

Soybean Yield Determinants and Response to Rhizobial Inoculation in an On-farm Trial in the Northern Guinea Savanna of Nigeria

J.A. Okogun^{1,2*}, B.T. Otuyemi¹, and N. Sanginga^{3*}

¹Agronomy Department, University of Ibadan, Ibadan, Nigeria.

²International Institute of Tropical Agriculture (IITA) PMB 5320, Ibadan, Nigeria.

³Present address: TSBF-CIAT, United Nations Avenue P O Box 30677, Nairobi, Kenya

*Corresponding author

Abstract

The response of two soybean varieties (Samsoy-2 and improved variety TGx 1448-2E) to *Bradyrhizobium* inoculation in the northern Guinea savanna of Nigeria was tested in a researcher-managed on-farm trial. There were variations in soybean yields between and within farmers' fields. Data obtained from 24 farmers' fields were analysed in a mixed model analysis of variance whereby the variance of the random component was estimated using Gaussian restricted maximum likelihood. Five major soil components recognised to contribute to the yield determining factors of the soybean varieties were as follows: (a) effective cation exchange capacity (ECEC), (b) silt and phosphorus, (c) acidity (d) soil total nitrogen and (e) salinity. The coefficient of determination in a stepwise regression analysis gave (R^2) up to 0.23 ECEC > silt and phosphorus > acidity > total nitrogen > salinity. Thus, some acceptable levels of cations in the soil are necessary for soybean establishment and BNF in farmers' fields. Inoculation of the Samsoy-2 variety did not have significant effect on the vegetative parameters (shoot, root, nodule number and shoot and nodule fresh weight) measured. This showed that the native rhizobial population was adequate for soybean nodulation. However, significant effect of the inoculated strain was observed only in the root biomass of the improved variety. While inoculation of the Samsoy-2 did not have significant effect on biological nitrogen fixation (BNF) and grain yield, the BNF and grain yield of the improved variety were significantly higher than the farmers' local variety showing that varietal differences masked the effect of inoculation.

Introduction

Production of soybean is rapidly taking a centre place among cereals and grain legume productions in the moist savanna zone (MSZ) of Nigeria. This stems from the fact that it is rapidly becoming a major food as well as an industrial crop in Nigeria (Brader, 1998). The growth in area of cultivation and

increase in the yield is due to the result of farmers' adoption of newly bred soybean varieties at the IITA. These varieties that store well, do not require expensive inputs such as high nitrogen fertilizer needed by maize or pesticides spraying on cowpea to sustain production.