

## ABSTRACT

Crude oil extraction in South Sudan started in the year 1999 and covers an estimated area of 1,834,000 ha currently producing about 198,000 - 290,000 barrels per day. It is estimated that over 730,000 ha of Sudd wetland are contaminated with crude oil. Incidentally, the ordinary citizens subsist of agriculture for livelihood. Globally, green technologies such as bioremediation are encouraged for rehabilitation of PHC contaminated soil. This study determined: i) plants species abundance in PHC contaminated soil for selection of phytoremediation species; ii) the capability of native plants species for enhancing soil bioremediation; iii) biostimulation rate of cattle manure for enhancing phytoremediation, and iv) rhizobacteria community contributing to bioremediation. The study sampled three land use types (oil drilled, cultivated and natural) for plant species and soil samples (objective 1) and screen house experiments (objectives 2 to 4). There were 23 herbaceous plant species in the sampled fields but only six (*Sorghum arundinaceum*, *Oryza longistaminata*, *Hyparrhenia rufa*, *Nicotiana tabacum*, *Gossypium barbadense* and *Abelmoschus ficulneus*) dominated PHC contaminated field. Petroleum hydrocarbon contamination at concentration of 45,097 mg kg<sup>-1</sup> was detected at distance 5 km from the drilling points. Most plant species could not tolerate over 00 g kg<sup>-1</sup> PHC in screen house experiment. Plant species *H. rufa* degraded about 74.4 % of PHC in soil (from 75 g kg<sup>-1</sup>) followed by *G. barbadense* (66.3 %), *O. longistaminata* (56.2 %), *T. diversifolia* (55.9 %), and *S. arundinaceum* (50.2 %). Biostimulation with cattle manure at 5 g kg<sup>-1</sup> significantly increased biodegradation of TPHs. Pyrosequencing of 16S rDNA generated 5 million reads and 3927 OTUs. There was abundance of bacteria community in manure treated hydrocarbon contaminated soil as shown by the Chao1 values (*H. rufa*, 10310; *T. Diversifolia*, 9795 *barbadense*, 9540; *O. longistaminata*, 9168; and *S. arundinaceum*, 8260). Rhizobacteria genera *Immundisolibacter*, *Luteimonas*, *Pseudomonas*, *Sphingomonas*, *Mycrobacterium*, *Rhodococcus*, *Bacillus* and *Fusibacter* were more prevalent in hydrocarbon-contaminated soils. In conclusion, plant species *H. rufa*, *T. diversifolia*, *G. barbadense*, *O. longistaminata* and *S. arundinaceum* biostimulated with 2 t ha<sup>-1</sup> of cattle improve bioremediation of PHC contaminated soils in Sudd region of South Sudan.