Status and Experiences Related to The Implementation of GMO Legislation in Lebanon

1st International Workshop on Harmonisation
of GMO Detection and Analysis in MENA Region

Dead Sea, Jordan, June 4 - 5, 2012

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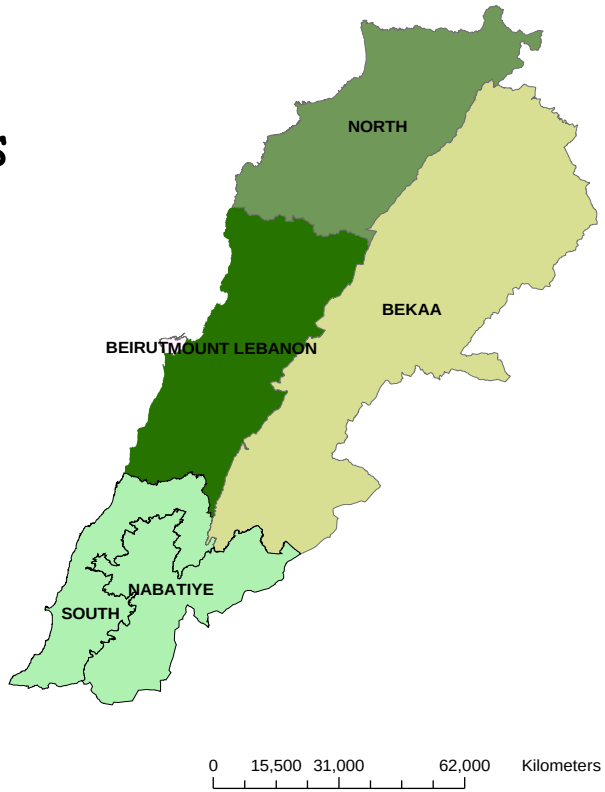
Lebanon - Overview

- Small country of 10 452 km^2 enjoying a very rich biodiversity due to its large mountainous landscape and extreme variability in climatic conditions.
- Five geo-morphological regions and 22 bio-climatic zones
- Large number of plant and animal species (4633 flora & 4886 fauna)



FAO-TCP regional project "Strengthening capacities towards the establishment of a regional platform for the detection of GMOs" (2008-2010)

Lebanon – Jordan – Sudan – Syria - Yemen

At the National Level, TCP has assisted in

- **Assessing the Status of Agricultural Biotechnology in Lebanon:** www.fao.org/docrep/012/al310e/al310e00.htm
  Ongoing activities on Plant, Animal & Microbiological Biotechnology
  GMOs Research and Development
  Legislations related to GMOs
  Readiness of academic & research institutions for GMOs detection.
- **Selecting "Molecular Biology" lab at AUST as a Reference Laboratory.**
- **Providing scientifically agreed approach to GMO detection:**
  training at EURL-GMFF- ISPRA in December 2010
- **Increasing Capacities of the technical staff in terms of GMO detection:**
  practical training at ICARDA in June 2010
- **Raising Awareness of the Scientific Community on Biotech & Biosafety.**
- **Establishing of a National Committee on Biotech & Biosafety at MoA.**

Existing National Legislations
Related to Biosafety vis-à-vis GMOs

Agriculture

- Sanitary and Phytosanitary Measures Law . Article 14 in this law bans the import of GM seeds and seedlings.

Health & Food Safety

- Presently there is no laws or decrees against the consumption of food or feed containing GMOs or the use of Medicines containing GMOs.

Environment & Biodiversity

- Framework Convention on Climate Change
- Convention on Biological Diversity
- Protection of the Environment
- **These laws are relevant to the regulations of GMOs-handling activities that present risks to environment and biodiversity**

Capacities for GMOs detection

- Biosafety concerns have not surfaced as a priority national issue and there is to date no official legislation or policy outlining the mandatory of GMOs detection in Lebanon.
- Lebanon has ratified the CPB in 2008 and developed its NBF in 2005.
- A draft decree to implement the provisions of the CPB in Lebanon was developed by the MoE in 2005 but it is not endorsed yet.
- As many developing countries, Lebanon is not yet a producer of GMOs, even if work with GMOs is being conducted in research institutions.
- Country has a free economy relying on the import of majority of seeds and foodstuffs. It is a potential market for GMOs introduction.
- Many Lebanese institutions took the initiative to start working on GMOs detection in line with CPB requirements.

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The Lebanese ISO 17025 Accredited Laboratory for GMO Testing

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American University of Science and Technology

Academic Activities

Faculty of Health Sciences
Beirut, Lebanon

- Training
- Consulting
- Testing

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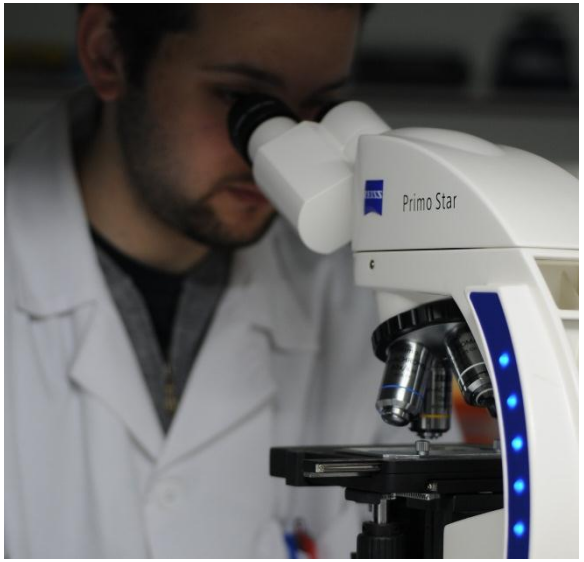
AUST Testing Laboratories

Molecular Biology Laboratory

Human Identification

Molecular Diagnostics



GMO Testing

partially funded by the Lebanese Ministry of Trade and Economy

QUALEB
QUALITY PROGRAMME

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GMO Laboratory Organization

1. Samples Preparation Room

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GMO Laboratory Organization

2. DNA Extraction Room

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GMO Laboratory Organization

3. PCR Room I

(A) PCR Setup I

(B) PCR Setup II

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GMO Laboratory Organization

4. PCR Room II

(A) Conventional PCR

(B) Real-Time PCR

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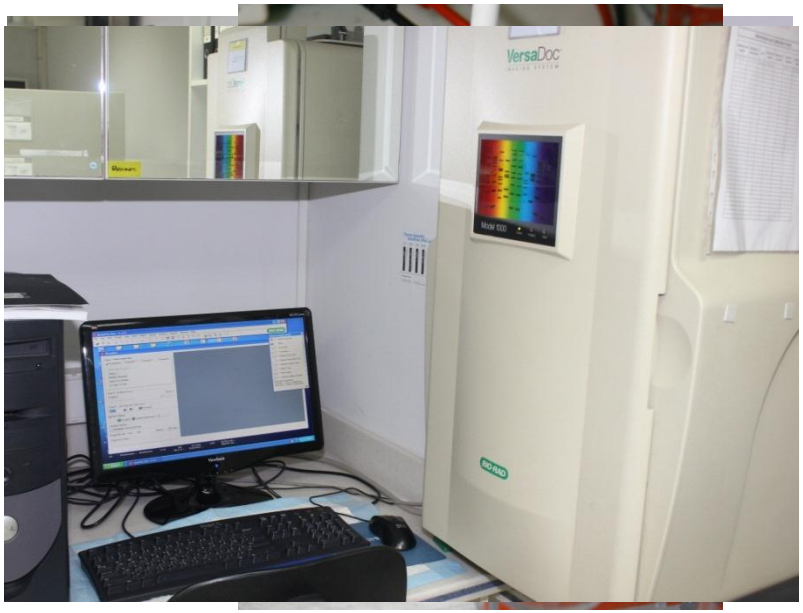
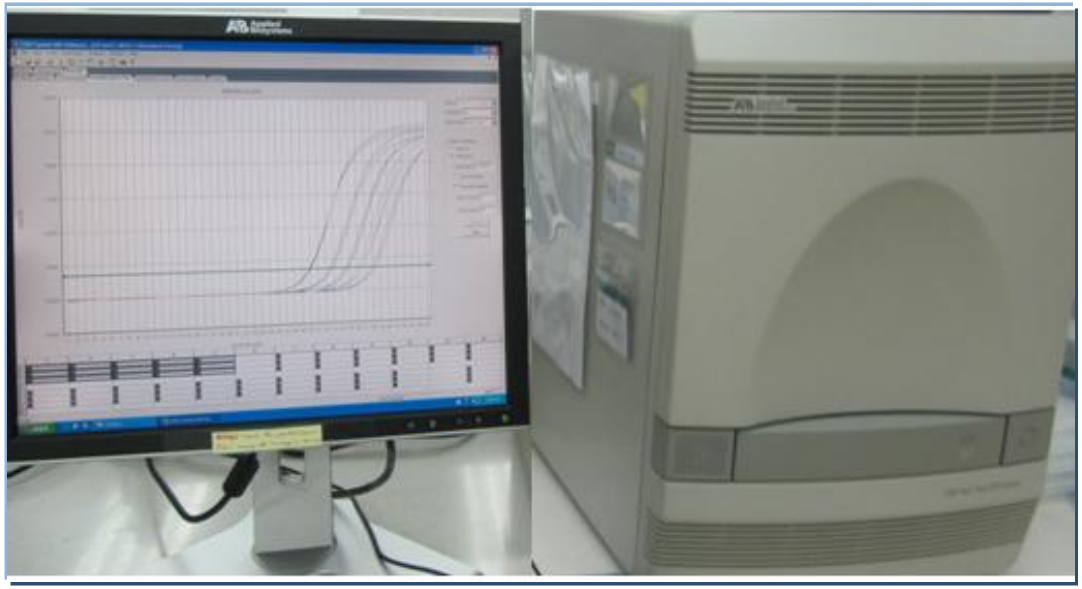
GMO Laboratory Organization

5. Post PCR Room

(A) Conventional PCR



(B) Real-Time PCR



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GMO Testing at AUST Laboratories

DNA based methods

Screening

Conventional and Real-Time PCR

- **ISO validated methods**
- **Optimized published protocols**
- **Kits**

TaqMan GMO maize 35S detection
TaqMan GMO soybean 35S detection

Identification

Real-Time PCR

EU-RL GMFF validated methods

Quantification

Real-Time PCR

- **EU-RL GMFF validated methods**
- **Kits**

TaqMan GMO maize quantification kit
TaqMan GMO soybean quantification kit
GMOQuant Roundup Ready™ Soy Kit

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QUALEB and Accreditation

ISO 17025 Requirements

- Technical Competency

- Quality Management

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Technical Competency

Sampling

EN/TS 21568

DNA Based Methods

DNA Extraction — ISO 21571:2005

Screening — ISO 21570:2005

Identification — ISO 21569:2005

Quantitation — ISO 21569:2005

General Requirements

ISO 24276:2005

ISO 17025 Accredited Laboratory

Technical Competency

GMO Analysis According to ISO Standards

Extraction

2 DNA Extractions/sample

Sample Reception → Sample Preparation → DNA Extraction → PCR Setup → PCR → Post-PCR

E.B.: Extraction Blank
P.E. Positive Extraction Control
Env.: Environmental Control
PDT: Positive DNA Target Control
NDT: Negative DNA Target Control
NTC: No template Control

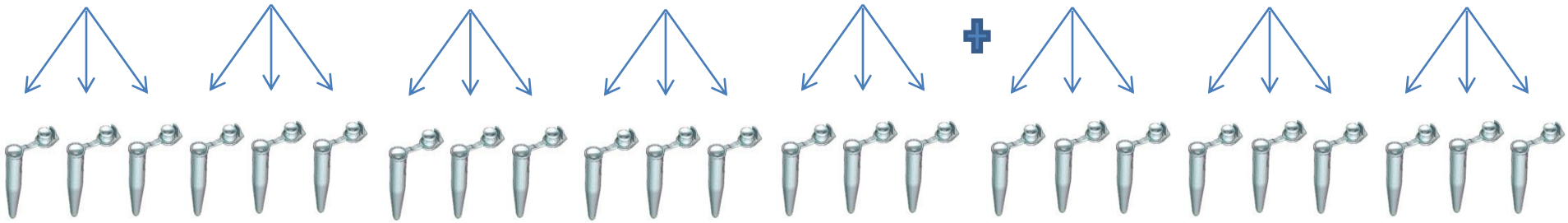
Extraction Controls

E.B. P.E. Env.

PCR

PCR Controls

PDT NDT NTC



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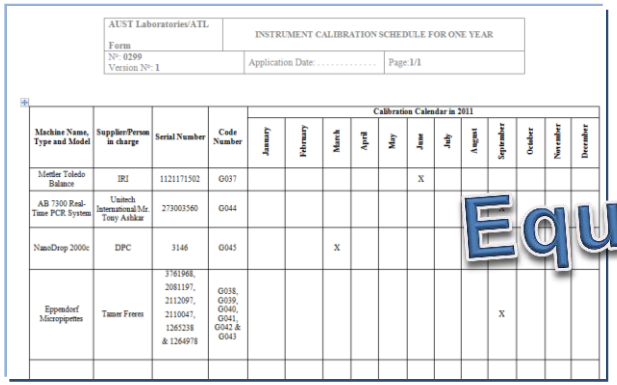
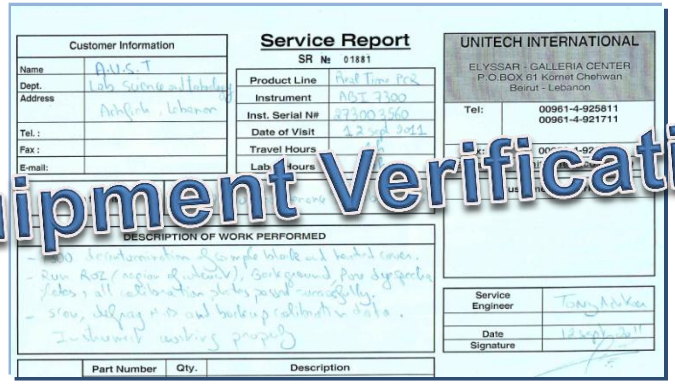
Technical Competency



AUST Laboratories/ATL — Form — INSTRUMENT CALIBRATION SCHEDULE FOR ONE YEAR
N°: 0299 — Version N°: 1 — Application Date: ..... — Page:1/1

Machine Name, Type and Model	Supplier/Person in charge	Serial Number	Code Number	Calibration Calendar in 2011											
				January	February	March	April	May	June	July	August	September	October	November	December
Mettler Toledo Balance	IRI	1121171502	G037						X						
AB 7300 Real-Time PCR System	Unitech International/Mr. Tony Ashkar	273003560	G044												
NanoDrop 2000c	DPC	3146	G045			X									
Eppendorf Micropipettes	Tamer Freres	3761968, 2081197, 2112097, 2110047, 1265238 & 1264978	G038, G039, G040, G041, G042 & G043									X			



Service Report — SR № 01881

Customer Information: Name: AUST; Dept.: Lab Science and Technology; Address: Ashrfieh, Lebanon; Tel.:; Fax:; E-mail:

Product Line	Real Time PCR
Instrument	ABI 7300
Inst. Serial N#	273003560
Date of Visit	12 Sept 2011
Travel Hours	
Labor Hours	

UNITECH INTERNATIONAL — ELYSSAR - GALLERIA CENTER, P.O.BOX 61 Kornet Chehwan, Beirut - Lebanon — Tel: 00961-4-925811, 00961-4-921711

DESCRIPTION OF WORK PERFORMED: - [illegible] transformation of sample block and heated cover. - Run ROZ (region of interest), background, pure dye spectra, slides, all calibration stuff, period, uniformity. - screw, display, up and back up calibration data. - Instrument working properly.

Service Engineer	Tony Ashkar
Date	12 Sept 2011
Signature	

Part Number	Qty.	Description

Service-Report No.: 01067

CUSTOMER: AUST — Contr. No: — Proj. No: — Eng.I Name: Charbel — Key I — Eng.II Name: — Key II

Message received by: — date: 5/7/2011 — time:

Reported by: — Reported defect: Preventive maintenance

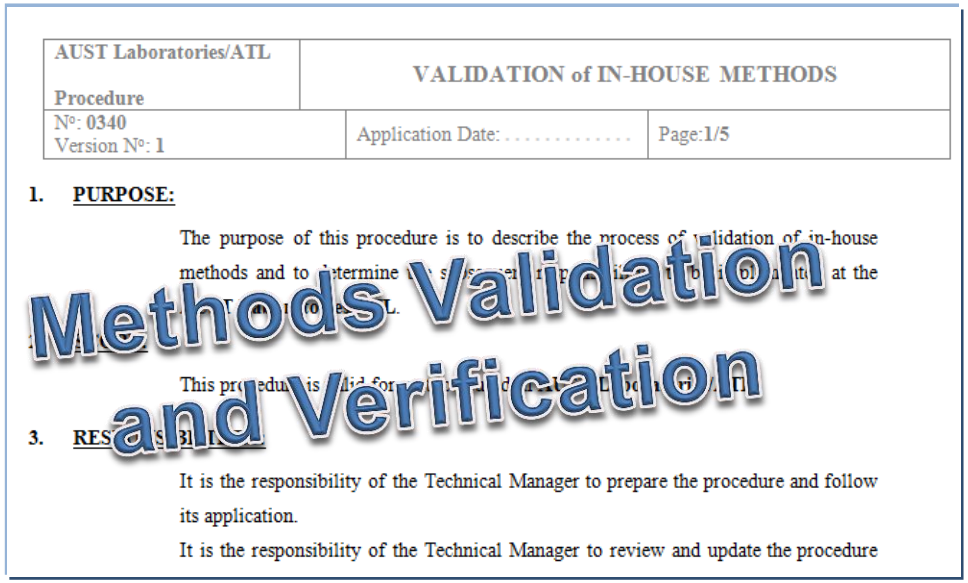
Part No.: — Serial No.: 212097

Work done: Preventive maintenance was done according to operating schedule. Blue it was tested and found in a good working condition.

Code:

Repair completed: yes ☑ no ☐ — Break Down Level: 1 — Last Repair No.:

Key	Date	time from	time to	HRS. work	HRS. wait	trav.	over hrs	KM	Code	Inst. Code:
Ulq	5/7/2011			1						



AUST Laboratories/ATL — Procedure — VALIDATION of IN-HOUSE METHODS
N°: 0340 — Version N°: 1 — Application Date: ..... — Page:1/5

1. **PURPOSE:**

The purpose of this procedure is to describe the process of validation of in-house methods and to determine [illegible] at the [illegible]

3. **RESPONSIBILITY:**

It is the responsibility of the Technical Manager to prepare the procedure and follow its application.

It is the responsibility of the Technical Manager to review and update the procedure

Equipment Verification

Methods Validation and Verification

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Technical Competency

Successful Participation in Proficiency Testing Schemes

- GEMMA, GeMSU46 (March 2011)

- EURL-GMFF-CT-01/11 ILC (April 2011)

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Quality Management System

DOCUMENTATION SYSTEM

Documented Protocols and Policies

AUST Laboratories/ATL Procedure	Detection and Quantification of Soybean Line 40-3-2	
N°: 0347 Version N°: 2	Application Date:	Page:1/14

1. **PURPOSE:**

The purpose of this procedure is to provide a method for:

i. Processing of samples.

ii. Genomic DNA extraction and purification from food, feed and seeds material.

iii. Analysis of the extracted DNA by ultraviolet spectrometric method.

iv. Analysis of the extracted DNA by agarose gel electrophoresis.

v. Event-specific quantification of Soya bean line 40-3-2.

2. **SCOPE:**

This procedure concerns all GM material in food, feed and seeds received at the **AUST Laboratories/ATL**.

Working Instructions & Protocols

AUST Laboratories/ATL Procedure	WORKING INSTRUCTIONS of iCYCLER THERMAL CYCLER iQ REAL TIME PCR DETECTION SYSTEM	
N°: 0167 Version N°: 1	Application Date:	

1. **PURPOSE:**

The purpose of this procedure is to provide the working instructions of the icycler Thermal Cycler iQ Real Time PCR Detection System present in the **AUST Laboratories/ATL**.

2. **SCOPE:**

This procedure concerns the icycler Thermal Cycler iQ Real Time PCR Detection System present in the **AUST Laboratories/ATL**.

3. **RESPONSIBILITIES:**

It is the responsibility of the Technician to prepare the procedure and follow its application.

It is the responsibility of the technical manager to review and update the

Records

AUST Laboratories/ATL Template	LOGBOOK INDEX	
N°: 0177 Version N°: 1	Application Date:	Page:1/1

Log Book N°	N° of pages	Name of Equipment	Equipment Code	Starting Date	Archiving Date

AUST Laboratories/ATL Template	REFRIGERATORS/FREEZERS TEMPERATURE RECORDS	
N°: 0164 Version N°: 1	Application Date:	Page: 1/1

Name of the Equipment	
Code Number	

Shelf Number	Date	Daily Average Temperature DL 1	Daily Average Temperature DL 2	Target Temperature

ISO 17025 Accredited Laboratory

ISO/IEC 17025:2005 Accreditation

Technical Competency

+

Quality Management

Hellenic Accreditation System S.A.

ESYD

ACCREDITATION CERTIFICATE

No. 777

The Hellenic Accreditation System S.A. (ESYD), as the national accreditation body of Greece in accordance with the Law 3066/2002,

ACCREDITS

the

Analytical Testing Laboratory (ATL) & American University of Science and Technology (AUST) Laboratory (Lebanon)

in Achrafieh, Lebanon

under the terms of the EN ISO/IEC 17025:2005 Standard and the ESYD Criteria, to carry out tests, as specified in the attached Scope of the Accreditation, which may be revised by decisions of ESYD.

This Certificate is valid until 04.12.2015, provided that the accredited body will comply with the above Standard and the ESYD Criteria.

Athens, December 05, 2011

George K. Anastassopoulos
Chairman

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Laboratory Activities

1. Testing
2. Research
3. Training

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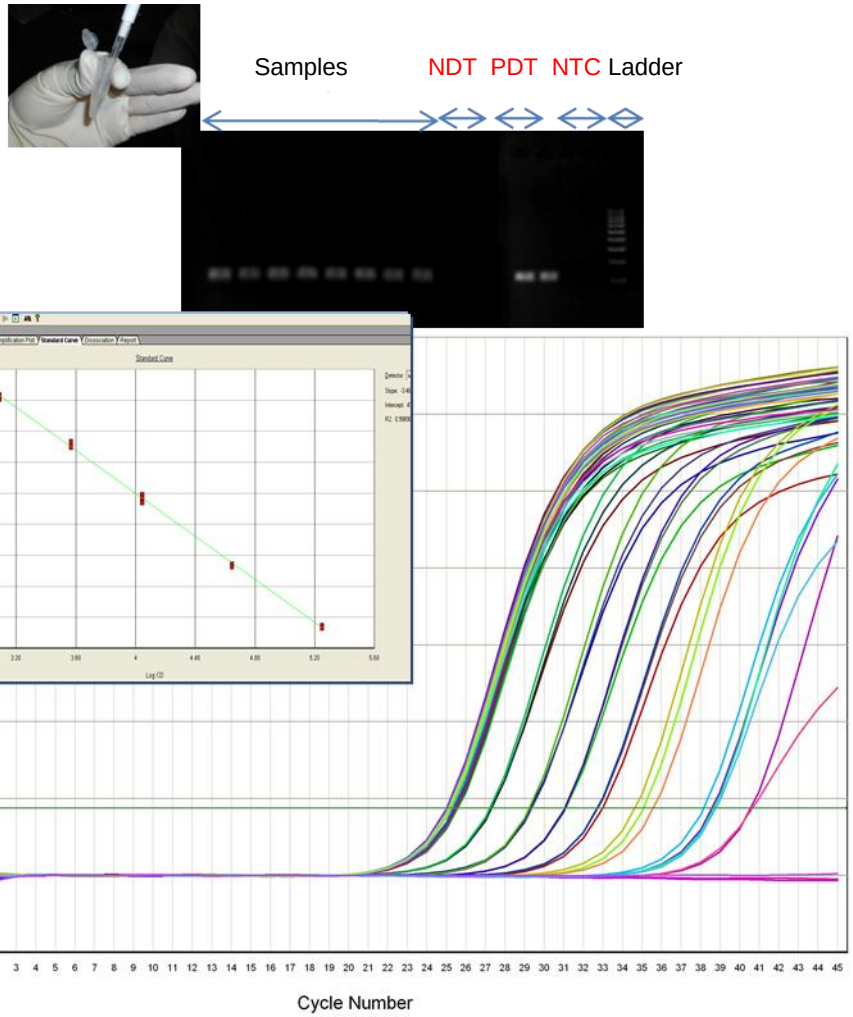
Testing



❖ Private Companies

❖ Lebanese Quarantine

Regular Testing of

Soybean and Maize

Seeds , Food and Feed

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Testing

Testing Seeds and Feed Imports at the Lebanese Quarantine

Dec 2009 → **2011**

Maize consignments

Soybean consignments

Seeds and animal feed

Middle East, Europe, Asia & USA

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Testing

Testing Soybean Feed Imports at the Lebanese Quarantine

- p35S screening by conventional PCR
- p35S screening and quantification by duplex Real-Time PCR
- Roundup Ready® identification by uniplex Real-Time PCR, EU-RL GMFF validated method
- Roundup Ready® quantification by uniplex Real-Time PCR, EU-RL GMFF validated method

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Testing

Quarantine Testing Results

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Research Activities

Collaborative

Screening of the Lebanese Quarantine for GM Food & Feed

AUST & Lebanese University (Marwan Ajaka and Lamis Chalak)

Screening of the Lebanese Market for GM Food & Feed

AUST & USEK University (Nadia Sarraf and Elsa Sattout)

AUST

Development of Cost Effective Testing Strategy Using Conventional and Real-Time PCR Methodologies

AUST (Narmeen Mallah and Gretta Abou Sleymane)

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Research Activities

Development of Cost Effective Testing Strategy Using Conventional and Real-Time PCR Methodologies

Plant Species	GM Event	p35S	t-nos	*cp4 epsps*	*pat*	*bar*	*nptII*
Maize	GA21	-	+	-	-	-	-

Plant species	Event	p35S	t-nos	*cp4 epsps*	*pat*	*bar*	*nptII*
Maize	LY038	-	-	-	-	-	-
Soybean	BPS-CV127-9	-	-	-	-	-	-
Maize	MIR162	-	+	-	-	-	-
Maize	TC1507	+	-	-	+	-	-
Soybean	A5547-127	+	-	-	+	-	-
Maize	Bt11	+	+	-	+	-	-
Soybean	GTS40-3-2	+	+	+	-	-	-
Maize	MON863	+	+	-	-	-	+
Soybean	GTS40-3-2	+	+	+	-	-	-

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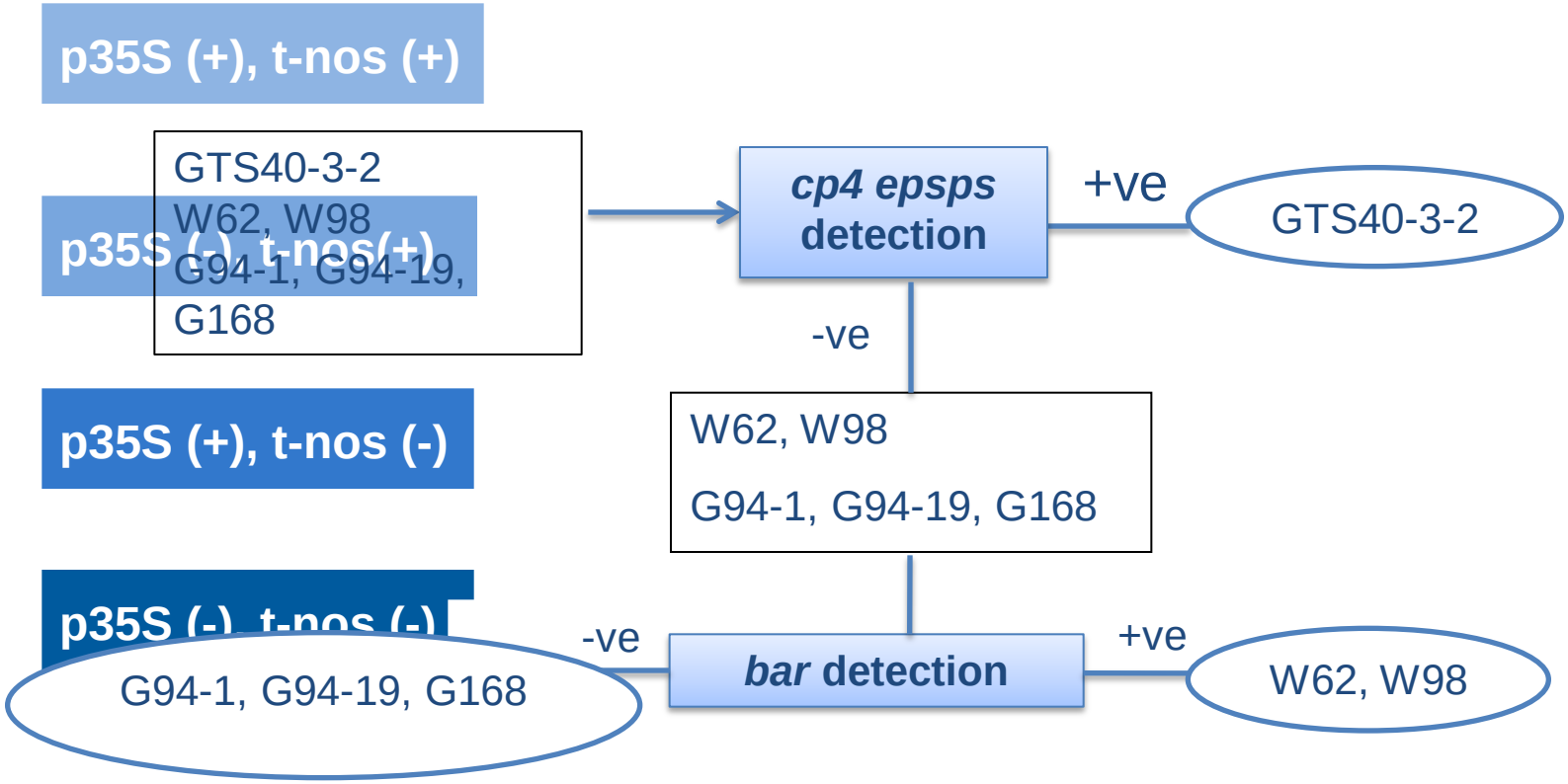
Research Activities

Samples grouping: detected screening elements



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Research Activities

Methods Development and Optimization

Aim	Target	Status
Development and optimization of Real-Time PCR based methods	p35S	**In Progress**
	t-nos	
	cp4 epsps	
	nptII	
	bar	
	pat	

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Training Programs

In house Training

Real-Time PCR

Regional Training Programs

Regional Project FAO/TCP/RAB/3202

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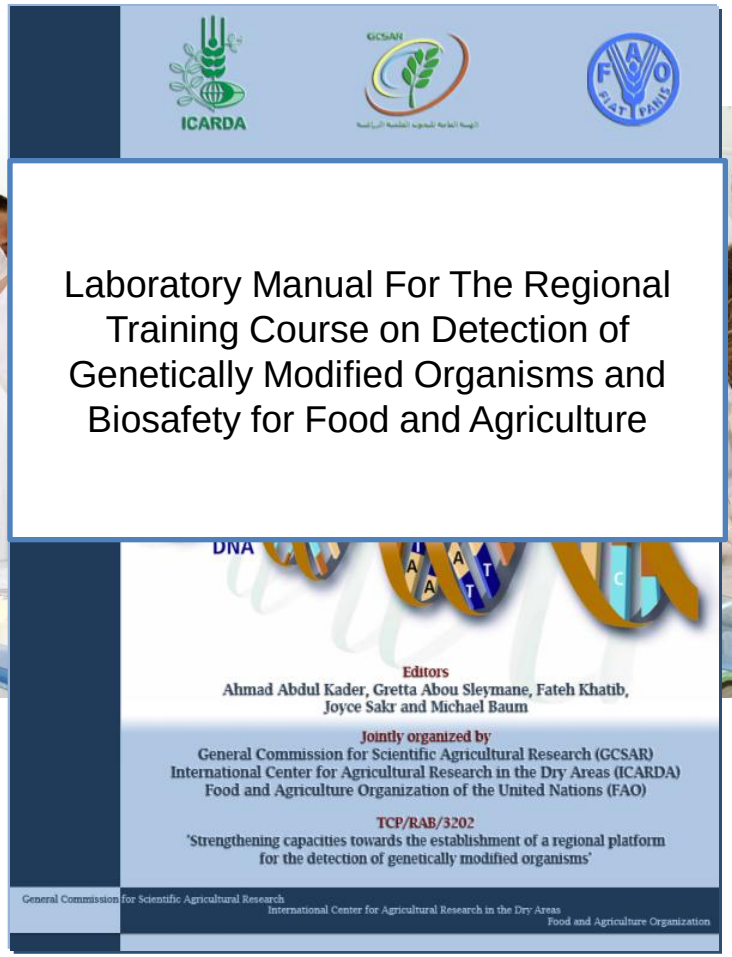
Training Programs

ICARDA – Aleppo, 2010



Laboratory Manual For The Regional Training Course on Detection of Genetically Modified Organisms and Biosafety for Food and Agriculture

Editors
Ahmad Abdul Kader, Gretta Abou Sleymane, Fateh Khatib, Joyce Sakr and Michael Baum

Jointly organized by
General Commission for Scientific Agricultural Research (GCSAR)
International Center for Agricultural Research in the Dry Areas (ICARDA)
Food and Agriculture Organization of the United Nations (FAO)

TCP/RAB/3202
'Strengthening capacities towards the establishment of a regional platform for the detection of genetically modified organisms'

General Commission for Scientific Agricultural Research
International Center for Agricultural Research in the Dry Areas
Food and Agriculture Organization

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Acknowledgement

REPUBLIC OF LEBANON
MINISTRY OF ECONOMY & TRADE

Republic of Lebanon
MINISTRY OF AGRICULTURE

EURL
European Union Reference Laboratory
for GM Food & Feed

QUALEB
QUALITY PROGRAMME

- Dr. Lamis Chalak

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THANK YOU