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Indigenous Post-harvest Systems: A Case of Mamone Village in Sekhukhune District, Limpopo Province, South Africa

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ABSTRACT The Limpopo province is one of the poorest provinces in South Africa, characterized by a high unemployment rate, poverty and lack of access to a range of resources that frustrate a majority of the people's ability to secure their livelihoods. The Sekhukhune district municipality is food insecure and is one of the poorest districts in the country. Sekhukhune district was identified as one of the presidential notes by the South African government based on the poverty index in 1997. Most of the crops planted in the Sekhukhune district are white Sorghum (4.3%), red Sorghum (4.6%), groundnuts (4.7%) and pearl millet (4.2%) compared to other districts such as Vhembe and Mopani. The primary aim of the research was to identify and document indigenous post-harvest practices in Sekhukhune, in order to incorporate them into development activities. The following objectives were identified: identify and document indigenous post-harvest and food storing activities practiced in Sekhukhune village. A representative sample of 50 households participated in the research and the research was done in Mamone village. The purposive sampling method used covered most of the households involved in indigenous post-harvest activities. The questionnaire was administrated to households and included matters relating to indigenous post-harvest and food accessibility. Software package for social science (SPSS) was used to code, capture and analyze the data. The results showed that a good percentage of Mamone village households are still practicing indigenous post-harvest systems and is contributing to food accessibility.

INTRODUCTION

A large portion of vegetables and fruits are lost worldwide after harvest and the main causes are physiological (wilting, shriveling and chilling injury), pathological (decay due to fungi and bacteria) and physical (mechanical injury) (Mashau et al. 2012). According to FAO (1989) and Madrid (2011), the causes of harvest loss can lead to post-harvest decay in many cases. Losses are estimated at twenty percent to forty percent in developing countries and ten percent to fifteen percent in developed countries, depending on the crop and the season (Kader 2005; Garnett 2006; Ogunleye and Adefemi 2007; Madrid 2011). It is estimated that post-harvest losses in developed countries are an average of twelve percent from production to retail warehouses, and an estimated twenty percent at retail stores and foodservice sites (Madrid 2011). Losses in developing countries run even higher because of poor storage and food handling technologies (Salami et al. 2010).

Indigenous post-harvest technologies are an important component of the strategy in the reduction of post-harvest loses by improving traditional drying, storage, processing and preserving methods (Mallet and Du Plessis 2001). This is certainly a priority area because problems have been clearly identified, the impact can be widespread amongst rural producers, and it has the potential to increase the effective harvest (and its quality) available for home consumption and marketing. According to Austin (1995) and Fellows (1997), indigenous post harvesting systems are usually located in rural areas, they generally benefit the rural poor by providing alternative food source for the rural population and contribute to overall economic growth.

Objectives

This research will be focusing on identifying and improving useful, inexpensive and in-

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digenous techniques to improve processing and storage, with the goal of contributing to food accessibility in Mamone village, Sekhukhune district. The following objective was identified: Identify and document indigenous post-harvest and food storing activities practiced in Mamone village.

METHODOLOGY

The Limpopo Province lies in the northern part of South Africa, and shares borders with Zimbabwe and Botswana, which allows favorable economic cooperation with these countries (StatsSA 2011). It has a total number of 5 district municipalities, namely, Waterberg district, Capricorn district, Sekhukhune district, Mopani district and Vhembe district (StatsSA 2011). The research was conducted in the Greater Sekhukhune District Municipality in the Limpopo Province of South Africa as seen in Figure 1.

This research used a quantitative design as questionnaires were used to collect data. During the first research visit after permission to conduct research in the village was granted by the chief, the questionnaires were explained to the local authorities. Two assistants were selected and trained in data collection. The importance of the study and data quality management was explained to them. The assistants also played a role in giving directions in the village since the village was fairly large and has unplanned geographical layout. The assistants relied on different landmarks to identify different wards. It was also important as part of providing back to the communities to empower local people with knowledge; here the assistants had an opportunity to learn more about data collection approaches. The wards were selected using cluster random sampling. The community was divided into clusters along geographic boundaries. The data for the study was obtained from the randomly selected households. Sampling of households involved obtaining a sample frame of households from the chief. Households were then randomly selected. The study was conducted in Mamone village. This village was selected purposively because of it being a poor study area for socio-economic development. Five wards were identified namely *Matsoke, Mohlala, Rantho, Magolwaneng and Maroteng,* which had approximately the same number of households. Ten households from each ward were randomly selected to form a total of 50 households.

The main analytical technique used was descriptive statistics. The purpose of using this

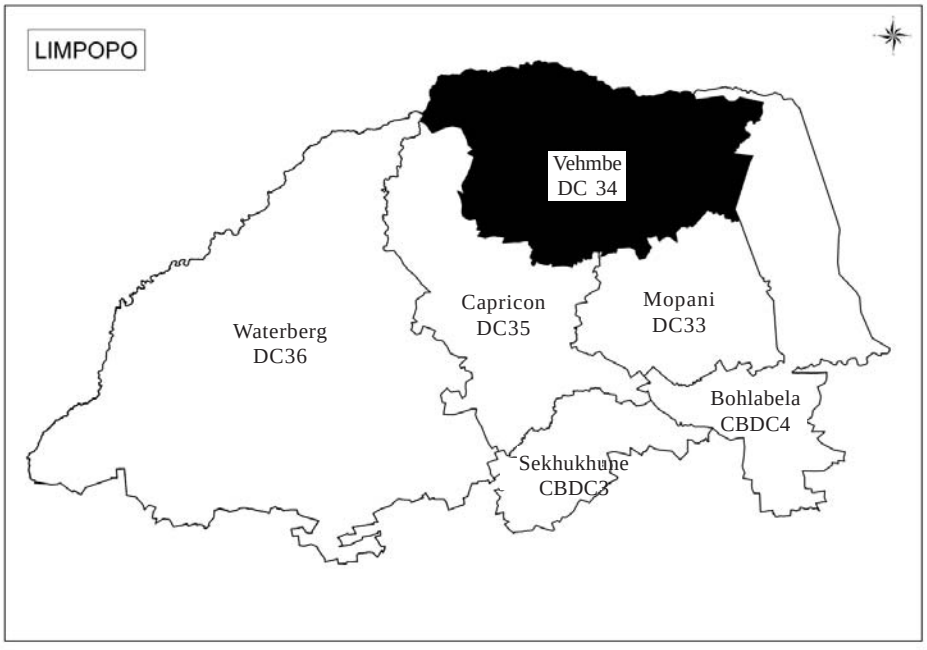

Fig. 1. Greater Sekhukhune District Map

analysis was to describe household's status of indigenous post-harvest and their food access. Data analysis was based on the research questions designed at the beginning of the research. Responses in the questionnaires were tabulated, coded and processed by the use of Statistical Package for Social Sciences (SPSS) program.

RESULTS AND DISCUSSION

Table 1 shows the number of households per ward visited. The following wards were visited in the Mamone village: Maroteng, Matsoke, Mohlala, Rantho and Magolaneng. The ward with the highest percentage of households is Matsoke (36%) followed Maroteng (24%), Magolaneng (18%), Rantho (6%) and Mohlala (16%). It is important to note that the selection of these households per ward was based on the agricultural setups and the agro-ecological zones within the village. The majority of these households have access to land and all households interviewed were *pedi*-speaking tribe.

Table 1: Summary characteristics of sample

Sample	*Number of households*	*Percentages*
Number of Households per District		
Sekhukhune district	50	100
Total	50	100
Number of Households per Local Municipality		
Makhuduthamaga local municipality	50	100
Total	50	100
Number of Households per Village		
Mamone	50	100
Total	50	100
Number of Households per Ward		
Maroteng	12	24
Matsoke	18	36
Mohlala	8	16
Rantho	3	6
Magolaneng	9	18
Total	50	100
Household Tribe		
Pedi	50	100
Total		
Household Language		
Sepedi	50	100
Land Access		
Yes	50	100
Total	50	100

The results show that the majority (28%) of the households in the Mamone village are between the ages of 36 to 45 years. This shows that most of the households fall under the middle age group. From this research survey, at least sixteen percent of the households are youth (18 to 35) (Table 2). Only twenty-four percent of the households are between the ages of 46 to 60. It was also noted that at least sixteen percent of the households have not yet reached 60 years of age (Table 2).

Table 2: Age of households

Age	*Number of households*	*Percentages*
18 - 35	16	16
36 - 45	14	28
46 - 60	12	24
60 >	8	16
Total	50	100

The results from Table 3 show that majority of the households (70%) in the Mamone village are dominated by females compared to thirty percent, which are headed by males. There are several reasons why the majority of households are female-headed. Some of the reasons are: (a) The majority of men in the Mamone village are working outside the district or are working as migrant workers in provinces such as Gauteng, Mpumalanga, and Northwest. (b) Some of the women are divorced or widows and are head of the households. A similar trend was also highlighted (Mpandeli 2006; Mpandeli and Maponya 2014; Maponya and Moja 2012; Maponya et al. 2014) in districts such as Capricorn and Vhembe. The majority of these women are now head of the households, however, it was noted that when these women are supposed to take decisions, they must consult their husbands even though the majority of the men in the district are involved in non-farming activities (Mpandeli 2006; Maponya and Moja 2012). Van Averbecke et al. (2011) mentioned that the majority of women involved in farming do not have land ownership documents in Limpopo province. This is a very disturbing point due to the fact that these women are finding it difficult to invest in infrastructure as a result of lack of land tenure security.

Table 3: Gender of households

Gender	*Number of households*	*Percentages*
Male	15	30
Female	35	70
Total	50	100

The findings revealed that most households whose heads are illiterate are more vulnerable compared to households whose heads are literate (Table 4). The results in the Mamone village show that the majority of the household members (44%) have completed secondary education compared to the twenty-six percent of the households, which had no qualifications at all. At least ten percent of the households have completed primary education; the majority of these households generated their income as laborers, or street vendors. It is important to note that the level of education determines the type of job and the level of income. People with high levels of education are able to take proper farming decisions compared to those with no education at all. These types of people can also read and interpret agricultural advisory information from the extension officers.

Table 4: Education level

Education level	*Number of households*	*Percentages*
No schooling	13	26
Primary education completed	5	10
Secondary education completed	22	44
Post-secondary education	9	18
Degree	1	2
Total	50	100

Table 4 also shows that only two percent of the households have completed degrees compared to eighteen percent of households with post-secondary education. It was noted that the majority of the households (34%) in the Mamone village relied heavily on social grants. Table 5 shows that eighteen percent of the households relied on pension grants. The results from Table 5 further show that only six percent of households have been employed fulltime in Mamone village. At least eighteen percent of the households have informal work, meaning these people are not permanently employed. However, twenty-eight percent of the households indicated that they are unemployed and cannot generate any income.

Table 5: Income generating activities

Activities	*Number of households*	*Percentages*
Unemployed	14	28
Informal work	9	18
Employed fulltime	3	6
Pensioner	7	18
Social grants	17	34
Total	50	100

Table 6 shows household incomes in Mamone village. The results in Table 6 show that household income ranges between R 300 to R 1000 per month. It was noted that only four percent of the households earned R 300 per month. At least fourteen percent of the households earned between R 500 to R 800 per month. The majority of the households (54%) earned between R 801 to R 1000 per month. Only twenty-six percent of the households in the village earned more than R 1000 per month. It is important to note that income level varies from household to household and is based on job type, qualification level and experience.

Table 6: Household income

Activities	*Number of households*	*Percentages*
R0 – R300	2	4
R301 – R500	7	14
R501 – R800	1	2
R801 – R1000	27	54
R1000 >	13	26
Total	50	100

Table 7 shows that households in the Mamone village have access to different government support programs. Table 7 shows that the majority of the households (86%) in the Mamone village have access to child support grant compared to ten percent of households with access to old age grant. The situation in the Sekhukhune district is not different from other districts such as Mopani, Vhembe, Waterberg and Capricorn (Maponya et al. 2014; Maponya and Moja 2012). At least two percent of the households in the Mamone village have access to a HIV/AIDS grant. This is a very small percentage compared to the one that have access to child support grants.

Table 7: Households support programs access

Access	*Number of households*	*Percentages*
Old age grant	5	10
HIV/AIDS grant	1	2
Child Support grant	43	86
Not applicable	1	2
Total	50	100

Table 8 shows that the majority of the households (62%) in the Mamone village use drying, blanching and pre-treatment sieving or winnowing compared to only four percent of the households which are using blanching. At least twenty-six percent of the households are using drying during the post-harvest activities. However, only eight percent of the households are using the pre-treatment sieving or winnowing for post-harvest activities.

Table 8: Post-harvest activities used by households

Post-harvest Activity	*Number of households*	*Percentages*
Pre-treatment sieving/ winnowing	4	8
Blanching	2	4
Drying	13	26
All of the above	31	62
Total		

Post-harvest storage has been highlighted as one of the key constraints by majority of the smallholder farmers across the Limpopo Province for several years. Mpandeli (2006) highlighted the same issue in the Vhembe district. Results from Table 9 show that the majority of the households (70%) in the Mamone village are using cool dry area, IK silo, baskets, clay pots, and plastic containers as storage facilities. It was noted that twenty percent of the households are using baskets as storage facilities compared to two percent of the households which are using cool dry areas, IK silo and clay pots. Only four percent of the households are using plastic containers for post-harvest storage.

Table 9: Post-harvest storage

Storage	*Number of households*	*Percentages*
Plastic containers	2	4
Clay pots	1	2
Baskets	10	20
IK silo	1	2
Cool dry area	1	2
All of the above	35	70
Total	50	100

The results from Table 10 show that the majority (62%) of the households celebrate post-harvest activities as compared to thirty-eight percent of the households. This shows that post-harvest celebration varies from area to area, and farmer to farmer depending on financial well-being, arrangements in the community and also the structural setups in the villages. In some villages, post-harvest celebration forms part of the culture and there is a belief that post-harvest celebration brings luck during the following cultivating season.

Table 10: Celebration of post-harvest activities by community

Storage	*Number of households*	*Percentages*
Yes	31	62
No	19	38
Total	50	100

Table 11 shows that the majority of the households (74%) are cultivating maize, sorghum and groundnuts. It is not surprising that only two percent of the households are planting maize in the village. The fact is that Sekhukhune district has poor rainfall distribution compared to other districts such as Vhembe and Mopani within the province. Only four percent of the households are planting sorghum in the area. Some of the households (20%) indicated that they cultivate groundnuts in the Mamone village due to the fact that groundnuts and sorghum are drought tolerant crops unlike maize crops. Some of the households further indicated that they are cultivating maize and groundnuts using intercropping. They are using this strategy in order to cover the surface area, reduce the rate of evaporation and also to conserve moisture. In Vhembe, for example, where rainfall is seasonal, the availability of irrigation provides smallholder farmers with important advantages over dryland farmers. One obvious advantage is that it enables farmers to produce crops beyond the rainy season, creating opportunities to market

Table 11: Crops cultivated

Crops	*Number of households*	*Percentages*
Maize	1	2
Sorghum	2	4
Groundnuts	10	20
All of the above	37	74
Total	50	100

produce during periods of limited supply when commodity prices tend to be high. It also enables farmers augment water availability to their crops during the rainy season, when the area experiences a dry spell (Van Averbeke et al. 2011). Farmers in the Rabali area have been trying to diversify their cropping system in order to increase production even though they are farming in a dryland area. The majority of the farmers indicated that groundnuts and cowpea grow well in dryland areas because these crops require less water compared to some other crops such as avocado and banana. Groundnuts and cowpea crops also conserve moisture by covering the soil surface (Annandale et al. 2002).

Intercropping is a practice whereby two or more crops are grown in the same field (Machado 2009). Other terms used to refer to intercropping are mixed cropping, multi-cropping, double cropping (arrangements involving two component crops) and poly-culture (Machado 2009). Using the spatial arrangement of component crops as the organising principle, Ouma and Jeruto (2010) citing Okigbo (1979) divided the different types of intercropping methods into four commonly used categories, namely,

- Strip intercropping, which involves growing two or more crops simultaneously on the same field in alternative strips of uniform width and spaced close enough for the different component crops to interact,
- Row intercropping, which refers to the growing of more than one crop on the same field in alternative rows,
- Mixed intercropping, which involves the simultaneous growing of two or more crops in the same field without a row arrangement,
- Relay intercropping, refers to the cultivation of two or more crops in the same field, whereby the second crop is planted after the first crop has been established and has reached a fairly advanced stage of development.

From a crop production perspective, the main justification for intercropping is to achieve more effective use of available resources, including light, water and nutrients, to increase total production per unit of land (Seran and Brintha 2010; Ouma and Jeruto 2010). Intercropping does not always raise total production per unit land. Competition among component crops in an intercropping arrangement can also reduce total productivity. However, competition for growth resources among component crops in a mixed crop arrangement can be minimized with careful planning.

CONCLUSION

A large portion of vegetables and fruits are lost worldwide after harvest and the main causes are physiological (wilting, shriveling and chilling injury), pathological (decay due to fungi and bacteria) and physical (mechanical injury). Losses are estimated at twenty percent to forty percent in developing countries, and ten percent to fifteen percent in developed countries, depending on the crop and the season. The majority of the households (62%) in the Mamone village use drying, blanching and pre-treatment sieving or winnowing compared to only four percent of the households, which use blanching. At least twenty-six percent of the households use drying during the post-harvest activities. However, only eight percent of the households are using the pre-treatment sieving or winnowing for post-harvest activities. Post-harvest storage has been highlighted as one of the key constraints by majority of the smallholder farmers across the Limpopo province for several years. Results from this research further show that the majority of the households (70%) in the Mamone village are using cool dry areas, IK silo, baskets, clay pots and plastic containers as storage facilities. It was noted that twenty percent of the households are using baskets as storage facilities compared to two percent of the households which are using cool dry areas, IK silo and clay pots.

RECOMMENDATIONS

The indigenous post-harvest system is therefore highly recommended for other rural areas in order to promote food security, revitalizing sustainable agriculture and incorporate them into developmental activities in the Greater Sekhukhune District.

REFERENCES

Annandale JG, Jovanovich NZ, Mpandeli NS, Lobit P, du Sautoy N 2002. Two Dimensional Energy Interception and Water Balance Model for Hedgerow Tree Crops. *Paper presented at Southern African*

Society of Horticultural Sciences Congress at Cedara, Kwazulu Natal, 15-17 January 2002.
Austin JE 1995. Reflections on IDB Strategy for Agricultural and Rural Development. *Mimeo*.
Food and Agricultural Organisation (FAO) 1989. *Prevention of Post-harvest Food Losses Fruits, Vegetables and Root Crops a Training Manual*. Food and Agriculture Organization of the United Nations, Rome. ISBN, 92-5-102766-8.
Fellows P 1997. *Traditional Foods: Processing for Profit*. Publications, London, United Kingdom: Intermediate Technology
Garnett T 2006. Fruit and Vegetables and UK Greenhouse Gas Emissions: Exploring the Relationship. UK: Food and Climate Research Network, University of Surrey. *FCRN Working Paper* 06-01 Rev. A: 1-134.
Kader AA 2005. Increasing food availability by reducing post-harvest losses of fresh produce. *Acta Hortic*, 682: 2169-2175.
Machado S 2009. Does intercropping have a role in modern agriculture? *Journal of Soil and Water Conservation*, 64(2): 55-57.
Madrid M 2011. Reducing Post-harvest Losses and Improving Fruit Quality Worldwide: The One-Billion-Dollar Untapped Business Opportunity. [WWW document] URL From<http://www. fruitprofits. com/ing/articulo.asp?reg=26.> (Retrieved on 1 November 2014).
Mallet M, Du Plessis P 2001. *Mahangu Post-harvest Systems*. CRIAA SADC, Windhoek, Namibia.
Maponya P, Moja S 2012. Asset portfolios and food accessibility in Sekhukhune District, Limpopo province, *Journal of Agricultural Science*, 4(12): 144-153.
Maponya Phokele, David Modise, Erika Van Den Heever, Sandile Mahlangu, Ntsako Baloyi, Risinga Maluleke, Dikeledi Chauke, Koena Manamela, Mapurunyane Mphahlele, Morongwa Mojapelo, Maria Mphahlele, Johan Carstens, Marjan Mphahlele 2014. Establishment of fruits and vegetables markets: A case of Greater Sekhukhune District in Limpopo Province. *Journal of Agricultural Science*, 6(9): 144-157.
Maponya PI, Modise D, Van Den Heever E, Mahlangu S, Baloyi T, Maluleke A, Carsten J, Van Der Walt M, Chauke D, Mkhari R, Sole L, Duba M, Malebana J, Mphahlele M 2014. Establishment of fruits and vegetables markets: A case of Waterberg District in Limpopo province. *Journal of Agricultural Science*, 6(6): 38-47.
Mashau ME, Moyane FN, Jideani IA 2012. Assessment of post-harvest losses of fruits at Tshakuma fruit market in Limpopo province, South Africa. *African Journal of Agricultural Research*, 7(29): 4145-4150.
Mpandeli NS 2014. Evaluation of crop production practices by farmers in Tshakhuma, Tshiombo and Rabali areas in Limpopo Province of South Africa. *Journal of Agricultural Science*, 6(8): 10-18.
Mpandeli NS 2006. *Coping with Climate Variability in Limpopo Province*. PhD Thesis. Johannesburg, South Africa: University of Witwatersrand.
Mpandeli NS, Maponya PI 2014. Constraints and challenges facing the small scale farmers in Limpopo Province. *Journal of Agricultural Science*, 6(4): 135-143.
Ogunleye RF, Adefemi SO 2007. Evaluation of the dust and methanol extracts of Garcinia kolae for the control of *Callosobruchus maculatus* (F.) and *Sitophilus zeamais* (Mots). *J Zhejiang Univ Sci B*, 8(12): 912-916.
Okigbo B N 1979. Evaluation for Plant Interactions and Productivity in Complex Mixtures as a Basis for Improved Cropping Systems Design. *Proceedings of the International Workshop on Intercropping*, 10-13 January, 1979, Hyderabad, India, pp. 350-356.
Ouma G, Jeruto P 2010. Sustainable horticultural crop production through intercropping: The case of fruits and vegetable crops: A review. *Agriculture and Biology Journal of North America*, 1(5): 1098-1105.
Salami P, Ahmadi H, Keyhani A, Mohammad Sarsaifee M 2010. Strawberry post-harvest energy losses in Iran. *Researcher*, 2(4): 67-73.
Seran TH, Brintha I 2010. Review on maize-based intercropping. *Journal of Agronomy*, 9(3): 135-145.
StatsSA (Statistics South Africa) 2011. *Community Survey 2007*. Pretoria: Statistics South Africa.
Van Averbeke W, Denison J, Mnkeni PNS 2011. Smallholder irrigation schemes in South Africa: A review of knowledge generated by the Water Research Commission, *Water SA*, 37(5): 797-808.