REVISTA DIGITAL ACADÊMICO MUNDO

CARACTERÍSTICAS DOS AGRICULTORES FAMILIARES E A EXTENSÃO AGRÍCOLA NAS COMUNIDADES DE CHICHOCANE NO DISTRITO DE VILANKULO, MOÇAMBIQUE

CHARACTERISTICS OF FAMILY FARMERS AND AGRICULTURAL EXTENSION IN THE COMMUNITIES OF CHICHOCANE IN THE DISTRICT OF VILANKULO, MOZAMBIQUE

CARACTERÍSTICAS DE LOS AGRICULTORES FAMILIARES Y LA EXTENSIÓN AGRÍCOLA EN LAS COMUNIDADES DE CHICHOCANE EN EL DISTRITO DE VILANKULO, MOZAMBIQUE

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RESUMO

As características dos agricultores familiares nas comunidades rurais de Chichocane, no distrito de Vilankulo, Moçambique, e os serviços de extensão a eles prestados foram avaliados em um estudo conduzido entre fevereiro de 2023 e fevereiro de 2024. Para a coleta de dados, utilizaram-se entrevistas semiestruturadas com agricultores e com o pessoal de extensão; revisões de literatura; e observações diretas de campo. Selecionou-se para o estudo uma amostra representativa de 39 agricultores, de uma população estimada em 390 agricultores. Foram avaliados o perfil socioeconômico (idade, escolaridade, estado civil) dos agricultores e as técnicas de extensão empregadas pelos agentes de extensão (Escolas Agrícolas; Demonstrações de Campo; Reuniões; e Visitas às Propriedades) [[nota: "Farm Schools" foi traduzido como "Escolas Agrícolas"; caso o original se refira ao conceito consagrado de *Farmer Field Schools*, a forma usual em português é "Escolas de Campo" — recomenda-se verificar]]. Todos os dados do estudo foram analisados com o Microsoft Excel 2010 para estatística descritiva (média, percentual), e os resultados foram apresentados em tabelas e gráficos. Sessenta e dois por cento dos agricultores do estudo eram do sexo feminino, em comparação com 38% do sexo feminino [[nota: o original diz "compared with 38% females", o que contradiz os 62% mencionados antes; pelo contexto, o valor de 38% provavelmente deveria referir-se ao sexo masculino — recomenda-se verificar]]. Oitenta por cento deles não chegaram ao Ensino Médio [[nota: "High School" traduzido como "Ensino Médio"; verificar a correspondência com o sistema educacional moçambicano]], e 53% tinham entre 36 e mais de 50 anos de idade. Os agentes de extensão realizaram menos visitas às propriedades devido às más condições das estradas e à falta de transporte confiável. O Método de Grupo foi considerado o mais viável, por permitir que os agentes de

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extensão alcancem um número maior de agricultores em uma mesma área e por possibilitar interações entre os agricultores e com os agentes de extensão.

Palavras-chave: Métodos de Extensão. Visitas às Propriedades. Chichocane. Vilankulo. Moçambique.

ABSTRACT
The characteristics of family farmers in the rural communities of Chichi cane of Chichocane in the district of Vilankulo, Mozambique and the extension services provided to them were assessed in a study conducted between February 2023 and February 2024. Semi-structured interviews of farmers and extension personnel; literature reviews; and direct field observations, were used to collect data. A representative sample of 39 farmers from a population estimated at 390 farmers was selected for the study. The socioeconomic profile (age, education, marital status) of farmers, and the extension techniques used by extension agents (Farm Schools; Field Demonstrations; Meetings; and Farm Visits) were assessed. All data from the study were analyzed with Microsoft Excel 2010 for descriptive statistics (mean/averages, percentage), then the results presented in tables and graphics. Sixty-two percent of farmers in the study were females, compared with 38% females. Eighty, % of them did not reach High School, and 53% were between the ages of 36 and over 50 years of age. The extension agents made fewer farm visits because of poor road conditions and the lack of reliable transport. The Group Method was viewed as the most viable, enabling extension agents to reach a greater number of farmers in one area, and enabling interactions among farmers and with extension agents.

Keywords: Extension Methods. Farm Visits. Cinchocaine. Vilankulo. Mozambique.

RESUMEN
Las características de los agricultores familiares en las comunidades rurales de Chichocane, en el distrito de Vilankulo, Mozambique, y los servicios de extensión que se les prestan fueron evaluados en un estudio realizado entre febrero de 2023 y febrero de 2024. Para la recolección de datos se utilizaron entrevistas semiestructuradas con agricultores y con el personal de extensión; revisiones de la literatura; y observaciones directas de campo. Se seleccionó para el estudio una muestra representativa de 39 agricultores, de una población estimada en 390 agricultores. Se evaluaron el perfil socioeconómico (edad, escolaridad, estado civil) de los agricultores y las técnicas de extensión empleadas por los agentes de extensión (Escuelas Agrícolas; Demostraciones de Campo; Reuniones; y Visitas a las Explotaciones) [[nota: "Farm Schools" se tradujo como "Escuelas Agrícolas"; si el original alude al concepto consagrado de *Farmer Field Schools*, la forma habitual en español es "Escuelas de Campo" — se recomienda verificar]]. Todos los datos del estudio se analizaron con Microsoft Excel 2010 para estadística descriptiva (media, porcentaje), y los resultados se presentaron en tablas y gráficos. El sesenta y dos por ciento de los agricultores del estudio eran de sexo femenino, en comparación con el 38% de sexo femenino [[nota: el original dice "compared with 38% females", lo que contradice el 62% mencionado antes; por el contexto, el 38% probablemente debería referirse al sexo masculino — se recomienda verificar]]. El ochenta por ciento de ellos no llegó a la escuela secundaria [[nota: "High School" traducido como "escuela secundaria"; verificar la correspondencia con el sistema educativo mozambiqueño]], y el 53% tenía entre 36 y más de 50 años de edad. Los agentes de extensión realizaron menos visitas a las explotaciones debido a las malas condiciones de las carreteras y a la falta de transporte confiable. El Método de Grupo se consideró el más viable, ya que permite a los agentes de extensión llegar a un mayor número de agricultores en una misma área y posibilita las interacciones entre los agricultores y con los agentes de extensión.

Palabras clave: Métodos de Extensión. Visitas a las Explotaciones. Chichocane. Vilankulo. Mozambique.

1 INTRODUCTION

In Mozambique, like in other countries in sub-Saharan African countries, roughly 80% of the rural families depend on agriculture for their livelihood. Small farmers dominate the farming landscape, cultivating on average 2 ha of farmland, principally for subsistence production. Under this scenario, only a small excess of crops produced by small family farmers is commercialized (Prakash, 2003; Davis, Di Giuseppe & Zezza, 2017 cited by Marassiro, et al. 2021). Small farm production constitute the backbone of the local economy, contributing to 1/3rd of the Gros Domestic Product (GDP) in much of the African countries. The country of Mozambique has vast areas (36 million hectares) of arable land; roughly 10% of which is used for agriculture (Marassiro, Et., al, 2021); numerous water resources (rivers, lakes, and ponds) and Agroecological conditions suitable for agricultural productions. In essence, agriculture is Mozambique is viewed as the cornerstone for the national economy and the country's development (MINAG, 2010), employing more than 67% and contributing roughly 22% of the PIB (INE, 2019).

Despite its potential and efforts made in the past, agriculture in Mozambique still faces serious challenges of productivity induced by the continued use of outdated and inadequate farming technologies, and climate change. Other factors such limited access to quality farm inputs (improved seeds, fertilizers and pesticides); low extension service area coverage and the inadequacy of extension services as they relate to application of current and local agricultural research findings; limited irrigation systems; soil infertility; and low access to credit, all contribute to low productivity of family farms (Mosca, 2012).

Based upon the above scenario, a strong rural extension service is needed, as it constitutes the crucial tool for optimizing agricultural production in an integrated approach that would link agricultural researchers, technicians, and farmers, to address the various challenges faced by small family farmers and the viability of rural communities (Callou, 2006). This present study characterized small farmers in the study area in terms of age, marital status, education level, and their perceptions of extension services provided by the government agency, SDAE[4], to increase adoption of agricultural technologies. Possible gaps in rural extension practices identified could lead to recommended solutions; with the expectation that such an approach could contribute to strengthening local extension services and foster better adoption rates of agricultural technologies, for an improved productivity under climate change.

[4] *Servicios Distrital das Atividades Economicas*

2 THEORETICAL FRAMEWORKS

Mozambique's economy is still heavily dependent on agriculture, with the sector contributing to an estimated 25 percent of the total Gross Domestic Product (GDP) (INE 2011). Small and medium-scale farms comprise around 99.3 percent of the 3.8 million farms. Small farms are predominant (99% of fields are smaller than 5 hectares, a quarter of them are led by women), growing mainly maize or cassava for subsistence. They constitute the socio-economic backbone of the country and provide the basis for food security, preserving biodiversity and providing environmental protection. While agriculture constitutes the economic activity of the majority of its population and remains the main source of income for the rural population, the productivity of farmlands and rangelands in the province of Inhambane is influenced by various factors including: limited key support services such as research and extension, and climate variances. These factors, in addition to traditional farming systems (slash & burn, and shifting cultivation), contribute in most part to low food production, resulting in higher food poverty level (67.1-85%) in the province.

The present study yields important data that fosters a better understanding of small family farmers dynamics in the Chichocane communities, as well as the nature of extension services they receive from the district government service provider. Far beyond an understanding of characteristics, the compiled data enables for identifying extension gaps which could lead to further studies and contribute to strengthening and implementing demand-driven extension services for sustainable and diversified agricultural production to reduce the incidents of food poverty in the study area.

3 MATERRIALS AND METHODS

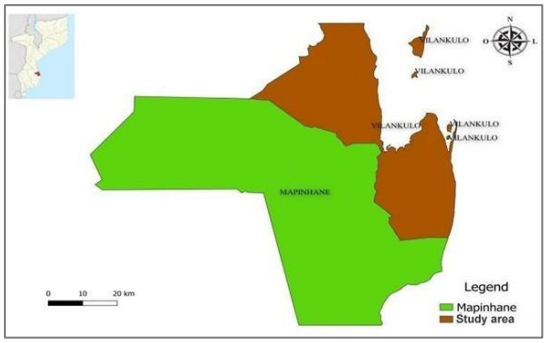
Study Area: The study was conducted in the rural farming community of Chichocane in the Mozambican district of Vilankulo, during a period spanning from February 2022 to February 2023, to identify local family farmers, and assess the extension services provided to them as tools to increase adoption rate of agricultural technologies. Situated in the northern part of Inhambane province, the district of Vilankulo is bordered to the North by the district of Inhassoro, to the South by the district of Massinga, to the West by the districts of Mabote and Funhalouro, and to the East by the Indian Ocean. With a land area of 5.867 km2 and a population estimated at 138.340 inhabitants[5], the district of Vilankulo registers a population density of 23,6 inhabitants/km2, (MAE, 2005). The village of Chichocane (the study area) is in the north-eastern part of the district of Vilankulo, and is bordered to the south by Nhafudo, to the

[5] 2005 Census

West by Murriane, to the North by Mangalisse and to the East by Vilanculos Bay (Fig.1.)

Figure 1

Map of the district of Vilankulo showing the study area (brown color).



Source: Adapted from QGIS-v. 3.2 (2023).

Climate and Soils. The climate of the district of Vilankulo is predominantly dry-tropical in the interior, and humid along the coastline. There are two seasons in the district: the warm and rainy season occurs from October to March, and the cool and dry season from April to September (MAE, 2005). The average annual precipitation (October – March) is 150mm, much of which occurring between February and March, often resulting in floods (MAE, 2005). The annual temperature in the coastal areas averages 18^0 to 33^0 C, and the soils are acidulous and permeable, Sandy-loam to loamy soils are found in the interior of the district, with precipitation averages of 1000 to 1200mm, accompanied by higher temperatures (MAE, 2005).

Economy and Services: According to MAE (2005), approximately 250 thousand hectares of the total 585 thousand hectares in the district is arable land, 35 thousand of which is occupied by small farmers. Agricultural production methods on small farms are manual, consisting of dry-land farming that integrates mixed cropping. The primary crops in the study area include corn (maize), peanut, green beans, cassava, sweet potato, sorghum, and millet (MAE, 2005). Because of uncertainties in agricultural production, more and more farmers, especially those living around the coastline, are turning into fishing for subsistence and also for commercialization to generate income. Small ruminants, swine and poultry are also produced in the study area, primarily for family consumption (MAE, 2005).

4 METODOLOGY

The study consisted of descriptive research involving local family farmers and extension agents serving the study area. Three (3) communities within the circumscription of Chichocane, including the villages of Chichocane, Chichocane Matsetselete, and Chichocane

Makassa, constituted the study area without distinction of the respective villages.

4.1 POPULATION AND SAMPLE SIZE.

The villages of Chichocane, Chichocane Matsetselete, and Chichocane Makassa, comprised of 112; 81 and 197 small farmers, respectively, for a total of 390 family farmers. Only farmers of at least 16 years of age were considered for the study. Furthermore, a sample size of ten percent (10%) from each of the 3 villages comprising the study area was selected for the study (Table 1.) based on to the probabilistic and/or non-probabilistic techniques described by: Murteira, & Pimenta (2008); and WANDERLEY SHIGUTI &VALERIA SHIGUTI (2006), also considering the recommendations of Matakala & Macucule (1998). Therefore, samples of eleven (11) small farmers from Chichocane, eight (8) from Chichocane Matsetselete, and twenty (20) from Chichocane Makassa were selected, totaling 39 small family farmers for the study. The government agency referred to as SDAE *(Servico Distrital das Atividades Economicas)* or *Detrital Service for Economic Activities* is the unique Extension Services Provider.

Table 1

Population distribution of family farmers

Local	Sample Percentage	Number of farmers	Sample size
Chichocane village	10%	112	11.2≈11
Chichocane Matsetselete	10%	81	8.1≈8
Chichocane Makassa	10%	197	19.7≈20
Total	_____	390	39

Source: Elaborated by the authors

4.2 DATA COLLECTION

Following the identification of the study area, estimation of small farmers population within the area and the determination of appropriate sample size, survey/interview questionnaires were elaborated to be used in assessing the Socioeconomic profile of family farmers; as well as the extension services provided in the area either in the context of assistance, or to help increase adoption rate of new agricultural technologies. Data collection was then carried out in (3) distinct phases including: extensive literature review of agricultural extension practices; semi structured interviews directed at the population sample; and personal field observations by the researchers:

- Literature review of published material accessible to the public, specifically books,

scientific publications, reports, paper and electronic publications (websites) related to the subject matter, was conducted to gather knowledge about the topic of the study and to ensure no duplication of any work already done in the study area.

- Semi-structured interviews consisting of "one-on-one and direct conversations" were conducted in the local language between the researcher (interviewer) and the interviewee (individual farmers.) The interviews were based on a sequence of specific questions from questionnaires previously elaborated and were conducted in either formal or informal settings. This approach enabled those farmers who could not read, write or speak in the national language (Portuguese) to contribute to the study by sharing their experiences with the interviewer.
- Direct observations enabled the researchers to observe and record facts or phenomena related to the subject matter under study. This technique was used to collect data that could not be obtained through interviews or questionnaires and consisted in i) site visits to the farmers' local, and ii) validation of the production system (farmland, mixed farming) and its condition.
- Additional discussions with extension workers following conclusion of main data collection, became necessary for validation of some of the responses by farmers, especially those concerning discrepancies or inconsistencies in field visits by extension agents.

4.3 DATA ANALYSES

All data collected from this study were compiled on Microsoft Excel-2010 sheets; examined to identify outliers and missing data to ensure accuracy, and then categorized by thematic, combining qualitative and quantitative observations to answer the original study questions (Yin, 2006). Qualitative data were transformed into numeric forms, for simple descriptive statistical analyses (totals, mean/averages, percentage, etc.), then the results were presented in graphics opted for better illustrations.

5 RESULTS AND DISCUSSION

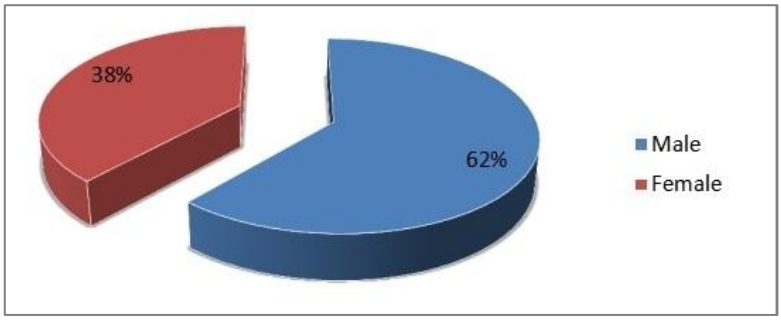
5.1 SOCIOECONOMIC PROFILE OF FAMILY FARMERS

Gender: Of the 39 family farmers interviewed, a total of 24 individuals (62%) were males, while only 15, corresponding to 38% were females (Fig.1.) Santos *et al*. (2020) also found in a similar study that more men (92% of small farmers) were involved in agricultural activities, compared to 8% women. Contrary to the above results, Lira *et al.* (2013) stated that among the 18 small farmers interviewed, women and men make up 50% each, while

Tarassoum et. al (2026) found that men and women make up almost similar proportions with 52% male and 48% female. The discrepancies in these above results could be attributed to sample size, or to characteristics of the study areas. However, the results of the present study suggest that in the rural communities, farming activities requiring strength for manual labor such land clearing, plowing, harrowing, etc. are done mostly by men, while women are more involved in domestic activities.

Figure 1

Gender representation of the study sample



Source: Elaborated by the authors

5.2 AGE DISTRIBUTION

The results of this study showed that four (4) out of 39 farmers interviewed (10%) were between the ages of 16 and 20 years old. This group consisted primarily of students who often felt obligated to forgo school at the onset of the rainy season, and stayed on the farm to help their parents with farming activities.

Eight percent (3/39) farmers were aged between 21 and 25 years. This sub-group was comprised of adolescents/young adults, and their low percentage could be explained by the fact that agricultural activity was not attractive to them.

Only two (2) farmers representing (5%) of the population sample, were between 26 and 30 years of age. This age group was associated with phenomena of “rural exodus” whereby young people leave the farm for urban areas in search of other sources of income generating activities, because agriculture was not profitable to them.

Five (5) farmers (13%) were between 31 and 35 years of age. Farming has been the livelihood for the group ass its members affirmed that they were producing to ensure the livelihood of their families.

Moreover, six (6) farmers or (15%) were aged between 36 and 40 years old and they took great pride in being able, through farming activities, to support their children who live and study in the cities. One (1) of (3%) of the respondents was between the ages of 41 and 45 years old. This respondent admitted that he had no other options but to farm.

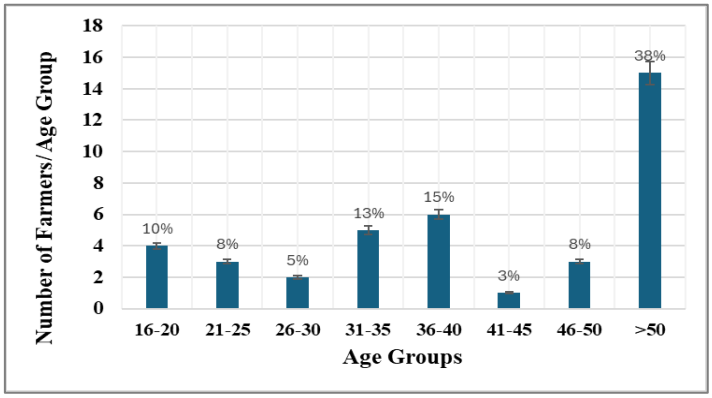
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Three (3) or (8%) were between 46 and 50 years old, and this group also takes great pride in providing financial support for their children who live and study in the cities.

Fifteen (15) or (38%) were over 50 years old. This group claimed to have no other sources of livelihood besides agriculture. Based upon the results presented above, more than half (53%) of the workforce involved in agriculture in the study was comprised of adults aged between 36 and 50 years of age or more. While much of the literature affirmed that older farmers tend to be less receptive to technological changes (Santos et al.; 2020), a recent study by Tarassoum et al.(2026) demonstrated that technical assistance was most sought by older farmers aged between 41 and 51 years. The difference between the above findings leads to an understanding that adoption of, or resistance to new agricultural technologies is evolving, at least in the Mozambican province of Inhambane, since older farmers in some areas do not necessarily adhere to core values of internalized cultures or age-related conformism.

Figure 2

Age distribution of respondents



Source: Elaborated by the authors

Education Level. Results from the study on education level attained by small family farmers in the study area are presented in Figure 3.

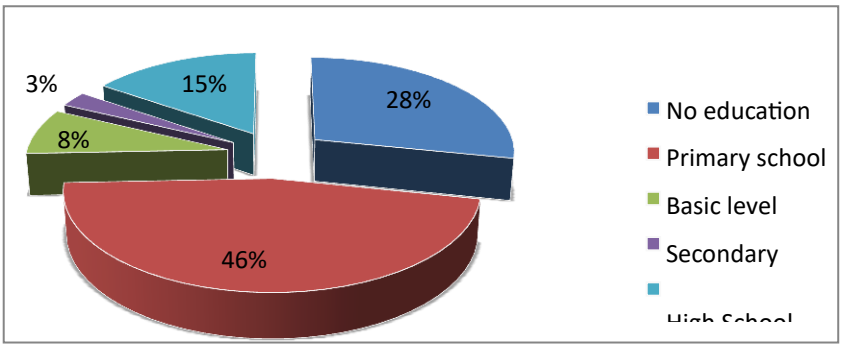
- Eleven (11) farmers or (28%) of the interviewees did not have any formal education because they came from disadvantaged families. Furthermore, this group asserted that the time they would have spent in school was spent practicing a variety of activities that guaranteed their subsistence. It should also be noted that small farmers with low education level are, just like the older ones, more resistant to the adoption of new production techniques.
- Eighteen (18) farmers constituting (46%) affirmed having had primary education, and their school attendance was facilitated by the existence of a primary school in their

village.

- Three (3 farmers representing (8%) of the population sample, had basic level of education,
- One farmer representing (3%) had a secondary level education. The low number of farmers who attended secondary school could be explained by the fact secondary schools are located far from their rural communities and finally,
- Six (6) farmers, corresponding to (15%) had reached higher education level, because most of them had family members with financial means and with residences in the city of Vilankulo, to support their education.

Figure 3

Education Level of Respondents



Source: Elaborated by the authors

The above results show that roughly 18% of small farmers interviewed had reached a secondary or higher level of education. For a member of a small family farm in the study area to attend school (primary, basic, secondary, or high school), he/she must travel a great distance to another village or town within the district of Vilankulo. Despite this handicap, all farmers in the study expressed their desires to send their children to school. The efforts that these farmers made, the great interest and pride they took in sending their children to school in towns and cities distant from their farming communities, were not only remarkable, but further demonstrated that the village of Chichocane had been making strides to advance education, despite the numerous challenges it faced. Overall, the result of this study revealed that the small farmers interviewed had a relatively good education level. Studies by Nhaurire (2007) and Gonçalo (2003) emphasized that the higher level of education is an important element for small farmers to be able to grasp the technical-scientific innovations, to improve their practices of social reproduction. The field research also showed that family farmers with a low level of education did not diversify their production, which could compromise their income, while producers with a higher level of formal education diversify their production more

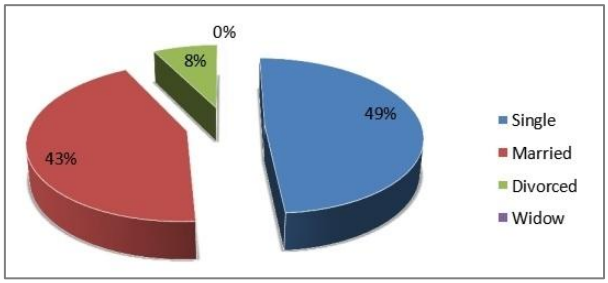
and, therefore, increase their income. In the same context, Pereira et al. (2009) pointed out that the level of education of producers is considered an important factor in decision-making, given that low education can compromise the process of insertion and management of new agricultural technologies.

5.3 MARITAL STATUS OF THE INTERVIEWEES

Results of this study showed that the majority (49%), nearly half of farmers interviewed, were single (Fig. 4). Some of the interviewees stated that they were not prepared for marriage, while others opted not to provide an explanation regarding their marital status. Figure 4 further shows that 17 out of 39 small farmers interviewed (43%) were married. The respondents considered marriage a tradition, and it takes place at the registry office in the presence of notaries. Furthermore, 3 farmers representing 8% of the sample were divorced and according to them, divorce often occurs when their partners seek better living conditions in the cities, which led to the deterioration of their relations. Finally, no widows were identified in this study.

Figure 4

Marital status of study participants



Source: Elaborated by the authors

5.4 DEMONSTRATIONS OF PRODUCTION TECHNIQUES BY EXTENSION WORKERS TO ASSIST FARMERS

Crop production on family farms in much of Mozambique is characterized by low-technology use, especially in low-income families, resulting in poor agricultural performance and low productivity. To remedy this, the local extension service sets up demonstrations of various production techniques for area farmers. The production techniques disseminated by the extension agents in the study area are summarized in Table 2.

Overall, the result of the study showed that all 39 farmers interviewed (100%) prepared their soil using manual hoes, because they do not have financial resources to purchase or even rent oxen-driven ploughs, or tractors. Under this scenario, soil preparation techniques

demonstrated by extension workers consisted merely of removing the natural vegetation, turning over the soil and incorporating dead plant debris (mulch) into the soil.

As for soil fertilization, the extension workers recommended organic fertilizers (animal manure) over inorganic ones. However, 23 out of 39 farmers (64%) in the study used chemical fertilizers based on Nitrogen, Phosphorus e Potassium (NPK) and Urea for commercial vegetable crops. Not only the farmers believe that chemical fertilizers were more efficient to produce commercial crops, but these products are readily available on the market whereas organic fertilizers are scarce at times. On the other hand, sixteen (16) farmers or 36% of the respondents used organic fertilizers because they had limited resources to afford chemical fertilizers. Contrary to the findings of Uaiene (2015) who reported that family farmers did not use fertilizers, pesticides, and improved seeds, because of their financial limitations, the results of the present study suggest that family farmers in the Chichocane area rely more on chemical fertilizers than on the organic ones for vegetable crop production, and additionally, they used essential pesticides for pests and diseases control.

Table 2

Production techniques disseminated by extension services to farmers

Description		Absolute Frequency	Relative Frequency
Soil preparation	Manual hoe	39	100%
	Total	**39**	**100%**
Soil fertilization	Quemical Fertilizantes	23	64%
	Orgânica	16	36%
	Total	**39**	**100%**
Seeding	Directly & in lines	13	33%
	Indirectly in nurser	26	67%
	Total	**39**	**100%**
Irrigation	Irrigation cans	15	38%
	Use ditches	24	62%
	Total	**39**	**100%**
Weeds & disease control	Yes	29	74%
	No	10	26%
Total		**39**	100%

Source: Elaborated by the authors

5.5 DISSEMINATION METHODS OF PRODUCTION TECHNIQUES BY EXTENSION WORKERS TO FAMILY FARMERS

In its effort to disseminate production techniques to family farmers in the study area, the government extension service, SDAE (*Servico Distrital das Atividades Economicas*)), organized On-Farm Schools, Field Demonstrations, and Group Meetings.

5.5.1 Farm Schools

Farm schools were organized in select small farmers' production field. According to the results of the survey, all farmers selected for the study (100%) highly appreciated farm schools because they provide opportunities for the extension agents to demonstrate new farming technologies, including production techniques and improved seeds. During farm schools, participants were organized in subgroups of 20 to 25 farmers for hands-on practical training on the field. Throughout the farm school, the participants assessed each technique and then made decisions based upon their assessments. The decisions by participating farmers were then passed on to the extension worker and to other farmers, to be reviewed and adopted. Whenever farmers had doubts or questions, they usually sought explanations or answers from other colleagues. These results align with Gaspar (2013) who reported that schools on farmers' fields summarized the process of technology transfer; training farmers on decision-making for crop management and production thus, minimizing costs while maximizing benefits through the interaction and information exchanges among farmers to promote local initiatives.

5.5.2 Field Demonstrations

As presented in the previous section, field demonstrations are an integral part of the extension services provided in the study area. In this study, all study participants (39 farmers or 100%) affirmed that the extension workers assigned to their villages, established plots near or within farmers' fields for demonstrations in efforts to better promote adoption of new technologies from these demonstration plots. This approach enabled all farmers in the study area to observe first-hand the techniques as well as the results. The demonstrations incorporated several approaches, including soil preparation, use of improved seeds with high cultural values, position and size of seeding beds, inter-spacing, mulching, inter-cropping, weed control, pests and diseases control.

5.5.3 Meetings

Meetings with small family farmers were generally conducted outdoors under a large tree, in a setting that enabled greater participation. Often a farmer's field was chosen for a meeting provided there is a shade sufficient to accommodate as many participants as possible. During these meetings, individual farmers were encouraged to present whatever production problems they were confronted with, and the extension agent would provide answers, or seek solutions to be provided to farmers later. The farmers included in the sample of the study also indicated that they participated in meetings at the SDAE headquarters as

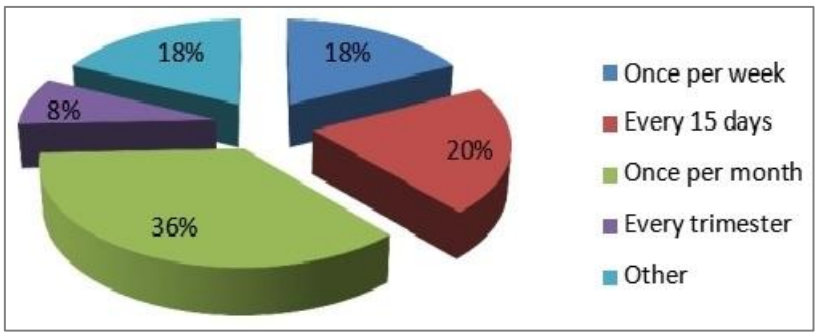
well, and such meetings generally took place at the beginning of the production campaign where various issues are discussed with other farmers from different villages within the district. Pereira et al, (2009) affirmed from a different study that meetings could solve complex issues faster because it is a space for socialization and knowledge exchange. Meeting new people with different experiences enables synergy of different experiences for problem resolutions, and group discussions often generate better performances and fewer errors in decision making than those made by just one person.

5.6 NUMBER OF FIELD VISITS BY EXTENSION AGENTS

Regarding the number of field visits by extension agents in the study area (Figure 5), 18% of the respondents (7 farmers) stated that the extension agent made field visits to their farms once a week. Another 18% (7 farmers) were visited twice a week. On the other hand, eight (8) farmers representing 20% of the sample, stated that they received field visits every 15 days, while 36% (14 farmers) were visited once a month. Finally, three farmers (8%) had quarterly visits. Based upon these results, the discrepancies in the number of site visits were quite evident, and this necessitated additional discussions with the local extension agents to validate the responses from farmers. According to the extension agents, these irregularities in field visits resulted from difficulties associated with rural infrastructure; namely access road conditions, or challenges with transportation means to reach all farmers. Essentially, rural roads are unpractical year-round, especially during the rainy season. Furthermore, there are no public transportation systems that reached all remote family farms. As the result, extension agents make field visits on dirt bikes, which are prone to break downs and could not be repaired immediately because of lack of spare parts.

Figure 5

Number of field visits by the extension agent



Source: Elaborated by the authors

6 CONCLUSIONS AND RECOMMENDATIONS

Based upon the results of this study, most of the family farmers in the study area (62%) were males, compared with 38% females. Manual farm work in the study area required strength and heavy labor, and as such, was done mostly by men, while women in this rural area were more oriented towards domestic tasks of child rearing and household duties. The majority (38%) of the study participants were over 50 years of age. Another group comprised of farmers aged between 41 and 45 years of age, made up 3% of the farmers in this study. These 2 age groups, making up 41% of the population sample, could be considered the true and permanent farmers, as they had no other sources of income besides farming. The prevalence of adult labor in farming activities is further enhanced when younger members of family farmers increasingly leave the farm for urban areas for school or in search of alternative ways of life.

In terms of education, 28% of the interviewees had no formal education, while 46% attended primary school level of education. The discrepancies in education levels attained by farmers were attributed to the socioeconomics of family farmers, and the absence of school systems in certain rural communities.

As for farming production techniques, this study showed that all (100%) of farmers use rudimentary tools (i.e. hoes) for soil preparation; 64% used chemical fertilizers for vegetable crops productions; and 36% did not use fertilizers. A total of 33% planted seeds directly in the soil and in rows, compared with 67% who produce seedlings in nurseries before transplanting them into the production fields. Regarding irrigation, 38% apply localized irrigation for vegetable crops production using manual watering cans, while 64% solely depended on rainfall for crop production. Pests and diseases controls were done through the application of insecticides in the field by about 74% of the farmers, while the remaining 26% do not use insecticides at all, because of the high cost of these important products. The most used rural extension methods were Farm Schools on peasant's field, Demonstration Plots, and Meetings. Because of resources limitations, the simultaneous use of these three methods was more viable as it enabled extension agents to achieve better results by reaching a greater number of farmers and strengthening the relationship between farmers and the extension agents.

RECOMMENDATIONS

For a long-term sustainable agricultural production in the study area, efforts must be made to stress the importance of education to better understand production dynamics under climate

change. Adoption rate of new agricultural technology must increase, but the success rate will depend on several factors, namely: opening schools in rural farming communities to facilitate learning, strengthening agricultural extension services by providing agents with reliable means of transport to reach all farmers; rehabilitating rural roads leading to and from farming communities; reinforcing retooling training sessions for extension agents; adopting a pluralist, local research-based extension approach; and last but not least; continuously developing new extension tools or strategies tailored for each age group, crop type and soil type. Finally, there is a need for the government to subsidize farm inputs to further stimulate productivity of low-income farmers.

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