
SUMMARY

V. SUMMARY AND CONCLUSION

This investigation was carried out during two successive seasons, 2002 and 2003 to study the effect of orange cultivars and growth regulators on growth, nutritional status, fruiting and fruit quality of Hamlin and Jaffa orange cultivars. Also, pollen grain viability, chromosomes and chromosomal behaviowr had been studied.

1- The Chromosomal Behavior:

The cultivars which showed the maximum average number of univalent chromosomes was Hamlin orange. The minimum average number of univalent chromosomes was Jaffa orange cultivar

The investigated treatments were as follows:

1- Control (Tap water).

2- CPPU at 10 ppm.

3- CPPU at 20 ppm.

4- GA_3 at 100 ppm.

5- GA_3 at 200 ppm.

6- CPPU at 10 ppm + GA_3 at 100 ppm.

7- CPPU at 10 ppm + GA_3 at 200 ppm.

8- CPPU at 20 ppm + GA_3 at 100 ppm.

9- CPPU at 20 ppm + GA_3 at 200 ppm.

The complete randomized block design with three replications. Every replicate was represented by one tree.

The main results obtained from this study could be summarized as follows:

V.2. Vegetative growth:

V.2.1. Leaf length:

- **Specific effect:**

The highest leaf length was closely linked with Jaffa orange cultivar as specific effect of orange cultivar was concerned. However, CPPU at 20 ppm treatment exceeded those of the other treatments in this regard.

- **Intraction effect:**

The highest values from leaf length were obtained from Jaffa orange cultivar and treated with CPPU at 10 ppm + GA_3 at 200 ppm treatment.

V.2.2. Leaf width (cm):

As for specific effect of orange cultivars, data obtained during both seasons revealed that leaf width increased with Jaffa orange cultivar.

Nevertheless, trend of response to specific effect of growth regulators decleared that CPPU at 20 ppm + GA_3 at 200 ppm surpassed significantly those of the other treatment.

- **Interaction effect:**

Data obtained during both seasons revealed that, the pronounced response to specific effect of orange cultivars which proved the superiority of Jaffa orange over Hamlin orange for leaf width from one had that associated with the relative tendency of CPPU at 200 ppm + GA_3 at 200 ppm treatment to exceed other treatments. Herein, the greatest values of the investigated growth parameters (leaf width) were markedly inclosed relationshipe to Jaffa orange cultivar treated with CPPU at 20 ppm + GA_3 at 200 ppm combination.

V.2.3. Leaf shape index:

- **Specific effect:**

With regard to specific effect of orange cultivars on leaf shape index, data obtained during both seasons revealed that response varied from one growth measurments to the other. Hence, leaf shape index increased significantly in Jaffa orange cultivar.

As for the specific effect of growth regulators, data obtained during both seasons displayed that, the rate of response was more pronounced than that GA_3 at 200 ppm.

- **Interaction effect:**

Regarding the interaction effect of various combinations between the two studied factors (orange cultivars and growth

regulators) on leaf shape index, data obtained during both seasons revealed that, trend and rate of response varied from treatment to the other.

However, the highest values of leaf shape index was in closed relationship to those GA_3 at 200 ppm x Jaffa orange cultivar during both seasons of study.

On the contrary, the least values of leaf shape index was markedly related to Hamlin cultivar treated with CPPU at 20 ppm.

V.2.4. Leaf area:

- **Specific effect:**

As for specific effect of orange cultivars, data obtained during both seasons revealed that, leaf area was obviously increased with Jaffa orange cultivar over Hamlin orange cultivar.

Nevertheless, trend of response to specific effect of growth regulator treatments declared that GA_3 at 200 ppm treatments surpassed significantly those of the other treatments.

- **Interaction effect:**

Data obtained during both seasons revealed that, the more pronounced response to specific effect of orange cultivars which proved the superiority of Jaffa orange cultivar over Hamlin orange cultivar for leaf area. Herein, the greatest values of the

leaf area were markedly in close relationship to Jaffa orange cultivar treated with GA_3 at 200 ppm during both seasons of the study.

V.2.5. Leaf dry weight:

- **Specific effect:**

With regasd to specific effect of orange cultivars, it was quite clear that the response was not only pronounced than that of leaf dry weight but are followed an opposite trend, whereas Jaffa orange cultivar gave the highest values in this respect.

On the other hand, the response to specific effect of growth regulators was mor pronounced with CPPU at 200 ppm + GA_3 at ppm, wherease this treatment had significantly the richest leaves in their dry weight.

- **Interaction effect:**

Jaffa orange cultivar treated with CPPU at 20 ppm + GA_3 at 200 ppm had the richest leaves in dry weight. On the contrary, the least leaf dry weight was coupled with Hamlin orange cultivar treated with CPPU at 10 ppm.

V.3. Nutritional status (leaf mineral content):

In this regard, leaf N; P; K; Mg; Fe; and Mn contents of both orange cultivars (Hamlin and Jaffa) were investigated regarding the specific and interaction effects of growth

regulators; orange cultivars and combinations during both 2002 and 2003 experimental seasons.

- **Specific effect:**

As for the specific effect of orange cultivars, however it was N; P; K; Mg; Fe and Mn were slightly increased in Jaffa orange cultivar compared with Hamlin orange cultivar.

As for the specific effect of growth regulators, data obtained during both seasons revealed that, the response was also slight. However, leaves of two orange cultivars showed higher leaf N; P; K; Mg; Fe and Mn content when treated with CPPU at 10 or 20 ppm + GA_3 at 200 ppm. The reverse was true with the control (water).

- **Interaction effect:**

Data obtained during both seasons of study displayed that, the trend of response to interaction effect was not so constant for both orange cultivars during two seasons of study. However, it could be generally observed that all nutrient elements exhibited their maximum content in leaves of Jaffa orange cultivar treated with CPPU at 20 ppm + GA_3 at 200 ppm. However the reverse was true with Hamlin orange cultivar treated with tap water (control).

V.4. Yield indicators:

V.4.1. Fruit set %:

- **Specific effect:**

The highest fruit set % was closely linked with Jaffa orange cultivar as specific effect of orange cultivars was concerned. However, CPPU at 10 ppm + GA_3 at 200 ppm treatment gave the highest values compared with the other treatments during two seasons of study.

- **Interaction effect:**

Higher percentage of fruit set was always in concomitant to each combination of Jaffa orange and CPPU at 10 ppm + GA_3 at 200 ppm, while the reverse was true with Hamlin orange cultivar treated with tap water (control).

V.4.2. Remained fruits percentage:

- **Specific effect:**

Data obtained during both seasons revealed that remained fruits % respond specifically orange cultivars, wherease the level was slightly increased in Hamlin orange cultivar compred with Jaffa orange cultivar during both seasons.

As for the specific effect of growth regulators, data obtained during both seasons indicated that, the highest values were obtained from CPPU at 10 ppm + GA_3 at 200 ppm treatment compared with the other treatments.

- **Interaction effect:**

Hamlin orange cultivar treated with CPPU at 20 ppm + GA_3 at 200 ppm gave the highest values in this respect compared with the other interactions during both seasons of study. On the contrary, the least of values were obtained from Jaffa orange cultivar treated with tap water (control).

V.4.3. Yield percentage:

- **Specific effect:**

As for specific effect of orange cultivars, data obtained during both seasons revealed that yield percentage was obviously increased in Jaffa orange cultivar.

Nevertheless, trend of response to specific effect of growth regulators declared that CPPU at 10 ppm + GA_3 at 200 ppm gave the highest values in this respect.

- **Interaction effect:**

Data obtained during both seasons revealed that the more pronounced response to specific effect of orange cultivars which proved the superiority of Hamlin orange cultivar over Jaffa orange cultivar for yield %. However, Jaffa orange cultivar treated with CPPU at 10 ppm + GA_3 at 200 ppm gave the highest values in this respect compared with the other combinations.

V.5. Fruit quality:

V.5.1. Fruit physical properties:

- **Specific effect:**

With regard to specific effect of orange cultivars on different fruit physical properties, data obtained during both seasons revealed that, the response varied from one to the other. Hence, (Fruit weight, volume; length and diametr) increased significantly in Hamlin orange cultivar. The reverse was true with fruit shape index and fruit peel thickness which increased in Jaffa orange cultivar.

As for specifi effect of growth regulators, data obtained during both seasons displayed that the rate of response was more pronounced than in orange cultivars. Moreover, the trend of response was to great extent similar, wherease most quality parameters, exhibited theis maximum values with CPPU at 10 ppm + GA_3 at 20 ppm treatment.

- **Interaction effect:**

Regarding the interaction effect of various combinations between the two studied factors (orange cultivars and growth regulators) on different physical quality parameters, data obtained during both seasons revealed that, trend and rate of response varied from measurement to the other.

However, the highest values of most parameters particulary fruit weight; volume, length and diameter were obtained from Hamlin orange cultivar treated with CPPU at 10 ppm + GA_3 at 200 ppm during both expirmental seasons. The superiority of such combination was significant as compared to other investigated combinations during both seasons of study.

On the contrary, the least values of most fruit physical quality were markedly related to Jaffa orange cultivar treated with tap water (control).

Moreover, other combinations were in between the aforesaid two extermes with relative tendency of variance observed not only from one cultivar to others, but also from parameter to others.

V.5.2. Fruit chemical properties:

T.S.S., acidity, T.S.S acidity and vitamin C contents of both orange cultivars were investigated regarding the specific and interaction effects of orange cultivars; growth regulators and combinations during both 2002 and 2003 experimental seasons.

- **Specific effect:**

As for the specific effect of orange cultivars, however it was TS.S., T.S.S. / acidity and vitamin C were slightly increased in Hamlin orange cultivar.

As for the specific effect of growth regulators, data obtained during both seasons revealed that, the response was also slight. However, fruits from two cultivars treated with CPPU at 10 or 20 ppm showed higher fruit content from TS.S. and vitamine C. The reverse was true with total acidity.

- **Interaction effect:**

Data obtained during both seasons of study displayed that the trend of response to interaction effect was not similar for both orange cultivars during two seasons of study. However, it could be generally observed that most fruit chemical quality exhibited their maximum content in fruits from Jaffa orange cultivar treated with CPPU at 20 ppm compared with other combinations.

V.6. Seediness and seed development:

- Specific effect:

The highest number of seeds per fruit was closely linked with Hamlem cultivar as specific effect of orange cultivar was concerned. However, CPPU at 10 or 20 ppm treatments exceeded of the those of other treatments in this respect.

- Interaction effect:

The highest values from number of seeds / fruit were obtained from Hamlin and treated with CPPU at 10 or 20 ppm.

Such trend was true in number of well developed seeds. But, the reverse was true in number of shirvel seeds per fruit.