(4) INCIDENCE OF APHID-BORNE ONION YELLOW DWARF VIRUS (OYDV) IN ALLIACEAE CROPS AND ASSOCIATED WEEDS IN EGYPT

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ABSTRACT

A field survey determined, first time in Egypt, the incidence of onion yellow dwarf virus (OYDV). Field inspection,as well as ELISA, TBIA and DBIA screening tests, indicated that, the highest natural incidence (70.6%) of the virus disease occurred in *Allium cepa* (Onion) fields, followed by *A.sativum* (Chinese garlic)(61.0%). The lowest rate (7.1%) of the disease incidence was found in Lily *Narcissus tazzeta*. The results of TBIA and DBIA tests also indicated the presence of OYDV in the different parts of the host plants. The alliaceae weed *C.acutum* proved to play an important role as a reservoir for OYDV. OYDV resembled the dominant syndrome observed in Giza region (88.3 and 68.8% for onion *var* .Giza 6 & Giza 20,respectively). In Minia region, the disease syndrome scored 78.3 % followed by Beni-Suef region (51.4%).

Key words: *alliaceae diseases, onion yellow dwarf virus, OYDV, virus disease incidence.*

1. INTRODUCTION

Onion is one of the most important field crops cultivated in many governorates in Egypt, for both local consumption and export. Onion and garlic plants are attacked by about 50 diseases, 34 of which are caused by fungi, 7 by bacteria and yeast's, 5 by nematodes, 3 by viruses and one by a mycoplasma-like organism (Schwartz and Mohan, 1995).

Onion yellow dwarf potyvirus (OYDV), described by Bos (1976), causes mosaic and yellow streak symptoms, striping, curling and distortion of flower stems, reduction in the number of flowers and seeds, and impairment of seed quality. Using ELISA, OYDV was found in onions and shallots (Mavric *et al*., 1999). Garlic was commonly infected by OYDV strain G at a high (86.5%) as well as low (18.5% to zero) incidence (Sutarya *et al*.,1994). Walkey *et al*. (1990) reported in garlic clones 14% of clone co-infection of leek yellow stripe potyvirus (LYSV) and OYDV. Sabry *et al*. (2008) reported OYDV as one of the major viruses infecting Garlic.

In Egypt, little knowledge is yet, available on onion, garlic and leek viruses and the role of the prevailing aphid vector species. Only one aphid-borne virus was isolated and characterized in alliaceae crops (Ibrahim *et al*., 1996). Therefore, the present work determines the incidence and indicates the epidemiology of the aphid-borne virus (OYDV) associated with Alliaceae crops and weeds in Egypt using ELISA, TBIA and DBIA tests.

2. MATERIAL AND METHODS

During two growing seasons 2002/2003 and 2003/2004, the Alliaceae crop species and cultivars were, onion, *Allium cepa* L. "Giza 20" and "Giza 6", Baladi garlic, *Allium sativum* L. and Chinese garlic, *Allium sativum* L. "Seds 40", Leek, *Allium (ampeloprasum) porrum* L., Egyptian leek, *Allium kurrat* L. and Lily *Narcissus tazetta* L. were sown end of September in Giza. The experimental area received all the usual agricultural practices except for any pest control measures. Weekly observation started as soon as Alliaceae plants emerged above ground, and continued for the whole 6-7 month- growing season. Newly infected plants were recorded in relation to plant age.

Incidence of diseased Alliaceae plant was determined as a percentage of infected plants, according to the visual signs of infection, that were confirmed later by ELISA, TBIA and DBIA tests. The confirmed source of the causal agent was maintained in the laboratory by repeated transmission to fresh healthy seedlings.

Occasional field observation of the different Alliaceae species was undertaken in other 5 governorates, Minia, Assuit, Beni-Suef, Fayoum, and Dakahilia, in order to determine levels of natural incidence of the viral diseases in Alliaceae fields of farmer.

Plants showing signs of leaf stripping, stunting, dwarfing, yellowing, mosaic and crinkled leaves were labelled and weekly observed. Leaf samples

and whole naturally infected plants were taken to the laboratory for both sap (mechanical) and aphid inoculation tests as well as ELISA test to identify the causative disease agent.

Incidence of viruliferous aphids: During the field observation, the different aphid species that collected from either Alliaceae plants or associated weeds were tested on the diagnostic indicator plants for the incidence of OYDV.

The field-collected aphids were allowed, singly or in groups, to feed on the indicator plants. Treated indicator plants were kept under routine Malathion (0. 01%) spraying in the greenhouse for any appearance of viral symptoms. The onion (*Allium cepa* L.) was the standard indicator plant used in insect transmission tests.

Sap inoculation: Sap inoculation test was carried out using fresh plant leaves ground in either distilled water only or with drops of phosphate buffer (pH 7.0)(0.03 M Na_2HPO_4 containing 0.2% Na-diethyldithio-carbamate (DIECA) (1:4), 400 mesh carborandum (75 mg/ml) + activated charcoal (75 mg/ml). Ground tissues were then pressed through two layers of cheesecloth and the obtained supernatant crude sap was used. With each test, a group of healthy indicators were kept, as a control treatment alongside with the group of treated indicators.

Aphid transmission: aphids were fasted for 2 h. and then allowed an acquisition access time (AAT) of 30 Sc-1min. on an infected plant and finally inoculation access time (IAT) of 24 hr.

Seed transmission: Seeds of onion plants were collected randomly from both infected and healthy plants in the experimental field. The seeds were washed and prepared according to (Bos,1983); ground in the extraction buffer and tested twice by DAS-ELISA. Samples with an absorbency of at least twice of that of the control were considered positive for virus presence.

Double antibody sandwich ELISA (DAS-ELISA): ELISA kits were supplied by BIOREBA AG (a product developed in cooperation with Deutsche Sammlung von Mikroorganismen und Zellkulturen GmbH (DSMZ) Braunschweig, Germany Schwarz).The technique of (DAS) ELISA (Clark and Adams,1977). was used for OYDV detection.

Tissue blotting immunobinding assay (TBIA)& Dot- blotting immunobinding assay (DBIA): These techniques were used according to Lin *et al*. (1990), to detect OYDV in field collected samples of crops and wild plant species.

3. RESULTS

The results in Table (1) indicate that, OYDV is transmitted manually (by sap) from naturally infected onion to different Alliaceae hosts. The lowest rate of transmission (3.3%) was from onion to Egyptian leek. On the other hand, Lily, *Chenopodium* and *Datura* did not show any symptoms, even after back inoculation to onion plants. These results indicate that the virus source plant might affect the rate of transmission by the same vector species and that may refer to feeding behavior and/or host preference by the insect. In this respect onion seemed the best source of OYDV transmission by the aphid vectors.

Aphid transmission: In all transmission tests *M. persicae* was the most efficient vector in the transmission of OYDV followed by *A. craccivora* (Table, 2).

Seed transmission: The results in Table (3) indicate a transmission rate (12. 9% and 16.7%), of OYDV through seeds of onionGiza 20 and Giza 6 , respectively.

Several serological techniques were employed to detect OYDV in Alliaceae host plant species, as well as in the aphid vector as follows: -

Detection of (OYDV) in the different Alliaceae hosts by:

Enzyme-linked immunosorbent assay (DAS-ELISA): The test indicated the presence of the Egyptian OYDV isolate (isolated from Giza region) in several leaves, bulbs and cloves samples of naturally infected Allium species (onion, garlic and Egyptian leek) as well as from wild plant species. Table (4) shows the reaction of 15 plant species that was determined by DAS - ELISA test. From the natural incidence of (OYDV) infection, only 4 plant species from Alliaceae showed a positive reaction; *Allium cepa, Allium sativum* (Seds 40), *Allium kurrat*, *Allium sativum*, and from Lilaceae ; *Narcissus tazetta.*

Signs of infection in relation to the presence or absence of (OYDV) detected by DAS-ELISA test : In Table (4), The highest incidence of OYDV (80 %) , was determined in *A. cepa* plants, followed by *Allium sativum* (Seds 40) (70.6 %). The lowest percentage of incidence was found in *Narcissus tazetta* (7.5%) although it did not show, any external symptoms. Whereas *A. porrum, Ch. murale, Ch. amaranticolor , C. album, A. viridis, V. faba, D. stramonium* and *S. olerecus* ,were not infected.

Table (1): Sap transmission ability of OYDV.

Virus source	Test plant species	No. Infected/No. Tested	Symptoms Apparent	% of infection
Garlic	*Ch. murale*	1/15	Chlorotic spots	6.7
Garlic	*D. innoxia*	0/15	-	0.0
Garlic	Garlic	6/10	Mosaic Striping-Yellowing-Stunting – Dwarfing	60.0
Egyptian Leek	Onion	4/18	Mosaic Striping-Yellowing-Stunting – Dwarfing	22.5
Onion	Garlic	33/63	Mosaic Striping-Yellowing-Stunting – Dwarfing	52.4
Onion	Onion	264/372*	Mosaic Striping-Yellowing-Stunting – Dwarfing	71.0
Onion	Lily	0/26	-	0.0
Onion	*Ch. murale*	0/18	-	0.0
Onion	Leek	1/30	Mosaic Striping-Yellowing-Stunting – Dwarfing	3.3

* Total no. of 12 exp.

Table (2) : Aphid transmission ability of OYDV.

Aphid species	No. Infected/No. Tested	Transmission %
M. persicae	23/31*	74.2
A. accivora	80/140	57.2

* Onion was used for both source and test plant of virus.

Table (3): **Percentage of OYDV- transmission in seeds of OYDV onion cultivars by DAS-ELISA.**

Cultivars source of seeds	No. of Infected / No.of Tested seeds	Transmission %
Giza 20 Healthy	0/60	0.0
Tested	70/540	12.9
Giza 6 Healthy	0/60	0.0
Tested	90/540	16.7

Table (4): Results of presence of (OYDV) in relation to the signs of infection using DAS- ELISA test.

Tested plant species	Sings of infection	No. of plants showing symptoms/No. Tested plants	% of Infection by visible observation	No.Infected Plants (ELISA)	Presence of OYDV % * DAS-ELISA	Mixed infection
Allium cepa	Yellow streak, Dwarfing & yellowing	95/150	63.0	120	80	-
Allium sativum (Seds 40)	Striping, Mosaic & yellowing	75/75	100	53	70.6	29.4
Allium porrum	----------	0/50	0.0	0	0.0	-
Amaranthus viridis	----------	0/20	0.0	0	0.0	-
Allium kurrat	Yellow streak & mosaic	6/80	7.5	15	18.75	-
Euphorbia peples	---------	0/25	0.0	0	0.0	-
Narcissus tazetta	----------	0/75	0.0	7	7.5	-
V. faba	----------	0/30	0.0	0	0.0	-
Datura stramonium	---------	0/38	0.0	0	0.0	-
Sonchus olerceus	---------	0/15	0.0	0	0.0	-
Allium sativum (Baladi)	Yellowing, Striping & Mosaic	98/116	84.5	65	66.3	18.2
Chenopodium murale	---------	0/25	0.0	0	0.0	-
Ch. amarnticolor	Local lesions	2/18	11.1	0	0.0	11.1
Chenopodium album	---------	0/20	0.0	0	0.0	-
Euphorbia geniculata	Yellow lesions	4/20	20.0	0	0.0	20.0

*Data are based on DAS-ELISA test ELISA values 405nm. ELISA value (*A*405) > 0.70 was classified as a positive reaction.

Table (5): Relative natural incidence of OYDV-syndromes on onion plants at six governorates during season 2001/2002.

Locality	Test plant	No. of infected/No. of examined plants	Incidence %
Giza	Onion (Giza 20)	86/125	68.8
	Onion (Giza 6)	51/60	88.3
	Garlic Local Baladi	9/20	45.0
	Garlic Baladi (Seds 40)	13/20	65.0
Minia	Onion (Giza 20)	47/60	78.3
Assuit	Onion (Giza 20)	32/50	64.0
Beni-Suef	Onion (Giza 20)	37/70	51.4
El-Fayoum	Onion (Giza 20)	22/50	44.0
El-Dakahilia	Onion (Giza 6)	4/11	36.4

Data obtained are based on results of (DAS-ELISA) of collected samples during 2001/2002.

The rate of infection by apparent symptoms in onion was lower (63.0%) than that detected by ELISA (80%). Whereas, in the case of garlic samples, the rates 100 & 84.5%, respectively were, higher than that detected by ELISA (70.6 and 66.3, %, respectively). This might be due to the mixed infection by another virus (GLV or LYSV).

Natural incidence of aphid-borne virus (OYDV) in the onion field at different localities: Using the DAS-ELISA test in Table (5), OYDV syndrome was dominant reaching a maximum level in Giza governorate, 88.3 and 68.8% for onion Giza 6. &Giza 20. Minia region came second in this order (78.3%) followed by Assuit (64.0%).

The presence of OYDV in onion bulbs at the end of the growing season, was very high reaching 77.7 % in onion (Giza 20) and 85.4 % in bulbs of onion (Giza 6) (Table 6). In garlic cloves (Table 7), the presence of OYDV was lower than in onion (45.4 and 59.2% in both varities).

Detection of OYDV in different host plants by tissue-blot immunosorbent assay (TBIA): OYDV was readily detected in infected leaves, stems, stalks, cloves and flowers of onion, garlic and leek tissues where infected samples developed the purple reaction of the tissue blots on the membrane after treatment with NTP/BCIP (Table, 8).

The highest percentage of OYDV (91.7%) was detected in onion bulbs followed by flowers (82.8%) . Whereas, the lowest percentage (36 %) was found in stalks (Table, 8). Similarly, in garlic OYDV detection was 52.9, 52 and 47.5 % in leaves, stems and cloves, respectively. The same trend was detected in infected Lilly.With leek, none of the tested samples gave reaction with OYDV (Table, 9).

Presence of the virus (OYDV) in the different crops and associated wild plants.

TBIA results in Table (10) show that from 19 different cultivated crops and wild plant species, onion, garlic, leek (kurrat) and *Euphorbia* gave a positive reaction to OYDV antiserum. The highest percentage of OYDV incidence (85.7%) was detected in onion bulbs and 81.3% in garlic cloves (Seds 40). In addition, *C. acutum* gave 50 &56 % positive reaction in two tested groups and *E. geniculata* gave 27.3 &45.8 % positive reaction (Table, 11).

Natural incidence of (OYDV) syndromes in the field:

Weekly observations indicated that OYDV a non-persistent-aphid transmitted virus, spread from mid. Dec., to late Apr. Table (13) Fig.(1) show that the highest rate of infection (86.9%) was in onion plants, followed by garlic (Seds 40) (70.5%) , and the lowest (29.5%) was in Egyptian leek plants. None of the viral syndromes were recorded on lily plants. Rate of infection in onion reached 90 and 80.6 % for season 2000/2001 &2001/2002 (Table 14 & Fig 2), respectively. Generally, the spread of OYDV was slow despite two flushes (indicated in yellow water traps) of different aphid species attacked Alliaceae field as well as on the different wild plants (Table, 15,16).

The spread of the virus by the vector within the crops and other Alliaceae continues until May. Wild hosts were the reservoirs, from which aphid vectors transmit the virus to new crops.

Incidence of viruliferous aphids from wild plant sources of virus in the field :

Table (14) shows that *M. persicae, R. maidis* , *A. nerii* and *D. sonchi,* collected from onion, garlic ,leek and associated wild plants in the field were able to transmit the viral agent causing OYDV-syndromes on onion indicator plants .In this respect, the field source of these viruliferous aphids were *A. cepa* (for *R. maidis & A. gossypii*) ,*C. arvensis* (for *M. persicae*), *S. oleraceus* (for *D. sonchi*) and *C. acutum* (for *A. nerii*).

M. persicae from collected *C. arvensis* source plants in the field was able to transmit OYDV. However, *C. arvensis* tested by ELISA, TBIA and DBIA (Table, 12) gave a negative reaction, which means that *C. arvensis* may not play a role as a source of OYDV and only harboured the viruliferous aphid. *R. maidis* collected from onion plants was viruliferous and *A.cepa* was also a majior source of the virus (shown by ELISA test). On the other hand, *R. maidis* collected from *A. kurrat* plant transmitted the OYDV to onion plants, despite the very low incidence determined by ELISA and TBIA tests. Also, *A. kurrat* is a perennial plant, that stays in the field all the year round, thus plays a role as a permanent source of infection. *C. acutum* plant proved to be a reservoir for OYDV as shown from TBIA test, as well as harboured *A. nerii, which* is a vector of the virus. Most of *C. acutum* collected at the end of the season contained OYDV when tested with TBIA test. Also, *A. sativum* plant was a source of OYDV in the field, from which collected aphid species were viruliferous, as shown from results of ELISA and TBIA tests. **TAB 8-12 & Fig**

Table (6): Percentage of OYDV presence in bulbs of two different onion and two different garlic cultivars using DAS-ELISA test.

Tested cultivars	No. of infected/ no. tested	% of infection
Onion (Giza 20)	35/45	77.7
Onion (Giza 6)	41/48	85.4
Garlic (Baladi)	64/141	45.4
Garlic (Seds 40)	84/142	59.2
Control positive (onion)	6/6	100
Control negative (onion)	0/6	0.0

Table (7): Percentage of OYDV presence in cloves using DAS-ELISA test.

Tested cultivars	No. of infected/ no. tested	% of infection
Onion (Giza 20)	19/25	76.0
	16/20	80.0
Total	35/45	77.7
Onion (Giza 6)	23/26	88.5
	18/22	82.0
Total	41/48	85.4
Control positive (onion)	6/6	100
Control negative (onion)	0/6	0.0

Table (8): Results of the presence of OYDV in different parts of field collected Alliaceae hosts using TBIA test.

Plant species	Tested part of plant	No. of Exp.	No. infected / No. tested	%
Onion	Leaves	4	29/59	49.2
	Stems	4	38/49	77.5
	Bulbs	3	33/36	91.7
	Stalks	3	9/25	36.0
	Flowers	4	29/35	82.8
Garlic (Baladi)	Leaves	3	18/34	52.9
	Stems	4	15/29	52.0
	Cloves	2	18/38	47.5
Garlic (Seds 40)	Leaves	2	23/32	71.9
	Stems	3	26/41	63.4
	Cloves	2	33/57	58.0
Egyptian leek	Leaves	3	4/27	14.8
	Stems	1	2/8	25
Leek	Leaves	2	0/20	0.0
	Stems	3	0/45	0.0
Lily (Narcissus)	Leaves	3	19/56	33.9
	Bulbs	2	10/46	21.7

Table (9) Detection of OYDV in different parts of mechanically inoculated Alliaceae hosts using TBIA test.

Plant species	Test part of plant	No infected / No. of tested	%
Onion	Leaves	15/20	75
	Stems	12/20	60
	Bulbs	20/20	100
Garlic (Seds 40)	Leaves	13/20	65
	Stems	10/20	50
	Cloves	18/20	90
Garlic (Baladi)	Leaves	11/20	55
	Stems	9/20	45
	Cloves	13/20	65

Table (10):Incidence of OYDV in the different Alliaceae crops and wild plant species collected from onion field in the late season of 2002/2003 using TBIA technique.

Column No.	Tested plant species	No. Positive/No. Tested	% of infection
1	Allium cepa (bulbs)	6/7	85.7
1	Allium cepa (leaves)	2/9	22.2
2	Amaranthus viridis	0/3	0.0
2	Allium cepa (red onion)	0/10	0.0
2	Euphorbia geneculata	1/3	10
3	Euphorbia peplus	2/13	15.4
3	Amaranthus viridis	0/3	0.0
4	Avena fatua	0/6	0.0
4	Polypogon monspeliensis	0/10	0.0
5	Cichorium endivia	0/16	0.0
6	Steria viridis	0/10	0.0
6	Ammi majus	0/6	0.0
7	Portulaca oleracea	0/7	0.0
7	Chenopodium murle	0/9	0.0
8	Convolvulus arvensis	0/16	0.0
9	Sonchus oleaceus	0/16	0.0
10	Allium kurrat	0/16	0.0
11	Allium porrum	0/16	0.0
12 &13	Narcissus tazetta	9/32	28.1
14 & 15	Allium sativum seds 40	26/32	81.3
16 & 17	Allium sativum	22/32	68.8

Table (11):Incidence of OYDV in different field collected Alliaceae crops and wild plant species using TBIA test.

No.	Tested plant species	No. Positive/ No. tested	% of infection
1	*Chenopodium murale*	0/22	0.0
2	*Cynanchum acutum*	12/24	50.0
3	*Cynanchum acutum*	14/25	56.0
4	*Euphorbia geniculata*	6/22	27.3
5	*Euphorbia geniculata*	11/24	45.8
6	*Convolvulus arvensis*	0/10	0.0
7	*Allium porrum*	0/13	0.0
8	*Allium porrum*	0/12	0.0
9	*Allium porrum*	0/12	0.0
10	*Allium kurrat*	1/13	7.7
11	*Allium cepa (*leaves*)*	2/12	19.7
12	*Allium cepa* (leaves)	1/12	8.3
13	*Allium cepa* (leaves)	1/6	16.7
14	*Allium cepa* (bulbs)	16/19	84.2

Table (12): Results of reactions of different Alliaceae crops and wild plant species by DBIA test

Rep.No.	Test plant species	No. Positive/no. tested	% of incidence
1	*C. arvenses*	0/6	0.0
2	*A. cepa*	6/6	100
3	*V. faba*	0/6	0.0
4	*A.sativum*	4/6	66.7
5	*C. arvenses*	0/6	0.0
6	*N. tazetta*	1/6	16.7
7	*A.kurrat*	1/6	0.0
8	*A.kurrat*	1/6	16.7
9	*A.porrum*	0/6	0.0
10	*A.sativum*	0/6	0.0
11	*A.sativum*	0/6	0.0
12	*Ch.album*	0/6	0.0
13	*Ch. murale*	0/6	0.0
14	*D. innoxa,*	0/6	0.0
15	*D. stramonium*	0/6	0.0
16	Negative control	0/6	0.0
17	Positive control	6/6	100

Table (13): Percentage of natural incidence of OYDV viral syndromes determined on onion, garlic, leek and *N. tazetta* plants in the field (Giza region, 2000/2001).

Sampling date	Natural incidence (%) of OYDV determined on indicated Alliaceae hosts				
	Onion	Garlic	Garlic (Seds40)	Egyptian Leek	N. tazetta
Mid., Nov., 2000	0.0	0.0	0.0	0.0	0.0
Mid., Dec.,	0.2	0.0	0.2	0.0	0.0
Mid., Jan., 2001	5.0	1.2	7.2	0.0	0.0
Mid., Feb.,	10.0	3.0	13.0	0.0	0.0
Mid., Mar.,	42.0	37.0	66.5	1.8	0.0
Mid., Apr.,	86.9	56.0	70.5	3.6	0.0
Mid., May.,	-	-	-	0.0	-
Mid., Jun.,	-	-	-	0.0	-
Mid., Jul.,	-	-	-	17.2	-
Mid., Aug.,	-	-	-	28.3	-
Mid., Sept.,	-	-	-	29.5	-

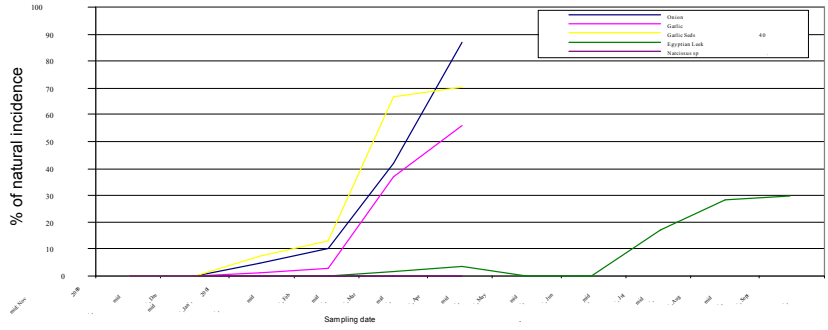

Fig. (1): Natural incidence of OYDV viral syndromes determined on onion, garlic, leek and *N .tazetta* in the field (Giza , 2000/2001).

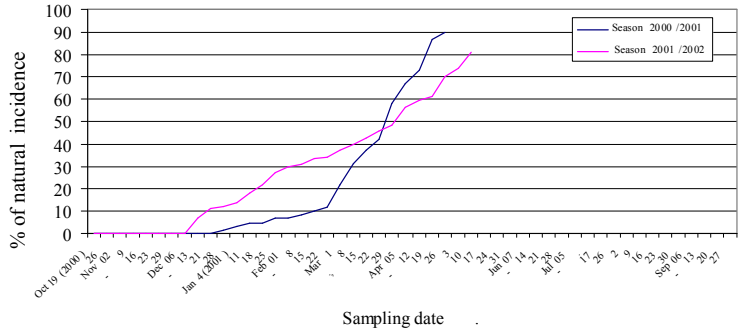

Fig. (2): Natural incidence of OYDV on Alliaceae crops in the two growing seasons (Giza, 2000/2002).

Table (14): Incidence of viruliferous aphid carrying (OYDV) among collected individuals from onion, garlic, leek and associated wild plants in the field (Giza, 2000/ 2001).

Sampling date	Collected aphid species	Host plant of aphid	Total No. of collected aphid	Test indicator	Transmission		Test
					Rate	%	
4/12/2000	*A. craccivora*	*Portulaca oleracea*	25	A. cepa	0/5*	0	ELISA
				A. kurrat	0/5	0	ELISA
				A. porrum	0/5	0	ELISA
				D. stramonion	0/5	0	ELISA
				C. album	0/5	0	ELISA
		Portulecaria afra	20	*A. cepa*	0/5	0	ELISA
				A. kurrat	0/5	0	ELISA
				Amaranthus cruentus	0/5	0	ELISA
				C. murle	0/5	0	ELISA
	R. maidis	*Sorghum virgatum*	20	*A. cepa*	0/5	0	ELISA
				A. kurrat	0/5	0	ELISA
				Amaranthus cruentus	0/5	0	ELISA
				C. album	0/5	0	ELISA
		A. kurrat	5	*A. cepa*	0/5	0	ELISA
11/10/2000	*R. maidis*	*Sorghum virgatum*	20	*Amaraarthus cruentus*	0/5	0	ELISA
				Datura stramonium	0/5	0	ELISA
				A. cepa	0/5	0	ELISA
				C. album	0/5	0	ELISA
19/10/2000	*R. maidis*	*Sorghum virgatum*	5	*A. cepa*	0/5	0	ELISA
26/10/2000	*M. persicae*	*Convolvalus arvensis*	10	*A. cepa*	2/10	20%	ELISA
	R. maidis	*A. sativum*	3	*Amaranthus cruentus*	0/5	0	ELISA
		Cyperus longus	10	*A. cepa*	0/10	0	ELISA
		Avena fatua	10	*A. cepa*	0/10	0	ELISA
2/11/2000	*A. nerii*	*Cynanchum acutum*	15	*A. cepa*	1/15	6.7 %	ELISA
	R. maidis	Cyerus longus	5	A. cepa	0/5	0	ELISA
16/11/2000	*A. nerii*	*A. sativum*	5	*A. cepa*	0/5	0	ELISA
23/11/2000	*B. brassicae*	*G. gynandra*	7	*A. cepa*	0/7	0	ELISA
23/11/2000	*B. brassicae*	*G. gynandra*	5	*A. cepa*	0/5	0	ELISA
		G. gynandra	10	*A. cepa*	0/10	0	ELISA
6/12/2000	*A. craccivora*	*Portulacaria afra*	20	*A. cepa*	0/10	0	ELISA
		Portulaca oleracea	20	*A. kurrat*	0/10	0	ELISA
		C.album	5	*C. album*	0/10	0	ELISA
	R. maidis	*A. sativum*	10	*A. cepa*	0/10	0	ELI

							SA
	A. gossypii	*Malva parviflora*	5	*A. cepa*	0/5	0	ELISA
	R. maidis	*Portulaca oleracea*	10	*A. cepa*	0/10	0	ELISA
	M. persicae	*Sorghum virgatum*	20	*A. cepa*	0/10	0	ELISA
		Datura stramonium	10	A. cepa	0/10	0	ELISA
		Gynandropsis gynadra	10	A. cepa	0/5	0	ELISA
		Convolvulus arvensis	5	*A. cepa*	0/5	0	ELISA
	A. craccivora	*Ammi majus*	5	*A. cepa*	0/5	0	ELISA
		Portulacaria afra	5	*A. cepa*	0/5	0	ELISA
	M. persicae	*Datura stramonium*	5	*A. cepa*	0/5	0	ELISA
		Convolvulus arvensis	5	*A. cepa*	0/5	0	ELISA
	R. maidis	*Sorghum virgatum*	5	A. cepa	0/5	0	ELISA
21/12/2000	*A. craccivora*	*Portulararia afra*	5	*A. cepa*	0/5	0	ELISA
	M. persicae	*A. sativum*	5	*A. cepa*	1/5	20%	ELISA
28/12/2000	*R. maidis*	*Sorghum virgatum*	5	*A. cepa*	0/5	0	ELISA
	M. persicae	*Covulvulus arvensis*	5	*A. cepa*	0/5	0	TBIA
	R. maidis	*Sorghum virgatum*	5	*A. cepa*	0/5	0	TBIA
4/1/2000	*M. persicae*	*Convolvulus arvensis*	5	A. cepa	0/5	0	TBIA
	D. sonchi	*Sorchus oleraceus*	10	*A. cepa*	0/5	0	TBIA
	R. maidis	*Sorghum virgatum*	5	*A. cepa*	0/5	0	TBIA
11/1/2000	*M. persicae*	*Couolvulus arvensis*	5	A. cepa	0/5	0	TBIA
	D. sonchi	*Sonchus oleraceus*	5	*A. cepa*	0/5	0	TBIA
	R. maidis	*S. virgatum*	5	*A. cepa*	0/5	0	TBIA
18/1/2000	*R. maidis*	*S. virigatum*	10	*A. cepa*	0/10	0	TBIA
	D. sonchi	*Sonchus oleraceus*	5	*A. cepa*	0/10	0	TBIA
25/1/2000	*M. persicae*	*Convolvulus arvensis*	20	A. cepa	1/20	5%	TBIA
1/2/2000	*R. maidis*	*A. cepa*	15	*A. cepa*	1/15	6.7 %	TBIA
	D. sonchi	*S. oleraceus*	10	*A. cepa*	0/10	0	TBIA
8/2/2000	*M. persicae*	*C. arvensis*	15	*A. cepa*	0/5	0	TBIA
				A. kurrat	0/5	0	TBIA
				C. album	0/5	0	TBIA
	D. sonchi	*S. oleraceus*	5	*A. cepa*	0/5	0	TBIA
15/2/2000	*M. persicae*	*C. arvensis*	10	*A. cepa*	0/10	0	TBIA
		S. irio	10	*A. cepa*	0/10	0	TBIA
		D. stramonium	10	*A. cepa*	0/10	0	TBIA
	R. maidis	*S. virgatum*	17	*A. cepa*	0/17	0	TBIA
22/2/2001	*M.*	*C. arvensis*	20	*A. cepa*	0/20	0	TBI

	persicae						A
		A. majus	10	*A. cepa*	0/10	0	TBI A
1/3/2001	*M. persicae*	*C. arvensis*	20	*A. cepa*	0/20	0	TBI A
	R. maidis	*A. fatua*	10	*A. cepa*	0/10	0	TBI A
		S. virgatum	10	A. cepa	0/10	0	TBI A
8/3/2001	*M. persicae*	*C. arvensis*	5	*A. cepa*	0/5	0	TBI A
	A. nerii	*C. acutum*	25	*A. cepa*	2/25	8%	TBI A
	R. maisdis	*S. virgatum*	5	*A. cepa*	0/5	0	TBI A
15/3	*A. craccivor a*	*C. murle*	5	*A. cepa*	0/5	0	TBI A
	D. sonchi	*S. oleraceus*	15	A. cepa	0/15	0	TBI A
22/3	*M. persicae*	*C. arvensis*	7	*A. cepa*	0/7	0	TBI A
	D. sonchi	*S. oleracea*	30	*A. cepa*	1/30	3.3 %	TBI A
29/3	*D. sonchi*	*S. oleracea*	15	*A. cepa*	0/15	0	TBI A
	R. maidis	*S. virgatum*	5	*A. cepa*	0/5	0	TBI A
5/4	*R. maidis*	*S. vrigatum*	5	*A. cepa*	0/5	0	TBI A
12/4	*A. nerii*	*C. acutum*	15	*A. cepa*	0/15	6.7 %	TBI A
6/9	*B. brassicae*		25	*A. cepa*	0/25	0	TBI A
	R. maidis	*A. kurrat*	3	*A. cepa*	0/3	0	TBI A
13/9/2001	*B. brasscae*		15	*A. cepa*	0/15	0	TBI A
	R. maidis	*A. kurrat*	5	*A. cepa*	0/5	0	TBI A
20/9/2001	*A. craccivor a*	*Portulacaria afra*	20	*A. cepa*	0/20	0	TBI A
	B. brassicae		5	*A. cepa*	0/5	0	TBI A
	R. maidis	*A. kurrat*	13	*A. cepa*	0/13	7.7	TBI A
	A. gossypii	*A. cepa*	25	*A. cepa*	0/25	0	ELI SA
27/9/2001	*A. craccivor a*	*Portulaca afra*	10	*A. cepa*	0/10	0	ELI SA
		Portulaca oleracea	10	*A. cepa*	0/10	0	ELI SA
	R. maidis	*Sorghum virgatum*	45	*A. cepa*	0/45	0	TBI A

*No. of infected plants/ no. tested.

4. DISCUSSION

The presence of the aphid -borne OYDV in Egypt, was partially characterized by symptoms, diagnostic hosts, transmission tests, purification, EM, ISEM, DAS-ELISA, TBIA and DBIA . From naturally infected onion and garlic plants The symptoms were similar to those previously described by Ibrahim *et al.* (1996).

Also, Van Dijk, (1994), Zitikaite (1996), Mavric *et al*. (1999) and Anon (1998) pointed out that, OYDV was isolated and identified from onion leaves showing mosaic and yellow streak symptoms.

It was also detected in some ornamental *Allium* spp. and some other *Allium* spp. (Havránek, 1974). In the present study, the Chinese sacred lily (*N .tazetta)* was recorded for the first time in Egypt as a symptomless host (as a carrier) for OYDV. Allam and Ghalwach (1970) stated that no symptoms were observed on *A. kurrat* and *A.sativum.*

Also, hardly any symptoms were produced in *Allium porrum* and the virus was rarely recovered (Bos,1983). Whereas, sometimes infective garlic sap gave a positive reaction on *Ch. amaranticolor, Ch.album* and *Ch. murale.* .The difference between investigators might be due to virus strain, host cultivar, micro- environmental conditions or the presence of a latent virus.

In the present study, *Ch. murale* or *Ch. album* does not give any reaction by mechanical inoculation or by ELISA and TBIA tests with onion samples.

OYDV was indicated and detected in all parts of the host plant; leaves, stems, stalks, flowers, bulbs and seeds using ELISA and TBIA. Also, the virus was detected in lily leaves and bulbs although lily did not show any infection syndromes.

In addition to Alliaceae crops, only *C. acutum, E. genicula* and *N. tazetta* reacted positively with TBIA tests. The present study suggests that, all these hosts play a role as a reservoir for the virus. Similar results were recorded by Mavric *et al.*(1999). Also, *A. porrum* (leek) did not give any reaction with OYDV antiserum by ELISA, TBIA and DBIA. Also, Bos (1981) reported that, OYDV infects poorly or with difficulty, *A. porrum* (leek). The present study suggests that, *A porrum* may not be infected by viruses transmitted by aphids because of its thickened and overlapping leaf bases.

The natural incidence of OYDV disease in the field was determined during the two growing seasons 2000/2002 at Giza region showing that, signs of infection with OYDV were the main syndromes observed in both onion and garlic crops at Giza region. Incidence of OYDV syndromes was low at the beginning of the growing season and the virus spread was very low. This suggests that the virus titre had not built up or high aphid numbers had not yet invaded Alliaceae field crops. The level of OYDV incidence was increased by the end of the growing season. Also, the highest percentage of infection with OYDV was recorded in Giza, Minia and Asuit governorate.

The maximum rate of OYDV incidence occurred in March and April (spring months). Graichen and Leistner (1987); reported that, infections with OYDV were showing mosaic symptoms in the spring. Also, Fukmai and Ishii (1991) observed that OYDV- symptoms were masked in winter. Also, in the present investigation, OYDV is transmitted by *M. persicae* and *A. craccivora,*.

The rates of virus transmission through seed, determined in the present study by DAS-ELISA are 12.8 and 16.7 % for onion (Giza 20) and onion (Giza 6), respectively. Also, Ibrahim *et al.*(1996) reported that, seed transmission of OYDV ranged between 4.2-18.9% according to onion cultivar. Also, Burnt (1996) found that, onion seeds produced shoots infected with OYDV (0.2 to 11.4%). Contrary, to that, Burnt *et al*. (1990), reported no seed transmission of OYDV.

The present investigation reveals that, at least 3 wild plant species, *C. acutum, E. peplus* and *E.geniculat* play a role as reservoirs of OYDV.

In the present study, garlic plants showing symptoms of mosaic disease react positively with OYDV antiserum by DAS- ELISA, TBIA and DBIA. Thus, the syndromes called GM disease are referred to the infection with OYDV and/or another strain of OYDV infecting garlic plants. This result is parallel to all previous studies recorded by Salomon (2002).

The mosaic syndromes of garlic induced by OYDV infection, is first reported in Egypt in the present study.

In conclusion, aphid may not constitute a direct pest on Alliaceae plants since it occurs in low densities as shown in the present study. However, few aphid individuals on Alliaeceae crops are enough to transmit high rate of virus infection within the crop. Furthermore, several vector species are also abundant on wild plant species, which are the major sources of Alliaceae viruses transmitted to the crops.

The present study indicates that, vectors were more abundant on wild plants than on Alliaceae crops. Thus control measures should give a special attention to elimination of wild plants and aphid species associated with them.

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تواجد فيرس التقزم الأصفر فى البصل (OYDV) – المنقول بحشرات المنّ – على محاصيل العائلة الثومية والحشائش المرتبطة بها فى مصر

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ملخص

أجريت متابعة حقلية ، لأول مرة فى مصر ، لتواجد فيرس التقزم الأصفر فى البصل (OYDV) فى نباتات محاصيل العائلة الثومية و النباتات البرية المرتبطة بها. و قد دلت الفحوصات الحقلية علاوة على إختبارات الغربلة (Screening tests) باستخدام تكنيكات ELISA،TBIA ،DBIA على أن أعلى تواجد طبيعى (٧٠,٦%) للمرض الفيرسى سجلت فى حقول البصل متبوعة بـــ (٦١,٠%) فى الثوم صنف سدس ٤٠ الصينى. و قد وجد أن أقل معدل (٧,١%) ، لتواجد المرض سجل على النرجس . أيضا دلت نتائج إختبارات الـــ TBIA و الـــ DBIA على أن فيرس الـــ OYDV ، قد تواجد فى الأجزاء المختلفة للنبات العائل، هذا و قد ثبت أن النبات البرى *C.acutum* التابع للعائلة الثومية يلعب دورا هاما كمخزن (Reservoir) لفيرسOYDV. وشابهت الإصابة بفيرسOYDV– ظهور الأعراض الظاهرية السائدة و التى تم ملاحظتها فى محافظة الجيزة (٨٨,٣ ، ٦٨,٨% فى البصل صنف جيزة ٦، جيزة ٢٠، على التوالى)، وقد كانت علامات الإصابة بمرض التقزم الأصفر فى البصل هى السائدة فى محافظة الجيزة.. وفى محافظة المنيا سجلت الأعراض الظاهرية للمرض ٧٨,٣% ، تبعتها محافظة بني سويف (٥١,٤%).