Tropentag, September 18-21, 2016, Vienna, Austria

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Preliminary Characterisation of Soybean Nodulating Rhizobia from Ethiopian Soils

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Abstract

Soybean (*Glycine max* (L.) Merrill) is one of the most important crops in the world today. It is considered to be a miracle crop as it is extraordinarily rich in protein (40 %) and oil (20 %). However, it is a relatively new crop for smallholder farming communities in most African countries, gaining popularity as a consequence of the increasing need for food and fodder. The introduction of soybean to Ethiopia dated back to 1950s, but it was soon abandoned due to low yields. The real production was started later in the 1970s with the introduction of high yielding soybean varieties from Europe and the USA. However, the national average yield (1.4 t ha^{-1}) is very low compared to the potential yield of the crop. This may be due to several reasons of which poor soil fertility or lack of compatible rhizobia could be one. Previous studies showed that soybean response to rhizobia inoculation is very high in many locations. However, knowledge about the diversity and symbiotic efficiency of rhizobia nodulating soybean in Ethiopian soils is scanty. Soybean rhizobia were trapped using two soybean varieties; Awassa-95 and Clark-63K and one cowpea variety (Bole) from major soybean growing soils in Ethiopia. These isolates were characterised on the basis of colony morphology, tolerances to extremes of temperature, salt and pH, ability to grow on different carbon and nitrogen sources and resistance to different heavy metals and antibiotics. The majorities of the isolates were slow growers and produced alkaline reaction in YEMA medium containing bromothymol blue. The isolates were diverse with respect to their physiological and biochemical properties as well as their symbiotic effectiveness. The majority of the isolates were sensitive to salinity and unable to tolerate more than 0.8 % NaCl which is a characteristic of slow growers. Most isolates were able to grow at pH ranging from 4 to 9.5 and grew at a maximum temperature between 35 and 40 °C. Some of the isolates with an outstanding symbiotic performance were identified, and will be tested under field conditions in a search for efficient and competitive strains for use in commercial inoculants in Ethiopia.

Keywords: Biochemical characterisation, Ethiopia, rhizobial isolates, slow growers, symbiotic efficiency

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