

EFFECT OF FOLIAR SPRAY WITH SOME FERTILIZERS AND CHEMICALS ON VEGETATIVE GROWTH , YIELD AND ITS RELATION TO POWDERY MILDEW DISEASE OF SQUASH PLANTS

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ABSTRACT

In order to save the Egyptian ecosystem from pollution with pesticides, under laboratory conditions . application of potassin (P) , mixed (N + P + K) , potassium sulphate and potassin (N) at 800 ppm in vitro decreased conidia germination and length of germ tube . However the least effective treatment was Urea (N) .Under field condition , all tested macroelements as foliar spray reduced powdery mildew disease severity . Application of (N + P + K), potassin- F , potassium sulphate and calcium super phosphate resulted the best effects . Disease severity was reduced to 18.14 , 18.95 , 19.78 and 20.96% respectively compared with control 63.65% . Observed results clear The Topase and sulphur micronized fungicide gave the best disease control .Two field experiments were carried out on squash cv . *Eskandrani* in the two summer season 2003 and 2004 to study the effect of foliar application with Urea 1% , calcium super phosphate 1% , potassium sulphate 1% + potassium sulphate 1% , potassin-N 2.5 ml/l , potassin-F 2.5 cm/l , Topas 0.25 ml/l and sulphur 2.5 gm/l on growth , sex expression , yield , chemical composition and disease severity of powdery mildew of squash plants . The results revealed that , vegetative growth (number of leaves , plant height , fresh and dry weight) were significantly increased by foliar application with all treatments compared with control .Spraying squash plants with Topase gave the highest values of number of fruits per plant , moreover , foliar spray with sulphur micronized gave the highest values of fresh and dry weight plants . Average fruit weight , early yield and total were obtained by foliar application squash plants with Urea 1% + calcium super phosphate 1% + potassium sulphate 1% and potassin-N 2.5ml/l . The chemical composition of the leaves revealed that different treatments used significantly increased N , P and K compared with control . In general , it can be stated that foliar application with Urea 1% + calcium super phosphate 1% + potassium sulphate 1% and potassin-N 2.5 ml/l were recommended to raise squash production under the environment condition of this investigation .

INTRODUCTION

The cucurbits are world important vegetable crops , generally they are attacked by many pathogens either in the open field or under covered agriculture conditions resulting in great economic losses i.e .*Erysiphe cichoracearum* the causal organisms of powdery mildew (maximilian, et al . 1976) . However good control of these disease can be achieved by chemical control products , they cause hazardous on the environmental and consumers (javoraska, 1978) . Limit the use of these pesticides emphasize the need altrenative methods to control plant disease .(Wilson et al 1987).Summer squash (cucurbita pepo L .) is one of the most vegetable crops in Egypt . Total cultivated area exceeds 95736 feddan in 2004 , which yielded 729772 tons , with an average 7.62 feddan were devoted to squash

plantation. Department of Agricultural Economies and statistics, Ministry of Agriculture, ARE, 2005. Plant nutrition is one of the primary factors, which play a role in vertically raising the yield of vegetable crops, especially those of upright vegetation like squash. Many factors are known to affect squash growth, Sex expression, Yield and its quality. Foliar application of N, P and K fertilizers are of great importance in these conditions. There are many factors that affect the availability of P and K in soils. Mengel and Kirkby (1987) reported that clay content probably contributed more fixation of P, N and K by clay minerals, leading to reduction of their availability and thus lower available concentration in soils. Amberger (1993) reported that phosphorus is quite immobile in soils with neutral or high PH and appears in more or less stable calcium phosphate. Added phosphate does not move more than 2.3 mm from the fertilizers particle and its precipitated rapidly to dicalcium phosphate ($\text{Ca H PO}_4 \cdot \text{H}_2\text{O}$) or octocalcium phosphate, entirely unavailable to crops. Smmoro (1997) reported that in soils which are rich in calcium and are alkaline in reaction, phosphate added as fertilizers are converted to less available from of calcium compounds. Many investigators reported that foliar application with NPK increased vegetative growth, sex expression, yield of squash plants, EL. Sayed *et al.*, (1992) found that spraying of squash plants with 0.04 p as KH_2PO_4 increased the total fruit yield. Also, Hanafy Ahmed (1997) found that spraying squash plants with Urea (1%), calcium super phosphate (1%) and potassium sulphate 1% increased significantly number of female flowers per plant and the percentage of femaleness and increased fruit yield. Powdery mildew cucurbits is endemic and major disease in Egypt, caused by *Erysiphe cichoraceam* which may cause losses reach to 30-80 from fruit yield of squash when the percentage of infection reaches to 50-100% (Curger 1974 and EL. Nagar *et al.*, 1991). The disease control can be achieved by using resistant cultivars and or chemicals. several fungicides. Recently become available for the control of powdery mildew (Gruzdyen 1980 and Isamail *et al.* 2003) on squash. Most of these investigators studied the effect of fungicides on controlling the growth and spread of fungi without determining their effect on plant growth and production. This work aims to study the effect of foliar application with N, P and K, potassin and some fungicides on growth, sex expression, yield, chemical composition and disease severity of powdery mildew of squash plants.

MATERIALS AND METHODS

Effect of foliar fertilizers on conidia germination *In vitro*

The tested foliar fertilizer treatments N, P and K at 6 levels i.e 100, 200, 300, 400, 600 and 800 ppm were used as follow:-

- 1 – Urea (46% N)
- 2 – Calcium supper phosphate (15.5% P_2O_4)
- 3 – Potassium sulphate (48% K_2O)
- 4 – Potassien – N (30% K_2O + 8% N)
- 5 – Potassien – F (30% K_2O + 10% P_2O_3)

The treatment were either individually applied or in combination using N or P or K or (N + P + K) or potassin-F. The fungicides Topase (0.25 g/l) and the micronized sulphur (2.5 gm/l) as show in table (1).

Table (1) :- Foliar fertilizers and fungicides treatments.

Treatments	Concentration of fertilizers and fungicides	Nutrient content
Control	Without foliar fertilizer (tap water)	
Urea (U)	1% (10gm/l) w/v	46% N as a source of N
Calcium super phosphate(CSP)	1% (10gm/l) w/v	15.5% P ₂ O ₅ as a source of P
Potassium sulphate(PS)	1% (10gm/l) w/v	48% K ₂ O as a source of K
U + CSP + PS	1% U + 1% CSP + 1% PS	as a source of N , P and K
Potassin-N	30% K ₂ O and 8% N(2.5 ml/l)	as a source of K and N
Potassin-F	30% K ₂ O and 10% P ₂ O ₅ (2.5 ml/l)	as a source of K and P
Topase 200	0.25ml/l (the recommended dose)	10% penconazole
Micronized Sulphur	2.5gm/l (the recommended dose)	80% Sulphur

U:- Urea

CSP :- Calcium superphosphate

PS :- Potassium sulphate

Each solution of the foliar fertilizers was deposited by means of hand atomizer on clean dry glass slides . The deposited solution was air dried to thin film and subsequently , the conidia were dusted on the slides by a camel hair brush . Each two slides were placed on Petri-dish containing mosited filter paper . Glass slides treated with distilled water left to dry and then dusted with conidia to serve as control . Four replicates were used for each particular concentration . All the slides were incubated for 24 hour at 25 C° and germination of conidia and the germ tube length were calculated .

Field experiments:

Two field experiments were carried out at the farm of EL . Goemmeiza Agric . Res station , Gharbiya government during the two succeive summer seasons of 2004 and 2005. The experimental soil was clay with PH 8.1 (in 1 : 2.5 suspension) , 1.5% organic matter . Available N , P and K were 30 , 7.5 and 450 ppm in first season and 35 , 7 and 465 in the second one , respectively . Seeds of squash variety "Eskandrani" were shown on 10th and 16th April of 2003 and 2004 , respectively . The experiment consisted of 9 treatments as shown in table 1 . These trails were arranged as complete randomized blocks design with 3 replicates . The plot area was 16 m² , consisted of 4 ridges 0.8 m apart and 5 m long . The distance between plants were 35 cm . Thinning took place after complete germination i.e , two weeks after seed sowing , leaving one plant per hill . The usual agricultural procedures of squash were used , nitrogen fertilizer was added as Urea (46% N) at the rate of 60 Kg / fed . in two equal dose before the first and second irrigation . Meanwhile all plots were fertilized with 100 Kg calcium super phosphate (15.5% P₂O₅) before the first irrigation . Foliar application was made at the 2-3 true leaf stage for the first spray and the second was applied 7 days later , using spray solution at 200 liter / feddan with a knapsok sprayer , equipped with on nezool boom .

Vegetative growth :

Five plants were collected from each plot to determine 1) vegetative growth , number of leaves , plant height and plant fresh weight after 100 days from sowing . 2) Flowering characters , five plants from each plot were chosen and labeled for the present study , male (M) and female (F) flowers for each treatment were counted two days intervals up to the end of the season.

Sex expression :

Sex ratio (M/F) and femalness $F / (F + M) \times 100$ were determined , 3) .

Yield and its components :

Yield parameters ; number of fruits / plant , average fruit weight (gm) , early yield (ton / fed) was determined from the first six harvesting and total yield (plot) was determined by summation all harvests through out the season , and the yield calculated as (ton / fed).

Chemical composition :

Dry matter sample of petioles and blades of leaves were taken after 45 days from sowing and dried at 70 C° until constant weight , Total nitrogen was determined according to chapman and pratt (1978) . Pand k were determined according to Jackson (1973) . The data were statistically analysed according to the procedure described by Snedecor and Cochran (1980) .

Disease severity :

Disease severity percentage was recorder on all plants of each plot and calculated according to the devised scale Horsfall and Barratt (1945).

RESULTS AND DISCUSSION

Effect of foliar fertilizer on conidia germination :

Table (2) show decrease in germination as well as in the length of germ tube by increasing the concentration of the fertilizers . The most efficient treatment was the fungicide treatment as Topase showed no conidia germination at (400 and 800 ppm) also unable to germinate under the effect of the micronized sulphur at the rate of (800 ppm) . The other treatments differed in their effect on the conidia germination and length of germ tube .At the highest concentration (800 ppm) the (potassin P) gave (18.3% & 19.2 μ) N P K resulted in (19.9% & 21.6 μ) , K induced (20.5% & 24.3 μ) and P showed (22.6% & 29.4 μ) while N was the least effective which resulted in (36.4% & 40.1 μ) as compared with control (67.6% & 74.2 μ) . This variation many treatments may be due to its highly toxicity and active ingredient. These results are in the line with that reported by Bains and Jhooty (1978) and El_desouky (1996) , They concluded in general most of the un balanced treatment (NPK) reduced infection and sporylation of downy mildew . Suhag et al (1988) who found that the fungicide was more effective in controlling powdery mildew epidemics caused by *Pesepodoperonospora cubensis* and it exhibited some phytotoxic effects.

Disease severity:

Table (3) indicate that all tested treatments exhibited lower disease severity in both growing season (2004) and (2005) Application of the fungicide in the first season (2004) , Topase showed the lowest percentage of

infection (10.02%) , followed by the micronized sulphur (16.12%). Similar trend could be observed at potassin (F) , macroelemets in combination (N P K) , potassium sulphate and calcium super phosphate , while potassin (N) (22.14%) . Application of Urea , however was the least effective treatment (28.24%) when compared as control (63.65%) infection. The results obtained with season (2004) were more similar to those of season (2005). The aim of fertilizer application was increase the natural fitness of cucurbits plants to the disease infection. These results are in agreement with those obtained by Farahat et al . (1990), El_desouky (1996) and Elkafrawy (1997) stated that , application of phosphatic or potassic fertilizers did not affect of the powdery mildew disease of Pea . However , when both fertilizers were combined the percentage of mildew decreased and the yield was increasing.

Table (2) :- Effect of different concentration of the treatments on *E.cichoracearum* , conidia germination (%) and germ tube length (μ) .

Treatments	Control		Concentration (PPm)												Mean	
			25		50		100		200		400		800			
	G	GTL	G	GTL	G	GTL	G	GTL	G	GTL	G	GTL	G	GTL	G	GTL
Urea 1%	67.6	74.2	65.9	72.8	63.8	71.3	59.9	69.4	50.1	61.2	43.5	53.1	36.4	40.1	53.9	61.3
Calcium super phosphate 1%	67.6	74.2	62.2	70.4	60.6	68.4	53.5	65.1	46.7	59.1	36.2	48.6	22.6	29.4	46.9	56.8
Potassium sulphate 1%	67.6	74.2	61.9	71.3	58.4	67.8	50.4	62.8	43.2	51.4	33.6	40.2	20.5	24.3	44.7	52.9
U+CPS+PS 1%	67.6	74.2	60.7	70.2	55.7	65.9	48.3	59.6	40.8	46.6	30.2	38.3	19.9	21.6	42.6	50.3
Potassin N) 2.5 ml/l	67.6	74.2	62.8	70.9	60.3	68.3	51.2	63.1	42.7	54.3	31.1	43.5	21.4	27.1	44.9	54.5
Potassin () 2.5 ml/l	67.6	74.2	61.6	70.1	56.8	64.8	49.5	58.9	39.8	42.6	29.2	36.4	18.3	19.2	42.1	48.6
Micronised Sulphur 2.5 ml/l	67.6	74.2	59.2	69.0	52.9	62.5	43.2	52.7	32.6	31.2	14.1	12.6	—	—	36.3	39.5
Topase (200) 0.25 ml/l	67.6	74.2	55.4	61.3	50.3	61.2	40.1	49.9	15.2	11.5	—	—	—	—	30.9	35.6

G :- Germination(%) GTL :- Germ tube length (μ)

U:-Urea CPS:- Calcium super phosphate

PS:- Potassium sulphate

Table (3) :- Effect of different treatment on powdery mildew severity (%) of squash during 2004 & 2005 seasons .

Treatments	Disease severity	
	Season 2004	Season 2005
Control	63.65	55.86
Urea 1%	28.24	26.35
Calcium superphosphate 1%	20.96	19.18
Potassium sulphate 1%	19.78	18.95
U + CPS + PS 1%	18.14	17.25
Potassin-N 2.5 ml/l	22.14	21.50
Potassin-F 2.5ml/l	18.95	18.17
Topase (200) 0.25 ml/l	10.02	8.97
Micronized sulphur 2.5 ml/l	16.12	15.04
L.S.D at 5%	5.01	3.11

U:-Urea CPS:- Calcium super phosphate

PS:- Potassium sulphate

Vegetative growth :

Data of table (4) show the effects of different fertilizers. Compounds and some fungicides , added as foliar spary to squash plants , on some

growth parameters . Number of leaves per plant , plant height plant fresh weight and plant dry weight were responded to the foliar treatments . The effects were significant in both seasons The highest values were obtained from spraying squash plants with Urea, potassium sulphate Urea + calcium super phosphate + potassium sulphate , potassien N . Topas and sulpher , while , The leavest values were obtained from control , cacium super phosphate and potassin-F .Spraying squash plants with Topase gave the highest values of numbers of leaces and plant height . Moreover , foliar spray with sulpher micromized gave the highest values of fresh and dry weight plant. Foliar feeding with N P K caused on increase in growth can be attributed to two main reasons . First is high demand of N P K , the second reason and perhaps the more important , N P K can be taken up rapidly and metabolised by leaves especially at period of high demand during fruit development . This result may statisfactorily agree with Elsayed et al , (1992) on squash and Mohamed et al , (1999) on cawpea . Morover , last and Nour (1961) found that phosphorus and potassium foliar fertilizers increased the average yield of vicia faba crop twice as high as the unsprayed . Foliar application with fungicides increased significantly growth of squash plants . This may be due to the complete protection from powdery mildew with this treatment which prolonged life of plants . Similar results were obtained by , Abdel . Hafez and Abd EL.Gawad (1987) on squash . Also , Ismail et al , (2000) they found that Topas and sulpher increased significantly dry weight of squash plants . It can be concluded that foliar N P K and potassin-N of squash plants has a favourable effect on the studied parameters of vegetative growth . Hanafy Ahmed (1997) found that foliar application of squash plants with Urea , calcium super phosphate and potassium sulphate increased dry weight , Free amino acid , sugars and N P K in dry weight .

Table (4) :- Effect of foliar application with N , P , K , potassin and some fungicides on vegetative growth of squash after 70 days from sawing during 2003 and 2004 seasons.

Treatments	No of leaves /plant		Plant height (Cm)		Plant fresh weight (Kg)		Plant dry weight (g)	
	2004	2005	2004	2005	2004	2005	2004	2005
Control (tap water)	27.67	28.66	31.67	29.33	1.033	0.967	95.3	90.6
Urea 1%	39.67	38.00	39.67	35.33	1.833	1.833	156.17	175
Calcium superphosphate 1%	33.00	38.33	35.00	34.33	1.500	1.600	133.65	145
Potassium sulphate 1%	41.67	39.33	41.67	35.66	2.067	1.967	185.5	160
U + CSP + PS 1%	41.67	39.33	43.67	36.00	1.767	1.833	162.7	166.15
Potassin-N 2.5 ml/l	46.00	46.66	42.67	37.67	1.733	1.867	161.9	172.6
Potassin-F 2.5 ml/l	35.00	33.66	35.00	37.67	1.467	1.233	138.0	115.5
Topas 0.25 ml/l	49.00	41.67	47.33	50.67	1.733	1.567	147.2	147.15
Sulphur 2.5 gm/l	37.00	40.00	41.67	49.33	1.900	1.867	175.8	174.17
L.S.D at 0.05%	8.1	8.16	6.56	7.8	0.440	0.258	34.3	21.0

U :- Urea

CSP :- Calcium superphosphate

PS :- Potassium sulphate

Sex expression :

Data in table (5) show that , foliar application with potassium sulphate , potassin-N and sulpher gave the highest values of total flowers of squash

plants in both seasons compared with control , Urea and calcium super phosphate , Moreover , the same data show clearly that all treatments significantly increased the percentage of female flowers , Unsprayed plants (control) produced the least of female flowers and the highest of male flowers . Moreover , data revealed that high significant increases in the percentage of femaleness as well as high significant decreases in sex ratio were reduced by the plants sprayed with all treatments compared with control-untreated plants . Spraying squash plants with Topase gave the highest values of femaleness % in both seasons . In this respect Abdel . Hafez and Abd El-Gawad (1987) found that spraying squash plants with fungicide Mil carbo : 4% increased the percentage of female flower and decreased the sex ratio. Also , Hanafy Ahmed (1997) found that spraying squash plant with Urea-calcium super phosphate , potassium sulphate significantly increased number of female flowers resulted in high significant decreases in sex ratio he also found that these treatment gave the highest values of dry matter accumulation and content of different of organic (sugars and amino acids) and inorganic (N , P and K) . The increasing of female flowers may be due to high values of cytokinin activity Hanafy Ahmed (1997)

Table (5) :- Effect of foliar application with N , P , K , potassin and some fungicides on number of flowers (male and female) , % of femaleness and sex ratio of squash plants during 2003 and 2004 seasons.

Treatments	Male flowers		Female flowers		% of femaleness		Sex ratio	
	2004	2005	2004	2005	2004	2005	2004	2005
Control (tap water)	21.67	21.67	7.67	8.00	26.1	26.9	2.84	2.74
Urea 1%	15.00	16.00	12.33	12.00	45.1	42.7	1.21	1.33
Calcium superphosphate	18.00	17.00	10.33	11.67	36.4	40.7	1.75	1.45
Potassium sulphate 1%	19.67	19.33	12.33	14.33	43.3	42.5	1.58	1.35
U + CSP + PS 1%	17.33	16.00	11.67	12.33	36.4	43.5	1.48	1.3
Potassin-N 2.5 ml/l	16.00	19.00	15.00	13.33	48.3	41.6	1.10	1.41
Potassin-F 2.5 ml/l	21.00	18.67	15.33	14.33	51.6	43.4	1.36	1.290
Topase 0.25 ml/l	19.33	16.67	16.67	13.67	56.8	45.00	1.16	1.403
Sulphur 2.5 gm/l	20.00	16.67	17.67	14.00	44.9	45.6	1.40	1.19
L.S.D at 0.05%	2.82	1.96	1.67	1.25	3.07	3.1	0.263	0.263

U :- Urea CSP :- Calcium superphosphate

PS :- Potassium sulphate

Yield and its components :

Data of table (6) show clearly that spraying squash plants with N , P , K , potassin and some fungicide increased significantly No . of fruits plant , average fruit weight , Early and total Yield (ton/fed) compared with control-unsprayed plants . The highest values were obtained from plants sprayed with solution of Urea 1% + calcium super phosphate 1% + potassium sulphate 1% . The superiority of spraying squash plants with solution of Urea + calcium super phosphate + potassium sulphate could be attributed to its N P K contents which helps giving plants some of its higher requirements of these essential elements as its clear in Table . In this respect , El . Sayed et al , (1992) working on squash mentioned that spraying with KH_2PO_4 at the concentration of 0.04% p produced the highest yield . Moreover , Safia Adam

et al (1998) working on tomato mentioned that spraying with 0.7% N + 1.0% K₂O gave more Yield of tomato plants , than these sprayed with each of solution spraying squash plants with potassium sulphate 1% + potassium 1% + sulphate 1% gave the highest values of vegetative growth i.e . No of leaves / plant , plant height , fresh and dry weight / plant compared with control . Moreover , significant increases in the number of female flowers per plant and percentage of femaleness were recorded by plants sprayed with Urea 1% , calcium super phosphate 1% , potassium sulphate 1% , mixture of them , potassien-N 2.5 ml/l , Topas 0.25 ml/l and sulphur 2.5 gm/l compared with control-unsprau plants .

Table (6) :- Effect of foliar application of N , P , K , potassin and some fungicides on fruit yield and its components of squash plants during 2003 and 2004 seasons.

Treatments	No of fruits/plant		Average fruit weight (gm)		Early yield (Ton/Fed.)		Total yield (Ton/Fed.)	
	2004	2005	2004	2005	2004	2005	2004	2005
Control (tap water)	4.87	4.53	105.67	96.00	2.21	1.77	6.52	5.14
Urea 1%	8.33	9.70	121.00	105.00	3.92	3.83	12.93	12.58
Calcium superphosphate	7.83	7.67	118.00	114.00	3.70	3.93	11.85	10.72
Potassium sulphate 1%	9.50	8.17	123.67	120.00	4.40	4.02	14.57	12.12
U + CSP + PS 1%	9.87	9.33	130.33	130.67	4.61	4.38	15.2	15.11
Potassin-N 2.5 mN	8.83	8.00	130.67	123.00	4.65	3.47	15.58	12.24
Potassin-F 2.5 mN	7.93	6.967	123.33	117.00	3.72	3.63	11.64	10.2
Topas 0.25 ml/l	7.47	8.100	119.67	118.67	3.46	3.67	11.28	11.6
Sulphur 2.5 gm/l	7.77	8.167	124.00	121.67	3.6	3.51	11.87	12.45
L.S.D at 0.05%	1.059	0.690	5.47	4.70	0.054	0.6	1.72	1.26

U :- Urea

CSP :- Calcium superphosphate

PS :- Potassium sulphate

Generally , The maximum number of fruit per plant , average fruit weight (gm) , Early and total Yield (ton/fed) were recorded with Urea 1% + calcium super phosphate 1% + potassium sulphate 1% and potassien-N at 2.5 ml/l the individual or control . Also , Hanafy Ahmed (1997) found that spraying of squash plants with Urea , calcium super phosphate and potassium sulphate significantly increased fruit Yield of squash plants. The increasing of Yield Of squash fruits could be attributed to spraying with Topas and sulphur which led to control of powdery mildew and reduced severity disease.

Chemical composition:

Nitrogen concentration : Data in table (7) show that the foliar feeding of squash plants in different treatment used seemed to increase significantly % N in the dry matter of leaves during the two season of experimentation compared with control Regarding phosphorus with concentration , the foliar addition of different treatment used significantly affected P% in dry matter of leaves in both seasons compared with control with respect to potassium concentration , the foliar addition of different treatments used increased K % significantly in the dry matter of leaves . The data show clearly that the highest values of N P K concentrations were obtained from spraying squash plants with solution contain 1% Urea + 1% calcium super phosphate + potassium sulphate compared with individual treatment or control. Similar results were obtained by Elsayed etal (1992) and Hanafy Ahmed (1997) on squash plants.

Table (7) :- Chemical composition of squash leaves as effected by foliar spray with N , P , K , potassin and some fungicides.

Treatments	N%		P%		K%	
	2004	2005	2004	2005	2004	2005
Control (tap water)	3.3	2.6	0.32	0.29	2.7	2.9
Urea 1%	4.55	3.5	0.36	0.35	3.6	3.7
Calcium superphosphate	4.1	3.1	0.41	0.42	3.5	3.6
Potassium sulphate 1%	4.55	3.3	0.38	0.35	3.8	4.6
U + CPS + PS	4.9	3.8	0.43	0.42	4.3	5.0
Potassin (N) 2.5 mN	4.55	3.9	0.39	0.37	4.6	4.8
Potassin (F) 2.5 mN	3.9	3.3	0.41	0.41	4.5	4.7
Topas 0.25 mN	3.55	3.1	0.34	0.37	3.6	3.5
Sulphur 2.5 gmN	3.55	3.2	0.37	0.37	3.5	3.6
L.S.D at 5 level	0.26	0.34	0.06	0.04	0.43	0.54

U:-Urea

CPS:- Calcium super phosphate

PS:- Potassium sulphate

REFERENCES

- Abd ElHafez , A . A and Mona M . El_Gawad (1987) : Effect of same fungicides on sex expression and Yield of squash and cucumber .
Annals of agric . sci , Moshtohor , Vol . 25 (4) : 2280 – 2289 .
- Amberger , A . (1993) : Dynamics of nutrients and reactions of retilizers applied on the environment proc . of Germany / Egyptian / Arab workshop in cairo and Ismalia , Egypt 6 – 17 June , 1993 . Edited by M . M . Fouly and F – E . Abdolla : 41 – 59 .
- Bains , S . and Jhooty , J.S .(1978 b) : Realationship between mineral nutrition of muskmelon and development of downy mildew caused by Psendoperonspora cubensis . plant and soil , 49 : 85-90.
- Chopman , H . D . and P . P . Pratt (1978) : Methods of analysis for soils , plants and water . Univ of California , Div of Agric . Sci . priced publ . 40 – 34 .
- Curger , G (1974) : A.sever occurrence of downy mildew caused by pseudo peronosora cubensis on cucumber crops in the Rhimeland .
Nachrichtenblatt des deutschen p fcanzenschutzdienstes , 26 (10) , 145 .
- El_desouky , S.M . (1996) : Studies on downy mildew disease of cucurbits .
Ph.D . Thesis , Fac . of Agric , Minufiya Univ . 89-94 .
- El-Kafrawy (1997) : Studies on powdery mildew of pepper ph.D.Thesis , Agric , Menofiya Univ .
- El- Nagar , M . A , Maklad , F . M , Ali , M . H . and Fadl , F . A (1991) :
Downy mildew disease of cucumber in plastic houses and its control .
Egypt . J . April . Sci . 6 , 12 .
- El-sayed , Hala A . ; A . M . Abo Elkhear and K . H . El-Hamdi (1992) : Growth , Yield and chemical composition of squash plants (cucurbit aepol) as affected by phosphorus foliar application .
- Farahat A.A ;El-Shami , Mona A.; Fadl , F.A. and El-zayat , M.M .(1990) :
Fungicidal application on the management of Pea powdery mildew in relation to Yield . Agric . Res . Rev . , 68 (3) . 501 – 512 .

- Gruzdyen., G. S. (1980) : The chemical protection of plants fungicides pp . 267 – 335 , MIR publishers Moscow .
- Hanafy Ahmed , A . H . (1997) : Effect of foliar application of some chemicals on sex expression of squash plants . J . Agric . Sci . mansoura univ , 22 (3) : 697 – 717
- Horsfall ,J.G. and Barratt, R.W (1945) : An improved rating system for measuring plant diseases. Plant Pathology, 35:665.
- Ismail , A . A ; E . A M . Hamada and M . A . Elhaak (2003) : Control of powdery mildew disease by some fungicides of different chemical groups and their side effect on squash . Egypt J . Agron . 25 , pp . 1 – 14 .
- Jacson M . L . (1973) : Soil chemical analysis . prentice Hall of Indian private limited , New Delhi.
- Javoraska , T . (1978). Effect of combined herbicides on the occurrence of morphoses in the spikes of spring barley . Agrochemia , 18:37-42.
- Last , F . T . and M . A Nour (1961) : Cultivation of (vicia faba L .) in northern sudan . Emp . J . Exp . Agric . 29 (113) : 60 – 70 . (c . f . field crop Abst . 14 : 1227) .
- Maximilian . K.; E . Muhle ; E . Renmuth and H.Bochow (1976) : Phytopathologie and phlanzenschutz . Akademik .Verly . Berlin , 915 pp.
- Mengle , K . and E . Kirkiby (1987) : Principals at plant nutrition . International potash Instilue P . O . Box . CH . 3048 worblan fen – bern , Switzerland
- Mohamed , F . I ; F . A . Helal and A . Y . El_Taweel (1999) : Response of growth , seed Yield and its components and seed chemical constituents in some cawpea CVS . To foliage nutrition . Zagozid J . Agric . RES . vol 26 No . (4) : 1125 – 1135 .
- Safia , M . Adam , E . H . Abou El . Saleheen and A . M . Abd – Alla (1996) : Effect of N and K fertilizers as foliar spray on Tomatoes under green house conditions . Zagazig J . Agric . Res . Vol . 23 No (4) . 629 – 640 .
- Snedecor , G . W . and W . G . Cochran (1980): Methods . The . Iowa state Univ . Pros . Amer . USA . 7 th ed .
- Sommro B . A (1997) : Cotton fertilization in Pakistan . FAO _ ICRNC , Joint Meeting of the working Groups 384 (cotton nutrition & Growth Regulators) ; 20 – 23 March , 1995 , cairo Egypt pp . 51 – 57 .
- Suhag , L.S , Maheshwari , S.K and Duhan , J.C (1988) : Chemical control of Pesudopronospora cubensis causing downy mildew on sponge gourd . Indian Journal of Agric . Sciences , 58 (6) : 462-464 .
- Wilson , Ch .; Fanklin , J.D. and Otto , B.E .(1987). Fruit volatives inhibitory to *Monilinia frueticola* ana *Botrytis cinerea* Plant DIS ., 71(4) . 316-319.

"تأثير الرش ببعض الاسمدة والكيماويات على النمو والمحصول في الكوسة وعلاقة ذلك بمرض البياض الدقيقي"

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- للحفاظ على البيئة المصرية من التلوث بالمبيدات تم استخدام البوتاسين (ف) ويوريا ١% + سوبر فوسفات الكالسيوم ١% و سلفات البوتاسيوم ١% والبوتاسين ٢,٥سم/لتر عند ٨٠٠ جزء في المليون تحت ظروف المعمل والتي ادت الى انخفاض نسبة الانبات وطول انابيب الانبات لجراثيم البياض الدقيقي بينما كانت معاملة اليوريا اقل المعاملات تأثيرا في هذا الخصوص .
- اجريت تجربتان حقليتان بالمزرعة البحثية لمحطة البحوث الزراعية بالجيزة / الغربية خلال الموسمين ٢٠٠٣ ، ٢٠٠٤ لدراسة تأثير الرش ببعض الاسمدة والمبيدات الفطرية علي نبات الكوسة مثل الرش بمحاليل اليوريا (٤٦% ن) ١% ، سوبر فوسفات الكالسيوم ١٥,٥% فو^٢ ١% ، سلفات بوتاسيوم ٤٨% ب^٢ أ ، ١% ، مخلوط يوريا + ١% سوبر فوسفات الكالسيوم ١% + سلفات بوتاسيوم ٢,٥ سم / لتر ، بوتاسين - ٢,٥ سم/لتر، والرش بالمبيد الفطري توباس ٠,٢٥ سم / لتر والكبريت ٢,٥سم/لتر وقد اظهرت النتائج:-
- جميع المعاملات التي استخدمت في كرش ورقي ادت الي خفض الشدة المرضية لمرض البياض الدقيقي وكانت معاملة (مخلوط يوريا + سوبر فوسفات + سلفات البوتاسيوم + ١%) والبوتاسين - ف وسلفات البوتاسيوم وسوبر فوسفات الكالسيوم افضل تأثيرا لمقاومة المرض مقارنة بالكنترول بينما كانت معاملة المبيدات توباس ٢٠٠ والكبريت الميكروني اعطت اعلي حماية في مقاومة المرض لنباتات الكوسة.
- ادى الرش الي زيادة النمو الخضري زيادة معنوية متمثلا في عدد الاوراق - طول النبات - الوزن الطازج والجاف للنبات وذلك مقارنة بالكنترول وذلك برش نباتات الكوسة بمحاليل يوريا (٤٦,٥-ن) + ١% سوبر فوسفات الكالسيوم ١٥,٥ (فو^٢ أ) + ١% سلفات البوتاسيوم ٤٨% (بو^٢ أ) كما اظهرت النتائج زيادة معنوية في عدد الازهار المؤنثة والنسبة المؤية للتانيث وذلك برش النباتات باليوريا ١% + سوبر فوسفات الكالسيوم ١% + سلفات البوتاسيوم ١% واليوريا ١% + سوبر فوسفات الكالسيوم ١% + سلفات البوتاسيوم ١% والبوتاسين ٢,٥ سم / لتر ، التوباس ٠,٢٥ سم / لتر والكبريت القابل للبلل ٢,٥ جم / لتر - مقارنة بنباتات الكنترول (الغير مرشوشة) .
- عموما كانت اعلي عدد للثمار / النبات - اعلي وزن للثمرة - واعلي محصول مبكر وكلي تم الحصول علي من رش نباتات الكوسة باليوريا ١% + سوبر فوسفات الكالسيوم ١% + سلفات البوتاسيوم ١% والرش بالبوتاسين - ن ٢,٥ سم/لتر .
- ادي الرش بالمعاملات المختلفة ادى الي زيادة محتوى المادة الجافة لاوراق الكوسة من النيتروجين والفسفور والبوتاسيوم زيادة معنوية مقارنة بمعاملة الكنترول وبصفة عامة توصي الدراسة برش نباتات الكوسة بمحلول اليوريا ١% + سوبر فوسفات الكالسيوم ١% + سلفات البوتاسيوم ١% او الرش بالبوتاسين - ن تركيز ٢,٥ سم / لتر للحصول علي اعلي محصول تحت الظروف المماثلة لظروف التجربة مع اجراء دراسة التأثير المشترك للرش بالمعاملات السابقة مع المبيدات الفطرية مع تقليل عدد مرات الرش .