Managing Salinity: an Adaptive Approach to Balance Salts and Nitrogen Leaching

P. Munguambe[a*], M. Chilundo[a]

[a]Department of Rural Engineering, University Eduardo Mondlane, Maputo 257, Mozambique

*Corresponding author e-mail: kensydoge@yahoo.com ; paiva.munguambe@uem.mz

In arid and semi-arid areas of Africa where about 70% of the rural population depend on agriculture for their livelihood, the human impact on land degradation processes through integrated irrigation and fertilization practices aggravate the declining crop production. In the Chókwè Irrigation Scheme (CIS) in Southern Mozambique, the soil degradation is mainly due to a combined effect of primary salinization, rudimentary irrigation programmes, mismanagement of crop rotation and fertilizers. This paper aimed to assess the impact of different nitrogen and water management practices on maize yield (cultivar PAN 67) under different soil salinity conditions in the CIS. An adaptive approach was followed to monitor nitrogen and salinity leaching under field conditions, and the experiment was conducted during the dry and wet seasons in 2007. The nitrogen treatments comprised of 100 & 200 kg ha^{-1} and were wisely applied (topdressing) throughout the growing season. The two irrigation water treatments consisted of a calendar basis and another on measured soil water deficit using a Time Domain Reflectometer and WinProbe. A set of Wetting Front Detectors (WFD) was installed at three different depths (20, 30 & 45 cm) in each plot to monitor salinity and nitrate in the drained soil solution. The adaptive approach was applied when the measured salt content in the shallower WFD (20 cm) under the water deficit treatment plots was found to be greater than 400 mS m^{-1}. Then a backward calculation to find the respective leaching fraction was followed. The experimental plots were arranged in a randomized complete block design (2x2 factorial) with three replications under none, moderate and saline soil conditions. The preliminary results indicated that the final grain yield of the none-saline plots (~10 ton/ha) was twice the yield under saline conditions (~4.8 ton/ha) in both seasons. The impact of nitrogen application rates and the water treatments on the final yield was not significant. Both nitrate and salt contents tend to decrease along the growing season as a result of the leaching process. Therefore, the use of an integrated and adaptive approach for both salt and nutrient management was found to be relevant in mitigating the nutrient leaching under salinity conditions.

Keywords: adaptive approach, soil salinity, salt and nitrogen leaching, WFD, water management

Targeted Sub theme: Water and Land
Type of Presentation: Oral and poster