**Stabilized ammonium versus nitrate nutrition of plants reduces crop water consumption toward more water saving**

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**Abstract**

Water is the main limiting factor for agricultural production in Iran as well as in many parts of the world. Global warming (higher temperatures) accompanied by low precipitation rates impose high pressure on underground water resources in many parts of Iran, as digging the soil down to 400-700 miter is being a common practice among farmers. So, wise application of water and cropping management toward increasing water use efficiency are the major priorities. On the other hand, nitrogen is the major essential nutrient in plant growth and production. Nitrogen forms (ammonium versus nitrate) could have important physiological and morphological consequences for plants. The aim of this study was to evaluate effects of ammonium versus nitrate nutrition of tomato and pepper plants on transpiration and water consumption in both nutrient solution and soil culture systems under controlled conditions.

The result of different experiments showed that tomato and pepper plants grown in ammonium or in nitrate had different pattern of transpiration and water consumptions. Compared to ammonium, nitrate led to higher water consumption in both crops and under hydroponic and soil cultures. In nutrient solution, when plants were supplied with nitrate at concentrations of 1, 2, 4 and 8 mM N-NO3, water consumption increased in trend with increasing nitrate concentrations, while ammonium-fed plants (buffered with CaCO3) resulted in a significant reduction of water consumption, regardless of ammonium concentration. Similarly, in soil using stabilized ammonium nutrition (by application of ammonium with 3,4-dimethylpirazole phosphate; DMPP, as a standard nitrification inhibitor) a significant reduction of water consumption compared to nitrate grown plants was observed. In both hydroponic and soil system, nitrogen concentrations and chlorophyll contents were significantly higher in ammonium compared to nitrate grown plants. Nitrate reductase activity was also inhibited under ammonium nutrition, and the activity of this enzyme could be used as a good indicator of water consumption of plants. In conclusion, stabilization of ammonium in the soil (preventing microbial ammonium oxidation) using different natural and synthetic nitrification inhibitors could significantly reduce water requirements of plants which is very important in agriculture in many semi arid and arid parts of the world.

**key words**: nutrient solution, ammonium, nitrate, nitrate reductase, DMPP