



Farmers' Perception of Training Needs, Recommended Technical Packages and Constraints of Production of Main Crops in Gezira Scheme, Sudan

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Abstract

The identification of the problems and constraints preventing farmers from increasing their productivity is essential for getting the real solution of low productivity. The main objectives of this study were to see how farmers perceived their training needs, their level of awareness and adoption of the technical packages of the main crops and how they identify constraints responsible for their low productivity in Gezira Scheme. Seven irrigation divisions were selected randomly from 21 irrigation divisions (Wad Elnaw, Wad Elbur, Tabat, Kab Elgidad, Shalaie, Wad Elmansi and Gaboja). A questionnaire was designed to collect the required data by using random sample technique from 395 farmers. The information was collected during the period from April to July 2010. The data were statistically analyzed using the statistical package for social science (SPSS) to calculate frequency, percentages, mean and standard deviation. A Likert scale was used to see how farmers perceive their training needs and how they identify constraints responsible for their low productivity. The study revealed that the level of adoption was relatively low and far less than the level of awareness for the recommended agricultural packages regarding the adequate use of water, removal of crops residues, uses of sprayer and plant spacing. The study showed that the farmers rank irrigation problems at the top followed by pests and diseases, insufficient agricultural inputs, increase of costs of production, problems of harvest and post-harvest processing, agricultural finance problems, inadequate agricultural marketing, lack of extension services and insufficient number of extensionists, management problems and finally problems of storage. Based on the findings, there was a strong need to provide farmers with sufficient credit inputs supply, marketing information and to raise the capacity of farmers on irrigation water management, farm management and in different subjects related to their needs to develop skills, upgrade knowledge and bring positive change among farmers to increase productivity.

Keywords: farmers perception, training needs, production constraints

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Introduction

Generally perception has been seen as the process by which people receive information or stimuli from their environment and transform it into psychological awareness (Oladele, 1998), however perception are effected directly by education level, expe-

rience and exposure to mass media. Training is an essential resource, which will direct knowledge and skills towards improving production. Extension and training are very important for farmers and they play a major role in building farmers capacities, raising their awareness and

providing them with modern knowledge aiming at enhancing their performance to achieve their ultimate goal of development (Al-shadiadeh, 2007). Elfaki and Khalid (2013) reported that the majority of Gezira Scheme farmers affirmed that training as a learning process was very important. In addition, the majority of them preferred practical oriented methods (field demonstration and field days) as training methods that can help in acquisition of new skills.

Literature reviewed showed that agricultural productivity increases more in developed countries compared to less developed countries. This is due to high investment in research and development, labour, land and capital as well as the improvement in the use of inputs such as fertilizers and machinery. According to Chang and Zepeda (2001), labour productivity in China increased by 4.13% whilst that of the United States was by 7.16% during 1987-1994. Hayami and Vernon (1971) hypothesized that the agricultural productivity gap among countries is based on differences in the prices of modern technical inputs in agriculture and differences in the stock of human capital capable of generating a sequence of innovations, which enables agriculture to move along the Meta production function in response to changes in factor and product price relationships.

Modern agriculture is essential for economic development. Employing modern agriculture is possible when farmers are provided with credit for purchasing modern inputs such as seeds, fertilizer *etc* (Schultz, 1964; Yusuf, 1984; Zuberi, 1989). Many developed countries have recognized the benefits of using modern farm technology. however, application of modern farm technology to increase agricultural output has increased financial needs of farmers. Easy and cheap credit was found to be the quickest way for boosting agricultural production and resulted in an increase in agricultural productivity of small farmers

(Siddiqi *et al.*, 2004; Abedullah *et al.*, 2009; Saboor *et al.*, 2009). The impact of credit, fertilizers, seeds, and irrigation on agricultural production was found to be positive and significant (Zuberi, 1983, 1989; Iqbal *et al.*, 2001, 2003; Waqar *et al.*, 2008).

In spite of the vast flat land, availability of gravity irrigation, sufficient scientific knowledge, still the Gezira Scheme suffers from low agricultural productivity. The Scheme is at present performing significantly below its potential yields. Cropping intensities are disappointing, and irrigation efficiency is low. There is a wide gap between average yields of all crops grown in the Gezira Scheme in farmers fields compared to that of research station plots. Average yields of the Gezira Scheme of cotton, sorghum, groundnuts and wheat in the period of 2000/001 to 2007/008 were 4.27 quintal/fed, 0.90 ton/fed, 0.8 ton/fed and 0.79 ton/fed, respectively. Compared with yields obtained by Gezira Research Sstation in the same period for the same crops which were 18 quintal/fed, 1.9 ton/fed, 1.5 ton/fed and 1.4 ton/fed respectively (Gezira Scheme, 2009; Khalid, 2012).

Many studies (Elfaki, 2000; Suleman 2004; Banaga *et al.*, 2008) had revealed that the main problems and constraints responsible for low productivity in Gezira Scheme were inadequate availability of agricultural inputs (in term of quality, quantity and affordability of prices), irrigation water management, pest and disease management, financing, lack of extension services, marketing and problems of harvest and post harvest processing.

The main objectives of this study were to see how farmers perceive their training needs, their level of awareness and adoption of the technical packages of the main crops and how they identify constraints responsible for their low productivity in Gezira Scheme.

Materials and Methods

Population and sample:

This study was conducted in the Gezira Scheme; it is located between the Blue and White Nile (Latitudes 13° -30' —15° 15' N and longitudes 32° 30' —33° 30' E). The Scheme has a sum of 132,000 farmers, for administrative purposes it is divided into 21 irrigation division. Seven irrigation divisions were selected randomly from (21) irrigation divisions (Wad Elnaw, Wad Elbur, Tabat, Kab Elgidad, Shalaie, Wad Elmansi and Gaboja). The random sampling technique was used. Accordingly, a proportion sample of 395 farmers was randomly selected from the total number of farmers (50555) in the selected irrigation divisions according to size of farmers in each irrigation division. The sample 0.78% out of the total population of the selected divisions. The respondents from each selected division were (57, 53, 60, 59, 56, 59, and 51 respectively).

The formula used (Israel, 1992)

$$n = \frac{N}{1 + N(e)^2} = \frac{50555}{1 + 50555(.05)^2} = 395$$

Where:-

N = Total population (50555)

n = Sample size

e = Standard error= 0.05

A questionnaire consisting of fifteen questions was developed covering questions about farmers' preference of training, the level of awareness and adoption rate of technical packages of the main crops, pest and disease management practices and production constraints in the Scheme. The personal interview technique was used to implement the questionnaire. The survey for collecting the data was carried out during April-July 2010. The collected data were statistically analyzed and interpreted by using the statistical package for social sciences (SPSS).

- 1) Descriptive analysis (frequencies, percentage, mean and standard deviation) were used to assess the level of awareness and adoption rate.

- 2) Comparison method was used to find out knowledge and practices gap.

- 3) A Likert scale was used to determine the training needs areas and constraints responsible for low productivity.

Three point scales were categorized according to their mean scores. Responses on three point a Likert-scale with mean scores of 1.50 and above were classified as major problems and constraints, those with a mean score of 1.0 < 1.5 were classified as moderate problems and constraints, while those with a mean score less than 1.0 were classified as minor problems and constraints.

Results and Discussion

Farmers' preference of training needs areas:

Results (Table 1) shows that the training needs of farmers in order of priority were seed production, technical packages, water cost return, distribution and management of water, agricultural extension activities, agricultural marketing and processing of agricultural product was very high. Corresponding mean values of those levels of needs (approximated to two decimal numbers) were 1.75, 1.67, 1.67, 1.60, 1.58, 1.58 and 1.58, respectively. On the other hand, the training needs of the farmers in the field management, storage, pests and diseases, agricultural plan, agricultural finance, agricultural insurance, and women and rural youth were found medium with corresponding mean values of 1.49, 1.49, 1.34, 1.33, 1.25 and 1.18. These findings indicated that the areas in which farmers expressed training needs are very relevant to knowledge and skills required for executing training programs as well as responding to farmers' needs

Table 1: Distribution of farmers according to their opinion about training needs

Training needs areas	Weighted average	S.D	Training needs level
Seed production	1.75	0.64	High
Water cost return	1.67	0.56	High
Technical packages	1.67	0.64	High
Distribution and management of irrigation water	1.60	0.67	High
Agricultural marketing	1.58	0.63	High
Agricultural extension	1.58	0.77	High
Processing of agricultural product	1.58	0.54	High
Pest & disease	1.49	0.58	Medium
Field management	1.49	0.76	Medium
Agricultural plan	1.34	0.88	Medium
Agricultural finance	1.33	0.72	Medium
Storage of crops	1.29	0.71	Medium
Agricultural insurance	1.25	0.76	Medium
Women and rural youth development	1.18	0.76	Medium

Source: Field survey (2010)

* According to a Likrt scale, the training needs were high when the mean value is more than 1.5.

Awareness of technical packages of the main crops:

Importance of application of agricultural recommendations and improved seed and knowledge of sowing date:

Table 2 reflects that the majority of farmers (87.1%) mentioned that the application of agricultural recommendation is very important for increasing their agricultural productivity. It also raveled that the vast majority of the farmers (93.9%) were aware of the recommendation regarding sowing of improved seeds, and their importance to

increase the agricultural productivity. The data in table (2) again showed that farmers sowing date knowledge for the main crops was high except for groundnuts with corresponding values of 91.6%, 99.0%, 82.2% and 48.8% for cotton, dura, wheat and groundnuts, respectively. This result indicates that there is a knowledge gap, which requires designing training program to be filled especially for groundnuts sowing date.

Table 2: Frequencies distribution and percentages of farmers according to their awareness of technical packages of the main crops

Items	Frequency	Percent
The impact of application of agricultural recommendation:		
Those who said very important	344	87.1
Those who said important	51	12.9
Those who said was not important	0.00	0.00
Importance of improved seed:		
Those who said important	371	93.9
Those who said was not important	24	6.1
Recommended sowing date:		
Cotton	372	91.6
Sorghum	391	99.0
Groundnuts	193	48.8
Wheat	225	82.2
Recommended plant spacing:		
Cotton	202	51.2
Sorghum	238	60.2
Groundnuts	322	81.1
Recommended fertilizer dose:		
Sorghum	115	28.8
Cotton	160	40.4
Groundnuts	141	35.7
Wheat	221	55.9
Tomato	166	42.0
Onion	128	32.4
Adequate uses of irrigation water:		
Those who were aware	290	74.5
Those who were not aware	105	26.5
Impact of removal of crops residues in reducing the incidence of pests and diseases:		
Those who were aware	330	85.0
Those who were not aware	65	15.0
Chemical side effects:		
Those who were aware	270	68.4
Those who were not aware	125	31.6

Source: field survey 2010

Knowledge of recommended plant spacing and dose of fertilizers:

The data in Table 2 again reflects that 81.1%, 60.2% and 51.2%, of the farmers are aware of the recommended plant spacing in groundnuts, cotton and dura, respectively. The results indicated that there is a relatively high need for training on plant spacing packages especially for cotton and dura. The result in Table 2 also showed that 55.9%, 42%, 40.4, 32.4% and 28.8% of the farmers were aware of the recommended fertilizer dose for wheat, tomato, cotton, onion and sorghum, respectively, which

means that the awareness of farmers of the recommended dose of fertilizers to increase yield was very low particularly for onion and sorghum . Therefore, there is a need to organize training programs considering the recommended dose of fertilizers for the different crops.

Adoption of some practices of crop production and pests and diseases management:

The results in Table 3 indicates that only 43.8%, 41.8%, 40.5%, 40.5%, 32.9% and 11% of the farmers always practice pest and

disease management, removal of crops residues, rouging, adequate use of water, use of sprayer and correct plant spacing, respectively. Therefore, the results indicated that the farmers' practices in the areas tested were very low which necessitates more extension coverage to bridge the skill gaps regarding those practices. The results in the same Table showed that 47.9%, 39.4% and 12.7% of the farmers used knapsack, plant leaf branch and sweeper, respectively. Also, the results in Table 3 indicated that 52.1% of the farmers were not using the recommended equipment (Knapsack).

Therefore, more training and extension work is needed to teach them the recommended spraying equipments and how to protect themselves from side effects of pesticides. The results in Table 3 showed that 45.8%, 44.9% and 9.3% of the farmers mentioned that they start spraying when the pests effects appear, protective spraying and at economic threshold, respectively. This also reflected a need to plan training programs to increase farmers' adoption rate of the recommended time of spraying.

Table 3: Frequencies distribution and percentages of farmers according to their adoption of some practices for crop production and pests and diseases management

Items	Frequency	Percent
Some practices for crop production:		
Plant spacing	45	11.0
Uses of sprayer	130	43.8
Pest and disease management	173	32.9
Adequate uses of water	160	40.5
Rouging	160	40.5
Removal of crops residues	165	41.8
Spraying equipments used:		
Plant leaf/branch	84	39.4
Broom	36	12.7
Knapsack sprayer	102	47.9
Using protective clothes and masks during spraying to avoid chemical side effects :		
Those who used	59	27.8
Those who did not use	153	72.2
Start of spraying:		
Protective spraying	128	44.9
When the pests effects appear	130	45.8
At economic threshold	26	9.3

Source: field survey 2010

Variation between level of awareness and level of adoption of some recommendations:

Some studies (Adeniji *et al*, 2007; Muhammad, 2009) had revealed that the level of adoption was far less than the level of awareness. Tables 2 and 3 showed similar results for the awareness and adoption of adequate use of irrigation water, plant spacing of the main crops grown in Gezira,

removal of crop residue and side effects of pesticides with corresponding values of 75.5%, 64.2%, 85% and 64.4% for awareness and 40.5%, 11%, 48.8% and 27.8% for adoption, respectively. The intensive practical oriented extension coverage will probably be one of the solutions that may increase the adoption rate to match the level of awareness.

Farmers’ response towards factors and constraints responsible for low productivity:

The identification of the constraints of high productivity is essential for getting the real solution of low productivity. In this regard, the data in Table 4 showed that the farmers rank irrigation problems at the top followed by pests and diseases, shortage of agricultural inputs, increase of costs of production, problems of harvest and post-harvest processing, agricultural marketing, agricultural finance problems, lack of extension services, management problems and finally problems of storage. The results about the constraints responsible for low productivity in this study were in line with the result reported by Banaga *et al.* (2008).

In a similar farmer perception study in Gezira Scheme carried out in 1998, farmers ranked irrigation problems first followed by lack of inputs, lack of credits, marketing problems, lack of extension and lack of labors, respectively (Elfaki 2000).The Scheme management should consider farmers perception regarding constraints preventing farmers from increasing their productivity and make all the necessary arrangements to remove constraints and help farmers to boost their productivity and ultimately lead to the increase of Gezira Scheme contribution in the national economy.

Table 4: Distribution of farmers according to their apprehension of problems and constraints of production

Agricultural problems areas in priority	Mean	St.d	Rank order
Irrigation problems	1.98	.13	1
Pests and diseases	1.92	.34	2
Lack of agricultural inputs	1.90	.31	3
Increase of cost of production	1.74	.54	4
Problems of harvest and post-harvest processes	1.66	.65	5
Inadequate agricultural marketing	1.67	.55	6
Agricultural finance problems	1.61	.51	7
Lack of extension services	1.46	.56	8
Management problems	1.19	.50	9
Storage problems	1.03	.65	10

Source: field survey 2010

Conclusions and implications

Half of the 14 areas tested for training needs were perceived by famers as highly needed, while the need for training for the rest was seen as medium. Application of the recommended technical packages was perceived as very important by the vast majority of farmers. Awareness of most of the technical packages was generally high. However, the level of adoption was raging between low and very low. Ranking of production constraints was found to be more or less similar to previous studies headed by

irrigation problems, pests and diseases and lack of inputs.

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رؤية المزارعين لاحتياجات التدريب، الحزم التقنية الموصى بها ومعوقات الإنتاج للمحاصيل الرئيسية بمشروع الجزيرة، السودان

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المستخلص

التعرف على المشاكل والمعوقات التي تحد من تحقيق أعلى إنتاجية من الأهمية بمكان لإيجاد الحلول لمشكلة تدني الإنتاجية. هدفت الدراسة لمعرفة مدي وعي وادراك المزارعين لإحتياجاتهم التدريبية، المستوي المعرفي وتبني الحزم التقنية للمحاصيل الرئيسية وإمكانية التعرف على المعوقات التي تؤدي لتدني الإنتاجية بمشروع الجزيرة. تم إختيار (7) أقسام ري عشوائيا من جملة 21 قسم ري بالمشروع (ودالنو، ودالير، طابت، كاب الجداد، شلعي، ودالمنسي وقسم ري قيوحة). تم تصميم إستبيان لجمع المعلومات المطلوبة باستخدام تقنية العينة العشوائية البسيطة بحجم عينة لهذه الدراسة 395 مزارع. تم جمع البيانات الأولية بواسطة الإستبيان في الفترة من أبريل - يوليو 2010. وتم تحليلها باستخدام برنامج الحزم الإحصائية للعلوم الاجتماعية (SPSS) لحساب التكرارات، النسب المئوية، المتوسط والانحراف المعياري كما تم استخدام a Likert لتحديد احتياجات التدريب للمزارعين ومعرفة مقدرتهم علي تحديد المشاكل والمعوقات الأساسية التي تؤدي لتدني الإنتاجية بالمشروع. كشفت الدراسة ان تبني الحزم التقنية الموصى بها ضعيف جداً مقارنة مع المستوى المعرفي للمزارعين وخاصة فيما يتعلق بالإستخدام الأمثل لمياه الري، ازالة مخلفات المحاصيل، إستخدام الرشاشات لتطبيق المبيدات و المسافة بين النباتات علي التوالي. كما كشفت الدراسة عن وعي وادراك المزارعين للمشاكل التي تتسبب في تدني الإنتاجية وأن مشكلة ادارة الري تأتي علي قمة المشاكل تليها مشكلة الأمراض والافات، عدم كفاية المدخلات، ارتفاع تكاليف الانتاج، مشاكل الحصاد وعمليات ما بعد الحصاد، مشاكل التمويل، مشاكل التسويق، ضعف الخدمات الإرشادية وقلة عدد المرشدين، المشاكل الإدارية وأخيراً مشكلة التخزين. إستنادا علي هذه النتائج ظهرت الحاجة القوية لتزويد المزارعين بالمدخلات الكافية، معلومات السوق ورفع قدرات المزارعين في مجال إدارة مياه الري، إدارة الحقل في المجالات المختلفة المتعلقة باحتياجاتهم لتطوير مهاراتهم وزيادة معارفهم لإحداث التغيير المرغوب وسط المزارعين لزيادة الإنتاجية.