

Effectiveness of extension methods in adopting the planting of improved varieties of sorghum and millet in Sheikan locality, Sudan

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ABSTRACT: The present study was conducted in Sheikan locality at North Kordofan State during the period 2014 to 2016. The main objective of the study is to identify the efficiency of some extension methods in convincing farmers to adopt planting some selected improved crops varieties. Seven villages were selected which represent 5% of the total number of the locality villages and 129 framers representing ten percent from the total head households were selected as sample. The respondents from each village were randomly selected. Primary and secondary sources were used to obtain the require information. Statistical Package of Social Sciences (SPSS) was used for data analysis. The results showed that all the respondents confirmed that farming is their main job and used traditional practices, 47.3% of the respondents indicated that the demonstration farms is the most suitable and effective method to convince farmers for practicing planting improved varieties. The results of Chi-square test showed significant differences among the respondents towards using farmer's schools as effective method in adopting planting improve millet and sorghum seeds ($X^2=6.839$, $p=0.009$) and ($X^2=4.390$, $p=0.036$) respectively. Also, Chi- square test revealed significant differences regarding use of demonstration plot with improve sorghum variety ($X^2 = 5.869$, $p = 0.015$), while showed significant differences regarding use of field trips with improve Millet seed. ($X^2 = 3.673$, $p = 0.055$). This study recommends concentration on using demonstration fields and farmers field schools.

Keywords: Adoption, improve varieties, extension methods, Sudan.

INTRODUCTION

Agricultural extension is an ongoing process of accessing useful information and raising productivity for agrarian people to identify problems and opportunities, sharing information (Sharma, 2006) through use of variety of communication methods (Altahat et al., 2012) and then assisting those farmers to utilize this information or technology for improvement of their quality of life (JICA, 2008). The reasons for low yields in most developing countries are non-adoption of latest agricultural technologies and poor farm management by farmers (Jafry et al., 2014). These might be attributing to the inadequate performance of public extension to an incentive failure on the part of extension agents. The failure derives from the

fact that in most public systems, agents are nominally accountable to their superiors (who may often not be attentive to effective supervision), and are only indirectly (if at all) accountable to their farmer-clients (Feder et al., 2010). Lack of information adapted to local needs and lack of technical knowledge at farm level which can be enhanced considerably if the latest agricultural technologies are communicated to the farmers through an efficient extension method (Khatam et al., 2013). Agricultural extension services (including traditional extension, consultancy, business development and agricultural information services) are expected to disseminate these technologies amongst their clients (DAES, 2013).

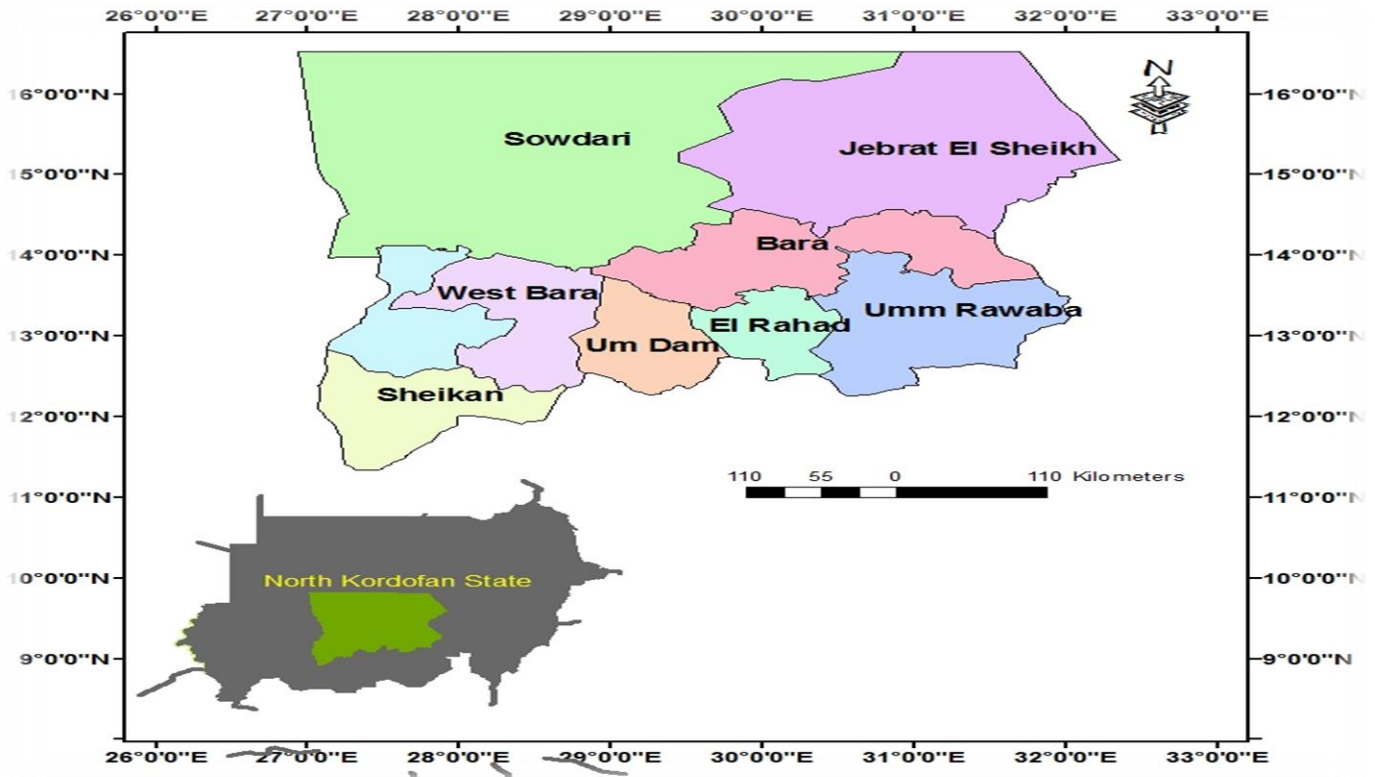


Figure 1. North Kordofan State.

There is now a much-reduced emphasis on uniform messages (such as those provided by the T&V system). The need to involve farmers more in the extension process itself has been recognized for some time and a number of participatory and facilitation approaches have been developed. In addition, farmers need extension on a diverse range of rural development options including information on markets, rural industry and other income opportunities (Chapman and Tripp, 2003). To achieve increased production and improved processing in all the sub-sectors of agriculture (crop and livestock), improvement of quality of life and promotion of environmentally friendly practices and other objectives require effective extension effort (Koyenikan, 2009). The appropriate messages should be developed to inform the rural population about the need to adopt and encourage the appropriate methods of agricultural innovation (Kassem, 2014).

Thus, the objective of this paper is to assess and identify efficiency of some extension methods in adopting planting of millet and sorghum in area of study.

METHODOLOGY

Study site description

North Kordofan State is located in the central part of Sudan (FEWSN, 2013). Arid and semi-arid zones that cover the

largest part of this State (Hamad, 2018). It lays between latitudes $12^{\circ} 14'$ and $16^{\circ} 30'N$, longitudes 27° and $32^{\circ} 35'E$ (Zeinelabdein and Elsheikh, 2015) (Figure1). The average annual rainfall is about 300 mm in the sandy soil while 400 mm in clay soil. The population is 2.04 million and 79% of them depend on agricultural activities in rain fed sectors as main sources for livelihoods. The State contribute 10% in exportation from total petroleum and non-petroleum products. The major crops grown are millet and sorghum (food crops), groundnut and sesame (cash crops) on the other site Gum Arabic production and forest and Non Timber Forest Products (NTFPs) contribute significantly to livelihood. Animal raised are mainly sheep, camels and goats (Hamad, 2018). Sheikan locality (the study area) is one of the nine localities located in the southern part of the North Kordofan State. Elobeid is the capital of the state. Sheikan locality lies between the latitudes $12^{\circ} 30'$ and $13^{\circ} 30'N$ and longitudes $29^{\circ} 30'$ and $30^{\circ} 30'E$ it shares boundaries with four localities; Bara, Ummrawaba, Ennuhoud, and Dilling from north, east, west and south respectively, with a total area of 93000 km² (ADS, 1993).

Sampling procedure and data collection

This study targeted the administration units of Skeikan locality. Seven villages were selected represent 5% from the total number of the locality villages (138). Ten percent

Table 1. shows the village name, total number of households in each village, % sample size, and number of respondents in the sample.

Villages Name	Total No. households	% sample size	No. in Sample
El Dmokia	303	10	30
El Karbab	152	10	15
El Dikia	178	10	17
Erafat Salim	116	10	12
Faris	230	10	23
Gisaba	200	10	20
El Edate	120	10	12
Total	1129	10	129

Source: Field research (2017).

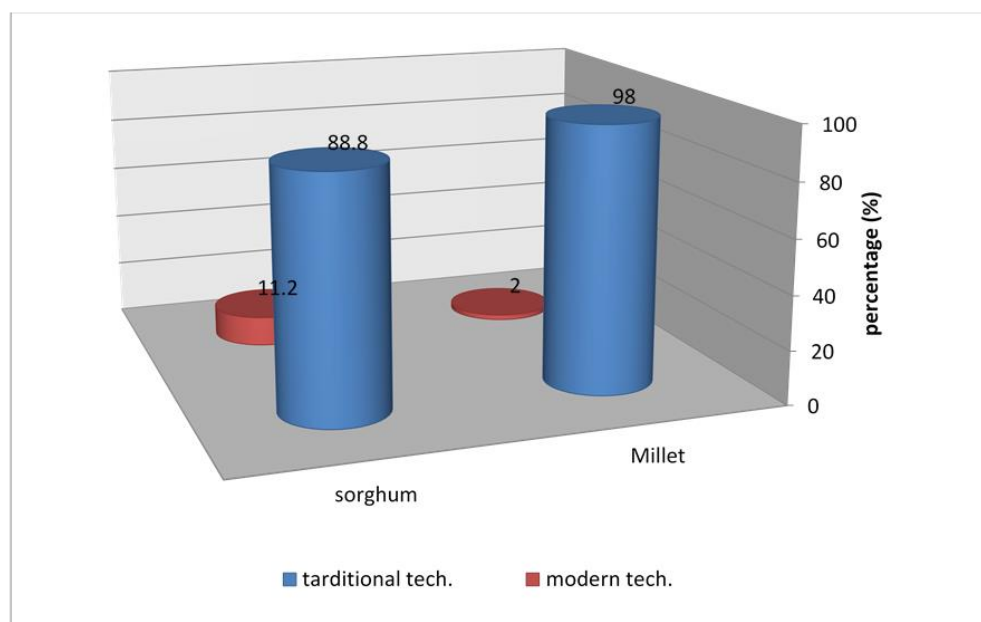


Figure 2. Showed the Comparison between technique used for planting Sorghum and Millet.

(10%) out of the total head households (1299) were selected as a sample of the study (129) farmers. The respondents from each village were selected using simple random technique (Table 1). Two sources of data were adopted; primary and secondary data; the primary data were collected via well designed constructed questionnaire, general observations and group discussions. Secondary data were obtained from related books, references, reports, workshops, scientific journals and internet websites.

Data analysis

Statistical package of social sciences (SPSS) was used for Data analysis considering descriptive statistic and Chi-square test.

RESULTS AND DISCUSSION

Figure 2 indicated that the 98.0 and 88.8% from the respondents practices local methods in planting both millet and sorghum respectively. This may attribute to farmers in the study area that are not received extension packages regarding these practices or not convinced with the modern way. The results revealed that majority of the respondents 76% received agricultural services from extension and 74.4% of these services in form of agricultural inputs (Figure 4). This mean that extension system in the area is responsible to deliver agricultural services to farmers to make them experts in their farm This result is in agreement with the work of Gerba et al. (2017) that agricultural extension in Sudan is playing a crucial role in agricultural development and rural transformation. Also results showed that 72.9 and 41.9% from the respondents

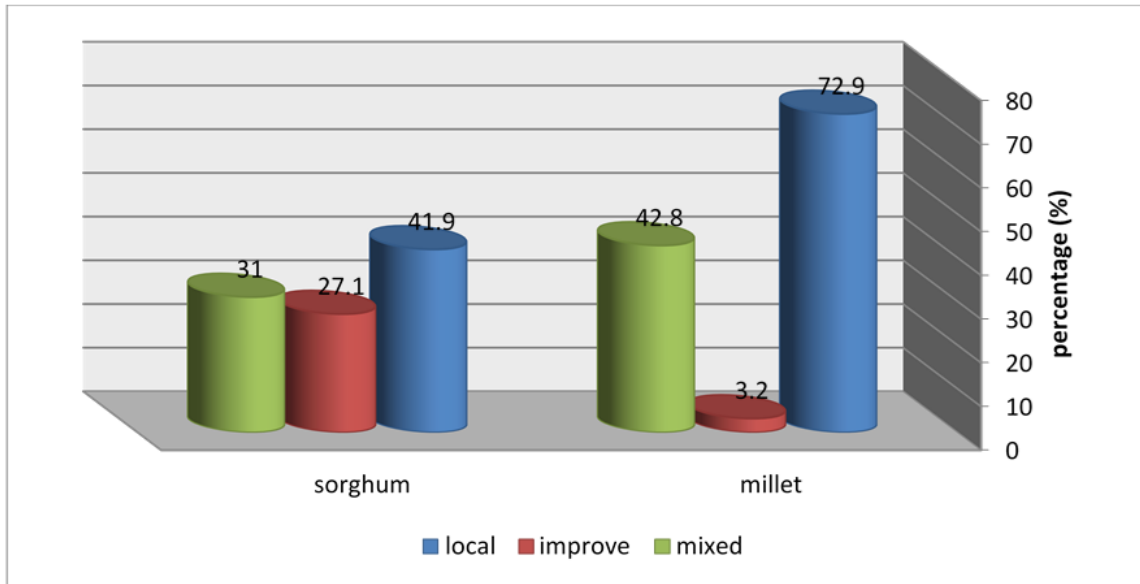


Figure 3. Varieties of millet and sorghum planted in the area.

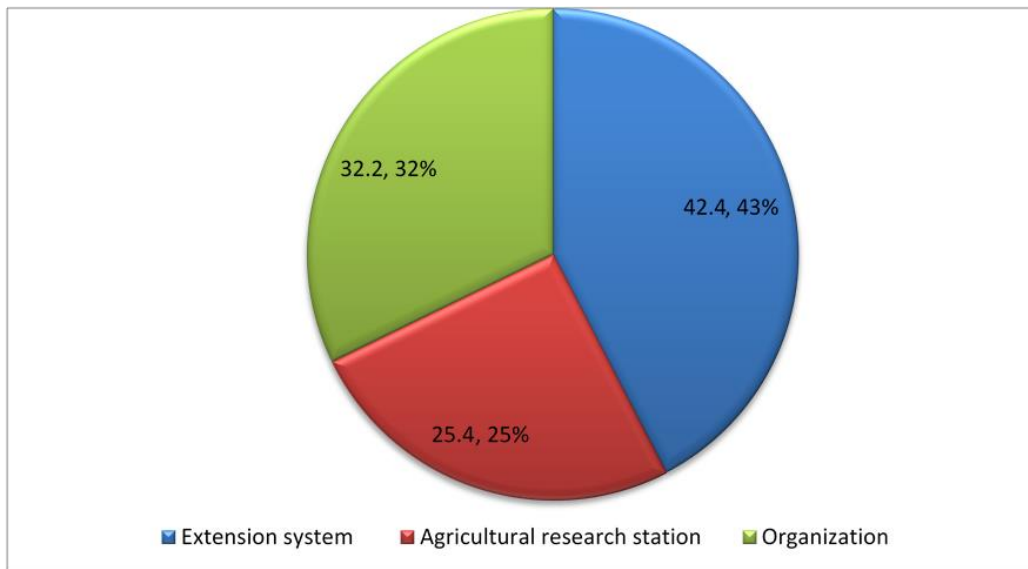


Figure 4. Sources of accessing agricultural information.

adopted local varieties for both millet and sorghum respectively (Figure 3). This in line with Ali-olubandwa et al. (2011) which noted that the extension service is charged with the responsibility of ensuring sustainable food production through promoting local practices and provided improved seed that is sufficient for domestic use and for export.

The results of Chi-square in the following Tables 2,3,4,5,6,7, and 8 depicted that strong association between different extension methods followed by farmers and adoption of modern technology which reflected in their

agricultural production. This in line with the study of Project and Strengthening (2008). It is not enough for an extension agent to have technical knowledge; he/she must also know how to communicate this knowledge and how to use it for the benefit of the farm family. In Sudan, a range of approaches to extension delivery (bottom up approach is more participatory approaches) have been promoted over the last years by the various extension service providers, including government extension offices, non governmental organizations (NGOs) and research centers (Nwaobiala, 2017). Appropriate extension methods encourage setting

Table 2. Chi-square test for significant effects of FFSs on plantation of improved millet crop.

		Millet crop		Total	Sig.
		Local	Improved		
FFSs	Exposure	12	2	14	0.009
	Not exposure	82	1	83	
Total		94	3	97	

$p \leq 0.05$ = significant, indicating by Chi-square test. Source: Field research (2017). X^2 value= 6.839.

Table 3. Chi-square test for significant effects of extension leaflets on plantation of improved millet crop.

		Millet crop		Total	Sig.
		Local	Improved		
Extension leaflet	Exposure	12	3	15	0.001
	Not exposure	82	0	82	
Total		94	3	97	

$p \leq 0.05$ = significant, indicating by Chi-square test. Source: Field research (2017). X^2 value= 16.92.

Table 4. Chi-square test for significant effects of Field visits on plantation of improved sorghum crop.

		Sorghum crop		Total	Sig.
		Local	Improved		
Field visits	Exposure	1	4	5	0.05
	Not exposure	31	53	84	
Total		32	57	89	

$p \leq 0.05$ = significant, indicating by Chi-square test. Source: Field research (2017). X^2 value= 3.673.

Table 5. Chi-square test for significant effects of office visits on plantation of improved sorghum crop.

		Sorghum crop		Total	Sig.
		Local	Improved		
Office visits	Exposure	3	8	11	0.015
	Not exposure	51	27	78	
Total		54	35	89	

$p \leq 0.05$ = significant, indicating by Chi-square test. Source: Field research (2017). X^2 value= 5.869.

Table 6. Chi-square test for significant effects of demonstration plots on plantation of improved sorghum crop.

		Sorghum crop		Total	Sig.
		Local	Improved		
Office visits	Exposure	3	8	11	0.015
	Not exposure	51	27	78	
Total		54	35	89	

$p \leq 0.05$ = significant, indicating by Chi-square test. Source: Field research (2017). X^2 value= 5.869.

with farmer to know what in their mine and practice with them the appropriate methods for adoption, therefore adopting of learning by doing is more effective's

approaches to accelerate the adoption process. Agricultural Innovations System (AIS) develop human resources and at the same time serve as a source of

Table 7. Chi-square Test for significant effects of farmer field school on plantation of improved sorghum crop.

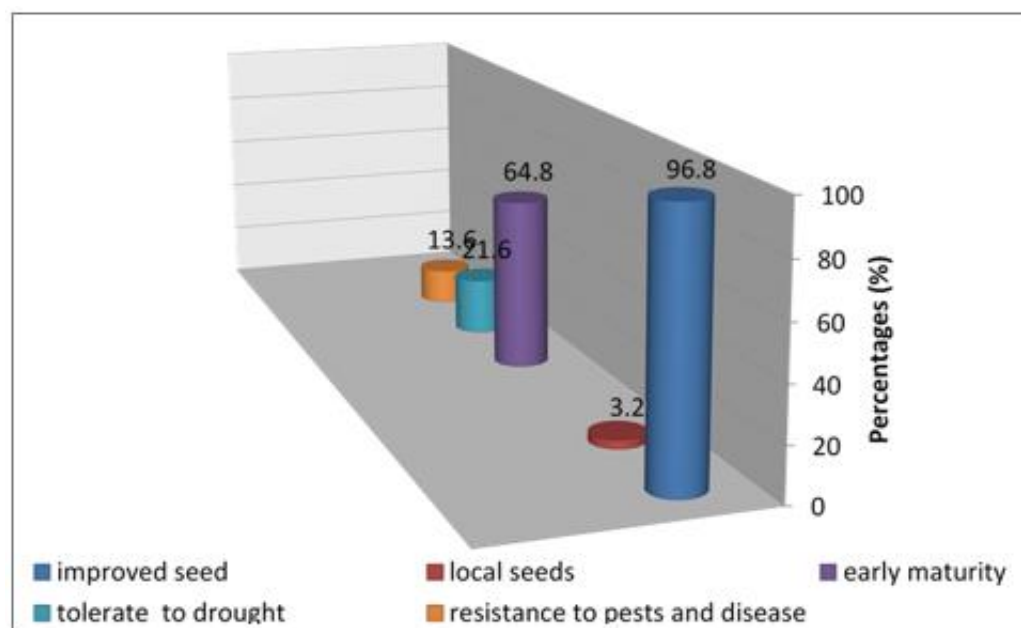
		Sorghum crop		Total	Sig.
		Local	Improved		
FFSs	Exposure	6	10	16	0.036
	Not exposure	48	25	73	
Total		54	35	89	

$p \leq 0.05$ = significant, indicating by Chi-square test. Source: Field research (2017). X^2 value= 4.390.

Table 8. Chi-square test for significant effects of radio programs on plantation of improved sorghum crop.

		Sorghum crop		Total	Sig.
		Local	Improved		
Radio programs	Exposure	26	26	52	0.015
	Not exposure	28	9	37	
Total		54	35	89	

$p \leq 0.05$ = significant, indicating by Chi-square test. Source: Field research (2017). Z^2 value= 5.973.

**Figure 5.** Perception of the respondents towards improved varieties compared with local and their justifications.

knowledge and technology. The absence or decline of these institutions responsible for knowledge transfer leave a large gap in a country's innovation capacity (Adam et al., 2015).

The results from the current study also show that 96.8 and 64.8% of the respondents adopt improved seed and early maturity varieties respectively. This due to effects of season variability in the area and were exposure more frequency to field visits (93%), office visits (87.6%) and demonstration plots (86%) for accessing their necessary agricultural information (Figures 5 and 6). Also, the respondents perceived that the demonstration plots

(47.3%), farmer's field school (38%), field visits (63.4%) have significantly effects and convinced methods and 67% focused on learning by doing as training approach for recommended packages (Figures 7 and 8). Egziabher et al. (2013) report that there are various extension teaching methods used by the extension worker to effect desirable changes in the behavior of farmers, arrange the best learning situations and provide opportunities in which useful communication and interaction takes place between extension workers and farmers. Such teaching methods/pathways include group training and demonstration plot.

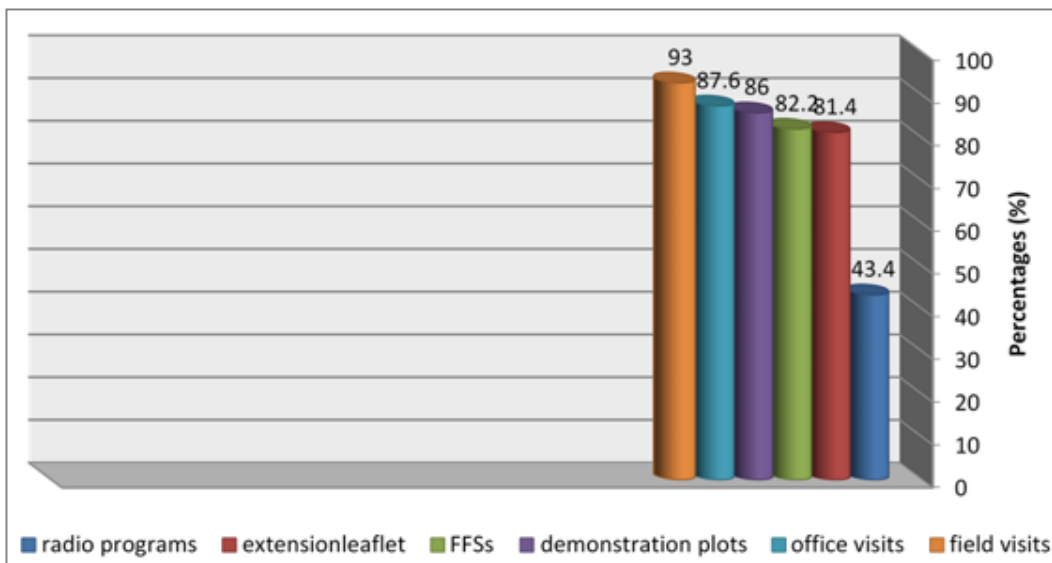


Figure 6. Distribution of the respondents according to their exposure to extension methods.

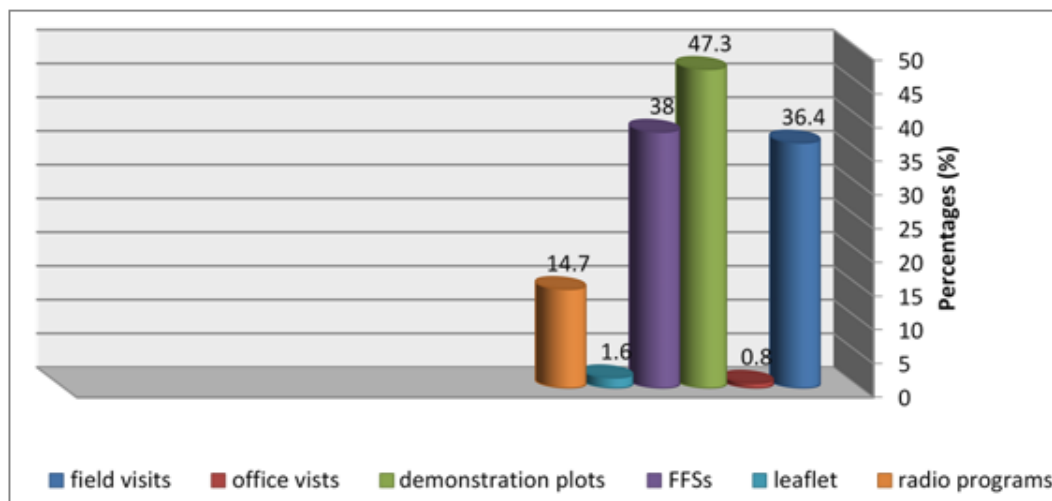


Figure 7. Best extension method for delivering agricultural information from farmer's point of views.

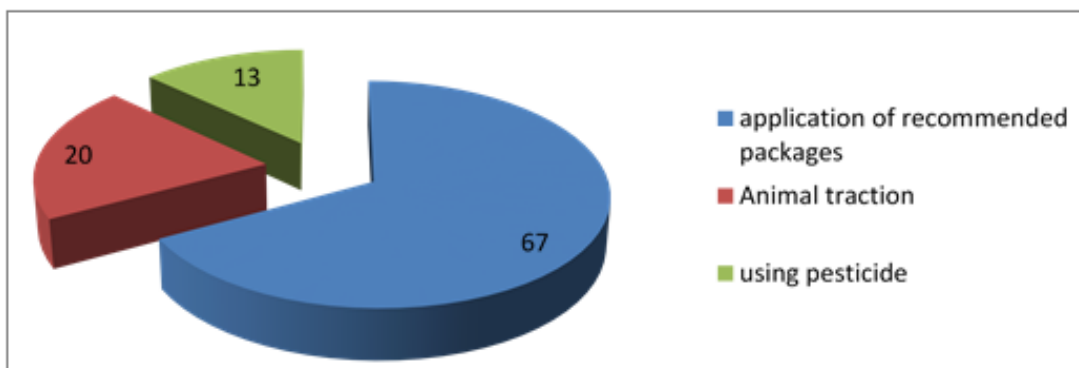


Figure 8. Issue of training conducted to respondents.

Conclusion and recommendations

Despite the importance of agriculture for Sudan economy, the Sudan Government budgetary allocation to the sector has been declined in the recent years, because policy makers do not recognise the important of agricultural sector as well as majority of farmers adopted traditional practices and local varieties in their farm. Extension system is responsible for knowledge transfer and supervision regarding millet and sorghum crops in the field, learning by doing approached which practiced through field visits, farmer field school, and demonstration plots were more effectives to accelerate the adoption process. Chi-square Test showed significant difference between extension methods followed by extension officer and adoption of modern technology which reflected in improvement of their agricultural production.

Based on the results of this study, it is therefore recommended that farmers should be encourage to participate in farmer field school and demonstration plots.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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