

## FINAL ICT2Scale PROJECT WORKSHOP

### Access to E-learning and Cell Phone Based Services to Strengthen Extension Services for Smallholder Farmers in Tunisia (ICT2Scale)



### Impact of Information and Communication Technologies (ICTs) on Agricultural Development in Tunisia

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## STUDY CONTEXT

- Information and extension services are one of the key elements in addressing development issues in the sector of agriculture in developing countries. These services support farmers by disseminating information and building the capacities. Unfortunately, in Tunisia **extension service fail to reach smallholders, especially in remote areas due to a lack on financial, human and logistical resources**. To face these challenges, **Information and Communication Technologies can act as a replacement to foster the access to innovation to farmers**.
- The project “ICT2scale” considered two information and communication technologies **to reach smallholders farmers through cell-phone based services** and access to e-learning **to strengthen extension services and help them improve their livelihoods**. This study presents the results of the two final surveys of this project implemented in three governorates: Zaghouan, Kairouan and Jendouba.



## ***MAIN OBJECTIVES***

- **Using ICT to enable smallholders farmers to access agricultural innovation systems.**
- **Assisting smallholders (women and men, with special emphasis to youth) to improve their farming technologies and farm management through the use of ICT-based agricultural extension services.**
- **Achieving a large-scale impact through ICT-based extension services.**



## ***SPECIFIC OBJECTIVES***

- **Diagnose the general characteristics of the users of the SMS technology, radio spots and short number,**
- **Analyze the factors affecting the use of the SMS (costs, comparative advantage, compatibility, simplicity, observability, social influence, etc.),**
- **Analyze the impact of the use of the ICTs on smallholder agricultural activities (yield, cost of production, revenue, etc.),**
- **Provide knowledge to trainers through e-learning Develop practical recommendations for the dissemination of extension services based on ICTs.**

## STUDY AREAS



Figure 1. Zaghouan governorate

N=122

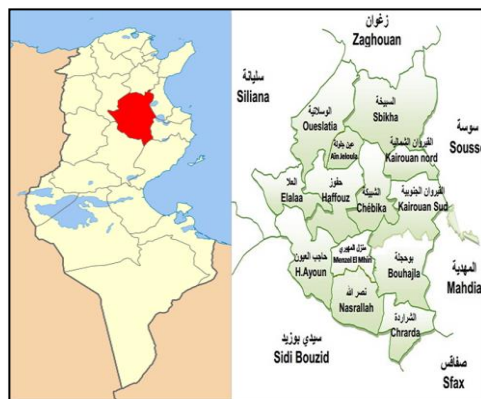


Figure 2. Kairouan governorate

N=179



Figure 3. Jendouba Governorate

N=122



## METHODOLOGICAL FRAMEWORK

The project is mainly based on **two information and communication technologies** to improve both extension services and the incomes of smallholders, it concerned:

- **E-learning** for the benefit of trainers from agricultural vocational training centers and extension agents attached to territorial extension units.
- **Mobile phone messaging** through which farmers receive relevant information via SMS to improve farming practices. A short number is also used to provide information on the availability of inputs and their prices in local markets as well as the prices of agricultural products to farmers in order to improve their income.



## *ICT TOOLS*

### **E-LEARNING MODULES**

**7 modules were elaborated for this project after discussion with the national partners (AVFA, INRAT) and ICARDA staff:**

- **Supplemental irrigation**
- **Cactus production**
- **Honey production**
- **Andragogy and development**
- **Creation of an agricultural project**
- **Cattle and Dairy**
- **Medical and Aromatic plants**
- **Innovation Platform**



## *ICT TOOLS*

### **Short message service**

Farmers receive relevant information through short message service (SMS) on their mobile phones to improve agricultural practices. 1000 farmers were concerned and received messages on their phones. A total of 101 SMS messages were developed in 2019 by national experts from different agricultural domains in the following agricultural areas:

- Cereals,
- Forages,
- Livestock,
- Olives and fruit trees,
- Vegetables
- Bee keeping (honey).
- Conservation agriculture





## *ICT TOOLS*

### **Agricultural product prices**

Farmers have access to the agricultural product prices (local markets) through a short number (85270) to enhance their revenues. The ICT2Scale project began collecting market prices for 10 agricultural input and output commodities in September 2019.

On a weekly basis, five regional extension agencies (CTV) have been collecting the prices on their local weekly souks (markets) and enter them to the online platform provided by the private IT company NGTrend. Through composing the short number “85270”, farmers and traders can obtain information on prices and availability of the 10 commodities in the five souks.

# SAMPLING METHODOLOGY

## ICT survey

ICT2Scale project was implemented in three governorates: Zaghouan, Kairouan and Jendouba. The selection of the individual farmers was based on a random sample and conducted mainly online due to the COVID-19 pandemic. The survey was conducted from April 19<sup>th</sup> to June 8<sup>th</sup> 2021.

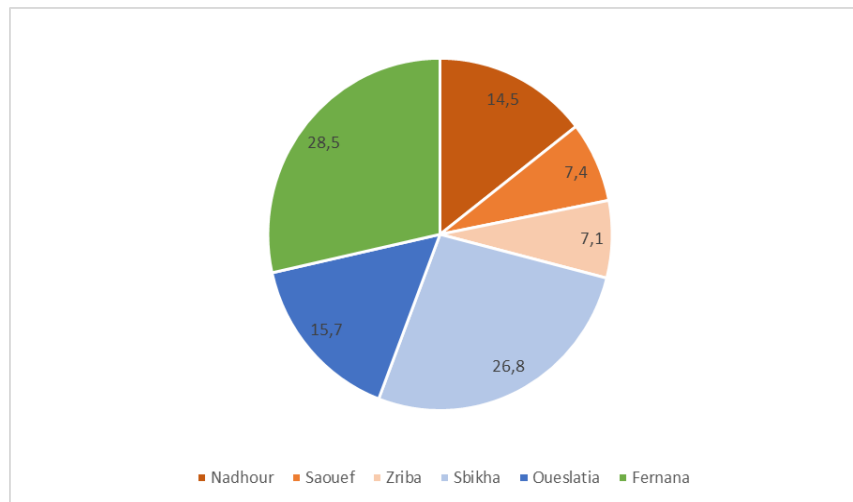


Figure 5. Sample distribution of ICT survey by delegation, %



## ***SAMPLING METHODOLOGY***

### **ICT survey**

The ICT questionnaire was divided into different modules presented as follow:

- Module 1: Identification of the interviewee
- Module 2 : SMS information
- Module 3 : Short number information
- Module 4: Radio spot information
- Module 5: Factors affecting the use of the SMS
- Module 6: ICT impact on agricultural activities

# SAMPLING METHODOLOGY

## E-learning survey

The E-learning survey concerned 37 participants, among them, we counted trainer, government manager, agricultural extension officer, student, researcher, project coordinator, farmer and agricultural employee. The survey was conducted online through Google forms questionnaires between May 12th and May 25th, 2021.

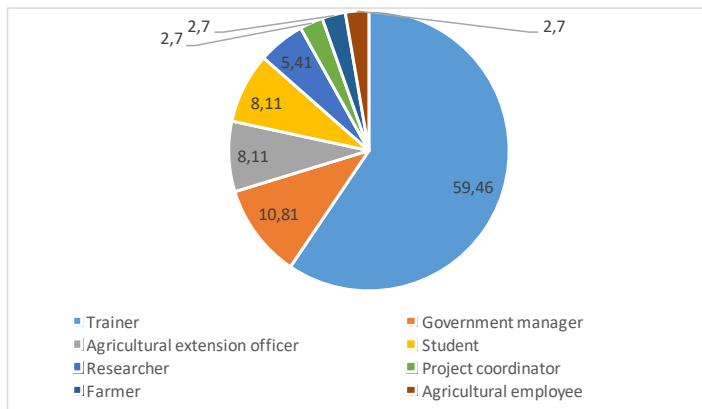


Figure 6. Sample distribution of e-learning survey by main occupation, %

The e-learning questionnaire was divided into different modules presented as follow:

- Module 1: Identification of the interviewee
- Module 2: Questions for the certified participants of the e-learning
- Module 3: Questions for the extension officers and the trainers whom did not participate to the e-learning modules.



## ***DATA ANALYSIS***

- **The two database (E-learning and SMS/short number) were cleaned, coded, entered and edited in the computer. Microsoft Excel and Statistical Package for Social Sciences (SPSS 21) were used for the analysis.**
- **The descriptive analysis was based on the Crosstabs and the chi-squared tests.**



# **I. Baseline characterization of ICT Survey**

## RESULTS AND DISCUSSION

### Socio-economic characteristics of the survey

Variables	$\chi^2$	Zaghouan (n=122)	Kairouan (n=179)	Jendouba (n=120)	Total (n=421)
<b>Sex of household head (HH)</b>					
Female		5.74	4.47	<b>18.33</b>	8.79
Male	19.220*	94.26	95.53	81.67	<b>91.21</b>
<b>Age of HH(years)</b>					
26 or less		2.46	1.12	4.17	2.38
27–35		4.92	15.08	29.17	16.15
36–45		16.39	17.88	<b>35.83</b>	22.57
46–55		27.05	<b>25.70</b>	20.00	<b>24.47</b>
56–65		<b>31.97</b>	23.46	8.33	21.62
65 or above	69.738*	17.21	16.76	2.50	12.83
<b>Education level of HH</b>					
Illiterate		6.56	11.17	2.50	7.36
Kuranic school		2.46	0	0	0.71
Primary education		<b>52.46</b>	<b>43.02</b>	17.50	38.48
Secondary education		22.95	29.61	33.33	28.74
University education	70.860*	15.57	16.20	<b>46.67</b>	24.70

\* Significant at 1%, \*\* Significant at 5%, \*\*\*\* Significant at 10%.

## RESULTS AND DISCUSSION

### Socio-economic characteristics of the survey

Variables	$\chi^2$	Zaghouan (n=122)	Kairouan (n=179)	Jendouba (n=120)	Total (n=421)
<b>Annual income (TND)</b>					
5000 or less		33.61	<b>43.02</b>	25.83	<b>35.39</b>
5000-10000	19.045*	<b>38.52</b>	30.17	<b>40.83</b>	<b>35.63</b>
10000-15000	*	22.13	12.85	23.33	18.53
More than 15000		5.74	13.97	10.00	10.45
<b>Member Of Association</b>					
No		93.44	92.18	62.50	84.09
Yes	58.526*	6.56	7.82	<b>37.50</b>	<b>15.91</b>
<b>Land holding(ha)</b>					
No land		5.74	1.68	<b>48.33</b>	16.15
Lessthan6		<b>45.90</b>	<b>45.81</b>	37.50	<b>43.47</b>
6–10	142.16	27.05	24.02	10.00	20.90
11–20	3*	12.30	18.44	2.50	12.11
Morethan20		9.02	10.06	1.67	7.36

\* Significant at 1%, \*\* Significant at 5%, \*\*\*\* Significant at 10%.



## RESULTS AND DISCUSSION

### Socio-economic characteristics of the survey

Variables	$\chi^2$	Zaghouan (n=122)	Kairouan (n=179)	Jendouba (n=120)	Total (n=421)
<b>Number of livestock (cattle, sheep, poultry)</b>					
No animals		<b>49.18</b>	<b>63.13</b>	<b>48.33</b>	<b>54.87</b>
Less than 10		13.93	13.41	12.50	13.30
11-20	12.057	10.66	7.26	13.33	9.98
20-50		15.57	11.17	15.00	13.54
More than 50		10.66	5.03	10.83	8.31
<b>Number of beehives</b>				<b>N=68</b>	<b>N=68</b>
Less than 10		-	-	29.4	29.4
11-50		-	-	<b>61.8</b>	<b>61.8</b>
More than 50		-	-	8.8	8.8

\* Significant at 1%, \*\* Significant at 5%, \*\*\*\* Significant at 10%.

# RESULTS AND DISCUSSION

## 1. Socio-economic characteristics of the survey

Variables	$\chi^2$	Zaghouan (n=122)	Kairouan (n=179)	Jendouba (n=120)	Total (n=421)
<b>Access to technology</b>					
Smartphone owned by HH	19.859*	40.98	35.20	<b>60.83</b>	44.18
Smartphone owned by a member of the household	1.644	<b>62.30</b>	<b>58.10</b>	54.17	<b>58.19</b>
<b>Distance to the market (Km)</b>					
Less than 6		<b>59.84</b>	27.37	40.00	<b>40.38</b>
6-10		13.11	13.97	19.17	15.20
11-20	64.158*	19.67	26.82	24.17	23.99
21-50		7.38	16.76	16.67	14.01
More than 50		-	<b>15.08</b>	-	6.41

\* Significant at 1%, \*\* Significant at 5%, \*\*\*\* Significant at 10%.

# RESULTS AND DISCUSSION

## 1. Socio-economic characteristics of the survey

### Main information sources

(mean likert scale ; 1: not important, 5 :Very important)

Variables	$\chi^2$	Zaghouan (n=122)	Kairoua n (n=179)	Jendoub a (n=120)	Total (n=421)
Neighbors, friends	12.385	3.25	3.16	3.29	3.22
Farmers	23.081**	3.75	3.77	3.81	3.77
Extension services (CTV, AVFA, etc.)	88.688*	1.51	1.25	2.09	1.57
Local market	38.168*	3.02	2.93	2.96	2.96
TV, radio	15.045***	1.57	1.40	1.22	1.40
Social Media	17.227**	2.42	2.15	2.82	2.42

\* Significant at 1%, \*\* Significant at 5%, \*\*\* Significant at 10%.

# RESULTS AND DISCUSSION

## 2. Information linked to the SMS

Variables	$\chi^2$	Zaghouan	Kairouan	Jendouba	Total
Since when do you receive the SMS sent by the regional extension services (CTV)?		N=122	N=171	N=120	N=413
2019	35.004*	-	10.53	11.67	7.75
2020		100.00	77.19	83.33	85.71
2021		-	12.28	5.00	6.54
Frequencies of the reception of the SMS		N=122	N=179	N=120	N=421
Twice a week	212.007*	39.34	1.12	25.83	19.24
Once a week		-	1.12	7.50	2.61
One to three times a month		5.74	37.99	28.33	25.89
Once every two or three months		0.82	8.94	19.17	9.50
When I check my phone		54.10	43.58	-	34.20
Irregularly		-	7.26	19.17	8.55

\* Significant at 1%, \*\* Significant at 5%, \*\*\*\* Significant at 10%.

# RESULTS AND DISCUSSION

## 2. Information linked to the SMS

Variables	$\chi^2$	Zaghoua n	Kairouan	Jendouba	Total
Do you have problems receiving SMS?		N=122	N=179	N=120	N=421
Yes	35.345*	18.85	4.47	0.00	7.36
Types of Problems receiving SMS		N=23	N=8	N=0	N=31
Change of the mobile number	1.867	4.35	-	-	3.23
Phone breakdown		4.35	-	-	3.23
Network problem		73.91	62.50	-	70.97
Phone storage problem		17.39	37.50	-	22.58

\* Significant at 1%, \*\* Significant at 5%, \*\*\*\* Significant at 10%.

# RESULTS AND DISCUSSION

## 2. Information linked to the SMS

Variables	$\chi^2$	Zaghouan	Kairouan	Jendouba	Total
<b>How often do you read these SMS?</b>		<b>N=122</b>	<b>N=179</b>	<b>N=120</b>	<b>N=421</b>
Regularly	138.768*	30.33	79.33	92.50	68.88
Sometimes		27.87	12.85	7.50	15.68
Rarely		36.07	7.82	-	13.78
Never		5.74	-	-	1.66
<b>Why do you rarely or never read the SMS ?</b>		<b>N=48</b>	<b>N=14</b>	<b>N=0</b>	<b>N=62</b>
No interest	10.650**	31.25	14.29	-	27.42
Illiterate		-	14.29	-	3.23
Lack of time		4.17	7.14	-	4.84
Lack of motivation		50.00	64.29	-	53.23
Network problem		14.58	-	-	11.29

\* Significant at 1%, \*\* Significant at 5%, \*\*\*\* Significant at 10%.

# RESULTS AND DISCUSSION

## 2. Information linked to the SMS

Variables	$\chi^2$	Zaghouan	Kairouan	Jendouba	Total
<b>Are these SMS useful?</b>		<b>N=122</b>	<b>N=179</b>	<b>N=120</b>	<b>N=421</b>
Not useful at all	295.953*	<b>42.62</b>	<b>28.49</b>	-	24.47
Not useful		14.75	<b>24.58</b>	-	14.73
Indifferent		<b>31.15</b>	<b>28.49</b>	3.33	22.09
Useful		9.02	15.64	<b>25.00</b>	16.39
Very useful		2.46	2.79	<b>71.67</b>	22.33
<b>Did these SMS teach you something?</b>		<b>N=122</b>	<b>N=179</b>	<b>N=120</b>	<b>N=421</b>
A lot of new information	46.895*	5.7	18.4	<b>31.7</b>	<b>18.53</b>
Moderately new information		12.3	<b>27.9</b>	11.7	<b>18.76</b>
Few new information		<b>24.6</b>	14.0	14.2	17.10
Nothing		<b>57.4</b>	<b>39.7</b>	<b>42.5</b>	<b>45.61</b>

\* Significant at 1%, \*\* Significant at 5%, \*\*\*\* Significant at 10%.

# RESULTS AND DISCUSSION

## 2. Information linked to the SMS

Variables	$\chi^2$	Zaghoua n	Kairoua n	Jendoub a	Total
<b>Do you keep the SMS as a reference information?</b>		<b>N=122</b>	<b>N=179</b>	<b>N=120</b>	<b>N=421</b>
No	1.536	29.51	23.46	24.17	25.42
Yes		70.49	76.54	75.83	74.58
<b>How much do you use the information of the SMS?</b>		<b>N=122</b>	<b>N=179</b>	<b>N=120</b>	<b>N=421</b>
Very high	260.598*	0.82	1.12	33.33	10.21
High		4.10	9.50	47.50	18.76
Moderate		25.41	17.88	17.50	19.95
Weak		21.31	24.58	0.83	16.86
Very weak		25.41	12.29	-	12.59
No use		22.95	34.64	0.83	21.62

\* Significant at 1%, \*\* Significant at 5%, \*\*\*\* Significant at 10%.



# RESULTS AND DISCUSSION

## 2. Information linked to the SMS

Variables	$\chi^2$	Zaghouan	Kairouan	Jendouba	Total
<b>Is this technology relevant?</b>		<b>N=122</b>	<b>N=179</b>	<b>N=120</b>	<b>N=421</b>
Not relevant at all	88.348*	<b>34.43</b>	<b>40.78</b>	5.83	<b>28.98</b>
Not relevant		<b>35.25</b>	<b>34.08</b>	22.50	<b>31.12</b>
Indifferent		11.48	15.64	<b>40.00</b>	21.38
Relevant		13.93	7.26	<b>29.17</b>	<b>15.44</b>
Very relevant		4.92	2.23	2.50	3.09
<b>Are the SMS received at the right time?</b>		<b>N=122</b>	<b>N=179</b>	<b>N=120</b>	<b>N=421</b>
Not agree at all	15.605*	<b>49.18</b>	<b>31.28</b>	<b>45.83</b>	<b>40.62</b>
Not agree		8.20	5.59	6.67	6.65
Indifferent		<b>27.05</b>	<b>45.81</b>	<b>34.17</b>	<b>37.05</b>
Agree		9.84	10.61	8.33	<b>9.74</b>
Totally agree		5.74	6.70	5.00	<b>5.94</b>

\* Significant at 1%, \*\* Significant at 5%, \*\*\*\* Significant at 10%.

# RESULTS AND DISCUSSION

## 2. Information linked to the SMS

Variables	$\chi^2$	Zaghou an N=122	Kairou an N=179	Jendou ba N=120	Total N=421
Are you willing to pay 0.030 TND per SMS sent once the project ends?					
No	38.044*	82.0	47.5	53.3	59.14
Yes		18.0	52.5	46.7	40.86
Reasons for unwillingness to pay 0.030 TND per SMS sent once the project ends?					
Extension services are free	103.087 *	-	10.59	29.69	11.24
Technology is not adapted		28.00	1.18	-	11.65
Problem related to the content of the SMS		41.00	37.65	46.88	41.37
Not interested by this technology		5.00	32.94	21.88	18.88
SMS is expensive		26.00	17.65	1.56	16.87

\* Significant at 1%, \*\* Significant at 5%, \*\*\*\* Significant at 10%.



## *RESULTS AND DISCUSSION*

### 3. Assessment of the other ICT for Agricultural Development

#### 3.1. Short number (85270)

- All the interviewed farmers declared that they **did not know** the short number (85270) dedicated to have access to the agricultural product prices (local markets).
- They claim that they were **not aware of this** new service. For the future use of this technology, the interviewed farmers prefer **to have this service for free** as it is paying for now (0.150DT per SMS).



## *RESULTS AND DISCUSSION*

### 3. Assessment of the other ICT for Agricultural Development

#### 3.2. Radio spot technology

- All the interviewed farmers in the whole sample stated that **they did not know** that the radio spots of ICARDA and AFVA broadcast every sunday around 8:30 am on the Tunisian national radio.
- They claim that they did not hear these radio spots and **were not aware** of this information and communication Technology. Indeed, the radio spot is a **new technology that the project introduced only in February 2021**. Unfortunately, there was no time to sensitize farmers about this technology.

# RESULTS AND DISCUSSION

## 3. Assessment of the other ICT for Agricultural Development

### 3.2. Radio spot technology

Variables	$\chi^2$	Zaghousa n (n=122)	Kairoua n (n=179)	Jendoub a (n=120)	Total (n=421)
<b>Are you interested in agricultural radio spots?</b>					
No	67.330*	40.16	54.75	90.00	60.57
Yes		59.84	45.25	10.00	39.43
<b>Is this technology (radio spots) relevant?</b>					
Not agree at all	78.424*	32.79	32.40	75.83	44.89
Not agree		19.67	17.88	9.17	15.91
Indifferent		40.98	31.84	11.67	28.74
agree		4.92	11.17	3.33	7.13
Totally agree		1.64	6.70	-	3.33
<b>Main Proposed thematic for these radio spots by the interviewees</b>					
Olive		72.13	21.79	-	30.17
Incentive policies		-	20.27	24.17	15.68
Plant diseases		-	25.14	7.50	12.83
Horticulture		12.30	4.47	-	5.46
Cereal		9.02	1.68	-	3.33
Arboriculture		6.56	-	-	1.90

\* Significant at 1%, \*\* Significant at 5%, \*\*\*\* Significant at 10%.

# RESULTS AND DISCUSSION

## 4. Factors affecting the use of SMS

### 4.1. Farmers assessment to the cost indicators of the SMS

Cost indicators		$\chi^2$	Zaghouan n=(122)	Kairouan (n=179)	Jendouba (n=120)	Total (n=421)
The price of the SMS (0.030 TND) to obtain farm input information is not expensive	Not agree at all	229.841*	65.57	25.70	5.83	31.59
	Not agree		16.39	6.15	1.67	7.84
	Indifferent		-	13.97	53.33	21.14
	Agree		-	6.15	17.50	7.60
	Totally agree		18.03	48.04	21.67	31.83
I use SMS because they are cheap (free at the moment)	Not agree at all	38.448*	27.05	14.5	17.5	19.00
	Not agree		6.56	11.7	8.3	9.26
	Indifferent		13.93	32.4	20.8	23.75
	Agree		-	6.7	11.7	6.18
	Totally agree		52.46	34.6	41.7	41.81
Obtaining information by phone calls or by going to the extension services is more expensive than using SMS	Not agree at all	256.421*	0.82	10.61	1.67	5.23
	Not agree		0.82	9.50	0.83	4.51
	Indifferent		17.21	13.97	4.17	12.11
	Agree		79.51	34.08	4.17	38.72
	Totally agree		1.64	31.84	89.17	39.43

\* Significant at 1%, \*\* Significant at 5%, \*\*\*\* Significant at 10%.

# RESULTS AND DISCUSSION

## 4. Factors affecting the use of SMS

### 4.2. Farmers assessment to the relative advantage indicators of the SMS

Relative advantage indicators		$\chi^2$	Zaghouan n=(122)	Kairouan (n=179)	Jendouba (n=120)	Total (n=421)
SMS is better than using books or newspapers to get farm input information	Not agree at all	66.831*	81.97	43.58	43.33	54.63
	Not agree		1.64	7.82	9.17	6.41
	Indifferent		3.28	16.20	28.33	15.91
	Agree		5.74	17.32	10.00	11.88
	Totally agree		7.38	15.08	9.17	11.16
SMS is more interesting than other sources of information that I have used to get farm input information	Not agree at all	83.246*	76.23	45.81	48.33	55.34
	Not agree		19.67	11.73	7.50	12.83
	Indifferent		2.46	16.76	32.50	17.10
	Agree		0.82	16.20	5.83	8.79
	Totally agree		0.82	9.50	5.83	5.94
Using SMS contributed to the adoption of farm input information than it would be not possible without them for me	Not agree at all	5.888	95.90	91.06	94.17	93.35
	Not agree		4.10	5.59	2.50	4.28
	Indifferent		-	3.35	3.33	2.38
	Agree		-	-	-	-
	Totally agree		-	-	-	-

\* Significant at 1%, \*\* Significant at 5%, \*\*\*\* Significant at 10%.

# RESULTS AND DISCUSSION

## 4. Factors affecting the use of SMS

### 4.3. Farmers assessment to the compatibility indicators of the SMS

Compatibility indicators		$\chi^2$	Zaghouan n=(12 2)	Kairoua n (n=179)	Jendou ba (n=120)	Total (n=42 1)
SMS is suitable to the way that I like to get information on farm inputs	Not agree at all	97.911*	84.43	46.93	41.67	56.29
	Not agree		3.28	3.35	4.17	3.56
	Indifferent		9.02	15.08	13.33	12.83
	Agree		3.28	20.67	5.83	11.40
	Totally agree		-	13.97	35.00	15.91
I think other farmers should use SMS to access/use farm input information	Not agree at all	241.823*	81.97	26.82	1.67	35.63
	Not agree		-	3.35	2.50	2.14
	Indifferent		5.74	26.82	25.00	20.19
	Agree		7.38	20.11	3.33	11.64
	Totally agree		4.92	22.91	67.50	30.40
Using SMS made my agricultural activities seem more relevant	Not agree at all	187.562*	88.52	44.13	32.50	53.68
	Not agree		1.64	13.97	10.83	9.50
	Indifferent		9.84	30.17	18.33	20.90
	Agree		-	11.73	4.17	6.18
	Totally agree		-	-	34.17	9.74



# RESULTS AND DISCUSSION

## 4. Factors affecting the use of SMS

### 4.4. Farmers assessment to the simplicity indicators of the SMS

Simplicity indicators		$\chi^2$	Zaghouan n=(12 2)	Kairoua n (n=179)	Jendou ba (n=120)	Total (n=42 1)
When using SMS, I have no difficulty finding the information that I want	Not agree at all	139.260*	86.07	51.96	44.17	59.62
	Not agree		2.46	8.94	10.83	7.60
	Indifferent		11.48	36.87	12.50	22.57
	Agree			1.12	4.17	1.66
	Totally agree			1.12	28.33	8.55
I have no difficulty understanding how to get around in SMS	Not agree at all	9.897**	-	-	-	-
	Not agree		-	-	-	-
	Indifferent		-	2.23	2.50	1.66
	Agree		-	4.47	5.83	3.56
	Totally agree		100.00	93.30	91.67	94.77
When using SMS, I have no difficulty implementing the information that I get	Not agree at all	67.767*	-	4.5	3.3	2.85
	Not agree		1.6	3.4	5.0	3.33
	Indifferent		-	20.1	21.7	14.73
	Agree		31.1	40.2	15.0	30.40
	Totally agree		67.2	31.8	55.0	48.69

\* Significant at 1%, \*\* Significant at 5%, \*\*\*\* Significant at 10%.

# RESULTS AND DISCUSSION

## 4. Factors affecting the use of SMS

### 4.5. Farmers assessment to the observability indicators of the SMS

Observability indicators		$\chi^2$	Zaghouan n=(122)	Kairouan (n=179)	Jendouba (n=120)	Total (n=421)
Other farmers were/seemed interested in SMS when they saw me using it (because I discuss with them sometimes)	Not agree at all		81.97	36.31	24.17	46.08
	Not agree		9.84	31.84	10.00	19.24
	Indifferent	176.985*	6.56	24.02	27.50	19.95
	Agree		1.64	6.15	7.50	5.23
	Totally agree		-	1.68	30.83	9.50
People can tell that I know more about farm input information since I have started using SMS (because I discuss with them sometimes on these ICT)	Not agree at all		82.79	55.87	53.33	62.95
	Not agree		0.82	5.03	7.50	4.51
	Indifferent	111.507*	0.82	5.59	31.67	11.64
	Agree		14.75	30.17	2.50	17.81
	Totally agree		0.82	3.35	5.00	3.09
Other farmers using SMS liked using them, i.e. they found them satisfactory (because I discuss with them sometimes on these ICT)	Not agree at all		81.97	42.46	23.33	48.46
	Not agree		1.64	5.03	10.00	5.46
	Indifferent	179.986*	1.64	15.08	28.33	14.96
	Agree		13.11	32.96	5.00	19.24
	Totally agree		1.64	4.47	33.33	11.88

\* Significant at 1%, \*\* Significant at 5%, \*\*\*\* Significant at 10%.

# RESULTS AND DISCUSSION

## 4. Factors affecting the use of SMS

### 4.6. Farmers assessment to the social influence indicators of the SMS

Social influence indicators		$\chi^2$	Zaghouan n=(122)	Kairouan (n=179)	Jendouba (n=120)	Total (n=421)
My neighbors (village mates, friends) think I should keep using SMS	Not agree at all		82.79	34.64	18.33	43.94
	Not agree		-	10.61	5.83	6.18
	Indifferent	209.182*	2.46	23.46	70.00	30.64
	Agree		13.93	29.61	1.67	17.10
	Totally agree		0.82	1.68	4.17	2.14
My friends and neighbors use SMS	Not agree at all		95.90	29.61	10.00	43.23
	Not agree		1.64	1.68	6.67	3.09
	Indifferent	272.816*	2.46	11.73	39.17	16.86
	Agree		-	34.64	9.17	17.34
	Totally agree		-	22.35	35.00	19.48
I feel that using SMS gives me a particular status	Not agree at all		95.08	64.25	64.17	73.16
	Not agree		2.46	25.70	10.00	14.49
	Indifferent	82.837*	1.64	6.15	25.00	10.21
	Agree		0.82	3.35	0.83	1.90
	Totally agree		-	0.56	-	0.24

\* Significant at 1%, \*\* Significant at 5%, \*\*\*\* Significant at 10%.

# RESULTS AND DISCUSSION

## 4. Factors affecting the use of SMS

### 4.7. Farmers assessment to the information quality indicators of the SMS

Information quality indicators		$\chi^2$	Zaghouan n=(12 2)	Kairou an (n=179 )	Jendou ba (n=120)	Total (n=42 1)
The information I got from SMS are complete, i.e. all the data necessary to meet my current needs for farm input information are provided	Not agree at all		96.72	58.66	43.33	65.32
	Not agree		1.64	3.91	10.00	4.99
	Indifferent	131.413*	0.82	10.06	10.83	7.60
	Agree		0.82	22.91	9.17	12.59
	Totally agree		-	4.47	26.67	9.50
The information I got from SMS was relevant, i.e. the information is suitable for my current needs	Not agree at all		91.80	46.37	25.00	53.44
	Not agree		1.64	5.59	8.33	5.23
	Indifferent	163.080*	4.10	15.64	26.67	15.44
	Agree		2.46	24.02	7.50	13.06
	Totally agree		-	8.38	32.50	12.83
The information I got from SMS was appropriate, i.e. in the suitable format and quantity	Not agree at all		89.34	41.34	20.83	49.41
	Not agree		1.64	16.76	14.17	11.64
	Indifferent	173.842*	7.38	13.97	24.17	14.96
	Agree		1.64	22.35	10.00	12.83
	Totally agree		-	5.59	30.83	11.16

\* Significant at 1%, \*\* Significant at 5%, \*\*\*\* Significant at 10%.

# RESULTS AND DISCUSSION

## 5. Farmer's assessment to the use of SMS indicators

Use of SMS indicators		$\chi^2$	Zaghouan n=(122)	Kairouan (n=179)	Jendouba (n=120)	Total (n=421)
I use/plan to consult SMS regularly when I need to	Not agree at all	145.836*	81.97	40.22	14.17	44.89
	Not agree		0.82	1.12	2.50	1.43
	Indifferent		11.48	16.20	40.00	18.29
	Agree		5.74	9.50	8.33	9.74
	Totally agree		-	32.96	35.00	25.65
I intend to use/continue to use SMS	Not agree at all	172.655*	81.97	29.61	5.00	37.77
	Not agree		-	1.68	4.17	1.90
	Indifferent		-	21.23	31.67	18.05
	Agree		4.10	3.35	10.00	5.46
	Totally agree		13.93	44.13	49.17	36.82
I recommend farmers to use SMS	Not agree at all	192.260*	81.97	29.05	5.83	37.77
	Not agree		-	3.91	6.67	3.56
	Indifferent		-	20.67	40.83	20.43
	Agree		13.93	12.85	7.50	11.64
	Totally agree		4.10	33.52	39.17	26.60

\* Significant at 1%, \*\* Significant at 5%, \*\*\*\* Significant at 10%.

## RESULTS AND DISCUSSION

### 6. Farmer's assessment to the increased adoption of farm input information indicators

Increased adoption of farm input information indicators		$\chi^2$	Zaghouan n=(1 22)	Kairoua n (n=179)	Jendou ba (n=120)	Total (n=42 1)
<b>Before</b> I started using SMS, I had difficulties to access farm input information	Not agree at all		85.25	60.34	51.67	65.08
	Not agree	97.455*	8.20	10.06	11.67	9.98
	Indifferent		6.56	7.26	31.67	14.01
	Agree		-	22.35	3.33	10.45
	Totally agree		-	-	1.67	0.48
<b>Before</b> I started using SMS, I had difficulties to use farm input information	Not agree at all		85.25	62.01	75.83	72.68
	Not agree	64.002*	9.02	8.94	15.83	10.93
	Indifferent		5.74	6.70	8.33	6.89
	Agree		-	22.35	-	9.50
	Totally agree		-	-	-	-
<b>After</b> I started using SMS, I found it easier to access farm input information, and I have more access to farm input information	Not agree at all		85.25	53.07	50.00	61.52
	Not agree	103.511 *	9.02	7.26	9.17	8.31
	Indifferent		5.74	11.17	17.50	11.40
	Agree		-	25.70	5.83	12.59
	Totally agree		-	2.79	17.50	6.18
<b>After</b> I started using SMS, I found it easier to use farm input information, and I have improved the use of farm input information	Not agree at all		85.25	56.42	55.83	64.61
	Not agree	104.951 *	9.02	7.26	10.83	8.79
	Indifferent		5.74	8.94	30.83	14.25
	Agree		-	24.58	0.83	10.69
	Totally agree		-	2.79	1.67	1.66

\* Significant at 1%, \*\* Significant at 5%, \*\*\*\* Significant at 10%.

# RESULTS AND DISCUSSION

## 7. Impacts of the use of SMS on agricultural activities

### 7.1. Olive crop

Variables	$\chi^2$	Zaghouan N=102	Kairouan N=122	Total N=224
<b>Olive crop management</b>				
No Impact	1.321	<b>80.39</b>	<b>80.33</b>	<b>80.36</b>
Weak Impact		10.78	12.30	11.61
Moderate Impact		7.84	7.38	7.59
Important Impact		0.98	-	0.45
Very important impact		-	-	-
<b>Olive phytosanitary treatments</b>		<b>N=102</b>	<b>N=123</b>	<b>N=225</b>
No Impact	10.175**	<b>79.41</b>	<b>92.68</b>	<b>86.67</b>
Weak Impact		16.67	7.32	11.56
Moderate Impact		1.96	-	0.89
Important Impact		0.98	-	0.44
Very important impact		0.98	-	0.44
<b>Olive harvest</b>		<b>N=102</b>	<b>N=123</b>	<b>N=225</b>
No Impact	16.321**	<b>78.43</b>	<b>92.68</b>	<b>86.22</b>
Weak Impact		15.69	2.44	8.44
Moderate Impact		4.90	1.63	3.11
Important Impact		0.98	2.44	1.78
Very important impact		-	0.81	0.44

\* Significant at 1%, \*\* Significant at 5%, \*\*\*\* Significant at 10%.

# RESULTS AND DISCUSSION

## 7. Impacts of the use of SMS on agricultural activities

### 7.1. Olive crop

#### *Reasons for the lack of impact of the SMS on olive crop*

Variables	$\chi^2$	Zaghouan N=82	Kairouan N=98	Total N=180
<b>Crop management</b>				
General information	3.343	51.22	54.08	52.78
Information already known		40.24	41.84	41.11
Immeasurable impact		8.54	3.06	5.56
Unused information		-	1.02	0.56
<b>Phytosanitary treatments</b>		N=81	N=114	N=195
General information	6.810***	55.56	48.25	51.28
Information already known		22.22	38.60	31.79
Immeasurable impact		4.94	2.63	3.59
Unused information		17.28	10.53	13.33
<b>Harvest</b>		N=80	N=114	N=194
General information	15.191**	52.50	46.49	48.97
Information already known		35.00	51.75	44.85
Immeasurable impact		12.50	0.88	5.67
Unused information		-	0.88	0.52

\* Significant at 1%, \*\* Significant at 5%, \*\*\*\* Significant at 10%.



## RESULTS AND DISCUSSION

### 7. Impacts of the use of SMS on agricultural activities

#### 7.2. Citrus crop

##### *Impact of the use of SMS on citrus crop*

Variables	$\chi^2$	Zaghouan N=1	Kairouan N=8	Total N=9
Crop management, Phytosanitary treatments, Harvest				
No Impact	-	100.00	100.00	100.00

##### *Reasons for the lack of impact of the SMS on citrus crop*

Variables	$\chi^2$	Zaghouan N=1	Kairouan N=7	Total N=8
Crop management, phytosanitary treatments, harvest				
General information	8.000**	-	100.00	87.50
Immeasurable impact		100.00	-	12.50

\* Significant at 1%, \*\* Significant at 5%, \*\*\*\* Significant at 10%.

# RESULTS AND DISCUSSION

## 7. Impacts of the use of SMS on agricultural activities

### 7.3. Vegetables

*Impact of the use of SMS on vegetables*

Variables	$\chi^2$	Zaghouan N=17	Kairouan N=44	Total N=61
<b>Vegetables management , vegetables irrigation, vegetables harvest</b>				
No Impact	-	100.00	100.00	<b>100.00</b>
<b>Vegetables phytosanitary treatments</b>				
No Impact		58.82	100.00	<b>88.52</b>
Weak Impact	20.46	29.41	-	8.20
Moderate Impact	6*	11.76	-	<b>3.28</b>
Important Impact		-	-	-
Very important impact		-	-	-

*Reasons for the lack of impact of the SMS on vegetables*

Variables	$\chi^2$	Zaghouan N=17	Kairouan N=44	Total N=61
<b>Crop management</b>				
General information	17.224*	64.71	<b>100.00</b>	<b>90.16</b>
Information already known		35.29	-	9.84
<b>Phytosanitary treatments</b>				
General information	-	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>
<b>Harvest</b>				
General information	20.466*	58.82	<b>100.00</b>	<b>88.52</b>
Information already known		41.18	-	11.48
<b>Irrigation</b>				
General information	27.326*	47.06	<b>100.00</b>	<b>85.25</b>
Information already known		<b>52.94</b>	-	14.75

\* Significant at 1%, \*\* Significant at 5%, \*\*\*\* Significant at 10%.

# RESULTS AND DISCUSSION

## 7. Impacts of the use of SMS on agricultural activities

### 7.4. Forage crops

*Impact of the use of SMS on forage crops*

Variables	$\chi^2$	Zaghouan N=5	Kairouan N=3	Total N=8
Choice of forage crops, forage crops management, valorization of the forage crops				
No Impact	-	100.00	100.00	100.00

*Reasons for the lack of impact of the SMS on forage crops*

Variables	$\chi^2$	Zaghouan N=5	Kairouan N=3	Total N=8
<b>Choice of forage crops</b>				
General information	4.800**	20.00	100.00	50.00
Information already known		80.00	-	50.00
<b>Forage crops management</b>				
General information	4.800 ***	20.00	100.00	50.00
Information already known		60.00		37.50
Unused information		20.00		12.50
<b>Valorization of the forage crops</b>				
General information	8.000	-	100.00	37.50
Information already known	**	80.00	-	50.00
Unused information		20.00	-	12.50

\* Significant at 1%, \*\* Significant at 5%, \*\*\* Significant at 10%.

# RESULTS AND DISCUSSION

## 7. Impacts of the use of SMS on agricultural activities

### 7.5. Cereal crops

*Impact of the use of SMS on cereal crops*

Variables	$\chi^2$	Zaghouan N=60	Kairouan N=7	Total N=67
Cereal crops management, Cereal fertilization				
No Impact	8.701**	100.00	85.71	98.51
Weak Impact		-	14.29	1.49
Cereal harvest				
No Impact	3.447***	98.33	85.7	97.0
Weak Impact		1.67	14.3	3.0

*Reasons for the lack of impact of the SMS on cereal crops*

Variables	χ2	Zaghoua	Kairoua	Total
		n	n	
Crop management		N=60	N=6	N=66
General information	26.908*	11.7	100.00	19.70
Information already known		85.0	-	77.27
Immeasurable impact		3.3	-	3.03
Fertilization		N=60	N=6	N=66
General information	26.908*	11.67	100.00	19.70
Information already known		36.67	-	33.33
Unused information		51.67	-	46.97
Harvest		N=59	N=6	N=65
General information	32.450*	8.47	100.00	16.92
Information already known		84.75	-	76.92
Immeasurable impact		1.69	-	1.54
Unused information		5.08	-	4.62

\* Significant at 1%, \*\* Significant at 5%, \*\*\*\* Significant at 10%.

# RESULTS AND DISCUSSION

## 7. Impacts of the use of SMS on agricultural activities

### 7.6. Livestock

*Impact of the use of  
SMS on livestock*

Variables	$\chi^2$	Zaghouan	Kairouan	Total
<b>Feed</b>		<b>N=70</b>	<b>N=72</b>	<b>N=142</b>
No Impact	14.090*	58.57	86.11	72.54
Weak Impact		27.14	6.94	16.90
Moderate Impact		14.29	6.94	10.56
<b>Management</b>		<b>N=70</b>	<b>N=72</b>	<b>N=142</b>
No Impact	9.404**	70.00	87.50	78.87
Weak Impact		21.43	9.72	15.49
Moderate Impact		8.57	1.39	4.93
Important Impact		-	1.39	0.7
<b>Vaccination</b>		<b>N=67</b>	<b>N=72</b>	<b>N=139</b>
No Impact	1.352	91.04	91.67	91.37
Weak Impact		5.97	5.56	5.76
Moderate Impact		2.99	1.39	2.16
Important Impact		-	1.39	0.72
<b>Trade</b>		<b>N=102</b>	<b>N=122</b>	<b>N=224</b>
No Impact	2.301	94.03	98.61	96.40
Weak Impact		4.48	1.39	2.88
Moderate Impact		1.49	-	0.72

\* Significant at 1%, \*\* Significant at 5%, \*\*\*\* Significant at 10%.

# RESULTS AND DISCUSSION

## 7. Impacts of the use of SMS on agricultural activities

### 7.6. Livestock

*Reasons for the lack  
of impact of the SMS  
on livestock*

Variables	$\chi^2$	Zaghouan	Kairouan	Total
<b>Feed</b>		<b>N=41</b>	<b>N=62</b>	<b>N=103</b>
General information	9.860**	29.27	<b>51.61</b>	42.72
Information already known		<b>68.29</b>	38.71	<b>50.49</b>
Immeasurable impact		2.44	3.23	2.91
Unused information		-	6.45	3.88
<b>Management</b>		<b>N=49</b>	<b>N=63</b>	<b>N=112</b>
General information	25.503*	26.53	<b>57.14</b>	<b>43.75</b>
Information already known		<b>34.69</b>	36.51	35.71
Immeasurable impact		6.12	6.35	6.25
Unused information		<b>32.65</b>	-	14.29
<b>Vaccination</b>		<b>N=61</b>	<b>N=66</b>	<b>N=127</b>
General information	18.153*	<b>36.07</b>	<b>51.52</b>	<b>44.09</b>
Information already known		36.07	46.97	41.73
Unused information		<b>27.87</b>	1.52	14.17
<b>Trade</b>		<b>N=63</b>	<b>N=71</b>	<b>N=134</b>
General information	35.304*	38.10	<b>49.30</b>	<b>44.03</b>
Information already known		4.76	<b>36.62</b>	21.64
Immeasurable impact		1.59	1.41	1.49
Unused information		<b>55.56</b>	12.68	32.84

\* Significant at 1%, \*\* Significant at 5%, \*\*\*\* Significant at 10%.

# RESULTS AND DISCUSSION

## 7. Impacts of the use of SMS on agricultural activities

### 7.7. Beekeeping

#### Impact of the use of SMS on beekeeping

Variables	$\chi^2$	Jendouba N=120
<b>Choice of hives</b>		
No Impact		-
Weak Impact		32.50
Moderate Impact	123.000*	16.67
Important Impact		19.17
Very important impact		31.67
<b>Water management</b>		
No Impact		-
Weak Impact		-
Moderate Impact	123.000*	32.50
Important Impact		44.17
Very important impact		23.33
<b>Phytosanitary treatment</b>		
No Impact		-
Weak Impact		-
Moderate Impact	123.000*	-
Important Impact		28.33
Very important impact		71.67
<b>Hibernation</b>		
No Impact		-
Weak Impact		-
Moderate Impact	123.000*	-
Important Impact		28.33
Very important impact		71.67

\* Significant at 1%, \*\* Significant at 5%, \*\*\*\* Significant at 10%.

# RESULTS AND DISCUSSION

## 7. Impacts of the use of SMS on agricultural activities

### 7.7. Beekeeping

#### *Impact of the use of SMS on beekeeping*

Variables	$\chi^2$	Jendouba
<b>Hive protection</b>		
No Impact	123.000*	-
Weak Impact		-
Moderate Impact		1.67
Important Impact		15.00
Very important impact		83.33
<b>Weather alerts</b>		
No Impact	123.000*	-
Weak Impact		-
Moderate Impact		0.83
Important Impact		12.50
Very important impact		86.67
<b>Trade</b>		
No Impact	72.570*	1.67
Weak Impact		20.00
Moderate Impact		64.17
Important Impact		9.17
Very important impact		5.00

\* Significant at 1%, \*\* Significant at 5%, \*\*\*\* Significant at 10%.



## RESULTS AND DISCUSSION

### 7. Impacts of the use of SMS on agricultural activities

#### 7.7. Beekeeping

*Reasons for the lack of  
impact of the SMS on  
beekeeping*

Variables	$\chi^2$	Jendouba N=2
Trade		
Information already known		50,00
Non measurable impact	5.000***	50,00
Unused information		-

\* Significant at 1%, \*\* Significant at 5%, \*\*\*\* Significant at 10%.

# RESULTS AND DISCUSSION

## 7. Impacts of the use of SMS on agricultural activities

### 7.7. Conservation agriculture


#### *Impact of the use of SMS on conservation agriculture*

Variables	$\chi^2$	Zaghouan N=1	Kairouan N=1	Total N=2
Advantages, management				
No Impact	-	100.00	100.00	100.00

#### *Reasons for the lack of impact of the SMS on conservation agriculture*

Variables	$\chi^2$	Zaghouan N=1	Kairouan N=1	Total N=2
Advantages, management				
Information already known	2000	100.00	-	50.00
Unused information		-	100.00	50.00

\* Significant at 1%, \*\* Significant at 5%, \*\*\*\* Significant at 10%.



## **II. Baseline Characterization of e-learning course participants**

# RESULTS AND DISCUSSION

## 1. Socio-economic characteristics of the survey

Variables	$\chi^2$	Trainers (n=22)	Others (n=15)	Total (n=37)
<b>Main occupation</b>				
Trainer	37.000*	100.00	-	<b>59.46</b>
Government manager		-	26.67	<b>10.81</b>
Agricultural extension officer		-	20.00	8.11
Student		-	20.00	8.11
Researcher		-	13.33	5.41
Project coordinator		-	6.67	2.70
Farmer		-	6.67	2.70
Agricultural employee		-	6.67	2.70

\* Significant at 1%, \*\* Significant at 5%, \*\*\*\* Significant at 10%.

# RESULTS AND DISCUSSION

## 1. Socio-economic characteristics of the survey

Variables	$\chi^2$	Trainers (n=22)	Others (n=15)	Total (n=37)
Gender				
Female	509	22.73	33.33	27.03
Male		77.27	66.67	72.97
Age (years)				
20–30	4.174	18.18	26.67	21.62
30–40		9.09	26.67	16.22
40–50		50.00	20.00	37.84
50–60		22.73	26.67	24.32
Education level				
Professional training	8.784***	4.55	-	2.7
Baccalaureate		36.36	66.67	48.6
License degree		50.00	20.00	37.8
Master degree		-	13.33	5.4
Phd		9.09	-	5.4

\* Significant at 1%, \*\* Significant at 5%, \*\*\*\* Significant at 10%.

# RESULTS AND DISCUSSION

## 2. Assessment of the e-learning modules

Variables	$\chi^2$	Trainers (n=22)	Others (n=15)	Total (n=37)
<b>Modules attended by the participants</b>				
Andragogy and development	2.399	<b>36.36</b>	13.33	27.03
Honey production	0.039	22.73	20.00	21.62
Cactus production	1.472	27.27	<b>46.67</b>	<b>35.14</b>
Creation of an agricultural project	0.113	<b>31.82</b>	26.67	<b>29.73</b>
Supplemental irrigation	3.058***	18.18	-	10.81
<b>Training duration</b>				
1-3 hours	4.355	27.27	<b>60.00</b>	<b>40.54</b>
3-5 hours		<b>40.91</b>	26.67	<b>35.14</b>
6-8 hours		<b>27.27</b>	13.33	21.62
> 8 hours		4.55	-	2.70

\* Significant at 1%, \*\* Significant at 5%, \*\*\* Significant at 10%.

# RESULTS AND DISCUSSION

## 2. Assessment of the e-learning modules

Variables	$\chi^2$	Trainers (n=22)	Others (n=15)	Total (n=37)
Main motivations to the attended modules				
(First Choice)				
Have a certificate to support my career advancement	3.246	63.64	40.00	54.05
Deepen my general knowledge		18.18	33.33	24.32
Curiosity		-	6.67	2.70
Improve relevant skills and knowledge		18.18	20.00	18.92
(Second Choice)				
Have a certificate to support my career advancement	0.994	-	-	-
Deepen my general knowledge		64.71	55.56	61.54
Curiosity		5.88	-	3.85
Improve relevant skills and knowledge		29.41	44.44	34.62
(Third Choice)				
Have a certificate to support my career advancement	1.519	-	-	-
Deepen my general knowledge		18.18	50.0	26.67
Curiosity		81.82	50.0	73.33
Improve relevant skills and knowledge		-	-	-

\* Significant at 1%, \*\* Significant at 5%, \*\*\*\* Significant at 10%.

# RESULTS AND DISCUSSION

## 2. Assessment of the e-learning modules

Variables	$\chi^2$	Trainers (n=22)	Others (n=15)	Total (n=37)
<b>Modules assessment</b>				
<b>Interesting Content, Useful Content</b>				
Not agree at all		4.55	-	<b>2.70</b>
Not agree		-	6.67	<b>2.70</b>
Indifferent	3.575	22.73	20.00	<b>21.62</b>
Agree		<b>36.36</b>	<b>20.00</b>	<b>29.73</b>
Totally agree		<b>36.36</b>	<b>53.33</b>	<b>43.24</b>
<b>Animation of the modules is very well done</b>				
Not agree at all		-	-	-
Not agree		4.55	<b>13.33</b>	<b>8.11</b>
Indifferent	3.727	13.64	33.33	<b>21.62</b>
Agree		<b>31.82</b>	<b>26.67</b>	<b>29.73</b>
Totally agree		<b>50.00</b>	<b>26.67</b>	<b>40.54</b>

\* Significant at 1%, \*\* Significant at 5%, \*\*\*\* Significant at 10%.





## *RESULTS AND DISCUSSION*

### **2. Assessment of the e-learning modules**

All participants **recommend these E-learning modules** trainings for their colleagues. They cited “the content is interesting”, “the content is relevant”, “Deepen my knowledge “as main motivations to recommend the E-learning modules especially to the beginner trainers. Some recommendations are suggested by the participants such as :

- Give more examples and practical exercises
- Putting the module in French
- Diversify the modules content (finance, value chain, etc.)
- Expand target population
- Improve the content of modules (give more details)
- Provide the module in Pdf form.
- Add video or simulation sequences during training "
- Include explanatory videos
- Develop methods and tools
- Program a field visits
- More workshop animation



## *RESULTS AND DISCUSSION*

### **2. Assessment of the e-learning modules**

The participants **propose some E-learning modules** to enrich the platform of ICARDA such as “Rural development and entrepreneurship”, “phytosanitary treatments of vegetable crops”, “business management”, “financial analysis of project”, “rational management of rangelands”, “organic farming”, “Hydroponics”, “geographic information system”, “Smart agriculture vs climate change”, “Food quality”, “startup”, “Climate change” “value chains and local governance”, etc.



## RECOMMENDATIONS TO THE USE OF ICTS

- **Improve the access of SMS technology:** to encourage the dissemination of the SMS technology among small farmers, a revision of the legislation (budget headings) is essential to allow the CRDA or CTV to use part of their budget to purchase and sent SMS .
- **Improve the use of ICT by professional organizations :** it is essential to recommend to SMSA and GDA to use SMS as an ICT to coach and advise their members. This is essential to disseminate the ICT for the professional organizations in Tunisian agriculture.
- **Improve the partnership between private and public sector :** a better coordination between SMSA and CTV can improve the adoption of ICT among farmers and provide relevant information on agriculture extension.
- **Improve the quality of information:** It is essential to do periodic needs assessment by agriculture extension information providers in order for them to deliver timely and relevant information to small-scale farmers for improved production. The department of agriculture extension should put a ***mechanism of ensuring that agriculture extension information provided by any entity should be useful in the right format, time and language that can support farming productivity***. Information sources to farmers should explore multilingual sources to ensure all small scale farmers benefit from information provided (Lung'ahi, 2014),



## RECOMMENDATIONS TO THE USE OF ICTS

- ***Improve the adoption of the ICTs:*** farmers should be offered learning trainings to facilitate acceptance and use of communication tools such as mobile phones, short number and radio spots. This will support adoption, replication and sustainability since farmers will be self-reliant,
- ***Improve the social influence of the ICTs:*** further research should be conducted to investigate why the social influence negatively affects the SMS technology in the studied governorates,
- ***Assessment of the other sources of extension agriculture information:*** further research should be conducted to investigate the role of other sources of extension agriculture information to find out the market share and the influence they have,
- ***Integrate the ICT approach into the national agriculture extension strategy:*** The government should create a digital service in the regional extension agencies and dedicate a budget to finance the different costs of the ICTs approach.



## RECOMMENDATIONS TO THE USE OF ICTS

- ***Introduce all the partners in the agriculture extension strategy*** to promote the ICTs such as public institutions, private sector, NGOs, SMSA, Farmers union, etc.
- ***Improve the communication about the importance of ICTs in agriculture:*** Implement a national communication strategy based on field days, workshop, flyers, radio show, programs TV...to promote the ICTs among farmers.
- ***Adapt the ICT tools to the local context:*** the cultures of farmers can differ according to the location.
- Supply CTV with necessary equipment (Tablet, Laptop) and infrastructure (access to ***internet***) to enable extension agents sending SMS. CTV should deploy more efforts in sending messages to their members as they did not receive them unlike members of the SMSA.
- ***Develop further e-learning modules*** and promote the modules (via social media and training centers)
- ***Create a national e-learning platform*** (e.g at AVFA)
- ***Collect market prices and make them available free of charge via an application or short number.***

# Thank You Comments – Questions

