I- INTRODUCTION

Water plays an important role as a constituent of the plants solvent, reagent and maintenance of cell turgidity as well as a media for the different biochemical reaction in the living organisms. In fact, in countries as Egypt where water and food are both in short supply, farmers are obliged to learn to use water in the most efficient possible way to get maximum production from each unit of water and each unit of land on scientific bases.

Almond is one of some new cultivars recently introduced to Egypt and cultivated in new reclaimed areas with high acreage. Therefore, the aim of this investigation was to study the effect of different levels of irrigation water and determine water use efficiency of Ne plus ultra, its acreage ranks about 15944 feddan with a total production of about 22292 tons according to the latest statistics of Ministry of Agriculture in 2009*.

Large areas of the world are classified as arid or semi-arid zones. So, expansion of irrigated agriculture (about 15 % of the world agricultural land) has been proposed by some as a possible solution to growing food shortage in many parts of the world (**Deaument, 1993**). Conventional agriculture has received a great deal of attention in term of developing best management practices for improving no-farm water use efficiency (**Hassan and Seif, 1997**). The goal of irrigation is to determine accurately crop water use and to water application with these requirements in timely manner.

Water is fast becoming an economical score resource in many areas of the world especially in arid and semiarid regions. In Egypt, water is considered as a limited resource because of increasing population. Moreover, water is one of the most

* Horticultural situation and outlook, A.E.C.A., Ministry of Agriculture, June, 2009.

important components in biological systems (**Salisbury and Ross, 1985**). Maximizing the use of irrigation water is essential for increasing of irrigation water demands (**Brown, 1999**).

Drought or plant water stress is usually due to the dominance of one of two factors or both of them. First, excessive water loss which is primarily controlled by transpiration and second, due to inadequate water absorption which is controlled by the extent and the efficiency of the root system as well as by the water potential of the soil and its hydraulic conductivity. Water stress certainly affects every aspect of plant growth, modifying its anatomy, morophology as well as the different physiological and biochemical processes. Some of the effects are related to the decrease in turgor and some are caused due to the decrease in osmotic potential (**Crafts, 1968 and Kozlowski, 1968**).

Wright and Stark (1990) revealed that, plant growth and development retarded when water supply as restricted. **Hussein (2004) and Ismail *et al.*, (2007)** on pear as well as **Kandil and EI-Feky (2006)** on apricot used 40, 60, 70 or 80 % field capacity (F.C.) and obtained the best growth parameters and yield components with 80 % F.C. Moreover, **Cathoun (1975)** found that, the increase in tension from zero to 0.33 bar released more than 75 % of water in light textured soil but less than 50 % in heavy ones. **Levin *et al.*, (1979)** pointed out that drip irrigation enables a restricted volume of wetted soil to be maintained with small fluctuations in water tension and with the development of a dense root system with minimum loss of water and fertilizers by leaching. Also, **Levin *et al.*, (1980)**, stated that, root distribution depended upon the volume of wetted soil, which was related to soil hydraulic conductivity, the rate and duration of water application.

There is little information on the water use and requirements of fruit tree species in new reclaimed areas and how water use affects vegetative growth, yield and quality of these species. However, the irrigation amount added to the fruit tree has affected vegetative growth (**Mass & Vander (1996) and Yoon *et al.*, (1996)**. Yield and quality (**Prazak & Janstan 1995, Maryam, 1998**). However, leaf chemical constituents are also affected with irrigation regime (**Yoon *et al.*, 1996**).

Water stress is an agricultural problem in many areas in the world. Transitory or constantly water stress cause an array of morphological, anatomical changes in plants, which affect plant growth and development and may lead to drastic reduction in economic yield, **Wahid *et al.*, (2007)**. Also, **A˜non *et al.*, (2004)** reported that although limited details are available, anatomical changes under water stress are generally similar to those under high ambient temperatures. At the whole plant level, there is a general tendency of reduced cell size, curtailed water loss and increased trichomatous densities and greater xylem vessels of both root and shoot.

This present investigation aimed to study the effect of different irrigation rates on some vegetative growth measurements, leaf and root mineral composition and histiological study of Ne plus ultra almond budded on bitter almond and Nemagurd peach rootstock.

On the other hand, the anatomical of studies in roots of Nemaguard peach and Bitter almond rootstocks at different levels of water stress and also stem and leaf of Ne plus ultra almond which grafted on the two rootstocks were investigated to show the best & suitable level of water treatment and best rootstock in the present study.