
Soil and Water Conservation Capabilities of Male and Female Vegetable Farmers on Micro-Veg Project Sites in South-western Nigeria

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Abstract

The study assessed the soil and water conservation (SWC) capabilities of male and female vegetable farmers on MicroVeg project sites in Southwestern Nigeria. Multistage sampling procedure was used for sample selection. Capabilities was measured as a pooled score of respondents' responses to identified SWC technologies used on a three point Likert type scale. Data were collected from male and female vegetable farmers using quantitative and qualitative data instruments and analysed using descriptive and inferential statistics. Results revealed that both male and female vegetable farmers were knowledgeable in most of the SWC technologies investigated. However, male vegetable farmers' capability of SWC technologies was higher when compared to the females. There were significant differences between the male and female vegetable farmers' SWC capabilities ($t = 1.631$; $p \leq 0.01$). Based on the key findings of the study, it was recommended that integration of a male-female perspective approach and policies that could bridge the gaps should be introduced as this will ensure female farmers unrestricted access to land and debunk the economic and socio-cultural factors responsible for this gap.

Key words: Soil and water conservation, capabilities, Vegetable farmers, MicroVeg project

Introduction

Nigerian farmers are small holder farmers who are confronted with the vagaries of climate change (Fatuase and Ajibefun, 2014). Various government and development agencies in Nigeria have responded and invested substantial resources in alleviating the negative effect of climate change thereby promoting soil and water conservation (SWC) practices as part of efforts to improve environmental conditions and ensure sustainable and increased agricultural production. One of such developmental effort is the MicroVeg Project (107983), an offspring of a synergy between the Nigeria-Canada Indigenous Vegetables Project (NiCanVeg Project 106511) and the Integrated Nutrient and Water Management in the Sahel (INuWaM Project 106516). The phase I (NicanVeg project) was a success story. The project aim was to popularize the production, processing and consumption of underutilized indigenous vegetables (UIVs) in rain forest and savannah agro-ecological zones in Southwest, Nigeria with a view to empowering the participating farmers especially women. NicanVeg project enabled the women farmers to take independent decisions on choice of land for vegetable production, size of land under cultivation, where and how to source credit, when to buy and apply fertilizer and the quantity to apply, when to irrigate, when to harvest the vegetables, and where and how much to sell the vegetables (Adebooye *et. al.*, 2014)

The phase 2 (MicroVeg project) was to scale up indigenous vegetable production in the areas of developing micro-dosing technology, increase yields and income through value addition, preserve soil and water ecosystems, and enable fertilizer cost saving. (Adebooye *et. al.*, 2016) The project aimed at synergising fertilizer micro dosing and indigenous vegetables innovations to develop appropriate value addition thereby enhancing food and economic security of farmers in the West African sub region from March 2015- February 2018. The project was undertaken with the financial support of the International Development Research Centre (IDRC), and the Government of Canada, through the Department of Foreign Affairs, Trade and Development, Canada (DFATD).

Soil and water conservation techniques help to curb soil degradation resulting from various agricultural and non-agricultural processes. Soil degradation poses serious threat to the sustainability of agricultural soils. Worldwide, about 85 percent of land degradation is caused by soil erosion, either by water or wind (Akpokodje, Tse and Ekeocha, 2010). The misuse of agricultural land by man results into soil erosion, soil toxicity, soil pollution and depletion of soil nutrients. The need for beneficial SWC under vegetable production results from the fact that vegetables are surface feeders hence production of vegetables involves frequent manipulation of the soil, depending on the type of vegetable. Also, the physical transport of soil from field by erosion runoff (soil loss) and the inability of soil of south-western Nigeria to hold water (poor coarse textured soil) as well as the search for other sources of water during the dry season call for effective SWC technologies in vegetable production.

In Nigeria, the goal of reducing male-female inequality has held a prominent place in international organizations and in national strategy statements, for over two decades. (UNDP 2014). Gender is used in social sciences to define the roles and activities of men and women (Odebode 2012). It is a term constructed within the social and cultural perception of the people within the society to distinguish between males' and females' roles, responsibilities, opportunities, privilege and needs (Deji 2011). Gender is defined by the culture of the society; hence it varies from one societal culture to the other and from time to time (Deji 2011). The land tenure system in many societies in Nigeria inhibits females from acquiring land through inheritance and invariably women become victims of unproductive land. Access and control over land is vested in a male household head. Women may have right of access to land, their overall control over land-use decisions and output is often constrained by the landowner. This may prevent women investing in SWC technologies on land which they have been allocated.

Capability is referred to as the ability to utilise SWC practices. Past studies have looked at gender involvement in SWC techniques. Koledoye *et al.* (2013) reported that male farmers are more involved in the use of SWC technologies for production of arable crops in Osun State. In a survey on the use of SWC technologies

conducted in Ghana and Zambia, it is opined that gender equity in land rights may also contribute to more technology adoption among women (Koppen *et al.*, 2012). The question now is; what are the SWC technologies used by the male and female vegetable farmers? Are there differences in the capabilities of the male and female vegetable farmers? What are the roles of male and female farmers in the use of the SWC technologies in the MicroVeg project sites?

The paper therefore sought to assess the utilisation (capability) of SWC technologies from a male-female perspective in the MicroVeg project sites in order to enhance the understanding of sex issues associated with SWC technologies among male and female farmers in the MicroVeg study area.

The specific objectives of the study were to:

1. describe the personal and socio economic characteristics of the vegetable farmers in the study area;
2. identify the SWC technologies used among the vegetable farmers; and
3. determine the capabilities of male and female respondents in the use of SWC technologies.

Methodology

The study area was south-western Nigeria, which is the MicroVeg project area. It consists of Lagos, Ogun, Oyo, Osun, Ondo, and Ekiti States. A multi-stage sampling procedure was used to select respondents. In the first stage, Ekiti, Ondo, Osun, and Oyo States were purposively selected based on their active vegetable production activities and participation in the phase 1 of the project (that is the Nigerian-Canada underutilised indigenous vegetable (NicanVeg) project). In the second stage, 50 percent of the MicroVeg project sites in each of the four states were randomly selected. Ekiti State has a total of six MicroVeg sites while Ondo, Osun and Oyo have four, six and four sites, respectively as at the time of the field survey. Three, two, three and two sites were selected from Ekiti, Ondo, Osun and Oyo State, respectively to give a total of ten project sites. At the third stage, purposive sampling technique was used to select respondents from each project site. The field survey

was carried out during the dry season period that is October to December 2016. A total of 215 respondents were selected for the study.

To determine the capability of using SWC technologies, a list of 17 SWC technologies identified from the project sites were presented to the farmers based on a three Likert type scale of Never used = 0, Occasionally used = 1 and Frequently used = 2. Quantitative and qualitative data collection techniques were used. Validated structured interview schedule was used to obtain quantitative information, while focus group discussion (FGD), key informant and participant observation were employed to obtain qualitative data. Data collected were described using means, standard deviation and frequency distribution. The qualitative data were analysed with Atlas. Ti software, and presented, in line with the principles of FGD, IDI analysis following Aransiola et al., (2014).

Results and Discussion

Table 1 shows that majority (70.3%) of the respondents were male, while 29.7% were female. There were more males than females who had the capability of using SWC technologies for vegetable production. This implies that male dominated vegetable farming. Awareness of the economic values in vegetable production evident from women vegetable farmers' success stories from the phase 1 of the project (NICANVEG) was the main identified reason for increase in male involvement in vegetable production (Adebooye *et. al.*, 2014). The male entry into vegetable production and the tediousness of most activities due to inadequate vegetable production technologies, especially during dry season were the main reasons for most women vegetable farmers' role-shift from production to marketing of vegetables.

The mean age of male vegetable farmers (MVF) was 35.28 ± 8.27 years while the mean age of female vegetable farmers (FVF) was 40.94 ± 10.34 years. This is in line with the findings of MicroVeg (2017) that FVF were older than their male counterparts. The findings are also in conformity with Deji, Koledoye and Owonmbo (2012), Koledoye et al., (2013), Agboola et al. (2015). The implication is that majority of the MVF and FVF were

in their active ages when they could actively participate in vegetable production thereby enhancing food security.

The mean monthly incomes of male and female vegetable farmers (VFs) were ₦53,655.6±26406.3 and ₦47,241.2±22216.7 respectively. These findings revealed that male VFs had higher income from sales of vegetables monthly than their female counterparts. The reason for the higher income of the MVF may be as a result of their higher capability in the utilisation of SWC technologies more than their female counterparts. This finding is consistent with the findings of Nakuja et al., (2012) and Agboola et al., (2015) that the utilisation and involvement in SWC technologies will influence and increase the level of income.

Result shows that the majority (63.6% and 78.1%) MVF and FVF respectively indicated farming as their primary occupation. Also (15.2% and 15.6%) of MVF and FVF respectively indicated trading as their primary occupation. About (5.3%) MVF and (1.6%) FVF indicated artisanship as major occupation. About (9.9% and 4.7%) indicated civil service as their major occupation and (6%) MVF indicated that they were students or apprentices. This implies that respondents were involved in multiple economic activities although farming is the major occupation they engaged in.

Table 1 indicates that majority (77.5%) MVF and (82.8%) FVF acquired land for vegetable production through leasehold/rent. The study reveals that the main method of land acquisition by both the male and female vegetable farmers in the study area was by leasehold. The implication is that the willingness to invest in SWC technology by respondents will reduce due to tenure insecurity. This finding is in agreement with the findings of Onu (2013) who asserted that length of land lease positively and significantly influenced farmers' soil conservation and erosion control practices investment decisions. This is because of the insecurity and uncertainty over use of rented lands.

Table 1: Vegetable farmers' personal and socio-economic characteristics

| Variable | MVF (n=151) % | Mean | S.D | FVF (n=64) % | Mean | S.D |
|-------------------------------|---------------------|---------|---------|--------------------|---------|---------|
| Sex | 70.2 | | | 29.8 | | |
| Age | | | | | | |
| <30 years | 25.8 | | | 12.5 | | |
| 31-40 years | 59.6 | 35.28 | 8.27 | 46.8 | 40.94 | 10.34 |
| 41-50 years | 8.6 | | | 20.3 | | |
| Above 50 years | 6 | | | 20.4 | | |
| Monthly Income (₦) | | | | | | |
| < 50000.00 | 63.6 | | | 51.6 | | |
| 50001 -150000 | 31.1 | 53655.6 | 26406.3 | 26.6 | 26406.3 | 22216.7 |
| 150001-250000 | 4.6 | | | 18.8 | | |
| 250001 and above | 0.7 | | | 3.1 | | |
| Major Occupation | | | | | | |
| Farming | 63.6 | | | 78.1 | | |
| Trading | 15.2 | | | 15.6 | | |
| Artisan | 5.3 | | | 1.6 | | |
| Civil servants | 9.9 | | | 4.7 | | |
| Students or Apprentice | 6 | | | 0 | | |
| Land acquisition | | | | | | |
| Inheritance | 13.9 | | | 17.2 | | |
| Rent /Leasehold | 77.5 | | | 82.8 | | |
| Gift | 8.6 | | | 0 | | |

Source: Field Survey, (2016)

Capability of using SWC Technologies by male and female vegetable farmers

Results in Table 2 reveal the mean score of SWC technologies capabilities in descending order. The results show that channeling water from river and stream (2.00) had the highest mean score among the SWC technologies used by male vegetable farmers while the use of earth dam (0.03) had the least mean score. In the female category, the SWC technology that ranked highest was channeling water from river and stream (2.00) while stone/soil bund (0.38) had the least mean score

A comparison of the male vegetable farmers' grand mean score of 0.977 for utilisation of SWC technologies with each of the individual SWC technology mean score, shows that the male farmers had higher capabilities in the SWC technology such as water channels from stream/river, fertilizer, mixed cropping, mono cropping, ridges, cover cropping, dug-out wells and irrigation (pumping machine) than the other forms of technology. The grand mean score of 0.907 for female farmers utilisation of SWC technologies when compared with the individual mean score of the various forms of technologies utilised revealed that female vegetable farmers utilised more of water channels from stream/river, fertilizer, cover cropping, rain water harvesting, early planting, mono cropping and drainage than all other forms of technologies.

This finding conforms to that of Nakuja *et al* ., (2012) that gender is a determinant factor of investment behaviour in dry season vegetable farming and Onu (2013) who asserts that male-headed farm households invested more in soil conservation and erosion control practices than the female-headed farm households.

Table 2: Rank order of mean scores of SWC technologies capabilities

| SWC Technologies (n= 151) | | Male | | | SWC Technologies | | Female (n= 64) | | |
|---------------------------|--|------|------|------------------|-------------------------|--|----------------|------|------------------|
| | | Mean | SD | Rank | | | Mean | SD | Rank |
| Water from stream/river | | 2.00 | 0.00 | 1 st | Water from stream/river | | 2.00 | 0.00 | 1 st |
| Cover cropping | | 1.46 | 0.69 | 2 nd | Cover cropping | | 1.55 | 0.56 | 2 nd |
| Fertilizer | | 1.43 | 0.49 | 3 rd | Fertilizer | | 1.16 | 0.37 | 3 rd |
| Mixed cropping | | 1.42 | 0.79 | 4 th | Rain water harvesting | | 1.03 | 0.64 | 4 th |
| Mono cropping | | 1.37 | 0.76 | 5 th | Early planting | | 1.03 | 0.25 | 5 th |
| Ridges | | 1.17 | 0.37 | 6 th | Mono cropping | | 0.95 | 0.72 | 6 th |
| Dug-out wells | | 1.00 | 0.84 | 7 th | Drainage | | 0.94 | 0.59 | 7 th |
| Irrigation(Pumpin g) | | 0.97 | 0.99 | 8 th | Farm yard manure | | 0.89 | 0.69 | 8 th |
| Rain water harvesting | | 0.95 | 0.81 | 9 th | Irrigation (Pumping) | | 0.86 | 0.56 | 9 th |
| Early planting | | 0.90 | 0.44 | 10 th | Mixed cropping | | 0.80 | 0.37 | 10 th |
| Drainage | | 0.83 | 0.76 | 11 th | Earth dam | | 0.78 | 0.98 | 11 th |
| Farm yard manure | | 0.73 | 0.74 | 12 th | Ridges | | 0.75 | 0,33 | 12 th |
| Green manure | | 0.70 | 0.76 | 13 th | Dug-out well | | 0.73 | 0.86 | 13 th |
| Irrigation (hand) | | 0.62 | 0.87 | 14 th | Irrigation (hand) | | 0.58 | 0.61 | 14 th |
| Stone/soil bund | | 0.52 | 0.81 | 15 th | Green manure | | 0.45 | 0.73 | 15 th |
| Storage tanks | | 0.51 | 0.86 | 16 th | Storage tanks | | 0.44 | 0.81 | 16 th |
| Earth dam | | 0.03 | 0.23 | 17 th | Stone/soil bund | | 0.38 | 0.70 | 17 th |

Source: Field Survey, 2016

Differences Between Male and Female Vegetable Farmers' Capability on SWC Technologies

Results in Table 3 show that there were significant differences between the male vegetable farmers' and female vegetable farmers' capability of SWC technologies ($t = -1.631$; $p \leq 0.01$). Specifically, Significant differences were found in the use of soil conservation technologies such as fertilizer ($t = -0.921$; $p \leq 0.05$), farm yard manure ($t = -1.485$; $p \leq 0.05$), mixed cropping ($t = 5.102$; $p \leq 0.01$), mono cropping ($t = 4.075$; $p \leq 0.01$), ridges ($t = 3.724$; $p \leq 0.01$), early planting ($t = -2.209$; $p \leq 0.01$) and stone/soil bund ($t = 1.221$; $p \leq 0.05$). Also there was significant differences in the use of water conservation

technologies among the male and female farmers. The differences were observed in technologies such as drainage ($t = -1.036$; $p \leq 0.01$), irrigation with bucket ($t = 0.315$, $p \leq 0.01$) rain water harvest ($t = 0.742$; $p \leq 0.01$), earth dams ($t = -8.902$; $p \leq 0.01$), irrigation with pumping machine ($t = 0.820$; $p \leq 0.01$), storage tanks ($t = 0.572$; $p \leq 0.01$) and dug-out well ($t = 2.105$; $p \leq 0.01$). The male vegetable farmers had a mean of 16.61 with standard deviation of 3.24 while the female vegetable farmers had a mean 15.42 with a standard deviation of 2.21. This implies that the male farmers utilised more SWC technologies than their female counterparts. The mean difference was 1.19 which shows that significant difference exists between male and female farmers in the utilisation of SWC technologies. The significant differences observed among the MVF and FVF in SWC technologies utilisation is in agreement with the report of Deji *et al.*, (2002), Deji and Parto (2010), Koledoye *et al.* (2013) that gender differential exist and it is an important factor influencing the adoption and utilisation of improved technologies. This could be as a result of the cultural and social obstacles set against the female folks in many societies of developing countries. (Deji and Parto, 2010).

Table 3: Differences in capability of SWC technologies for male and female vegetable farmers

| SWC Technologies | Mean (Male n=151) | Mean (Female n=64) | Std Error | t value |
|----------------------|-------------------|--------------------|-----------|---------|
| Cover cropping | 1.17 | 1.16 | 0.055 | 0.168 |
| Fertilizer | 1.46 | 1.65 | 0.098 | -0.921* |
| Farmyard manure | 0.73 | 0.89 | 0.109 | -1.485* |
| Green manure | 0.70 | 0.45 | 0.113 | 2.147 |
| Mixed cropping | 1.43 | 0.80 | 0.072 | 5.102* |
| Mono cropping | 1.42 | 0.95 | 0.116 | 4.075* |
| Ridges | 1.37 | 0.75 | 0.102 | 3.724* |
| Early planting | 0.90 | 1.03 | 0.059 | -2.209* |
| Stone/soil bund | 0.52 | 0.38 | 0.116 | 1.221* |
| Drainage | 0.83 | 0.94 | 0.106 | -1.036* |
| Irrigation (bucket) | 0.62 | 0.58 | 0.120 | 0.315* |
| Rain water harvest | 0.95 | 1.03 | 0.114 | 0.742* |
| Earth dam | 0.03 | 0.78 | 0.085 | -8.902* |
| Irrigation (machine) | 0.97 | 0.86 | 0.135 | 0.820* |
| Storage tanks | 0.51 | 0.44 | 0.127 | 0.572 |
| Dug-out well | 1.00 | 0.73 | 0.126 | 2.105 |
| Overall t- test | 16.61 | 15.42 | 0.443 | 1.631* |

*P≤0.05; ** P≤0.01

Source: Field survey, 2016

Gender Issues in SWC Technologies Among Respondents

The study explored the gender specific roles in SWC technologies in MicroVeg project sites. The qualitative results in Figure 1 reveal the various gender specific roles of respondents. It was observed from the field survey, that the vegetable farms were run as household enterprises with role division by gender. The roles of MVF in the use of SWC technologies for vegetable production include, land clearing or cultivation and watering of vegetables.

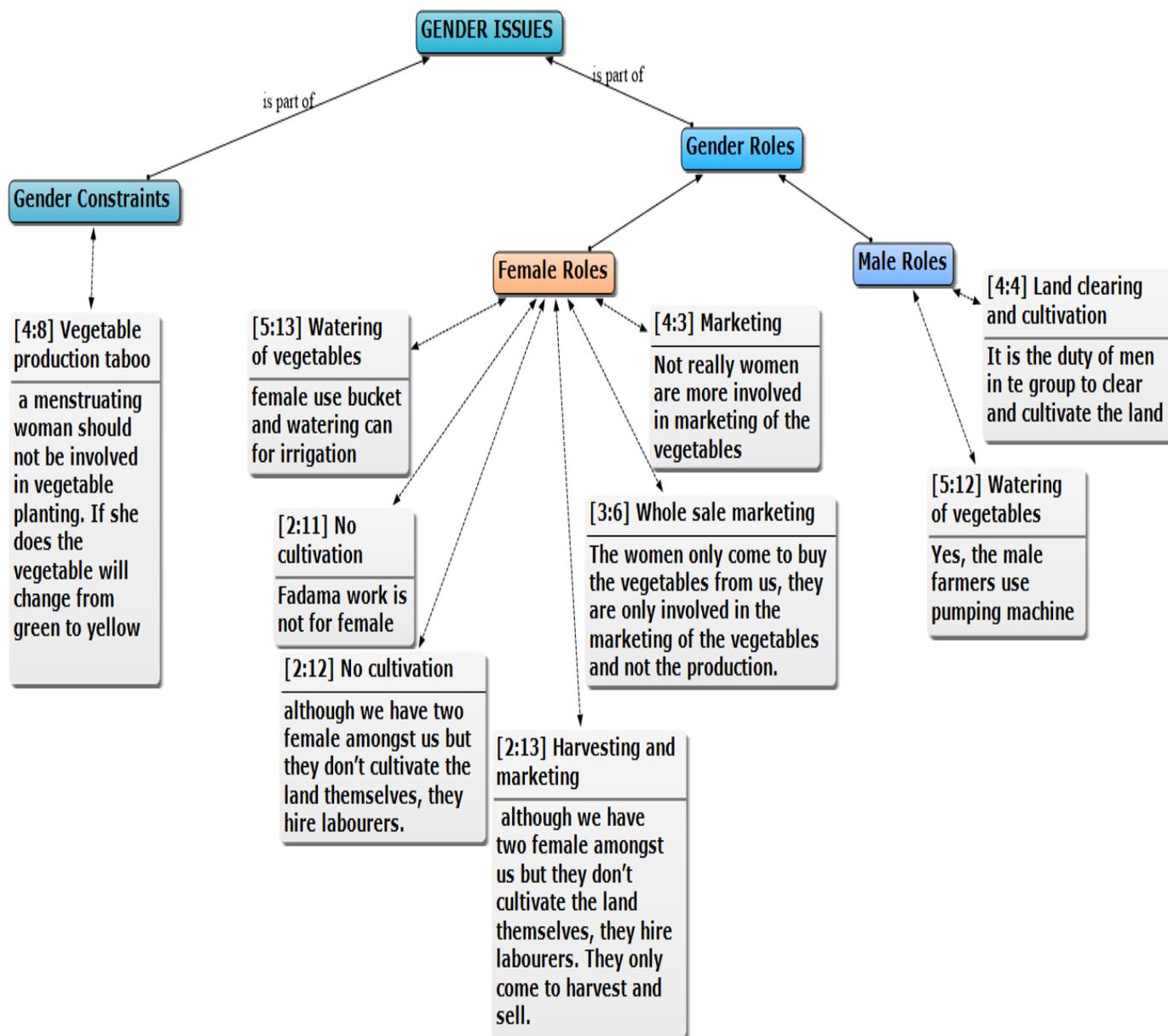


Figure 1: Gender specific roles in SWC technologies among respondents

It was observed that few women were involved in vegetable production in the sites on small plots allocated to them by their husbands, although women do not usually have field of their own unless they are widows. The active roles of the women were more in the post planting operation such as wetting, application of fertilizer, harvesting and marketing. The men were more involved in the cultivation of the land for the planting of the vegetables

Conclusion and Recommendation

Female farmers' participation in vegetable marketing increased while there was decline in their traditional vegetable production responsibilities during the project. This implies that gender issue is dynamic and at times complex along agricultural value chain. Also, there was increase in male involvement in vegetable production. Awareness of the economic values in vegetable production evident from women vegetable farmers' success stories was the main identified reason for increase in male involvement in vegetable production. The male exodus into vegetable production and the tediousness of most activities due to inadequate vegetable production technologies, especially during dry season were the main reasons for most women vegetable farmers' role-shift from production to marketing of vegetables.

There is need for integration of a gender perspective approach that will ensure the female farmers have unrestricted access to land by debunking the economic and socio-cultural factors responsible for this gap. The Micro Veg project should consider the integration of indigenous technologies and the gender responsiveness of the farmers while designing the tool to use for the micro dosing technology. Micro Veg Project should employ more extension methods in disseminating the importance of soil and water conservation technologies in order to reinforce the information

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