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INTEGRATED MANGAMENT SYSTEM OF SOME SUCKING PESTS INFESTING FABA BEAN CROP AT NOBARIA REGION.

Taha, H.A.[1]; S.A. El-Hadad[2]; I. K. Kotb[3] and Amera A. Shoeib[1]

1- Plant Protection Res. Inst. (ARC) Dokki, Egypt.

2- Plant Pathology Res. Inst. (ARC), Giza, Egypt.

3- Soils, Water and Environment Res. Inst., (ARC), Giza, Egypt.

ABSTRACT

Two field experiments of faba bean (*Vicia faba* L. cv. Giza Blanka) were conducted in Nobaria province. The first one was divided into seven treatments including foliar applications, with vertimec(V), super-misrona oil(SMO), V+SMO, micronutrient (ME), V+ME, SMO+ME and control. The second one was divided into six recommended fertilizing treatments; i.e. P-band, K-band, P+K-band, P-surface, K-surface and control, and subjected to two microhiza treatments (with and without application). Five random plants were examined for each replicate in the two experiments. The treatments were tested against both spider mite *Tetranychus urticae* Koch and Aphid *Aphis craccivora* Koch on faba bean crop at Nobaria region, also, tested upon macronutrient content, plant character and yield.

All compounds exhibited different degrees of mortality of mites and aphids whereas V+SMO gave the highest initial and residual activity, while ME exhibited the lowest one on both pests.

Foliar application of micronutrients increased the concentration of the elements in the plants, and their applications with SMO increased number of branches/plant. While their applications with (V) increased pod weight, seed weight and weight of 100 seeds.

P-band was the best application for increasing all tested plant nutrients. P-band with microhiza was the best application for increasing P in the plant, while pod-weight and seed weight were the highest values when using P+K-band and showed the highest reduction percent of the two sucking pests. P-surface was superior for branches No/plant.

INTRODUCTION

The integrated crop management system (ICMS) is defined as "a system whereby all interacting crop production and pest control tactics aimed at maintaining and protecting plant health are harmonized in the appropriate sequence to achieve optimum crop yield and quality and maximum net profit, in addition to stability in the agroecosystem, benefiting society and mankind". Sucking pests such as aphids *Aphis craccivora* (Koch) and the common red spider mite *Tetranychus urticae* Koch cause a great damage for faba bean (*Vicia faba* L.) crop. A new concept of using the environment friendly management had been processing. They are optimum recommended practices suitable to soil and crop, balanced fertilizing.

Baker and Connell (1963) mentioned that the spider mite damaged the protective leaf surface and the stomata and it might inject toxic substances into the leaf and interfere with vital processes while Hafez 1964

reported that aphids caused a great damage and transfer virus which caused infection diseases.

Masis and Aguilar (1990) evaluated the efficacy of vertimec against *T. urticae*, they found that vertimec was the superior in activity in strawberries fields. While Botha *et al.* 1994 concluded that vertimec was more effective to control *T. urticae* on apple orchards than propagate (Comite).

Phosphate supply could be a major limiting factor for increasing plant growth and fixation of atmospheric N_2 by legumes. Legumes required large amounts of phosphorus and their ability to utilize soil phosphate was often less pronounced than grasses and cereals (Gunawardena et al., 1992). Soil insoluble phosphate might be rendered available to plants by plant roots through secretion of organic acids in their environment. Phosphate dissolving microorganisms in soil played an important role in rendering phosphorus available to plants. Soil microorganisms might release soluble inorganic phosphate into soil through their decomposition of soil organic matter rich in phosphorus (Tinker and Sanders, 1975).

Engelatad, 1985 reported that banding P fertilizers gave greater yields of crops compared with broadcast, the difference in efficiency between banded and broadcast applications of P materials is usually greater in soils of low available P and seasons of adverse climatic conditions, like cold wet conditions. Sparrow *et al*, 1993 found that potato response to banded P was greater than to broadcast P.

Osmotic potential of spray, mechanical pushing of pests, specific effects of the environmentally safe materials used impling fertilizer foliar application and balanced nutrients lead to good plant health which over-come the stresses, suggested the objective of this work which used foliar manner of some save materials and some fertilizers application on aphids *Aphis craccivora* (Koch) and spider mite *Tetranychus urticae* Koch, as well as on crop characters and yield.

MATERIALS AND METHODS

Two field experiments of faba bean (*Vicia faba* L. cv. Giza Blanka) were conducted in Nobaria province (table 1). The first one was divided into seven treatments including control and subjected to foliar applications. The treatments were vertimec (V), super misrona oil (SMO), micronutrient and/or mixture, (table 2). The second one was divided into six fertilizing treatments including control.

The fertilizing treatments were recommended phosphorus and potassium fertilizer in band and/or surface application, and subjected to two microhizal treatments (with or without application). Each treatment of the two experiments was replicated four times, and each plot area was 1/42 feddan. A row was left unseeded as buffer between each replicate. All normal agricultural practices were done during the season.

Five random plants were examined for each replicate in the two experiments, to count aphid insects. Plants were investigated before spraying directly and after 2, 5, 7 and 11 days post-treatments.

While for spider mite *T. urticae* the motle stages of mites were count in two square inch lower surface in 20 leaflets/replicate (160 sq. inch treatment). Leaflet investigated before spraying directly and after 3, 7, 14 and 21 days.

Soil and plant samples were analyzed and determined according to Jackson, 1973.

Table (1): Soil characters

Particle size distribution		Soluble salts (ppm)	454 l
Sand (%)	41.6	Ca^{++} (ppm)	59
Silt (%)	21.2	Mg^{++} (ppm)	32
Clay (%)	37.2	Na^{+} (ppm)	30
CaCO3 (%)	32	K^{+} (ppm)	9
Available nutrients		HCO_3^{+} (ppm)	71
P (ppm)	2.7	Cl^{-} (ppm)	28
K (ppm)	322	$SO_4^{=}$ (ppm)	225

Table (2):The treatments of the first experiments and their rates

	Treatments	Rate of application
V	Vertimec 1.8	40 & 50 cm/100 L water
SMO	Super-misrona oil	1%
V+SMO	Vertimec 1.8 + super-misrona oil	50 cm+1000 cm/100L water
ME	Micro-element (Fe, Mn, Zn)	150 ppm for each element
V+ME	Vertimic 1.8+micro-elements	50cm/100 L water+150 ppm
SMO+ME	Super-misrona+micro-elements	1000 cm/100L water+150 ppm
Control	Control	-

RESULTS AND DISCUSSIONS

Obtained results showed that all tested materials exhibited different degrees of mortality of aphids and mites. Data in table (3 and 4) clear that the initial and residual activity of certain compounds against *T. urticae* and *A.craccivera* during 2002-2003 season. It is clear that V+SMO exhibited the highest initial and residual effect on both aphids and mites (92.9 & 89.5) and (89.5 & 82.6) followed by vertimec alone (91.9 & 88.3) and (86.3 & 80.1), V+ME (90.2 & 86.3) and (85.2 & 79.3), SMO+ME (84.4 & 76.7) and (79.4 & 76.6), SMO alone (84.2 & 74.2) and (79.1 & 74.2). While the micronutrient was the least in order of activity (67.4 & 55.6) and (58.6 & 54.6) at the same trend. These results are in agreement with those obtained by several investigators. Ahmed (2001) stated that vertimec gave the highest initial kill against *T. urticae*. El-Sisi and El-Hariry (1991) evaluated three fractions of the local Egyptian oils were formulated as emulsifiable concentrates and tested against *A. craccivora*.

General mean reduction of the tested compounds were (89.2 & 81.7), (75.9 & 75.5), (90.4 & 84.3), (58.6 & 55.6), (87.3 & 80.8) and (78.7 & 77.3) on spider mites and aphids infesting faba bean when sprayed with vertimec, SMO, V+SMO, ME, V+ME and SMO+ME respectively.

Table (3): Initial kill (I.K.) and residual effect of some environmentally safe compounds in controlling spider mites infesting faba bean plants at Nobaria region during the season 2002-2003.

Treatments of formulation/ 100 L. water	No. of mites before treatments	No. of mites and reduction percentages at indicated days				Residual Effect %
		I.K. 3 days	7 days	14 days	21 days	
V	568	42 **91.9**	45 **90.88**	51 **88.2**	57 **85.9**	**88.3**
SMO	548	94 **84.2**	103 **78.4**	108 **71.0**	117 **70.1**	**74.2**
V+SMO	524	34 **92.9**	39 **91.4**	46 **90.3**	49 **86.9**	**89.5**
ME	532	159 **67.4**	171 **63.02**	184 **54.4**	192 **49.4**	**55.6**
V+ME	612	55 **90.2**	58 **89.1**	64 **86.2**	71 **83.7**	**86.3**
SMO+ME	594	88 **84.4**	95 **81.6**	102 **77.4**	122 **71.2**	**76.7**
Control	596	547	518	452	425	

Table (4): Initial kill (I.K.) and residual effect of some environmentally safe compounds in controlling aphid infesting faba bean plants at Nobaria region during the season 2002-2003.

Treatments and formulation/ 100 L. water	No. of aphids before treatments	No. of aphid and reduction percentage at indicated days				Residual effect %
		I.K. 2 Days	5 days	7 days	11 days	
V	204	31 **86.3**	42 **82.8**	54 **79.9**	69 **77.8**	**80.1**
SMO	185	43 **79.1**	52 **74.5**	62 **74.5**	74 **73.7**	**74.2**
V+SMO	188	22 **89.5**	35 **84.4**	42 **83.0**	56 **80.4**	**82.6**
ME	178	82 **58.6**	94 **55.8**	105 **55.2**	128 **52.7**	**54.6**
V+ME	212	35 **85.2**	46 **81.8**	64 **77.1**	68 **78.9**	**79.3**
SMO+ME	192	44 **79.4**	51 **77.8**	59 **76.7**	72 **75.3**	**76.6**
Control	196	218	234	258	298	

Foliar application of some safe compound affected the micronutrients content of faba bean plant. Data in table (5,a) showed that when sprayed the micronutrients alone increased Fe, Mn and Zn in the plants more than those mixed with vertemic or super masrona oil. Although micronutrients and those mixed with SMO represented the highest effect on pod No./plant (table 5-b), the micronutrients sprayed with vertemic affected superiority the pod weight, seed weight and weight of 100 seeds.

Fertilizer application in band and/or surface broadcast affected the plant content of P, K, Fe, Mn and Zn (mg/kg). The values in table (6,a) of P, Fe, Mn and Zn under P-band, as well as K under K-band were the highest values, (table 6-a). Phosphorus applied as band increased phosphorus content in faba bean plant and represented higher effect compared to other applications (table 6-b). This trend was more pronounced with microhiza (0.36%).

Table (5): Effect of foliar application on nutrient content and plant characters of faba bean. (a). nutrient content

Treatments	Fe (mg/kg)	Mn (mg/kg)	Zn (mg/kg)
ME	1500	65	590
ME+V	1300	50	280
ME+SMO	1200	50	230

(b). faba bean plant characters.

Treatments	Branch No./ Plant	Pod No./ plant	Pod weight g/plant	Seed weight g/plant	Weight of 100 seeds (g)
V	7	9	125	88	79
SMO	7	8	143	115	98
V+SMO	12	12	132	104	82
ME	8	15	141	109	93
V+ME	6	5	150	118	110
SMO+ME	9	11	139	116	82
Control	9	9	110	83	75

Table (6): Effect of fertilizer application (band and surface), (A). on plant content, (B). application with microhiza and (C & D). on P-content and plant characters and yield of faba bean plants.

A

Treatments	P %	K %	Fe Ppm	Mn Ppm	Zn Ppm
P-band	0.28	3.23	1100	60	110
K-band	0.24	3.93	900	40	106
P+K-band	0.25	3.93	1200	50	88
P-surface	0.22	2.19	1000	40	100
K-surface	0.18	2.86	900	40	80
Control	0.15	2.00	800	40	90

B

Treatments	P (%)	
	With microhiza	Without microhiza
P-band	0.36	0.28
K-band	0.26	0.24
P+K-band	0.30	0.25
P-surface	0.25	0.22
K-surface	0.19	0.18
Control	0.15	0.15

C

Treatments	Branch No./plant		Pod No./plant	
	with	Without	With	Without
P-band	8.8	7.5	9.0	7.0
K-band	9.0	10.8	10.2	11.3
P+K-band	6.4	6.5	7.6	8.8
P-surface	11.0	10.0	9.8	10.0
K-surface	7.8	10.3	9.6	13.0
Control	5.8	5.8	5.0	6.2

D

Treatment	Pod weight g/plant		Seed weight g/plant		Reduction % of some sucking	
	With	Without	With	Without	Aphid	Mites
P-band	163	130	125	103	39	41
K-band	151	146	123	116	43	45
P+K-band	159	129	154	109	46	49
P-surface	141	140	124	120	35	37
K-surface	130	125	183	157	38	40
Control	120	122	96	89	-	-

Data in table (6-d) show that P-band affected pod weight, and the effect was pronounced with microhiza other than without; i.e. 163 and 130 g/plant respectively. The treatment of P+K-band and K-surface were pronounced on seed weight especially with microhiza. Engelatad, (1985) reported similar results and pointed out that banding P fertilizers gave greater yields of crops compared with broadcast,

Reduction percent of some sucking (Aphid and Mites) was reduced when using P+K-band. This might due to plant healthy growth which aphid and mites could not continue feeding on.

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المكافحة المتكاملة لبعض الآفات الثاقبة الماصة على نبات الفول البلدى فى منطقة النوبارية

حسن على أحمد طه[1] ، صفوت عبد الحميد الحداد[2] ، قطب أبراهيم قطب[3] ، اميرة شعيب[1]

١- معهد بحوث وقاية النباتات ، ٢- معهد بحوث امراض النباتات

٣- معهد بحوث الأراضى والمياه والبيئة، مركز البحوث الزراعية ، مصر

أقيمت تجربتان فى منطقة النوبارية على محصول الفول البلدى (صنف جيزة بلانكا). حيث خضعت التجربة الأولى للرش بسبع معاملات متضمنه المقارنه و كانت معاملات الرش هى: فيرتيميك، سوبر مصرونا، فيرتيميك+سوبر مصرونا، مغذيات صغرى، فيرتيميك+مغذيات صغرى، سوبر مصرونا+مغذيات و المقارنة. كما خضعت التجربة الثانية لست معاملات أرضية للتسميد بالسوبرفوسفات و سلفات البوتاسيوم حيث كانت المعاملات: فوسفور خندقى، بوتاسيوم خندقى، فوسفور+بوتاسيوم خندقى، فوسفور سطحى، بوتاسيوم سطحى و المقارنة، و أن هذه المعاملات قد خضعت لإضافة فطر الميكروهيزا و أخرى بدون إضافة. تم تقييم فعالية المركبات المختبرة لمكافحة العنكبوت الأحمر و المن طبقا للبرتوكول، كما أخذت عينات نباتية لتقدير المغذيات و ايضا تم تقدير الخصائص المحصولية.

أظهرت المركبات المختبرة درجات مختلفة من الإبادة لكلا من العنكبوت الأحمر والمن، حيث أعطى الفيرتيميك+سوبر مصرونا أعلى معدل للقتل الفورى والأثر الباقى بينما أظهرت العناصر الصغرى أقل تأثيراً على هاتين الآفاتين.

أدى الرش بالمغذيات الصغرى إلى زيادة تركيز هذه المغذيات فى النبات و أن إضافتها مع سوبر مصرونا أدى الى زيادة الأفرع للنبات. بينما إضافتها مع الفيرتيميك أدى إلى زيادة وزن القرون ووزن البذور لكل نبات ووزن المائة بذرة.

إضافة الفوسفور الخندقى كان أفضل على زيادة كل العناصر المقدرة فى النبات وأن إضافته مع فطر الميكروهيزا كان أفضل على زيادة الفوسفور فى النبات بينما وزن القرون و البذور لكل نبات كان أعلى ما يمكن عند إضافة الفوسفور+البوتاسيوم الخندقى مع وجود فطر الميكروهيزا و صاحب ذلك أعلى نسب خفض فى تعداد الآفتين. و أن الإضافة السطحية للسوبرفوسفات أعطى أعلى قيم للتفريع لكل نبات.