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Relationship between Phytochemical Composition of Five Snap Bean Varieties and Its Susceptibility to Aphid and Whitefly Infestation.

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Abstract

Two filed experiments were conducted during two successive seasons 2019 and2020 at the experimental vegetable farm of Asfaina,Toukh, Qalubiya Governorate, Egypt to study the effect of phytochemical composition of five snap bean(*Phaseolus vulgaris* L.) cultivars(Oxera, Falantino, Sebaries, Bronco and Golly) and their susceptibility to infestation with aphids(*Aphis gossypii*, *Myzus persica* and *Aphis craccivora) and* whitefly *Bemisia tabaci*. Results showed that Bronco and Oxera cultivars have higher population density of aphids increased with increase of percentages of the total protein, total carbohydrates, peroxidase, alpha esterase and beta esterase. While, decreased with the increase of total phenols. Oxera cultivar was considered the highest susceptible snap bean cultivar to *B. tabaci* infestation. On the other hand, the snap bean cultivar, Falantino was the highest resistant one.

Keywords: snap bean (*Phaseolus vulgaris* L.), Whitefly, *Bemisia tabaci*, *aphid Aphis craccivora*,chemicals composition

Introduction

The Fabaceae family's including common bean (*Phaseolus vulgaris* L.) has high commercial value and outstanding nutritional composition with high protein content in dry seed and a good source of fiber in snap beans have led to its widespread cultivation around the world especially in Egypt, Kenya, Tanzania and Uganda **(Abdel Mawgoud *et al.*, 2005)**. It is eaten either as snap beans (a fresh vegetable) or dry beans (a grain) **(Mayhew and Penny 1988; Santalla *et al.*, 1999; Ayoub and Abdalla 2014 and Sarhan *et al.*, 2018)**. Its immature edible pod ripe seeds are packed with protein, calcium, iron, thiamine, carbs, fiber. Common beans include snap beans and others like kidney, navy, and black beans; it's likely that they all descended from a single progenitor. (CIAT, 2006).

Aphids, leaf miners, leafhoppers, thrips, red spider mites, which seriously harm plants and reduce production, are among the various pests regularly infest kidney beans in Egypt. These pests also cause significant damage to the quantity and quality of the beans produced **(Schuster and Everett, 1983; Parrella *et al.*, 1985; Abd El-Gawwad, 2008; Saleh, 2011; Gamila *et al.* 2016 and Draz *et al.* 2022).**

The best time to sow a crop depends on the cultivar that will be used; it is also a key component in determining the environmental conditions for planting. The timing of sowing can have a significant impact on crop success and seed production **(Dapoah *et al.*, 2000)**.

The aim of this study is to determine the degree and severity the infestation of five snap bean cultivars (Oxera, Falantino, Sebaries, Bronco and Golly) with the considered insect pests during two successive season 2019 and 2022.

Material and methods

Five of the most important snap bean cultivars were chosen and cultivated in the experimental vegetable farm of Asfaina,Toukh, Qalubiya Governorate, Egypt to determine their susceptibilities to infestation with aphids and whitefly, during 2019 and 2020 growing seasons. The tested cultivars were Oxera, Falantino, Sebaries, Bronco and Golly. Seeds of all cultivars were obtained from Horticultural Research Institute, Agricultural Research Center. Seeds of all tested cultivars were sown at September1st in the two investigated seasons. All plots were arranged in a split block design with three replicates (3 plots) for each cultivar. All plots received normal agricultural practices and were kept free from any pesticide treatments. Ten snap bean leaflet ware picked weekly from each replicates and inspected by using

stereomicroscope. The individual numbers of insect pests were counted and tabulated to study the infestation severity of aphids and whitfly of five snap bean cultivars

1. Laboratory studies

1.2. Phytochemical components analysis of the bean leaves.

The aim of this study to determine the relationship between the components of the leaves of five studied snap bean cultivars (Oxera, Falantino, Sebaries, Bronco and Golly) and the rate of insect pests infestation throughout the second season, 2020. Leave samples were collected at (about 35 days after planting). Leaves of each cultivar were homogenized by Teflon tissue grinder using a glass cup surrounded by ice jacket. Distilled water was used as the homogenizing medium.

The homogenate was centrifuged at 8000rpm for 15 min. using a refrigerated centrifuge. The sediment was discarded, and the supernatant was taken for biochemical determination.

Determination of Phenols

- **Extraction procedure:**

Ten plant leaves from each replicate (3 replicates for each treatment) were washed with ΔH2O and placed in an oven to dry at 45˚C for 4 days. Then they were grounded in an electric grinder into fine powder **kâhkônen *et al*., (1999)**. Grounded plant seedlings (5g) were extracted with 2x10 ml of 80% aqueous methanol using electric homogenizer for 5 min. Samples were centrifuged (10 min.,3000 r.p.m.), and combined extracts were poured into pre-weighed small conical flasks. Methanol was removed under reduced pressure. The solid residue (crude extract) was weighed and dissolved in Δ H2O to a 5 ml volume.

- **Quantification of total phenolics**:

The amount of total phenolics in extracts was determined by Folin – Ciocateu method as modified by **Singelton and Rossi (I965).**

Two hundred microliters of plant extracts were introduced into test tubes; 1 ml of Folin- Ciocalteu reagent and 0.8 ml of sodium carbonate (7.5%) were added. The tubes were mixed and allowed to stand for 30 minutes. Absorption at 760 nm was measured against blank containing everything except the sample. Gallic acid standard (5 gm%) was used, and the total phenolic content was expressed as mg gallic acid per g dry weight of the original sample (mg GA/g dw).

B. 1.B: Determination of total carbohydrates

Total carbohydrates were estimated in acid extract of sample by the phenol-sulphuric acid reaction of **Dubois *et al*., (1956).** Total carbohydrates were extracted and prepared for assay according to **Crompton and Birt (1967).**

B. 1.C: GST

Glutathione S-transferase (GST) catalyzes the conjugation of reduced glutathione (GSH) with 1-chloro 2,4-dinitrobenzene (CDNB) via the -SH group of glutathione. The conjugate, S-(2,4-dinitro-phenyl)-L-glutathione could be detected as described by the method of Habig *et al*.(I974). The reaction mixture consisted of 1 ml of the potassium salt of phosphate buffer (pH6.5),100µl of GSH and 200µl of larval homogenate. The reaction started by the addition of 25µl of the substrate CDNB solution. The concentration of both GSH and CDNB was adjusted to be 5mM and 1mM, respectively. Enzyme and reagents were incubated at 30˚C for 5 min. The increment in absorbance at 340 nm was recorded against blank containing everything except the enzyme to determine the nanomole substrate conjugated/min/larva using a molar extinction coefficient of 9.6/mM/cm. Total proteins were determined by the method of **Bradford (1976).**

B. 1.D: Nonspecific esterases

Alpha esterases (α-esterases) and beta esterases (β-esterases) were determined according to **Van Asperen (I962)**

α-and β-naphthol standard curves were prepared by dissolving 20 mg α- or β-naphthol in 100ml phosphate buffer, pH7 (stock solution). Ten milliliters of stock solution were diluted up to 100ml by the buffer. Aliquots of 0.1,0.2,0.4,0.8 and 1.6 ml of diluted solution (equal to 2,4,8,16 and 32 µg naphthol) were pipetted into test tubes and completed to 5 ml by phosphate buffer. One milliliter of diazo blue reagent was added, and the developed color was measured as mentioned before.

B. 1.F: Quantitative Determination of Peroxidase

Peroxidase activity was determined according to the procedure given by **Hammerschmidt *et al*. (1982)**. To a spectrophotometer sample cuvette ,1.5 ml of pyrogallol (0.05 M) and 100 µl enzyme extract were added. The readings were adjusted to zero at 420 nm. to initiate the reaction ,100 µl of hydrogen peroxide (1%) were added to the sample cuvette. The enzyme activity was expressed as a change in absorbance /min/ g sample.

B. 1.F: Total proteins

Total proteins were determined by the method of **Bradford (I976)**. Protein reagent was prepared by dissolving 100mg of Coomassie Brilliant blue G-250 in 50ml 95% ethanol. To this solution 100ml 85% (W/V) phosphoric acid were added. The resulting solution was diluted to a final volume of 1 liter. Sample solution(50µl) or for preparation of standard curve 50µl of serial concentrations containing 10 to 100µg bovine serum albumin were pipetted into test tubes. the volume in the test tube was adjusted to 1 ml with phosphate buffer (0.1M, pH 6.6). Five millimeters of protein reagent were added to test tube and the contents were mixed either by inversion or

vortexing. The absorbance at 595 nm was measured after 2 min and before 1 hr. against blank prepared from 1 ml of phosphate buffer and 5 ml protein reagent.

C. Statistical analysis.

Data were analyzed using **(SAS Institute, 2003)** to test standard error between treatments and estimate LSD among treatments.

Results and discussion

1.1. Aphids (especially *A. gossypii, Myzus persica* and *A. craccivora*)

Data presented in **Table (1)** showed that the degree of infestation of *A. craccivora* differed significantly between the five snap bean cultivars. In the first growing season 2019, the seasonal mean numbers of this pest infesting leaflet of snap bean cultivars Oxera, Sebaries, Bronco, Golly and Falantino were 45.30, 45.35, 46.54, 43.69 and 32.75 individuals/ leaflet, respectively. The corresponding counts of *A. craccivora*, in the second growing season 2020 were 41.57, 25.19, 41.55, 40.14 and 31.57 individuals / leaflet, respectively. Regarding the general mean numbers of *A. craccivora* counted on snap bean cultivars throughout the two investigated seasons together, the numbers of insects were 43.44, 35.27, 42.99,41.91 and 32.16 individuals/ leaflet, respectively.

Analysis of variance of the obtained results revealed significant differences between the tested cultivars in their infestation with aphids. The susceptibilities of the tested cultivars could be grouped according to Duncan's multiple range tests and L.S.D. value to four groups for the two growing seasons. In the first season, these groups were (a, b, c, and d), (a) group the most susceptible cultivars represented by Bronco followed by (b) group which included two cultivars Oxera and Sebares, then (c), group which was represented by one cultivar Golly, and the fourth group (d) contain the lowest infested cultivar, Falantino cultivar.

During the subsequent season, four groups were found; a, represented by Bronco and Oxera cultivars and b, group including Golly, c group, occupied by Falantino, while the last group (d) represented by the Sebares cultivar which was infested by the lowest number of thrips (25.19 individuals/ leaflet). By calculating the allover mean number of the two growing seasons together, it is clear that, these cultivars could be divided into four groups, a, heavily infested group included snap bean plants cultivars Bronco and Oxera (42.99 and 43.44 individuals/leaflet respectively) b and c: moderately infested groups consisted of snap bean cultivars, Golly and Sebares (41.91 and 35.27 individuals/leaflet) and the least infested group contained Falantino cultivar (32.16 individuals/leaflet).

Rapid aphid resistance to several pesticides is caused by the high rate of population increase, parthenogenesis, live bearing, and polymorphism in aphids. As a result, the usage of insecticides has been constrained **(Saldo and Szpyrka 2009).** Using resistant cultivars is typically a steady and cost-effective way to fend off insect invasion. The IPM's primary method, which forms its most practical methodology, is this one **(Trumble 2000)**. Only 64 of the 5364 faba bean genotypes evaluated during research by **Weigand and Bishara (1991)** to reduce the amount of damage caused by the black bean aphid were found to be susceptible to the least amount of damage. The author interpreted two genotypes (Rebya 40 and Giza 402) in two consecutive years as having shown this resistance.

1. 2. Whitefly, *Bemisia tabaci*.

Data presented in **Table (2)** showed that in the first season, the highest infestation was observed on samples collected from Oxera and Bronco cultivars, being 9.85 and 9.76 individuals /leaflet respectively while, the lowest infestation were recorded on Golly cultivar (7.57 individuals /leaflet). In the second season, the results took the same trend in the first season, as Oxera and Bronco cultivars infested by highest numbers of *B. tabaci*, showing 11.07 and 10.07 individuals /leaflet, respectively. On other hand, the lowest population was recorded on Golly and Falantino cultivars (9.73 and 8.48 individuals /leaflet, respectively).

For the two seasons together, the five tested cultivars of snap bean could be arranged dissentingly according to the L.S.D value (0.55) and to their susceptibilities to the infestation of whitefly as follow: Oxera 10.46 individuals/ leaflet > Bronco10.36 individuals/ leaflet > Sebares 9.54 individuals/ leaflet > Golly 8.65 individuals/ leaflet > Falantino 8.43 individuals/ leaflet.

Finally, it could be recommended that Oxera cultivar was considered as the highest attract snap bean cultivar to *B. tabaci* infestation. On the other hand, the snap bean cultivar, Falantino was the highest resistant one.

Snap bean exhibits varying degrees of attraction to *B. tabaci* via means of antixenosis or antibiosis **(da Silva et al., 2014, 2019; Jesus et al., 2010; Oriani and Lara, 2000)**. For instance, the winter season (July 6 to September 13, 2010) in Brazil saw lesser *B. tabaci* adult infestation and lower whitefly oviposition in the common bean cultivars IAC-Una and IAC-Eldorado. **(da Silva et al., 2019)**. IAC-Una and LP 02-13 were noted to have the fewest oviposition by MEAM1 (described as *B. tabaci* biotype B), whereas LP 98-122 and FT-Nobre were noted to have the fewest whitefly nymphs present during the dry season (April to June 2007) in Brazil. **(Jesus et al., 2010)**.

Table 1. Mean numbers of aphids per leaflet infesting five snap bean cultivars throughout two successive seasons 2019 and 2020 at Qalubia Governorate.

season	1st season					2nd season					Mean of two seasons				
	Oxera	Sebares	Bronco	Golly	Falantino	Oxera	Sebares	Bronco	Golly	Falantino	Oxera	Sebares	Bronco	Golly	Falantino
Sep.,16th	10.93	2.4	1.53	1.7	0	4.54	0	5.38	8.24	0	7.74	1.20	3.46	4.97	0
23 rd	20.77	11.53	33.03	10.44	4.72	9.75	4.2	9.97	16.27	1.67	15.26	7.87	21.50	13.355	3.195
30 th	24.78	24.85	16.23	18.9	11.35	17.12	7.87	22..92	13.72	4.07	20.95	16.36	16.23	16.31	7.71
Oct.,7 th	27.35	43.75	39.26	23.65	9.7	22.83	13.68	27.1	33.98	16.52	25.09	28.72	33.18	28.815	13.11
14 th	64.16	39.04	56.67	43.8	29.43	41.72	53.25	43.25	39.15	26.12	52.94	46.15	49.96	41.475	27.775
21 st	73.38	70.59	68.2	61.93	56.06	50.8	23.68	69.48	31.89	53.38	62.09	47.14	68.84	46.91	54.72
28 th	91.55	88.19	85.46	94.31	66.43	62.95	37.87	72.72	52.42	64.31	77.25	63.03	79.09	73.365	65.37
Nov., 4 th	83.16	82.54	88.02	73.63	75.61	87.21	61.11	71.28	78.43	58.27	85.19	71.83	79.65	76.03	66.94
11 th	67.43	81.87	79.86	79.47	72.77	74.12	51.96	76.2	100.99	74.66	70.78	66.92	78.03	90.23	73.715
18 th	46.68	55.55	51.31	75.53	39.85	80.47	31.74	50.54	74.01	53.33	63.58	43.65	50.93	74.77	46.59
25 th	25.67	23.16	28.75	28.3	20.31	36.04	12.39	22.45	23.83	20.8	30.86	17.78	25.60	26.065	20.555
Dec., 2 nd	7.75	20.76	10.12	12.64	6.74	11.32	4.48	8.69	8.71	5.74	9.54	12.62	9.41	10.675	6.24
Mean	45.30[b]	45.35[b]	46.54[a]	43.69[c]	32.75[d]	41.57[a]	25.19[d]	41.55[a]	40.14[b]	31.57[c]	43.44[a]	35.27[c]	42.99[a]	41.91[b]	32.16 [d]
F			17.16					13.47					11.55		
L.S.D			0.88					0.92					1.25		

Table 2. Mean numbers of whitefly per leaflet infesting five snap bean cultivars throughout two successive season 2019 and 2020 at Qalubia Governorate.

season	1st season					2nd season					Mean of two seasons				
	Oxera	Sebares	Bronco	Golly	Falantino	Oxera	Sebares	Bronco	Golly	Falantino	Oxera	Sebares	Bronco	Golly	Falantino
Sep.,16th	3.32	1.85	3.03	2.03	1.33	2.8	2.9	3.63	1.21	2.20	3.06	2.375	3.33	1.62	1.77
23 rd	4.14	3.51	4.26	3.60	3.32	5.45	5.67	5.53	2.83	3.47	4.795	4.59	4.90	3.22	3.40
30 th	6.89	6.97	6.32	5.47	4.75	6.51	9.78	10.88	5.02	5.36	6.7	8.36	8.60	5.24	5.06
Oct.,7 th	5.06	6.17	4.77	9.82	9.12	10.13	6.83	8.18	6.10	4.74	7.595	6.5	6.48	7.96	6.93
14 th	11.54	11.89	11.37	7.45	10.09	15.22	11.73	14.13	12.23	9.61	13.38	11.81	12.75	9.84	9.85
21 st	14.42	11.56	18.39	9.07	8.69	15.1	14.34	16.51	18.10	13.29	14.76	12.95	17.45	13.59	10.99
28 th	13.43	12.72	9.87	12.25	11.72	15.6	15.71	18.34	11.45	14.53	14.515	14.215	14.11	11.85	13.13
Nov., 4 th	19.55	18.5	16.75	12.05	14.51	18	13.95	14.40	16.37	12.02	18.775	16.225	15.58	14.21	13.27
11 th	17.29	16.55	19.46	15.53	14.32	21.51	16.71	16.98	18.07	11.39	19.4	16.63	18.22	16.80	12.86
18 th	13.53	13.3	13.51	8.51	13.16	11.89	11.49	12.48	16.73	15.39	12.71	12.395	13.00	12.62	14.28
25 th	6.73	7.18	6.72	4.07	6.74	7.2	5.62	6.98	6.26	7.85	6.965	6.4	6.85	5.17	7.30
Dec., 2 nd	2.28	1.85	2.65	0.97	2.93	3.42	2.08	3.54	2.42	1.88	2.85	1.965	3.10	1.70	2.41
Mean	**9.85 a**	**9.34 b**	**9.76 a**	**7.57 d**	**8.39 c**	**11.07a**	**9.73 b**	**10.97 a**	**9.73 b**	**8.48 c**	**10.46a**	**9.54b**	**10.36a**	**8.65 c**	**8.43 c**
F			**3.74**					**5.44**					**3.56**		
L.S. D.			**0.31**					**0.29**					**0.55**		

These data were in agreement with the findings of **Li et al. (2022)** who reported that the cultivars 'Jade' maintained the fewest *B. tabaci* eggs, but cultivars 'Gold Mine', 'Golden Rod', 'Long Tendergreen', and 'Royal Burgundy' harbored a noticeably reduced amount of whitefly nymphs. The yield of snap beans was noticeably higher on the cultivars "Affirmed," "Momentum," "PV-857," "Sybaris," and "Tema." These snap bean varieties may lower whitefly populations, benefit crops in nearby plots, and need less insecticide, delaying the emergence of insecticide resistance and maintaining the efficacy of currently available insecticides.

2. Relation between some phytochemical components of five snap bean cultivars and infestation rates of principal insect pests at Qalubiya Governorate in 2020 season .

Data recorded in **Table (3)** show the mean counts of examined insect pests (aphids and whitefly) infesting five snap bean cultivars (Oxera, Sebares, Bronco,Golly and Falantino) at the second growing season and their relation to the level of certain phytochemical components in the leaf of the concerned cultivars (total protein, total carbohydrates, total phenols and some enzymes GST, alpha esterases and beta esterases). The correlation coefficient factor between these factors and the mean of population densities of the studied insect pests were also estimated as shown in **Table (4)**.

2.1. Aphids (especially *A. gossypii, Myzus persica* and *A. craccivora*)

It was clearly that the heaviest infestation of aphids was recorded on the leaves of Bronco and Oxera cultivars (41.90 and 41.73 individuals/leaflet) respectively compared with other three remaining cultivars, Golly, Falantino and Sebares with mean number(40.61,31.30 and 25.71 individuals/ leaflet).

The analysis of variance indicated significant differences among the leaves of the five tested cultivars in their contents of all tested phytochemical components and enzymes. The L.S.D values were 0.28, 1.18, 0.20, 4.75, 8.50 and 4.9 for total protein, total carbohydrates, total phenols, GST, peroxidases, alpha esterase and beta esterase. The results in **Table (4)** showed that there was significantly positive correlation between the infestation of aphids and the percentages of total protein, peroxidase and alpha esterase as the calculated correlation coefficient factor (r) values were 0.84, 0.77 and 0.54, respectively. While the r value was positive but not significant with carbohydrates, GST and beta esterase were 0.46, 0.26 and 0.24, respectively. On the other hand, there was insignificantly negative correlation between the infestation with aphids and total amount of phenols as r value was - 0.42%.

Concerning the infestation with aphids to the tested five cultivars, it was observed that, the lowest seasonal mean numbers occurred on the leaves of Sebares (25.71 individuals/leaflet) was associated with the lowest levels of total protein and peroxidases (2.50 and 80.43, respectively). On the contrary, leaves of Oxera and Bronco cultivars contained higher percentage of total protein (3.56 and 3.91, respectively), Peroxidases (93.70 and 101.33, respectively) and alpha esterase (155.67 and 156.33, respectively) and lowest percentage of total phenol (1.76 and 1.70, respectively). The intermediate mean numbers of aphids recorded on the leaves of Falantino (31.30 individuals/leaflet, respectively) were associated with an intermediate level of total protein (2.96%).

From the above-mentioned results, it could be stated that the population density of aphids increased by increasing the amount percentages of the total protein, total carbohydrates, peroxidase, alpha esterases and beta esterases. While, decreased by increasing total phenols.

Table 3. Relationship between some phytochemical components in five snap bean cultivars and population density of certain insect pests/ leaflet during 2020.

			Phytochemical components						
Cultivars	**Mean no. Aphids**	**Mean no. Whitefly**	**Total proteins**	**Total carbohydrates**	**Total phenols**	**GST**	**Peroxidases**	**Alpha esterases**	**Beta esterases**
Oxera	41.73	11.57	3.56	10.97	1.76	18.30	93.70	155.67	58.67
sebares	25.71	9.46	2.50	8.79	1.97	18.20	80.43	107.00	54.50
Bronco	41.90	10.59	3.91	9.18	1.70	24.50	101.33	156.33	64.53
Golly	40.61	9.75	3.47	12.67	2.18	26.13	97.73	101.67	43.03
Falntino	31.30	8.75	2.96	10.80	1.84	23.73	83.63	111.00	49.73
Mean	36.25	10.02	3.28	10.48	1.89	22.17	91.36	126.33	54.09
F	**9.70**	4.34	**18.33**	**17.0**	**8.05**	**19.9**	**25.6**	**46.0**	**44.90**
L.S.D.	**5.01**	1.95	**0.28**	**1.18**	**0.20**	**1.15**	**4.75**	**8.5**	**4.9**

Table 4. Correlation coefficient factors between the population density of certain insect pests/leaflet and some photochemical components of five snap bean cultivars during 2020.

Cultivars	Correlation coefficient factors						
	Total proteins	Total carbohydrates	Total phenols	GST	Peroxidases	Alpha esterases	Beta esterases
Aphids	0.84**	0.46	-0.42	0.26	0.77**	0.54*	0.24
whitefly	0.33	0.13	-0.11	-0.26	0.37	0.48	0.41

2.2. Whitefly *Bemisia tabaci*

The simple correlation analysis in the changes of the population density of whitefly in relation to the changes of seven different phytochemical leaf components of the five snap bean cultivars were tabulated in **Table (3)**. The highest infestation by whitefly was recorded on Oxera and Bronco with mean numbers 11.57 and 10.59 nymph/ leaflet with highest rate of total protein, peroxidase, alpha esterase and beta esterase 3.56, 3.91, 93.70, 101.33, 155.67, 156.33, 58.67 and 64.53, respectively.

The analysis of variance indicated that the degree of infestation of the tested snap bean cultivars was insignificantly negatively correlated with the level of total phenol and GST, as the calculated r values were -0.11, -0.26 and -0.37 respectively. While, were insignificantly positive correlated with the component of total protein, total carbohydrates, peroxides, alpha esterase and beta esterase, as (r) values were 0.33, 0.13, 0.37, 0.48 and 0.41, respectively.

From the above-mentioned results, it is clear that the study of phytochemical contents is there is one factor affecting on the population density of whitefly on the five studied snap bean cultivars, but these results indicated that there were other combined factors affecting the activity of this insect. These results agree with **Abdallah *et. al.* (2001)** who found that the population densities of *Aphis gossypii*, *Empoasca spp* and *Bemisia tabaci* were reduced on cotton leaves which contained high percentage of phenols, while opposite trend occurred with both reduced and total sugars. Nitrogen was negatively correlated with population of the three studied pests. **Tantawy (2006)** also studied the correlation between population densities of some pests and some phytochemical components of leaves of six tested cultivars and indicated that insignificantly positive relationship with carbohydrate and significantly positive with non-reducing sugars and total sugars, and insignificantly negative correlation values resulted in cases of phenols, phosphorous and potassium.

Awadalla, *et al.* (2013) found insignificantly or significantly positive relationship among faba bean varieties contents from C. protein, T. lipids and T. phenols with *Empoasca spp*., *N. viridula* and *L. trifolii* while was negative relationship with T. carbohydrate and silica. In contrast, the results showed significantly positive relationship among varieties contents from T. carbohydrate and silica with craccivora while was significantly negat ive relationship with C. protein, T. lipids and T. phenol.

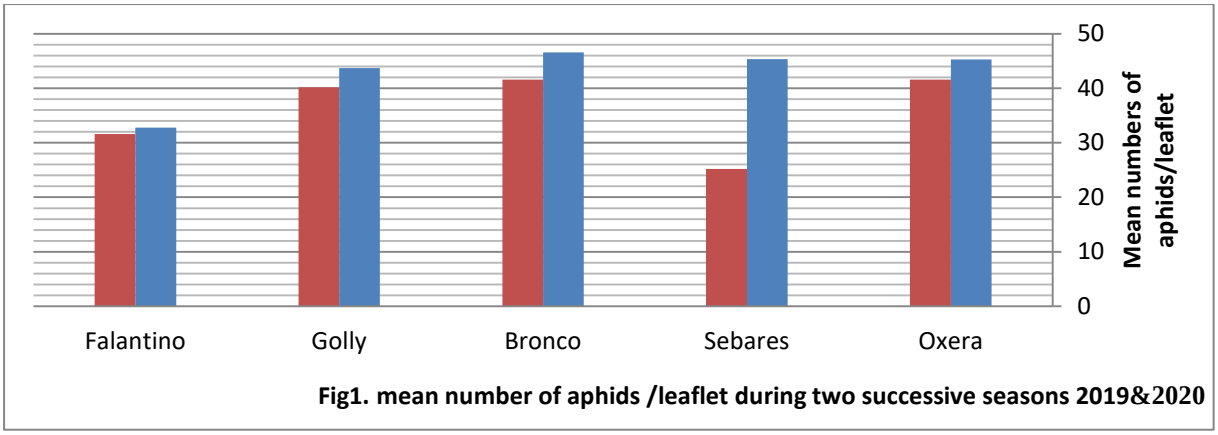
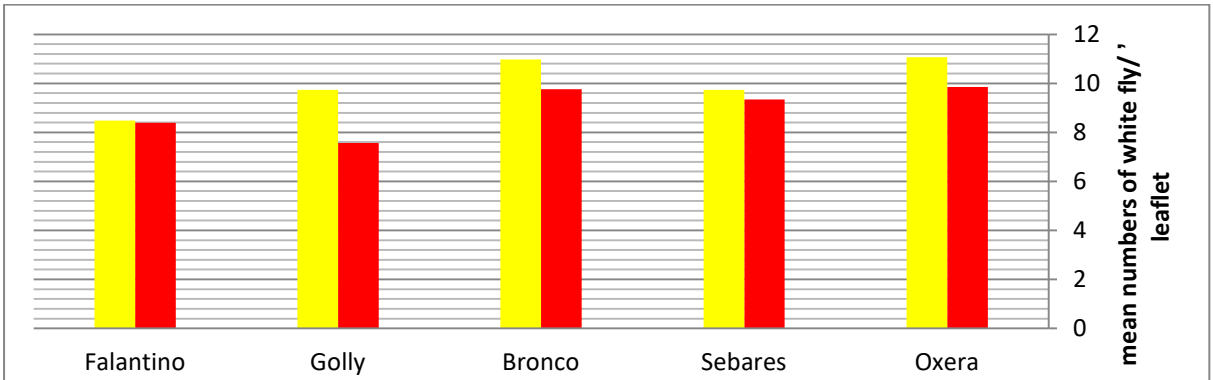


Fig1. mean number of aphids /leaflet during two successive seasons 2019&2020



Meannumbersof whitefly/ leaflet during two successive seasons 2019&2020

Conclusion

From results of current study, the highest infestation with aphids and whitefly was observed on Oxera and Bronco cultivars. The population density of aphids increased by increasing of total protein, total carbohydrates, peroxidase, alpha esterases and beta esterases. While, decreased by increasing total phenols. on the other hand, snap bean cultivars was insignificantly negative correlated with population density of whitefly and level of total phenols and GST, and insignificantly positive correlated with the component of total protein, total carbohydrates, peroxides, alpha esterase and beta esterase.

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العلاقة بين التركيب الكيماوى لخمس اصناف من الفاصوليا وقابليتها للاصابة بحشرتى المن والذبابة البيضاء

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تم اجرء التجارب الحقلية بمزرعة بقرية السفاينة –طوخ محافظة القليوبية خلال موسمين متتالين موسم 2019 و2020 لدراسة تاثير التركيب الكيماوى على معدل الاصابة لخمس اصناف من اصناف الفاصوليا (اجزيرا ، برنكو، سيبارس ، جولى وفلانتينو)ومدى حساسية الاصناف المختبرة للاصابة بحشرتى المن والذبابة البيضاء اوضحت النتائج ان صنفى برنكو واوجزيرا اعلى الاصناف اصابة بحشرة المن وذلك لزيادة نسبة البروتين والكربوهيدرات والبروكسيدايزوالالفاستيرز والبيتاستيرز ويقل التعداد بزيادة نسبة الفينولات فى النبات . اما بالنسبة للذبابة البيضاء اوضحت النتائج المتحصل عليها ان صنف اوجزيرا كان اعلى الاصناف اصابة بالحشرة.