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Descriptive Study of Cucumber Farmers' Awareness and Perception in 'Jordan Valley' Toward Fertigation Technology

Ahmad N. AL-Shadiadeh

Department of Plant Production and Protection,
Faculty of Agricultural Technology, Al-Balqa' Applied University, Al-Salt 19117, Jordan

Abstract: The aim of this study was to determine cucumber farmers'Awareness and Perceptionin Jordan Valley' toward fertigation technology. Random sample of 250 farmers were selected for participation in the study. Data were collected through personal structured interviews with participants at their farms. Overall, farmers tended not to be aware or have low levels of awareness with respect to fertigation technology. Farmers tended to agree or were unsure about fertigation technology. The most selected sources of information were other farmers, friends and relatives, radio programs, Extension agents and television programs. The least selected sources of information were extension programs and local leaders. Concerns over awareness of fertigation practices, technology and responsibility for conservation are discussed. The study recommends strengthening the role of agricultural extension in educating cucumber farmers through the preparation of the plan dealing with the detailed results of this study.

Key words: Fertigation Technology · Cucumber · Agricultural Extension · Jordan Valley · Jordan

INTRODUCTION

The area of Jordan is 89300 km^2, but only 5.7 % can be used for agriculture (Table 1). The land use in Jordan depends on many factors such as climate, soil type, availability of water and topography. The main factor for land use is the moisture availability, therefore, the land use divided into four broad groups:

Desert Zone: The average annual rainfall in this region is less than 100 mm. Temperatures show wide variation with mean maximum between 36°C and 44°C and mean minimum between 1°C and 8°C and mean annual of about 18°C. This zone is important for grazing. The plains carry only very sparse vegetation, but the valleys support a significant range of palatable species.

Low Rainfall Zone: This includes the lands that receive 100-200 mm rainfall. It has an arid climate with mean annual daily temperature from 16 to 18°C. These lands support steppe grassland and brush species and are important grazing areas. The valley bottoms in these areas have been used for the production of barley and wheat.

Rainfed Agriculture Zone: This includes lands that receive more than 250-mm rainfall. Most of the rainfall occurs during the months of Nov., Dec., Jan., Feb. and March. Mean annual temperature ranges from 18 to 24°C, with an average maximum of 30°C (August) and an average minimum of 0.5°C (January). Within this zone two main sub-divisions:

- Tree crops are the major component on the hilly and steeply sloping lands.
- Wheat is the main crop on the undulating lands of the major plains with lesser areas of tobacco, sorghum and summer crops.

Irrigated Agriculture Area (IAA): The total irrigated agriculture area in year (TIAA) 2003 is about 71.3 x 103 ha (Tabl.2). The major area of IAA is located in the Jordan Valley (represent 70% from TIAA). The major crops in IAA are tree (including citrus and bananas grow in Jordan Valley only), vegetables and cereals crops [1].

The Fertilization in Jordan: The use of chemical fertilizer started in irrigated agriculture area since 1960s. In rained agriculture areas the farmers have been applying mainly

Corresponding Author: Ahmad N. AL-Shadiadeh, Department of Plant Production and Protection, Faculty of Agricultural Technology, Al-Balqa' Applied University, Al-Salt 19117, Jordan.

Table 1: Geographical areas according to rainfall in Jordan.

Region	89300 km^2	%of total area	Average annual Rainfall (mm)	Min Temp °C	Max Temp °C
Desert	8080	90.5	<200	1-8	36-44
Arid	490	5.5	200-350	3-7	34-40
Semi-arid	170	1.9	350-500	3-7	27-33
Semi-humid	190	2.1	>500	3	27-33

Source. MOA. Jordan. 2001

organic fertilizer. The farmer in irrigated areas usually use amount of chemical fertilizer and organic fertilizer more than needed by crops. Applying fertilizers in irrigation water using fertigation technology started in the mid of 1980s. Jordanian agriculture gained considerable experience in fertigation techniques. About 90% of the farmers in the Jordan irrigate their plants using drip irrigation systems: Vegetables, flowers, green house and open field vegetables are fully fertigated. In the Jordan Valley in 2000 about 75% of the framers using fertigation, only 25% using surface irrigation [2], while nowadays in 2011 in Jordan 88% of the farmers using fertigation and only 12% used surface irrigation. Fertilizer injection equipment's used in Jordan are: fertigation techniques, Irrigation water pump suction, hydraulics injectors and venture injectors. The oldest equipment used in Jordan, it is started used with drip irrigation used at the mid of 80s in the last century and it still used by the Jordanian farmers on the large area. On the middle of 90s some of the farmers inject the fertilizer through the irrigation system by the suction pipe of the irrigation water pumps, many of the farmers are used it nowadays (39.4%) fertigation techniques with different plant nutrients should be recommended for farmers in Jordan where the water and fertilizer use efficiency is low and cost of fertilizer and wages of labors are high. Moreover, with this in mind the traditional management of plant nutrient application must be modified and adjusted to crops with this trend in irrigation method. Thus on 1985 the national center of agriculture research and extension starting using the fertigation trenches (dosatron hydraulic injectors and venturi) on its research on vegetable crops and fruit trees. AS Jordan addresses its goal of self-sufficiency in the production of cucumber products, the impact, role and adoption of various Fertigation technology and practices are becoming more important [3, 4]. Increasing populations and demands for cucumber have resulted in the degradation, depletion and pollution of soil, water and other natural resources. Extension agents in Jordan have an important role in helping farmers conserve, protect, rehabilitate and manage their land, water and other natural resources [5]. Because conservation and sustainable agriculture practices require farmers to spend more time planning, thinking and developing a strategy for managing farming systems to attain a sustainable agriculture production-farming unit, the majority of farmers in Jordan are not adopting recommended practices. Nowak [6] noted that inefficiencies in the development and delivery of relevant information and assistance contributed to poor adoption rates of technologies. Useful information, appropriate technology and sound advice are needed to overcome these inefficiencies. Shadaideh [7] noted that failure of farmers to adopt new methods can be attributed to individual objectivity in choosing to adopt of not adopt. That is, if the farmer fails to see a direct benefit, adoption is unlikely. A greater understanding of farmers' perceptions of awareness, knowledge and sources of information with respect to fertigation technology. This research may present useful information on fertigation technology for decision makers in Jordan who are attempting to increase the adoption of fertigation technology.

Problem of Study: For more than 100 years, Extension has been an organization to help people solve problems. As we enter the 21st Century, The people are facing critical issues that are requiring better emergency preparedness skills and self-reliance. The need for Extension to become a stakeholder in homeland security is evident. Extension's accurate knowledge and skills can assist communities in reducing loss in the event of a natural disaster. Knowing which hazards will be the most likely threat to your locality will help in determining what information you provide [8]. The planned programs for agricultural development represent the new trend that is adopted by most of the countries to modernize their societies; however, most of the planners for the required development have paid more attention toward the economic aspects rather than development of human resources. This might highlight the importance of extension and training for farmers as these means play major role to develop the farmers' knowledge [9].

Despite all efforts in this field from all development agencies, still the extension and training programs suffer many deficiencies that seem to be necessary to achieve the planned goals. These goals will reflect their results on farmers' skill and their performance in the related fields. One of the critical factors is the: absence of definite specification for awareness and perception for target groups. This considers from the important basics that should be taken in consideration in planning of extension programmes [10]. Building on these difficulties and constraints the researcher conducted this study to determine the cucumber farmers' awareness and perception in 'Jordan Valley' toward fertigation technology. In order to plan the extension programmes that might meet their needs.

Importance of the Study: The study of farmers' awareness and perception toward agricultural technologies is the important base for extension process and its activities, so specifying the farmers' needs is considered an important step in planning the programmes aiming at building farmers capacity [11]. All programmes that do not take these awareness and perception into consideration tended to be wasting for valuable resources [12]. However; the importance of this study refers to the following considerations:

- One of the pilot studies in Jordan that limit, the awareness and perception for farmers.
- The results of this study can be base for planning the future programmes in this area, to enhance agricultural extension programs and it can be further developed in the future.

Purpose and Objectives: The main purpose of this study is to identify awareness and perception of cucumber farmers' in 'Jordan Valley' for fertigation technology.
The study addressed the following objectives:

- Describing farmers' awareness toward fertigation technology;
- Describing farmers' perceptions toward fertigation technology;
- Describing farmers' with respect to sources of agricultural information

Methods and Procedures

Population: The study was carried out with 250 farmers in the Jordan Valley Region, All farmers returned the questionnaire. Usable data were provided by (100%) farmers.

Instrumentation: A questionnaire prepared by researcher (2010) to address farmers' perceptions toward fertigation technology in the Jordan Valley Region. Approval to use questionnaire from experts of agricultural extension and vegetables was obtained. Questions were also developed by the current investigator to collect additional information regarding farmers' perceptions toward fertigation technology. The questionnaire includes two parts: part one had 5 questions to assess awareness the farmer with respect to fertigation technology and 11 questions to assess farmers perceptions toward fertigation technology concepts.An expert panel assessed the content validity of the questionnaire.The included faculty members from the department of plant production and protection in Al-Balqa' Applied University; group of Jordanian Specialist in agricultural extension. Reliability of the summated values for two parts from the pilot-test data was verified by calculating the Cronbach's alpha internal reliability measure. Cronbach's reliability alpha coefficient was 0.85. For two parts, a three point, likert-type response scale: part 1: 1 = not awareness; 2 = low awareness; 3 =high awareness and part2:1 = disagree; 2 = unsure; 3 =agree.

Data Collection and Analyses: The data were collected with the cooperation of departments of the agricultural extension in the national center of agriculture research and extension in study region. The Director of national center of agriculture research and extension sent a cover letter to each departments of the agricultural extension in study region with the questionnaires. In his letter, the Director asked the departments of the agricultural extension to distribute the questionnaires to cucumber farmers in their areas.The questionnaires then were collected by the researcher from the departments of the agricultural extension. Data collection started February 2, 2010 and was completed April 15, 2010 with a 100% return. The Statistical Package for Social Sciences (SPSS) was used to analyze data. Descriptive Statistics (frequency distributions, percentage, means and standard deviations) were used to address objectives one, two and three [13].

RESULTS AND DISCUSSION

The following section presents findings by objective. Farmers who participated in the study ranged in age from 25 to 70 years. The mean age of respondents was 45 years. All of the farmers were male. Farmers were asked to report their highest level of education: 35% of farmers had an elementary education; 20% were illiterate; 27% had secondary education; 18% collegiate education. Farmers

were asked to indicate the number of yearsthey had farming experience. Years of experience ranged from 3 to more than 30 (M=20; SD=12). The average size of land was 20dun. Most farmers (60%) stated they will continue farming as a profession and would transfer their farming operations to their children (60%).

Objective 1: The first objective was to describe perceptions of farmers' awareness toward fertigation technology. Overall (M=1.6; SD=.76) farmers tended to not be aware or have low levels of awareness with respect to fertigation technology. As shown in Table 2, approximately 71 % of farmers were not aware that fertigation technology and important problem in their area. 64% of farmers were not used this technology. Farmers had low (32 %) to high (30 %) levels of awareness with respect to fertigation technology in their region.

Objective 2: The second objective was to describe farmers' perception toward fertigation technology. Overall (M=1.6; SD=.73) farmers tended to agree or were unsure about soil conservation technology. As shown in Table 3, approximately 84 % of farmersagreed that the government should pay farmers for the cost of practicing fertigation technology. Approximately 80% of farmers agreed that fertigation technology and controlling. Farmers had low (32%) to high (30%) levels of awareness with respect to fertigation technology n being a source of contamination in their region.

Farmers tended to be unsure (40%) that when using farmlands and natural resources therights of future human and creatures should be taken in consideration. Farmers tended todisagree (50 %) that when using farmlands should one think only of its own benefit. Farmersalso tended to disagree (76 %) that practicing soil conservation technology was a waist of capital and time.

Objective 3: The third objective was to describe farmers' perception with respect to sources of information and adoption of fertigation technology. Table 4 shows participants perception with respect to information sources. The most selected sources of information were other farmers, friends and relatives, radio programs, Extension agents and television programs. The least selected sources of information were extension programs and local leaders. The results presented here show that farmers did not perceive fertigation technology to be aserious or important problem on their farm.

Table 2: Farmer's awareness with respect to fertigation technology

	Not Awareness		Low Awareness		High Awareness	
Item	*f*	%	*f*	%	*f*	%
Fertigation technology is a serious and important problem in your area	178	71.1	43	17.1	29	11.1
Farmers should take a responsible role in using of fertigation technology in their farms	160	64.0	52	20.8	38	15.1
Fertigation technology is a danger on agricultural production and reduction of food	132	52.9	70	27.7	48	19.4
Fertigation technology is one of the important factors in reduction of soil fertility in your area	145	58.0	37	14.9	68	27.1
Fertigation technology is a source of contamination in your area	930	37.1	80	32.0	77	30.8

Note: Scale: 1=not aware; 2=low awareness; 3=high awareness; M=1.6; SD=.76, n=250

Table 3: Farmers' perceptions toward fertigation technology farmers' perception with respect to fertigation technology

	Agree		Unsure		Disagree	
Item	*f*	%	*f*	%	*f*	%
Government should pay farmers the cost of practicing Fertigation technology, who have decided to adopt and will use the practice	210	84.0	16	6.4	24	9.4
Fertigation technology and controlling is important and essential	200	80.0	26	10.4	24	9.7
Is practicing fertigation technology appropriate for you considering your agricultural conditions	185	74.0	35	14.0	30	12.0
Practicing fertigation technology will increase the agricultural benefits of those who use it	184	73.4	42	16.9	24	9.7
Farmers have responsibility in reducing fertigation technology on their farms	181	72.3	33	13.0	36	14.3
Practicing fertigation technology requires much skill and knowledge	169	67.4	50	20.3	31	12.3
Farmers who have used fertigation technology in their farmlands, the government should legally want them to practice fertigation technology	146	58.6	39	15.4	65	26.0
In using farm lands and natural resources, should the rights of future human and creatures should be taken in consideration	110	44.0	100	40.0	40	16.0
Practicing fertigation technology requires purchasing new tools and equipments	90	36.0	70	28.0	90	36.0
In using farm lands should one think only of its own benefit	73	29.4	52	20.8	125	50.0
Practicing fertigation technology is a waist of capital and time	19	7.4	41	16.4	190	76.0

Note: Scale: 1=Agree; 2=Unsure; 3=Disagree; M=1.6; SD=.73, n=250

Table 4: Sources of information with respect to adoption of fertigation technology

Information Sources	*f*	%
Other farmers	116	33.1
Friends and relatives	98	28.0
Radio programs	95	27.1
Extension agents	91	26.0
Television programs	91	26.0
Observation of other farms	85	24.3
Neighbors	54	15.4
Extension publications	52	14.9
Extension programs	12	3.4
Local leaders	7	2.0

Note: Respondents could choose multiple selections

They do, however, recognize that fertigation technology is an overall important issues…just "not in their backyard" Farmers reject the notion that fertigation technology is a shared responsibility between farmers and the government. Farmers indicated they were unwilling to expend their capital and time in address fertigation technology and suggested that this is a governmental issue. Given the low levels of financial rewards and subsistence lifestyles of Jordanian farmers this finding is not surprising. The challenge for the Ministry of Agriculture and Jordan's Extension is to provide educational programs and financial incentives to farmers and to help farmers to share in the responsibility for fertigation technology. A starting place such change should revolve around the sources of information currently being used by farmers with respect to adoption of fertigation technology.Primary sources of information included other farmers, friends and relative, radio programs, Extension agents, television programs and observation of other farmers. Extension publications, programs and local leaders were not primary sources of information. In the past, Extension and the Ministry of Agriculture have relied on such sources of information as their primary delivery strategies. A gap between what and how information is being offered and what and how farmers wish to receive information exists. Numerous studies have identified to desire of Jordanian farmers to be more involved in agricultural based training and development programs. While the ideal program might be to treat each farmer individually and prescribe solutions individually, a compromise would be to classify farmers into groups and then prescribe different policies for each group.

CONCLUSION

Insights gained from this research point to three possible approaches to grouping farmers: 1) by the relationship between fertigation technology needs and actual farmer behavior; 2) by the apparent influences on conservation behavior, especially constraints; and 3) by the degree of receptivity of individuals to increasing fertigation technology effort. The government can devise more efficacious mechanisms to application the fertigation technology. Although the research presented here is narrowly defined and generalizable only to Jordanian farmers, global and cross-national implications may exist. the globalization define as the "rapidly increasing social, cultural, political and economic process of awareness, though not necessarily acceptance, of a global consciousness and interdependence by which people make decisions about their life and their work, decisions affected or influenced by expansion and interconnectedness of linkages throughout the whole world, not just the region or country in which they live and work and decisions that over time collectively result in social, cultural, political and economic consequences, both intended and unintended". Using this definition of globalization as a basis a greater understanding of what is occurring and what changes are proposed in Jordan may help farmers throughout the world make better decisions with respect to soil conservation. It may also propel Jordanian farmers to accept recommended best management practices that may result in Jordan achieving its goal of self-sufficiency in the production of food and fiber…or at least provide a step in the "right" direction.

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