant height) were useful in cultivar differentiation for cowpea and soybean cultivars examined. Six out of ten cowpea cultivars could be distinguished solely by qualitative morphological characters examined and other four cultivars could be divided into two groups containing two cultivars in each group. Five out of 10 soybean cultivars could also be differentiated by these qualitative morphological characters. However mungbean cultivars could not be identified or differentiated using these three morphological characters.

By combining quantitative morphological characters such as seed weight, pod length and plant height with the qualitative morphological characters all the cowpea cultivars could be identified and soybean and mungbean cultivars could be categorized into groups.

The purpose of the laboratory experiment was to examine the possible use of electrophoresis in identification of soybean, cowpea and mungbean cultivars. Starch gel electrophoretic technique was used to analyze extracts prepared from young leaf tissues of seven days old seedlings of each cultivar from each species grown under green house conditions.

The potential use of electrophoresis was assessed by identifying variability of different isoenzymes among soybean, cowpea and mungbean cultivars. Distinct variety specific zymograms were observed for several enzymes. Unique combination of isozymic variants of two to four enzyme systems assayed differentiated all the cultivars in each species studied. Moreover, every enzyme is not necessary to separate all the cultivars examined. However, if more varieties are to be identified all the enzyme systems may be required to differentiate them. Thus, isozymic banding patterns for these enzymes can be used as an additional characteristic for cultivar identification.

Results in this study suggested that sufficient variability present in soybean, mungbean and cowpea cultivars to allow the isozyme electrophoresis as a system for cultivar identification. Since the electrophoretic zymograms were stable varietal characteristics, it could be used in varietal identification complement to the morphological characters.