



## **Improving water use efficiency of wheat (*triticum aestivum* L. Giza 168) crop using <sup>15</sup>N tracer technique under Egyptian environment**

Eman IBRAHIM REFAIE EMARA (1), Lamy MAMDOH MOHAMED HAMED (1,2), Stefano BOCCHI (2), and Yehia GALAL (3)

(1) Faculty of Agriculture, Cairo University, Agronomy Department, Giza, Egypt, (emanrefaie@gmail.com), (2) Department of Agricultural and Environmental Sciences, State University of Milan, Italy, (lamy.hamed@unimi.it, stefano.bocchi@unimi.it), (3) Atomic Energy Authority, Nuclear Research Center, Soil and Water Research Department, Abou-Zaabl, Egypt, (galalyehia@yahoo.com)

The Mediterranean environment is characterized by low and erratic rainfall amount which varies between (200–600 mm.year<sup>-1</sup>), and characterized also by high temperature which increase the rate of evapotranspiration from the cultivated soil. Under these conditions which have a great influence on crop production, there is a great needing to increase the crop water use efficiency. In this context, two field experiments were carried out in northern Cairo–Egypt, during November and December 2012 and April 2013, with two different textured soils. The soil in the first location (30° 16' N latitude, 30° 56' E longitude) is clay soil, while in the second one (30° 24' N latitude, 31° 35' E longitude) is sandy soil. The interaction effect of soil types, soil water regimes, nitrogen fertilizer application rates and timing on nitrogen balance of soil were studied, in terms of nitrogen gained by plant portions, remained in soil and losses through different ways for the wheat crop (*Triticum aestivum* L. Giza 168). The aim of this research is to increase the water use efficiency of wheat crop, in addition to identify the most proper and effective combinations of above–studied variables that provide a satisfactory grain wheat yield and finally to minimize the use of chemical nitrogen fertilizers.

Three water regimes (100%, 75% and 50% of crop water requirements) using drip irrigation system and the application methods of Nitrogen rates, 100%, 80% and 60% of recommended rates, which are 178 Kg of Nitrogen for the clay soil and 238 Kg of Nitrogen for sandy soil, were applied to the two experimental fields. Ineed, two modes of agricultural management, mode A and B, were applied. Each mode is different than the other in terms of seedling and tillering practices, where mode A performed with 25% at seedling, 25% at tillering and 50% at jointing while mode B performed with 35% at seedling and 65% at tillering.

The greatest limitation to growth and Nitrogen use efficiency was the amount of water supply. Wheat grain was dictated by the extent to which the 75% of crop water requirement had applied as well as the best nitrogen use efficiency had been recorded with 80% of recommended rate of nitrogen using mode A in both clay and sandy soils. It was obvious that the most efficient use of Nitrogen fertilizer by grains was occurred under 75% of crop water requirements comparable to other water regimes. As a result, there was no big significant difference between the two modes A and B of Nitrogen application.