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STUDIES OF GROWTH, YIELD AND ITS COMPONENTS AND CHEMICAL COMPOSITION UNDER EFFECT OF VITAMIN C, VITAMIN B_1 BORIC ACID AND SULPHUR ON PEA (*Pisum sativum* L.) PLANTS.

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ABSTRACT

Field experiment was carried out at farm, EL-Gemmeiza Agricultural Research Station during the two winter seasons of 2001-2002 and 2002-2003, to study the effect of foliar spray of vit. C, i.e. 100, 200 and 300ppm, Boric acid (500 ppm), vit., B_1 (150ppm) and micronized sulphur (750g./fed.) on growth, yield and its components and chemical composition on pea plants.

Results indicated that foliar spray with vit. C (200ppm) increased no. of leaves/plant followed by vit. B_1 and S compared with control. While all treatments had no significance on plant height in relation to both seasons. Moreover, height of the 1st fruiting node, plant yield, total yield/fad., shell out %, no. of pods/ plant and no. of seeds/pod were significantly increased by using vit C (200ppm) and vit. B_1 (150ppm) in both seasons. Also, foliar spray with vit. B_1 increased length and weight of pod, weight of green seeds/pod, and pod diameter in both seasons.

Foliar spray with sulphur (750g./fed) and vit C (200ppm) caused a significant increase in chl. a, b, a+b and carotein in leaves and crude protein in seeds in both seasons. While all treatments had no significant differences in TSS and carbohydrates in both seasons.

Positive significant correlation were found between no-of leaves with most characters and among total yield /fed. and wt. of 100 seed, wt. of seeds/pod, length and wt. of pod, no of seeds/ pod, protein, TSS chlorophyll and carotein.

Negative significant correlation were found between height of plant and height of 1st fruiting node, as between no. of leaves /plant and height of 1st fruiting node. Among no. of pods/plant and height of 1st fruiting node, also between total yield /Fed. and height of 1st fruiting node, the correlations were significantly negative.

INTRODUCTION

Pea (*Pisum sativum* L.) is one of the most important leguminous vegetable crop either as green or dry seeds yield in winter growing season in Egypt. The seed of pea contains considerable amounts of protein, carbohydrates, sugar, phosphorus, potassium, iron, calcium, vitamin A and B ... etc., so this vegetable crop is considered as one of the most important out sources in human food nutrition. Increasing the production of the green pods and dry seeds with high quality are very national aim, the objective of the present investigation is to study the growth, yield and quality of pea when planted under different foliar nutrients on plants.

Omer (1988) found that sulphur application to peanut plants led to increase in plant height and number of both leaves and branches per plant. Soaking seeds in vitamin B_{12} solution at 2.5ppm significantly increased stem length, both number of leaves and branches/plant and dry weight of different

plant organs in Bean (Abd EL-Fattah and Arisha, 2000). Number of pods/plant, yield/plant and yield / Fed. of pea were significantly increased with increasing vit. B_1 up to 100ppm, while leaf pigments, i.e., chl. a, b and total (a+b) and carotenoids were significantly increased with increasing vit. B_1 up to 200 and 50ppm in pea (Arisha, 2000). Foliar spray with Boron, at 250 or 500pppm were stimulative for vegetative growth characters of broad bean plants, expressed as plant height, number of leaves and branches, green pod and seed yield, also number of pods/plant, pod setting percentage were significantly increased by using Boron spraying at 500ppm (Abd EL Fattah, 1997). Sulphur play many roles in plant nutrition, it is essential for synthesis of protein and the essential sulphur containing amino acids, methionine and cysteine (Morris, 1985). Application of sulfur to the soil up to 200kg/fed. significantly increased number of both branches and leaves/plant, number of both / plant, total yield/fed., total soluble sugars in seeds of pea plant (Arisha *et al.*, 1998).

MATERIALS AND METHODS

Two field experiments were conducted at the experimental farm of research station at EL-Gemmaza, Gharbia governorate during winter seasons of 2001/2002 and 2002/2003. This experiment included seven treatments, spraying pea plants cv. Master B with three concentration of vit. C (L-ascorbic acid) i.e. 100, 200 and 400ppm, boric acid 500ppm, sulfur 750 g., vit B_1 (Thiamine) 150ppm and control. The experimental soil was clay with PH7.8 (In 1: 2.5 suspension), 1.6% organic matter. Available N, P and K were 32, 7.6 and 486ppm in the first season and 35, 7.8 and 465ppm in the second one, following the same order.

Pea cv. Master was planted on October 20 and 18 in 2001 and 2002 respectively Foliar nutrition was done three times, i.e., 30, 40 and 50 days after sowing. A randomized complete block design with three replications was used at each season. Treatments means were compared by Duncan's Multiple range test (Duncan, 1955).

Each plot consisted of four ridges (60cm width and 5m. in length, plot area was $12m^2$. The other cultural practices i.e., irrigation, fertilization and pest control were carried out as recommended in the district. Data were recorded for the following items and were taken as follows:

1-Vegetative growth characters:

Plant height, Height of the 1st fruiting node/cm and no. of leaves/plant.

2-Yield and its components:

At harvesting time, 20 green pods from each treatment were randomly taken at flowering stage to determine: number of seeds/pod, pod length cm. pod weight g., weight of green seeds/pod g., number of ovula / pod, fresh Wt. of 100 seeds g., total yield ton/fed., shell out %, pod diameter cm., No. of pods/plant and individual plant yield g.

3-Photosynthetic pigments (mg/cm^2) in leaves:

Chlorophyll a, b, (a+b) and carotenoids in fresh leaves was determined at flowering stage according to the method advocated by Moran and Parath (1982).

4-Chemical analysis in dry seeds:

Grain samples were cleaned by excluding foreign grains and materials then ground to fine powder for chemical analysis. Dry matter of seeds was wet digested using sulfuric and perchloric acids. Total N was determined by method of Hesse (1971) using the micro kieldahl, the crude protein content was calculated by multiplying N value x 6.25. total carbohydrate was determined in dry powder material of seeds according to Dubois *et al.* (1956). Total soluble solids (T.S.S.%) was determined using hand refractometer. Data obtained were subjected to statistical analysis according to Snedecor and Cochran (1968).

RESULTS AND DISCUSSION

1- Morphological charaters:

Data presented in Table (1) indicated that vit. C. (200ppm) had high significant effect on number of leaves /plant, followed by vit. B_1 and the sulfur, while the control was the lowest records in both seasons. Also, there was no significance between foliar spray and plant height in both seasons. Treating potato tuber with vit. C. was insignificant on plant height (EL-Sayed, 1991) Data for the effect of foliar spray on the height of the 1st fruiting node revealed that the lowest height of the 1st fruiting node was recorded under foliar spray with C. (200ppm), followed by vit . B_1 and the Boric acid, while the heighest 1st fruiting node was recorded under control, consequently the foliar spray with vit. C (200ppm), vit. . B_1 (150ppm) and Boric acid showed the earliest flowering, but flowering was delayed in control in both seasons. Foliar spray of tomato plant with vit. C had significantly increased number of leaves /plant (EL-Ghamring *et al.,* 1999), Arisha, 2000 on pea

Vitamin C (ascarbic acid) is an organic compound in higher plants which is required in trace amount to maintain normal growth (Samiullah and Afridi, 1988). Vitamin B_1 (Thiamine) is an organic compound, which act as a cofactor in the decarboxylation of pyruvate (Oertli, 1987). Vit. B_1 can be supplied to plants as seed soaking or as foliar spray to improve their growth and productivity. For legumes these vitamines could be add as simulative for root growth (Samiullah and Afridi, 1988).

Foliar spray of pea plants with vit. B_1 was significantly increased stem length, number of leaves/ plant and number of branches (Arisha, 2000).

The stimulative effect of vit B_1 on tomato morphological characters may be attributed to its role in increasing root growth of tomato plant (Radzevicius and Bluzmanas, 1975). Obtained results are in accordance with those reported by Samiullah and Afridi (1988), on pea, EL-Beheidi *et al* (1995) on pea and Fathy and Farid (1996) on common bean.

Table (1): Effect of foliar spray with Vit. C, concentrations, Vit. B1, sulfur and boric acid on morphological characters of pea plants.

Treatment	Plant height	No of leaves/plant	Height of the 1st fruiting node (cm)
Season 2001-2002			
Vit. C Conc. Ppm			
100	29.85	11.22 a	7.22 ab
200	30.00	12.51 a	7.29 a
400	31.06	11.29 a	6.75 a-c
Boric acid (500 ppm)	33.55	11.57 a	6.33 a-c
Sulphar (750 gm/fed)	31.55	12.11 a	6.11 c
Vit. B 1 (150 ppm)	33.11	12.45 a	7.22 bc
Control	29.56	9.48 b	7.29 a
F test	N.S	**	*
Season 2002-2003			
Vit. C Conc. Ppm			
100	29.67	11.06 a	7.27 ab
200	30.01	12.45 a	7.38 a
400	30.91	11.37 a	6.80 a-c
Boric acid (500 ppm)	33.91	11.96 a	6.45 bc
Sulphar (750 gm/fed)	31.29	12.07 a	6.09 b
Vit. B 1 (150 ppm)	34.40	12.37 a	7.27 ab
Control	29.30	9.55 b	7.38 a
F test	N.S	**	*

Means followed by the same lower case letter within a character are not significantly different, P= 0.06 N.S= Not significant, ** = highly significant

2- Yield and its components:

Data in Table 2 &3 and Fig. (1) illustrated that vit C (200ppm) and vit. B_1 had significant effect on plant /yield, total yield, shell out, number of pods/plant and number of seeds/ plant in both seasons and wt. of 100 seed in the first season while was not significant in the second season.

It is also clear that vit. B_1 followed by vit C were highly significant in pod diameter, pod length, pod wt., and wt. of green seed/pod in both seasons while the number of ovula/pod was significant in the second season only. Vit C had significant effect on yield and its components on pea plant (Arisha, 2000). The superiority of total yield in the case of 200ppm vit C. treatments showed similar trend to those plant growth (Table 1). The inhancing effect of vit C. on total yield/Fed. may be due to its stimulation effect on number of pods/plant. Vit. B_1 at rate of 100ppm was the best effective treatment for improving growth yield and its components of pea (Arisha, 2000). Therefore obtained results might be attributed to the increments in plant growth, so that the metabolites synthesized (Carbohydrate) improved plant growth and resulting in improving the total yield.

These results agree with those reported by Midan (1986) on tomato, Agwah (1990) on lettuce and EL-Ghamriny *et al.* (1999) on tomato and Arisha, 2000 on pea

Table (2): Effect of foliar spray with Vit. C, concentrations, Vit. B1, sulfur and boric acid on yield and its components of pea plants.

Treatments	Aver. pod length (cm)	Aver. Pod weight (g.)	No. of seeds/ pod	Wt. Of green seeds / pod (g.)	Pod diameter (cm)	No. of pods/ plant
Season 2001-2002						
Vit. C Conc. ppm						
100	10.71 ab	8.27 a-c	7.28 ab	4.40 a-c	1.64 bc	9.04 cd
200	10.90 a	9.15 ab	7.72 a	5.04 ab	1.78 a	10.44 a
400	10.35 ab	8.22 bc	7.26 ab	4.29 bc	1.56 c	9.30 bc
Boric acid (500 ppm)	10.75 ab	8.46 a-c	7.49 a	4.54 a-c	1.68 ab	9.79 a-c
Sulphar (750 gm/fed)	10.74 ab	8.13 bc	7.58 a	4.50 a-c	1.64 bc	9.49 a-c
Vit. B 1 (150 ppm)	11.23 a	9.36 a	7.83 a	5.27 a	1.72 ab	10.08 ab
Control	9.76 b	7.63 c	6.70 b	4.01 c	1.55 c	8.21 d
F test	*	*	*	*	**	**
Season 2002-2003						
Vit. C Conc. ppm						
100	10.90 bc	8.58 ab	7.62 ab	4.37 c	1.64 bc	8.80 de
200	11.35 a	9.35 a	8.00 a	5.30 ab	1.82 a	10.65 a
400	10.63 c	8.45 ab	7.52 ab	4.30 c	1.73 ab	9.15 cd
Boric acid (500 ppm)	11.24 ab	8.62 ab	7.85 a	5.27 ab	1.79 a	9.42 b-d
Sulphar (750 gm/fed)	11.18 ab	8.49 ab	7.72 ab	5.15 b	1.60 c	9.57 bc
Vit. B 1 (150 ppm)	11.55 a	9.48 a	8.05 a	5.37 a	1.80 a	10.02 b
Control	10.12 d	7.87 b	6.73 b	4.02 d	1.55 c	8.44 e
F test	**	*	*	**	**	**

Means followed by the same lower case letter within a character are not significantly different. P= 0.05 N.S= Not significant, ** = highly significant

Table (3): Effect of foliar spray with Vit. C, concentration, Vit. B1, sulfur and boric acid on yield and its components of pea plants.

Treatment	No ovule / pod	Wt. Of 100 seed	Plant/ yield (g)	Total yield (ton/fed)	Shell out %
Season 2001-2002					
Vit. C Conc. Ppm					
100	7.69	53.97 ab	64.22 ab	3.07 d	47.36 c
200	8.24	73.39 a	82.39 a	4.10 a	62.41 a
400	7.06	59.14 ab	78.74 ab	3.54 c	54.44 b
Boric acid (500 ppm)	7.95	63.40 ab	81.52 a	3.94 ab	59.84 ab
Sulphar (750 gm/fed)	7.83	63.12 ab	80.27 ab	3.82 b	57.19 ab
Vit. B 1 (150 ppm)	8.33	72.09 ab	81.90 a	4.06 ab	61.02 ab
Control	6.79	52.81 b	58.93 b	2.91 d	44.37 c
F test	N.S	*	*	**	**
Season 2002-2003					
Vit. C Conc. Ppm					
100	7.61 ab	55.29	64.68 ab	3.12 d	47.70 bc
200	7.94 ab	74.40	82.88 a	4.16 a	62.86 a
400	7.11 ab	60.15	79.15 ab	3.62 c	55.13 a-c
Boric acid (500 ppm)	7.81 ab	63.96	82.02 a	3.99 ab	60.50 a
Sulphar (750 gm/fed)	7.64 ab	63.70	80.65 ab	3.88 b	57.78 ab
Vit. B 1 (150 ppm)	8.29 a	74.09	82.58 a	4.14 ab	61.23 a
Control	6.77 b	52.98	59.26 b	2.97 d	44.78 c
F test	*	N.S	*	**	*

Means followed by the same lower case letter within a character are not significantly different, P= 0.05 N.S= Not significant, ** = highly significant

3- Photosynthetic pigments:

Data in Table (4) reveal that foliar spray with sulfur 750 g./fed followed by vit. C (200ppm) had significant effect on photosynthetic pigments content in pea leaves, i.e. chlorophylls a and carotenoids. It is quite clear that sulfur foliar spray resulted in leaves with more intensive photosynthetic pigments than without sulfur (control).

These results hold true in the two growing seasons. Gypsum (sulfur) application to the soil significantly increased pigments content in leaf tissue of pea plant (Chl. a, b, a+b) and carotenoids Ramadon, 1997. For the effect of sulpur on photosynthetic pigments, it has been found that a drastic decrease leaf area, number leaf cells, number of choloroplast /cell and colorophyll content of leaves is atypical jeature of sulfur deficiency (Purke *et al.*, 1986); Dietz, (1989).

This is to be expected as in leaves a high proportion of the protein is located in the chloroplsts where the chlorophyll molecular comprise EL-Gamal *et al.* (1990) on potato reported that potato leaf chlorophyll content was significant affected when 50kg S/Fed. was applied to the potato field.

Table (4): Effect of foliar spray with Vit. C, concentrations, Vit. B1, sulfur and boric acid on leaf pigments of pea plants

Treatment	Chlorophylls mg/g/dry weight a	b	a + b	Cartotenoids mg/g/dry weight
Season 2001-2002				
Vit. C Conc. Ppm				
100	3.83 a	2.42 c	6.34 c	4.02 cd
200	4.14 a	3.35 ab	7.49 ab	4.42 ab
400	4.11 a	3.31 ab	7.41 ab	4.22 bc
Boric acid (500 ppm)	3.94 a	2.46 c	6.40 c	3.79 d
Sulphar (750 gm/fed)	4.28 a	3.63 a	7.91 a	4.73 a
Vit. B 1 (150 ppm)	4.11 a	2.99 b	7.10 b	3.95 cd
Control	3.12 b	1.75 d	4.87 d	3.07 e
F test	**	**	**	**
Season 2002-2003				
Vit. C Conc. Ppm				
100	3.86 a	2.46 c	6.31 c	4.00 cd
200	4.16 a	3.36 ab	7.70 ab	4.33 b
400	4.08 a	3.05 bc	7.44 ab	4.15 bc
Boric acid (500 ppm)	3.98 a	2.52 c	6.50 c	3.82 d
Sulphar (750 gm/fed)	4.32 a	3.68 a	8.00 a	4.72 a
Vit. B 1 (150 ppm)	4.12 a	3.02 bc	7.18 b	3.93 cd
Control	3.10 b	1.75 d	4.85 d	3.10 e
F test	**	**	**	**

Means followed by the same lower case letter within a character are not significantly different, P= 0.05 N.S= Not significant, ** = highly significant

4- Chemical composition:

The influence of foliar spray with sulfur (750gr/Fed) and vit. C 100, 200 and 300ppm on crude protein %, TSS% and carbohydrate are presented in Table (5) and Fig. (2). Data showed that foliar spray with sulfur increased

crude protein % in both seasons. Soil application of sulfur at 50kg/fed. significantly increased dry weight, crude protein of dry seeds (EL-Sawy and Hassan 1994). Gypsum application increased N, and protein contents in pea seeds. Vit C. had significant effect on N% in tubers of pea (Arisha, 2000).

There results are in accordance with those reported by Midan (1986) on tomato, E. Sayed (1991) who obtained similar conclusion regarding N and ascorbic acid in tomato fruits. Also, EL-Gamal (1984) came to similar results regarding specific gravity and TSS in potato tubers.

Table (5): Effect of foliar spray with Vit. C, concentration, Vit. B1, sulfur and boric acid on chemical composition of pea plants

Treatment	Crude protein %	T.S.S %	Carbohydrate%
Season 2001-2002			
Vit. C Conc. Ppm			
100	22.40 b	11.70	58.19
200	23.87 a	12.11	58.58
400	23.59 a	11.86	58.31
Boric acid (500 ppm)	20.98 c	10.78	55.88
Sulphar (750 gm/fed)	24.66 a	12.15	56.87
Vit. B 1 (150 ppm)	22.26 b	11.27	57.76
Control	20.24 c	9.90	54.90
F test	**	N.S	N.S
Season 2002-2003			
Vit. C Conc. ppm			
100	24.28 a	12.26	53.44
200	24.55 a	13.37	54.53
400	24.52 a	12.90	54.10
Boric acid (500 ppm)	22.37 c	12.10	52.42
Sulphar (750 gm/fed)	24.76 a	13.58	56.58
Vit. B 1 (150 ppm)	23.42 b	12.03	52.65
Control	20.19 d	10.98	52.06
F test	**	N.S	N.S

Means followed by the same lower case letter within a character are not significantly different. P= 0.05 N.S= Not significant, ** = highly significant

These results may be due to the fact that sulfur is necessary for building sulfur amino acid such as cystin, cysteine and methionine, which are necessary for protein synthesis (Lorenz and Maynard, 1986).

It is evident from Table (5) that vit C, vit B_1, sulfur and Boric acid had no significant effect on TSS and carbohydrate. TSS were not significantly affected by treating potato tuber with vit. C (EL-Sayed, 1991).

5- Correlation between studied characters:

Results in Table (6) indicated that positive correlation were found among plant height and each of pod diameter, plant yield, shell out %, total yield, wt. of green seeds/pod, also, between no. of leaves /plant and the characters of pod diameter, no. of pods/ plant, plant yield, total yield, wt. of 100 seed, no. of ovula /pod, wt of green seeds/pod, pod wt., pod length, no. of seeds/pod, crude protein, TSS, chl. a, chl. b and chl. A+b.

Table (6): Correlation coefficients between studied characters of pea

Variable		X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	X16	X17	X18	X19	X20	X21
Plant height	X1	0.089	0.316*	0.102	0.410**	0.443**	0.378*	0.261	0.184	0.503**	0.040	0.233	0.177	-0.465**	-0.078	0.072	-0.007	0.029	0.030	0.041	-0.091
No. of leaves /plant	X2	1.00	0.659**	0.698**	0.566**	0.589**	0.716**	0.477**	0.335*	0.519**	0.383*	0.659**	0.522**	-0.614**	0.525**	0.560**	0.751**	0.553**	0.707**	0.162	0.277
Pod diameter	X3		1.00	0.598**	0.491**	0.575**	0.644**	0.315*	0.221	0.654**	0.386*	0.659**	0.459**	-0.529**	0.311*	0.401**	0.391**	0.184	0.324*	-0.024	-0.157
No. of pods/plant	X4			1.00	0.544**	0.706**	0.855**	0.326*	0.150	0.595**	0.272	0.566**	0.377*	-0.584**	0.512**	0.484**	0.623**	0.488**	0.634**	0.327*	0.235
Plant yield	X5				1.00	0.583**	0.735**	0.502**	0.228	0.497**	0.118	0.255	0.258	-0.552**	0.353*	0.457**	0.576**	0.446**	0.549**	0.339*	0.162
Shell out %	X6					1.00	0.651**	0.396**	0.208	0.650**	0.160	0.580**	0.320*	-0.699**	0.368*	0.384*	0.444**	0.446**	0.516**	0.331*	0.165
Total yield	X7						1.00	0.647**	0.369*	0.727**	0.539**	0.562**	0.662**	-0.640**	0.372*	0.504**	0.695**	0.523**	0.682**	0.444**	0.106
Wt. of 100 seed	X8							1.00	0.312*	0.498**	0.568**	0.163	0.594**	-0.517**	0.163	0.270	0.454**	0.344*	0.446**	0.227	0.091
No. of ovula/pod	X9								1.00	0.225	0.201	0.384*	0.120	-0.378*	-0.245	-0.153	0.0629	-0.139	-0.042	0.384*	-0.073
Wt of green seeds /pod	X10									1.00	0.472**	0.658**	0.526**	-0.563**	0.287	0.444**	0.456**	0.314*	0.436**	0.202	-0.009
Pod Weight	X11										1.00	0.372*	0.783**	-0.278	0.185	0.290	0.346*	0.264	0.359*	0.080	0.002
Pod length	X12											1.00	0.425**	-0.456**	0.356*	0.446**	0.476**	0.233	0.388*	0.092	-0.040
No. of seeds/pod	X13												1.00	-0.423**	0.419**	0.528**	0.532**	0.467**	0.551**	0.080	-0.029
Height of The 1st Fruiting nod	X14													1.00	-0.253	-0.387*	-0.397**	-0.324*	-0.391**	-0.340*	-0.0204
Crude Protein	X15														1.00	0.883**	0.687**	0.792**	0.835**	0.288	0.188
T S S	X16															1.00	0.681**	0.709**	0.795**	0.282	0.097
Chl. a	X17																1.00	0.649**	0.869**	0.250	0.312*
Chl. b	X18																	1.00	0.895**	0.505**	0.413**
Chl. a+b	X19																		1.00	0.446**	0.390*
Carotenoids	X20																			1.00	0.183
Carbohydrate	X21																				1.00

*= Significant **= high significant r at 5 %= 0.304 r at 1 % = 0.393

Positive correlations were obtained among pod diameter and no. of pods / plant, plant yield, shell out %, total yield, wt. of 100seed, wt. of green seed/pod, pod wt., pod length, no. of seeds/pod, crude protein, TSS, chl. a and chl. a+b. the same trends were obtained between no. of pods/ plant and plant yield, shell out %, total yield, wt. of 100 seed, wt. of green seeds/pod, pod length, no. of seeds/pod, protein , TSS, chl. a, chl. b, chl. a+b and carotenoids. Similar results were found among plant yield and shell out %, total yield, wt. of 100 seed, wt. of green seeds/pod, protein, TSS, chl. a, chl. b, chl. a+b and carolenoids, as well as between shell out % and total yield, wt. of 100 seed, wt. of green seeds/pod, pod length, no. of seeds/ pod, protein, TSS, chl. a, chl. b, chl. a+b and carotenoids.

Among total yield and wt. of 100 seed, no. of ovula/pod, wt. of green seeds/pod, pod wt. pod length, no. of seeds/pod, protein, TSS, chl. a, chl. b, chl. a+b and carotenoids were positive correlations. Between wt. of 100 seed and no. of ovulal/pod, wt. of green seeds /pod, pod wt. no. of seeds/pod, chl. a, chl. b and chi. a+b. Similarly to those among pod wt. and pod length, No. of seeds/ pod, chl. a and chl. a+b, between pod length and no. of seeds/pod, protein, TSS, chl. a, chl. a+b, were positive correlation as those among no. of seeds/ pod and protein, TSS, chl. a, chl. b and chl. a+b.

Correlations among height of the 1st fruiting node, chl. b and carotenoids were found as well as between protein and TSS, chl. a chl. b and chl. a+b, among Tss and chl. a, chl. b and chl. a+b and among chl. a and chl. b and chl. a+b. Between chl. b and chl. a+b, carotenoids and carbohydrate. Among chl. a+b, carotenoids and carbohdrate.

Significant negative correlatins were found among plant height and height of 1st fruiting node, among pod diameter and height of the 1st fruiting node and between no. of pods/plant and height of the 1st fruiting node.

The same trends were obtained among total yield and height of the 1st fruiting node, between wt. of 100 seeds and height of the 1st fruiting node, among no. of ovula/pod and height of the 1st fruiting node. Regative correlation were found between wt. of green seeds/pod and hight of the 1st fruiting node, among pod length and height of the 1st fruiting node as well as between no. of seeds/pod and height of the 1st fruiting node and finally among height of the 1st fruiting node, TSS, chl. a, chl. b, chl. a+b and carotenoids.

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دراسة النمو والمحصول ومكوناته والمحتوى الكيماوى فى نباتات البسلة تحت تأثير الرش الورقى بفيتامين ج، فيتامين ب١ ، والبورون والكبريت الميكرونى

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أجرى هذا البحث بالمزرعة البحثية لمحطة البحوث الزراعية بالجميزة – غربية خلال الموسمين ٢٠٠١-٢٠٠٢، ٢٠٠٢-٢٠٠٣ لدراسة تأثير الرش الورقى بفيتامين ج (حمض الأسكوربيك) بتركيزات (١٠٠، ٢٠٠، ٣٠٠) جزء فى المليون والبورون بتركيز ٥٠٠ جزء فى المليون، فيتامين ب١ (الثيامين) بتركيز ١٥٠جزء فى المليون والكبريت الميكرونى بتركيز ٧٥٠جم/فدان وذلك على قياسات النمو والمحصول والمحتوى الكيماوى لبذور الصنف ماستر من البسلة.

وقد أوضحت النتائج مايلى:-

أولاً : النمو الخضرى :

ازداد عدد الأوراق فى النبات نتيجة المعاملة بفيتامين C (٢٠٠ جزء فى المليون) تليها المعاملة بفيتامين ب١ والكبريت وذلك بالمقارنة بالكنترول. بينما لم تظهر استجابة للمعاملات على ارتفاع النبات فى كلا الموسمين. أيضا أظهرت الدراسة معنوية للرش بفيتامين ج (٢٠٠ جزء فى المليون) على ارتفاع النبات حتى أول زهرة يليها تأثير فيتامين ب١، البورون.

ثانياً : المحصول ومكوناته:

كان تأثير الرش بفيتامين C (٢٠٠ جزء فى المليون)، فيتامين ب١ معنوى على محصول النبات الواحد، المحصول الكلى للفدان، التصافى، عدد القرون فى النبات، عدد البذور فى القرن فى كلا الموسمين، وزن ١٠٠ بذرة فى الموسم الأول فقط بينما كان غير معنوى فى الموسم الثانى. كما أوضحت النتائج أن الرش بفيتامين ب١ ١٥٠ جزء فى المليون قد أدى إلى زيادة معنوية فى كل من طول ووزن القرن، ووزن البذرة الخضراء فى القرن وقطر القرن فى كلا الموسمين.

صبغات التمثيل الضوئي:

أزداد محتوى الأوراق من كلورفيل أ ، كلورفيل ب والمحتوى الكلوروفيل أ + ب والكاروتين بالرش بالكبريت بمعدل ٧٥٠ جم/ فدان وأيضاً فيتامين C (٢٠٠ جزء فى المليون) وذلك فى كلا الموسمين.

المحتوى الكيماوى للبذور:

إزداد محتوى القرون من البروتين الخام نتيجة الرش الورقى بالكبريت (٧٥٠جم/ فدان) فى كلا الموسمين. أيضاً أوضحت النتائج أن الرش الورقى، بفيتامين C ، فيتامين ب١ والكبريت والبورون لم يكن لهم تأثير معنوى على المواد الصلبة الذاتية والكربوهيدرات.

أوضحت أهم نتائج دراسة الارتباط بين الصفات التى تم دراستها أن هناك إرتباط معنوى موجب بين كثير من الصفات ومن أهمها الارتباط الموجب بين عدد الأوراق على النبات ومعظم الصفات التى تم دراستها أيضاً ظهر الإرتباط المعنوى بين عدد القرون على النبات ومعظم الصفات وكان الإرتباط الموجب أيضاً بين المحصول النهائى للفدان ووزن الـ ١٠٠ بذرة ووزن بذور القرن وطول ووزن القرن وعدد بذور القرن والبروتين، المادة الصلبة والكلورفيل والكاروتين.

كما أوضحت النتائج أيضاً وجود أرتباط معنوى سالب بين أرتفاع النبات وطول النبات حتى أول زهرة، أيضاً عدد الأوراق على النبات وارتفاع النبات حتى أول زهرة كذلك عدد قرون النبات وارتفاع النبات حتى أول زهرة، أيضاً المحصول النهائى للفدان كان له أرتباط معنوى سالب مع ارتفاع النبات حتى أول زهرة.