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Access to Agricultural Inputs, Technology and Information, Communicating with Farmers, and the Role of Women in Agriculture: Perceptions of Iraqi Extension Agents

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Access to Agricultural Inputs, Technology and Information, Communicating with Farmers, and the Role of Women in Agriculture: Perceptions of Iraqi Extension Agents

Abstract

The goal of this study was to gain a more comprehensive understanding of access to inputs, technology and information available to Iraqi extension agents, and to ascertain current farmer communication strategies and gender roles within the diverse Iraq agricultural extension system. The conflicts, government policies, and economic sanctions that have enveloped Iraq over the last several decades have significantly impacted access to agricultural resources. Iraqi extension personnel participating in the Iraq Agricultural Extension Revitalization (IAER) program provided their perspective on the availability of agricultural supplies, technology and related information. About two-thirds of the extension agents indicated that the flow and availability of agricultural supplies has become less restricted and generally felt that there was greater access to basic agricultural information compared to the previous decade. Despite perceiving noticeable improvement overall in access to agricultural supplies and technology, over 83% of the program attendees agreed that access to agricultural inputs was currently insufficient to successfully promote productive agricultural practices. An overwhelming preference for face-to-face communication by both farmers and extension personnel also limits the extent to which agricultural information can be disseminated. In addition, several regional and gender-based differences emerged. Notably, it appears that farmers do not approach female extension personnel equally, wherein better educated farmers are more likely to interact with female extension agents. We suggest that an approach based on a horizontal exchange of knowledge between extension personnel and local farmers, coupled with a better integration of women extension personnel, will help a revitalized Iraqi extension system achieve greater agricultural sustainability.

Keywords

Iraq, International Agricultural Extension, Resource Availability, Sustainable Agriculture, Gender Issues

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**Access to Agricultural Inputs, Technology and Information, Communicating with Farmers,
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Abstract

The goal of this study was to gain a more comprehensive understanding of access to inputs, technology and information available to Iraqi extension agents, and to ascertain current farmer communication strategies and gender roles within the diverse Iraq agricultural extension system. The conflicts, government policies, and economic sanctions that have enveloped Iraq over the last several decades have significantly impacted access to agricultural resources. Iraqi extension personnel participating in the Iraq Agricultural Extension Revitalization (IAER) program provided their perspective on the availability of agricultural supplies, technology and related information. About two-thirds of the extension agents indicated that the flow and availability of agricultural supplies has become less restricted and generally felt that there was greater access to basic agricultural information compared to the previous decade. Despite perceiving noticeable improvement overall in access to agricultural supplies and technology, over 83% of the program attendees agreed that access to agricultural inputs was currently insufficient to successfully promote productive agricultural practices. An overwhelming preference for face-to-face communication by both farmers and extension personnel also limits the extent to which agricultural information can be disseminated. In addition, several regional and gender-based differences emerged. Notably, it appears that farmers do not approach female extension personnel equally, wherein better educated farmers are more likely to interact with female extension agents. We suggest that an approach based on a horizontal exchange of knowledge between extension personnel and local farmers, coupled with a better integration of women extension personnel, will help a revitalized Iraqi extension system achieve greater agricultural sustainability.

Key words: Iraq, International Agricultural Extension, Resource Availability, Sustainable Agriculture, Gender Issues

Introduction

The Iraq Agricultural Extension Revitalization Project

Effective agricultural extension systems often form the cornerstone of information and technology transfer to farmers. Although Iraq has an agricultural extension system in place, extended conflict has greatly reduced its operational capacity. An effective agricultural extension system can help revitalize the farming sector and encourage long-term agricultural sustainability. Training sessions for Iraqi extension personnel have been supported by organizations such as the United Nations and various countries (e.g., United States and Australia). The USDA-funded Iraq Agricultural Extension Revitalization (IAER) program was one such effort. This project aimed to train Iraqi extension

professionals to better deliver information to farmers in their communities. Participation in the IAER program allowed U.S. university personnel to interact with Iraqi agricultural extension agents to gain insight into obstacles they may face while revitalizing the agricultural sector in Iraq. The goal of this study was to gain a more comprehensive understanding of access to inputs, technology and information available to Iraqi extension agents, and to ascertain current farmer communication strategies and gender roles within the diverse Iraq agricultural extension system.

Current State of Agriculture in Iraq

Agricultural production occupies about 9.5 million of Iraq's 43.7 million ha and represents the second largest contributor to the national gross domestic product

(GDP) (USAID, 2006). Agriculture also serves as a pivotal component of the rural social structure. Iraq is agriculturally and geographically diverse. The landscape ranges from the rich alluvial plains of the southern Tigris–Euphrates valley to mountainous areas in the Kurdistan Regional Government (KRG). Dryland small grain cultivation (principally wheat and barley) makes up much of the agricultural activities in the north. Cereal, vegetable, tree fruit, and vine production (particularly dates, figs, grapes, and olives) predominate in the central and southern irrigated zones (Shnepft, 2003).

Each region exhibits limitations to agricultural productivity, although water scarcity is prevalent across much of Iraq. Desert composes 40% of Iraq's land area. Semi-nomadic agro-pastoralists inhabit these desert regions (EIU, 2007). The Jazira Plateau covers about 20% of Iraq. This region contains much of the country's arable land, but it regularly experiences drought conditions. High soil salinity often compounds arid conditions in the southern and central portions of the country. The foothill agro-environments in the KRG receive moderate rainfall but commonly exhibit poor fertility. This agricultural and geographic diversity demands a staff of well-trained extension personnel capable of meeting the many and varied needs of Iraqi farmers.

Iraq's food production systems have declined over the last several decades. Wars, government policies and economic sanctions reduced the diversity of Iraq's agricultural infrastructure (USAID, 2006; EIU, 2007). For instance, Iraq operated three seed companies producing a total of 80,000 metric tons of seed per year prior to economic sanctions in the 1990s (Bishay, 2003). However, shortages of many seed varieties, poor seed quality, and inadequate knowledge about varieties now exist (Iraq

Ministry of Agriculture – Karbala, personal communication, 2011). Additionally, fertilizer is often in short supply.

Agricultural equipment, when available, is often old or ill-suited to diverse farm systems (USAID, 2006). Soil erosion and removal of crop residues for animal feed have depleted soil organic matter. Excessive tillage has also contributed to the physical degradation of soil structure (Bishay, 2003). Soil salinity has increased due to a lack of high quality water and irrigation equipment, and overall poor water management. Many people have left rural areas, which has led to labor shortages in traditional farming regions. This exodus further exacerbates the decline in local knowledge of diverse farming systems and contributes to reduced agricultural productivity (Shnepft, 2003).

The Iraq agricultural sector requires revitalization to ensure sufficient food. Currently, 80% of Iraq's food is imported from neighboring countries (McChesney, 2008). Agricultural production has begun to increase since the U.S. occupation of Iraq. However, disturbance of the previous food distribution system limits food availability to some Iraqi citizens. This situation has contributed to increased childhood malnutrition over the past decade (Picotte & Campbell, 2010). Food aid from the international community can help overcome this issue. However, Iraq needs to avoid developing dependency on aid, as Hafer et al. (2011) warned in an assessment of post-conflict agricultural development in Iraq. Iraq has a long history of food surpluses and has the potential capacity of overcoming this dependence on international food aid and imports. Revival of the agricultural sector is important to guarantee food security for the country.

Purpose and Objectives

Limited literature exists regarding agricultural extension in Iraq that is written

in English. Thus, this study aimed to gain insight into the perceptions of Iraqi extension agents to better understand the challenges they face. This information can be used to enhance future international training efforts for Iraqi extension personnel. The first objective of this study was to assess the availability of basic agricultural inputs and new agricultural technologies in Iraq. A second objective was to investigate access to agricultural information and the needs for more training on different topics. The results of these objectives provide a perspective on the current agricultural infrastructure and perceived changes in access to agricultural resources over the last ten years. A third objective was to evaluate communication strategies used between extension agents and farmers in Iraq. A fourth objective was to examine the role that women play in Iraq agriculture. A separate training session for female extension agents presented an opportunity to evaluate survey responses in a gender context. The results obtained for each of these four objectives are based on the responses of the Iraq agricultural extension agents participating in the IAER program. The data given here are useful because they present the perceptions of Iraq extension agents, which can vary from information available through other sources.

Methods

The Iraq Agricultural Extension Revitalization (IAER) Program

The USDA funded the IAER program with the primary aim of training Iraqi extension professionals to better deliver information to farmers in their communities. This goal was intended to help Iraq approach previous levels of agricultural self-sufficiency (Abi-Ghanem et al., 2009). Principal to the IAER program, five U.S. land grant universities performed training sessions for Iraqi extension agents. Texas

A&M University (TAMU) played the lead institutional role in the IAER program. Four other land grant universities composed the rest of the team: Washington State University (WSU), the University of California, Davis (UC Davis), New Mexico State University (NMSU), and Utah State University (USU). Each university held multiple training sessions in the Middle East on select technical topics. A training event consisted of 25 to 30 Iraqi Ministry of Agriculture (MoA) personnel taught by two to five university faculty members and/or extension agents for ~6 days per session (Abi-Ghanem et al., 2009). Each university offered training on a primary focus topic: dryland agriculture (WSU), horticulture (UC Davis), extension methods and marketing (NMSU), livestock management (TAMU), and irrigation (USU). Additional training sessions taught effective extension teaching methods.

A total of 44 training activities occurred over the duration of the IAER program, reaching 720 trainees. This study focuses on five of these training sessions conducted by WSU from 2008 to 2011. The first session occurred in January, 2008 at the International Center for Agricultural Research in the Dry Areas (ICARDA) near Aleppo, Syria. This session involved 29 trainees (25 men, 4 women). Featured topics concerned soil fertility, on-farm experimental design, composting, and crop variety testing. The second session involved 26 women selected by the MoA to participate in an all-women's session held in Amman, Jordan in June, 2008. This special session intended to increase women's roles in Iraq's agricultural redevelopment. This training addressed sustainable agriculture, composting, food safety, and scientific communication. This paper hereafter refers to these two sessions as the "mixed-gender" and "women's" sessions. MoA identified the topics based on interest indicated by internal

surveys and apparent needs. Subsequent IAER sessions occurred in Erbil (May, 2010 and February, 2011) and Dohuk (June, 2011), KRG, Iraq. This paper refers to these as the KRG sessions. These trainings, conducted by WSU, UC Davis, and TAMU, included extension agents from KRG. Open-ended interview responses conducted during the KRG sessions supplement the survey data in this study. Surveys were conducted during these sessions to collect information on participant satisfaction with the training, their level of learning, and future training needs (Abi-Ghanem et al., 2009). The surveys also addressed access to agricultural resources in Iraq and provided data on the extension personnel in regional and gender contexts.

Surveys

Iraqi trainees completed questionnaires to assess perceived views on the Iraqi agricultural sector during the WSU sessions in Syria and Jordan. Participants completed the same survey in each session. The survey was designed according to Brace (2004) and included 17 questions about the current state of agricultural extension in the respective Iraqi regions. The questionnaire was developed based on a literature review and personal interviews with Iraqi extension personnel during previous IAER sessions. Question design intended to adequately assess trainees' perceptions of the agricultural infrastructure and changes that may have happened over the prior ten years. Specifically, the assessments regarded access to basic on-farm inputs, new agricultural technologies, related information (including the use of traditional and novel methods of disseminating information), and the role of women in agriculture.

Logistics prevented the possibility of follow-up surveys. However, the study considered qualitative reliability and

validity. An organized review of survey content tested content validity, internal validity, and external validity to ensure suitable and appropriate material was presented. Questions were direct, phrased in a positive way, and posed in Arabic. The study assessed reliability by checking for internal consistency by using different question types, including multiple choice, fill-in-the-blank, and yes/no formats. This study pooled survey results from the two sessions for general use to improve sample size. References to specific demographic groups were made accordingly (e.g., based on region). Personal interviews of the Iraqi extension personnel by WSU agents supplemented the questionnaires. Personal interviews conducted during the KRG sessions provide additional data. In addition, the KRG session interviews gained information on the situation facing the Iraq extension system.

This study has a limited sample size and does not fully represent the status of Iraqi agriculture or the extension system. However, the data gained from working extension agents from throughout Iraq provides valuable insight due to the lack of other existing information on their perceptions. Also, one should note that data was collected during a time of shifting turmoil and politics. The situation in Iraq is dynamic, and information may become outdated over time. Still, consistency was observed in responses from the Iraqi extension agents between the 2008, 2010, and 2011 training sessions used in this study. Moreover, extension agents from developed nations working in developing nations (particularly after a period of conflict) can gain an awareness of situations they may encounter.

Results and Findings

Gender, Geography, and Educational Background of Iraqi Extension Agents

The distinct regions and populations of Iraq necessitate consideration of the demographics exhibited by the IAER participants. While all of the attendees in the women's session were female, the mixed-gender session was 86% male and 14% female. For both sessions, about half of the participants were from the KRG, with the remainder from other Iraqi regions. This division reflects the existence of two separate MoAs in Iraq. One is headquartered in Erbil to represent the KRG, and the other is located in Baghdad to primarily represent the non-KRG governorates. Southern Iraq, incorporating the governorates of Al-Muthanna, Dhi Qar, Maysan and Al-Basrah, had the lowest representation at 12 to 13% of trainees in each instance. The sessions displayed distinct age differences. Fifty-two percent of the women's session was 20 to 30 years old, and none were above 50. Fifty-five percent of the mixed-gender participants were 30 to 40 years old, with 15% over 50. Educational backgrounds in each session differed as well. Bachelor of science (BS) degrees in agriculture were held by 87% of the trainees in the mixed-gender session. However, only 62% of the women's session had a BS degree, while 31% possessed a technical degree.

Access to Agricultural Inputs and Technologies

A critical component to the success of extension trainings is determining the perceived access of the extension agents to agricultural farm inputs and supplies and new technologies. Survey results show that the flow and availability of agricultural supplies and products has become less restricted compared to the previous decade. However, further improvements are still required. Sixty-three percent of the participants indicated greater access to agricultural inputs, such as seed and fertilizer, in 2008 than in 1998 (see Table 1). About a quarter of the participants denoted diminished access to inputs in 2008 versus 1998. A majority of such respondents were from central Iraq, where 47% felt fewer resources were available, compared to 41% who felt more resources existed. Despite perceiving noticeable improvement overall, 83.6% of the program attendees responded that access to agricultural inputs was currently insufficient to successfully promote productive agricultural practices. No significant deviation in responses occurred between women and men with regard to either changed access to basic agricultural inputs or the needs for greater availability.

Table 1. Perceived Changes in Access to Basic Agricultural Inputs and New Technologies in Iraq Based on Region Between 1998 and 2008 (n = number of respondents)

Region of respondent	Access to basic agricultural inputs compared to 10 years ago			Access to new technologies compared to 10 years ago		
	More	Similar	Less	More	Similar	Less
South Iraq (n = 7)	5	0	2	4	0	3
Central Iraq (n = 17)	7	2	8	7	4	5
Kurdistan (n = 28)	20	4	3	7	7	10
Total	32	6	13	18	11	18

Note: Twenty-eight (28) surveys were returned for the Jan. 2008 mixed-gender session (including one by an administrator) and 24 were returned from the June 2008 all-women's session. Question totals do not equal survey total (52), because respondents either made no selection or marked two answers, leading to the entire response being discarded.

Regional differences in responses were found between extension agents from Kurdistan and southern Iraq compared to those from central Iraq. Face-to-face discussions with participants revealed several possible reasons for these differences. Some of the trainees claimed international sanctions imposed on Iraq from 1990 to 2003 significantly restricted the flow and availability of agricultural supplies and products. Southern Iraq, especially in the areas surrounding Basra, possessed advanced vegetable and crop production practices prior to sanctions, which declined thereafter. Earlier reports noted a shortage of equipment in southern Iraq (FAO, 2003) and more than half of the tractors are allegedly at least 15 years old. However, the participants indicated that most farms in southern Iraq increasingly have timely access to improved equipment. Meanwhile, more negative responses from the central Iraq trainees may stem from the end of region-specific policies that existed under the previous regime. The extensive strife from 2003 to 2008 exacerbated problems in the dispersal of agricultural supplies in the central Iraq region.

Kurdish responses generally suggested a feeling of increased access to agricultural inputs over the last decade (74, 15, and 11% of the Kurdish participants denoted more, similar, and less resource access, respectively). This response is interesting, because there has been an overall decrease in international support over the last decade. Agriculture was promoted and well supported with new technologies from both the KRG government (which received autonomy in 1991–1992) and international organizations from 1997 to 2003. However, foreign entities abandoned their programs in 2003, preceding the war. These survey results imply that this transfer of support from

largely international to domestic sources has not disrupted resource dispersal in the region. Individual interviews with Kurdish extension agents during the KRG sessions expressed that much of this transfer has come through increased efforts by the private sector.

Participants disagreed markedly regarding access to new technologies (see Table 1). An equal number of respondents (38%) believed that access was more available as believed that it was more limited. Twenty-three percent indicated no perceived change. When viewed by region, a greater proportion of those from south and central Iraq denoted increased access to new technologies. Kurdish representatives more frequently designated that new technologies were exceedingly limited during the period in question. The influx of international aid after KRG autonomy and their subsequent departure could offer an explanation for this disparity. More notably, a distinct gender difference emerged. While 58% of those at the predominately male session indicated greater availability of new technology, 57% of the all-women's session denoted access has decreased. The proportion of participants who were Kurdish was greater among women than men, which may have contributed to this discrepancy. Also, many of the women were new university graduates exposed to more advanced technologies. Their recent education may have unrealistically raised their expectations for access to new technologies.

Access to Agricultural Information

Another important component to extension training sessions is to consider the availability of scientific agricultural information to Iraqi extension agents. Iraqi extension personnel generally indicated that both they and the farmers they worked with had more access to basic agricultural

information in 2008 compared to 1998. Exceptions included some farmers in central Iraq (Salaheddin and Baghdad) and KRG (see Table 2). In central Iraq, conditions remained unstable at the time that the survey was conducted. It was considered unsafe for extension personnel, particularly women, to

visit farmers and distribute information in certain locations. This situation may have generated perceptions held by extension agents in these areas that they and their respective client farmers had less access to information.

Table 2. Perceived Changes in Access to Agricultural Information by Extension Personnel and Farmers in Iraq Based on Region Between 1998 and 2008 (n = number of respondents)

Region of respondent	----- Access to agricultural information compared to 10 years ago -----					
	for extension personnel			for farmers		
	More	Similar	Less	More	Similar	Less
South Iraq (n = 7)	7	0	0	5	1	1
Central Iraq (n = 17)	12	2	3	13	2	2
Kurdistan (n = 28)	21	4	2	16	3	6
Total	40	6	5	34	6	9

Note: Twenty-eight (28) surveys were returned for the Jan. 2008 mixed-gender session (including one by an administrator), and 24 were returned from the June 2008 all-women's session. Question totals do not equal survey total (52), because respondents either made no selection or marked two answers, leading to the entire response being discarded.

Participants in both initial sessions agreed that increased agricultural education for farmers is needed in Iraq. Ten topics were identified as important by over half of the trainees (see Table 3). Plant protection was the most commonly listed response, with over three-quarters of the extension personnel asserting this was a critical area requiring more education. Fruit and vegetable production, machinery use and repair, row crop production, weed control, and soil fertility represented other high

priority items. The KRG sessions identified similar findings. No clear regional differences emerged from the results. While women indicated the same priorities (listed in a slightly different order), the overall percentages were noticeably lower. This finding suggests that other topics not listed are important to women. Open-ended questions during training also revealed soil salinity, seed production, and deforestation as major concerns.

Table 3. Agricultural Educational Topics Identified by Iraqi Extension Personnel as a Critical Need for their Respective Regions (n=55)

Topic areas	Percent (%) response
Plant protection	76.4
Fruit and vegetable production	69.1
Machinery use and repair	67.3
Row crop production	63.6
Weed control	63.6
Soil fertility	61.8

Livestock management	56.4
Farm financial management	56.4
Soil management and erosion control	52.7
Biological control of pests	50.9

The educational topics identified by trainees during the IAER program tended to target specific issues and did not involve more holistic perspectives. Shinn & Briers (2009) noted the need for more robust rapid rural appraisals in Iraq. The U.S. IAER trainers during the KRG sessions drew similar conclusions. It also was apparent from the KRG sessions that Iraqi extension agents require more education regarding general extension methods that incorporate aspects of needs assessments, program development, program planning and delivery, and evaluation. This observation corresponds with an evaluation of the Department of Agricultural Extension at the University of Baghdad (Briers, Balschweid & Al-Ajeeli, 2012). That assessment found that agricultural extension faculty follow an outdated curriculum and lack practical extension experience. The extension agents in the Dohuk session stated similar experiences during their schooling. When appropriate, future extension training sessions in Iraq should present specific topics into a comprehensive educational program. This approach will provide a more robust background for Iraqi extension agents

so they can address the numerous issues facing agricultural production.

Communication with Farmers

According to all trainees, farmers in Iraq greatly prefer to obtain information through face-to-face interaction with extension personnel. The extension agents also preferred this method to disseminate agricultural information (see Table 4). This finding is largely due to limited access to the internet and written materials. Interviews during the KRG sessions indicated that the lack of a postal service in Iraq and illiteracy rates among farmers in specific areas further limited dissemination options. Iraqi extension personnel generally reach more farmers through workshops and on-site demonstrations than through written or electronic materials. The results were similar across regions and gender. This finding suggests that both male and female extension agents feel farmers show no gender-bias regarding when receiving their information. The successful transfer of information and implied knowledge is often dependent on successful face-to-face interaction (Keller, 2004), in this case between extension personnel and farmers.

Table 4. Preferred Formats Through Which Iraqi Farmers Prefer to Receive Agricultural Information, as Assessed by Iraqi Extension Personnel, and Formats Through Which the Extension Agents Prefer to Disseminate Information.

Format	Farmer preference (%)	Extension agent preference (%)
Personal face-to-face	64.2	74.9
Written brochures and bulletins	20.7	11.7
Internet	9.5	3.8
Video media	3.8	9.6
Written books	1.8	0.0

Opinions regarding the means by which farmers typically acquire agricultural training differed by gender among the attendees. The majority of trainees in both sessions (57.3%) responded that most farmers receive training from other local farmers and family members. Most Iraqi farmers possess no college education or specialized agricultural training. Approximately 46% of the mixed-gender session indicated that farmers had no formal agricultural education. However, this was the least common answer listed during the women's session (3.9%). As the regional representation of trainees was similar for both sessions, this difference is more likely perception than fact. One explanation may be that women agents are approached less by uneducated farmers and proportionately more by educated farmers. This interaction could lead to a perception by the women that most farmers are educated. Another possibility is that women extension agents may be more likely to consider training by family members, mentors, and extension workshops as legitimate sources of farmer education. Conversely, male extension agents may consider farmers as uneducated if their training was not from official sources. Nevertheless, Holz-Clause, Swaroop & Koundinya (2012) identified farmer-to-farmer communication as key to farmer learning globally in both developed and developing nations. Iraqi extension agents can capitalize on such interactions by teaming with respected farmers to conduct demonstrations, etc. to broaden farmer education.

Iraqi Women in Agriculture and Agricultural Extension

The gender of extension personnel and their audiences is an important consideration in agricultural extension systems worldwide. Female roles in Arab

agriculture are seldom addressed, and facts often contradict stated ideals. For example, according to the Arab Charter on Human Rights, there should be no discrimination between men and women who are equal in terms of occupation. However, in most Arab countries women own less farmland and their average plot sizes are smaller than men's. Specifically, women own 28.6% of land in Jordan, 4.9% in the United Arab Emirates, and 0.4% in Oman (Cotula, 2007). In addition, men dominate agriculture extension positions in most Arab countries due to long-standing cultural norms (Cotula, 2007). For example, Arab women often need their husbands' approval for employment in the region. A substantial public investment is needed to strengthen women's advocacy and decision-making for improving overall agricultural diversity and management (Padmanabhan, 2008). Moreover, it has been recognized that women are critical agents in poverty reduction, food security, and environmental sustainability in rural areas (UN, 2011). The foundation to expand the role of women in Iraqi agricultural extension exists, based on the interactions that occurred over the course of the IAER program. This was particularly evident during the Dohuk KRG session, where the women were among the most attentive, apt, and energetic of the trainees. The women-only session held in Jordan was designed in part to improve the social capital of female Iraqi extension agents. This was seen as key, because women play an important role in information exchange in agricultural extension systems (Katungi, Edmeades & Smale, 2008).

The survey question concerning the role of women in agriculture enterprises led to uncertainty, discussion, and considerable debate, particularly in the mixed-gender session. Most participants in both sessions responded that women often contribute as

farm labor, but few manage the farm (see Table 5). Only one participant in each session believed women were not highly involved in agriculture in their governorate. Four participants at the mixed-gender session (14%) and five (19%) in the women's session responded that women manage more than 10% of farms in their areas. Women trainees stated during interviews that relatively few women own land. Women landowners generally obtain ownership through inheritance and have family members help manage the farm.

However, the trainees indicated that Iraqi women are significantly involved in farming. Still, the wide range of responses in both sessions suggests that women's roles in managing farms are poorly understood or quantified. Gender-specific extension activities have been recommended for women farmers in Jordan to enhance their roles in agricultural production (Al-Rimawi, 2002). Implementing similar programs for Iraqi women farmers would likely improve their position in contributing to agricultural sustainability.

Table 5. Perceptions of Iraqi Extension Agents on the Involvement of Women in Iraq Agriculture (mixed-gender Syria Session (SS), n=29; women's only Jordan Session (JS), n=26)

Category of women involvement in agriculture	Number of responses in SS	Number of responses in JS
Women are not highly involved with agriculture in my region	1	1
Women are involved with raising food for the family but not for sale	5	5
Women are involved with farm work but rarely manage farm	13	13
Women manage some farms in my region, but less than 10%	6	2
Women manage 10 to 25% of farms	1	3
Women manage 25 to 50% of farms	2	0
Women manage over 50% of farms in my region	1	2

Conclusions, Recommendations, and Implications

The achievement of agricultural sustainability throughout the diverse regions of Iraq will largely depend on the success of extension agents in assisting farmers gain access to more relevant information and further appropriate technology. Results from this case study suggest that agricultural information was generally more available in 2008 than in 1998. However, further education of Iraq extension personnel is needed and can be achieved using specialists from more developed countries (Sawada, Matsuda & Kimura, 2007). Future training programs should include a review of general extension methods in addition to other identified topics. Such programs should evaluate the level of background that the trainees have on specific topics, as it may be

necessary to begin instruction at a basic level. Future training should also understand that communication methods between extension agents and farmers in Iraq are largely based on face-to-face conversations. Thus, extensive discussion on new communication technologies would not be relevant in many regions. An approach targeting women extension personnel and farmers may address the specific needs of women by using them to transmit and horizontally exchange local knowledge (Hassanein, 1997; Trauger et al., 2008).

It is clear from the survey and interview results presented here, as well as reports from international aid organizations, that Iraq continues to lack adequate access to agricultural inputs, information and technologies. Specific needs are region-dependent and reflect differing recent

histories and turmoil. In order to meet the needs identified in this study, we suggest that future efforts should focus on increasing access to agriculture inputs, information and technology, enhancing communication among the diverse agricultural regions within Iraq. Also, increased efforts are needed that encourage expanding the role of women in Iraqi agriculture.

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