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EFFECT OF VARIETY AND POTASSIUM FERTILIZATION IN REDUCING THE INFESTATION OF CORN STEM BORER *SESAMIA CRETICA* L. AND IN THE GROWTH GRAINS YIELD OF YELLOW CORN PLANTS

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Abstract

The results of the study showed that there was a significant effect of the varieties, the fertilization treatments and the times number of fertilizer was added in the percentage of plants and the ears infested with the corn stem borer. The lowest mean of these infestation was on Buhooth 106, with 31.24% and 12.88% respectively, and the treatment of fertilization (90 kg / ha) was reached 12.14 and 8.72%, respectively, and when twice adding fertilizer (34.25% and 14.21%) for both the plants and the infested ears respectively. The highest mean of infestation was on Rabi variety (45.13% and 20.82%) and for the control treatment (zero fertilization) was 80.61% and 25.26% respectively. In the addition of one time the infestation was reached 40.40% and 18.57% for each plant and the affected ears respectively. Also, the yellow corn plants were different in height and area of plant leaf according to different varieties, the potassium used rate and the times number of fertilizer addition. The highest of these averages was the Buhooth 106 (172,88 cm and 440.05 cm^2) and the fertilization treatment 90 kg (178.99 cm and 534.48cm^2) and for twice potassium addition(169.86cm, 429.32 cm^2) respectively. The lowest average height of the plant and the plant leaf area on the Rabea variety and the control treatment (not added fertilizer) was 134.83 cm and 165 cm^2 respectively, As for the grains yield and weight of dry matter, the results showed that the highest average was on Buhooth 106 (1794.77 kg and 158.66 g) respectively and for the treatment of fertilization 90 kg (2062.1 kg and 176.82 g) and twice addition of fertilizer (1650,13 Kg and 181.28 g) respectively.

Key words : Potassium fertilization, Grain yield, Corn stem borer, Yellow corn varieties.

Introduction

Corn stem borer *Sesamia cretica* Led. was the main pest of the maize crop in Iraq and some countries of the world (Al-Hasnawi and Karbouli, 2009, Ali, 2005) the maize crop suffers from a decrease in the rate of production per unit area in Iraq. The insect pests, especially stem borers, are among the most important factors determining these crop in all areas of its cultivation, affecting in the quantity and quality of the product produced and cause losses of up to 80% (Karbouli *et al.,* 1999). According to the International Center for Crops Agriculture CABI (2012), this insect is spread in 53 countries, including 12 in Europe, 25 in Asia and 16 in Africa.

However, Kfir, (2002) the severity and nature of stem borer damage depend upon the borer species, the plant growth stage, the number of larvae feeding on the plant, and the plant's reaction to borer feeding (Bosque-pérez,1995, Kfir, 2013). This pest usually controls with the use of chemical pesticides (Ghani, 2013). For the negatives of the excessive use of pesticides, the researchers' efforts were directed at finding equal or more efficient alternatives to pest control and reducing their damages such as the use of resistant varieties (Ahmed, 2015), or using some agricultural methods as use. Potassium fertilizers to reduce pest damage (Al-awadi *et al*., 2007). Potassium contributes significantly to growth, development, yield, and quality of the crop plants. (Kumar *et al.*, 2018).

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Several defence mechanisms against insect herbivory have been found in maize (McMullen *et al.,* 2009) that can be broadly grouped into structural and biochemical defenses [Malvar *et al.*, 2008). Structural mechanisms confer protection against insect damage by mechanical constrain to feeding or by nutrients dilution (Read and Stokes, 2006). Resistance to corn borers has been related to cell wall composition and structure, particularly lignin content and composition and cross-linking of lignin to structural polysaccharides (Ostrander and Coors, 1997, Santiago *et al.,* 2006, Barros-Rios *et al.,* 2012, Barros-Rios *et al.,* 2015).

In recent years the cultivation of yellow corn has expanded in Iraq, especially in Kirkuk Governorate (Al-mhiary, 2016) and due to the lack of studies on the nature and amount of damage caused by the corn stem borer to local varieties or the entred recently, as well as the importance of agricultural methods in integrated pest management programs in order to maintain a clean environment as well as a significant economic returns The current study came in order to evaluate the effectiveness of some agricultural operations (varieties, fertilization) in the percentage of plants infested with corn stem borer in addition to its impact on many productive characteristics of the crop.

Materials and Methods

A field experiment for the autumn season was carried out during 2017 in one of the fields of the College of Agriculture and Forestry / University of Mosul, with the aim of studying the integration between the effect of three levels of potassium fertilizer (zero, 60, 90) kg / ha and the sensitivity of five yellow corn varieties (Buhooth 106, Rabea, Sara, Danya and Talar) in the infestation by the corn stem borer *Sesamia cretica*, The planted seeds were obtained from the Seed Inspection and Purification Department in Nineveh Governorate. All agricultural operations related to the cultivation of the crop have been carried out according to the recommendations for crop cultivating (tillage, fertilizing and weeding) mentioned in (Younis, 2003). The experiment land plowed two perpendicular tillers, then it was blessed and settled and the land was divided into experimental units with dimensions of 3 x 3 m and the experimental unit contained 4 lines along 3 m and the distance between line and another 75 cm and 25cm between a plant and another and 1 m between an experimental units in order to prevent interference between the treatments, the complete random block design Factorial RCBD were used and three replicates per treatment (Al-rawi and Khalaf allah, 1980), in addition to the fertilization process that included the addition of compound fertilizer NPK On date 1/7 at a rate of 200 kg / ha for one time with the first batch of urea fertilizer at a rate of 320 kg / ha, according to the recommended amount,the second paid of NPK was added with the same amount after 20 days of Agriculture. Each of the three replicates included five varieties of yellow corn, and each variety had three treatments with potassium fertilizer, as (zero, 60, 90) kg / ha. The treatments were randomly distributed to each variety on the three replicates. As for potassium fertilizer, it was added in two batches, the first at germination and the second at the start of the infestation On the date of 25/7, as decided in the design of the experiment, by opening a strip under the plant and spreading the fertilizer inside the strip and then covering it with field soil (Al- Dulaimi, 2001). After two weeks of the potassium fertilizer addition, a program of data taking was started and the following characteristics were calculated:-

1. Percentage of infested plants studied at harvest according to the following equation:-

   % infested plants = number of infected plants in experimental unit x 100 total number of plants
2. Plant height / from the soil surface to the lower neck of the male bulb (Pendleton and Seif, 1961)
3. Leaf area (cm 2 / plant): - was calculated from the equation

   leaf area = leaf length × maximum width × 0.75 for all plant leaves (Montgomery, 1911)
4. Percentage of infested ears / was calculated by the same manner mentioned for the infested plants.
5. Dry plant weight (g / plant) was calculated from the rate of 6 plants without ears taken randomly at harvest from the lines adjacent to the midline of the experimental unit, then cut and dried in an electric oven at 70 c for 72 hours until the stability of weight (Titio - Kagho and Gardner, 1988).
6. The total grains yield (kg / dunum) was calculated from the weight of the grain per plant (g) × the plant density (Al-Sahuki, 1990).

Results and Discussion

1. Effect of Variety and Potassium Fertilization on Infestation Percentage of Corn Stem Borer at Harvest

The results mentioned in table 1 showed that the general mean of plant infestation varied significantly with different varieties, the lowest infestation mean was on Buhooth 106(31.24%), followed by Sarah variety (34.30%) While the highest rate of infestation was 45.13%

Table1: Effect of Variety and Potassium Fertilization on Percentage of Corn Stem Borer at Harvest.

General Mean of Times number of addition	Effect of fertilization × Times number of additions	Varieties										Fertilization treatments	Times number of addition
		Rabea		Buhooth 106		Dania		Sarah		Talar			
		Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range		
40.40a	81.79a	92.35A	93.75-91.66	73.60g	75-72.91	79.16 e	79.16-79.16	78.46 ef	79.16-77.08	85.41C	87.5-83.33	Control	Once addition
	25.55c	38.19H	39.58-37.5	16.66l-n	16.66- 16.66	22.91 g	25-20.83	20.13K	20.83-18.75	29.86I	31.25-27.08	60 kg	
	13.88d	18.75K	18.75- 18.75	10.41o-t	10.41-10.41	13.19o-q	14.58-12.5	11.10pq	11.10-10.41	15.97Mn	18.75-14.58	90 kg	
34.25b	79.43b	89.58B	89.58- 89.58	71.52g	72.91-70.83	77.08 ef	77.08- 77.08	76.38F	77.08-75	82.63D	83.33-81.25	Control	Twice addition
	12.91d	17.35Lm	18.75-16.66	9.02st	10.41-8.33	12.5op	12.5- 12.5	11.10q-r	12.5-10.41	14.60Mn	16.66-14.58	60 kg	
	10.41e	14.58n-p	14.58- 14.58	6.25u	6.25- 6.25	11.10q-r	12.5-10.41	8.33Tu	10.41.6.25	11.80o-q	12.5-10.41	90 kg	
80.61a	General mean of fertilization treatments	90.96A		72.56d		78.12c		77.42C		84.02b		Control	The Mean effect of fertilization treatment
19.23b		27.77E		12.84ig		17.70g		15.61H		22.23f		60 kg	
12.14c		16.66Gh		8.33k		12.14g		9.71K		13.88i		90 kg	
		49.76A		33.55f		38.42d		36.56E		43.74b		One time	The Mean Times number of addition
		40.50C		28.93h		33.56f		31.93G		36.34e		Twice	
		45.13A		31.24e		35.98c		34.30D		40.04b		The Mean of varieties	

Values followed by similar characters with no significant differences according to Duncan polynomial test at 0.05 probability level.

on Rabea variety. Solag *et al.*, (2005) reported that the genotype Ebaa 5012 recorded an infestation rate of 10.73 and 23.16% with corn stem borer in autumn and spring season respectively, while the lowest infestation was 14,62 and 29.84% respectively. In a study of Khalaf et al. (2006) in southern Baghdad, pointed out that there is no effect of the traits (plant height, number of leaves, leaf area and density of setea) on the infestation of corn stem borer, and also pointed that infestation between varieties don't depends on their essential components of (Carbohydrates, protein, fats and fibers), but depend on secondary compounds, noting that the rate of infestation decreases as the lignin compound increases in varieties and that coumarin compounds have a significant impact on the survival rate of larvae, reaching 65 and 28% for the genotypes that contain high and low coumarin respectively. The effect of potassium fertilization treatments indicated that the treatment of 90 kg fertilizer was superior in reducing the infestation of borer by 12.14%, which was significantly different from the fertilization treatments (zero and 60) kg / ha which amounted 80.61 and 19.23% respectively. The use of chemical fertilizers may reduce or increase infestation depending on the type and amount of fertilizer, the treated plant and the type of insect pest (Klostermeyer, 1950). Al-awadi (2004) pointed for the superior use of potassium fertilizer of 60 kg/ha which giving the lowest rate of corn stem borer infestation compared to other levels (0, 20, 40 kg / ha).

A significant effect of times number of potassium fertilizer addition is shown from the above table of in the general percentage of infestation which decreased to reach 34.25% significantly when adding twice compared to one time (40.40%_. The results of the effect of interference of fertilization treatments with the times number of additions showed that the lowest mean of infestation was in the treatment of 90 kg / ha and when the twice addition (10.41%) which differed significantly from

Table 2: Effect of Variety and Potassium Fertilization on Percentage of Infested Ears by Corn Stem borer.

General Mean of Times number of addition	Effect of fertilization × Times number of additions	Rabea Mean	Rabea Range	Buhooth 106 Mean	Buhooth 106 Range	Dania Mean	Dania Range	Sarah Mean	Sarah Range	Talar Mean	Talar Range	Fertilization treatments	Times number of addition
18.57a	25.53a	34.33A	35-33	19g h	20-18	25d	25-25	21.66e f	23-20	27.66c	29-25	Control	Once Addition
	19.59b	22.66E	23-22	15i	15-15	20.33f g	21-20	18.33H	20-17	21.66e f	22-21	60 kg	
	10.59c	13.66I	14-13	9l-n	10-8	10j-m	10-10	9.33Lm	10-9	11kl	12-10	90 kg	
14.21b	24.99b	32.66B	34-32	19.66g h	21-18	24.66d	25-24	20.66f g	21-20	27.33c	29-25	Control	Twice Addition
	10.79c	13.33I	14-13	9.33k-m	10-9	10.33j-l	11-10	9.66J - m	10-9	11.33j	12-11	60 kg	
	6.86d	8.33m - o	9-8	6p	7-5	6.66o p	7-6	6p	6-6	7.33N - p	8-7	90 kg	
25.26a	General mean of fertilization treatments	33.49A		19.33 e		24.83 c		21.16D		27.49 b		Control	The Mean effect of fertilization Treatments
14.19 b		17.99G		12.16j		15.33 h		13.99I		16.49 g		60 kg	
8.72c		10.99 K		7.5 m		8.33 ml		7.66 M		9.16 l		90 kg	
		23.55 A		14.33 f		18.44 c		16.44 D		20.10 b		One time	The Mean Times number of addition
		18.10 C		11.66 g		13.88 f		12.10G		15.33 e		Twice	
		20.82A		12.88B		16.16c		14.37d		17.71b		The Mean of varieties	

Values followed by similar characters with no significant differences according to Duncan polynomial test at 0.05 probability level.

all other treatments and the highest rate of infestation of the borer was in the control treatment for the one-time additive treatment of 81.79%. Motlak *et al.,* (2015) stated that the mineral nutrition of some potassium is important as it is a necessary major nutrient needed by the maize plant in its growth stages and it has important role in the process carbon representation and improve plant performance through its role in the activation of more than 80 enzyme represents the key to increase the yield and improve the quality and production and increase plant resistance to drought and plant diseases.

(Table 2) shows that the percentage of infested ears varied significantly according to varieties, fertilization rates and times number of additions. The lowest general mean of these percentages was on the variety buhooth 106 (12.88%), when fertilization treatment 90 kg / ha (8.72%) and When the fertilizer was added twice (21.14%), while the highest general mean was recorded for Rabea variety (20.82%), control treatment (25.26%), and once added (18.57%). The number of plant ears is one of the components of the grain yield in the area unit of maize and is affected by environmental conditions and genetic structure (Issa, 1999). Al-Jassani (2004) stated that the corn stem borer attack ear shell and feed on seeds in the milky phase, thus affecting the number of grains in the row and other high yield components. The results of the effect of the interfere between the cultivars and fertilization treatments showed that the lowest mean percentage of infested ears was on the Buhooth 106 and the fertilization treatment 90 kg / ha as it reached 7.5% significantly differed compared to the other cultivars except Sara and Dania, where the difference was not significant and the highest of these averages was on the control treatment (no fertilizer addition) on Rabea variety was 33.49% significantly differed from other treatments. The statistical analysis showed that the application of fertilizer twice exceeded significantly in its effect in reducing the percentage of infested ears,

which reached the lowest level on the Buhooth 106 (11.66%) compared to other cultivars except Sarah (12.10%) where the difference between them was not significant.

2. Effect of Variety and Potassium Fertilization on Some Growth Characteristics and Grains yield of maize

The results in table 3 indicate the variation of maize plants in height with different varieties and the rate of application of potassium fertilizer and the times number of fertilizer application. The highest general mean of plant height was on the Buhooth 106 (172.88 cm) which differed significantly from all other cultivars and their averages are descending as follows (168.10, 164.88, 161.71, 156.71) cm for the varieties Sara, Dania, Talar and Rabea respectively. The growth of the stem is due to cell division, elongation and specialization. The genotypes of maize differ in these traits. Al-Dulaimi (2001) found a highly significant effect of the genotypes (Ebaa 2052, Spiro 440633, Ebaa 3001, Ebaa 5012, Buhooth 106, Buhooth 105) in plant height as The genotypes of Buhooth 106 exceeded the rest of the genotypes, which reached 184.7 and 179.9 cm for the spring and autumn seasons, respectively. The study results Dhaif *et al.*, (1999) showed that the variety Buhooth 106 gave the highest plant height (208cm) compared with two cultivars Ebaa 5012, 5019 that gave the lowest rate (107cm). Karbouli (1997) was pointed out that the infestation of corn stem borer has a significant impact on plant height for all studied cultivars and that the decrease in plant height reached about 38% compared with plants treated with pesticides and in a study of Al- Moheri (2016) indicated that the highest loss in plant height caused by corn stem borer was 30.50%, on the variety Corena which differed significantly from all other varieties, and the lowest loss was on Cadiz variety (15%)

The results of the above table indicate that the highest general rate of plant height was on fertilization level of 90 kg / ha

Table 3: Effect of Variety and Potassium Fertilization on Plant height cm^2 / plant.

General Mean of Times number of addition	Effect of fertilization × Times number of additions	Varieties										Fertilization treatments	Times number of addition
		Rabea		Buhooth 106		Dania		Sarah		Talar			
		Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range		
159.81b	140.66f	130.33p	131-130	151.66k	153-150	140n	140-140	148.66l	150-147	132.66o	134-131	Comparison	Once Addition
	166.66d	156g	166-155	174.33e	175-174	167.66h	168-167	170g	170-170	165.33i	166-165	60 kg	
	172.13c	164.66i	165-164	178.66d	179-178	172.33f	173-171	175e	176-174	170g	171-168	90 kg	
169.86a	147.06e	139.33n	140-139	153k	155-151	147m	149-146	150l	150-150	146m	147-146	Control	
	176.66b	170.66g	171-170	181.33c	183-180	177.66d	188-177	179.33d	180-179	174.33e	175-173	60 kg	
	185.86a	179.33d	180-179	198.33a	199-198	184.66b	185-184	185.66b	186-185	181.33c	182-181	90 kg	
143.93 c	General mean of fertilization treatments	134.83L		152.33h		143.5g		149.33i		139.66k		Control	The Mean effect of fertilization treatment
171.66b		163.33G		177.83c		172.66		174.66d		169.83f		60 kg	
178.99a		171.99E		188.49a		178.49c		180.33b		175.66d		90 kg	
		150.33I		168.21d		159.99g		164.55e		155.99h		One time	The Mean Times number of addition
		163.10F		177.55a		169.77C		171.66b		167.44d		Twice	
		156.71E		172.88a		164.88C		168.10b		161.71d		The Mean of varieties	

Values followed by similar characters with no significant differences according to Duncan polynomial test at 0.05 probability level.

Table 4: Effect of Variety and Potassium Fertilization on leaf area cm^2 / plant.

General Mean of Times number of addition	Effect of fertilization × Times number of additions	Varieties										Fertilization treatments	Times number of addition
		Rabea		Buhooth 106		Dania		Sarah		Talar			
		Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range		
349.12b	207.26f	165w	165-165	256s	257-255	200v	200-200	218.66u	220-218	196.66x	198-195	Control	One Time
	337.33d	398.66r	400-388	490m	490-490	420p	420-420	474.66o	475-474	403.33q	405-400	60 kg	
	502.79c	483.66n	485-482	516.66h	520-515	505.33j	506-505	510i	510-510	498.33l	499-498	90 kg	
429.32a	209.53e	166w	166-166	257.33s	258-257	206.33w	208-205	221.66t	222-221	196.33x	197-196	Control	Twice Addition
	512.26b	500.66k	501-500	524f	525-522	511.66i	513-510	520g	520-520	505j	505-505	60 kg	
	566.19a	544e	545-543	596.33a	598-595	560c	560-560	573.33b	575-572	557.33d	559-555	90 kg	
208.39c	General mean of fertilization treatments	165.5 O		256.66 k		203.16 M		220.16 l		196.49n		Control	The Mean effect of fertilization treatment
474.79b		449.66 J		507 f		465.83 H		497.33 g		454.16i		60 kg	
534.48a		513.83 E		556.46 a		532.66 C		541.66 b		527.83d		90 kg	
		349.10 J		420.88 d		375.11 H		401.10 g		366.10i		One time	The Mean Times number of addition
		403.55 F		459.22 a		425.99 C		438.33 b		419.55e		Twice	
		376.32 E		440.05 a		401.88 C		419.71 b		392.82 d		The Mean of varieties	

Values followed by similar characters with no significant differences according to Duncan polynomial test at 0.05 probability level.

(178.99 cm) and when the addition of two times (169.86 cm) while these rates reached the lowest in the control treatment (not add fertilizer) was 143. 93 cm and once added 159.81cm. The statistical analysis of the interference between fertilization treatments and varieties showed that the plant height rate of Buhooth 106 at the fertilization of 90kg/ha was exceeded significantly (188.49 cm) compared to the other treatments, while the lowest rate of plant height (134.83cm) on the Rabea and the control treatment.

Most scientific references point to the importance of potassium in the plant growth stages and their role in stem strengthening and increasing the synthetic carbohydrates and transporting them from the formation places to the places where they are needed in the plant (IPI, 2002). The results of Muhammad (2001) showed the superiority of the potassium treatment which increase plant height of 8.35%.

(Table 4) shows the significant effect of the cultivars, fertilization treatments and their times number additions in the general mean of leafy area (cm^2 / plant) and the highest general mean of leafy area was on the variety Buhooth 106 (440.05) cm^2 / and for fertilization treatment of 90 kg (534.48)cm^2 and for twice addition (429,32) cm^2/, the results mentioned in the above table indicate that the highest rate of the leafy area was on the variety Buhooth 106 treated with potassium fertilizer 90 kg / ha and twice as it reached 596.33 cm^2 / plant, which differed significantly from all study treatments, while the minimum rate of leafy area was in Rabea variety plant of non-fertilized (control), reaching 165 cm^2/ plant. Shieh and Tseny (1993) found a significant difference in the leaf area of yellow maize when planting six genotypes in the spring season. Ealk (2001) also indicated that there were significant differences between the genotypes of the yellow corn in the leaf area of the two experiment seasons, as

Table 5: Effect of Variety and Potassium Fertilization on Grains Yield kg / dunum.

General Mean of Times number of addition	Effect of fertilization ×Times number of additions	Varieties										Fertilization treatments	Times number of addition
		Rabea		Buhooth 106		Dania		Sarah		Talar			
		Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range		
1405.71b	729.33e	406.66o	410-400	946.66N	950-945	795p	800-790	845r	850-840	653.33q	660-650	Control	One Time
	1597d	1100f	1100-1100	1993E	2000-1990	1600k	1600-1600	1746i	1750-1740	1546l	1550-1540	60 kg	
	1890.8c	1666j	1700-1650	2116C	2120-2110	1876g	1900-1850	2000e	2000-2000	1796h	1800-1790	90 kg	
1650.13a	727.6e	413r	415-410	943N	945-940	795p	795-795	846o	850-840	641q	645-640	Control	Twice Addition
	1989.4b	1803g	1810-1800	2145C	2150-2140	2006e	2010-2000	2060d	2065-2055	1933f	1950-1910	60 kg	
	2233.4a	1933f	1950-1910	2625A	2650-2625	2133C	2150-2110	2403b	2410-2400	2073d	2220-2000	90 kg	
728.46c	General mean of fertilization treatments	409.83 N		944.83 J		795l		845.5 k		647.16 m		Control	The Mean effect of fertilization treatment
1793.2b		1451.5 I		2069 C		1803 g		1903 f		1739.5 h		60 kg	
2062.1a		1799.5 G		2370.5 A		2004.5 d		2201.5 b		1934.5 e		90 kg	
		1057.55 I		1685.22 C		1423.66 f		1530.33 e		1331.77 h		One time	The Mean Times number of addition
		1383 G		1904.33 a		1644.66 d		1769.66 b		1549 e		Twice	
		1220.27 E		1794.77 A		1534.16 c		1649.99 b		1440.38 d		The Mean of varieties	

Values followed by similar characters with no significant differences according to Duncan polynomial test at 0.05 probability level.

the genotype Buhooth 106 gave the highest leaf area, while the hybrid 301 gave the lowest rate for this trait. The results of the interfere effect of the fertilization treatments and the number of additives indicated that the highest average leaf area was for plants treated with 90 kg / ha of potassium fertilizer and when it was added twice (566.19 cm^2/ plant) compared to the same fertilization treatment but when added once (502.79 cm^2) where the difference between them was significant.

From the above its clear the obvious effect of fertilization treatments and the times number of additions in some yield traits, as for the effect of varieties seemingly from the results of the study, the infestation or degree of food preference for insect on these varieties play an important role in some growth characteristics of yellow corn yield. In a study of the host preference of corn stem borer on some varieties of sugarcane in Qadisiyah governorate, Kazem (2008) indicated that the insect prefers lay eggs on varieties with high leafy area and high moisture and nitrogen content compared to those with low content.

As for the variety and potassium effect on grain yield (kg / dunum), the results mentioned in table (5) indicate that the highest general rate of grains yield was on Buhooth 106 (1794.77 kg), followed by the variety Sarah (1649.99 kg) where the difference between them was not Significantly, the treatment of fertilization 90 kg / ha was 2062.1 kg / dunum and when potassium fertilizer was added twice (1650.13 kg). The results indicated in the above table showed that the cultivars showed significant differences in the average yield per any fertilizer treatment or the times number of fertilizer application, this is mostly due to morphplogical and chemical properties of these varieties which play important role in nutritional preference of corn stem borer, thus its sensitivity or resistance to infestation, as well as the difference in these varieties in the growth and yield characteristic that may be to the genetic

Table 6: Effect of Variety and Potassium Fertilization on Dry Matter Weight g / plant.

General Mean of Times number of addition	Effect of fertilization × Times number of additions	Varieties: Rabea Mean	Rabea Range	Buhooth 106 Mean	Buhooth 106 Range	Dania Mean	Dania Range	Sarah Mean	Sarah Range	Talar Mean	Talar Range	Fertilization treatments	Times number of addition
94.77b	74.39e	59.33U	60-59	85.33o	85-86	77t	78-76	80.66s	81-80	69.66u	70-69	Control	One Time
	103.46d	90.33O	91-90	116.33l	118-115	98.33p	99-98	115l	115-115	97.33p	98-97	60 kg	
	106.46c	97.33P	98-97	123.66k	125-123	102n	103-100	109.33m	110-109	100m-n	100-100	90 kg	
181.28a	73.06f	59U	60-58	84o	85-83	74u	75-73	79.33q	80-79	69u	70-68	Control	Twice
	223.59b	201G	201-201	254.33i	255-253	219.33h	220-219	228.33f	229-228	215i	216-214	60 kg	
	247.19a	222G	223-221	228.33f	295-285	240d	240-240	249.33c	250-248	236.33e	237-235	90 kg	
73.72c	General mean of fertilization treatments	59.16M		84.66I		75.5k		79.99g		69.33l		Control	The Mean effect of fertilization treatment
163.52b		145.66H		185.33B		158.83f		171.66d		156.16d		60 kg	
176.82a		159.66F		205.99A		171d		179.33c		168.16		90 kg	
		82.33G		108.44F		92.44h		101.66g		88.99i		One time	The Mean Times number of addition
		160.66E		208.88A		177.77c		185.66b		173.44d		Twice	
		121.49E		158.66A		135.10c		143.66b		131.21d		The Mean of varieties	

Values followed by similar characters with no significant differences according to Duncan polynomial test at 0.05 probability level.

characteristic of each variety. Bergvinson (1997) found that the nutritional preference of corn stem borer certainly depends on the maturity of leaves and their chemical compounds. The results of Al-Maamouri (1997) indicated the superiority of the hybrid 3001 on the variety Buhooth 106 due to the genetic difference between them. About the interference effect the results showed a significant effects of times number of fertilizer addition on grains yield at fertilization 90 or 60 kg/ha which amounted (2233.4 and 1890.8 kg) and (1989.4 and 1597 kg), respectively. Inadequate nutrition with potassium leads to root and stem rot and therefore affects grain filling and may lead to deformation of yellow corn ear (Kruger, 1976). In a study by Mutlaq *et al.,* 2015, potassium has a significant effect in increasing the yield of corn plant up to 30%.

The results of table 6 indicate the effect of cultivar and fertilization on the weight of dry matter (g / plant) of maize plants. The statistical analysis showed that the general mean weight of dry matter was significantly higher for Buhooth 106 (158.66 g) and fertilization treatment of 90 kg (176.82 g) and for twice addition (181.288). The results of the interference effect indicate that the highest mean weight of dry matter was on Buhooth 106 and for fertilization treatment 90 kg (205.99 g) followed by fertilization of 60 kg for the same variety (185.33 g). While the lowest mean weight of dry matter was 59.16 g / plant on Rabea cultivar for control treatment. In a study of Al-Awadi (2004) noted the superiority of the variety Buhooth 106 with the highest dry weight of 100.54 and 113.51 g / plant for spring and autumn season respectively compared to the genotypes Ibaa 512 which gave the lowest rate of 94.79 and 101.05 g / plant for the above two season respectively. He attributed the superiority of genotype 106 in this trait to the length of vegetative growth in addition to its superiority in plant height, number of leaves / plant and leafy area. The same reference indicated that there was a significant effect of potassium fertilization levels on the dry

weight of (112.08, 122.27 g / plant) at fertilizer level of 60 kg / ha for spring and autumn season respectively, which was attributed to Potassium is an important factor in increasing the efficiency of photosynthesis and the transfer of its products (Mutlaq *et al*., 2015) and thus the positive effect on growth and production of dry matter. In addition to that potassium stimulate to increase the thickness of the walls of plant tissue cells (Al-nuaimi, 1999), which reduces to the proportion of insect infestation, and thus reflected positively in increasing the weight of the dry plant. This finding was also confirmed by Alousi *et al*., (2001) and Mohammed (2001), who found a significant increase in the weight of dry maize plant in the treatment of potassium added in agriculture compared to no addition.

Conclusion

From the above, it is evident that the variety Buhooth 106 excelled in achieving the lowest percentage of corn stem borer infestation of plants and corn ears compared to other varieties, even in control treatment This means that there are genetics specific to the variety that give it the characteristic of resistance or non preference by insects, whether for feeding or for laying eggs (Butron *et al.,* 2012, Malvar *et al.,* 2004) And that the use of potassium fertilizers at rates 60 and 90 kg / hectare, once and twice, has steadily increased the ability of plants of this variety and others also to tolerance the infection which results probably from the effect of these treatments on some morphological characteristics (plant height, leafy area), which was reflected positively in the yield quantity and dry weight of the plant, as well as other factors related to the induction of antibiotic resistance, which can be the main cause of resistance, especially the thickness and components of plant cell walls, which are important factors that we recommend to study in the future to determine the exact causes of resistance This is consistent with what many researchers mentioned in this field (Khalaf *et al*., 2006, Ostrander and Coors,1997, Santiago *et al.,* 2006, Barros-Rios *et al.,* 2012, Barros-Rios *et al.,* 2015)

There could be trade-offs between plant growth and defence against insect herbivory (Züst and Agrawal, 2017), which in the case of crops means that the improvement of the plant defenses could be at the cost of yield and vice-versa. Specifically, for corn borer resistance it has been found that selection for resistance can be detrimental for grain yield and vice-versa (Klenke, 1986, Butron *et al.,* 2012). However, in other studies the correlation between resistance and yield was low or non-existent (Ordas *et al.,* 2010, Samayoa *et al.,* 2014, Samayoa *et al.,* 2015) suggesting that the relationship between the two traits could be dependent on the specific properties of the populations. Flowering and plant height could be also correlated with stalk tunneling, although the degree of the relationship, from null to moderate, depended also on the population under study (Ordas *et al.,* 2010, Samayoa *et al.,* 2014, Samayoa *et al.,* 2015).

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