



ΤΕΧΝΟΛΟΓΙΚΟ
ΕΚΠΑΙΔΕΥΤΙΚΟ
ΙΔΡΥΜΑ
ΤΕΙ ΗΠΕΙΡΟΥ



European Territorial Cooperation Programme

**Greece - Italy
2007-2013**

INVESTING IN OUR FUTURE

Co-funded by the European Union (ERDF)
and by National Funds of Greece & Italy



Project Title:

**Towards a Common Quality Control and food chain
traceability system for the Greek – Italian primary sector of
activity**



Agroquality

Deliverable Title:

Design of guidelines

Author	:	TEI of Epirus (LP)
Type	:	Document
Document Reference	:	Final version
Version	:	1.0
Date	:	February, 22nd 2014

Control Page

Deliverable Number	D.5.5.1
Corresponding WP Title	5 Implementation of the model
Corresponding Action Title	5.5 Design of guidelines
Responsible Partner:	TEI of Epirus (LP)
Working Group	Euripides Glavas Aristidis Anagnostakis Fotis Varziotis Aggelos Pappas Eyaggelos Karvounis
Scientific Coordinator:	Georgios Manos
Creation Date:	15/1/2014
Last Update:	22/2/2014
Type:	Document
Version:	1

Modification Control

EDITION	DATE	COMMENTARY/STATUS	AUTHOR
1	15/1/2014	1 st internal version	TEI of Epirus
2	22/2/2014	Final version	

Table of Contents

1. Introduction	4
2. Modules' specifications	6
2.1. System Use for AgroQuality ECR.....	6
2.2. AgroQuality ECR Modules	8

1. Introduction

The present Document constitutes the deliverable 5.5.1. “Design of guidelines (document)” / Action 5.5 “Design of guidelines” / Work Package 5 “Implementation of the model” of the project “AgroQuality: Towards a Common Quality Control and food chain traceability system for the Greek – Italian primary sector of activity”. TEI of Epirus, the leader partner (LP) of AgroQuality, was in response to implement the corresponding study for the Region of Epirus.

AgroQuality project aimed at developing a model of the total management of olive growing in order to:

- Monitor the conditions under which the olives are cultivated
- Produce and distribute a “best practice” roadmap for the cultivation of olives
- Prove the quality of the product through quantitative measures, strengthening the positioning

The rational following question “how can we issue a health certificate for plants?” was the core question for the AGROQuality project, which leads the initial concept and the overall development. Towards this, a novel platform based on a special purpose Geographical Information System has been developed, in order to integrate the first Electronic Cultivation Record for olive products sector (cultivation, processing, trading).

The objective of WP5 was the implementation of the model at farm level, in various typologies of farm. The implementation would result a number of comments regarding alterations of the model in order resemble better the real world conditions. The Electronic Cultivation Record User Manual and Installation Guide is the main objective of the present document. Also ideas regarding new features of the ECR (for future versions extensions) are proposed.

User Manual

- **System Prerequisites**
- **System Installation**
- **System Use per component**

System Prerequisites

The ECR may be deployed in any modern Web server (Apache, IIS) with PHP support and the MS SQL driver for PHP installed. The database system should be based on Microsoft SQL 2012 or higher. In addition, the PHPMailer, a full-featured email creation and transfer class for PHP should be installed, as well as the PHP implementation of QR Code 2-D barcode generator. The ECR may accessed through many type of devices (PCs, tablets, smartphones etc.) having a standard Web browser with JavaScript enabled. Currently, the following browsers have been successfully tested:

- Internet Explorer
- Safari
- Firefox
- Opera
- Chrome

System Installation

As a web-based application, the ECR requires minimum installation steps:

- 1) Copy all ECR files to the access folder of the web server
- 2) Install database on the SQL database engine
- 3) Configure the database credentials on the related configuration file in the SDSS application (/mssql/mssql.php)

2. Modules' specifications

2.1. System Use for AgroQuality ECR

In the introductory screen, user has three choices concerning ECR: Login as an already registered user or make a new registration. Already registered members of the system may be:

- The administrator of the system
- A Union Team
- An Agriculturist
- A Farmer.

All users mentioned above have specific rights to the system.

New Registration: Initially, in the case of new registration, the user (either agriculturists or farmers) fill all necessary form fields (like *First name*, *Surname*, *father name*, *Specialty* etc) and submits the informations. All informations are send through email to the administrator of the system in order to evaluate/validate the request. Afterwards, the administrator has to choices: to reject or accept (sending back a personalized password) the request. The main and registration form are shown below (*Figure 1*). All necessary registration fields are shown in the right screen.

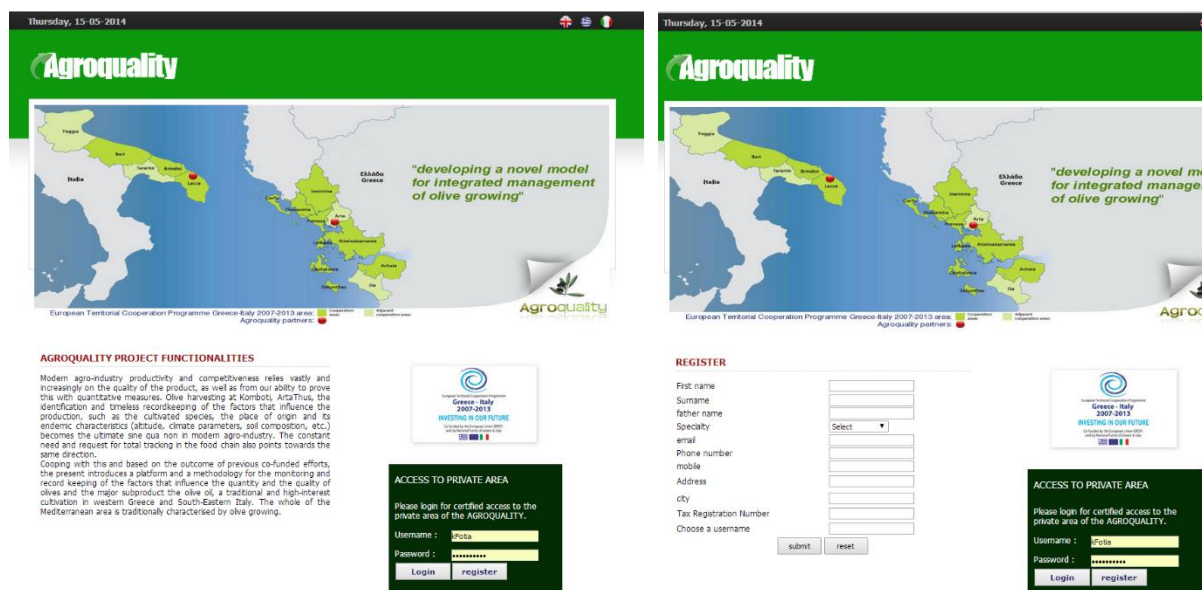


Figure 1. Introductory (left) and registration screen (right) of the ECR.

In general, after successful user login, the platform is redirected to the main page, including a graphical representation of all possible actions (depending of the user specialty). The structure of the main page depends of the user specialty. The structure is based on a hieratical tree structure (see *Figure 2*), meaning that: the *Administrator*, having full rights, controls all system parameters. New *Union Teams* may be register to the system. All *Union Teams* are under the supervision of the Administrator. Several *agriculturists* are under the supervision of each *Union Team*, while several *farmers* are under the

supervision of each agriculturist. Finally, each farmer may register several *lands* to the system, recording all related cultivation activities.

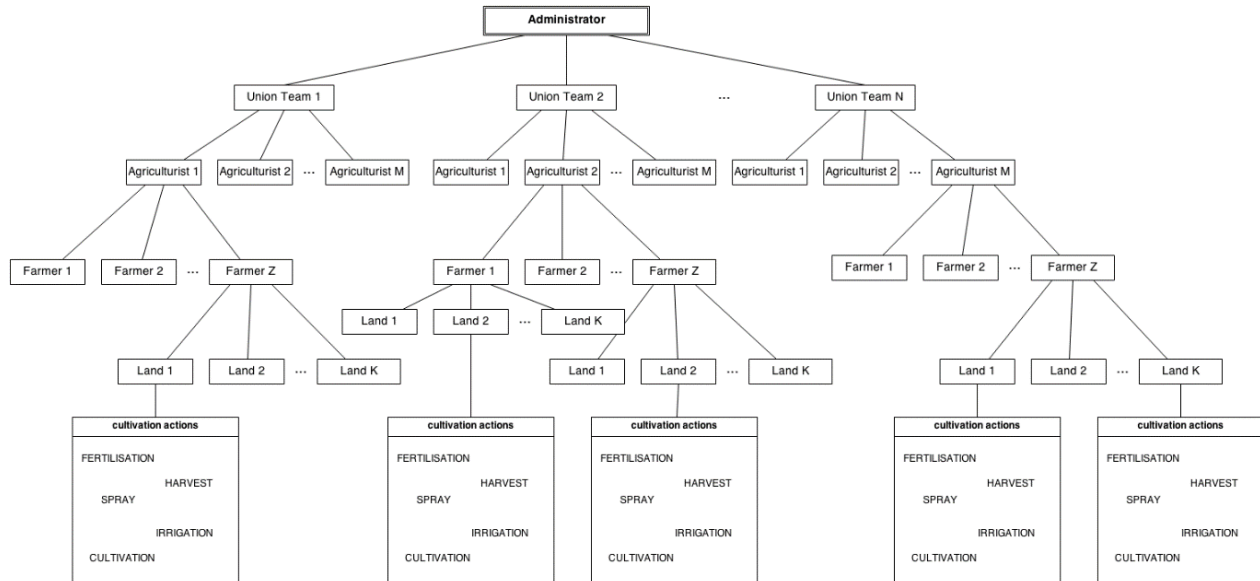
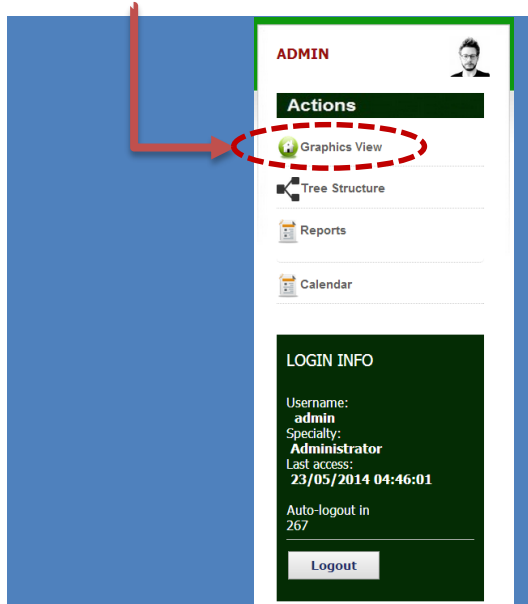


Figure 2. Hieratical tree structure of the system.

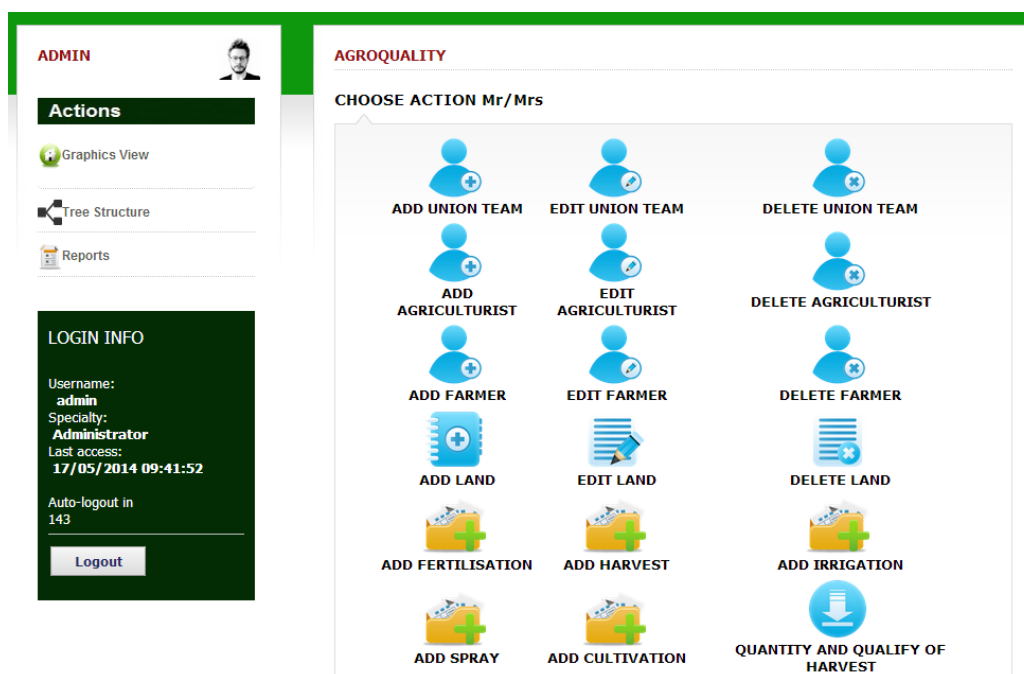
2.2. AgroQuality ECR Modules

Next, all menu actions are presented in details.

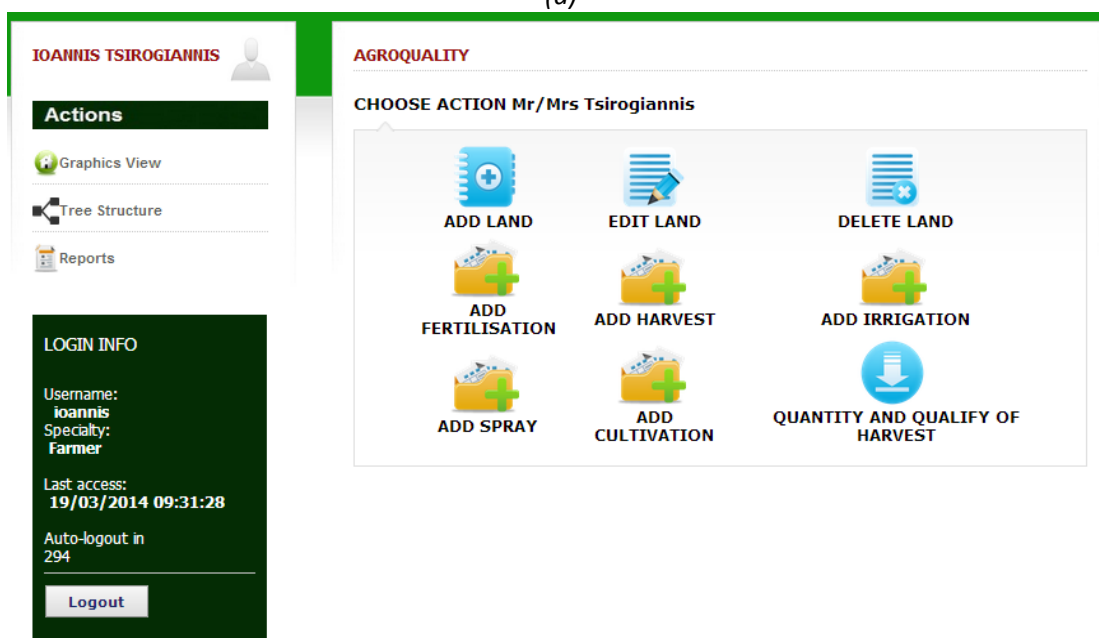
[1]. Graphics View



The main page structure depends of the user specialty. Administrator has all possible capabilities (as shown in Figure 3a and explained in Figure 2) while all other specialties like the Union Team, the Agriculturist and the Farmer have limited rights. Figure 3b presents a screenshot of the Farmer personalized Graphics View main page. Contrary to the Administrator extended capabilities, the Farmer has limited specific choices. And most important, ALL POSSIBLE options are related ONLY to the lands, belonging to his/her jurisdiction.



(a)



(b)

Figure 3. (a) Administrator Graphics View main page and (b) Farmer Graphics View main page and

However, regardless of user's specialty, the Graphics View main page has specific options. Next, the options are analyzed in details.

ADD/EDIT/DELETE UNION TEAM

The only registered user that has rights to add/edit/delete Union Team is the Administrator of the system. In case the Administrator want to add a new Union Team, he/she has to fill the fields shown in the next screenshot (Figure 4).

AGROQUALITY

ADD UNION TEAM INFORMATION

Username

Password

Unions Name

email

Phone number

Address

city

Tax Registration Number

description

certification type

Certification Expiration Date

Account Creation Date

Account Expiration Date

Figure 4. Graphics View main page.

In addition, the Administrator can edit Union Team personal informations, selecting from a list (see Figure 5a). Making a choice using the button with label 'View/Edit', the Administrator can change and update any information, as shown in Figure 5b.

AGROQUALITY

CHOOSE UNION TEAM FROM THE LIST TO EDIT

ID	Fname	Date Created	Tax Registration Number	
1	alivia@hotmail.com	2014-01-25 00:00:00	054879556	<input type="button" value="View/Edit"/>
2	ekarvuni2	2014-01-25 00:00:00	223432234	<input type="button" value="View/Edit"/>
3	TEI HPEIROU B1	2014-03-17 00:00:00	123456789	<input type="button" value="View/Edit"/>

(a)

AGROQUALITY

EDIT UNION TEAM 'alivia@hotmail.com' INFORMATIONS

Username:

Password:

Unions Name:

Email:

Phone number:

Address:

city:

Tax Registration Number:

description:

certification type:

Certification Expiration Date:

Account Creation Date:

Account Expiration Date:

(b)

Figure 5. (a) Edit Union Team list and (b) Union Team personal infos update form.

Finally, the Administrator can delete any Union Team from the Union Team Delete list. A screenshot is shown in Figure 6.

CHOOSE UNION TEAM FROM THE LIST TO DELETE

ID	Fname	Date Created	Tax Registration Number	
1	alivia@hotmail.com	2014-01-25 00:00:00	054879556	<input type="button" value="Delete"/>
2	ekarvuni2	2014-01-25 00:00:00	223432234	<input type="button" value="Delete"/>
3	TEI HPEIROU B1	2014-03-17 00:00:00	123456789	<input type="button" value="Delete"/>

Ειδοποίηση από τη σελίδα στη διεύθυνση agroquality.teiep.gr: x

Are you sure?

Figure 6. Choosing a Union Team from the delete list, a confirmation message is displayed.

ADD/EDIT/DELETE AGRICULTURIST

In the same way, the Administrator or a registered Union Team, can add (Figure 7a), view/edit (Figure 7b) or delete an Agriculturist (Figure 7c). It must be mentioned again here that contrary to the Administrator

(that can edit/delete ANY Agriculturist), a Union Team can edit/delete ONLY Agriculturists that are under its supervision.

AGROQUALITY

ADD AGRICULTURIST INFORMATIONS

Username

Unions Name

Password

First name

father name

email

Phone number

mobile

Address

city

Tax Registration Number

Account Creation Date

Account Expiration Date

(a)

AGROQUALITY

CHOOSE AGRICULTURIST FROM THE LIST TO EDIT

ID	Fname	Date Created	Email	
1	agric_ww	2014-01-16 00:00:00	ekarvuni@gmail.com	<input type="button" value="View/Edit"/>
2	kFotia	2014-03-17 00:00:00	d_fotia@yahoo.com	<input type="button" value="View/Edit"/>
3	Kosmas	2014-01-18 00:00:00	ekarvounis@i-plan.gr	<input type="button" value="View/Edit"/>
4	Kosmas33443	2014-02-12 00:00:00	ekarvuni@gmail.com	<input type="button" value="View/Edit"/>

(b)

AGROQUALITY

CHOOSE AGRICULTURIST FROM THE LIST TO DELETE

ID	Fname	Date Created	Email	
1	agric_ww	2014-01-16 00:00:00	ekarvuni@gmail.com	<input type="button" value="Delete"/>
2	kFotia	2014-03-17 00:00:00	d_fotia@yahoo.com	<input type="button" value="Delete"/>
3	K			
4	Kosm			

Ειδοποίηση από τη σελίδα στη διεύθυνση agroquality.teiep.gr: x

Are you sure?

(d)

AGROQUALITY

EDIT AGRICULTURIST 'kFotia' INFORMATIONS

Username

Unions Name

Password

First name

father name

Email

Phone number

mobile

Address

city

Tax Registration Number

Account Creation Date

Account Expiration Date

(c)

Figure 7. (a) Add, (b) View/Edit list, (c) Update infos and (d) Delete process, in case of Agriculturist.

ADD/EDIT/DELETE FARMER

Here the Administrator, Union Team or Agriculturist (ONLY the supervisor) can add, View/edit or Delete a Farmer. The same restrictions apply here, too. The Administrator has full rights, while Union Team and Agriculturist have limited rights (Figure 8a to Figure 8d) and ONLY if the Farmer is under its supervision.

(a)

ID	Fname	Date Created	Email
1	asdwerwerwe	2014-04-07 00:00:00	ekarvuni@gmail.com
2	ioannis	2014-03-18 00:00:00	
3	Kosmas	2014-05-19 00:00:00	ekarvuni@gmail.com
4	penelope	2014-03-18 00:00:00	

(b)

(d)

(c)

Figure 8. (a) Add, (b) View/Edit list, (c) Update infos and (d) Delete process, in case of a Farmer.

ADD/EDIT/DELETE LAND

Similar capabilities and limitations apply here, too. Indicate screenshots are shown in Figure 9.

AGROQUALITY

ADD LAND INFORMATION

Land Code

Land Name

OSDE Code

Polygon (GIS-Maps)

Cultivation

Variety

Area (Ha)

Number of trees

Existence of storage areas

Slope more than 6%

Rented/Owned

Irrigated

Way of irrigation

Intercropping

Neighboring Cultures

Description

Soil Analysis/Date of Analysis

Farmer name

(a)

AGROQUALITY

CHOOSE LAND FROM THE LIST TO EDIT

ID	Land Code	Date Created	Cultivation	
1	021555	2014-03-18 00:00:00	000	<input type="button" value="View/Edit"/>
2	324324fdsf	2014-03-04 00:00:00	ΕΠΙΤΡΑΠΕΖΙΑ ΕΛΙΑ	<input type="button" value="View/Edit"/>
3	fsd	2014-03-04 00:00:00	000	<input type="button" value="View/Edit"/>

(b)

AGROQUALITY

CHOOSE LAND FROM THE LIST TO DELETE

ID	Land Code	Date Created	Cultivation	
1	021555	2014-03-18 00:00:00	000	<input type="button" value="Delete"/>
2	324324fdsf	2014-03-04 00:00:00	ΕΠΙΤΡΑΠΕΖΙΑ ΕΛΙΑ	<input type="button" value="Delete"/>
3				
4	Kk			
5	la			
6	pe			

Ειδοποίηση από τη σελίδα στη διεύθυνση agroquality.teiep.gr: x

Are you sure?

(d)

AGROQUALITY

EDIT LAND WITH CODE '324324fdsf' INFORMATION

Land Code

Land Name

OSDE Code

Polygon (GIS-Maps)

Cultivation

Variety

Area (Ha)

Number of trees

Existence of storage areas

Slope more than 6%

Rented/Owned

Irrigated

Way of irrigation

Intercropping

Neighboring Cultures

Description

Soil Analysis/Date of Analysis

Farmer name

(c)

Figure 9. (a) Add, (b) View/Edit list, (c) Update infos and (d) Delete process, in case of a Land.

Remarks: Concerning the Add Land option, it must be mentioned here that incorporates a field, mentioned as Polygon (GIS-Maps) (see the blue cycle in Fig.9a). Using that button, the user can declare the position of the land in a map. The position is indicated graphically in the map with a simple click or drawing a polygon. Figure 10 presents a screenshot of the GIS module. The Land position is indicated after the mouse click in orange color (see the red dotted cycle in Figure 10) and the coordinates are stored automatically in the ECR database after form submission.

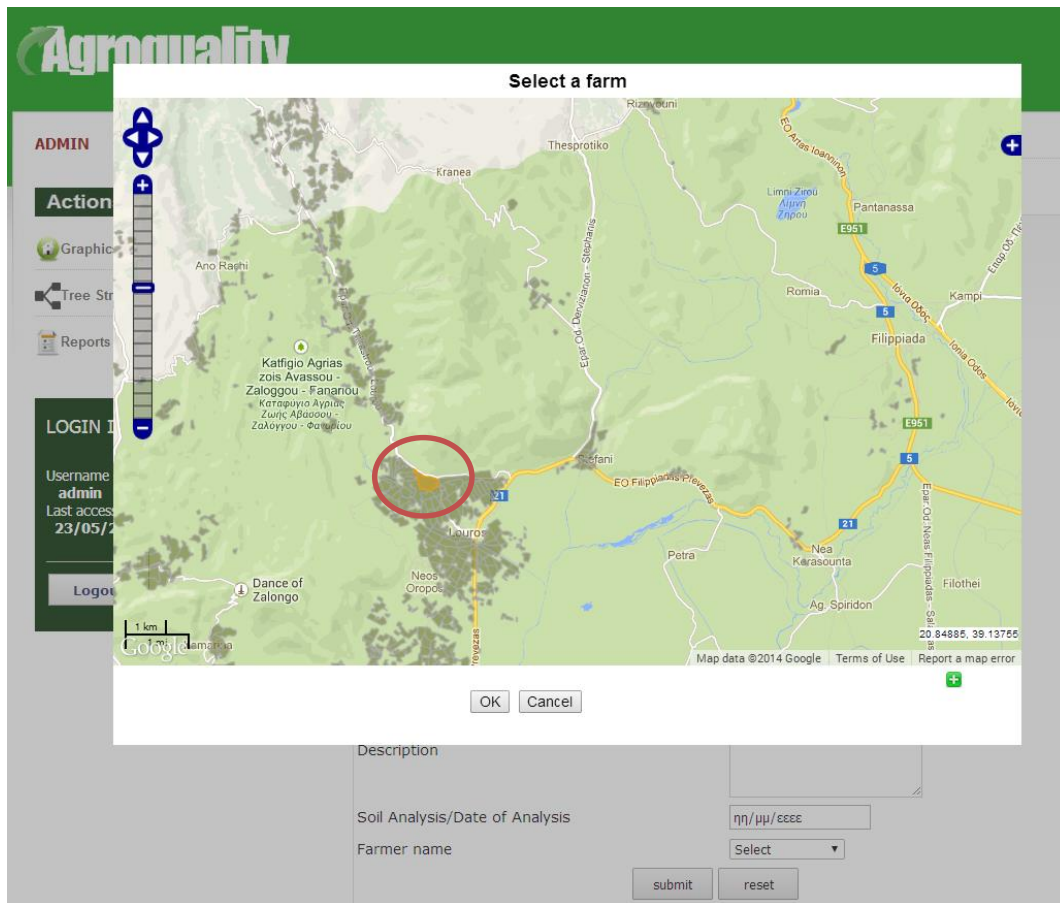


Figure 10. GIS Land-map position is mentioned in orange color in the map.

➤ Cultivation Activities

The Administrator, Union Team, Agriculturist or Farmer can apply several cultivation activities to a Land, like FERTILISATION, HARVEST, IRRIGATION, SPRAY and CULTIVATION. In all cases, the user has to declare if the cultivation action applied in All Lands or a specific one. Several screenshots for each case are presented below.

ADD FERTILISATION

ADD FERTILISATION

Command Code

Date of application

Expiration Date

Fertilizer Trade Name

Fertilizer Type

Unit of measurement

Quantity (λίτρα)

N-P-K units - -

N,P,K total units

Application way

Operators name

Weather conditions

Plot(s)

Fertilizer Trade Name choice:

- Select
- 11-15-15
- 11-15-15-(14) SOP
- 11-15-15-(18) MOP
- 15-15-15
- 21-0-11
- 21-7-14-(6) + 0,5MgO + 0,38
- 21-8-11 + 0,5 B
- COMPLEX
- ENTEC
- ENTEC ACTIVE
- FERTILIZER
- MAGNIBOR
- NATURPHOSPHAT
- NEWBOR
- NUTRIMORE
- PATENT KALI
- PERFECT
- ULTRASOL SOP 52
- VICTORY

Plot application:

(λίτρα)

- -

- Select
- 021555
- 324324fdfs
- fsd
- Kostø11
- land999
- penland 1
- penland 2
- penland 3
- penland 4
- rrwe344
- tsirland 1
- tsirland 2
- tsirland 3
- weqee
- Application to all

Figure 11. (a) Fertilization Input form. (b) Fertilizer Trade Name choice and Plot application.

ADD HARVEST

ADD HARVEST

Start date	<input type="text" value="ηη/μμ/εεεε"/>
Expiration Date	<input type="text" value="ηη/μμ/εεεε"/>
First approved harvest date	<input type="text"/>
Quantity	<input type="text"/>
Unit	<input type="text" value="Select"/>
Client/Buyer	<input type="text"/>
Plot(s)	<input type="text" value="Select"/>

Figure 12. Harvest Input form.

ADD IRRIGATION

ADD IRRIGATION

Start date	<input type="text" value="ηη/μμ/εεεε"/>
Expiration Date	<input type="text" value="ηη/μμ/εεεε"/>
Water quantity	<input type="text"/>
Unit	<input type="text" value="Select"/>
Irrigation duration	<input type="text"/> hours
Irrigation method	<input type="text" value="Select"/>
Plot(s)	<input type="text" value="Select"/>

Figure 13. Irrigation Input form.

ADD SPRAY

ADD SPRAY

Command Code

Date of application

Expiration Date

Formulation trademark

Active substance

Cause of application

Dose used

PHI

Dose measurement unit

Operator

Plot(s)

Formulation trademark dropdown list:

- Select
- ADMIRAL 10 EC
- AGREE WP
- ATTALOS 40 WG
- BACILLUS THURINGIENSIS var. Kurstaki ΦΑΡΜΑ-ΧΗΜ 32000 WP
- BACTOIL SC
- BACTOSPEINE WG
- BACTOSPEINE WP
- BISCAYA 240 OD
- BLUE SHIELD 50 WG
- BLUE SHIELD 50 WP
- BORDELESA 20 SC
- BORDELESA 20 WP
- BORDELESA ULTRA 20 WG
- BULLDOCK 2,5 SC
- CHAMP 36,3 SC
- CHAMP 37,5 WG
- CHAMPION 50 WP
- CITROLE
- CLEAR 36 SL

Form details for BORDELESA 20 WP:

calcium copper sulfate, α

ΚΥΚΛΟΚΟΝΙΟ, ΓΛΟΙΟΣΠΟΙ

600-650

21

Figure 14. Spray Input form (Note: Choosing a formulation trademark, fields' Active substance, Cause of application, Dose used and PHI are filled automatically)

ADD CULTIVATION

ADD CULTIVATION

Date of application

Expiration Date

Type of Cultivation

Remarks

Plot(s)

Figure 15. Cultivation Input form.

QUANTITY AND QUALIFY OF HARVEST

Here, the user can proceed to the certification of the product, using a QR-Code generator. More specifically, a specific QR-code is produced corresponding to the quantification and qualification of all or a specific Land (Figure 16a and Figure 16b). The QR-Code ‘hides’ very important information about the Land production. A screenshot of the QR-Code decoding using a QR-Reader is shown in Figure 16c.

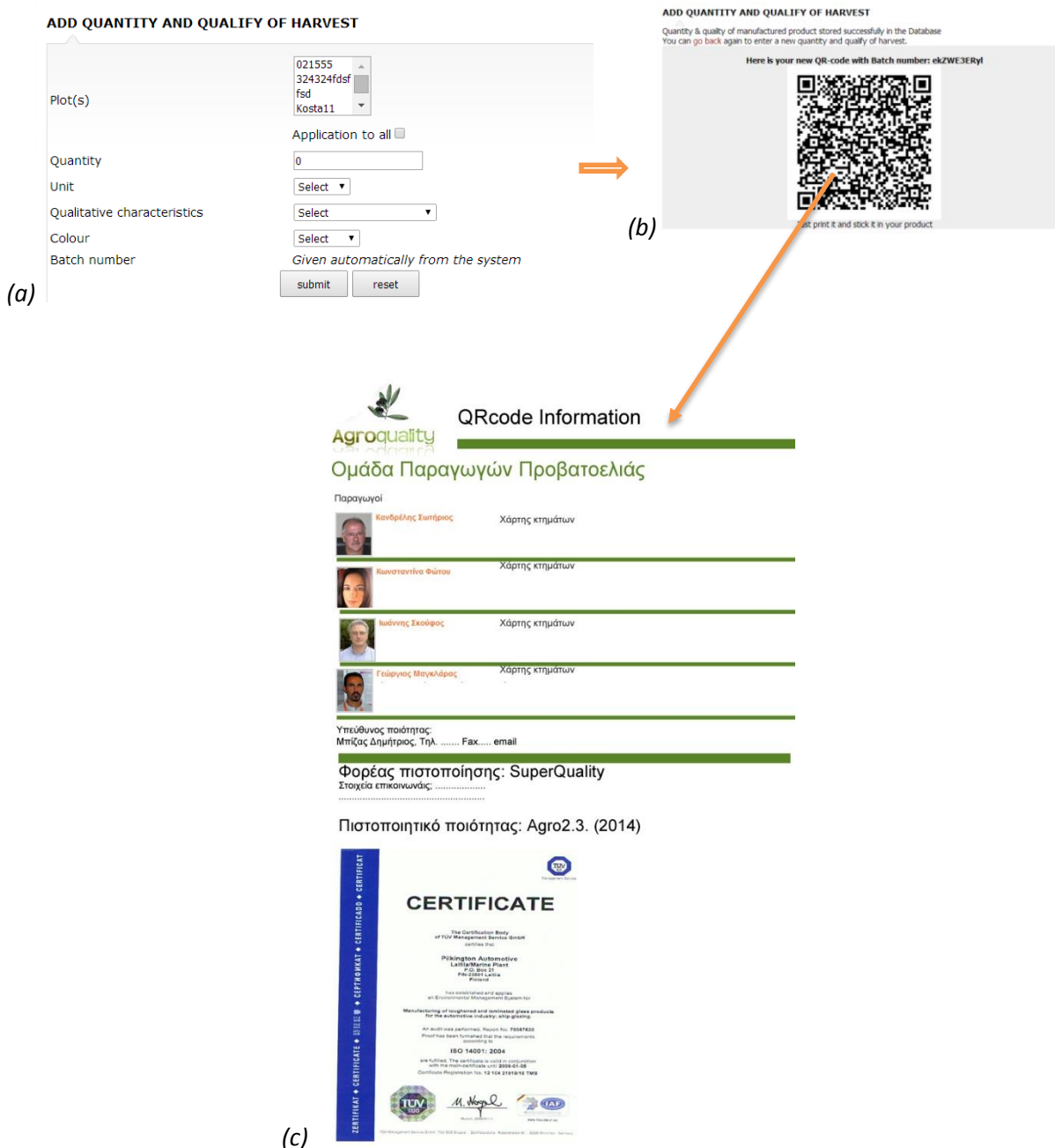
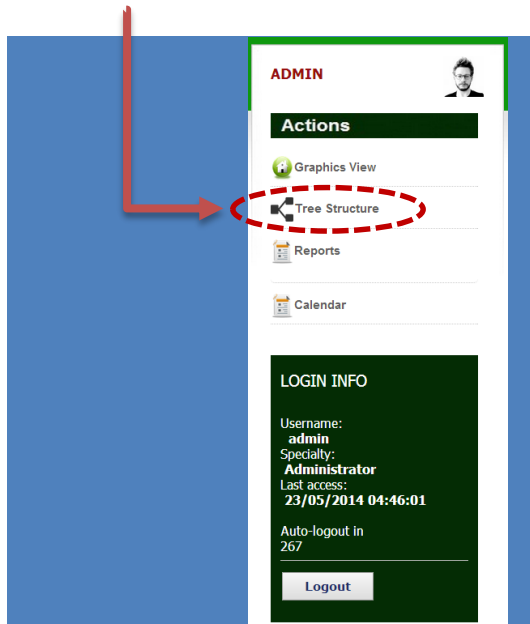


Figure 16. (a) Quantity and qualify of harvest input form, (b) QR-Code and (c) QR-Code decoding.

[2]. Tree Structure

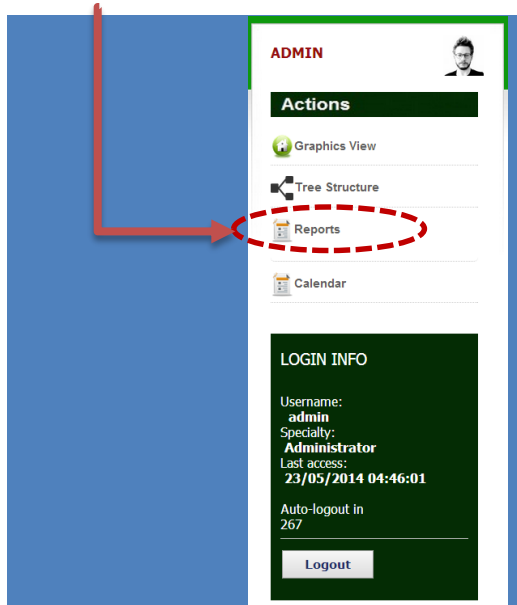


All the above described procedures (Add Union Team, View/Edit Union Team, Add Agriculturist, View/Edit Farmer etc.) except cultivation activities, can be easily accomplished using the Tree Structure choice in the main menu list (Figure 17). Registered user can add/edit/delete Union Team, Agriculturist and Farmer, using list options. However, the same hierarchical tree structure restrictions are applied here, too (see Figure 2). A screenshot is shown below.



Figure 17. Tree Structure page. Here the add/edit/delete actions become more flexible.

[3]. Reports



The platform incorporates an efficient reporting module. More specifically, the main page of the report module contains several options like: visualization and detailed search (including several parameters) of the Agroquality ECR database tables (data). In addition, using the same tool, the user has the opportunity to print the results (current or all resulting pages) while can extract the results in Excel, Word, Xml, Csv or Pdf format. The reporting main page is shown below in Figure 18, containing all system possibilities. From the main view, user can Add/Edit /Delete a record, directly.

Logout

Αρχικό μενού χρήστη

Farmers

User Name	Password	First Name	Last Name	Father Name	ID Number	Email	Age	Gender	Tel	Tel Mob	Address	Tax Registration Number	Responsible agriculturist	Certification Type	Expiration Date	Date Now
asdwewerwe	sasd2	Gewrgios	Vavvas	ARTA_UNION	Mixail Kappelou 27	ekarvuni@gmail.com	0		6974492030	6974492030	Tsianou 9	223454432	Kosmas33443	AGRO2	1900-01-01	190-01-01
Ioannis	1234	Ioannis	Tsirogiannis		123456789	ekarvuni@gmail.com	0	Male				123456789	kFotia	3	1900-01-01	190-01-01
Kosmas	Tzallas	ΕΥΑΓΓΕΛΟΣ	ΚΑΡΘΟΥΝΗΣ	ekarvounis@gmail.com	ΤΣΙΑΝΟΥ 9	ekarvuni@gmail.com	33	000	6974492030	6974492030		556548896	Kosmas	AGRO2	1900-01-01	190-01-01
penelope	7979	Penelope	Baltzoi	Athanasios	123456789		0	000				123456789	kFotia	3	1900-01-01	190-01-01

Σύνθετη αναζήτηση

Εύρεση για: Όλες οι συνθές

Username

Union's username

Password

First Name

Father Name

Email

Tel

Tel Mob

Address

City

Tax Registration Number

Account Creation Date

Account Expiration Date

Date Now

Εφαρμογή

Καθάρισμα

Username	Union's username	Password	First Name	Father Name	Email	Tel	Tel Mob	Address	City
Christos	6947434790	Preveza	ekarvuni@gmail.com	6947434790	6947434790	Kefalynias 10	IOANNINA		
7878	Konstantina	Vasileios	d_fotia@yahoo.com				ARTA		
Christos	ekarvounis@gmail.com	Ioannina	ekarvounis@i-plan.gr	2651002262	2651002262	Tsianou 9	Ioannina		

Logout

Αρχικό μενού χρήστη

Εμφάνιση/απόκρυψη πανθάρ

Τρέχουσα σελίδα: Agriculturists

ΛΙΣΤΑ ΣΕΛΙΔΑΣ

Unions

Agriculturists

Farmers

Lands

Fertilisators

Harvests

Irrigations

Sprays

Cultivations

ΕΚΤΥΠΩΣΗ

Εκτύπωση τρέχουσας σελίδας

Εκτύπωση όλων των σελίδων

ΕΞΑΓΩΓΗ

Εξαγωγή σε Excel

Εξαγωγή σε Word

Εξαγωγή σε Xml

Εξαγωγή σε Csv

Εξαγωγή σε Pdf

AGRICULTURISTS

Σύνθετη αναζήτηση

20 records per page

Εύρεση για:

Οποιοδήποτε πεδίο

περιέχει

Εφαρμογή

Καθάρισμα

Προσθήκη νέας

Διαγραφή επιλεγμένης

Ανανέωση

Ενέργειες	Username	Union's username	Password	First Name	Father Name	Email	Tel	Tel Mob	Address	City	Tax Registration Number	Account Creation Date	Account Expiration Date	DateNow
<div>+</div> <div>+</div> <div>+</div> <div>+</div> <div>+</div>	agric_vw	NULL	Christos	6947434790	Preveza	ekarvuni@gmail.com	6947434790	6947434790	Kefalynias 10	IOANNINA	226545569	1900-01-01	1900-01-01	2014-01-16
<div>+</div> <div>+</div> <div>+</div> <div>+</div> <div>+</div>	kFotia	TEI HPEIROU B1	7878	Konstantina	Vasileios	d_fotia@yahoo.com				ARTA	123456789	1900-01-01	1900-01-01	2014-03-17
<div>+</div> <div>+</div> <div>+</div> <div>+</div> <div>+</div>	Kosmas	NULL	Christos	ekarvounis@gmail.com	Ioannina	ekarvounis@i-plan.gr	2651002262	2651002262	Tsianou 9	Ioannina	445434456	2014-01-09	2014-01-26	2014-01-18
<div>+</div> <div>+</div> <div>+</div> <div>+</div> <div>+</div>	Kosmas33443	alvia@hotmail.com	IOANNINA ΔΦΣΔ	6974492030	IOANNINA	ekarvuni@gmail.com	6974492030	6974492030	ΤΣΙΑΝΟΥ 9	Ioannina	112343323	1900-01-01	1900-01-01	2014-02-12

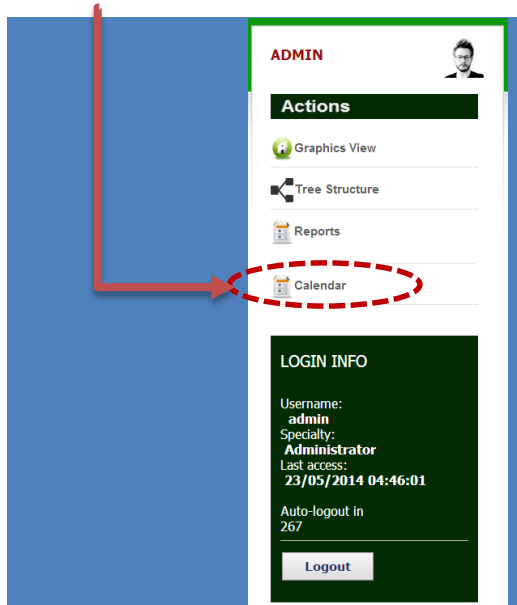
Προσθήκη νέας

Διαγραφή επιλεγμένης

Ανανέωση

Figure 18. Reporting of Agriculturist data. Tree Structure page. Here the add/edit/delete actions become more flexible.

[4]. Calendar



Using that module, the user has the opportunity to watch in a calendar all cultivation activities. More specifically, the system for a time period and for one or more lands, informs about all cultivation activities, taken between the two dates. A searching tool has been incorporated in the module. Figure 19 presents a screenshot of the calendar, together with an action (Fertilization) report.



(a)

AGRO QUALITY

Fertilization Report

Created at: 28/04/2014 08:04:07

Land details

Land Name : land4
Cultivation : Kalamon
Number of trees : 100

Fertilization details

Fertilization Period : [2014-02-11] - [2014-02-11]
Name of fertilizer : lanate
Type of fertilizer : poison
Unit : Kg
Amount : 100.0
Units of Nitrogen : Kg
Units of Phosphorus : Kg
Units of Potassium : Kg
Total units : Kg
Application method : direct application
Operator : Agro Teenager
Weather conditions : thunderstorm

Close

(b)

Figure 19. (a) The calendar that incorporates all cultivation activities. (b) A Fertilization Report.