SAFETY MANAGEMENT OF INSECT TRANSMISSION FOR PLUM POX VIRUS IN EGYPT

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ABSTRACT.

The Insect transmission were conducted under green house condition on pea plant plum pox virus has been able to be transmitted by six different aphid species *Myzus persicae* (70%) *Aphis craccivora* (50%) *Hyalopterus pruni* (30%) *Rhopalosipinum padi* (20%). *A. faba* (10%) *A. gossypii* (10%) the virus transmissibility by aphid is higher parallel to number of insect allowed acquire the virus plum pox transmitted by nymph stage more than adult stage (75% and 32%) respectively . Plum pox virus is beginning able to be acquired by *M. persicae* insect after 2 days post- inoculation period. The effects of releasing *Chrysoperla carnea* stephens larvae were tested with plum pox viruliferous aphid. The Infection has been decreased with *Chrysoperla carnea* releasing in the stage of *M. persicae* nymph. Finally, the results made clear that the insecticides decrease virus infection than *C. carnea*.

Key words: Plum box virus; Aphids ; *Chrysoperla carnea*

INTRODUCTION

Plum Pox virus was the causal agent of such serious disease. The diseases is major areas where the virus has not yeat been introduce. It spread to all the European countries **(Roy and Smith, 1994)** and also it coexist in some middle East and North African countries **(Dunez, 1988 and Mazyad *et al.*, 1992)** and also it coexist in Egypt **(Dunez,1988; Wetzel *et al*., 1992; Mazyed *et al*., 1992; El Hammady *et al*., 1995; Abdel-Ghaffar *et al*., 1998 and Abo EL-ELa *et al*., 1999).** Aphid insect transmitted Plum pox **(Maisa *et al*., 2007).** C*hrysoperla carnea* could be used as a biological control predator in case of vegetable, crops fruits and ornamentals against different kinds of aphids. Especially high temperature variations which Chrysopa will not have any problems in greenhouse. Most investigations were concentrated on *C. carnea* as the mass rearing techniques were relatively developed. This predator has mainly been used against aphids where the green lacewings can be transferred to the green house either as eggs or as second instars larvae **(El Arnaouty *et al*., 1993)** the efficiency of lacewings depended on the date of the first release and the larvae needed to be present before the first winged aphids **(Collet *et al*., 1998)** and **(El-Tahlawy and EL Arnaouty 2006).** This study aims to uncover some epidemic causing factors of population fluctuations of aphid vectors in relation to virus infection. SO, the management of the plant virus diseases is limited within the preventive measurements. The early control of the viruliferous aphid is the effective alternative for the suppression of the virus incidence. The impact of *C. carnea*

release on controlling the populations of aphid during nymph and adult stage were investigated.

MATERIAL AND METHODS

Virus source andsymptoms:-

From previous work, El-Amer isolate was isolated from apricot trees growing at El-faiyum Governorate and subjected to different studies **(Mazyed *et al* 1992, EL-Hammady *et al*, 1995 and Abo-El-Ela *et al* 1999).** Leaf symptoms appears on infected trees included light chlorotic or yellow rings, spots and blotches yellow line patterns along veins, vein clearing and leaf distortion on some cultivars. (Fig 1).

Virus-vector relationship

a- Aphid transmission

Aphid transmissibility of PPV was evaluated under controlled conditions on 15 days old pea (*Pisum sativum*) seedlings Ammar E D, Nault Lr 2002. Colonies of virus- free aphids were *A. craccivora*, *Hyaiopterus pruni*, *Myzus persicae*, *Aphis gossypi*, *Rhapelosipinum padi and Aphis fabe*, obtained. From Economic Entomology and pesticides DEP faculty of Agriculture, Cairo university, were allowed to acquit PPV previous 5-10min aphid species and were inoculate health pea indicator seedlings to determine virus transmission ability (Table1 and Fig.2). The ability of aphid to transmit PPV from apricot was tested by ELISA method over two growing season

b- **determination of both acquisition access period (AAP) and inoculation access period (IAP)**

*M. persica*e insects nymph were used for determination of both acquisition access period (AAP) and inoculation access period (IAP) using different period (5-60 min) and 10 insects /plant were used **Ammar E D, Nault Lr 2002** (Table 2)

c- **Determine of plum pox virus ability by different aphid stage**

Also *M. persicae* insect were used to determine of plum pox virus ability by different aphid stage and different and different number of insects /plant **Ammar E D, Nault Lr 2002** (Table 3).

Relationship between vector, C. carnea, and insecticides on plant growth.

Ten replicate were used all time, six treatments were conduct using *Pisium sativum* (pea) cv. Alaksa nymph stage and adult for each treatment 10 of replicates plastic pots (measuring 50 cm in diameter) were prepared and arranged in the greenhouse (temperature was maintained at 22°C in each pot 0 pea seeds were planted and maintained till the appropriate stage of treatment (Table 4 and 5). Each series of treatments was carried out during insect nymphal stage (N) and adult stage (D).

At each stage of nymph and adult were designed as a follows:

Treatment 1: healthy plant
Treatment 2: healthy aphids (20 aphid / pot)
Treatment 3: healthy aphids + *C. carnea* (10 larvae / pot)
Treatment 4: viruliferous aphid
Treatment 5: viruliferous aphid + *C. carnea*

Treatment 6: viruliferous + aphicide (Malathion)

The pots were daily observed starting by the 10th day of the insects introduction. At the end of the plants development the number and the weights of harvested pea pods and seeds were recorded .

RESULTS AND DISCUSSION:

Virus sources

The virus was showing symptoms on apricot light chlorotic and yellow rings spots and blotches, yellow line patterns along veins, vein clearing and leaf distortion Fig (1).

A B C D

Fig (1): (A). Vein clearing and chlorotic spots appeared on naturally infected with PPV appeared on apricot cv.El-Amar leaves (B). PPV symptoms (Chlorotic rings) appeared on artificially infected El-Amar apricot leaves (C). Symptoms on artificially infected apricot leaves with PPV showing line pattern and mosaic (D). Chlorotic and white lines PPV symptoms on artificially infected leaves of apricot.

Virus-vector relationship

a- **Aphid transmission**

The virus could be transmitted by six different aphid species *M.persicae* 70% *A. craccivora* 50 %, *H. pruni* 30%, *R . padi* 20%, *A. faba* 10% and *A. gossypi* 11% (Table 1and Fig. 2). This results conformed with **Maisa *et al.*, (2007)** but *Myzus persicae* was more efficiency of transmission Table (1). Fig (2)

The viral charge acquired and inoculated by single aphid in non-circulated transmission in most plant viruses depend on specific vectors for horizontal transmission between host plants. Insects particularly homopterans with piercing–sucking mouth parts, are by for the most frequent vectors of plant virus **(Moreno *et al.*, 2009).**

b- **Determination of both acquisition access period (AAP) and inoculation access period (IAP)**

Virus – vector relationship information manipulation and applied science application. There is some factors were studied in this work; acquisition access period (AAP) was determined as 2 hr (Table 2) Inoculation access period (IAP) was 10 min (Table 2) .

c- **Determine of plum pox virus ability by different aphid stage**

PPV is transmitted by nymph stage more than adult stage 88% and 35% respectively (Table 3). This results conformed with **Aboul-Ata *et al*., (2004).**

Relationship between vector, C. carnea, and insecticides on plant growth.

1- Nymph stage

Concerning the group N (nymph stage) treatments on the nymph stage as shown in Table (4) treatment (H.P) average weigh of pod was 10 while average tall of pod was 10 with an average of 7 seeds/plant. Treatment (P+V) average weigh of pod was 2 while average tall of pod was 3with an average 3 seeds/plant. Treatment (P+AV+C) average weigh of pod was 9 while average tall of pod was 10 with an average of 6 seeds/plant. Treatment (P+A+C) average weigh of pod was 7 while average tall of pod was 8 with an average of 5 seeds/plant . Treatment (H+A) average weigh was 7 while average tall of pod was 7 with an average of 5 seed/plant. Treatment (P+AV+I) average weigh of pod was 9 while average tall of pod was 10 with an average of 7 seeds/plant (Fig. 3 and Table 4)

2- Adult stage

Concerning the group D (adult stage). Treatment on the adult sage as shown in Table (5) treatment (P+V) average weigh of pod was 3 while average tall of pod was 3 with an average of 3 seeds/plant . Treatment (P+AV+C) average weigh of pod was 4 while average tall of pod was 5 with an average of 3 seeds /plant. Treatment (P+AV+T) average weigh of pod was 6 while tall of pod was 7 with an average of 5 seeds/plant (Fig. 3)

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The significance of variation ranged according to the defined parameters in relation to the treatments. Concerning the tall of pod and number of seeds show in Table (4) were [P+V] (2 , 3, 3) and [P+ (VA)+ C] (9. 10. 6] [INSECTICIAD + P + (AV)] (9 , 10 , 7).

While stage of adult show in Table (5) were [P+V] (3. 3 3) [P+ (AV) +C] (4, 5. 3) [INSECTICTAD + P + (AV)] (6, 7, 5) (Table 5) Fig (3)

Table (1): Determination of PPV transmission ability by different aphid species

EXP	Different aphid species					
NO	*A. craccivora*	*Hyalopterus pruni*	*Myzus persicae*	*A. gossypii*	*Rhapalosipinum . padi*	*A. faba*
1	9/20	5/20	13/20	1/20	4/20	1/20
2	10/20	6/20	15/20	2/20	5/20	3/20
3	11/20	7/20	14/20	3/20	3/20	2/20
%	%50	%30	%70	%10	%20	10%

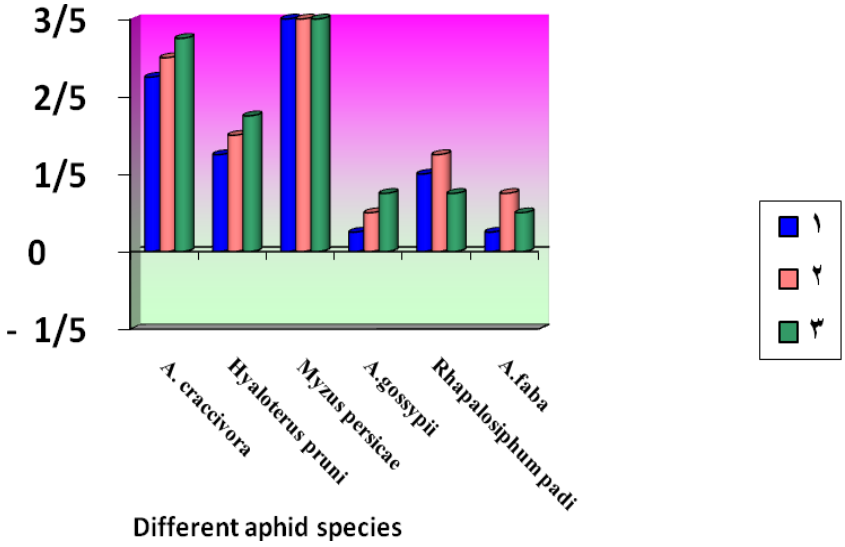


Fig. (2): Different aphid species

Table (2): Determination of acquisition access period (AAP), and inoculation access period (IAP) of *Plum pox virus* by *M. persicae*.

Time TEST	A.A.P and T.A.P of (*Plum Pox Virus*).							
	(A.A.P)*				(T.A.P)* *			
	Rep1	Re2	Rep 3	%	Rep1	Rep2	Rep3	%
Min 5	3/10	2/10	3/10		10/10	9/10	9/10	
Min10	5/10	4/10	6/10		10/10	8/10	9/10	
Min 30	7/10	6/10	8/10		8/10	7/10	6/10	
Hr 1	10/10	8/10	10/10		7/10	6/10	7/10	

A.A.P= 5 :10 min* T.A.P=5 : 60 min **

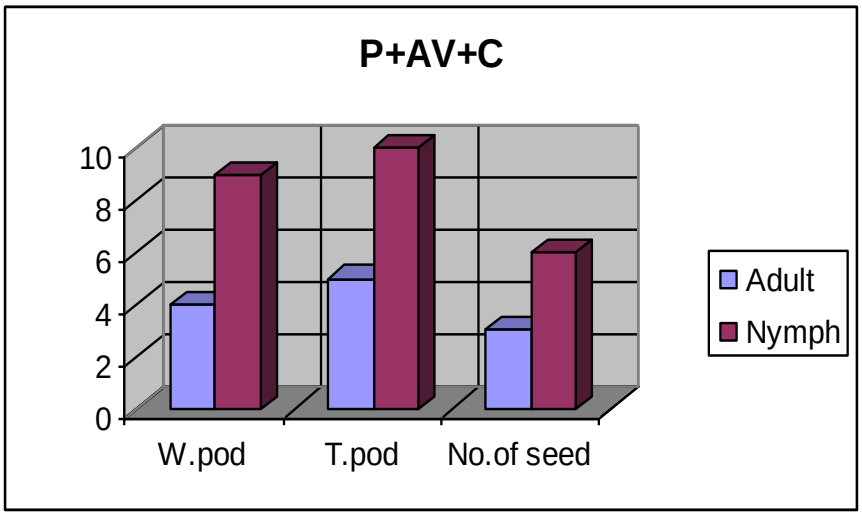
Table (3):determination of PPV transmission ability by different aphid stage

Exp.	Different ***stage of M. persicae***		
No.	Nymph	Apterous Adult	**Adult**
1	22/25	9/15	**7/20**
2	23/25	7/15	**6/20**
3	21/25	10/15	**8/20**
%	88%	%57	**%35**

Table (4): influence of virus infection on plant growth (nymph stage)

Exp.	H.P			P.V			H.A			P+AV+I			P+A+C			P+AV+C		
	W(pod)	T(pod)	no of see															
1	8	10	9	3	3	3	7	9	6	7	8	5	9	10	6	10	10	6
2	10	12	8	2	5	5	6	7	5	11	12	7	7	8	4	8	9	4
3	11	9	6	2	1	2	8	8	4	9	10	9	5	6	5	9	11	8
4	8	9	5	2	3	2	7	6	5	9	10	7	7	8	5	9	10	6
5	9	10	7	4	4	3	9	7	3	8	9	8	8	9	7	11	8	7
6	8	9	8	2	2	4	5	6	5	10	11	6	6	7	3	7	12	5
7	9	11	6	2	3	2	7	8	7	9	10	7	7	9	5	9	10	6
8	9	10	7	2	3	3	8	7	6	7	10	6	7	7	5	8	10	6
9	8	١١	7	3	4	3	6	5	5	10	11	8	8	8	6	10	9	5
10	9	10	7	2	2	3	7	7	4	9	9	7	6	8	4	9	11	7
Average	10	10	7	2	3	3	7	7	5	9	10	7	7	8	5	9	10	6

H.P=Healthy plant
H.A=Healthy .plant +Aphid
P.V= Plant+ viruliferous
P+AV+C=plant+viruliferous+chrysoperla carnea
P+A+C= plant+aphid+ chrysoperla
P+AV+C+I=VIRULIFEROUS+Chrysoperla carnea+insecticide
Stage of nymph



	W.pod	T.pod	No.of seed
Adult	4	5	3
Nymph	9	10	6

Fig. (3): The influence of virus infection by adult and nymphal stages on plant growth

Table (5): influence of virus infection on plant growth (adult stage)

EXP. NO	P+V			P+AV+C			P+AV+I		
	W of pod	T. of pod	NO of seed						
1	4	5	3	6	6	3	4	9	5
2	3	1	3	4	4	4	8	5	6
3	2	3	4	2	5	2	6	7	4
4	3	3	2	4	5	3	6	7	5
5	5	2	5	5	7	5	7	8	7
6	1	4	1	3	3	1	5	6	3
7	3	3	3	4	5	3	6	7	5
8	3	3	4	4	5	4	6	8	5
9	4	4	2	6	6	3	5	6	5
10	2	2	3	4	4	3	7	7	5
Average	3	3	3	4	5	3	6	7	5

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التحكم الآمن في عملية نشر فيروس جدري الحلويات في مصر

***مهجة عبد الرحمن الطحلاوي، **سيد اشرف الارناؤوطي، *امال ابو العلا احمد**
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تعتبر المحاصيل ذات النواة الحجرية من محاصيل الفاكهة الاقتصادية وذات قيمة غذائية عالية لاحتوائها علي العديد من الفيتامينات و تصاب بعديد من الفيروسات منها فيروس جدري الحلويات الذي يسبب خسارة اقتصادية كبيرة لمحصول المشمش ، وقد اجريت عدة تجارب للتحكم في انتشار هذا الفيروس الخطير
- تم دراسة قدرة انواع المن التي تنقل المرض وكانت الاكثر نقلا بالترتيب.
Myzus persicae, Aphis craccivora A.gossypii,A.faba Rhopolosipium padi, Hyaloptrus
- تم دراسة طور الحشرة الاكثر قدرة علي نقل المرض وقد وجد ان الطور الحورية ٧٥% كان اكثر قدرة علي نقل المرض ويليه طور الحشرة الكاملة ٣٢%
تم دراسة تأثير نشر أسد المن في فترة الاصابة بحشرات في طور الحرية.
- تم دراسة تأثير نشر أسد المن في فترة الاصابة في طور الحشرة الكاملة.
- قياس الفرق بين المرحلتين بقياسات النمو علي محصول الفاصوليا (عدد و وزن البذور والقرون في النباتات) وقد أدي نشر أسد المن في طور الحورية الي زيادة قياسات النمو في النبات، حيث ان اطلاق اسد المن في عمر الحورية أدي الي وزن القرون ٩جرام وطول القرن ١٠سم وعدد البذور ٦للقرن، بينما عند النشر بالحشرة الكاملة كانت القياسات السابقة كالآتي :٤-٥-٣علي التوالي
-عند المقارنة بين نشر اسد المن والرش بالمبيد ،كان للمبيد تأثير افضل وذلك من خلال قياسات النمو أيضا.