

Producing Capacity of Valencia Orange Trees As Affected With Spraying Some Crop Seed Sprout Extracts

Farouk H. Abdelaziz¹; Youssed A. Hussein² and Wael M.R. Abd El-Latif¹

¹ Hort., Dept., Fac. of Agric., Minia Univ., Egypt.

² Citriculture Res. Dep. Hort. Res. Instit. ARC., Giza, Egypt.

Abstract: During 2015/2016 and 2016/2017 seasons, Valencia orange trees received three sprays of four crops seed sprout extracts namely Radish, Leek, barely and wheat each at 0.1 to 0.4 %. The merit was elucidating the effect of these crop seed sprout extracts on growth aspects, tree nutritional status, fruit setting, yield and fruit quality. Carrying out three sprays of Radish, Leek, barley and wheat seed sprout extracts each at 0.1 % to 0.4 % had an announced promotion on all growth traits, tree nutritional status, fruit setting, yield and fruit quality relative to the control treatment. Using seed sprout extracts of Radish, Leek, barley and wheat, in ascending order was very effective in promoting yield and fruit quality. Meaningless stimulation on these characteristics were observed among the higher two concentrations of each crop seed sprout namely 0.2 and 0.4 %. For promoting yield and fruit quality of Valencia orange trees, it is suggested to spray wheat seed sprout extract at 0.2 % three times (growth start, just after fruit setting and one month later).

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Keywords: Valencia orange trees, Radish, Leek, barley, wheat, seed sprout extracts, growth, yield, fruit quality.

1. Introduction

In the past, promoting the yield and fruit quality of different fruit crops was achieved by using chemical fertilizers. For avoiding environmental pollution, many studies were accomplished for using crop seed sprout extracts versus chemicals that were responsible for performing insect and pathogens resistance to the fungicides and insecticides.

Germination and sprouting of different crop seed may change the content and composition of foods namely proteins, fats and amino acids and enhances the building and biosynthesis of essential amino acids like glutamic acid, tryptophan, arginine, methionine and lysine, vitamin B & C and all macro and micro nutrients and makes them high available to the trees (Cazuola *et al.*, 2004; Cairney, 2005; Biomerson, 2007; Abdallah, 2008 and Anwar *et al.*, 2013)

Previous studies showed that treating citrus (Cairney, 1995) Keitte mangos (Mohamed, 2014 and Refaai, 2014b), Zaghoul date palms (Refaai, 2014 a); Wonderful pomegranates (Ahmed and Gad El-Kareem, 2014) and Wishington Navel oranges (El-Khawaga and Mansour, 2014; Ahmed and Habasy-Randa, 2014 and Abd El-Rahman, 2015) was very effective in improving growth aspects, nutritional station of the trees, fruit setting, yield and fruit quality.

The objective of this study was examining the effect of some crop seed sprout extracts on vegetative growth characteristics, tree nutritional status, fruit setting, yield and fruit quality of

Valencia orange trees.

2. Materials and Methods

This study was carried out during two consecutive experimental 2015/ 2016 & 2016/ 2017 seasons on uniform in vigour 39 5- years old Valencia orange trees onto sour orange rootstock. The selected trees are grown in a private orchard located at Blbeis district, El- Sharkia Governorate. The trees planted at a spacing of 4 x 6 meters. The soil of the orchard is well drained sandy (Table 1) in texture with a water table not less than two meters deep. Drip irrigation system was carried out using Nile water. Soil analysis was carried out using the procedures outlined according to (Wilde *et al.*, 1985) as shown in Table (1).

Table (1): Analysis of the soil at the trial location

Constituents	Values
Sand %	: 74.0
Silt %	: 6.0
Clay %	: 20.0
Texture	: Sandy
O.M. %	: 0.24
pH (1:2.5 extract)	: 8.11
E.C (1:2.5 extract) (mmhos/ cm/ 25°C)	: 1.14
CaCO ₃ %	: 1.22
Available N %	: 0.04
Available P (Olsen method, ppm)	: 1.5
Available K (ammonium acetate, ppm)	: 50.5

The selected trees were subjected to the normal horticultural practices that already applied in the orchard except those dealing with using crop seed sprout extracts.

This investigation consisted of thirteen treatments arranged as follows:

1. Control
2. Spraying Radish seed sprout at 0.1 %
3. Spraying Radish seed sprout at 0.2 %
4. Spraying Radish seed sprout at 0.4 %
5. Spraying Leek seed sprout at 0.1 %
6. Spraying Leek seed sprout at 0.2 %
7. Spraying Leek seed sprout at 0.4 %
8. Spraying Barley seed sprout at 0.1 %
9. Spraying Barley seed sprout at 0.2 %
10. Spraying Barley seed sprout at 0.4 %
11. Spraying Wheat seed sprout at 0.1 %
12. Spraying Wheat seed sprout at 0.2 %
13. Spraying Wheat seed sprout at 0.4 %

Each treatment was replicated three times, one tree per each. The four crop seed sprout extracts (radish, leek, wheat and barley) were sprayed three times at growth start (2nd of Mar.), just after fruit setting (last week of Apr.) and one month later (last week of May). Triton B as a wetting agent was added to all extracts at 0.05 % and spraying was done till runoff.

Table (2): Chemical composition of leek (Dini *et al.*, 2008; Gupta and Gupta, 2014 and Koca and Tasei, 2016)

Constituent	Values (mg/100 g F.W)
Dry matter	7.98-14.7
K	1.6
Ca	0.24
P	0.12
Na	0.06
Mg	0.07
Fe	0.014
Zn	0.013
Cu	0.025
Se	0.0026
Proteins	1.5%
Vitamin A	501IU
Vitamin B	403 IU
Vitamin C	11.0 mg
Asparatic acid	0.0011 %
Alanine	0.0014 %
Arginine	0.0014 %

Chemical composition of the four crop seed sprout extracts (Leek, Barley, Wheat and Radish) are shown in Tables (2 to 5). Extracts of the four crop seed sprout were prepared by germinating of the seeds and when the plant height reached

ten cm, they were harvested and put in the refrigerator at C⁰ till use. As the time of application they were blended in electric blinder.

Randomized complete block design (RCBD) was adopted which the experiment included thirteen treatments and each treatment was replicated three times, one tree per each.

Table (3): Chemical composition of wheat seed sprout

Constituent	Values (mg/100 g F.W)
Asparatic acid	3.3
Arginine	4.0
Alanine	3.1
Isoleucine	4.1
Glutamic acid	5.2
Thiamine	3.1
Riboflavin	3.0
Pyridoxine	2.5
Vitamin E	0.59
K	644
P	600
Mg	319
Ca	292
Fe	511
Zn	218

Table (4): Chemical composition of barley seed sprout

Constituent	Values (mg/100 g F.W)
Asparatic acid	2.1
Arginine	3.5
Alanine	2.9
Isoleucine	2.0
Glutamic acid	4.7
Thiamine	2.5
Lysine	1.9
Riboflavin	3.0
Pyridoxine	1.9
Vitamin E	0.61
K	600
P	510
Mg	281
Ca	280
Fe	181
Zn	150

During both seasons the following measurements were recorded:

1-Vegetative growth characteristics namely shoot length, number of leaves/shoot, shoot thickness and Leaf area (cm²) (Ahmed and Morsy, 1999).

2-Leaf pigments namely chlorophylls a & b, total chlorophylls and total carotenoids (as mg/ 1 g F.W.) (Von- Wettstein, 1957).

3-Total carbohydrates and C/N. (A.O.A.C., 2000).

4- Leaf chemical components namely N, P, K, Mg, S and Ca (as %) and Zn, Fe, Mn and Cu (as ppm) (Summer, 1985 and Wilde *et al.*, 1985).

5-Percentages of Initial fruit setting and fruit retention.

6-Number of fruits per tree and yield/ tree (kg.) were calculated (1st week of April).

7- Physical and chemical characters of the fruits namely fruit weight (g.) and dimensions (height and diameter, cm), percentages of juice and fruit peel weight, fruit peel thickness (cm), T.S.S.%, total acidity % (as g. citric acid/ 100 ml juice); T.S.S./acid, total and reducing sugars % (Lane and Eynon, 1965) and vitamin C content (mg/ 100 ml juice) (A.O.A.C., 2000).

Statistical analysis was done and treatment means were compared using new L.S.D. at 5% (Mead *et al.*, 1993).

Table (5): Chemical composition of radish seed sprout (Kawashima and Soares, 2003)

Constituent	Values (mg/100 g F.W)
Energy	16
Carbohydrates	3.40
Dextrose	105
Fructose	0.75
Total fiber	1.60
Fats	
Saturated	0.032
Monounsaturated	0.017
Polyunsaturated	0.048
Proteins	0.68
Cholesterol	0
Vitamins	
Vitamin A	7
Vitamin C	14.800
Thiamin	0.012
Riboflavin	0.039
Niacin	0.254
Pantothenic acid	0.165
Vitamin B6	0.071
Folate	0.025
Vitamin E	0
Vitamin K	1.3
Beta-carotene	4
Lutein + zeaxanthin	10
Minerals	
Potassium	233
Sodium	39
Calcium	25
Phosphorus	20
Magnesium	10
Iron	0.34
Zinc	0.28
Copper	0.05
Manganese	69
Fluoride	6
Selenium	0.6

3. Results and Discussion

1- Vegetative growth characteristics:

Data in Table (6) clearly show that spraying extracts of radish, leek, barley and wheat seed sprouts at 0.1 to 0.4 % significantly enhanced the four growth aspects of Valencia orange trees namely shoot length, number of leaves/shoot, shoot thickness and leaf area in the spring growth cycle relative to the control treatment. The stimulation was appreciably related to the increase in the concentrations of each crop seed sprout. The outstanding effects on the investigated growth characteristics of these crop seed sprouts could be arranged as follows, in ascending order radish, leek, barley and wheat. Increasing concentrations of each crop seed sprout from 0.2 to 0.4 failed to show significant promotion on these growth aspects. Significant differences on these growth traits were observed the four crop seed sprouts. The maximum values of shoot length (7.2 & 7.3 cm), number of leaves/shoot (6.9 & 7.1 leaf), shoot thickness (3.6 & 3.6 mm) and leaf area (25.0 & 25.5 cm²) were recorded on the trees received three sprays of wheat seed sprout extract at 0.4 %. The minimum values were observed on the control treatment. These results were true during both seasons.

2- Leaf chemical composition:

Data in Tables (7 to 11) obviously reveal that chlorophylls a & b, total chlorophylls, total carotenoids, total carbohydrates %, N, P, K, Mg, S, Ca, Zn, Fe and Mg in the leaves were significantly varies among the thirteen crop seed sprout extract treatments. They were significantly enhanced in response to treating the trees with any one of the four crop seed sprouts namely radish, leek, barley and wheat each at 0.1 to 0.4 % compared to the control treatment. Using seed sprout extracts of radish, leek, barley and wheat, in ascending order significantly maximized these leaf components. Increasing concentrations of each crop seed sprout from 0.2 to 0.4 % had no significant effect on these leaf components. The maximum values of chlorophyll a (9.5 & 9.7 mg/100g F.W), chlorophyll b (4.7 & 4.9 mg/100g F.W), total chlorophylls (14.2 & 14.6 mg/100g F.W), total carotenoids (4.1 & 4.1 mg/100g F.W), total carbohydrates (20.0 & 20.01 %), N (2.23 & 2.28 %), P (0.237 & 0.246 %), K (1.81 & 1.86 %), Mg (1.19 & 1.19 %), S (1.39 & 1.38 %), Ca (4.25 & 3.39 %), Zn (83.0 & 86.4 ppm), Mn (83.5 & 84.6 ppm) and Fe (89.3 & 91.0 ppm) were recorded on the trees received three sprays of wheat seed sprout extract 0.4 %. The untreated trees produced the lowest values. The ratio between total carbohydrates and N (C/N) and leaf content of Cu were unaffected by the present crop seed sprout extract treatments.

3- Percentages of initial fruit setting and fruit retention and yield/tree:

Data in Table (12) noticeably declare that treating Valencia orange trees three times with radish, leek, barley and wheat seed sprout extracts at 0.1 to 0.4 % had significant promotion on the percentages of initial fruit setting and fruit retention, yield and number of fruits/tree relative to the control treatment. The promotion was significantly associated with using seed sprout extract of wheat, barley, leek and radish, in descending order. The promotion on the yield was depended on increasing concentrations of each crop seed sprout. Increasing concentrations from 0.2 to 0.4 % failed to show

significant promotion on the percentage of initial fruit setting and fruit retention and yield/tree. Therefore, from economical point of view, it is concluded to use the medium concentrations of each crop seed sprout namely 0.1 %. Under such promised treatment (using wheat seed sprout extract at 0.1 %) the yield per tree reached 78.2 and 78.4 kg during both seasons, respectively. The percentage of increment on the yield over the control treatment (49.8 and 47.9 kg/tree) reached 2015/2016 and 2016/2017 seasons, respectively. These results were true during both seasons.

4- Fruit quality:

Table (6): Effect of spraying some crop seed sprouts on some vegetative growth aspects of Valencia orange trees during 2015 & 2016 and 2016/2017 seasons

Crop seed sprouts	Shoot length (cm)		No. of leaves/shoot		Shoot thickness (mm)		Leaf area (cm) ²	
	2015/ 2016	2016/ 2017	2015/ 2016	2016/ 2017	2015/ 2016	2016/ 2017	2015/ 2016	2016/ 2017
Control	4.0	3.9	3.0	2.9	1.4	1.4	16.0	15.9
Spraying Radish seed sprout at 0.1 %	4.3	4.4	3.5	3.4	1.7	1.7	16.8	17.1
Spraying Radish seed sprout at 0.2 %	4.6	4.7	4.0	4.0	1.9	2.0	17.9	18.2
Spraying Radish seed sprout at 0.4 %	4.7	4.8	4.1	4.1	2.0	2.1	18.0	18.3
Spraying Leek seed sprout at 0.1 %	5.0	5.2	4.5	4.6	2.2	2.3	18.9	19.3
Spraying Leek seed sprout at 0.2 %	5.2	5.5	4.9	5.1	2.5	2.5	19.9	20.3
Spraying Leek seed sprout at 0.4 %	5.3	5.6	5.0	5.1	2.6	2.6	20.0	20.4
Spraying Barley seed sprout at 0.1 %	5.7	5.9	5.5	5.6	2.8	2.9	21.0	21.5
Spraying Barley seed sprout at 0.2 %	6.0	6.3	5.9	6.0	3.0	3.1	22.0	22.6
Spraying Barley seed sprout at 0.4 %	6.1	6.4	6.0	6.1	3.1	3.1	22.2	22.7
Spraying Wheat seed sprout at 0.1 %	6.4	6.6	6.4	6.6	3.3	3.4	23.3	24.36
Spraying Wheat seed sprout at 0.2 %	7.1	7.2	6.8	7.0	3.5	3.6	24.9	25.3
Spraying Wheat seed sprout at 0.4 %	7.2	7.3	6.9	7.1	3.6	3.6	25.0	25.5
New L.S.D at 5%	0.2	0.3	0.4	0.3	0.2	0.2	0.7	0.8

Table (7): Effect of spraying some crop seed sprouts on chlorophylls a & b and total chlorophylls in the leaves of Valencia orange trees during 2015 & 2016 and 2016/2017 seasons

Crop seed sprouts	Chlorophyll a (mg/1 g F.W)		Chlorophyll b (mg/1 g F.W)		Total chlorophylls (mg/1 g F.W)	
	2015/2016	2016/2017	2015/2016	2016/2017	2015/2016	2016/2017
Control	2.4	2.6	1.0	1.1	3.4	3.7
Spraying Radish seed sprout at 0.1 %	3.0	3.3	1.4	1.5	4.4	4.8
Spraying Radish seed sprout at 0.2 %	3.6	4.0	1.8	1.9	5.4	5.9
Spraying Radish seed sprout at 0.4 %	3.7	4.1	1.9	2.0	5.6	6.1
Spraying Leek seed sprout at 0.1 %	4.5	4.7	2.4	2.5	6.9	7.2
Spraying Leek seed sprout at 0.2 %	5.5	5.4	3.0	3.0	8.5	8.4
Spraying Leek seed sprout at 0.4 %	5.6	5.5	3.1	3.1	8.7	8.6
Spraying Barley seed sprout at 0.1 %	6.6	6.4	3.5	3.6	10.1	10.0
Spraying Barley seed sprout at 0.2 %	7.8	7.4	3.9	4.0	11.7	11.4
Spraying Barley seed sprout at 0.4 %	8.0	7.5	4.0	4.1	12.0	11.6
Spraying Wheat seed sprout at 0.1 %	8.9	8.6	4.3	4.5	13.2	13.1
Spraying Wheat seed sprout at 0.2 %	9.4	9.6	4.6	4.8	14.0	14.4
Spraying Wheat seed sprout at 0.4 %	9.5	9.7	4.7	4.9	14.2	14.6
New L.S.D at 5%	0.3	0.4	0.2	0.3	0.4	0.5

Table (8): Effect of spraying some crop seed sprouts on total carotenoids, total carbohydrates and C/N in the leaves of Valencia orange trees during 2015 & 2016 and 2016/2017 seasons

Crop seed sprouts	Total carotenoids (mg/1 g F.W)		Total carbohydrates %		C/N	
	2015/2016	2016/2017	2015/2016	2016/2017	2015/2016	2016/2017
Control	0.9	1.0	13.9	14.0	8.63	8.81
Spraying Radish seed sprout at 0.1 %	1.4	1.5	14.9	15.0	8.62	8.82
Spraying Radish seed sprout at 0.2 %	1.8	1.9	15.5	15.5	8.71	8.66
Spraying Radish seed sprout at 0.4 %	1.9	2.0	15.6	15.6	8.67	8.67
Spraying Leek seed sprout at 0.1 %	2.3	2.4	16.3	16.4	8.76	8.77
Spraying Leek seed sprout at 0.2 %	2.5	2.8	17.0	17.1	8.85	8.81
Spraying Leek seed sprout at 0.4 %	2.6	2.9	17.1	17.2	8.86	8.82
Spraying Barley seed sprout at 0.1 %	3.0	3.2	17.8	17.9	8.86	8.86
Spraying Barley seed sprout at 0.2 %	3.2	3.5	18.4	18.5	8.85	8.77
Spraying Barley seed sprout at 0.4 %	3.3	3.5	18.5	18.6	8.85	8.77
Spraying Wheat seed sprout at 0.1 %	3.6	3.8	19.1	19.2	8.84	8.73
Spraying Wheat seed sprout at 0.2 %	4.0	4.1	19.8	19.9	8.92	8.77
Spraying Wheat seed sprout at 0.4 %	4.1	4.1	20.0	20.0	8.97	8.77
New L.S.D at 5%	0.2	0.3	0.6	0.5	NS	NS

It is clear from the data in Tables (13 to 15) that subjecting Valencia orange trees three times with any one of the four crop seed sprout extracts (radish, leek, barley and wheat) each at 0.1 to 0.4 % significantly was followed by enhancing fruit quality in terms of increasing weight, height and diameter of fruit, juice %, T.S.S.%, T.S.S./acid, total and reducing sugars and vitamin C and decreasing fruit peel weight and thickness and total acidity relative to the check treatment. The promotion on both physical and chemical characteristics of the fruits was significantly associated with using seed sprout extracts of radish, leek, barley and wheat, in ascending order. This means that the best crop seed sprout extract was wheat followed by barley and

radish seed sprout extract occupied the last position in this respect. The promotion also on fruit quality was in proportional to the increase in concentration of each crop seed sprout. Meaningless promotion on fruit quality was attributed to increasing concentrations of each crop seed sprout from 0.2 to 0.4 %. Therefore, economical point of view, it is advised to using the medium concentrations of each crop seed sprout namely 0.2 %. The best results were obtained due to treating the trees three times with wheat seed sprout extract at 0.2 % unfavourable effects on fruit quality were recorded on untreated trees. Fruit shape values was unaffected by the investigated crop seed sprout extract treatments. These results were true during both seasons.

Table (9): Effect of spraying some crop seed sprouts on the percentages of N, P and K in the leaves of Valencia orange trees during 2015 & 2016 and 2016/2017 seasons

Crop seed sprouts	Leaf N %		Leaf P %		Leaf K %	
	2015/2016	2016/2017	2015/2016	2016/2017	2015/2016	2016/2017
Control	1.61	1.59	0.159	0.161	1.11	1.09
Spraying Radish seed sprout at 0.1 %	1.69	1.70	0.167	0.170	1.18	1.20
Spraying Radish seed sprout at 0.2 %	1.78	1.79	0.176	0.180	1.25	1.27
Spraying Radish seed sprout at 0.4 %	1.80	1.80	0.177	0.181	1.26	1.28
Spraying Leek seed sprout at 0.1 %	1.86	1.87	0.186	0.190	1.34	1.37
Spraying Leek seed sprout at 0.2 %	1.92	1.94	0.194	0.197	1.42	1.46
Spraying Leek seed sprout at 0.4 %	1.93	1.95	0.195	0.198	1.43	1.47
Spraying Barley seed sprout at 0.1 %	2.01	2.02	0.204	0.207	1.52	1.56
Spraying Barley seed sprout at 0.2 %	2.08	2.11	0.214	0.217	1.62	1.69
Spraying Barley seed sprout at 0.4 %	2.09	2.12	0.215	0.218	1.63	1.70
Spraying Wheat seed sprout at 0.1 %	2.16	2.20	0.225	0.235	1.71	1.69
Spraying Wheat seed sprout at 0.2 %	2.22	2.27	0.236	0.245	1.80	1.85
Spraying Wheat seed sprout at 0.4 %	2.23	2.28	0.237	0.246	1.81	1.86
New L.S.D at 5%	0.05	0.07	0.06	0.08	0.04	0.06

Table (10): Effect of spraying some crop seed sprouts on the percentages of Mg, Ca and S in the leaves of Valencia orange trees during 2015 & 2016 and 2016/2017 seasons

Crop seed sprouts	Leaf Mg %		Leaf Ca %		Leaf S %	
	2015/2016	2016/2017	2015/2016	2016/2017	2015/2016	2016/2017
Control	0.59	0.61	2.39	2.37	0.79	0.80
Spraying Radish seed sprout at 0.1 %	0.65	0.67	2.49	2.54	0.84	0.86
Spraying Radish seed sprout at 0.2 %	0.71	0.73	2.61	2.66	0.89	0.93
Spraying Radish seed sprout at 0.4 %	0.72	0.73	2.63	2.74	0.90	0.94
Spraying Leek seed sprout at 0.1 %	0.77	0.86	2.82	2.86	0.96	0.99
Spraying Leek seed sprout at 0.2 %	0.85	0.94	2.92	2.97	1.02	1.05
Spraying Leek seed sprout at 0.4 %	0.86	0.95	2.94	2.99	1.05	1.06
Spraying Barley seed sprout at 0.1 %	0.94	1.01	3.02	3.08	1.12	1.12
Spraying Barley seed sprout at 0.2 %	0.99	1.07	3.10	3.17	1.20	1.20
Spraying Barley seed sprout at 0.4 %	1.00	1.08	3.11	3.19	1.21	1.21
Spraying Wheat seed sprout at 0.1 %	1.09	1.13	3.20	3.29	1.31	1.29
Spraying Wheat seed sprout at 0.2 %	1.18	1.18	3.24	3.38	1.98	1.36
Spraying Wheat seed sprout at 0.4 %	1.19	1.19	4.25	3.39	1.39	1.38
New L.S.D at 5%	0.04	0.05	0.07	0.09	0.05	0.04

Table (11): Effect of spraying some crop seed sprouts on the leaf content of Zn, Mn, Fe and Cu (ppm) of Valencia orange trees during 2015 & 2016 and 2016/2017 seasons

Crop seed sprouts	Leaf Zn (ppm)		Leaf Mn (ppm)		Leaf Fe (ppm)		Leaf Cu (ppm)	
	2015/2016	2016/2017	2015/2016	2016/2017	2015/2016	2016/2017	2015/2016	2016/2017
Control	50.1	49.3	55.3	56.0	58.9	59.0	1.11	1.13
Spraying Radish seed sprout at 0.1 %	53.6	54.0	58.4	59.1	62.0	62.1	1.12	1.13
Spraying Radish seed sprout at 0.2 %	57.6	58.0	61.5	62.2	66.0	66.1	1.12	1.13
Spraying Radish seed sprout at 0.4 %	58.0	58.5	61.6	62.3	66.3	66.5	1.12	1.14
Spraying Leek seed sprout at 0.1 %	62.0	61.9	65.9	66.6	70.0	69.9	1.13	1.14
Spraying Leek seed sprout at 0.2 %	66.0	66.0	69.0	69.6	74.0	74.5	1.14	1.14
Spraying Leek seed sprout at 0.4 %	66.1	66.3	69.3	70.0	74.5	75.0	1.14	1.14
Spraying Barley seed sprout at 0.1 %	70.0	70.0	73.0	73.6	78.0	78.9	1.14	1.14
Spraying Barley seed sprout at 0.2 %	74.1	73.0	76.9	77.6	82.0	83.0	1.14	1.14
Spraying Barley seed sprout at 0.4 %	74.2	74.0	77.0	77.9	82.3	83.3	1.14	1.14
Spraying Wheat seed sprout at 0.1 %	78.5	77.0	80.0	81.3	86.0	87.0	1.14	1.14
Spraying Wheat seed sprout at 0.2 %	82.6	80.0	83.0	84.0	89.0	90.9	1.14	1.15
Spraying Wheat seed sprout at 0.4 %	83.0	80.4	83.5	84.6	89.3	91.0	1.15	1.15
New L.S.D at 5%	3.1	2.8	0.5	2.4	3.0	2.9	NS	NS

Table (12): Effect of spraying some crop seed sprouts on the leaf content of the percentages of initial fruit setting and fruit retention and yield/tree of Valencia orange trees during 2015 & 2016 and 2016/2017 seasons

Crop seed sprouts	Initial fruit setting %		Fruit retention %		No. of fruits/tree		Yield/tree (kg.)	
	2015/2016	2016/2017	2015/2016	2016/2017	2015/2016	2016/2017	2015/2016	2016/2017
Control	11.0	10.9	0.74	0.71	311.0	301.0	49.8	47.9
Spraying Radish seed sprout at 0.1 %	11.7	11.8	0.80	0.79	320.0	319.0	52.5	52.6
Spraying Radish seed sprout at 0.2 %	12.5	12.6	0.86	0.86	331.0	329.0	55.9	55.9
Spraying Radish seed sprout at 0.4 %	12.6	12.7	0.87	0.87	332.0	330.0	56.4	56.4
Spraying Leek seed sprout at 0.1 %	13.4	13.6	0.92	0.92	342.0	343.0	59.5	60.0
Spraying Leek seed sprout at 0.2 %	14.0	14.2	0.99	1.00	354.0	353.0	63.4	63.5
Spraying Leek seed sprout at 0.4 %	14.1	14.3	1.00	1.01	355.0	354.0	63.9	63.5
Spraying Barley seed sprout at 0.1 %	14.7	14.9	1.06	1.08	366.0	370.0	66.9	68.1
Spraying Barley seed sprout at 0.2 %	15.4	15.6	1.12	1.14	376.0	380.0	69.9	70.7
Spraying Barley seed sprout at 0.4 %	15.5	15.7	1.13	1.14	377.0	381.0	70.3	71.2
Spraying Wheat seed sprout at 0.1 %	16.3	16.6	1.18	1.21	386.0	391.0	74.1	75.1
Spraying Wheat seed sprout at 0.2 %	17.0	17.5	1.23	1.26	395.0	399.0	78.2	78.4
Spraying Wheat seed sprout at 0.4 %	17.1	17.6	1.24	1.27	396.0	401.0	78.8	79.0
New L.S.D at 5%	0.5	0.6	0.04	0.05	8.1	8.3	0.7	0.8

Table (13): Effect of spraying some crop seed sprouts on some physical characteristics of the fruits of Valencia orange trees during 2015 & 2016 and 2016/2017 seasons

Crop seed sprouts	Fruit weight (g)		Fruit height (cm)		Fruit diameter (cm)	
	2015/ 2016	2016/ 2017	2015/ 2016	2016/ 2017	2015/ 2016	2016/ 2017
Control	160.0	159.0	6.8	6.7	6.1	5.9
Spraying Radish seed sprout at 0.1 %	164.0	165.0	7.0	7.0	6.3	6.2
Spraying Radish seed sprout at 0.2 %	169.0	170.0	7.3	7.2	6.6	6.5
Spraying Radish seed sprout at 0.4 %	170.0	170.8	7.4	7.3	6.7	6.7
Spraying Leek seed sprout at 0.1 %	174.0	175.0	7.7	7.6	6.9	7.0
Spraying Leek seed sprout at 0.2 %	179.0	180.0	8.0	8.0	7.3	7.3
Spraying Leek seed sprout at 0.4 %	180.0	180.0	8.1	8.1	7.4	7.3
Spraying Barley seed sprout at 0.1 %	183.0	184.0	8.4	8.3	7.7	7.6
Spraying Barley seed sprout at 0.2 %	186.0	187.9	8.7	8.7	7.9	7.9
Spraying Barley seed sprout at 0.4 %	186.5	187.0	8.8	8.8	8.0	8.0
Spraying Wheat seed sprout at 0.1 %	191.9	192.0	9.0	9.0	8.2	8.2
Spraying Wheat seed sprout at 0.2 %	198.0	196.5	9.2	9.3	8.5	8.4
Spraying Wheat seed sprout at 0.4 %	199.0	197.0	9.2	9.3	8.6	8.4
New L.S.D at 5%	2.0	1.8	0.2	0.2	0.2	0.2

Table (14): Effect of spraying some crop seed sprouts on some physical characteristics of the fruits of Valencia orange trees during 2015 & 2016 and 2016/2017 seasons

Crop seed sprouts	Fruit shape		Juice %		Fruit peel weight %		Fruit peel thickness (cm)	
	2015/ 2016	2016/ 2017	2015/ 2016	2016/ 2017	2015/ 2016	2016/ 2017	2015/ 2016	2016/ 2017
Control	1.11	1.14	39.0	40.0	24.0	23.3	0.40	0.41
Spraying Radish seed sprout at 0.1 %	1.11	1.13	40.	41.0	23.0	23.0	0.37	0.38
Spraying Radish seed sprout at 0.2 %	1.11	1.11	40.9	42.0	22.0	21.9	0.33	0.36
Spraying Radish seed sprout at 0.4 %	1.10	1.09	41.0	42.1	21.9	21.8	0.32	0.35
Spraying Leek seed sprout at 0.1 %	1.12	1.09	42.0	43.0	20.0	19.9	0.29	0.33
Spraying Leek seed sprout at 0.2 %	1.10	1.10	43.0	44.0	19.0	18.9	0.26	0.30
Spraying Leek seed sprout at 0.4 %	1.09	1.11	43.3	44.2	18.9	18.8	0.26	0.29
Spraying Barley seed sprout at 0.1 %	1.09	1.09	45.0	46.6	17.0	16.9	0.23	0.26
Spraying Barley seed sprout at 0.2 %	1.10	1.10	45.9	47.6	16.0	15.9	0.20	0.23
Spraying Barley seed sprout at 0.4 %	1.10	1.10	46.0	48.0	15.9	15.8	0.19	0.22
Spraying Wheat seed sprout at 0.1 %	1.10	1.10	47.0	50.0	15.0	14.9	0.18	0.20
Spraying Wheat seed sprout at 0.2 %	1.08	1.11	49.0	50.9	14.0	13.9	0.18	0.19
Spraying Wheat seed sprout at 0.4 %	1.07	1.11	49.3	51.0	14.0	13.8	0.18	0.19
New L.S.D at 5%	NS	NS	0.8	0.7	1.0	0.8	0.03	0.03

Table (15): Effect of spraying some crop seed sprouts on some chemical characteristics of the fruits of Valencia orange trees during 2015 & 2016 and 2016/2017 seasons

Crop seed sprouts	T.S.S.%		Total acidity%		T.S.S./acid	
	2015/2016	2016/2017	2015/2016	2016/2017	2015/2016	2016/2017
Control	10.8	10.9	1.350	1.362	8.0	8.0
Spraying Radish seed sprout at 0.1 %	11.0	11.1	1.330	1.320	8.3	8.4
Spraying Radish seed sprout at 0.2 %	11.2	11.3	1.309	1.306	8.6	8.7
Spraying Radish seed sprout at 0.4 %	11.3	11.4	1.307	1.305	8.6	8.7
Spraying Leek seed sprout at 0.1 %	11.5	11.7	1.280	1.266	9.0	9.2
Spraying Leek seed sprout at 0.2 %	11.8	11.9	1.255	1.250	9.4	9.5
Spraying Leek seed sprout at 0.4 %	11.9	12.0	1.250	1.249	9.5	9.6
Spraying Barley seed sprout at 0.1 %	12.2	12.3	1.222	1.202	10.0	10.2
Spraying Barley seed sprout at 0.2 %	12.5	12.5	1.201	1.180	10.4	10.6
Spraying Barley seed sprout at 0.4 %	12.6	12.6	1.200	1.177	10.5	10.7
Spraying Wheat seed sprout at 0.1 %	13.3	13.4	1.170	1.140	11.4	11.8
Spraying Wheat seed sprout at 0.2 %	13.7	13.7	1.140	1.120	12.0	12.2
Spraying Wheat seed sprout at 0.4 %	13.8	13.8	1.137	1.118	12.1	12.3
New L.S.D at 5%	0.2	0.2	0.016	0.014	0.3	0.4

Table (16): Effect of spraying some crop seed sprouts on some chemical characteristics of the fruits of Valencia orange trees during 2015 & 2016 and 2016/2017 seasons

Crop seed sprouts	Total sugars %		Reducing sugars %		Vitamin C (mg/100 ml juice)	
	2015/2016	2016/2017	2015/2016	2016/2017	2015/2016	2016/2017
Control	7.3	7.0	3.0	2.9	44.5	44.9
Spraying Radish seed sprout at 0.1 %	7.5	7.2	3.2	3.2	45.1	45.5
Spraying Radish seed sprout at 0.2 %	7.7	7.4	3.4	3.4	45.7	46.1
Spraying Radish seed sprout at 0.4 %	7.8	7.5	3.5	3.5	45.8	46.2
Spraying Leek seed sprout at 0.1 %	8.0	7.8	3.6	3.6	46.5	47.0
Spraying Leek seed sprout at 0.2 %	8.2	8.0	3.8	3.9	47.1	47.6
Spraying Leek seed sprout at 0.4 %	8.3	8.1	3.9	4.0	47.2	47.7
Spraying Barley seed sprout at 0.1 %	8.5	8.3	4.0	4.1	48.2	48.9
Spraying Barley seed sprout at 0.2 %	8.7	8.5	4.2	4.3	49.1	49.9
Spraying Barley seed sprout at 0.4 %	8.7	8.69	4.3	4.5	49.2	50.0
Spraying Wheat seed sprout at 0.1 %	8.9	8.8	4.5	4.5	50.2	50.6
Spraying Wheat seed sprout at 0.2 %	9.1	9.0	4.5	4.7	50.9	51.6
Spraying Wheat seed sprout at 0.4 %	9.1	9.0	4.6	4.8	51.0	51.7
New L.S.D at 5%	0.2	0.2	0.2	0.2	0.4	0.4

4. Discussion:

Germination and sprouting of different crop seed may change the content and composition of foods namely proteins, fats and amino acids and enhances the building and biosynthesis of essential amino acids like glutamic acid, tryptophan, arginine, methionine and lysine, vitamin B & C and all macro and micro nutrients and makes them high available to the trees (Cazuola *et al.*, 2004; Cairney, 2005; Biomerson, 2007; Abdallah, 2008 and Anwar *et al.*, 2013)

Previous studies showed that treating citrus (Cairney, 1995) Keitte mangos (Mohamed, 2014 and Refaai, 2014b), Zaghoul date palms (Refaai, 2014 a); Wonderful pomegranates (Ahmed and Gad El-Kareem, 2014) and Washington Navel oranges (El-Khawaga and Mansour, 2014; Ahmed and Habasy-Randa, 2014 and Abd El-Rahman, 2015) was very effective in improving growth aspects, nutritional station of the trees, fruit setting, yield and fruit quality.

Conclusion:

For promoting yield and fruit quality of Valencia orange trees, it is suggested to spray wheat seed sprout extract at 0.2 % three times (growth start, just after fruit setting and one month later).

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