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Effects of Seed Number on Fruit Characteristics of Tangerine

Saichol Ketsa[1]

ABSTRACT

A study on the effects of seed number on fruit size, fruit weight and peel thickness of tangerine (*Citrus reticulata* Blanco) was conducted. Number of seeds per fruit was significantly correlated with fruit size (diameter), fruit weight and peel thickness. The role of seeds was discussed in relation to the aspect of an active site to supply plant hormones.

INTRODUCTION

The relationship between fruit size and seed number in many kinds of fruit is well recognized. In apple, Alderman (1918) reported that larger size of apple was associated with greater seed numbers. Similarly, seed development is considered to have a marked effect on final size of grape (Darrow, 1941), blueberry (Olmo, 1946), cantaloupe (Mann, 1953) and tomato (Varga and Bruinsma, 1976).

Citrus fruit size can be affected by many factors, among which are fertilizer (Embleton *et al.*, 1956), soil moisture (Erickson and Richards, 1955), root stocks (Bitters and Batchelor, 1951), amount or crop (Caprio and Harding, 1955), climate (Jones and Cree, 1954), chemical sprays (Erickson and Haas, 1956) and maturity (Issarakraisila, 1984). In most of seedy types of citrus fruit, the relationship between fruit size and seed number has been rarely reported. With the Clementine mandarin, Soost (1956) reported that fruit size was significantly correlated with seed number. Such a relationship has been shown for Valencia orange and other citrus varieties (Cameron *et al.*, 1960).

In this work we present the relationship between seed number and fruit size, fruit weight and peel thickness of Khieo Waan tangerine.

MATERIALS AND METHODS

Samples of newly harvested tangerine fruit used in this experiment were purchased from the packing house. Fruits were separated into five sizes according to their diameters by grading machine in order to get uniformity distribution of fruit sizes. The smallest size of fruits had an averaged diameter of 4.49 $\pm$ 0.29 cm and the largest size of fruits had an averaged diameter of 6.62 $\pm$ 0.15 cm. Forty-five fruits per size were used and each fruit was determined for diameter at equator, weight, peel thickness and seed number. All data of fruit diameter, fruit weight and peel thickness were plotted against seed number and regression analysis was calculated between seed number and diameter, weight and peel thickness of fruits.

RESULTS AND DISCUSSION

The distribution and relationship between seed number and diameter, weight and peel thickness of Khieo Waan tangerine fruit is shown in Figures 1, 2 and 3 respectively. There is a direct relationship between seed number and diameter, weight and peel thickness of Khieo Waan tangerine fruit. These data clearly show the role of seed number in controlling final

[1] Dept. of Horticulture, Faculty of Agriculture, Kasetsart Univ.

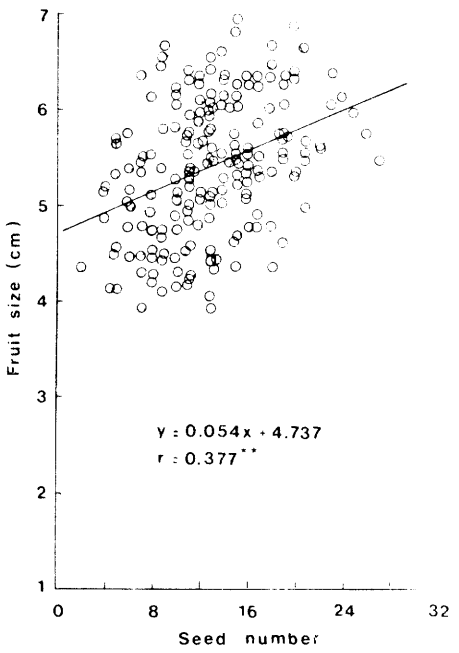

Figure 1. Scatter diagram and regression line on the data from seed number and fruit diameter of tangerine fruits. Each point represents the seed number and fruit diameter of the same fruit (n = 225).

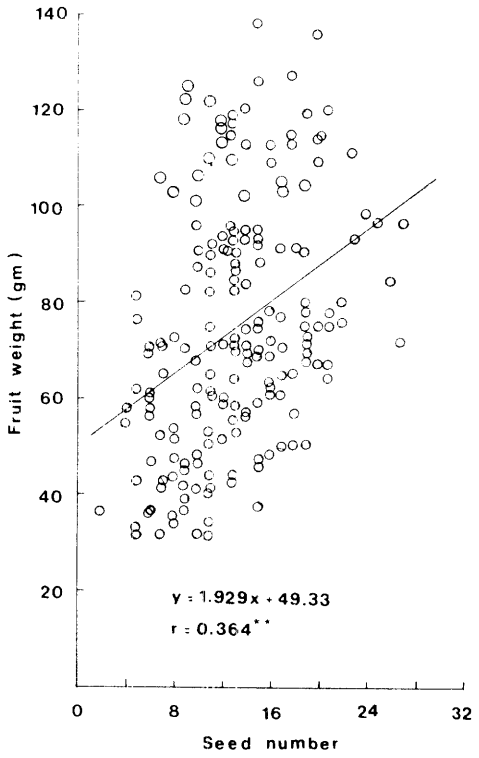

Figure 2. Scatter diagram and regression line on the data from seed number and fruit weight of tangerine fruits. Each point represents the seed number and fruit weight of the same fruit (n = 225).

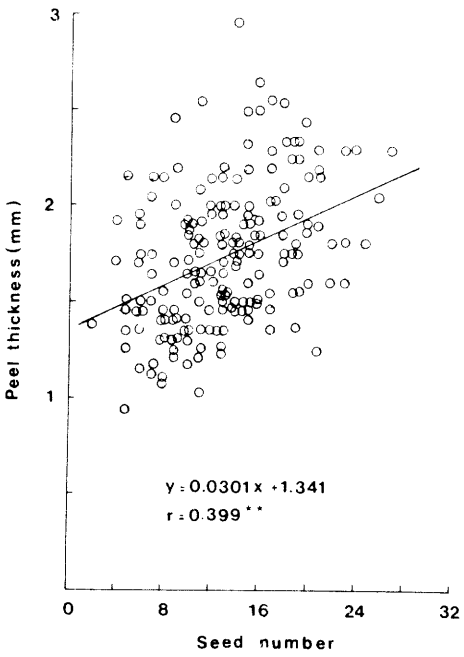

Figure 3. Scatter diagram and regression line on the data from seed number and peel thickness of tangerine fruits. Each point represents the seed number and peel thickness (n = 225).

size of fruits. Developing seeds are active site of auxin, cytokinin and gibberellin synthesis, whether in squash (Gustafson, 1939), strawberry (Nitsch, 1950), apple (Luckwill, 1948) and tomato (Varga and Bruinsma, 1976). The physiological roles of endogenous hormones produced in developing seeds are able to pass out of the seed either along the vascular system or by diffusion through the testa which in turn directly stimulate the growth of surrounding tissues of the fruit and indirectly by directing the metabolic transport of photosynthates required for fruit growth (Crane, 1969). Ovaries contain a greater number of fertilized ovules, greater seed number may automatically accompany larger fruit size. Therefore, better pollination may be necessary to stimulate fruit development in non-parthenocarpic varieties like Khieo Waan tangerine.

Similarly, there is a direct relationship between seed number and peel thickness of Khieo Waan tangerine in this work (Figure 3). The role of endogenous hormones in normal

and abnormal (rough) thickness of citrus fruits has been extensively reviewed (Monselise and Goren, 1978). There is a close agreement between the development rough peel and the presence of higher cytokinin and gibberellin levels in the relevant tissues (Erner *et al.*, 1976b). Reduction of peel roughness of Shamouti orange with daminozide and chlormequat confirms the cause of increased transport of photosynthates into which would win better sink (Erner *et al.*, 1976a). The additional supply of nutrient transport could also be one of the reasons for the thickness of the peel.

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