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Opinion

Using of Antitranspirants to Reduce Transpiration in Semiarid and Arid Areas

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Soil water deficit and excessively high temperature are two of the most common yield-limiting factors in crops in semiarid and arid areas of the world. The main objectives in many studies have been to improve growth and yields by reducing the effects of drought and making agricultural water use more efficient. The amount of water vapor lost to the environment accounts for 99% of the plant water uptake and makes little direct contribution to plant growth [1,2]. In arid and semi arid areas actively growing plants would transpire water equal to its weight each hour if water is supplied adequately [3]. Plant tolerance to drought results from both morphological adaptation and responses at biochemical and physiological levels [4]. Different mechanisms contribute to drought resistance in plants such as avoidance of water deficits by drought escape, water conservation, and more efficient water uptake [5]. Thus, plants close their stomata apparatus and modulate their leaf area, and thereby adjust the loss of water from the canopy [6]. Stomatal control is the first and most important step in response to drought, as stomatal conductance reduces the rate of water loss and slows the rate of water stress development and minimizes its severity [7]. Photosynthesis is strongly affected by water shortage as a decrease in stomatal conductance reduces the CO_2 assimilation [8].

Water is also lost to the atmosphere through transpiration and the potential for reducing transpirational water loss without significantly reducing photosynthetic rate is based on the premise that resistance to the movement of carbon dioxide in the mesophyll is greater than the stomatal resistance that limits water loss to the atmosphere. Application methods using antitranspirants have been proposed to reduce water loss and enhance the water status of plant.

Davenport., *et al*. (1971) have pointed out that there are three types of antitranspirants, either a waxy compounds which form a waxy layer above the plant leaves surface and close stomata apparatus completely or partially close, or chemical compounds that control the movement of stomata apparatus and prevent the full opening, and the third type reflect the radiation of the leaves and reduce the temperature of the leaves, and the first type is the most one applied in the field, including paraffin wax, emulsified oils, strong alcohol, silicon and plastic substance.

In Iraq we use some antitanspirants to decreased water stress effect on potato plants. Kahlel [9] found that foliar application of liquid paraffin at 2% concentration significantly increased the TWC (Total Water Content) and total chlorophyll content in leaves, yield quantity parameters (tuber number, tuber weight, marketable and total tuber yield). Also spraying liquid paraffin reduced the damage effect of water stress in drought plants.

Also Kahlel 2015 applying four antitranspirants substances, namely (MgCO3, 3g/L, liquid paraffin 2%, Nu-film 17, 1% Kaolin 5 g/L.).

The results showed that spraying potato plants with liquid paraffin 2% led to the highest total water content (83.37%), stomata area (1.466 µm2/stomata), the lowest relative transpiration (0.152%), the lowest leaf water deficit (20.33%) the highest plant yield (509.22 g), total yield (24.236 tons/ha), marketable yield (22.770 tons/ha) and water use efficiency (11.83 kg/m^3).

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Volume 3 Issue 8 Augut 2019