MORPHO-PHYSIOLOGICAL CHARACTERISATION OF BAMBARA GROUNDNUT (*Vigna subterranea* L.) LANDRACES COLLECTED IN MPUMALANGA PROVINCE

BY

SELWANA MICHAEL MAGONGWA

(11629556)

DISSERTATION

Submitted in fulfilment of the requirement

For the degree of

M.Sc. Agric IN THE DEPARTMENT OF PLANT PRODUCTION

SCHOOL OF AGRICULTURE

UNIVERSITY OF VENDA

SUPERVISOR: Prof JBO Ogola

CO-SUPERVISOR: Mr C Mathews

AUGUST 2016

ABSTRACT

Bambara groundnut (*Vigna subterranea* [L.] Verdc.) has a large number of landraces throughout Africa partly because of its drought tolerance. The study was aimed at evaluating genotypic variation of landraces collected in Mpumalanga Province.

The study comprised of two experiments, pot experiment (Experiment I) and field trial (Experiment II). Experiment I was conducted in rain shelter at the University of Venda, Thohoyandou (latitude 22°58´S and longitude 30°26 ´E; 596 m above sea level), Limpopo Province. The experimental design was a split-plot, with watering regime being the main factor and landrace being the sub-plot, arranged in a randomised complete block design with three replicates. Experiment II was conducted during summer 2013 to 2015 involving 27 bambara groundnut landraces (Nkomazi-1, Zm-1, Bushbuckridge-1, MPB 51, Sb7-1, Bosfontein-1, Msholozi-1, Zm-4, Ntunda-1, Sandriver-1, Matsulu-1, Nkangala-2, Msholozi-2, Sandriver-3, Mashishing-3, Brianbeck-2, Zm-6, Ntunda-2, Matsulu-3, Nkangala-3, Mashishing-2, Brainbeck-3, Zm-5, Ntunda-4, Sandriver-2, Msholozi-3 and Mashishing-4. The field experiments were laid out in Randomised Complete Block Design (RCBD) with three replications at two sites. The landraces were collected from the following places: Bosfontein (1), Bushbuckridge (1), Mashishing (3), Matsulu (2), Nelspruit-LRU (8), Msholozi (3), Nkangala (2), Nkomazi (1), Ntunda (3) and Sandriver (3). In experiment I, leaf chlorophyll content and stomatal conductance were measured and experiment II the following traits were measured days to 50% emergence (50% DTE), days to 50% flowering (50% DTF), number of leaves per plant, 100 seed weight, dry pod weight, crop biomass, number of seeds per pod and grain yield.Highest chlorophyll content levels were observed in landraces ZM-4 (35.5 mmol cm^{-2} s^{-1}) and MPB 51 (35.3 mmol cm^{-2} s^{-1}) at week 3. The effect of watering regime on stomatal conductance was significant in 3rd week but not in 1st and 2ndweek. The highest stomatal conductance was observed at high watering regime while the lowest was observed at low watering regime. Days to 50 % emergence, days to 50% flowering varied with landraces in Mzinti and at Nelspruit, and number of leaves per plant generally did not differ in landraces. Bambara groundnut landraces significantly influenced ($P \leq 0.001$) 100 seed weight at both locations. The study showed variation among landraces in days to emergence, days to flowering, dry biomass and 100 seed weight.

Good performance of the landraces Sandriver-2 and Matsulu-3 across all ecological regions makes them suitable for further research under stress conditions and future climate change scenarios.