



Contents lists available at ScienceDirect

Journal of the Saudi Society of Agricultural Sciences

journal homepage: www.sciencedirect.com

Full length article

Gender capacity building needs on soil fertility management practices among smallholder arable crop farmers in Kwara State, Nigeria

A.K. Daudu*, F.O. Oladipo, A.O. Kayode

Department of Agricultural Extension and Rural Development, University of Ilorin, Ilorin, Nigeria

ARTICLE INFO

Article history:

Received 13 February 2017

Revised 28 April 2017

Accepted 19 June 2017

Available online xxxx

Keywords:

Gender

Capacity building

Soil fertility management practices

ABSTRACT

Poor soil fertility management practices are major reasons for slow growth in food production among smallholder farmers of sub-Saharan Africa including Nigeria. This study therefore assessed gender capacity building needs on soil fertility management practices among smallholder arable crop farmers in Kwara State, Nigeria. A structured interview guide was used to elicit information from six hundred and fifty (650) respondents using three-stage sampling technique. Data collected were described using descriptive statistics such as frequency, percentages, mean, standard deviation, charts and analysed using correlation and Borich model. The study revealed that mean age of the male farmers was 49 years while that of the female farmers was 45 years. Majority of the respondents (97.8% male and 76.7% female) were married, 49.8% male and 42.7% female respectively had one form of formal education or the other; capacity building were perceived to be mostly needed in the areas of crop rotation (MWDS = 0.0102) for male and organic manuring (MWDS = 0.0082) for female farmers; and major constraints to both male and female farmers involvement in soil fertility management practices were limited income (male $\bar{x}$ = 3.65, female $\bar{x}$ = 3.50) and high cost of management (male $\bar{x}$ = 3.58, female $\bar{x}$ = 3.54). The study concluded both male and female smallholder arable crop farmers require capacity building on soil fertility management practices but female farmers required more than their male folks. It is therefore recommends an urgent need to intensify capacity building for farmers on soil fertility management practices by the extension agents especially where the capacity building is importantly needed in order to improve their knowledge and productivity.

© 2017 Production and hosting by Elsevier B.V. on behalf of King Saud University. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

1. Introduction

Nigerian agriculture stands at crossroads either improved productivity and income will remain elusive with isolated success in training and adoption of new soil fertility management practices by smallholder farmers to improve on productivity and their income. Currently smallholder farmers form an important foundation upon which the Nigerian agriculture relies (Amanze et al., 2010). One of the most severe constraints to the sustainability of smallholder-based agriculture in sub-Saharan Africa is declining soil fertility. In the past, African farmers managed soil fertility on

their farms by following their land. However, as the population increased, following of land reduced, with many farmers adopting intensive land use practices that require fertilizers to replenish nutrients. Declining soil fertility is thus an obstacle for sustainable productivity improvement of crops and consequently livestock. Soil fertility management and agriculture productivity in which groups of farmers learn together, exchanging know-how and organizing their own knowledge networks and sharing are rapidly declining as it is no longer supporting plant life for farmers' livelihoods (FAO, 2010).

Soil fertility management is a knowledge intensive approach to soil management practice (Bationo et al., 2004). In order to create awareness on soil fertility management practices, dissemination of knowledge and information should be done through regular trainings using workshops, demonstrations, seminars, field days and short exchange visits (Adolwa et al., 2010; Matata et al., 2008; Bationo et al., 2004). Training overcomes constraints through providing appropriate knowledge and new skills (Wegulo et al., 2009) and thus providing an understanding of what a technology entails and facilitates its efficient adoption and utilization. However, the

* Corresponding author.

E-mail address: kamal_4real@yahoo.com (A.K. Daudu).

Peer review under responsibility of King Saud University.



Production and hosting by Elsevier

capacity for soil fertility management research in sub-Saharan Africa is insufficient (Bationo et al., 2004). Training needs assessment is thus a critical activity for the training and development function (Miller et al., 2002).

Local soil knowledge is an important component of the agro-ecosystem, especially in low-input farming systems around the world (Mairura et al., 2008). Knowledge is often created by a combination of education and experience. Knowledge of the people who have been interacting with their soils for a long time can offer many insights into the sustainable management of tropical soils (Edmundo et al., 2002). The integration of scientific systems and indigenous knowledge should be viewed as a logical development in soil knowledge systems (Mairura et al., 2008).

Soil knowledge including that encapsulated in scientific learning, develops in culture through long-term interactions with the environment and use of land resources (Mairura et al., 2008). An adequate understanding of farmers' knowledge of soil fertility is important because it enables existing state of knowledge to be recognized so that indigenous knowledge can be integrated with scientific knowledge to facilitate design of appropriate and effective technology development and dissemination programmes (Odeno et al., 2010). The absorptive capacity of soil fertility technologies depends heavily upon the level of knowledge obtained through education and training (Mytelka, 2001). Thus it is paramount to understand the training need and knowledge levels of farmers in soil management practices in the study area in order to promote enhanced uptake and utilization of soil fertility management technology and information for sustainable agriculture.

According to Borich, a need is described as a discrepancy or gap between "what is", or the present state of affairs in relation to a group and situation of interest, and "what should be", or desired state of affairs (Altschuld and Witkin, 2000). Borich (1980) pioneered his methodological model in an effort to design such a survey instrument that would allow one to collect data that can be weighed and ranked in order of priority. By doing so, responses can be linked to a practical decision framework to improve a training program. Borich defined a capacity building need as "a discrepancy between an educational goal and trainee performance in relation to this goal." He further suggested that capacity building programmes could utilize his model by employing the two extreme positions: what is (the measured behaviours, skills, and competencies of trainees) and what should be (the goals of the training program). Also, Youdeowei and Kwarteng (2006) defined training need as the difference between the required level of individual competence and his present level of competence. Capacity building needs is meant to identify performance requirements, knowledge, skills, and abilities needed by an agency's workforce/individuals to achieve their required potentials. Identifying area of capacity building needs in all aspects of agricultural production of farmers will help to enhance farmers' productivity for better yield and increased income.

Knowledge is bound up with action but what people do is not necessarily what they "know". This is because different knowledge types represent certain conceptions and convictions, therefore the issue of farmer preferences, furthermore, farmers' resources such as land, labour and capital can also be limiting. It is therefore paramount to empower farmers through greater understanding, training and application of soil fertility management principles (Bationo, 2003).

However, since both gender were involvement in the management of agricultural soil therefore the need to assess the knowledge level of male and female farmers in soil fertility management practices becomes imperative with view of increasing agricultural production. The study thus assesses the capacity building need of male and female on soil fertility management practices among smallholder arable crop farmers in the study area. Specifically, it described the socioeconomic characteristics of smallholder arable

crop farmers, identified the level of importance and competence in the selected areas of soil fertility management practices.

1.1. Hypothesis

H₀₁. There is no significant relationship between some selected socio-economic characteristics of male and female farmers and their perceived capacity building needs on soil fertility management practices.

2. Materials and methods

The study was conducted in Kwara State, Nigeria. The State is one of the 36 states that make up the Federal Republic of Nigeria. It is geographically located between latitude 8°5'–10°4'N and longitude 4°55'–6°5'E covering an estimated land area of 32,500 km (KWADP, 2012) with a population of about 2.4 million (NBS, 2010). It shares boundary with Niger, Oyo, Kogi and Osun States and the Republic of Benin. Kwara state is predominantly an agrarian state with over 80% of the population involved in Agriculture and lies within a region described as tropical climate and are characterized by double rainfall maxima and has tropical wet and dry climate (Olanrewaju, 2009). The state is grouped by Kwara State Agricultural Development Project (KWADP) into four Zones; Zone A has its headquarters in Kaiama while the Zonal headquarters of Zone B is at Patigi. Zone C and D have their headquarters at Malete and Igbaja respectively. The population for this study comprised all smallholder arable crop farmers in Kwara State, Nigeria (See Fig. 1).

Three-stage sampling procedure was used for sample selection. At stage one, all the four (4) Agricultural Development Programme Zones were selected so as to ensure that the study cut across the entire ADP Zones in the state. Stage two, involved a purposive sampling technique was also used to select 8 communities from each ADP Zone based on their prominence in selected arable crop farming activities making a total of 32 villages. At stage three, a proportionate random sampling technique was used in selecting 0.35% of male and female farmers from each village from the list of contact farmers of Kwara ADP making a total of 650 respondents. Efforts to get exact equal number of both male and female farmers proved abortive as 329 male and 321 female were sampled but only six hundred and twenty-two (317 male and 305 female) farmers responses were eventually used for the study. Data were collected through structured questionnaire on the socio-economic characteristics of the smallholder arable crop farmers, the perceived importance areas of soil fertility management practices and the perceived competency level in the selected areas of soil fertility management practices among the smallholder arable crop farmers in the study area. Some of these variables were measured as follows:

2.1. Capacity building needs on soil fertility management practices

- i. **Previous capacity building received:** The respondents were asked whether they have received any capacity building on soil fertility management before and it was rated as Yes (1) and No (0).
- ii. **Willingness to participate in capacity building programme on soil fertility management practices:** Both two categories of respondents were asked of their willingness to participate in capacity building programme on soil fertility management practices and this was rated as Yes (1) and No (0).
- iii. **Willingness to pay for capacity building programme on soil fertility management practices:** Also, respondents



Fig. 1. Map of Kwara State showing Local Government areas. Source: www.kwarastate.gov.ng/about-kwarastate/.

were asked to indicate whether they are willing to pay for capacity building programme on soil fertility management practices and which was rated as Yes (1) and No (0).

- iv. **Areas of capacity building need on soil fertility management practices:** To assess the area of capacity building needs of male and female farmers in soil fertility management practices, Borich Needs Assessment Model was used. This model proposed by Borich (1980) is one of the most widely used models in agricultural education and agricultural extension with regard to need assessment of agricultural teachers, extension agents, farmers and so on. According to Borich (1980), a need can be considered as a discrepancy between “what is” and “what should be”. Borich (1980) also defined capacity need as a discrepancy between an educational goal and trainee performance in relation to this goal. According to the model, weighted discrepancy score (WDS) was calculated (following formula) for evaluating and ranking farmers’ capacity building needs (Borich, 1980). To this end, first the discrepancy score of each eligible was calculated individually (Eq. (1)) then the weight discrepancy score was calculated for each individual job competency (Eq. (2)). Finally, by summing weight discrepancy scores and dividing it by the number of different people, mean weight discrepancies scores were calculated (Eq. (3)) and 11 competencies were ranked according to MWDS.

i.e.

$$\text{Discrepancy Score} = (I - C) \quad (1)$$

$$\text{Weight Discrepancy Score} = I(I - C) \quad (2)$$

$$\text{Mean Weight Discrepancies Scores} = \sum I(I - C)/n \quad (3)$$

where I = Importance level,

C = competency level,

n = number of male and female farmers.

A four point likert-type scale was employed in the measurement of the respondents’ perceived importance of various areas

of soil fertility management practice and also the level of the respondents’ competence on the various areas of soil fertility management practice. The scale was graded as follows:

2.2. Perceived importance of selected areas of soil fertility management practice

Respondents were asked to tick the option best describes their situation and were rated as follows:

Very important = 4, Important = 3, Less important = 2, Not important = 1.

2.3. Perceived level of competence in selected areas of soil fertility management practice

Respondents competencies in the listed skills were rated as follows:

Very competent = 1, Competent = 3, Less competent = 2, Not competent = 1.

The means of various levels of competence and importance were calculated and then used to rank the skills in order to show levels of importance and competence of each skill.

Finally, Paired Sample T -test was used to ascertain the actual areas of soil fertility management practices where capacity building is significantly important among male and female farmers’ in the study area.

Collected data were analysed with both descriptive and inferential statistics including frequency counts, means, percentages, chats, Pearson Product Moment Correlation and Borich Model.

3. Results and discussion

3.1. Socioeconomic characteristics of the respondents

Results in Fig. 2 revealed that majority (97.8% and 76.7%) of male and female respondents were married. This suggests that marriage commits individuals to directly engage in productive

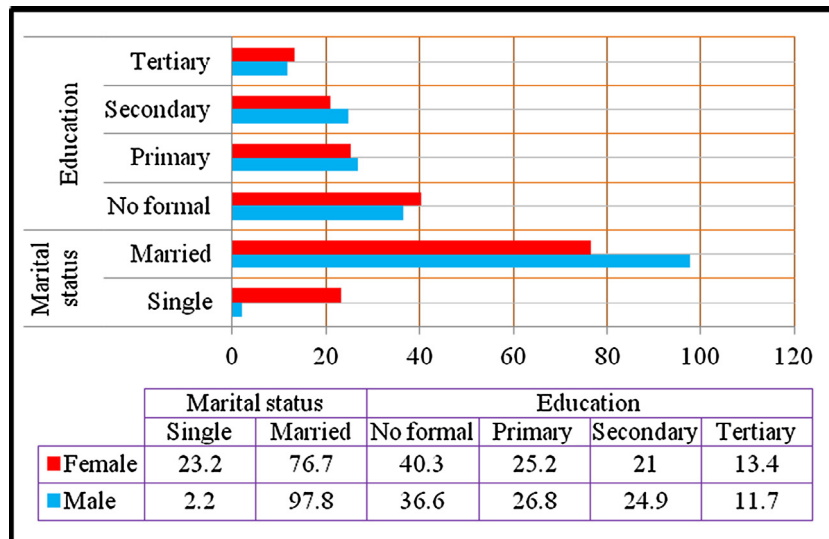


Fig. 2. Marital status and Educational level of respondents by gender. Source: Field survey, 2016.

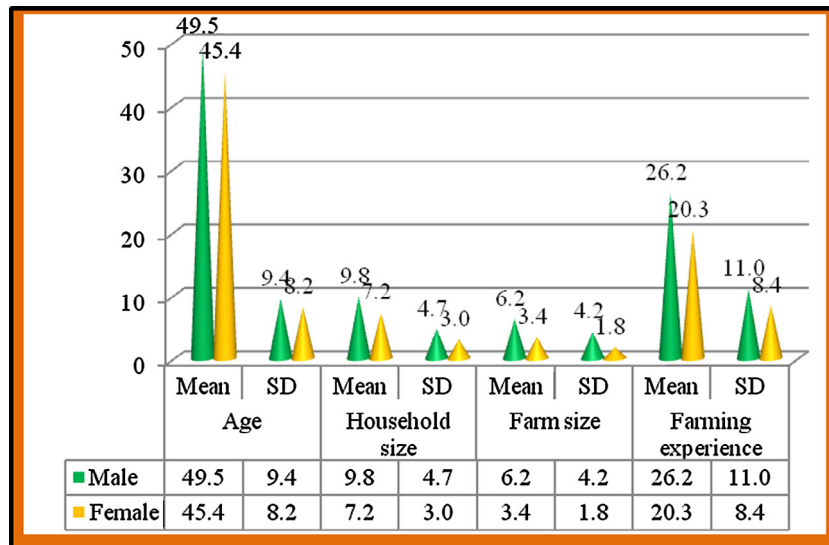


Fig. 3. Age, Household size, Farm size and Farming Experience of respondents by gender. Source: Field survey, 2016.

farming to raise enough crop produce for domestic use and for sale to meet other cash needs. Also in Fig. 2, about 50.2% and 57.3% of male and female respondents had no formal education. This suggests that there were more non-literate female farmers than their male counterparts in the study area. The implication is that the level of education of farmers helps in adoption of recommended soil fertility management practices.

Findings from Fig. 3 revealed that the mean age of the male respondents was 49.5 ± 9.4 years while that of the female respondents was 45.4 ± 8.2 years. This suggests that most of the farmers are strong and energetic and they were still in their economic active age that can make positive contribution to agricultural production. Results in Fig. 3 revealed that the mean household size of the male respondents was 9.8 ± 4.6 while that of the female respondents was 7.2 ± 3.0 . This implies male headed household would have advantage of family labour than the female headed household which may be crucial for farming operation. Furthermore, the mean farm size for male respondents was 6.2 ± 4.2 while that of their female counterparts was 3.4 ± 1.8 (Fig. 3). The mean farm experience was 26.2 ± 11.0 years for male respondents while

female respondents have mean farming experience of 20.3 ± 8.4 years. This finding suggests that male respondents had greater farming experience which may be crucial in their involvement soil fertility management practices.

Also, it was revealed in Fig. 4 that the average annual income N416,356 for male respondents and N340,393 for female respondents in the study area. The finding shows that male respondents had higher annual income than their female counterpart in terms of farming business in the study area. This may be as a result of large farm size among the male farmers. The implication is that male farmers would have more income to exploit different soil fertility management in order to improve their agricultural productivity.

3.2. Capacity building needs of respondents by gender

Results in Fig. 5 revealed that majority (69.7% and 89.5%) of male and female respondents' respectively indicated that they had not involved or participated in any form of soil-fertility management capacity building programme while a lesser proportion

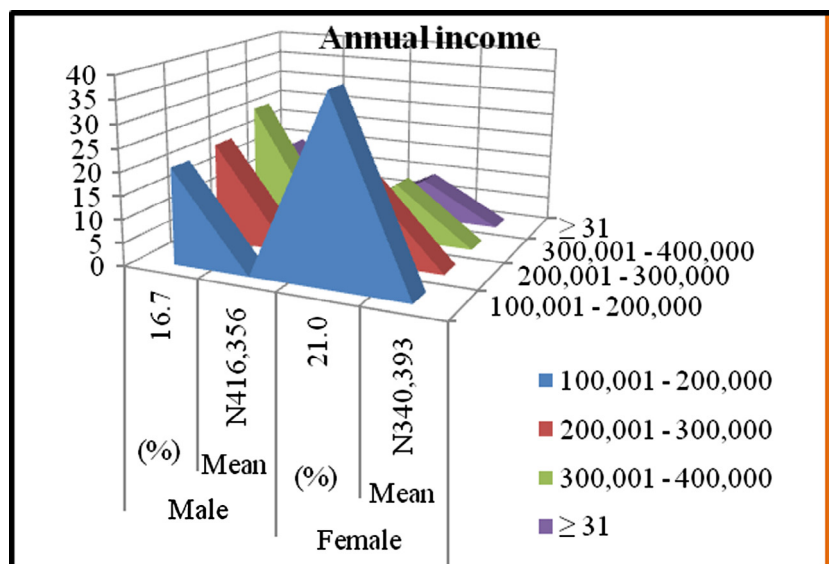


Fig. 4. Annual income of respondents by gender. Source: Field survey, 2016.

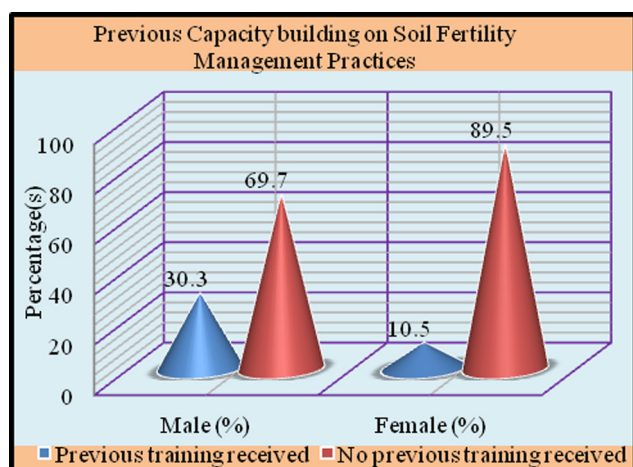


Fig. 5. Previous capacity building on SFMP. Source: Field survey, 2016. SFMP: Soil Fertility Management Practices.

of male (30.3%) and female (10.5%) indicated that they have been involved or participated in one form of soil fertility management capacity building programme or the other. From this finding, it was suggested that male farmers have been involved or participated in soil fertility management capacity building programme than their female counterpart but there is still need to build the capacity of both male and female farmers in the management of soil fertility in the study area.

Results in Fig. 6 revealed the results of farmers' willingness to partake or not partaking in soil fertility management practices capacity building programme. It was revealed that an overwhelming majority (90.9% and 96.4%) of male and female respondents' respectively indicated their willingness to involve in soil fertility management practices capacity building programme which would likely broadening their knowledge of soil management and thereby improve the productivity of their farmland while a lesser proportion (9.1% of male and (3.6%) of female respondents' were not willing to involve in any form of capacity building programme or the other. Also, it was discovered from the findings that female respondents' were more willing to participate in capacity building programme than their male counterparts in the study areas. This

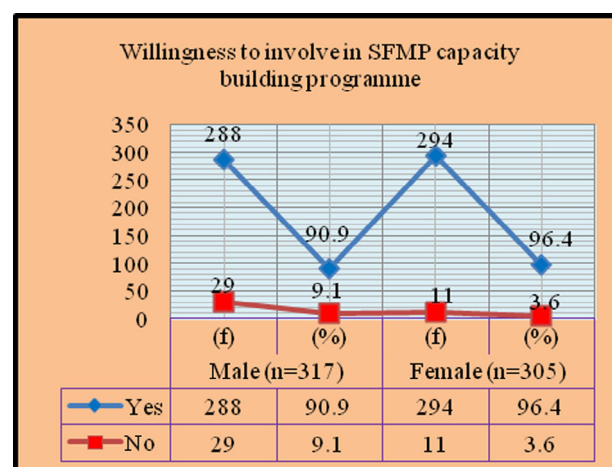


Fig. 6. Respondents willingness to capacity building on SFMP.

implies that female farmers' were willing to learn and acquire more knowledge necessary to be more involved in soil fertility management practices alongside their male counterparts who have always been in the fore front of soil fertility management practices.

Results in Fig. 7 revealed that majorities (67.6%) of male and (79.9%) of female respondents were not willing to pay for capacity building programme on soil fertility management practices while a lesser proportion (32.4% and 20.1%) of male and female respondents' respectively were much willing to pay for capacity building programme on soil fertility management practices. It could be deduced from this finding that male farmers, were more willing to acquired knowledge on soil-fertility management practices than their female counterparts in the study areas despite the fact that female farmers were more willing to acquire knowledge but they are not willing to pay for capacity building programme on such practices. The willingness to pay for capacity building programme on soil fertility management practices exhibited by certain percentages (32.4 and 20.1) of male and female farmers could be attributed to their understanding and believe that, if they pay to acquire knowledge or any skills on soil fertility management practices they would use the acquired knowledge/skills judiciously in

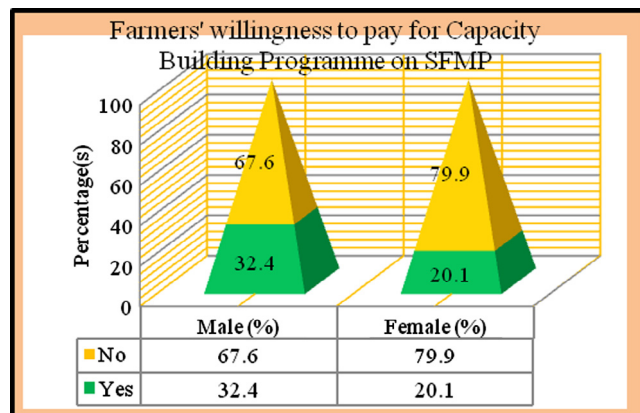


Fig. 7. Respondents' willingness to pay for capacity building programme on soil fertility management practices. Source: Field survey, 2016 SFMP: Soil Fertility Management Practices.

such a way that will bring about increase in their agricultural productivity.

3.3. Respondents' importance of soil fertility management skills as required by them

Results in Table 1 revealed the distribution of male and female farmers according to the level of importance of each soil fertility management skills as perceived by them in the study area. Using mean score and standard deviation to rank the order of importance as indicated by the two categories of respondents: In male category, soil fertility management skills is of highly importance on "Mixed cropping" (Mean = 3.63 ± 0.83), "Shifting cultivation" (mean = 3.54 ± 0.73), "Use of fertilizer" (Mean = 3.52 ± 0.95), as they ranked 1st, 2nd, 3rd and so on. In the female category, "Shifting cultivation" (Mean = 3.30 ± 0.74), "Organic manuring" (Mean = 3.25 ± 0.99), and "Use of fertilizer" (Mean = 3.24 ± 0.96), were ranked 1st, 2nd, 3rd respectively. From the findings, it was evident that mixed cropping (Mean = 3.63 ± 0.83), and shifting cultivation (Mean = 3.30 ± 0.74), was perceived most and ranked highest among male and female farmers respectively. This implies that both male and female farmers pay more importance priority on them than other soil fertility management skills in the study area. The implication of this finding is that the two categories of farmers' in the study area need an urgent training especially in the areas where the level of importance of such management skill is highly important in order to increase them in knowledge of soil fertility management. This will bring about good soil management practices and improved performance among them and consequently boost their agricultural productivity.

Table 1

Distribution of Respondents' importance and competence to carry out soil fertility management skills. Source: Data Analysis, 2016.

Soil fertility management skills	Respondents' importance of SFMP skills as required by them				Respondents' competence to carry out SFMP skills			
	Male		Female		Male		Female	
	Mean ($\pm$ SD)	Rank	Mean ($\pm$ SD)	Rank	Mean ($\pm$ SD)	Rank	Mean ($\pm$ SD)	Rank
Mulching	2.16 $\pm$ 1.05	10th	3.18 $\pm$ 0.94	5th	3.15 $\pm$ 0.94	4th	3.20 $\pm$ 0.72	2nd
Bush fallowing	3.21 $\pm$ 1.09	5th	2.95 $\pm$ 1.05	7th	3.14 $\pm$ 1.09	5th	2.55 $\pm$ 1.03	6th
Mixed cropping	3.63 $\pm$ 0.83	1st	3.19 $\pm$ 0.88	4th	3.35 $\pm$ 0.73	2nd	3.16 $\pm$ 0.89	3rd
Cover cropping	2.99 $\pm$ 1.04	6th	2.15 $\pm$ 0.97	9th	2.82 $\pm$ 1.02	6th	2.78 $\pm$ 0.93	5th
Organic manuring	2.59 $\pm$ 1.12	8th	3.25 $\pm$ 0.99	2nd	1.73 $\pm$ 0.88	10th	2.48 $\pm$ 1.21	7th
Use of fertilizer	3.52 $\pm$ 0.95	3rd	3.24 $\pm$ 0.96	3rd	3.42 $\pm$ 0.55	1st	3.22 $\pm$ 0.97	1st
Shifting cultivation	3.54 $\pm$ 0.73	2nd	3.30 $\pm$ 0.74	1st	3.29 $\pm$ 0.84	3rd	3.15 $\pm$ 0.61	4th
Conservation tillage	2.74 $\pm$ 0.91	7th	2.48 $\pm$ 0.97	8th	2.49 $\pm$ 0.93	8th	1.79 $\pm$ 1.01	10th
Crop rotation	3.50 $\pm$ 0.91	4th	2.96 $\pm$ 1.00	6th	2.58 $\pm$ 1.17	7th	2.13 $\pm$ 1.07	9th
Tree planting	1.71 $\pm$ 0.90	11th	1.45 $\pm$ 0.70	11th	1.52 $\pm$ 0.75	11th	1.43 $\pm$ 0.65	11th
Ridging across the slope	2.43 $\pm$ 1.01	9th	1.87 $\pm$ 0.89	10th	1.78 $\pm$ 0.86	9th	2.36 $\pm$ 0.91	8th

3.4. Respondents' competence to carry out soil fertility management skills

Further results in Table 1 revealed the level of ability or competence of male and female farmers to perform certain soil fertility management skill in the study area. Using mean score and standard deviation to rank their ability or competency level: Male farmers were highly competence in soil-fertility management skills like "Use of fertilizer" (Mean = 3.42 ± 0.55) and "Mixed cropping" (Mean = 3.35 ± 0.73), and they were ranked 1st and 2nd respectively while in female category, the competency level was ranked highest in "Use of fertilizer" (Mean = 3.22 ± 0.97) and ranked least competence in "Tree planting" (Mean = 1.43 ± 0.65) respectively. From the findings the order of importance and level of competency of soil fertility management skills as perceived by male respondents was not the same to the order of importance/level of competence perceived by female respondents.

3.5. Respondents' capacity building needs on soil fertility management practices

Results in Table 2 present the male and female farmers' capacity building needs on soil fertility management practices using Mean Weighted Discrepancy Score (MWDS). In male category, it was revealed that crop rotation with highest Mean Weighted Discrepancy Score (MWDS = 0.0102) is the soil fertility management practice in which capacity building is mostly needed. This is closely followed in the following order, bush fallowing (MWDS = 0.0067), ridging across the slope (MWDS = 0.0050), organic manuring (MWDS = 0.0037), mixed cropping (MWDS = 0.0032), conservation tillage (MWDS = 0.0022), shifting cultivation (MWDS = 0.0017), cover cropping (MWDS = 0.0016), use of fertilizer (MWDS = 0.0011), tree planting (MWDS = 0.0010) and mulching MWDS = -0.0068). In the female category, the order of capacity building need of respondents on soil fertility management practices is as follows: organic manuring with Mean Weighted Discrepancy Score (MWDS = 0.0082) is the area of soil fertility management where capacity building need is mostly needed followed by crop rotation (MWDS = 0.0081), conservation tillage (MWDS = 0.0056), bush fallowing (MWDS = 0.0039), shifting cultivation (MWDS = 0.0016), mixed cropping (MWDS = 0.0003), use of fertilizer (MWDS = 0.0002), tree planting (MWDS = 0.0001), cover cropping (MWDS = -0.0044), ridging across the slope (MWDS = -0.0030) and mulching (MWDS = -0.0002).

Since, not all areas of soil fertility management practices is capacity building needed among male and female respondents' then further results in Table 2 revealed the significant area of soil fertility management practices where capacity building is actually needed among the two categories of respondents' through paired

Table 2

Capacity building needs of male and female farmers' on soil fertility management practices according to Borich model. Source: Data Analysis, 2016

Male respondents'								
Soil fertility management skills	Mean score		Discrepancy score (I-C)	WDS = [I(I-C)]	MWDS = { $\sum[I(I-C)/n]$ }	Rating of MWDS	Paired-sample T-test	
	Importance (I)	Competence (C)					T	sig. (2-tailed)
Crop rotation	3.5	2.58	0.92	3.22	0.0102	1st	8.895	0.000*
Bush fallowing	3.21	2.55	0.66	2.12	0.0067	2nd	2.241	0.002*
Ridging across the slope	2.43	1.78	0.65	1.58	0.0050	3rd	2.986	0.003*
Organic manuring	2.59	1.73	0.34	0.86	0.0037	4th	5.333	0.000*
Mixed cropping	3.63	3.35	0.28	1.02	0.0032	5th	5.148	0.000*
Conservation tillage	2.74	2.49	0.25	0.69	0.0022	6th	1.239	0.000*
Shifting cultivation	3.45	3.29	0.16	0.55	0.0017	7th	1.986	0.001*
Cover cropping	2.99	2.82	0.17	0.51	0.0016	8th	2.874	0.242
Use of fertilizer	3.52	3.42	0.10	0.35	0.0011	9th	-1.729	0.216
Tree planting	1.71	1.52	0.19	0.32	0.0010	10th	-2.039	0.042
Mulching	2.16	3.15	-0.99	-2.14	-0.0068	11th	-2.039	0.606
n = 317								
Female respondents'								
Soil fertility management skills	Mean score		Discrepancy Score (I-C)	WDS = [I(I-C)]	MWDS = { $\sum[I(I-C)/n]$ }	Rating of MWDS	Paired-sample T-test	
	Importance (I)	Competence (C)					T	sig. (2-tailed)
Organic manuring	3.25	2.48	0.77	2.50	0.0082	1st	4.652	0.000*
Crop rotation	2.96	2.13	0.83	2.46	0.0081	2nd	0.126	0.004*
Conservation tillage	2.48	1.79	0.69	1.71	0.0056	3rd	2.416	0.001*
Bush fallowing	2.95	2.55	0.40	1.18	0.0039	4th	0.867	0.004*
Shifting cultivation	3.30	3.15	0.15	0.50	0.0016	5th	3.818	0.001*
Mixed cropping	3.19	3.16	0.03	0.10	0.0003	6th	3.312	0.001*
Use of fertilizer	3.24	3.22	0.02	0.06	0.0002	7th	1.446	0.000*
Tree planting	1.45	1.43	0.02	0.03	0.0001	8th	1.441	0.000*
Cover cropping	2.15	2.78	-0.63	-1.35	-0.0044	9th	-0.867	0.388
Ridging across the slope	1.87	2.36	-0.49	-0.92	-0.0030	10th	-3.775	0.149
Mulching	3.18	3.20	-0.02	-0.06	-0.0002	11th	0.456	0.456

n = 305, WDS = Weighted Discrepancy Score.

MWDS = Mean Weighted Discrepancy Score.

* Significant at 1% level.

sample *t*-test. In male category, using Paired Sample *t*-test at 1% significant level, capacity building were significantly needed in the order of the following skills: crop rotation (0.000*), bush fallowing (0.002*), ridging across the slope (0.003*), organic manuring (MWDS = 0.000*), mixed cropping (0.000*), conservation tillage (0.000*), shifting cultivation (0.001*) and cover cropping (0.000*). While in female category capacity building were actually needed in the following order: organic manuring (0.000*), crop rotation (0.004*), conservation tillage (0.001*), bush fallowing (0.003*), shifting cultivation (0.000*), mixed cropping (0.001*), use of fertilizer (0.000*) and tree planting (0.000*). Also, in male and female categories training is not significantly important in four (4) and three (3) areas respectively of soil fertility management practices. That is, in male category (use of fertilizer, mulching, tree planting and cover cropping) while in female category (cover cropping, ridging across the slope and mulching) were the areas where capacity building programme is not significantly important to be carried out among the two categories of respondents'. This finding suggests that female respondents' require capacity building in more areas of soil-fertility management practices than their male counterparts in the study area.

3.6. Hypothesis testing

Table 3 revealed the results of correlation analysis of the relationship between some selected socioeconomic characteristics (age, education, household size, farm size, farming experience, extension contact and income) of male and female respondents' and their perceived capacity building needs on soil fertility management practices. However, in male category, farm size

Table 3

Results of correlation analysis showing the relationship between some selected socioeconomic characteristics of male and female farmers' and their perceived capacity building needs on soil fertility management practices. Source: Data Analysis, 2016.

Male		Variables	Female	
r-value	p-value		r-value	p-value
-0.065	0.248	Age	-0.050	0.386
0.074	0.192	Education	0.176**	0.002
-0.033	0.553	Household size	0.239**	0.000
0.156**	0.005	Farm size	0.262**	0.000
-0.104	0.064	Farming experience	0.028	0.631
-0.046	0.416	Extension contact	0.099	0.085
0.110*	0.050	Income	0.134	0.019

* Correlation significant at 0.05 level (2-tailed).

** Correlation significant at 0.01 level (2-tailed).

($r = 0.156$, $p = 0.005$) and income ($r = 0.110$, $p = 0.050$) were positive and significant at 1% and 5% respectively. The implication is that male respondents' with large farm size will require more capacity building than those with small farm size and those with higher income will most likely be able to attend capacity building programme to acquire knowledge on how best to manage farms' soil. Other socioeconomic variables were not significant with the capacity building needs of male farmers' on soil fertility management practices suggesting that those remaining variables have no influence on capacity building needs of farmers. In female category, there were positive and significant relationship between socioeconomic variables such as education, household size and farm size and the capacity building needs of female farmers. This implies

that educational levels will most likely influences female farmers' capacity building needs of soil fertility management practices i.e. the more educated one is, the more he/she is able to manage their soil fertility. This could also be attributed to their exposures. Also, number of children assisting in farming and farm size could also determine the capacity building needs on soil fertility management practices among female farmers.

4. Conclusion

Based on this study it was concludes both male and female smallholder arable crop farmers require capacity building on soil fertility management practices but female farmers required more than their male folks. The findings of the study could reveal that male arable crop farmers were more literate than their female counterparts. Also, there were positive and significant relationship between the selected socioeconomic characteristics of male and female farmers and their capacity building needs at different degrees. It is therefore recommends an urgent need to intensify capacity building of farmers on soil fertility management practices by the extension agents especially where the capacity building is importantly needed in order to improve their knowledge. The capacity building programme should be for both males and females and done especially in groups since this would increase knowledge on the soil fertility management practices with view to increasing food production.

References

- Adolwa, I.S., Esilaba, A.O., Okoth, P., Mulwa, M.R., 2010. Factors influencing uptake of integrated soil fertility management knowledge among smallholder farmers in western Kenya. 12th KARI Biennial Scientific Conference: *Transforming agriculture for improved livelihoods through agricultural product value chains*. KARI headquarters. pp. 1146–1152.
- Amanze, B., Eze, C., Eze, V.M., Chiedozi, I.O., Blessing, R.E., 2010. Factors influencing the use of fertilizer in arable crop production among smallholder farmers in Owerri Agricultural Zone of Imo State. *Academia Arena* 2, 90–99.
- Altschuld, J.W., Witkin, R. (Eds.), 2000. Needs assessment: Trends and a view toward the future. Special Issue of *New Directions for Evaluation*, 144.
- Bationo, A., Kimetu, J., Ikeera, S., Kimani, S., Mugendi, D., Odendo, M., Silver, M., Swift, M.J., Sanginga, N., 2004. The African network for soil biology and fertility: new challenges and opportunities. In: Bationo, A. (Ed.), *Managing Nutrient Cycles to Sustain Soil Fertility in Sub-Saharan Africa*. Academy Science Publishers and Tropical soil Biology and Fertility Institute of CIAT, Nairobi, pp. 1–23.
- Borich, C.D., 1980. A needs assessment model for conducting follow up studies. *J. Teacher Educ.* 31 (3), 39–42.
- Edmundo, B., Delve, Robert, J., Marco, T.T., Richard, J.T., 2002. 17th World Congress of Soil Science, Bangkok, Thailand Research and training capacity of stakeholders enhanced. *Soil and Water*. (August), pp. 625–649.
- FAO, 2010. "Climate-Smart" Agriculture; Policies, Practices and Financing for Food Security, Adaptation and Mitigation. FAO, Rome.
- Kwara State Agricultural Development Project (KWADP), 2012. Planning, Management and Evaluation (PME), Agricultural Production Survey (APS), 2002 – 2011. 6.
- Mairura, F.S., Mugendi, D.N., Mwanje, J.L., Ramisch, J.J., Mbugua, P.K., Chianu, J.N., 2008. Scientific evaluation of smallholder land use knowledge in central Kenya. *Land Degrad. Dev.* 19, 77–90.
- Matata, P.Z., Ajayil, O.C., Oduol, P.A., Agumya, A., 2008. Socioeconomic factors influencing adoption of improved fallow practices among smallholder farmers in western Tanzania. *Int. NGO J.* 3 (4), 068–073.
- Miller, Janice, A., Diana, M., Osinski, S.P.H.R. (2002). Training needs assessment. February 1996. Reviewed. July 2002.
- Mytelka, L., 2001. Promoting scientific and technological knowledge for sustainable development. Paper for the Third UN Conference on Least Developed Countries, Round Table: "Education for All and Sustainable Development in LDCs", May 2001.
- National Bureau of Statistics (NBS), 2010. Commercial Agriculture Development Project (CADP), NBS/CADP Baseline Survey Report. pp. 5–46.
- Odendo, M., Obare, G., Salasya, B., 2010. Farmers' perceptions and knowledge of soil fertility degradation in two contrasting sites in Western Kenya. *Land Degrad. Develop.* 21, 557–564.
- Olanrewaju, R.M., 2009. Climate and the growth cycle of yam plant in the guinea savannah ecological zone of Kwara State, Nigeria. *J. Meteorolog. Clim. Sci.*, 43–48.
- Wegulo, F.N., Wandahwa, P., Shivoga, W., Tabu, I., Muhia, N., Inoti, S. Egerton University, Kenya, 2009. Sustainable Development In Africa, The Role of Higher Education: Engaging Communities in Soil Fertility Management For Sustainable Agricultural Production: Case Studies From Kakamega And Nakuru Districts. p. 5.
- Youdeowei, A., Kwarteng, J., 2006. Tool Kit for the Production of Agricultural Extension Materials. Guide Book. CTA Wageningen, The Netherlands, p. 50.