**Kuwait Plant Virus Diagnosis** 



### London, UK September 2017

Presented By: Keynote Speaker: <u>Ebtisam Al-Ali</u>





## Introduction

•Kuwait farms have suffered from heavy losses and dramatic reduction in Tomato crops due to TYLCV infection.

•Rapid spread of viral diseases due to long distance transportation and increase volume of free trade in plants has lead to sever losses.







• Most viruses are excluded from true seed during plant development. However, they are easily transported in planting material of vegetative crops, such as onion or in vegetable transplants. A recent example of this is the large losses in solanaceous vegetables caused by the recent spread of tomato yellow leaf curl virus (TYLCV) into the Middle East.







• The first step for successful management depend on proper identification of pests .However ,the confirmation is usually based on the virus identification using molecular detection methods.





# Objective

- Equipping the existing laboratory to accomplish the work.
- Transferring technology for the diagnosis of major viruses infecting vegetable crops in Kuwait, using serological methods ELISA technique.
- Ten vegetable crops were selected from 4 families:
- 1. Cucurbitaceae (cucumber, squash, melon, and zucchini).
- 2. Solanaceae (tomato, potato, pepper and eggplant).
- 3. Liliaceae (onion).
- 4. Leguminosae (bean).







# Methodology

#### Sampling:

- Fresh plant leaf samples were collected from green houses and open fields (symptomatic and non symptomatic). Four samples from each farm were collected on monthly bases throughout the growing season (first month of planting, before flowering, flowering time, fruiting time). Six farms in two main production areas, south and north agricultural districts, were surveyed four times per year.
- Kuwait Map showing two agricultural areas.
- Al-Wafra ★
- Al-Abdally ★













#### Enzyme-linked immunosorbant assay (ELISA)

 Double sandwich ELISA kits (DAS-ELISA) were purchased from BioReba and Agdia and assays were performed following the manufacturers' directions. Results were recorded after visual observation or spectrophotometrically by measuring absorbance at A<sub>405</sub> nm.







- The survey focused on: thirteen viruses for Solanaceae CMV, PVY, PVX, PVA, PVS, PVM, PLRV, PVV, PMTV, PMMoV, ToMV, TSWV, TYLCV.
- CMV = Cucumber mosaic virus
- PVY = Potato virus Y
- PVX = Potato virus X
- PVA = Potato virus A
- PVS = Potato virus S
- PVM = Potato virus M
- PLRV = Potato leafroll virus
- PVV = Potato virus V
- PMTV = Potato mop-top virus
- PMMoV = Pepper mild mottle virus
- ToMV = Tomato mosaic virus
- TSWV = Tomato spotted wilt virus
- TYLCV = Tomato yellow leaf curl virus





- Six Viruses for Cucurbitaceae: CMV, MNSV, PRSV, SqMV, ZYMV, and WMV).
  - CMV = Cucumber mosaic virus
  - MNSV = Melon necrotic spot virus
  - PRSV = Papaya ring spot virus
  - SqMV = Squash mosic virus
  - ZyMV = Zucchini yellow mosaic virus
  - WMV = Watermelon mosaic virus
- Three viruses for Liliaceae: OYDV, IYSV, and GarCLV OYDV = Onion yellow dwarf virus IYSV = Iris yellow spot virus GarCLV = Garlic common latent virus
- Two viruses for Leguminosae: TSWV and AMV viruses.
  TSWV = Tomato spotted wilt virus
  AMV = Alfalfa mosaic virus



### **Results**

#### Symptematoloy:

• Symptoms on Solanaceous crops included mosaicking, mottling, malformation, yellowing, stunting, interveinal chlorosis, bronzing and silvering of the leaves, as well as fruit malformation and necrotic ringspot.







• The symptoms on cucurbits included mosaicking, mottling, malformation, lesions, stunting, yellowing, and curling of leaves, as well as bumps or deformation of fruits.







 Symptoms in Liliaceae (onion) plants consisted mainly of lesions, sometimes oval in shape on leaves. Most onion fields contained many weeds, which can acted as a source of viruses. The incidence of severe symptoms was close to 100% in most fields. Symptoms in Leguminosae (bean) plants included yellowing.







- Table 1. Survey of Viruses Affecting Cucurbit in Kuwait: Relative Frequencies of Samples Infection with CMV, MNSV, PRSV, SqMV, WMV, and/or ZYMV, as Determined by DAS-ELISA
- A total number of 90 samples were tested.

— Сгор	Viral Disease No. of Infections per Sample								ple	
	WMV	ZYMV	CMV	MNSV	PRSV	SqMV	Single	Double	Triple	> 3
Cucumber	88	20	8	90	8	5	1	63	16	10
Melon	90	90	0	90	7	3	0	0	81	9
Squash	86	88	11	89	3	0	0	6	71	13
Zucchini	84	90	6	90	41	0	0	4	45	41



- Table 2. Survey of Viruses Affecting Tomatoes in Kuwait: Relative Frequencies of Infection with CMV, PVY, TYLCV, PepMV and/or ToMV, as determined by DAS-ELISA.
- A total of 90 samples were tested.

Crop			Viral Disease			No. of Infection per Sample				
_	CMV	PVY	TYLCV	PepMV	ToMV	Single	Double	Triple	4	
	6	3	12	75	17	56	24	2	0	
Tomato										



- Table 3. Survey of Viruses Affecting Other Solanaceae (i.e., Potato, Pepper and Eggplant) in Kuwait: Relative Frequencies Infection with TSWV, ToMV, PMTV, PVX, PVA, PVS, PVV, PLRV, PVY, PMMoV and PVM, as Determined by DAS-ELISA
- A total number of 90 samples were tested per crop.

		Viral Disease									
Crop	TSWV	ToMV	PMIV	PVX	PVA	PVS	PVV	PLRV	PVY	PMMoV	PVM
Potato	0	0	1	3	0	0	0	0	12	0	15
Pepper	0	1	0	0	0	0	0	0	2	1	0
Eggplant									0	0	0



- Table 4. Survey of Viruses Affecting Liliaceae (i.e., Onion) in Kuwait: Relative Frequencies of Infection with IYSV, GarCLV and OYDV, as Determined by DAS-ELISA.
- A total 90 samples were tested per crop.

_			Vira	Disease	No	). of Infections j	per Plant
Сгор	IYSV	CarCLV	OYDV	Single	Double	Triple	> 3
Onion	90	2	0	88	2	0	

 Concerning bean (Leguminosae), most of the requested ELISA kits were not made available, therefore tests were conducted for only two viruses. AMV was detected in one sample.



# Conclusion

This preliminary survey constitutes the first report in Kuwait of 1 5 of the 18 viruses detected, in Solanaceae, nine viruses were detected out of 14 tested, *Pepino mosaic virus* (PepMV) and *Tomato yellow leaf curl virus* (TYLCV) were the most predominant viruses. in Curbitaceae, all six viruses tested were detected mainly in double or triple infections. In onion, *Iris Yellow stunt Virus* (IYSV) was widespread; in bean, *Alfalfa mosaic virus* (AMV) was detected. A pamphlit entitled "Intergrated Managment of Firal Diseases Affecting Vegetable Crops in Kuwait" was issued and circulated to farmers.





### **Thank You**

