INFLUENCE OF CERTAIN BIO AND CHEMICAL TREATMENTS ON SUGAR PEA PRODUCTIVITY AND PROTECTION OF SOME INSECT PESTS

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Abstract

This study was carried out during the winter seasons of 2007/2008 and 2008/2009 at the Experimental Farm of El Kassasein Research Station, Ismailia Governorate, to investigate the effect of spraying with vitamins (B_1 and C) at rates 50 and 100 mg/L, yeast at rates 2 and 4 g/L and different combination treatments of them as well as control on vegetative growth, yield and its components, chemical constituents and protection from pea leaf miner (*Liriomyza pisi*), leguime aphids (*Aphis craccivora* Koch) and two spotted spider mite (*Tetranychus urtica* Koch) attacking pests of sugar pea cv. Gaint grown in sandy soil under drip irrigation system. plants were sprayed three times at 20, 34 and 48 days after sowing

The results indicated that vegetative growth, yield and its components and chemical constituents were promoted with all spraying materials as compared to control (sprayed with water), and spraying plants with vitamins (B_1 and C) at two concentrations recorded the uppermost values of growth, pod quality, total yield and chemical constituents than yeast .

Generally, spraying plants with mixture vitamins (B_1 and C) and yeast at all concentrations significantly increased vegetative growth, yield and its components and chemical constituents than sprayed by vitamins (B_1 or C) or yeast alone as well as control.

The previous results are supporting through the entomological study which indicted that:

1- The important role of vitamins (B_1 and C) in plant physiological healthy which capable to resist the three pests.

2- Plants treated with yeast were more expose to infesting with pests because the yeast was more suitable to insect feeding.

3- Plants treated with 4 g yeast + 100 mg/L vitamin B_1 + 100 mg/L vitamin C were sufficient nutrient for plants and the same time to feeding the pests.

For this, the results show the great current of pest control concern about the environment indicates a need to limit application of chemicals for lank pests control.

INTRODUCTION

Sugar pea or snow peas (*Pisum sativum* var. macrocarpon) is one of the important newly introduced vegetable crops in Egypt. It has small edible pods that should be picked for their tenderness when very young, just as the seeds start to form, the pods could be shelled for their seeds because they will turn starchy. The

young pods of sugar peas are flat, crispy, string-less, brittle, succulent and have wonderful flavour and sweatiness.

Recently, great attention has been focused on the possibility of using natural and safety substrates, i.e., vitamins and yeast in order to improve plant growth, yield (quantity and quality) and plants protection of pests.

Vitamin B_1 was found to favour sugar pea growth, total pods yield and exhibited a high total nitrogen and phosphorus (Kamel, 2005 and Omaima, 2009), increased total soluble solids (El-Ghamriny *et al.,* 1999). Vitamin B_1 participates in plant growth and development indirectly by enhancing endogenous levels and various growth factors such as cytokinins and gibberllin (Kodandara and Rao, 1985).

Vitamin C functions as antioxidant, an enzyme factor and as growth regulating factor. It participates in a variety of processes, including photosynthesis, photoprotection, cell wall growth and cell expansion, resistance to environmental stresses and synthesis of ethylene, gibberellins, anthocynins and hydroxyproline (Nicholas and Wheeler, 2000 and Midan and El-Dinary, 2008). Spraying plants with vitamin C increased plant growth. It's exhibited a high total nitrogen and phosphorus in leave tissues, diminished number of pods/plant, augmented average pod weight and increased yield/plant (Omaima, 2009).

In addition, yeast is a natural source of many growth substances (thiamine, riboflavin, niacin, pyridoxine HCl, pantothenate, bioten, cholin, folic acid and vitamin B_{12}) and the most of nutritional elements (Na, Ca, Fe, Mg, K, P, S, Zn and Si) as well as organic compounds,.i. protein, carbohydrates, nuclic acids and lipids (Nagodawithana, 1991). Spraying plants with yeast increased plant growth, chlorophyll in leaf tissues, NPK uptake and increased pod setting as well as total yield, average fruit weight and TSS (Abdel-Aziz, 1997 and El-Ghamriny *et al.,* 1999).

Numerous investigators in different parts of the world have studied the main pest species and population density inhabiting by using natural substances in sugar pea (Bijjur and Verma, 1996). A variety of methods is recommended for the protection of some vegetable crops grown in open fields against pests include the use of liquid fertilizers to increase resistance of plants to insects and insecticide infusions based materials, biological preparations and synthetic chemicals (Zashchita 1991). In Egypt attention has been focused in the recent years on the possibility of using natural resistant varieties against leaf miner insect and mite pests on pea (Megali *et al.,* 1992).

Present work aimed to study the possibility of using vitamins (B_1 and C) and yeast to improve growth, flowering, pods quality, total yield and protection from some attacking pests of sugar pea.

MATERIALS AND METHODS

Two field experiments were carried out during two successive winter seasons 2007/2008 and 2008/2009 at the Experimental Farm of El-Kassasin Horticultural Research Station, Ismailia Governorate, the experimental soil of the site area was sandy in texture with 8.1 pH, 0.48% organic matter, 95 mg/L N, 26 mg/L P and 116 mg/L K. The objective of these experiments was to determine the effect of vitamins (B_1 and C) and yeast on growth, pods quality, total yield and protection of sugar pea (*Pisum sativum* var. macrocarpon) cv. Gaint to some insect pests. Seeds were sown in hills (2 seeds/hill) on two sides of drip irrigation row as 20 cm apart on 18th and 23th October in 2007 and 2008 seasons, respectively.

This experiment included 15 treatments as follows:

1- Control
2- 2 g yeast/L
3- 4 g yeast/L
4- 50 mg/L vitamin B_1
5- 100 mg/L vitamin B_1
6- 50 mg/L vitamin C
7- 100 mg/L vitamin C
8- 2 g yeast/L + 50 mg/L vitamin B_1 + 50 mg/L vitamin C
9- 2 g yeast/L+ 50 mg/L vitamin B_1 + 100 mg/L vitamin C
10- 2 g yeast/L + 100 mg/L vitamin B_1 + 50 mg/L vitamin C
11- 2 g yeast/L + 100 mg/L vitamin B_1 + 100 mg/L vitamin C
12- 4 g yeast/L+ 50 mg/L vitamin B_1 + 50 mg/L vitamin C
13- 4 g yeast/L + 50 mg/L vitamin B_1 + 100 mg/L vitamin C
14- 4 g yeast/L + 100 mg/L vitamin B_1 + 50 mg/L vitamin C
15- 4 g yeast/L + 100 mg/L vitamin B_1 + 100 mg/L vitamin C

Yeast was mixed with sugar at ratio 1:1 and dissolved in water, then left for 2 hours before spraying.

The studied treatments were arranged in a randomized complete block design with three replications, except control treatment which have six replications for using three from them to spraying with pesticide (bensultap 50 % Wp). The experimental unit area was 24 m^2 which contained 8 rows with 5 m length for each and 60 cm width of them, four inner rows were possessed for yield determination, whereas the four outer rows were for determination of plant growth characters. One row was left between each two experimental plots to avoid the overlapping. Plants were sprayed three times at age 20, 33 and 48 days after sowing, the normal agricultural practices

of sugar pea production under drip irrigation system of this area followed according to the recommendations of Ministry of Agriculture.

The common agricultural practices were followed regularly without any pesticide treatments throughout the growing seasons except three replications in control treatment were sprayed with bensultap 50 % Wp as a recommended pesticide for main pest attack sugar pea (pea leaf miner) according to the recommendations of Ministry of Agriculture after two weeks from the end of sprayed by vitamins (B_1 and C) and yeast on other replications. A knapsack sprayer equipped with one nozzle was used with rate 200 L spraying solution/fed.

Bensultap 50 % Wp is the natural insecticide and provided by Taked Chemical Industries, Ltd., chemical name S,S-2- dimethylaminotrimethylene di- (benzene thiosulfonate), trade name bensultap, Vietenon, 22 Doricida, Ruban. It was applied at the rate of 600 g/fed water

Data recorded

A. Plant Growth

A random sample of six plants from each plot taken at flowering stage and the following data recorded plant height (cm), number of leaves and branches/plant,
Dry weight of whole plant (g):

A random sample of other six plants from each plot was taken and dried at 70^0C till constant weight and the dry weight of whole plant was determined.

B. Yield and Its Components

Mature green pods were continuously harvested when reached suitable maturity stages. The following data were recorded:

1. Number of pods/plant = $\frac{\text{Total number of pods/plot}}{\text{Number of plants/plot}}$

2. Average pod length (cm).
3. Average pod weight (g).
4. Early yield (Mg/fed) [Mg (mega grams) = million gram] (the sum of first and second pickings)
5. Green pods yield

Total green pods yield (Mg/fed) was calculated on the base of total yield along harvesting stages by summing (the sum of all harvests).

C: NPK Contents and Uptake, Total protein, Total Carbohydrates and Total Soluble Solids

1. NPK Contents and Uptake

Dried plants were finely ground separately and digested with sulphoric acid and percholoric acid (3:1) and nitrogen, phosphorus and potassium were determined according to the method described by Bremner and Mulvaney (1982), Olsen and Sommers (1982) and Jackson (1970), respectively and NPK uptake were calculated as NPK contents on dry weight basis (mg/plant).

2. Total protein (%)

It was determined as nitrogen content and converted to its equivalent protein content by multiplying N content X 6.25.

3. Total Carbohydrates (%)

It was determined colorimetrically using the method described by Dubois *et al.* (1956).

4. Total soluble solids

A random sample of six green pods from the third picking were blended, filtrated throughout muslin cloth and then throughout filter paper No. 1, the total soluble solids (TSS) were finally determined in filtrated by Carlzies refractometer.

D: Population Density of Pests

Weekly samples of 10 leaflets of sugar pea were chosen and collecting from three levels (upper, middle and down) from 10 plants at random across a diagonal transect of each replicate starting lower in the first week of Nov. and the end of the second week of Nov. until the end week of Jan. during first and second seasons, respectively. The numbers of aphid (*Aphis craccivora*) on 10 leaflets were counted visual directly in the field. The pests found on same 10 leaflets were put in plastic sac and transferred to laboratory for examination by the aid of a stereo-microscope and recorded a live larvae of leaf miner (*Liriomyza pisi.*) inside the tunnels between the upper and lower surface of each leaflet and mite(*Tetranychus urtica*). The efficacy of the tested treatments was calculated according to Henderson and Tilton (1955).

Statistical Analysis

Data were tested by analysis of variance according to Snedecor and Cochran (1980) and the means separations were compared by using Least Significant Difference (LSD) at 5% level.

RESULTS AND DISCUSSION

Plant Growth

Results given in Table 1 show the effect of spraying plants with 50 and 100 mg/L vitamin B_1, 50 and 100 mg/L vitamin C, 2 and 4 g yeast/L and different combination treatments among them as well as water spray (control) on growth aspects (plant height, number of branches and leaves /plant and dry weight/plant).

It is obvious that vegetative growth was promoted with all spraying materials as compared to control.

Spraying plants with vitamins B_1 or C at two concentrations under study recorded the uppermost values of plant height, number of branches and leaves/plant and dry weight/plant than yeast or control. Dry matter is the function of the environmental source and metabolic activities for sugar pea production, since it is the final outcome of plant growth and consequently affected yield and its attributes.

This may be due to vitamins participates in a variety of processes, including photosynthesis, photoprotection, cell wall growth and cell expansion, resistance to environmental stresses and synthesis of ethylene, gibberellins, anthocynins and hydroxyproline (Kodandara and Rao, 1985, and Midan and El-Dinary,2008).

Thiamine as well as ascorbic acid are necessary for the completion of reactions that lead to the formation of both chlorophyll and carotenoids in plant leaves. The changes in chlorophyll and chlorosis symptom may be used as a physiological and morphological signs of senescence in vegetables (Yamauchi and Alley 1991).

Meanwhile spraying plants with yeast at two concentrations had a significant increase on vegetative growth than control (sprayed with water), this may be due to yeast is a natural source of many growth substances (thiamine, riboflavin, niacin, pyridoxine, pantothenate, bioten, cholin, folic acid and vitamin B_{12}) and the most of nutritional elements (Na, Ca, Fe, Mg, K, P, S, Zn and Si) as well as organic compounds (protein, carbohydrates, nuclic acids and lipids), which reflected on plant growth (Nagodawithana, 1991).

The best treatment for increasing growth was spraying plants with mixture vitamins (B_1 and C) and yeast at all concentrations under study as compared to sprayed by vitamins (B_1 or C) or yeast alone as well as control. This may be due to spray with mixed vitamins (B_1 and C) and yeast collection the beneficial of vitamins (B_1 and C) and yeast together, which reflect on growth plant.

The obtained results are in accordance with those reported by El-Ghamriny *et al.,* (1999), Midan and El-Dinary (2008) and Omaima (2009).

Yield and Its Components

Concerning the effect of spraying plants with different treatments on number of pods/plant, pod length, pod weight, early yield and total yield of sugar pea, it is obvious form Table 2 that all spraying treatments had a significantly increments in yield and its components as compared to control

Table 1. Effect of vitamins (B_1 and C) and yeast on vegetative growth of sugar pea throughout seasons 2007/2008 and 2008/2009.

Characters / Treatments	Plant height (cm)		No of leaves/plant		No of branches/plant		Dry matter/plant (g)	
	First season	Second season	First season	Second season	First season	Second season	First season	Second season
1	47.67	46.67	48.42	46.66	4.18	4.18	7.57	7.61
2	50.33	51.67	53.97	51.39	4.34	4.84	7.89	7.71
3	53.00	52.67	52.66	52.41	4.90	3.69	7.80	7.45
4	51.00	54.67	57.50	54.03	4.83	4.30	7.99	8.04
5	57.67	54.33	57.43	55.31	5.00	4.76	8.03	8.01
6	54.67	58.66	58.87	56.42	5.09	4.76	7.99	8.51
7	56.00	60.33	59.43	57.93	5.22	5.04	8.81	8.46
8	55.00	61.00	61.03	60.87	5.32	5.26	8.82	9.12
9	56.00	57.67	62.52	59.41	5.21	5.16	9.32	9.35
10	59.67	60.33	60.74	60.31	5.30	5.20	8.98	8.92
11	60.33	58.33	58.38	59.06	5.16	5.30	9.64	8.78
12	57.67	60.67	61.67	60.75	5.22	5.11	9.54	9.25
13	58.67	60.67	60.53	59.19	5.00	5.21	9.53	9.53
14	60.00	58.67	57.14	58.43	5.29	5.18	9.25	9.40
15	60.67	59.33	59.64	57.29	5.41	5.27	9.61	9.49
$LSD_{0.05}$	3.41	2.64	3.24	4.37	0.39	0.26	0.89	0.52

1- Control 2- 2 g yeast/L 3- 4 g yeast/L

4- 50 mg/L vitamin B_1 5- 100 mg/L vitamin B_1 6- 50 mg/L vitamin C 7- 100 mg/L vitamin C 8- 2 g yeast/L+ 50 mg/L vitamin B_1 + 50 mg/L vitamin C

9- 2 g yeast/L+ 50 mg/L vitamin B_1 + 100 mg/L vitamin C

10- 2 g yeast/L+ 100 mg/L vitamin B_1 + 50 mg/L vitamin C

11- 2 g yeast/L+ 100 mg/L vitamin B_1 + 100 mg/L vitamin C

12- 4 g yeast/L+ 50 mg/L vitamin B_1 + 50 mg/L vitamin C

13- 4 g yeast/L+ 50 mg/L vitamin B_1 + 100 mg/L vitamin C

14- 4 g yeast/L+ 100 mg/L vitamin B_1 + 50 mg/L vitamin C

15- 4 g yeast/L+ 100 mg/L vitamin B_1 + 100 mg/L vitamin C

These results are in good line with those obtained from the data of vegetative growth in Table 1 in this study, and total yield is the sum of vegetable growth, dry matter accumulation and metabolic activity.

Among the single treatments, data presented in Table 2 show that spraying plants with vitamin C at 50 or 100 mg/L scores the highest values of number of pods/plant, pod length, pod weight, early yield and total yield than vitamin B_1, yeast and control. vitamin C functions as antioxidant, an enzyme factor and as growth regulating factor. It participates in a variety of processes, including photosynthesis, photoprotection, cell wall growth and cell expansion, resistance to environmental stresses and synthesis of ethylene, gibberellins, anthocynins and hydroxyproline, which reflect on yield and its components (Midan and El-Dinary,2008).

Meanwhile spraying plants with vitamin B_1 at 50 or 100 mg/L had a significant increase on yield and its components than yeast or control (sprayed with water). The effect of vitamin B_1 may be due to the role of B_1 which is combined with 2 molecules of phosphoric acid to form thiamine phosphate (TPP) which is the most active form that acts as a coenzyme necessary for oxidative decarboxylation of pyruvic acid from glycolysis to active acetate in Krebs cycle and this in turn affect the growth and yield of plant.

The effect of thiamine may be due to the role of thiamine which is combined with 2 molecules of phosphoric acid to form thiamine pyrophosphate (TPP) which is the most active form that acts as coenzyme necessary for oxidative decarboxylation of pyruvic acid from glycolysis to active acetate in Kreb 's cycle and this in turn affect the growth and yield of plant.

But spraying plants with yeast at 2 or 4 g/L had a significant increase on yield and its components than control (sprayed with water). Furthermore, yeast via its cytokinins content (Nagodawithanna 1991) and the high content of vitamin B_s and minerals might be play a role in orientation and translocation of metabolites from leaves into the reproductive organs, also, it might play a role in the synthesis of protein and nucleic acid and minimized their degradation (Natio *et al.*,1981). All of these occurrences and attributes might lead to the improvement of pea yield.

Spraying plants with mixture vitamins (B_1 and C) and yeast at all concentrations increasing number of pods/plant, pod length, pod weight, early yield and total yield of sugar pea than sprayed by vitamins (B_1 or C) or yeast alone as well as control. This may be due to the beneficial of vitamins (B_1 and C) and yeast together, which reflects on yield and its components.

Table 2. Effect of vitamins (B_1 and C) and yeast on yield and its components of sugar pea throughout seasons 2007/2008 and 2008/2009.

Characters / Treatments	Number of pods/plant		Pod length (cm)		Pod weight (g)		Early yield (Mg/fed)*		Total yield (Mg/fed)*	
	First season	Second season	First season	Second season	First season	Second season	First season	Second season	First season	Second season
1	15.54	13.20	8.86	8.41	3.13	3.16	0.913	0.914	2.652	2.636
Bensultap**	-	-	-	-	-	-	-	-	3.402	3.358
2	15.97	13.54	9.06	9.13	3.16	3.19	0.935	0.956	2.908	2.892
3	17.42	14.68	9.28	8.87	3.28	3.20	0.953	0.963	2.944	2.956
4	18.21	15.06	9.93	9.59	3.38	3.28	0.964	0.970	3.005	3.013
5	16.96	15.64	9.87	9.40	3.58	3.41	0.983	0.968	2.985	3.003
6	19.64	16.45	10.05	9.01	3.77	3.45	1.033	1.042	3.072	3.067
7	19.74	16.75	10.49	9.96	3.61	3.66	1.044	1.005	3.089	3.029
8	18.78	16.06	10.26	10.95	3.90	3.80	1.002	1.085	3.122	3.073
9	19.34	17.23	10.04	10.92	3.91	3.85	1.010	1.032	3.033	3.105
10	19.19	16.54	10.24	10.46	4.04	3.82	1.100	1.109	3.035	3.008
11	19.15	17.32	10.00	10.74	4.03	3.84	1.036	1.117	3.115	3.064
12	19.88	15.74	10.95	10.64	4.02	3.96	1.085	1.068	3.062	3.136
13	18.18	17.22	10.64	10.66	4.08	4.01	1.023	1.029	3.097	3.056
14	18.63	17.55	10.89	10.75	4.00	4.00	1.100	1.029	3.013	3.111
15	19.29	16.69	10.45	10.23	3.78	4.12	1.036	1.043	3.022	3.094
$LSD_{0.05}$	2.00	1.82	0.47	0.78	0.26	0.22	0.075	0.053	0.092	0.092

* Mg (mega gram = million gram) ** Bensultap (pesticide)

1- Control 2- 2 g yeast/L 3- 4 g yeast/L

4- 50 mg/L vitamin B_1 5- 100 mg/L vitamin B_1 6- 50 mg/L vitamin C 7- 100 mg/L vitamin C 8- 2 g yeast/L+ 50 mg/L vitamin B_1 + 50 mg/L vitamin C

9- 2 g yeast/L+ 50 mg/L vitamin B_1 + 100 mg/L vitamin C

10- 2 g yeast/L+ 100 mg/L vitamin B_1 + 50 mg/L vitamin C

11- 2 g yeast/L+ 100 mg/L vitamin B_1 + 100 mg/L vitamin C

12- 4 g yeast/L+ 50 mg/L vitamin B_1 + 50 mg/L vitamin C

13- 4 g yeast/L+ 50 mg/L vitamin B_1 + 100 mg/L vitamin C

14- 4 g yeast/L+ 100 mg/L vitamin B_1 + 50 mg/L vitamin C

15- 4 g yeast/L+ 100 mg/L vitamin B_1 + 100 mg/L vitamin C

NPK Contents

The effect of foliar application with different treatments on mineral contents (NPK) in plants of sugar pea are shown in Table 3. It is obvious from the data that foliar application of vitamins (B_1 or C) or yeast at all concentrations reflect significant effect on all mineral contents (NPK) in plants as compared to control (water spray). Among the single treatments, data indicated that spraying plants with 50 or 100 mg/L vitamin C caused a high increase in mineral contents (NPK) more than the effect of spraying with vitamin B_1 or yeast at all concentrations, and spraying plants with 50 or 100 mg/L vitamin B_1 caused a high increase in mineral contents (NPK) more than the effect of spraying with yeast at all concentrations.

A stimulative effect for vitamins (B_1 and C) and yeast application on mineral contents (NPK) was also reported by Abdel-Aziz (1997), El-Ghamriny *et al.,* (1999) and Midan and El-Dinary (2008).

The best treatment for increasing mineral contents (NPK) in plants of sugar pea plants was spraying plants with mixture vitamins (B_1 and C) and yeast at all concentrations under study as compared to sprayed by vitamins (B_1 or C) or yeast alone as well as control. This may be due to spray with mixture vitamins (B_1 and C) and yeast gave the beneficial of them together, which reflects on mineral contents (NPK) in plants of sugar pea.

NPK Uptake

Data in Table 4 show the effect of spraying with different treatments on mineral uptake. It is obvious from the data that foliar application of vitamins B_1, C or yeast at all concentrations reflect significant effect on all mineral uptake (NPK) in plants as compared to control (water spray).

Vitamin C reflected increase on mineral uptake more than vitamin B_1 or yeast at all concentrations, and vitamin B_1 superior than those of yeast at all concentrations. In general, the best treatment for increasing mineral uptake (NPK) in plants of sugar pea was spraying plants with mixture vitamins B_1 and C and yeast at all concentrations under study as compared to sprayed by vitamins B_1, C or yeast alone as well as control.

Total protein, Total Carbohydrates and Total Soluble Solids

Concerning the effect of spraying plants with vitamins B_1, C and yeast and different combination treatments among them as well as water spray (control) on total protein, total carbohydrates and total soluble solids in pods, results in Table 5 show that all spraying materials promoted total protein, total carbohydrates and total soluble solids in pods as compared to control (sprayed water).

Table 3. Effect of vitamins (B1 and C) and yeast on NPK contents in sugar pea plants throughout seasons 2007/2008 and 2008/2009.

Characters / Treatments	N %		P %		K %	
	First season	Second season	First season	Second season	First season	Second season
1	3.06	2.99	0.34	0.31	2.10	2.04
2	3.10	3.08	0.35	0.32	2.12	2.11
3	3.13	3.10	0.35	0.33	2.14	2.13
4	3.16	3.12	0.36	0.35	2.16	2.17
5	3.17	3.13	0.37	0.36	2.21	2.20
6	3.20	3.15	0.39	0.37	2.28	2.23
7	3.20	3.17	0.37	0.38	2.25	2.23
8	3.22	3.21	0.38	0.39	2.33	2.28
9	3.23	3.23	0.39	0.39	2.30	2.29
10	3.26	3.23	0.40	0.40	2.35	2.31
11	3.25	3.24	0.40	0.41	2.37	2.34
12	3.29	3.26	0.40	0.41	2.36	2.35
13	3.31	3.27	0.41	0.42	2.37	2.35
14	3.31	3.28	0.41	0.42	2.37	2.35
15	3.22	2.95	0.42	0.43	2.37	2.37
$LSD_{0.05}$	0.11	0.15	0.04	0.08	0.05	0.05

1- Control 2- 2 g yeast/L 3- 4 g yeast/L

4- 50 mg/L vitamin B_1 5- 100 mg/L vitamin B_1 6- 50 mg/L vitamin C 7- 100 mg/L vitamin C 8- 2 g yeast/L+ 50 mg/L vitamin B_1 + 50 mg/L vitamin C

9- 2 g yeast/L+ 50 mg/L vitamin B_1 + 100 mg/L vitamin C

10- 2 g yeast/L+ 100 mg/L vitamin B_1 + 50 mg/L vitamin C

11- 2 g yeast/L+ 100 mg/L vitamin B_1 + 100 mg/L vitamin C

12- 4 g yeast/L+ 50 mg/L vitamin B_1 + 50 mg/L vitamin C

13- 4 g yeast/L+ 50 mg/L vitamin B_1 + 100 mg/L vitamin C

14- 4 g yeast/L+ 100 mg/L vitamin B_1 + 50 mg/L vitamin C

15- 4 g yeast/L+ 100 mg/L vitamin B_1 + 100 mg/L vitamin C

Table 4. Effect of vitamins (B1 and C) and yeast on NPK uptake (mg/plant) of sugar pea plants throughout seasons 2007/2008 and 2008/2009.

Characters / Treatments	N uptake		P uptake		K uptake	
	First season	Second season	First season	Second season	First season	Second season
1	23.16	227.5	2.57	23.6	15.90	155.2
2	24.46	237.5	2.76	24.7	16.57	162.7
3	24.41	231.0	2.73	24.6	16.69	158.7
4	25.25	250.8	2.88	28.1	17.26	174.5
5	25.46	250.7	2.97	28.8	17.75	176.2
6	25.57	268.1	3.12	31.5	18.22	189.8
7	28.19	268.2	3.26	32.1	19.82	188.7
8	28.40	292.8	3.35	35.6	20.55	207.9
9	301.0	302.0	36.3	36.5	214.4	214.1
10	292.7	288.1	35.9	35.7	211.0	206.1
11	313.3	284.5	38.6	36.0	228.5	205.4
12	3139	301.6	38.2	37.9	225.1	217.4
13	315.4	311.6	39.1	40.0	225.9	223.9
14	306.2	308.3	37.9	39.5	219.2	220.9
15	309.4	280.0	40.4	40.8	227.8	224.9
$LSD_{0.05}$	14.65	11.65	6.45	7.96	12.56	5.78

1- Control 2- 2 g yeast/L 3- 4 g yeast/L

4- 50 mg/L vitamin B_1 5- 100 mg/L vitamin B_1 6- 50 mg/L vitamin C 7- 100 mg/L vitamin C 8- 2 g yeast/L+ 50 mg/L vitamin B_1 + 50 mg/L vitamin C

9- 2 g yeast/L+ 50 mg/L vitamin B_1 + 100 mg/L vitamin C

10- 2 g yeast/L+ 100 mg/L vitamin B_1 + 50 mg/L vitamin C

11- 2 g yeast/L+ 100 mg/L vitamin B_1 + 100 mg/L vitamin C

12- 4 g yeast/L+ 50 mg/L vitamin B_1 + 50 mg/L vitamin C

13- 4 g yeast/L+ 50 mg/L vitamin B_1 + 100 mg/L vitamin C

14- 4 g yeast/L+ 100 mg/L vitamin B_1 + 50 mg/L vitamin C

15- 4 g yeast/L+ 100 mg/L vitamin B_1 + 100 mg/L vitamin C

Table 5. Effect of vitamins (B1 and C) and yeast on total protein, total carbohydrates and total soluble solid in pods of sugar pea throughout seasons 2007/2008 and 2008/2009.

Characters / Treatments	Total protein (%)		Total carbohydrates (%)		TSS	
	First season	Second season	First season	Second season	First season	Second season
1	19.13	18.69	33.93	32.76	10.11	9.74
2	19.38	19.25	34.50	33.32	10.15	10.15
3	19.56	19.38	34.64	34.80	10.35	10.24
4	19.75	19.50	35.89	34.66	10.34	10.40
5	19.81	19.56	36.80	35.75	10.47	10.57
6	20.00	19.69	36.52	36.19	10.51	10.57
7	20.00	19.81	37.74	36.19	10.68	10.66
8	20.13	20.06	37.82	37.72	10.80	10.76
9	20.19	20.19	38.96	37.25	10.96	10.85
10	20.38	20.19	39.86	38.61	11.19	10.85
11	20.31	20.25	40.01	37.75	11.29	11.07
12	20.56	20.38	39.52	39.30	11.50	11.45
13	20.69	20.44	40.56	38.76	11.71	11.17
14	20.69	20.50	39.23	37.75	11.77	11.47
15	20.13	18.44	39.28	38.20	11.64	11.32
$LSD_{0.05}$	0.02	0.19.	1.72	1.00	0.28	0.23

1- Control 2- 2 g yeast/L 3- 4 g yeast/L

4- 50 mg/L vitamin B_1 5- 100 mg/L vitamin B_1 6- 50 mg/L vitamin C 7- 100 mg/L vitamin C 8- 2 g yeast/L+ 50 mg/L vitamin B_1 + 50 mg/L vitamin C

9- 2 g yeast/L+ 50 mg/L vitamin B_1 + 100 mg/L vitamin C

10- 2 g yeast/L+ 100 mg/L vitamin B_1 + 50 mg/L vitamin C

11- 2 g yeast/L+ 100 mg/L vitamin B_1 + 100 mg/L vitamin C

12- 4 g yeast/L+ 50 mg/L vitamin B_1 + 50 mg/L vitamin C

13- 4 g yeast/L+ 50 mg/L vitamin B_1 + 100 mg/L vitamin C

14- 4 g yeast/L+ 100 mg/L vitamin B_1 + 50 mg/L vitamin C

15- 4 g yeast/L+ 100 mg/L vitamin B_1 + 100 mg/L vitamin C

Vitamin C caused a significant increase than vitamin B_1 and yeast, while sprayed plants with yeast gave the lowest values as compared to vitamins (B_1 and C). Spraying plants with mixture vitamins (B_1 and C) and yeast at all concentrations increasing total protein, total carbohydrates and total soluble solids in pods

Entomological Studies

Under field conditions, all materials sprayed were affected directly on pest via the mineral nutritional status of the plants, and indirectly by producing healthy plants. The most abundant insects on legume crops are leaf miner (*Liriomyza pisi.*), aphid (*Aphis craccivora*) and mite (*Tetranychus urtica*), which causes high yield losses. Studies were taken to examine the population build up of this pests and its correlation with the magnitude of NPK contents in leaf extracts of sugar pea.

1- Efficacy of *Liriomyza pisi*

Table 6 show the numbers and percentage reductions of *Liriomyza pisi.* infesting sugar pea. It can be seen the *Liriomyza pisi.* started to appear in the 2nd week of Nov. in two seasons, the population density increased gradually in control treatment and reached in maximum during the 1st week of Jan. in first season and 3rd week of Jan. in second season. Lel Dash and Abo Shaeshae (2001) who found that the highest average number of serpentine leaf miner larvae (*Liriomyza trifolii*) on pea plants was observed during Dec. and Jan.

Concerning the mean of % reduction, data indicated that, treated plants by 4 g yeast + 100 mg/L vitamin B_1 + 100 mg/L vitamin C recorded high % reduction (29.96 %) in first season, while treated plants by 100 mg/L vitamin B_1 recorded the lowest levels of % reduction (- 34.77).

On the other hands at second season, treated plants by 2 g yeast + 100 mg/L vitamin B_1 + 100 mg/L vitamin C recorded high % reduction (40.04), while treated plants by 2 g yeast recorded the lowest level of % reduction (- 15.83). This results indicated that the important role of vitamin B_1 and vitamin C in the plant physiological healthy which capable to resist the insect.

Theses results agree with those obtained by Nicholas and Wheeler (2000) who noticed that plants sprayed with vitamin B_1 or C enhanced the status of plant physiology including photosynthesis, photoprotection and cell wall growth.

2- Efficacy on *Aphis craccivora*

Table 7 shows the numbers and percentage reductions of *Aphis craccivora* infesting sugar pea. From this Table, it can be seen that the population density increased gradually in control treatment until the end of season, and increased gradually in yeast treatment until the 3rd week of Jan., while the plants treated with vitamins (B_1 or C) at two concentrations increased gradually until the 3ed week after

the 3rd spray. These phenomena indicated that yeast was more suitable to insect feeding. This may be due to the highest plant uptake of nitrogen, which necessary factor of making plant sap. These results agree with those obtained by Omaima (2009) who found that spraying snap bean plants by yeast at 1 kg/100 L water increased nitrogen uptake, also Abdel-Aziz (1997) found that spray tomato plants by baker yeast at 1 kg/200 L water increased nitrogen uptake.

Also, the chemical composition of sugar pea plants and it's correlation with aphids occurrence were studied. The chemical composition of plants may be playing good role at two axis, nutrition of plant and feeding of aphid in this respect, the higher nitrogen extract plus appropriate protein and lower dry matter in plant sap lead to increases the population of aphid. Data show that plants treated by 100 mg/L vitamin B_1 + 100 mg/L vitamin C + 4 g yeast/L infested with mean numbers 2.94 individ./10 leaflets and 2.04 individ./10 leaflets in first and second seasons respectively. These results agree with those obtained by Darwish (1991) who sited that the occurrence of aphid contributed with high moisture of plant and decrease of dry matter (%), which seem to be obligator to the existence of aphid.

Generally, the plants treated by vitamins (B_1 and C) and yeast recorded the highest population and the highest yield in two seasons. In first season, plants treated with 50 mg/L vitamin B_1 + 100 mg/L vitamin C + 4 g yeast caused 51.4 % R in population of aphid and gave 3.357 Mg/fed. While this treatment in second season caused 30.73 % R in population of aphid and gave 3.356 Mg/fed. The mean number of aphid attacked untreated check was 5.34 and 5.29 individ./10 leaflets in first and second seasons respectively. These finding are in partial agreement with those of El-Serafi *et al.,* (2000).

Concerning the plants treated with recommended pesticide (bensultap 50 % Wp), it was recorded 94.52 % R in population of aphid and gave 3.402 Mg/fed in first season, while recorded 91.37 % R in population of aphid and gave 3.358 Mg/fed in second season. This results indicated that the spray with vitamin B_1 + vitamin C + yeast was more suitable to aphids feeding and in the same time was sufficient to giving plants sap which sufficient to both insect and plant. Those results may be due to reduce misuse of insecticides.

3- Efficacy on *Tetranychus urtica*

The correlation between a recommended pesticide against moving stages of infesting sugar pea and spraying by fifteen formulas from three materials (vitamin B_1, vitamin C, yeast and different combination treatments among them as well as control) during two successive seasons were shown in Table 8. All plots injured with mite during the two seasons but with different levels of infestation. The population of

mite (moving stages) was the lowest in the first three weeks then followed by increase until the end of both seasons. Regarding the mean number of mite, there was a significant difference among the three tested materials.

During first season, all plants harboured the lowest number of mite, the mean number ranged between 0.1 to 0.7 indivil./10 leaflets, while increased gradually in control treatment until the end of both seasons. Moving stages of mite began with lowest number during the three inspections, while increased during the following eight inspections, and then decreased in mean numbers till the end of season during the two successive seasons. The mean number of mite population at check plots in first season was 4.84 indivil./10 leaflets, while it was 7.18 indivil./10 leaflets in second season. The previous results are generally in agreement with Darwish *et al.,* (1996).

The highest mean number of mite population in treatments in first seasons was 8.09 indivil./10 leaflets caused – 5.65 % R in population of mite which occurred in (2 g yeast + 50 mg vitamin B_1/L + 50 mg vitamin C /L), while in second season was 7.69 indivil./10 leaflets caused 9.1% R in population of mite.

On the other hand, the lowest mean number of mite population from all treatments in first season was 1.86 indivil./10 leaflets caused 7.12 % R in population which occurred in (4 g yeast/L), while in second season was 1.1 indivil./10 leaflets caused 10.97 % R in 50 mg vitamin C /L.

Concerning the results of two seasons and it's contributed with data resulted ins and outs NPK and yield. Its clear that plants treated with vitamin B_1, vitamin C or yeast were caused high infestation with mite and high yield, while plants treated with (4 g yeast + 50 mg vitamin B_1/L + 50 mg vitamin C /L) caused low infestation with mite and acceptable yield.

On the other hand, the plots treated with (4 g yeast + 100 mg vitamin B_1/L + 100 mg vitamin C /L) caused moderate infestation with mite and high yield. Also, the plots treated with bensultap 50 % Wp caused high % R (74.59 and 83.94% R) in two seasons, respectively, and gave the high yield.

Generally, these results indicated that treatment with 4 g yeast + 100 mg vitamin B_1/L + 100 mg vitamin C /L was sufficient nutrient for both plants and in the same time to feeding three tested pests. These results showed that the natural materials can a play an effective role in checking the piercing sucking pests in sugar pea crop. This result showed the great current concern about the environment indicates a need to limit application of chemical for lank pests control. These results agree with those obtained by Faris *et al.*, (2004).

Table 6. Effect of 1st, 2nd and 3rd spray with vitamins (B_1 and C) and yeast compared with the recommended pesticide (Bensultap) on *Liriomyza pisi* infesting of sugar pea throughout seasons 2007/2008 and 2008/2009.

Date of inspection / Treat.	First season												
	Mean number and reduction (%) of individ./10 leaflets at the indicate week after application												
	8/11*	15/11	22/11**	29/11	6/12***	13/12	20/12#	27/12	3/1##	10/1	17/1	25/1	Mean
Control	0.8	0.9	1.2	1.5	2.6	4.3	5.7	6.2	6.3	5.5	4	2.1	3.43
							Bensultap	2.1	1.10	0.30	0.20	0.00	1.73
								66.1	82.44	94.53	94.98	100	87.61
2 y	0.9	1.3	2	2.3	3	3.6	3.2	3.4	2.9	2.6	1.2	1	2.28
		-28.56	-48.89		31.00	26.8	50.93	52.40	60.37	59.27	74.00	6.00	26.49
4 y	0.5	0.9	1.5	1.9	2.6	3.3	4.3	4.6	5.3	4	2.6	1.2	2.73
		-60.20	-101.00	-1.33	20.27	22.58	23.92	25.69	16.42	27.69	35.00	42.77	4.71
50 vit B_1	0.7	0.8	1.5	1.7	2	2.7	3.6	4	4.6	5	3.1	1.6	2.61
		-1.74	-43.57	-9.33	38.67	17.65	17.20	16.00	5.70	-17.50	-0.75	0.80	3.92
100 vit B_1	0.2	0.6	0.9	1.3	2.4	3	3.1	3.5	4.8	5.3	4	2	1.58
		-167.00	-201.5	-15.56	-22.67	23.75	-40.58	38.75	18.00	-3.79	-8.33	-3.33	-34.77
50 vit C	0.6	1	1.1	1.8	2.6	3.1	3.3	4.7	4.6	3	2.1	1.6	2.46
		-48.33	-22.83	-30.91	-8.73	27.27	41.62	24.08	27.46	45.77	47.50	23.69	11.50
100 vit C	0.7	1.3	1.9	2.6	3.3	3.6	4.3	4.8	4	3.6	3.1	2	2.93
		-65.29	-81.86	-9.47	20.11	33.46	40.06	38.91	50.30	48.73	38.94	24.85	12.61
2 y + 50 vit B_1+ 50 vit C	0.4	0.9	1.6	2	2.7	2.9	4.6	5	3.3	2.6	1.6	1.3	2.41
		-100.25	-168.00	0.00	22.38	34.48	21.63	22.22	49.89	54.74	61.48	40.30	3.53
2 y + 50 vit B_1+ 100 vit C	0.8	1.3	1.5	2.3	3.6	5	5.6	3.6	4.8	3.6	2	1.1	2.93
		-44.63	-25.63	-22.67	-10.40	15.28	28.45	58.00	45.33	53.00	63.89	62.11	20.25
2 y + 100 vit B_1+ 50 vit C	0.5	0.9	1.6	2.4	3	4	5.3	4.3	3.6	2.3	2	1.2	2.63
		-60.20	-114.40	-20.00	13.75	18.67	18.73	32.80	50.80	63.97	56.67	50.40	5.95
2 y + 100 vit B_1+ 100 vit C	0.6	1	1.4	2.3	2.4	2.6	3.7	4.2	4	2.6	2	1.5	2.36
		-48.33	-56.33	-31.43	21.14	33.92	29.08	26.50	31.67	49.08	45.83	22.50	11.24
4 y + 50 vit B_1+ 50 vit C	0.3	0.8	1.1	1.5	1.9	2.2	2.6	3.6	4.2	3	2.1	0.8	2.01
		-137.33	-145.67	-9.09	20.55	29.37	37.05	20.42	9.37	25.79	28.16	47.79	-6.69
4 y + 50 vit B_1+ 100 vit C	0.7	0.8	1.5	2.3	2.4	3.9	4.6	5.6	4.0	3.2	1.9	1.2	2.68
		-1.71	-43.57	-22.67	26.40	0.88	11.83	2.00	31.67	37.33	48.54	38.00	11.70
4 y + 100 vit B_1+ 50 vit C	0.4	0.9	1.6	2.7	3	3.3	5.4	4.6	3.2	2.3	1.3	0.6	2.25
		-100.25	-168.00	-35.00	13.75	32.90	17.20	35.60	56.27	63.97	71.83	75.20	5.77
4 y + 100 vit B_1+ 100 vit C	0.8	1.4	2.3	2.8	3.6	4.3	4.30	4.7	2.6	1.2	0.8	0.3	2.43
		-55.75	-92.63	2.61	28.00	27.14	45.06	45.17	70.39	84.33	85.56	89.67	29.96
$LSD_{0.05}$	26.08	26.08	29.46	8.15	17.17	7.85	8.16	8.06	8.16	7.86	19.35	7.44	6.41

*1st spray with (vit. B_1, vit. C and yeast) and different combination **2nd spray with (vit. B_1, vit. C and yeast) and different combination
***3rd spray with (vit. B_1, vit. C and yeast) and different combination # 1st spray with Bensultap ##2nd spray with Bensultap

Cont. Table 6.

Date of inspection / Treat.	second season Mean number and reduction (%) of individ./10 leaflets at the indicate week after application												
	13/11*	20/11	27/11**	4/12	11/12***	18/12	25/12#	1/1	8/1##	15/1	22/1	28/1	Mean
Control (bancol)	0.1	0.8	1.3	3.3	5.4	6	6.3	6.5	6.8	7	6.7	3.6	4.48
								2.00	0.90	0.10	0.20	0.00	2.15
								69.21	87.71	89.22	82.00	100	85.43
2 y	0.2	0.4	1	2.6	3.3	5.6	6	5.8	4.7	5	4.6	3.2	3.53
		34.00	35.00	1.40	20.80	-52.73	-56.36	-45.88	-12.52	-16.67	-12.91	-45.46	-15.83
4 y	0.7	1	1.1	1.8	2.2	3.6	3.8	4	3	3	1.2	1	2.2
		52.86	79.57	-24.64	52.00	47.27	-48.55	-50.91	-7.73	-5.00	5.58	31.82	12.03
50 vit B_1	0.4	0.6	1.0	1.6	2	3	3.2	3.7	3.3	2.1	2	1.2	2.01
		50.5	67.50	37.60	52.00	87.73	3.76	-53.55	-30.33	-15.15	12.00	10.00	22.05
100 vit B_1	0.4	0.8	1.2	2.1	2	3	4.6	5	5	3	3.1	2	2.68
		34.00	61.00	31.75	60.00	-35.00	-97.80	-10.75	-97.5	15.50	-25.55	-50.00	27.07
50 vit C	0.2	0.6	0.5	1.3	2	2.6	3.3	4	4.6	4.3	2	1.8	2.27
		1.00	67.50	-1.40	4.00	-17.00	-41.90	-66.00	-81.70	-65.55	19.00	-35.00	19.73
100 vit C	0.6	0.8	0.9	1.2	2.3	3.6	3	3	3.6	3.7	2.1	1.6	2.2
		56.00	80.50	48.00	38.67	-40.87	-12.17	-8.26	-23.65	-23.87	26.04	-4.35	12.46
2 y + 50 vit B_1+ 50 vit C	0.6	0.9	1.6	1.9	2.6	3.8	4.3	4.9	3.6	2.6	2	1.6	2.53
		50.50	65.33	53.69	61.00	-31.54	42.23	-56.42	-9.39	23.00	37.69	7.69	22.16
2 y + 50 vit B_1+ 100 vit C	0.2	0.5	1	1.8	2.2	4.3	5.1	5	5.6	4.3	3.6	1.3	2.91
		17.5	35.00	29.80	47.20	-75.91	-99.36	-88.64	-101.09	-50.50	-32.55	11.36	27.93
2 y + 100 vit B_1+ 50 vit C	0.4	0.6	1.4	2	2.9	3	4	5.6	3.3	1.6	1	1	2.23
		50.50	-54.50	44.29	50.29	6.90	18.62	-60.28	10.10	57.52	72.07	48.28	22.16
2 y + 100 vit B_1+ 100 vit C	0.4	0.6	1.6	1.9	2.6	3.10	2.6	2.7	2.4	2	1.3	0.6	1.82
		50.50	48.00	53.69	61.00	7.31	13.40	13.81	27.08	40.77	59.50	65.39	40.04
4 y + 50 vit B_1+ 50 vit C	0.6	0.9	1.7	3	3.4	4	2.9	2.3	1.8	1.3	0.6	0.2	1.56
		50.50	63.17	31.18	52.00	-5.88	26.65	43.85	58.17	70.58	-21.50	-8.82	32.72
4 y + 50 vit B_1+ 100 vit C	0.1	0.3	0.6	2.2	1.3	2	1.8	1.5	1.2	1.0	0.4	0.1	1.96
		1.01	22.00	5.20	68.80	-38.46	-19.08	-4.23	27.08	40.77	75.08	88.46	29.42
4 y + 100 vit B_1+ 50 vit C	0.3	0.8	1.2	2.6	2.2	2.6	3	3.8	2.3	1.6	1.2	0.8	1.87
		12.00	48.00	35.00	56.00	-6.36	-40.73	-43.36	17.41	44.00	55.82	45.46	20.50
4 y + 100 vit B_1+ 100 vit C	0.3	1.0	1.7	2	2.1	2.8	2.7	3	2.3	1.3	1	0.3	1.70
		10.00	26.33	54.12	70.35	-20.00	10.57	-18.57	13.48	52.33	61.43	78.57	30.79
$LSD_{0.05}$													

*1st spray with (vit. B_1, vit. C and yeast) and different combination **2nd spray with (vit. B_1, vit. C and yeast) and different combination
***3rd spray with (vit. B_1, vit. C and yeast) and different combination # 1st spray with Bensultap ##2nd spray with Bensultap

Table 7. Effect of 1st, 2nd and 3rd spray with vitamins (B_1 and C) and yeast compared with the recommended pesticide (Bensultap) on *Aphis craccivora* infesting of sugar pea throughout seasons 2007/2008 and 2008/2009.

Date of inspection / Treat.	First season												
	Mean number and reduction (%) of individ./10 leaflets at the indicate week after application												
	8/11*	15/11	22/11**	29/11	6/12***	13/12	20/12#	27/12	3/1##	10/1	17/1	25/1	Mean
Control	0.4	0.6	1.2	1.6	2.3	5.5	7.3	7.6	8.3	10	10.3	9	5.43
							Bensultap	0.3	0.7	0.1	00	0.1	1.68
								96.10	91.56	88.14	100	26.96	94.52
2 y	0.7	0.6	0.6	1	1.3	2.7	4.3	5	5.4	5.9	6.6	4	3.18
		41.57	71.71	25	12.67	12.77	5.85	15.39	24.62	4.39	11.69	20.20	22.42
4 y	0.4	0.7	1.3	1.8	2.4	2.9	3.6	4.4	7.6	8	9	8.1	4.18
		-17.25	-7.25	-3.85	4.00	49.25	52.00	63.33	36.67	75.79	73.95	72.29	36.18
50 vit B_1	0.6	0.8	1.4	2.7	3	3.2	5.3	7.2	8.1	6.2	5.8	6	4.19
		10.67	23.00	-44.64	-11.43	55.20	43.47	59.25	54.15	82.40	84.25	80.74	41.81
100 vit B_1	0.4	0.3	0.6	0.6	1.8	2.4	2.9	3.3	10	5	2	12	3.44
		49.75	50.50	25.00	-56.00	44.00	48.45	45.00	66.67	36.11	75.56	78.33	42.13
50 vit C	1	1.6	1.7	2.3	3.6	4.6	5.2	7	7.6	6.6	3.9	3	4.01
		-7.2	43.90	-1.47	-10.12	46.33	53.72	59.62	56.15	80.03	88.71	29.74	41.62
100 vit C	0.7	1.3	1.6	1.8	3.3	4	4.6	6.6	8	7.6	5	4.6	4.01
		-24.42	24.57	15.63	-7.25	49.09	55.39	56.97	47.83	78.15	86.25	85.05	46.11
2 y + 50 vit B_1+ 50 vit C	0.5	0.9	2.1	3.2	4.8	5.3	6.3	7	8.3	9.6	11	8	5.58
		-20.60	-38.60	-14.29	-18.86	53.63	58.00	66.67	60.48	73.40	90.84	74.94	26.87
2 y + 50 vit B_1+ 100 vit C	0.6	0.7	1.9	2.8	4.3	6.6	7.6	8	9	11	11.2	8.2	6
		21.83	-4.50	-10.53	17.68	35.54	43.44	68.42	64.47	71.89	72.38	76.31	41.54
2 y + 100 vit B_1+ 50 vit C	0.3	0.5	1.2	1.6	1.9	3.4	4.7	7.3	8	10.6	11	9	4.96
		-11.67	-32.00	-	17.67	10.75	20.84	53.40	48.94	69.63	69.75	70.75	31.03
2 y + 100 vit B_1+ 100 vit C	0.4	0.6	1.3	2	3.3	5.3	6.6	7.6	9	11	8	7	5.18
		-0.50	7.25	15.39	-32.00	32.55	36.00	65.46	59.09	71.89	80.45	79.38	37.76
4 y + 50 vit B_1+ 50 vit C	0.3	0.5	0.9	1.3	1.6	3.2	5.3	9.2	9.6	10.3	9.2	6.8	4.85
		-11.67	1.00	8.33	7.56	16.00	-6.00	47.93	56.66	75.32	78.92	81.58	34.76
4 y + 50 vit B_1+ 100 vit C	0.6	0.7	1.1	1.4	2.8	3.9	4.3	5.2	6	5.1	3.2	1.3	2.97
		21.83	39.50	4.55	32.36	41.50	50.86	63.72	58.14	80.45	88.27	94.37	51.41
4 y + 100 vit B_1+ 50 vit C	0.3	0.6	0.8	1.3	1.8	1.6	2.3	3.6	4.8	6	6.3	3.7	2.76
		-34.00	12.00	-21.88	-17.00	58.00	59.11	53.04	37.39	67.42	71.13	79.96	35.20
4 y + 100 vit B_1+ 100 vit C	0.3	0.4	0.6	1.2	1.9	2.2	2	3.5	5.6	7	5.6	5	2.94
		10.67	34.00	-50.00	-64.67	51.37	66.32	47.50	16.00	71.25	78	76.79	30.57
$LSD_{0.05}$		6.4	7.26	6.4	8.5	8.25	7.54	7.97	8.16	11.05	8.10	8.29	12.06

*1st spray with (vit. B_1, vit. C and yeast) and different combination **2nd spray with (vit. B_1, vit. C and yeast) and different combination
***3rd spray with (vit. B_1, vit. C and yeast) and different combination # 1st spray with Bensultap ##2nd spray with Bensultap

Cont. Table 7.

Treat. \ Date of inspection	First season												
	Mean number and reduction (%) of individ./10 leaflets at the indicate week after application												
	13/11*	20/11	27/11**	4/12	11/12***	18/12	25/12#	1/1	8/1##	15/1	22/1	28/1	Mean
Control	0.2	0.5	1.4	2.6	4.3	4.6	6.6	6.8	7.3	9.6	11.6	8.0	5.29
Bensultap							Bensultap	0.2 97.06	0.5 93.18	0.1 84.8	00 100	0.1 81.80	1.76 91.37
2 y	0.4	0.6 40	1.2 58	1.6 28	2.7 25.75	2.8 2.52	4 3.7	3.6 16.00	4.2 8.22	4 33.33	3.3 54.78	2 32.59	2.53 27.54
4 y	0.3	0.7 6.67	1 53.33	1.6 13.60	1.7 43.90	2 -10.59	2.9 -10.88	3.3 -22.29	3.5 -21.47	3.8 -0.59	3 34.71	2 36.47	2.15 13.15
50 vit B_1	0.1	0.2 60	0.6 16	1 10	1.1 39.50	1.5 -28.18	1.8 6.36	2.1 -20.27	2.9 -55.55	3.1 -26.82	2.6 12.55	1.4 31.27	1.51 4.08
100 vit B_1	0.4	0.6 40	1.3 54.5	2 16.92	3.6 8.62	4.2 -9.67	4.7 15.14	5.6 2.04	5.8 4.95	7 -12.5	6.6 31.17	5 25.00	3.9 19.25
50 vit C	0.6	0.8 33.33	1.2 72	1.3 41.50	3.3 9.25	3.9 61	5 11.52	6 -14.14	7.1 -26.94	7.6 -3.64	8 10.30	4.8 22.46	4.78 18.83
100 vit C	0.3	0.7 6.67	1.4 34.67	1.8 30.57	2.6 38.71	3.3 -8.46	5.2 -30.00	5.6 -35.69	6.6 -49.77	4.3 28.57	3.3 53.04	2 38.46	3.09 12.76
2 y + 50 vit B_1+ 50 vit C	0.7	1.6 8.57	2.5 50	3.7 20.08	4.3 43.24	4.6 -0.58	5.8 -12.33	7.8 -14.28	6.8 -6.7	5.8 -39.30	4.7 59.56	3.5 56.07	4.32 15.88
2 y + 50 vit B_1+ 100 vit C	1	1.2 52	2.1 70.6	2.8 28	3.5 45	4 -7.43	4.8 10.86	5.6 -0.8	7.3 -23.06	6.2 20.29	5.30 43.97	4 38.29	3.98 21.56
2 y + 100 vit B_1+ 50 vit C	0.7	0.9 48.57	2.4 52	2.6 41.50	3.2 56	3.8 -11.63	4.9 0.47	4.7 7.47	5.9 -8.78	6.6 -7.19	5 42.19	4.2 29.13	3.74 24.08
2 y + 100 vit B_1+ 100 vit C	0.7	1 42.86	1.7 66	2.4 23.77	3 41.77	3.6 -12.80	4.6 0.33	5.2 -9.20	5.6 10.13	3 46.00	3.8 20.20	3 46.00	3.18 21.21
4 y + 50 vit B_1+ 50 vit C	0.3	0.7 6.67	1.3 39.33	1.6 33.54	1.8 54.31	1.9 0.78	2 27.78	2.7 5.5	3 1.67	3.1 22.50	2.8 42.45	2.5 25.00	2.88 23.60
4 y + 50 vit B_1+ 100 vit C	0.5	0.6 52	0.9 74.80	1.2 28	1.9 30.33	2.1 -3.9	2.5 14.47	2.9 3.84	3.2 0.63	3 28.95	2.5 51.32	2 43.16	3.85 30.73
4 y + 100 vit B_1+ 50 vit C	0.4	0.6 40	0.8 72	1.2 19	2 17.50	2.1 1.3	2.4 22.00	2.7 14.95	3.2 5.6	3.9 12.25	3.2 60.53	3 19	2.3 25.83
4 y + 100 vit B_1+ 100 vit C	0.2	0.5 -	0.7 51	1.2 7.43	1.8 15.14	1.9 0.78	2.6 6.11	2.8 2.00	2.9 1.67	3.2 20.00	3 38.33	2.6 22	2.04 14.95
$LSD_{0.05}$		6.0	9.26	7.06	7.14	5.61	5.91	5.12	6.15	6.76	6.92	7.04	6.65

*1st spray with (vit. B_1, vit. C and yeast) and different combination **2nd spray with (vit. B_1, vit. C and yeast) and different combination
***3rd spray with (vit. B_1, vit. C and yeast) and different combination # 1st spray with Bensultap ##2nd spray with Bensultap

Table 8. Effect of 1st, 2nd and 3rd spray with vitamins (B_1 and C) and yeast compared with the recommended pesticide (Bensultap) on *Tetranychus urtica* infesting of sugar pea throughout seasons 2007/2008 and 2008/2009.

Date of inspection / Treat.	First season												
	Mean number and reduction (%) of individ./10 leaflets at the indicate week after application												
	8/11*	15/11	22/11**	29/11	6/12***	13/12	20/12#	27/12	3/1##	10/1	17/1	25/1	Mean
Control	0.3	0.3	0.6	0.7	1.3	4.8	5.2	6.1	6.8	8.9	12.0	11.0	4.84
							Bensultap	1.8	2.7	0.4	0.7	0.3	1.85
								70.58	60.02	89.04	85.22	93.11	74.59
2 y	0.3	0.3	0.8	1	1.5	5.1	5.6	8.1	9.3	10	11.6	11	5.38
		25	2.8	-7	31	13.60	6.67	-13.4	-17.8	-	14.93	12	8.46
4 y	0.1	0.2	0.3	0.4	0.6	1.6	2.1	2.4	2.8	4.1	4.0	3.8	1.86
		-20	19	-14.67	8	28	12.50	16	11.33	-2.5	26.67	24	7.12
50 vit B_1	0.5	1	1	1.3	1.3	2.8	4.10	5.6	6.7	7.6	10.0	9	4.24
		-50	46	-11.8	40.2	41.85	21.15	9.54	2.08	12.31	15.39	16.92	13.06
100 vit B_1	0.3	0.6	1	1.4	1.5	2.3	3.5	5	5.9	7.2	8.9	8	3.8
		-50	10	-20.4	31	58.60	-41.67	30	25.27	28	34.73	36	20.44
50 vit C	0.1	0.15	0.4	0.5	0.7	2.4	2.7	3.1	3.5	4.1	4.9	5.5	2.34
		-12.5	-8	-7.5	19.5	7.43	3.57	7	5	12.14	23	13.57	5.75
100 vit C	0.2	0.3	0.9	1	1	2.7	3.8	5	6.1	8.3	9.4	10.5	4.1
		-12.5	-21.50	4.45	48.89	27.1	5	-5	-15.9	-24.5	-3.4	-26	-2.12
2 y + 50 vit B_1+ 50 vit C	0.4	0.7	1.3	1.9	2	5.2	9.5	10.8	11.3	15	19	20	8.09
		-31.25	12.25	-25.69	29.23	29.8	-18.75	-13.4	-7.35	-12.5	-4.5	-20	-5.65
2 y + 50 vit B_1+ 100 vit C	0.3	0.5	0.6	1	1.1	1.9	2.60	5.8	8.1	8.8	13.6	16.2	5.04
		-25	55	-43.33	-15.67	53.36	40.91	-10.73	-39.91	-20	-36	-76.73	-10.74
2 y + 100 vit B_1+ 50 vit C	0.3	0.4	0.6	0.9	1	1.8	2.4	5.6	7.8	8.7	12.4	15.9	4.82
		-	-46	-29	23.33	51.40	40	-17.6	-48.2	-30.5	-36.4	-90.8	-15.71
2 y + 100 vit B_1+ 100 vit C	0.1	0.2	0.3	0.5	0.7	1.7	3	5.2	5.3	5.8	5	3.1	2.58
		-50	19	-43.33	-7.33	34.43	-7.14	-56	-43.86	-24.26	21.43	46.86	-10.02
4 y + 50 vit B_1+ 50 vit C	0.5	1	1.1	1.9	2	5.9	7.6	8.1	9.5	11.6	13.8	16	6.58
		-50	40.60	-48.55	16.36	20.35	5	14.95	9.75	13	24.1	4	8.32
4 y + 50 vit B_1+ 100 vit C	0.3	0.3	0.7	0.9	1.2	2.3	6.2	6.6	6.8	9.6	5	3	3.58
		-	37	-10.57	21.14	48.25	-33.33	-15.5	-7.67	-20	54.17	70	13.05
4 y + 100 vit B_1+ 50 vit C	0.2	0.4	0.8	2.1	2.2	4.5	6	6.1	6.3	8.6	8	5.3	4.21
		-50	-8	-125.75	-26.50	44.77	31.82	41.77	45.59	41.36	60	71.01	11.37
4 y + 100 vit B_1+ 100 vit C	0.2	0.6	0.7	1.9	2	2.8	3.6	3.9	4.2	4.6	4.7	3	2.68
		-125	5.5	-133.43	-31.43	62.60	55	59.05	60.1	65.5	74.15	8.2	15.79
$LSD_{0.05}$		6.11	1.94	10.17	1.71	15.22	1.52	1.38	1.56	1.64	1.85	3.19	12.78

*1st spray with (vit. B_1, vit. C and yeast) and different combination **2nd spray with (vit. B_1, vit. C and yeast) and different combination
***3rd spray with (vit. B_1, vit. C and yeast) and different combination # 1st spray with Bensultap ##2nd spray with Bensultap

Con. Table 8.

Treat. \ Date of inspection	First season												
	Mean number and reduction (%) of individ./10 leaflets at the indicate week after application												
	13/11*	20/11	27/11**	4/12	11/12***	18/12	25/12#	1/1	8/1##	15/1	22/1	28/1	Mean
Control	0.3	0.4	1	2.6	3.9	6.9	9.3	10.6	11.2	14.0	16.0	10.0	7.18
Bensultap								2.1	2.9	0.5	0.7	0.1	2.6
								80.13	74.12	86.21	83.1	96.14	83.94
2 y	0.5	0.5	0.8	2.1	3	4.6	6.3	7.2	8.1	8.5	10.4	6.3	4.85
		10	52	-2.38	2.5	12.6	11.8	11.2	5.5	20.67	16.8	18.1	14.44
4 y	0.1	0.1	1	2	4.6	7.2	7	5.8	6.3	6.5	9.6	4.8	4.5
		25	-200	22	-19.6	10.78	36.09	53.35	52.07	60.44	49.91	59.3	13.58
50 vit B_1	0.7	1.3	2	2.7	3	5.5	6	7.7	8.2	8.5	6.6	5.1	4.78
		39.29	14.29	47.35	61	-4.5	16	5.3	4.33	20.67	47.2	33.7	18.73
100 vit B_1	0.4	0.6	1.3	3	4.6	5.4	6.9	6.6	7.8	9.2	10	7	5.23
		-12.5	2.5	10	8	33.09	37	46.91	40.65	44	47.83	40.65	27.1
50 vit C	0.1	0.12	0.3	0.5	0.6	0.9	1.2	1.3	1.7	2.4	2.6	1.5	1.1
		-10	10	35	48	14.5	16	19.83	0.83	-12	-4	2.5	10.97
100 vit C	0.1	0.2	0.3	0.5	0.8	1.3	3	3.1	3.6	3.1	3.2	2.5	1.81
		-50	10	35	30.67	7.38	84.25	-43.38	-57.5	-8.5	4	-21.88	-0.91
2 y + 50 vit B_1+ 50 vit C	0.3	0.4	1.2	1.7	2.9	6.8	8.8	9.6	10.9	14	17.2	11	7.07
		-	-20	44.75	37.17	-33.66	-27.45	-22.48	-31.55	-35.17	-42.34	-47.93	9.1
2 y + 50 vit B_1+ 100 vit C	0.2	0.5	0.7	1.5	1.6	3	3.5	3.6	4.2	4	4.8	4	2.63
		-87.5	-5	16.43	40.67	-6.88	8.13	16.75	8.13	30	28	-25	-4.14
2 y + 100 vit B_1+ 50 vit C	0.1	0.3	1.3	2.6	3.3	4.8	5.1	6.3	6.2	5.1	3.1	2.8	3.42
		-125	-290	22	34	17.09	35.09	29.36	34.24	56.73	77.46	66.91	-.383
2 y + 100 vit B_1+ 100 vit C	0.3	0.3	0.5	0.9	1.8	2.8	3.6	3.8	5.4	6.5	7.4	4.8	3.17
		-33.33	50	29.8	6.4	11.33	16	12.13	-5	-1.11	1.33	-4	-7.6
4 y + 50 vit B_1+ 50 vit C	0.1	0.3	1.	1.6	1.8	2	2.1	3.5	5.1	3.1	2	0.8	1.98
		-125	-290	52	64	36.67	51	28.06	0.83	51.78	73.33	82.67	2.3
4 y + 50 vit B_1+ 100 vit C	0.4	0.8	1	1	1.6	3.1	5.4	6.1	7	4.2	2.8	1.6	2.92
		-50	25	61	58.4	-10.44	-41.75	-41.06	-53.13	26.5	58	61	8.5
4 y + 100 vit B_1+ 50 vit C	0.1	0.1	0.2	0.4	1.5	3.6	3	3.2	3.6	4.3	3.1	1.7	2.07
		25	40	22	-95	-36.8	-160	21.07	16	19.73	50.4	55.8	12.2
4 y + 100 vit B_1+ 100 vit C	0.1	0.1	0.3	0.7	1.5	2.8	3.9	4.6	4	3.3	3.2	3	2.29
		25	10	9	-30	-6.4	-9.2	13.47	6.67	38.4	48.8	22	11.61
$LSD_{0.05}$		6.68	70.15	4.79	5.95	4.35	12.71	19.02	16.08	14.10	9.32	10.01	10.36

*1st spray with (vit. B_1, vit. C and yeast) and different combination **2nd spray with (vit. B_1, vit. C and yeast) and different combination
***3rd spray with (vit. B_1, vit. C and yeast) and different combination # 1st spray with Bensultap ##2nd spray with Bensultap

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تأثير بعض المعاملات الحيوية والكيميائية على إنتاجيه البسلة السكرية والحماية من بعض الآفات

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أجريت هذة الدراسة فى الموسم الشتوى لعامى ٢٠٠٧/٢٠٠٨ ، ٢٠٠٨/٢٠٠٩ بمزرعة التجارب البحثية بمحطة بحوث البساتين بالقصاصين – محافظة الاسماعيلية، وذلك لدراسة تأثير الرش بالفيتامينات (فيتامين ب ١ ، فيتامين ج) بمعدلات ٥٠ ، ١٠٠ ملليجرام/لتر ، والخميرة بمعدلات ٢، ٤ جم/لتر ومختلف معاملات التوافيق بينهم على النمو الخضرى والمحصول ومكوناته والمحتوى الكيماوى والحماية من بعض افات البسلة السكرية صنف جاينت المنزرعة بالارض الرملية مع نظام الرى بالتنقيط.

اوضحت النتائج تحسن فى النمو الخضرى والمحصول ومكوناته والمحتوى الكيماوى مع كل مواد الرش مقارنة بمعاملة الكنترول (الرش بالماء)، سجل رش النباتات بفيتامينات (ب ١ ، ج) بأى من التركزين أعلى القيم للنمو الخضرى وجوده القرون والمحصول الكلى والمحتوى الكيماوى عن الرش بالخميرة او معاملة الكنترول.

عموما، أظهر رش النباتات بمخلوط من فيتامينات(ب١ ، ج) والخميرة عند كل التركيزات زيادة معنوية فى النمو الخضرى والمحصول ومكوناته والمحتوى الكيماوى عن الرش بأى منهم منفردا أو معاملة الكنترول.

قد عضدت الدراسة السابقة من خلال الدراسة الحشرية التى اوضحت ان:

١- يتمثل الدور الهام لفيتامينات ب١ ، ج فى صحة النباتات فسيولوجيا مما يجعلها قادره على مقاومة الافات محل الدراسة.

٢- النباتات المعاملة بالخميرة تكون اكثر عرضة للاصابة بالافأت لان الخميرة اكثر ملائمة لتغذية الافات محل الدراسة.

٢- النباتات المعاملة ب ١٠٠ ملليجرام/لتر من فيتامينات ب١ ، ج ، ٤ جرام/لتر خميرة تكون كافية لتغذية النباتات وفى نفس الوقت تغذية الافات محل الدراسة.

ولذلك، فأن هذه النتائج توضح الدور الهام لمكافحة الافات مع المحافظة على البيئة بالحد من استخدام الكيماويات.