EFFECT OF FOLIAR NUTRITION ON FIG SAPLING GROWTH OF CV. WAZIRY

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ABSTRACT

The objective of this study was to investigate the effect of foliar nutrition on fig sapling growth of cv. waziry at the College of Agricultural Engineering Scicences A factorial experiment within Randomized Complete Block Design with three replicates was used during the seasons of 2017-2018, using fig seedlings by spraying fertilizers (Foliartal) with four concentrations (0, 2, 4, 6 ml.L^{-1}) and organic fertilizers (Tecamin Max) with four concentrations (0, 3, 4, 5 ml.L^{-1}). Results revealed that application folir of chemical fertilizers caused an increases in plant growth. the highest concentration (4 ml.L^{-1}) was the most effect leading to a significant increases in plant height (19.74, 27.46 cm), stem diameter (3.43, 5.85 mm), leaves area (40.30, 68.47 dm^2), and leaves chlorophyll content (219.4, 277.4 mg.100 g^{-1}) The treatment(6 ml.L^{-1}) led to the highest significant increases in nitrogen (2.13, 2.63%), phosphorus (0.86, 0.93%), potassium (2.50, 2.99%) and amino acids (3.77, 6.17%) for both seasons, respectively Foliar organic fertilizer applied (5 ml.L^{-1}) with amino acid significantly increased plant height (13.39, 19.50 cm), nitrogen (2.11, 2.57%), phosphorus (0.78, 0.81%, potassium (2.90, 2.34%)contents, and the leaves area for the first season (42.65 dm^2). While the concentration (4 ml.L^{-1}) indicated a significant increases in stem diameter (3.43, 5.23 mm),leaves chlorophyll content (202.3, 281.2 mg.100 g^{-1})fresh weight and amino acid (4.05, 6.26%) for both seasons and leaves area (67.88 dm^2) for the second season. the interaction treatments had a significant effect on all the vegetative growth traits .

Keywords: deciduous fruits, mineral fertilizer, organic fertilizer, amino acids.
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مجلة العلوم الزراعية العراقية -2019 :50(2):689-696 المعموري والبياتي

تأثير التغذية الورقية في نمو شتلات التين صنف وزيري

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المستخلص

هدفت الدراسة لمعرفة تأثير التغذية الورقية في نمو شتلات التين صنف وزيري. اجريت التجربة في كلية علوم الهندسة الزراعية / جامعة بغداد باستعمال تجربة عاملية بتصميم القطاعات العشوائية الكاملة RCBD في الموسمين 2017 و2018 على شتلات التين وذلك برش السماد الكيميائي Foliartal بأربعة تراكيز (0،2،4،6) مل.لتر$^{-1}$ والسماد العضوي Tecamin Max بأربعة تراكيز (0،3،4،5) مل.لتر$^{-1}$، بينت النتائج أن رش السماد الكيمياوي بتركيز 4 مل.لتر$^{-1}$ كان الأكثر تأثيرا حيث أدى لحصول زيادة معنوية في أرتفاع النبات (19.74 و27.46) سم، قطر الساق (3.43 و5.85) ملم، مساحة ورقية (40.30 و68.47) دسم^2، ومحتوى الاوراق من الكلوروفيل (219.4 و 277.4) ملغم.100 غم. كما وأدى التركيز 6 مل.لتر$^{-1}$ الى زيادة معنوية للنتروجين في الاوراق (2.13 و2.63)%، الفسفور(0.86 و0.93)%، البوتاسيوم (2.50 و2.99) %، والاحماض الامينية (3.77 و6.17) % للموسمين بالتتابع. كما وأن رش السماد العضوي المدعم بالاحماض الامينية بتركيز 5 مل.لتر$^{-1}$ أثر معنويا في أرتفاع النبات (13.39 و19.50) سم، النتروجين (2.11 و2.57)%، الفسفور(0.78 و0.81)%، البوتاسيوم(2.34 و2.90) %، والمساحة الورقية للموسم الاول اذ بلغت 42.65 دسم^2. بينما أعطى التركيز 4 مل.لتر$^{-1}$ زيادة معنوية قطر الساق(3.43 و5.23) ملم الكلوروفيل (202.3 و281.2) ملغم.100غم وزن طري، والاحماض الأمينية (4.05 و6.26)% لكلا الموسمين والمساحة الورقية (67.88) دسم^2 للموسم الثاني، بينت معاملات التداخل تأثيرا معنويا واضحا في زيادة جميع صفات النمو الخضرية .

الكلمات المفتاحية: فاكهة نفضية، السماد المعدني، السماد العضوي، الاحماض الامينية .
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INTRODUCTION

Fig (*Ficus carica*) belonging to the Moraceae family, which contains 2000 species of evergreen trees, shrubs, and a section of deciduous trees (10). It is believed that the original habitat of figs is south of the Arabian Peninsula and spread rapidly to the area surrounding the Mediterranean Sea (1). Foliar nutrition is the spraying of nutrient element solutions on plant vegetation. The foliar application of the mineral materials help the plants to absorb nutrient materials faster than their absorption from the soil through the roots (16). Organic fertilizers when sprayed supply plants with necessary nutrient elements for plant growth, It is a modern method to some extent an the addition of all the nutrient elements by dissolving these substances in water and then foliar applying them to the leaves, after the development of foliar fertilizers it was used and manufa - crured by many companies, where the foliar application for nutrient elements has become a successful way of crops production development (2). Mineral fertilizers are those fertilizers that contain one or more fertilizer elements in a metal form, fertilizers that are prepared industrially and may contain one or more element fertilizers are called simple fertilizers or contain more than one element are called compound fertilizers. Compound fertilizers have several names, including balanced or neutral fertilizers, which consist of three very important elements needed for any plant, nitrogen N, phosphorus P and potassium K, each of, these elements gives a specific performs and the plant specific benefit and strengthens a certain aspect The recent years there was a great interest in fertilization instead off the chemical fertlizers as an attempt to reduce environmental pollution. This study was aimed tow are improving the as a base to carry the fruits for the next years ,in addition to a comparaison between the organic and the chemical fertilization with stating the importance of each this study was to investigate the effect of foliar nutrition on fig sapling growth of cv. waziry.

MATERIALS AND METHODS

This study was applied at the Department of Horticulture and Gardening landscape, College of Agriculture Engineering sciences University of Baghdad (Al-Jadriya) during the growing seasons of 2017 and 2018 to study the effect of spraying with chemical fertilizers (Foliartal) and organic fertilizer supported with the amino acid (Tecamin Max) on using 144 homogenous Fig seedlings (Wazeri cultivar), with one year old seedlings were selected as much as possible for growth. A factorial experiment was conducted within Randomized Complete Block Design (RCBD), with three replicates .Planting three sapling within each experimental unit for each treatment. The experiment included foliar spraying for two factors, the first factor Foliartal (NPK) (13:13:13), was used with four concentrations (0, 2, 4, 6 $ml.L^{-1}$), and it was symbolized by F to become the concentrations (F0,F1,F2,F3).The recomm - ended concentration is (2 $ml.L^{-1}$) . The second factor is the organic fertilizer, which is supported by the amino acid (Tecamin Max). It was used with four concentrations (0, 3, 4, 5 $ml.L^{-1}$), and it was symbolized by T to become the concentrations (T0,T1,T2,T3). Note that the recommended concentration is (3$ml.L^{-1}$). The seedlings were cultivated in 2 kg bags. They were converted in to plastic bags (15 kg) in the agricultural media which is a mixture of loam and peat moss, with volumetric ratio of 1:2 at date 2017/27/2. The studied factors were sprayed 4 spraying times between spraying and other 20 days and between factor and other two day during two seasons, Genstat was used in the analysis of the data and the means were compared according to the least significant difference (LSD) and below the probability level (0.05), (4).

Studied traits

Plant height (cm)

Plant height were taken before spraying at the beginning of the season in 28/2/2017, and at the end of the season, in 25/8/2017, the differences represents the increase in plants height for both seasons.

Stem diameter (mm)

The trees were marked at a height of 10 cm from the soil surfaces in 3 March/2017 and before spraying using the Vernia at the mentioned height of the stem diameter at the beginning of the season (5 November) and at

the end of the season (3 November), the difference between them represents the increase in the main stem diameter of the plant for both seasons .

Leaves Area (dm^2)

Measurments were taken using Digimizer method by taking a picture of the leaf after placing it on A4 paper and dragging a line (10 cm) near the leaf to correct the reading, and took a fourth leaf from the plant under the apical meristem and calculated the leaf area (dm^2).

Leaf chlorophyll content (mg.100 g^{-1} fresh weight)

The leaves chlorophyll content was estimated in midJune according to (9). The fourth leaf was taken under the apical meristem of each experimental unit and read by Spectro photometer on the wave lengths (663-645 nm).

Leaf Nitrogen content%

The leaves were taken in mid-June and dried in an electric oven at 65 °C for 72 hr until the weight was stabled. Then milled and 0.2gm of them were taken to digested, the sample was digestior using a mixture of concentrated sulfuric acid and perchloric acid with ratio of 1:3.Nitrogen was estimated using Kjeldahl (12).

Leaf Phosphorus content %

It was estimated in mid-June. using ammonium molybdates and ascorbic acid after taking the sample from the digestion extract using spectrophotometer and wavelength (882 nm) according to method of (19).

Leaf Potassium content %

Potassium was estimated by the Flame photometer based on the method proposed by (12) in mid-June.

Estimation of total amino acids

Free amino acids were analyzed using Amino acid analyzers It was a specialized device only for the analysis of amino acids in the Department of Water and Environment, Ministry of Science and Technology.

Table 1. Effect of spraying with chemical fertilizer and organic fertilizer on plant height, stem diameter, leaf area and leaf chlorophyll content

Treatments	Average increase in plant height (cm)		Average increase in stem diameter (mm)		Leaves area (dm^2)		The leaves chlorophyll content (mg.100 g^{-1} fresh weight)	
	2017	2018	2017	2018	2017	2018	2017	2018
F0	5.26	9.58	1.84	2.95	32.60	43.34	160.8	244.5
F1	7.26	13.29	2.62	4.17	37.63	56.07	173.5	253.5
F2	19.74	27.46	3.43	5.85	40.30	68.47	219.4	277.9
F3	11.94	13.67	2.07	3.24	39.50	66.11	217.4	271.6
L.S.D%	0.274	0.783	0.036	0.013	1.279	0.609	0.537	1.168
T0	9.48	12.29	1.52	2.09	28.71	47.70	171.1	234.9
T1	9.99	15.50	2.44	4.30	37.33	54.64	198.3	263.4
T2	11.33	16.71	3.43	5.23	41.34	67.88	202.3	281.2
T3	13.39	19.50	2.58	4.57	42.65	63.66	199.5	267.9
L.S.D%	0.274	0.783	0.036	0.013	1.279	0.609	0.537	1.168
F0T0	2.66	5.67	1.23	1.99	23.27	24.77	121.7	178.4
F0T1	4.33	8.17	2.26	3.45	32.96	54.49	147.7	228.9
F0T2	6.66	14.33	2.28	3.62	31.00	48.21	209.8	277.8
F0T3	7.38	10.17	1.59	2.72	43.15	45.87	163.7	292.6
F1T0	4.93	8.67	1.55	2.06	33.73	41.11	219.1	234.5
F1T1	7.23	20.33	2.32	4.52	33.71	51.45	147.1	258.0
F1T2	8.79	11.50	3.27	4.96	50.05	69.19	148.9	278.8
F1T3	8.09	12.67	3.35	5.12	33.04	62.52	179.0	242.7
F2T0	14.66	16.50	1.81	2.11	32.23	60.48	175.7	259.4
F2T1	16.87	19.50	2.95	5.98	34.35	80.32	256.6	301.5
F2T2	19.19	30.50	5.70	7.97	36.56	40.00	266.7	292.6
F2T3	28.22	43.33	3.25	7.28	58.06	93.07	178.5	257.8
F3T0	15.67	18.33	1.47	2.17	25.62	64.84	167.8	267.4
F3T1	11.53	14.00	2.21	3.24	48.29	32.31	241.9	265.3
F3T2	10.67	10.50	2.46	4.36	47.74	114.12	183.5	275.5
F3T3	9.880	11.83	2.14	3.17	36.35	53.19	276.7	278.4
L.S.D%	0.548	1.566	0.072	0.026	2.558	1.217	1.073	2.335

RESULTS AND DISCUSSION

plant height increase (cm)

Reslts in Table 1 shows significant differences between the treatment of two factors and their interaction. where All the spraying treatments with chemical fertilizers (NPK) was significantly superior to non-spraying treatments for plant height. The F2 treatment with concentration of (4 ml.L^{-1}) had the tallest plants for both seasons (19.74, 27.46 cm), respectively. While the control treatment recorded the shortest plants (5.26, 9.58 cm), for both seasons respectively. The organic fertilizers significantly increased in plant height, the concentration of (5 ml.L^{-1}) T3 had the highest value in both seasons (13.39, 19.50 cm). While the non-spraying treatment had the lowest value recording (9.48, 12.29 cm), for both seasons respectively. The interaction between the chemical fertilizer and the Tegemin Max fertilizer showed significant differences in both seasons the treatment (F2 T3) produced tallest plants (28.22,43.33 cm) for two seasons, respect tively. while, control treatment produced the lowest in both seasons (2.66, 5.67 cm),this reveals that the response of fig sapling, to chemical fertilizers were differed from orgamic fertilizers spraying results.

Stem diameter (mm)

Results in Table 1 shows that there were significant differences between treatments of two factors in stem diameter the interaction between Spraying treatment with chemical fertilizer (NPK) was significantly superior to the non-spraying treatment, The F2 treatment, with concentration of (4 ml.L^{-1}) had the highest stem diameter over all the treatments, which had (3.43, 5.85 mm) for the two seasons, respectively. While the non-spraying treatment recorded the lowest stem diameter (1.84, 2.95 mm) for both seasons ,respectively. While the organic fertilizer treatment gave significant differences in stem diameter of the plant, The treatment T2 with the concentration (4 ml.L^{-1}) gave the highest stem diameter (3.43, 5.23 mm), while the non-spraying treatment had the lowest value (1.52, 2.09 mm) for both seasons, respe - ctively. The interaction between the chemical fertilizer and the Tecamin Max fertilizer showed a significant effect. Where the treatment (F2T2) gave the highest value (5.70, 7.97 mm) for both seasons, respectively, but the control treatment gave the lowest value of (1.23, 1.99 mm) for both seasons, respectively this indicates that fig sapling response to chemical fertilizers differed from organic fertilizers in stem diameter.

Leaves area (dm^2)

leaves are the food manufacture for the plants by photosynthesis results in Table 1 shows that there were significant differences for all treatments of the two factors. where all the spraying treatments with chemical fertilizers were significantly highest leaf area in comparison to the non-spraying treatment. The plants treated by the F2 treatment recorded the highest leaf area of (40.30, 68.47 dm^2) for both seasons. While the non-spraying treatment had the lowest leaf area(32.5, 43.34 dm^2). The F2 treatment did not differed significantly from the F3 treatment for the first season. Organic fertilizer was differed significantly in the leaf area for both seasons The plants at treatment T3 recorded the highest value (42.65 dm^2) while the non-spraying treatment gave the lowest (28.71 dm^2) in the first season, in the second season, the treatment of T2 gave the highest value (67.88 dm^2), which was significantly superior over to all treatments. While ,the non-spraying treatment produced the lowest leaf area (47.70 dm^2). The interaction between the studeid variables showed a significant effect on leaf area. The interaction (F2 T3) gave the highest value of leaf area (58.06 dm2). While the control treatment gave the lowest (23.27 dm^2) for the first season, in the second season, the treatment (F3 T2) recorded the highest value (114.12 dm^2).

Leaf content chlorophyll (mg.100g^{-1})

Results in Table 1 shows significant differ - ences among chemical fertilizer, organic fertilizer and their interactions in Leaves chlorophyll content for both seasons The F2 treatment had the highest chlorophyll content (219.4, 277.9 mg.100 g^{-1}), while the non-spraying treatment recorded the lowest (160.8, 244.5 mg.100 g^{-1}), respectively. The organic fertilizer gave significant differences

for both seasons, while the T2 treatment with the concentration of (4 ml.L^{-1}) recorded the highest values of (202.3, 281.2 mg.100 g^{-1}), while the non-spraying treatment gave the lowest value of (171.1, 234.9 mg.100 g^{-1}) for both seasons, respectively. Interaction treatments showed significant differences, where the F3T3 treatment gave the highest value of (276.7 mg.100 g^{-1}), while the control treatment gave the lowest value of (121.7 mg.100 g^{-1}) in the first season. In the second season, the F2T1 treatment gave the highest value of (301.5 mg.100 g^{-1}) with a significant differences for all treatments, these resrlts showed that the fig leaves chlorophyll content response to the chemical fertilizers differed compared to the organic fertilizers.

Foliartal contains macronutrient elements, which the represented by nitrogen, phosphorus and potassium, in their available form, are essential for conducting vital processes within the plant which is necessary for total vegetative. The results revealed increases in plant height, stem diameter, leaf area and chlorophyll. Nitrogen fertilizers are very important to the cell division , increasing the number of cells and their size in the leaves, which increases the leaves area as a result of its entry into the structure of the protein, nucleic acids, DNA and RNA, whicn important to the division and expansion of cells and its entry into the formation of amino acids, including Tryptophan, (3,6). Phosphor - us enters energyrich compounds and in the process of photosynthesis, thus increasing the production of nutrient elements within the plant, thus improving vegetative growth (15,23). The vegetative growth activity is increased as result to the effect of potassium as a catalyst in the formation of chlorophyll and proteins, which will do a lot of biological processes such as photosynthesis, carbohyd - rate metabolism and the mechanism of opening and closing the stoma, which leads to the improvement of vegetative traits, leading to the increase of manufactured materials, the transition to parts of the plant, increasing the length and number of its branches, and the availability of nutrient elements will results in increasing in growth and this will reflect on the manufacture of carbohydrates in the leaves as shown in Table 1, (14,18). Fertilizer (Tecamin Max) is a free amino acid compound from a plant source, activateing the biological processes in the plant and cauces to increase the processes of construction and metabolism within the plant, thus increaseing most of the growth traits. The studied vegetative traits for fig seedlings (wazeri cultivar) are excelled including plant height, leaf area, diameter of the main stem significantly increased by the effect of spraying organic nutrient. Amino acids stimulate cell division, elongation and growth of plant tissues, which are responsible for the activity of the apical meristem thas extending the life of cells, where they have a major impact on the vital functions of food production its (22,20). This shows increases in plant height and the leaf area. The increases in stem diameter as shows in Table 1 is due to the increases in wood and bark sieve tube size for in the stem diameter due to the increase in the activity of decomposition of the complex compounds, which leads to the release of the elements, which increases the plant availability and increases the rate of cell division and extinction, What the fertilizer includes of elements and amino acids are important in the photosynthesis processes and respiration (13) reported that spraying the organic fertilizer (Tecamin Max) containing a group of amino acids may have a role in increasing leaf chlorophyll content of because they contain Glycine betaine, which plays a role in maintaining the stability of proteins and enzymes (8). The positive role of nitrogen in the formation of a group of porphyrin that enters the chlorophyll pigment (11). This indicates the increases of total chlorophyll in the leaves. The results in Table 2 show significant differences among both variables , and there interactions in both seasons for this traits where chemical fertilizer spraying treatments were significantly increased by producing the highest value as the treatment F3 which recorded (2.13, 2.63%), While the non-spraying treatment recorded the lowest value reaching (1.91, 2.02%), respectively. Organic fertilizer gave significant differences between all treatments for the both seasons where the treatment T3 recorded the highest value of (2.11, 2.57%), while the non-spraying treatment gave the lowest value

which reached (1.96, 2.13%). Interaction treatments showed a significant effect on nitrogen percentage in the leaves for both seasons. F3T3 gave the highest values (2.37, 3.27%) respectively. While the control treatment recorded the lowest value of 1.88% for the two seasons, respectively. The Results Table 2 shows a significant differences for the factors of chemical fertilizer, organic fertilizer in the trait, all chemical fertilizer treatment significantlyl increased, F3 treatment had the highest value of (0.86, 0.93%) for both seasons, respectivelyl, while the non-spraying treatment recorded the lowest value of (0.52, 0.54%) for both seasons respectively. Where the F2 treatment did not differ significantly from the F3 treatment in the first season. Organic fertilizer T3 gave the highest value for the phosphorus% in the leaves recording (0.78, 0.81%) with a significant differences with all treatments and for both seasons, while non-spraying treatment gave the lowest value reaching (0.69, 0.71%) for both seasons, respectively. Interaction treatments showed significant differences for the treatment of F3T3 which gave (1.03, 1.10%) for both seasons, respectively, while the control treatment recorded the lowest value of (0.42, 0.44%) for the two seasons. The Results in Table 2 shows significant differences for both variables and there interactions in both seasons. The F3 treatment gave the highest values of (2.50) and did not differed significantly from the value of F2 treatment in the first season, which recorded (2.49%),while the treatment of F3 in the second season gave differences (2.99%), while a non-spraying treatment gave the lowest value (1.81,2.12%) for the two seasons, respectively. The T3 treatment for organic fertilizer has recorded the highest value, which significantly increased to all the treatments recording (2.34%, 2.90%) while the non-spraying treatment recorded (2.02%, 2.24%) for both seasons, respectively .Interaction treatment F3T2 for the two seasons produced the highest values of (3.06, 3.87%), while the control treatment recorded the lowest values of (1.64,1.83%), respectively. The Results in Table 2 show significant differences among both factors, where all the spraying treatments with chemical fertilizers were significantly superior to the non-spraying treatment. F3 treatment recorded the highest value of (3.77,6.17%) for both seasons, respectively. While the non-spraying treatment recorded the lowest values of (1.45, 2.07%) for two seasons, respectively. The results of organic fertilizer treatments gave significant differences for all treatments. The T2 treatment recorded the highest value of (4.05, 6.26%), The non-spraying treatment gave the lowest value of (0.50, 0.67%) for both seasons. F3T3 interaction treatment gave the highest value of amino acids in the leaf (5.19, 9.53%) for both seasons, while the control treatment recorded the lowest value of (0.21, 0.32%), respectively for the both seasons. The F3T3 treatment did not record differences for the F3T2 treatment for both seasons and did not differ from F3T1 treatment in the first season. Foliartal is a neutral chemical fertilizer containing the macronutrient elements, especially N, P and K, as well as the micro elements, which are absorbed directly when sprayed on the leaves and its apparent effect in increasing the percentage of mineral elements, thus increasing its percentage in the plant. The plant activity increases its concentration in plant tissues (7;21). Organic fertilizer contains the amino acids where amino acids used to increas the availability of nutrient elements when sprayed on the leaves and this is reflected on the growth of the plant due to its absorbed directly through the stoma and through the cuticle layer (17) entering the plant tissue directly and this will increase the vital effectiveness, Thereby increasing their absorption (5**)**

Table 2; Effect of spraying with neutral chemical fertilizer and organic fertilizer on percentage of elements (NPK) in leaves and Percentage of total amino acids (%)

Treatments	Leaf nitrogen content (%)		Leaf phosphorus content (%):		Leaf potassium content in (%)		Total amino acids (%)	
	2017	2018	2017	2018	2017	2018	2017	2018
F0	1.91	2.02	0.52	0.54	1.81	2.12	1.45	2.07
F1	1.94	2.26	0.67	0.69	1.99	2.31	2.32	3.37
F2	2.08	2.44	0.84	0.86	2.49	2.81	2.91	4.27
F3	2.13	2.63	0.86	0.93	2.50	2.99	3.77	6.17
L.S.D%	0.044	0.069	0.023	0.025	0.036	0.041	0.381	0.561
T0	1.96	2.13	0.69	0.71	2.02	2.24	0.50	0.67
T1	1.99	2.18	0.70	0.73	2.20	2.38	2.60	3.74
T2	2.01	2.47	0.72	0.77	2.22	2.70	4.05	6.26
T3	2.11	2.57	0.78	0.81	2.34	2.90	3.30	5.21
L.S.D%	0.044	0.069	0.023	0.025	0.036	0.041	0.381	0.561
F0T0	1.88	1.88	0.42	0.44	1.64	1.83	0.21	0.32
F0T1	1.89	1.97	0.48	0.49	1.77	2.04	0.75	0.88
F0T2	1.93	2.28	0.55	0.58	1.90	2.36	3.25	4.34
F0T3	1.94	1.96	0.62	0.64	1.91	2.25	1.59	2.74
F1T0	1.90	1.94	0.67	0.68	1.99	2.02	0.29	0.92
F1T1	1.94	2.02	0.64	0.66	1.95	1.99	1.44	2.28
F1T2	1.96	2.84	0.64	0.66	1.91	2.39	4.14	6.18
F1T3	1.97	2.24	0.75	0.77	2.11	2.84	3.41	4.08
F2T0	2.04	2.28	0.83	0.84	2.51	2.68	0.80	0.81
F2T1	2.07	2.51	0.90	0.91	2.71	2.77	3.60	5.86
F2T2	2.05	2.16	0.92	0.94	2.02	2.19	4.24	5.94
F2T3	2.14	2.82	0.72	0.75	2.74	3.58	3.01	4.49
F3T0	2.01	2.43	0.86	0.88	1.96	2.45	0.71	0.64
F3T1	2.04	2.23	0.79	0.86	2.37	2.72	4.64	5.93
F3T2	2.08	2.59	0.75	0.90	3.06	3.87	4.55	8.58
F3T3	2.37	3.27	1.03	1.10	2.61	2.92	5.19	9.53
L.S.D%	0.088	0.137	0.046	0.049	0.073	0.083	0.763	1.122

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