Impact of boron and potassium fertilization on productivity of some sugarbeet cultivars and related to infestation with beet moth, *Scrobipalpa ocellatella* Boyd (Lepidoptera, Gelechiidae) under applying four pesticides.

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ABSTRACT

The present work was carried out at district Verhash - Hosh Issa, El Behiera governorate during the two successive seasons, 2009/10 and 2010/11, to study the effect of two elements levels (boron and Potassium) on the population density of beet moth *Scrobipalpa ocellatella* Boyd, susceptibility of the three cultivars (i.e. Gloria, Top and Monte Blanka) , yield and quality of sugarbeet. In season 2010/11, the highest root yield of sugarbeet cultivar (Gloria) was sowing in new five parts which were applied by the same previous fertilizers. Four parts were sprayed by four pesticides (Challenger 36% SC (45cm^3/feddan), Actellic 0% EC (350cm3/feddan), Malthion57% EC (150/100 liter) and Lannate SP 90% (3·0gm/ feddan) and the last one was used as control.

The obtained results showed that Gloria cultivar which treated with 10 kg boric acid mixed with 48 kg of potassium sulfate gave the highest value of root yields, its value was (25.25 tons/feddan).There were significant differences between the fertilization treatments and between cultivars. The treatment of potassium sulfate (48 kg /feddan) mixed with boric acid (10 kg /feddan) had given the highest values for the fresh leaves yield (13.93, 12.99and 12.31 tons/feddan) for the three cultivars of Gloria, Top and Monte Blanka, respectively. The individual treatments (10 kg) boric acid treatment, (48 kg) potassium sulfate and mixture of boric acid & potassium sulfate (10 +48 kg /feddan) gave the highest sugar yields with Gloria cultivar (3.48, 3.59 and 3.99 tons/feddan), respectively. The plots treated by boric acid (10 kg /feddan) gave the highest T.S.S% values (20.85, 20.15 &18.65%) in the three cultivars (Gloria, Top and Monte Blanka) ,respectively. The sucrose percentage character recorded the highest value by mixture 10 kg boric acid with 48 kg potassium sulfate in each cultivar (15.80, 13.91 and 13.63%). The boric acid (5kg/feddan) treatment gave the highest purity% during the investigation periods for both Gloria and Top cultivars

The appearance of beet moth larvae (*S. ocellatella*) appeared in some plots fairly slight on the experimental treatment control, but appeared on the January. The lowest numbers of *S. ocellatella* were recoded by boric acid treatment of 10 kg / feddan (85.60 /10 plants) in the harvest time as cumulative total numbers for the duration of the study and while, the average number of larvae was (8.98 larvae /10plants). Gloria cultivar was more sensitive cultivars for beet moth *S. ocellatella*.

In general, used pesticides improved quantity and quality of sugarbeet .Pesticide Lannate 90% SP gave the highest reduction percentage on the third day, recording 8.45%. In the third week of spraying, the pesticide Actellic 50% EC was recorded the highest reduction rate (80.28%), followed by Challenger 36% SC (77.27%), the pesticide Lannate 90% SP (73.65) and finally pesticide Malthion57% EC (64.05%). The interaction between pesticides and fertilization treatments as applied on sugarbeet during the experiment period, the pesticide Malthion 57% EC with treatment boric acid (10kg / feddan) treatment recorded the highest value of yield roots (28.10 ton / feddan) .The highest sugar yield(4.00 ton/feddan) was obtained by the some fertilization treatment of boric acid (10kg/feddan) with pesticides Actellic 50% EC. Also the pesticide Actellic 50% EC and treatment potassium sulfate (48kg) gave the highest value of top (leaves) yield (13.50 ton/feddan) .

INTRODCUTION

In Egypt, sugarbeet is considered the second sugar crop for sugar production in Egypt after sugarcane. Recently, sugarbeet crop has been an important position in Egyptian crop rotation as a winter crop not only in fertile soils, but also in poor, saline, alkaline and calcareous soils. Sugarbeet is one of the most important sugar crops worldwide. Allen and Pilbeam (2007) stated that sugarbeet crop has high requirements for boron (B). Boron is required for all plant growth. Adequate B nutrition is critical for high yields and quality of crops. Boron increases the rate of transport of sugars (which are produced by photosynthesis in mature plant leaves) to actively growing regions and also in developing fruits. Boron is essential for providing sugars which are needed for root growth in all plants and also for normal development of root nodules in legumes such as alfalfa, soybeans and peanuts. Boron is by far the most important of the trace elements needed sugarbeet because, without an adequate supply, the yield and quality of roots is very depressed [Cooke and Scott, 1993]. Soil application, as well as, a foliar spray of boron is equally effective, hence the root fresh weight, sucrose %, root and top yields significantly increased by increasing boron levels (Jaszczolt, 1998). In cotton boron deficiency may have been involved in yield reductions caused by high rates of nitrogen (Gupta, 1979), but with sugarbeet nitrogen fertilizers decreased boron deficiency symptoms (Hemphill, 1982).

The beet moths *S. ocellatella* in spring and in the beginning of summer, they mine leaves, usually along main veins, also piercing holes in petioles. The damaged leaves roll and blacken. A black clump of rotten leaves fastened with silk threads is formed instead of the central rosette. In hot and dry years, such damage frequently causes the whole plant to die since the outer leaves die off quickly and new ones are not formed because of the central rosette loss. Beet moths *S. ocellatella* of the following generations penetrates into roots. In the upper part of the roots they gnaw out narrow, twisting grooves or holes under thin skin, sometimes boring to a depth of 5 cm. These holes under skin also injure lateral parts of roots. The damaged roots become languid and rotten. In parent beet plants, the beet moth *S. ocellatella* injure flower buds, unripe seeds, and tips of growing floriferous stalks, piercing holes; as a result, the stalks are bent, and yield of seeds sharply falls. Control measures are as follows agronomical ones include careful harvesting of roots and leaves where the older beet moth *S. ocellatella* can finish their development before plant rotting; autumn deep plowing (25-27 cm) that is most effective at daily average temperature to 5-6°C when the beet moth *S. ocellatella* are inactive, not able to get out on soil surface. Chemical measures include insecticide treatments of beet crops and plantings during mass oviposition by moths of each generation. L vovskii and Piskunov (1999). Larvae feed on leaves, stems, pods and buds. Feeding creates a whitish appearance of surface tissues, as tissues are stripped and on the undersides of leaves creates holes, with eventually only the larger vein tissues remaining intact. Larvae may drop on a silk thread when disturbed. Leaves and petioles may be rolled and tied together with webbing.

Providing a fast growing world population with sufficient food while preserving ecological and energy resources of our planet is one of the biggest challenges in this century. Optimized management of chemical fertilizers and pesticides will be essential for achieving sustainability of intensive farming and requires both empirical data from field trials and advanced fundamental understanding of the molecular processes controlling plant growth. Genes involved in plant responses to nutrient deficiency and pathogen/herbivore attacks have been identified. The focus of this review is on the relationship between the potassium status of plants and their susceptibility to pathogens and herbivorous insects. The latter provides evidence that facilitated entry and development of pathogens or insects in potassium-deficient plants as a result of physical and metabolic changes is counteracted by an increased defense. Once identified, these can be used to design agricultural strategies that support the nutritional status of the crops while exploiting their inherent (William, 2008).

Therefore according to IPM program , this study was carried out for two aims, first one to investigate the effect of two levels of boron and potassium as well as their combinations on productivity of three sugarbeet cultivars and the infestation with beet moth larvae *S. ocellatella* as side effect in 2009/10 and 2010/11 seasons. The second aim, in seasons 2010/11 for the highest sugarbeet cultivar (Gloria) of root yield, four pesticides was also applied against *S. ocellatella*, where, no recommended specific pesticides against this insect were recorded.

Materials and Method

The present work was carried out at district Verhash - Hosh Issa, Al Behiera governorate during the two successive seasons, 2009/10 and 2010/11, to study the effect of two fertilizers and their combinations as follow:

1) 10 kg Boric acid (B)
2) 105 kg Boric acid (B)
3) Potassium at K_2SO_4 (48kg)
4) Potassium at K_2SO_4 (24kg)
5) B + K2SO4 (10+48kg)
6) B + K2SO4 (10+24 kg)
7) B + K2SO4 (5+48kg)
8) B + K2SO4 (5+24kg)
9) Control (Free treatment)

10) In the second season, only the highest sugarbeet cultivar yields (Gloria) with the same previous fertilizers areas were repeated five times.

Four parts were sprayed by four pesticides (Challenger 36% SC ($45cm^3$/feddan), Actellic 50% EC (350cm/100liter water), Malthion57% EC (150cm/100liter) and Lannate SP 90% (1 liter/feddan) and the last one was used as control.

The effects of the population density with beet moth *Scrobipalpa ocellatella* Boyd, on the susceptibility of sugarbeet cultivars, yield and its quality were recorded.

Sowing took place on 15th October in both seasons. Nitrogen fertilizer was applied as ammonium nitrate in two equal doses, at 4 leaf stages (35 day from sowing) and 8 leaf stages (50 day from sowing). Boron was added during the processing of soil for agriculture. Plot area was 31.5 m^2 represent five ridges (90 cm in width × 7m in length). Spacing between hills was 20 cm Soil type was sandy clay and irrigation was flooding from Verhash Canal. At four true leaf stages sugarbeet plants were thinned into one plant/hill according to (Nemat Alla *et al.* 2007). The results of chemicals analysis for land of trial were Boron 0.66 ppm, Potassium 550 ppm, Phosphor 5 ppm and Nitrogen 70 ppm. A split-split plot design with four replicates was used, where three cultivars of sugarbeet (i.e., Gloria, Top, and Mont Blanka) were in the main plots, while treatments with or without pesticides in sub plots.

The first sample of insect pests was taken after eight weeks from sowing. Monthly samples, each consisted of forty sugarbeet plants (10 plants / replicate), were randomly collected along the period of growing season. Each sample was put in plastic bag at different dimensions according to the status of plant growth to be transported to the laboratory. The sampled plants were carefully examined for counting the larva of beet moth S. *ocellatella* according to Abo El-Ftooh (2002). The pesticides were applied in the field by using the dorsal spraying machine during the peak period on March. However, the percentage of reduction of population densities of *S. ocellatella* larvae was obtained according to the equation of Henderson and Tilton (1955).

At maturity (210 days after sowing), At maturity (210 days after sowing), the plants yield of each plot was obtained estimate the root, top and sugar yield. Also, the quality characters in sugarbeet roots included sucrose (s), total soluble solids percentage (T.S.S %) and juice purity percentage was determined as a ratio between sucrose% and T.S.S. % according to Carruthers and Old Field (1961).

Yield components

a) Root fresh yield (RFY) in ton/Fed.

b) Top fresh (leaves) yield (TFY) in ton/Fed

c) Sugar yield (SY) in ton/Fed.

SY = RFY × Sugar percentage

Juice quality

a) Total Soluble Solids percentage (T.S.S %) was determined by using hand refractometer.
b) Sucrose percentage was determined by saccharemeter apparatus in Sabahia Research Station according to the method described in A.O.A.C. international (1995).
c) Purity percentage : was determined according to the following equation

$$\text{Purity \%} = \frac{(Sucrose\%)x100}{T.S.S.\%}$$

Data of all characters were statistically analyzed by COSTAT program according to Steel and Torrie (1981) and the means of each treatments were compared by the value of LSD (Least Significant Difference Test) at the of 5% probability.

RESULTS

A.-Effect of boron and potassium fertilization on yield characters without applying pesticides:-

1.1-Roots yield

Results presented in Table 1 showed that the roots yield of Gloria cultivar which treated with treatment 10 kg boric acid mixed with 48 kg of potassium sulfate gave the highest value was (25.25 tons /feddan). The higher results obtained from the combined analysis of two cultivars in both Top and Monte Blanka as a result of the same treatment as recorded (22.23 ton/feddan) and (23.73 ton/feddan) respectively. Root yield values can be arranged in descending order according to the treatments as follows:-- The first was mixture 10 kg boric acid with 48kg/feddan potassium sulfate (25.25 tons / feddan) , followed by treatment of 10 kg boric acid (24.09 tons / feddan), 48 kg/feddan potassium sulfate (22.71 ton/feddan) , 24 kg/feddan potassium sulfate (22.08 ton/feddan) , 5 kg boric acid (22..62 ton/feddan), 5 kg boric acid with 24kg/feddan potassium sulfate (21.02 tons/feddan) finally, the control treatment was recorded(15.98 tons/feddan). There were significant differences between the fertilization treatments as well as between cultivars. From the results of roots yield in Table (1) clear that the increase of roots yields than the control treatment were due to the fertilization treatments. These results are compatible with the decision of (Mahmoud and Aboushal 2007) where they found that the rate (0.2µg/g) of boron increasing roots yield (27.4%). Also, this results was confirmed by conform to El-Geddawy *et al.* (2007) they found that B 1 kg/feddan significantly increased the root, top and sugar yield. Also, Magda (2002) indicated that the addition of boron increased roots yield and sugar yield and not influence sucrose % and T.S.S. These results agree with Hellal *et al.*(2009) who reported that application of 50 ppm Boron significantly improved the parameters of the roots yield and above ground growth and nutrient contents and balance ratio of sugarbeet

1.2- Top yield:-

Results presented in Table (1) explained that the fertilization treatment (48 kg / feddan) of potassium sulfate mixed with 10 kg / feddan boric) has given the highest values for the fresh Top yield (13.93, 12.99and 12.31 tons/feddan) for the three cultivars under study, Gloria, Top and Monte Blanka, respectively. While, the lowest values of fresh top yield were (6.70, 7.25 and 7.36 tons /fed) came from using 24, 24kg potassium sulfate /fed) and from applying (5kg boric acid and48kg potassium sulfate /fed) for Mont blanka , Gloria and Top cultivar respectively.

1.3- Sugar yield:-

The data presented in Table 1 showed that individual fertilization treatments (10 kg) boric acid treatment, 48 kg potassium sulfate , and a mixture of boric acid & potassium sulfate (10 +48 kg / feddan) gave the highest sugar yield(3.84, 3.47 and 3.99 tons/feddan) with Gloria cultivar, respectively. While, the same treatments gave the lowest values of sugar yield with Monte Blanka cultivar which were (3.06, 2.23 and 3.25 tons /fed) and were (3.16, 2.49 and 3.09 tons / fed) for top cultivar. There were significant effects between the fertilization treatments and there were also significant differences between the cultivars. These results agree with Ouda (2007) who reported that boron gave the significant increasing of roots, fresh leaves sugar yield ton/yield. Also, similar results were found by Magda (2002) In addition, Mahmoud and Aboushal 2007 indicated that the potassium fertilization led to an increase in sugar yield.

2) Effects on Juice quality

2.1-Total soluble solid (T.S.S.%):-

Results were scheduled in Table 2 indicated that the total soluble solids (T.S.S%) which treated with the individual treatments without mixing recorded that the highest values for total soluble solids, where the plots treated by boric acid treatment rate of (10 kg / feddan) gave the highest T.S.S% values (20.85, 20.15 &18.65%) in the three cultivars of Gloria, Top and Monte Blanka , respectively. In addition to this treatment 48 kg potassium sulfate produced the second order T.S.S% values (20.30, 20. 00 and 18.65%) of each of the three cultivars Gloria, Top and Mont Blanka respectively. On the contrary, the lowest values were (18.67& 17.90%) showed in the experimental plots that treated, control by 5kg b+48kg potassium sulfate /fed for Gloria and top cultivars respectively, except in Monte Blanka cultivar, the lowest value was (17.00%) that was obtained from the control. Also, there were significant effects between treatments .It was also showed that there were significant differences between the three cultivars for this characteristic under study. From the previous data in Table(2) the best treatment came from the boric acid 10 kg (20.85, 20.15 and18.65%), from three cultivars Gloria, Top and Monte Blanka , respectively followed by 48 kg Potassium Sulfate treatment(20.30, 20.00 and18.65 %) followed by treatment with a mixture of boric acid with potassium sulfate(10 Kg+48kg) (20.80, 19.50&18.50%) followed by treatment potassium sulfate 24 kg/feddan (19.85, 19.15 and 18.00%)and then the boric acid treatment 5 kg / feddan(19.50, 18.70 and 17.70%). From the previous results matched with Telep *et al.* (2008) where they decided that the application of potassium led to a significant increase of root yield, sugar yield and total soluble solids.

2.2- Sucrose %:-

The sucrose percentage character recorded the highest value by 10 kg boric acid in each cultivars (15.95, and 15.11) except in the treatment fertilization mixture of boric acid with potassium sulfate(10 Kg+48kg) with Mont Blanka cultivar , while the lowest values were recorded in plots which treated by potassium sulfate 24 kg (15.42, 13.03 and 12.26 %) in Gloria , Top, and Mont Blanka cultivars , respectively. Second mixture boric acid (5 kg) with potassium sulfate (24 kg) gave lower values of the sucrose percentage than the first mixture 10 kg boric acid with 48 kg of potassium sulfate on three cultivars Gloria, Top and Monte Blanka, respectively. These results agree with Osman *et al.*(2004), where they decided that boron impact significant effect increasing of total soluble solids, Sucrose %.

2.3- Purity %:-

The important results was the purity% of sugarbeet juice where it was one of the determinants the sugar yield of the juice where the results showed that boric acid (5kg/feddan) treatment gave the highest purity% during the investigation periods, which demonstrated by combined analysis of the three cultivars in the Gloria and Top Monte Blanka respectively . Gloria cultivar was a product has achieved the highest degree of purity %(78.67%) in the three cultivars, followed by top cultivar and then Monte Blanka. It can be arranged the values of this product by decreasing the transactions used in the experiment as follows: - treatment 5 Kg Boric acid(77.83 %), Potassium Sulfate 48kg(77.85%) , Potassium Sulfate 24kg (77.83%) ,10 Kg Boric acid (76.50%), Boron+ Potassium (10+48kg) (75.96%),Boron+ Potassium(5+24kg)(74.45%) and control treatment (73.58%). These results are inconsistent with El-Hosary *et. all* (2007) which were decided that increasing supplied dose of boron negatively affected the values of total solids percentages and harmony with the results as the boron caused increase in the percentage of sucrose and purity.

2.3- Effect of boron and potassium fertilization on population density of beet moth *S. ocellatella* Boyd without applying pesticides (as combined analysis).

Data in Table 3 explained that the appearance of beet moth larvae *S. ocellatella* appeared in some plots fairly slight on the experimental treatment control, but appeared in the month of January in most of the treatment plots and cultivars under this investigation. In Gloria cultivar, the control treatment recorded the highest numbers of population density of beet moth larvae as cumulative total numbers in the experiment (182.90/ 10plants) with mean average (22.65 / 10 plants). On other hand, the lowest numbers of *S. ocellatella* were recoded that by boric acid treatment of (10 kg / feddan) (85.60/10plants) as cumulative total numbers for the duration of the study and while, the average number of larvae (8.98 larvae /10 plants). Top cultivar had the highest cumulative enumeration of larvae at the control treatment (162.4), a control larva per 10 plants and the average (27.10 larvae / 10 plants). The lowest cumulative record number of boric acid treated fairly 10 kg per feddan is 73.70 /10plants with an average of 12.28 Larva /10plants.

The same direction was appeared in the Monte Blanca cultivar, where the lowest total cumulative population was recorded from treated with boric acid at 10 kg and the highest population appeared in plots which treated with a mixture of 5 KG Purim with 24 kg potassium sulfate. There were significant differences among treatments and there were no significant differences between cultivars. From the results presented in the previous Table (3) that Gloria cultivar was more sensitive cultivars of beet moth *S. ocellatella*. These results are compatible with Bassyouny, (1987) and Abo El-Ftooh (1995) where beet moth *S. ocellatella* which found that appeared in the month of January until May on sugarbeet and there were significant difference between cultivars.

B- Effect of Boron and Potassium fertilization on yield characters with applying pesticides:-

1.1:- Root Yield

From Table 5it could be noticed that the interaction between pesticides and treatments as applied on sugarbeet during the experiment period results cleared that the highest root yield (28.10 ton/fed)was obtained from treatment of 10kg boric acid /fed with applying Malthion 57%EC, mean while the lowest one (20.60ton /fed) was due to untreated treatment (control) and applying the same Malthion 57%EC

1.2:- Top Yield

On the other hand, the highest value of fresh top yield found that the highest value was appeared from the result in Table 5 that the application of the pesticide Actellic 50% EC and Potassium Sulfate (48kg / fed) (13.5 tons/feddan) and next record value pesticide Lannate 90% SP and mixture of treatment Boron+ Potassium (10+48kg) (12.30

tons/feddan). Also, the lowest value (8.38 ton /fed) was recorded as result of application pesticide treatment (Lannate 90% SP) with control (6.38 ton/ fed) treatments boric acid 5kg/feddan (6.66 tons/feddan).

1.3:- Sugar Yield

Finally, the sugar yield value was the highest registered by spray pesticide Actellic 50% EC and treatment of individual 10 kg boric acid(4.00 tons/feddan), but lowest value (1.89 ton /fed) of the sugar yield recorded based on the application of the pesticide Challenger 36% SC and control treatment

Generally , the pesticide Actellic 50% EC with treatment of boric acid(10kg/fed) treatment recorded the highest values of sugar yield , while the same pesticide and treatment Potassium Sulfate (48 kg) gave the highest value of top (leaves) yields .The highest yield of root came from application of 10kg boric acid / fed and using Malathion 57 % EC.

2- Quality characteristics:-

2.1- A. Total soluble solids (T.S.S)

The data presented in Table 6 explained that the percentage of total soluble solids (T.S.S) in the juice extracted from the roots of sugar beet was that the highest percentage of interaction between Malthion57% EC insecticides with treatment individual fertilizer (10 kg boric acid) (22.36%). Followed by the Actellic 50% EC (21.85%), Challenger 36% SC pesticide (21 .33%) and finally Lannate 90% SP (19.15%) with the same treatment. While, the same data showed that less total soluble solids (T.S.S. %) were the result of individual treatment 5k g / feddan, where the overlap between them and the pesticides were the following (17.55, 17.67, 16.67and 17.83%) Challenger 36% SC, Actellic 50% EC, and followed by, Malthion57% EC and Lannate 90% SP, respectively. The lowest values came from the control treatments and applying Malthion57% EC (16.67%), Challenger 36% SC (17.83%) and Lannate 90% SP (17.90%.

2.2- Sucrose %:-

The data which identified in Table 6 showed that the highest sucrose% by the interaction between the pesticide Challenger 36% SC with individual treatment K2SO4 (48kg). The same results were appeared with pesticides tested Actellic 50% EC (16.09%) and Lannate 90% SP (16.42) in the same plots which treated K2SO4 (48kg) except of the pesticide Malthion 57% EC, rescored the lowest sucrose% values. The same data in Table 6 showed that the lowest ones were obtained from application of Malthion57% EC with applying (5kg)B+ (48kg)K, , Challenger 36% SC with control treatment, Actellic 50% EC and finally Lannate 90% SP, their values were 12.26, 12.98, 13.22 and 13.81 respectively.

2.3- Purity of juice %:-

Data in table (6) showed that the highest values of purity% had given from application of Challenger 36% SC and using B+K_2SO_4 (10kg+24kg/fed), Lannate 90%SP, Malathion 57%EC and finally with using

K_2SO_4 (24kg/fed), their values were 85.95, 83.25, 83.08 and 81.00 % respectively. Mean while, the lowest ones were recorded from the control treatment with applying the three pesticides except Malathion 57% EC which gave the lowest by apply B+K_2SO_4 (5+24kg/fed).

3-The Chemical control to reduce the populations numbers of beet moth *S. ocellatella*.

The data were scheduled in Table 4 during the application period of pesticides in field, 3 days after spraying, five days, seven days, fourteen days and three weeks. Pesticide Lannate 90% SP gave the highest reduction percentage on the third day, recording 8.45% than the control followed Challenger 36% which rescored reduction 3.896%, followed by Actellic 50% EC the pesticide scoring which was 2.703% and comes in the end the pesticide Malthion57% EC achieved a reduction of 2.614% numbers of the larvae. After week from the pesticide application Lannate 90% SP recorded the highest rate of reduction recorded 52.82%, the pesticide Challenger record 42.21% reduction of larvae Actellic 50% EC (28.38% and finally pesticide Malthion57% ECrecord (27.45%). In the third week of spraying the pesticide Actellic 50% EC recorded the highest reduction rate (80.28%), Challenger 36% SC (77.27%) Followed by the pesticide Lannate 90% SP (73.65) finally pesticide Malthion57% EC % (64.05%).

Conclusion, The use of the pesticide Malathion 57% and mixture boric acid 10 kg / feddan gave the highest root yield, sugar yield and the highest percentage of total soluble solids(T.S.S%). The use pesticides with treatment has increased the roots yield, sugar yield (Quantity and quality characteristics

Table (1):- Effect of boric acid and potassium fertilization on the roots yield, leaves yield (fresh yield) and sugar yield as combined analysis through the two successive seasons 2009/10 and 2010/11.

YIELD CHARACTERS	ROOT YIELD			TOP YIELD			SUGAR YIELD		
Cultivars	Gloria	Top	Mont blanka	Gloria	Top	Mont blanka	Gloria	Top	Mont blanka
10 kg Boric acid (B)	24.09	20.90	22.66	13.35	13.73	12.27	3.84	3.16	3.06
5 kg Boric acid (B)	22.62	17.81	16.74	8.40	10.4	9.13	3.47	2.49	2.23
K_2SO_4 (48kg)	22.71	16.76	15.89	12.85	10.17	6.70	3.59	2.51	2.24
K_2SO_4(24kg)	22.08	16.12	14.31	7.25	12.17	10.78	3.40	2.35	1.89
B + K_2SO_4(10+48kg)	25.25	22.23	23.72	13.93	12.99	12.31	3.99	3.09	3.23
B + K_2SO_4(10+24kg)	21.00	16.63	15.70	10.23	8.90	9.00	3.04	2.24	2.08
B + K_2SO_4(5+48kg)	20.67	16.00	17.11	11.00	7.36	8.33	2.86	2.08	2.10
B + K_2SO_4(5+24kg)	21.02	16.71	17.77	12.15	12.15	10.72	3.00	2.27	2.24
Control	15.98	15.81	15.39	7.70	8.10	8.28	2.23	2.09	2.03
Average yield	21.71	17.66	17.70	10.76	10.66	9.72	3.27	2.48	2.34
LSD $_{0.05}$ between cultivars		1.120			0.800			1.131	
LSD$_{0.05}$ between treatments		1.940			1.386			1.959	

Table (2):- Effect of boric acid and potassium fertilization on sugarbeet quality as combined analysis through the two successive seasons 2009/10 and 2010/2011

Cultivars	Characters / Fertilizers	T.S.S %	Sucrose (%)	Purity %
Gloria	10 kg Boric acid (B)	20.85	15.95	76.50
	5 kg Boric acid (B)	19.5	13.82	78.67
	K_2SO_4 (48kg)	20.3	15.80	77.83
	K_2SO_4(24kg)	19.85	15.42	77.68
	B + K_2SO_4(10+48kg)	20.8	15.80	75.96
	B + K_2SO_4(10+24kg)	19	14.46	76.11
	B + K_2SO_4(5+48kg)	18.67	15.34	74.02
	B + K_2SO_4(5+24kg)	19.15	14.26	74.46
	Control	19	13.98	73.58
	Average cultivar	19.68	14.98	76.09
Top	10 kg Boric acid (B)	20.15	15.11	74.99
	5 kg Boric acid (B)	18.3	13.96	76.28
	K_2SO_4 (48kg)	20.0	15.0	75.00
	K_2SO_4(24kg)	19.15	13.03	75.98
	B + K_2SO_4(10+48kg)	19.5	13.91	71.33
	B + K_2SO_4(10+24kg)	18.83	13.47	71.53
	B + K_2SO_4(5+48kg)	17.99	14.55	72.43
	B + K_2SO_4(5+24kg)	18.7	13.59	72.67
	Control	17.9	13.24	73.97
	Average cultivar	18.95	13.98	73.80
Mont blanka	10 kg Boric acid (B)	18.65	13.49	72.33
	5 kg Boric acid (B)	17.7	13.33	75.31
	K_2SO_4 (48kg)	18.65	14.11	75.66
	K_2SO_4(24kg)	18	12.26	73.28
	B + K_2SO_4(10+48kg)	18.5	13.63	73.68
	B + K_2SO_4(10+24kg)	18.08	13.26	73.34
	B + K_2SO_4(5+48kg)	17	13.19	72.12
	B + K_2SO_4(5+24kg)	17.22	12.62	73.29
	Control	17.65	13.2	74.79
	Average cultivar	17.94	13.23	73.75
$LSD_{0.05}$ between cultivars		0.64	0.60	1.70
$LSD_{0.05}$ between treatments		1.109	1.039	2.944

Table (3):- The effect of both boric acid and potassium fertilization on the population density of beet moth *S. ocellatella* Boyd during successive seasons 2009/10 and 2010/11 (Combined analysis)

Cultivars	Date / Treatments	1/12	1/1	1/2	1/3	1/4	1/5	Average	Total	$LSD_{0.05}$
Gloria	10 kg Boric acid (B)	0.0	6.3	11.3	16.3	20.0	31.7	8.98	85.60	1.777
	5 kg Boric acid (B)	0.0	2.7	13.3	24.3	36.0	44.0	12.72	120.30	
	K_2SO_4 (48kg)	0.0	11.7	24.0	34.0	37.0	42.7	17.78	149.40	
	K_2SO_4(24kg)	0.0	17.0	27.0	38.0	43.0	50.0	20.83	175.00	
	B + K_2SO_4(10+48kg)	0.0	13.3	16.3	29.3	38.0	47.0	16.15	143.90	
	B + K_2SO_4(10+24kg)	0.0	6.7	21.3	21.7	35.7	42.7	21.35	128.1	
	B + K_2SO_4(5+48kg)	0.0	7.1	18.0	23.3	34.0	44.3	21.12	126.7	
	B + K_2SO_4(5+24kg)	0.0	10.7	22.0	26.3	33.3	41.7	23.3	139.4	
	Control	1.0	14.3	31.6	42.3	46.7	47.0	22.65	182.90	
	Average	0.11	9.98	20.5	28.39	35.97	43.5	18.32	139.03	
Top	10 kg Boric acid (B)	0.0	5.0	6.0	11.7	14.3	36.7	12.28	73.70	1.439
	5 kg Boric acid (B)	0.0	10.0	19.3	26.3	30.0	36.0	14.27	121.60	
	K_2SO_4 (48kg)	0.0	4.3	11.0	24.0	34.0	42.3	12.22	115.60	
	K_2SO_4(24kg)	0.0	7.3	21.3	24.3	30.7	37.0	13.93	120.60	
	B + K_2SO_4(10+48kg)	0.0	12.0	21.0	33.7	40.3	44.7	17.83	151.70	
	B + K_2SO_4(10+24kg)	0.0	11.7	18.3	32.3	33.3	40.3	22.65	135.9	
	B + K_2SO_4(5+48kg)	0.0	10.3	20.0	33.7	37.3	37.3	23.10	138.6	
	B + K_2SO_4(5+24kg)	1.7	12.7	22.3	37.3	41.0	44.0	19.17	159.00	
	Control	1.0	17.0	29.0	35.0	39.1	41.3	27.1	162.4	
	Average	0.30	10.0	18.7	28.70	33.33	39.9	18.06	131.01	
Mont blanka	10 kg Boric acid (B)	0.0	4.7	7.7	13.7	17.0	26.3	7.18	69.40	1.228
	5 kg Boric acid (B)	0.0	7.0	14.0	21.3	25.7	30.7	11.33	98.70	
	K_2SO_4 (48kg)	0.0	2.0	6.0	28.0	34.7	43.7	11.78	114.40	
	K_2SO_4(24kg)	0.0	10.7	28.7	37.3	39.0	40.3	19.28	156.00	
	B + K_2SO_4(10+48kg)	0.0	11.7	17.7	31.0	36.0	47.0	16.07	143.40	
	B + K_2SO_4(10+24kg)	0.0	9.0	18.7	27.3	24.3	33.7	18.83	113	
	B + K_2SO_4(5+48kg)	0.0	6.7	22.7	22.7	28.3	34.3	19.12	114.7	
	B + K_2SO_4(5+24kg)	0.0	7.0	16.3	18.7	26.0	30.7	21.83	161.70	
	Control	0.0	15	22.7	30.3	34.0	45.2	24.5	147.2	
	Average	0.00	8.20	17.2	25.59	29.44	36.88	16.66	124.28	

Table (4):- The reduction of population numbers of beet moth *S. ocellatella* due to pesticides in district Verhash - Hosh Issa, El Behiera governorate during season 2010/11.

Pesticides		Control	3 days	5 days	7 days	14 days	21 days
Challenger 36% SC	Nal	51.33	49.33	37.67	29.67	19.33	11.67
	Rc%	0.00	3.896	26.62	42.21	62.34	77.27
Actellic 50% EC	Nal	49.33	48.00	42.33	35.33	24.00	9.33
	Rc%	0.00	2.703	14.19	28.38	51.35	80.28
Malthion57% EC	Nal	51.00	49.67	44.67	37.00	30.33	18.33
	Rc%	0.00	2.614	12.42	27.45	40.52	64.05
Lannate 90% SP	Nal	47.33	43.33	33.00	22.33	15.00	13.00
	Rc%	0.00	8.45	30.28	52.82	68.31	73.65

NI Number of larvae in 10 plant / replicates
RC% Reduction than control

Table (5):-The interaction between fertilization treatments and pesticide effects on some sugarbeet characters through season 2010/11

Characters	Pesticides / Treatments	Challenger 36% SC	Actellic 50% EC	Malthion 57% EC	Lannate 90% SP	LSD 0.05
Root yield (tons/feddan)	10 kg Boric acid (B)	24.67	25.33	28.10	27.85	1.044
	5 kg Boric acid (B)	22.88	23.00	24.90	23.50	
	K_2SO_4 (48kg)	23.9	22.60	21.7	27.71	
	K_2SO_4 (24kg)	22.00	21.41	21.71	25.33	
	B + K_2SO_4(10+48kg)	24.00	22.33	23.66	25.14	
	B + K_2SO_4(10+24kg)	21.88	24.00	24.22	22.36	
	B + K_2SO_4(5+48kg)	26.33	22.58	20.44	24.33	
	B + K_2SO_4(5+24kg)	24.73	22.55	21.11	24.00	
	Control	21.23	21.33	20.60	22.20	
	Average	23.37	22.46	22.29	24.32	
Top yield (tons/feddan)	10 kg Boric acid (B)	8.61	7.77	6.94	7.01	0.879
	5 kg Boric acid (B)	8.54	7.25	6.66	7.85	
	K_2SO_4 (48kg)	11.00	13.5	10.6	9.21	
	K_2SO_4(24kg)	11.20	11.03	10.53	12.00	
	B + K_2SO_4(10+48kg)	12.3	8.99	9.16	10.14	
	B + K_2SO_4(10+24kg)	7.10	9.01	6.88	8.55	
	B + K_2SO_4(5+48kg)	8.90	8.70	7.12	7.62	
	B + K_2SO_4(5+24kg)	10.24	8.47	8.32	8.60	
	Control	7.00	6.95	6.55	6.38	
	Average	9.43	9.07	8.08	8.60	
Sugar yield (tons/feddan)	10 kg Boric acid (B)	3.44	4.00	3.61	3.99	0.673
	5 kg Boric acid (B)	2.51	2.77	2.63	2.88	
	K_2SO_4 (48kg)	3.44	3.36	3.19	2.99	
	K_2SO_4(24kg)	2.09	2.14	2.00	2.05	
	B + K_2SO_4(10+48kg)	3.25	3.77	3.58	3.11	
	B + K_2SO_4(10+24kg)	2.00	2.22	2.48	2.01	
	B + K_2SO_4(5+48kg)	2.30	2.11	2.31	2.43	
	B + K_2SO_4(5+24kg)	2.35	2.11	2.33	2.19	
	Control	1.89	2.01	2.00	1.97	
	Average	2.59	2.72	2.68	2.62	

Table (6):-The interaction between fertilization treatments and pesticide effects on some sugarbeet quality on season 2010/11

Characters	Pesticides / Treatments	Challenger 36% SC	Actellic 50% EC	Malthion 57% EC	Lannate 90% SP	LSD 0.05
T.S.S %	10 kg Boric acid (B)	21.33	21.85	22.36	19.15	1.254
	5 kg Boric acid (B)	17.55	17.67	16.67	17.83	
	K_2SO_4 (48kg)	21.30	18.00	17.00	20.00	
	K_2SO_4(24kg)	20.85	20.67	18.57	18.15	
	B + K_2SO_4(10+48kg)	20.80	20.33	22.33	19.50	
	B + K_2SO_4(10+24kg)	18.50	19.33	18.67	18.30	
	B + K_2SO_4(5+48kg)	19.67	19.33	17.75	17.99	
	B + K_2SO_4(5+24kg)	18.75	20.00	20.00	18.70	
	Control	17.33	17.85	16.67	17.90	
	Average	19.37	19.30	18.43	18.95	
Sucrose %	10 kg Boric acid (B)	16.71	13.31	13.49	15.33	0.587
	5 kg Boric acid (B)	14.43	14.69	13.33	15.00	
	K_2SO_4 (48kg)	17.05	16.09	14.11	16.42	
	K_2SO_4(24kg)	14.42	14.46	13.19	14.67	
	B + K_2SO_4(10+48kg)	16.71	13.22	13.63	13.90	
	B + K_2SO_4(10+24kg)	14.87	14.47	13.26	15.42	
	B + K_2SO_4(5+48kg)	14.48	13.45	12.26	16.40	
	B + K_2SO_4(5+24kg)	14.33	13.33	12.62	15.21	
	Control	12.98	13.24	13.20	13.81	
	Average	14.87	14.12	13.20	15.10	
Purity %	10 kg Boric acid (B)	82.21	73.67	75.67	74.67	0.768
	5 kg Boric acid (B)	85.11	79.33	76.00	75.81	
	K_2SO_4 (48kg)	82.54	74.00	82.33	82.40	
	K_2SO_4(24kg)	80.61	81.00	83.08	83.25	
	B + K_2SO_4(10+48kg)	84.86	74.77	79.54	81.33	
	B + K_2SO_4(10+24kg)	85.95	75.63	80.67	81.56	
	B + K_2SO_4(5+48kg)	83.93	77.33	77.00	77.33	
	B + K_2SO_4(5+24kg)	85.27	78.61	71.67	80.33	
	Control	82.13	73.54	72.67	74.00	
	Average	83.57	76.78	77.87	79.73	

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الملخص العربي

تأثيرالتسميد بالبورون والبوتاسيوم على إنتاجية بعض اصناف بنجر السكرو علاقة ذلك بالأصابة بفراشة البنجر *Scrobipalpa ocellatella* Boyd تحت تأثير المبيدات الحشرية

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نفذ هذا البحث في منطقة فرهاش التابعة لمركز حوش عيسى بمحافظة البحيرة خلال موسمين متتاليين، ٢٠٠٩/١٠ و ٢٠١٠/١١، لدراسة تأثير مستويات سماد البورون والبوتاسيوم على أنتاجية وجودة ٣ أصناف من بنجر السكر وهو (Gloria, Top and Monte Bianka) على قابلية الاصناف للاصابة بيرقات فراشة البنجر *S. ocellatella* بالأضافة لتأثير اربع من المبيدات الحشرية على الكثافة العددية ليرقات فراشة البنجر و أيضاً تاثيرهما علي المحصول وجودة أصناف بنجر السكر فى موسم ٢٠١٠/ ١١ للصنف غلوريا الاعلى أنتاجية تحت نفس تأثير الأسمدة المستخدمة .

النتائج التي نحصل عليها ان الصنف غلوريا الذي عومل بحمض البوريك ١٠ كجم مختلطة مع ٤٨ كجم من كبريتات البوتاسيوم أعطت أعلى قيمة من محصول الجذور هي (٢٥,٢٥ طن / فدان). كانت هناك اختلافات معنوية بين المعاملات السمادية ، وكانت هناك أيضا اختلافات معنوية بين الأصناف المعاملة بـــ(٤٨ كجم / فدان) من كبريتات البوتاسيوم المخلوط مع (١٠ كجم / فدان) حمض البوريك حيث اعطت تلك المعاملة أعلى قيم للمحصول الأوراق الطازجة (١٣,٩٣و ١٢,٣١ و١٢,٩٩ طن / فدان) بالترتيب للأصناف الثلاثة و هي غلوريا و توب ومونت بلانكا، على التوالي.

اظهرت المعاملات الفردية (١٠كجم) حمض بوريك علاج حامض، (٤٨ كجم) كبريتات البوتاسيوم، ومزيج من حمض البوريك وكبريتات البوتاسيوم (١٠ +٤٨ كجم / فدان) أعلى محصول السكر (3.84 و ٣,٥٩ و ٣,٩٩ طن / فدان) على التوالي.

كان هناك تأثيرمعنوي بين المعاملات اعطت الأصناف اعلي قيم النسبة المئوية للماد الصلبة الذائبة الكلية بعد المعاملة بحمض البوريك (١٠ كجم / فدان) و هي علي الترتيب جلوريا و توب ومونت بلانكا، (٢٠,٨٥، ٢٠,١٥ و ١٨,٦٥٪) . سجلت النسبة المئوية للسكروز أعلى قيمة من المعاملة بمخلوط حمض البوريك ١٠ كجم مع ٤٨ كجم كبريتات البوتاسيوم في الأصناف الثلاثه جلوريا و توب ومونت بلانكا (١٥,٨٠ و ١٣,٩١ و ١٣,٦٣٪) على التوالي. أعطيت المعاملة حمض البوريك (٥ كجم /فدان) اعلي نبسة مئوية لنقاوة العصير خلال فترة الدراسة.

وبالنسبة لحشرة فراشة البنجر *S. ocellatella* فبدأ ظهور يرقات الفراشة في بعض المعاملات طفيفا نسبيا المعاملة كنترول بدا الظهور في يناير. سجل اقل أعداد الفراشة بعد معاملت النباتات بحمض البوريك ١٠ كجم / فدان بمجموع تراكمي (٨٥،٦٠ يرقة / ١٠ نبات). ، ومتوسط عدد اليرقات وكان (٨,٩٨ يرقة / ١٠نباتات). وكانت جلوريا أكثر الاصناف حساسية ليرقات فراشة البنجر أعطي المبيد "لانيت" أعلى نسبة خفض لاعداد اليرقات في اليوم الثالث، مسجلا ٨,٤٥٪ ولكن في الأسبوع الثالث من الرش كان المبيد الحشري "اكتيليك " سجل أعلى نسبة انخفاض (٨٠,٢٨٪)، يليه المبيد "تشالنجر" (77.27٪) والمبيد الحشري "لانيت" ٧٣,٦٥%، وأخيرا المبيد الحشري ملاثيون (٦٤,٠٥٪) .

أوضح التفاعل بين المبيدات الحشرية و المعاملات السمادية المطبقة خلال فترة التجربة ان المبيد الملاثيون مع المعاملة بحمض البوريك (١٠ كجم /فدا ن)اعطت اعلي محصول جذور (٢٨,١ طن/ فدان)و اعلي محصول سكر(٤,٠ طن/فدان) اتي من نفس الجرعة السمادية مع المبيد "اكتيليك واعلي محصول اورق (١٣,٥٠ طن فدان) اتي من المعاملة بالمبيد"اكتيليك مع جرعة سمادية من كبريتات البوتاسيوم (٤٨ كجم / فدان).