INTRODUCTION

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Citrus is one of the major fruit crops of the world and ranked second after grape production. Also, it is considered to be the first crop in fruit production in Egypt.

According to the 2005 statistics inventory of the Egyptian Ministry of Agriculture, the total acreage of citrus was (364798) Feddans in A.R.E., representing about (32.12 %) from total area occupied by fruit crop. Total area planted with citrus in Qalubia Governorate amounted 34525 Feddans, forming about (9.46 %) of the total citrus orchards of the country.

Among all citrus species grown in Egypt, Balady Tannarif orange is considered the most promising cultivars for local consumption or export. It is particularly good for fresh fruit market because the fruit is desirable by many people for its eating qualities as well as for proper development of physical health in both children and adults.

Recently in A.R.E. increased interest in the sweet orange exportation to many of the European and Arabic countries have enhanced its economic values. Increasing sweet orange exportation could be achieved by increasing the cultivated area and improving the quality of the production fruits.

The net income from citrus production is in closed relationship to fruit qualities, which play the great important role in determining the price. Moreover, the recently distribution of creasing disorder is one of the most prevailing

problems facing the citrus producer, which certainly reflected negatively on grading and marketing value of produced fruits.

Creasing consists of grooves of furrows in an irregular pattern in the rind. This disorder occurs on several types of citrus, most commonly on very mature fruit. Thin skinned fruit especially susceptible to creasing, as well as subsequent splitting. Creasing is thought to be related to a complex of preharvest factors but the causes are not fully understood.

Creasing also known as albedo breakdown, it is a rind disorder of some sweet orange cultivars and commonly develop post colour break. In this disorder, fractures develop within the albedo tissues continues to separate during fruit expansion. The rind develops localized undulations on the fruit surface. The major effect of crease is on the critical visual-appeal of the fruit in the fresh fruit market rather than the possibility of increased splitting of the fruit during handling and transport due to a reduction in the mechanical strength of the rind (**Gilfilian** and **Stevenson, 1977**). Factors associated with the incidence of crease were reviewed by **Holtzhausen, (1982)** and **Monselise *et al.*, (1976)**. The various listed factors included rind thickness; crop size; tree heredity; fruit position; climate; irrigation; nutrition and rootstock. However, others reported that the incidence of crease was not positively correlated, with crop load (**Treeby *et al.*, 1995**). They mentioned that rootstock strongly influenced the incidence of crease, being the lowest for

Bellamy navel orange grafted on sweet orange and highest for these grafted on Rangpur lime. As for the nutrition status, **Le Roux** and **Crous (1938)** indicated that low nitrogen has been associated with severe incidence of crease. However, **Jones** and **Embleton, (1967)** reported that P application aggravate the incidence of crease, but the effect of K is varied and may be indirectly linked to its effect on rind thickness (**Holtzhausen, 1982**).

From the various factors that play a dominant role in improving quality subsequently orange exportation is the creasing (puffing), which known as a physiological malady of citrus fruits characterized by irregular grooves on the fruits, probably due to climatic or soil conditions.

Egyptian "Balady" orange is the most tendant variety to this disorder. The outer symptoms of this physiological disorder is a peel defect which characterized by sunken furrows in the surface of the rind. There is no doubt that any treatments minimize this physiological disorder would be of great value to both the grower and consumer.

To date there no reported consistent correlations between the incidence of crease and nutrient level in affected fruits or in the rind of affected fruit. However, **Storey *et al.*, (2002)** have summarized the results of their work over a number of years (over two seasons), whereas the two latter seasons of their study coincided with the duration during which the present investigation was conducted on fruits with varied symptoms of crease have analyzed for nutrients in particular Ca. fruits collected from different sites (along

Australia) with different histories of disorder were analyzed for their rind and pulp K, Ca and Mg contents, besides the effect of rootstock on nutrient levels and incidence of crease were investigated. They investigated the key roles of low Ca and high K/Ca and Mg/Ca ratios in creased fruits through a nutrient trial was set up with young navel orange trees grown in large pots in a shade house whereas N, K and Ca supply was varied to identify nutrient regimes associated with the incidence of crease.

The present investigation was carried out as a trial to decrease creasing in the Egyptian "Balady" Tanarif orange. Consequently this work aimed to study the following aspects:

1. A comparative study including sound and creased fruits.
2. The effect of GA, P and K foliar spray treatments on the susceptibility of Balady orange Tanarif fruits to creasing.
3. The effect of water-deficit treatments on the susceptibility of Balady orange Tanarif to creasing.

Consequently, two experiments were conducted during both 2002/2003 and 2003/2004 seasons at the Horticultural Research Station at El-Kanater El-Khairia, Qaliobia Governorate Egypt.