

Traditional Science of Seed and Crop Yield Preservation: Exploring the Contributions of Women to Indigenous Knowledge Systems in Zimbabwe

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Abstract

The article explored the contributions of women to indigenous knowledge relating to seed and crop yield processing, preservation and storage. The paper is informed by eco-feminist perspective and the post-colonial theory. Harvard analysis tool was used to determine the nature of gender roles and activities in seed and crop yields processing, preservation and storage. The research design was purely qualitative in form of narrative enquiry which is suitable for ethnographic research. Sampling was purposive and judgemental through use of network referencing. In-depth interviews were conducted with 50 respondents (23 males and 27 females) in Matabeleland South province of Zimbabwe. Observation of processed, treated and stored seeds and crop yields was also done. The research revealed that the people in this province still have a considerable list of indigenous grain crops they depend on as their staple food. These were processed and preserved through traditional means. Preservation of seeds and varieties of melons and pumpkins was cheaper in terms of time and labour. Smoke coating and ash mixtures were the dominant chemicals used to preserve most seeds and grain crops for long-term use. Women played the dominant role in seed and crop yields processing, preservation and storage. Gender roles depended on time, location of activity, physical labour demanded, stereotypes and technology used. The paper recommends inclusion of women in both scientific and IKS. There is need for agricultural extension works to recognise women and incorporate IKS in agricultural training institutions as women make the majority of farmers in rural areas. There is need to fuse culture, gender and nature in their courses.

Key terms: Traditional science, processing, preservation and indigenous seeds.

Background to the study

Role of women in Agriculture

Makamure, Jowa and Muzuva (2001) pointed out that women in small holder agriculture have contributed a great deal as defacto farm managers and members of the rural labour force. The 1980s and 90s have even seen a shift from working with individual farmers to master farmers approach. Agricultural extension extended to recruit females as extension agents. This is supported by Garwe, Munzara-Chawira and Kusena (2009) who argue that women play an important role in agriculture estimating that 70% of small holder farmers are women. UNIFEM (2004) also noted that women play a significant role in food security, though they are constrained by various factors. Makamure et al (2001) are of the view that its women who tend to be responsible for food crops, storage, processing and preservation. This is also echoed by Parawira and Muchuweti (2008) cite that in Zimbabwe processing and storage is mostly done by women.

Importance of indigenous knowledge in agriculture

Indigenous Knowledge Systems (IKS) in farming practices form a bed rock of a community's composite and collective wisdom which is passed from one generation to the other (Madebwe, Madebwe and Kabeta, 2005). IKS act as a community's armour against environmental shocks and manifests community's resourcefulness (ibid). Madebwe et al (2005) argue that IKS allow local communities to solve local environmental problems using endogenous solutions which they have full control of. Wide range of indigenous agricultural land use practices by farmers are based on generations of informal experience and experiments and intimated understanding of bio-physical and social environment (Mapara, 2009).

Madebwe et al (2005) noted that marginalisation of IKS has resulted in rapid loss of traditional seed varieties best suited to the prevailing agro-economic conditions. It has also led to the cultivation of unsuitable crops for marginal farming areas. Traditional ways of seed selection and preservation are not considered a priority after years of dependence on commercially produced high yielding varieties.

Parawira and Muchuweti (2008) are of the view that Zimbabwe is rich in traditional and indigenous foods which have not been researched on to show nutritional value and methods of improving their processing and preservation. Researchers have been undertaken on modern methods of processing to improve acceptance and utilisation of overall food security. Traditional methods of production, processing, preservation and storage have been ignored. Millennium Development Goals (MDG) 2004 cites that maize is the staple food in Zimbabwe, as such; hunger is commonly associated with its shortage in the country. Other crops like sorghum and millet are not considered as staple grain. This is echoed by Mararike (2000) who postulates that maize is the most popular crop in Zimbabwe which is grounded into flour used to prepare thick porridge sadza, the staple food for most people in Zimbabwe. However, it must be noted that maize is not an indigenous crop but was introduced into the Mutapa state by the Portuguese in 15th Century (Prew, Pape, Mutwira and Barnes, 1993).

The Great Zimbabwe and Mutapa people used to grow finger millet, sorghum and rapoko for sadza or thick drink (mahewu). Other traditional food crops were peanuts, beans, pumpkins, groundnuts and wide varieties of vegetables (Mararike. 2001; Guruve et al, 2009) states that today sorghum is the third most important cereal crop in Zimbabwe and that it is principal food for many Zimbabwean predominantly those living in semi-rural regions for sadza, mahewu, beer and as fodder for livestock.

Researchers from Rhodes University, Sebakwa Black Rhino Conservation Trust in Shava (2010) discovered that traditional crops are important sources of community resilience to climatic change and economic disturbance in Zimbabwe. Commercial crops are not adaptable to local conditions and require high agro-chemical inputs such as mechanisation, fertiliser and water supply. These are also vulnerable to climatic changes like drought and flooding in Zimbabwe. Returning to indigenous crops and vegetables enables farmers to increase crop diversity. It also assists farmers to match specific varieties to their own micro-climate. The other advantage is seed sowing, processing and preservation through drying and smoke coating make communities to have secure and reliable source of food during the off-season. Seed sowing and sharing ensures community independence from commercially produced and expensive ones.

Traditional seed crops are also resistant to diseases and attacks by pests (Madebwe et al, 2005). Tsiko (2007) argue that commercially produced crops pose a threat of erosion of indigenous foods. This increases food aid and use of genetically modified staple crops. This causes reduced exploitation of traditional food which may have a better nutritional value than commercial foods. There is also social stigma associated with consumption of traditional foods. These are viewed as 'poverty crops' making people to turn to them during floods and droughts. New agricultural practices and urbanisation have also reduced availability of indigenous foods in Zimbabwe and Africa. Commercial Smallholder agriculture has in practice meant use of bought inputs and increased concentration of cash crops for sale rather than production for household consumption.

Findings by Chisvo in Makamure, Jowa and Muzuva (2001) revealed however that 10% of households in many district, of Zimbabwe used millet from the previous year as a survival strategy during times of shortage. They also noted that millet was becoming unpopular with the new generation. James (2008) found that in Gokwe (Nembudziya), there was decline of legume, root vegetable cropping and even groundnuts, were not grown to a greater extent. This was because modern seeds were easily attacked by aphids. As a result people concentrated on cotton as a cash crop. Other reasons cited were availability of bought seeds, overall knowledge and interest in indigenous traditional food had a bearing on production of indigenous foods. Traditional foods were viewed as having extra toil in food processing, preparation and storage. In Gokwe nutritional gardens were introduced to complement cooperative ones. There were set up adjacent small dams to provide income generation through fresh food supplies versus dried one. Parawira and Muchuweti (2008) also found that surveys highlighted constraints in the cultivation of traditional foods such as lack of seeds, production, and poor quality of processing which is mostly long hours of boiling and drying. Nyambara in James (2008) also noted the influence of immigrants as a result of resettlement as one of the factors of low production and consumption of traditional foods. With immigration, the characteristics of people, social relations and their traditions including diet changes.

Food Situations in Zimbabwe

Access to adequate food is a basic human right and is catalytic to the realisation of all other rights (Madebwe et al, 2005). Attaining national food security is a fundamental development goal. Since 2002, Zimbabwe has not had the capacity to produce or import adequate food (ZMDG Goals, 2004). Zimbabwe is an agricultural based economy with about 70% of its population residing in rural areas and earning a living largely from subsistence agriculture. Agriculture is still a major contributor to Gross Domestic Product (GDP) at 24, 7% (ZMDG, 2004). Malnutrition is still a major problem associated with poverty. The 2002 Nutritional Assessment Study estimated that 11% of the children in urban areas and 26, 5% of those in rural areas were malnourished (ZMDG, 2004). One of the strategies to reduce dependency on rain-fed agriculture and increase agricultural productivity and capacity of household to manage risk, the country has in place a national food and nutrition policy framework to guide nutritional interventions. One of the interventions is the emphasis of indigenous foods to supplement maize whose productivity has declined due to dependency n rain fed agriculture which is erratic. Maize productivity in recent years has suffered vulnerability to droughts and floods. Indigenous crops are adaptable in semi-arid and arid regions 3, 4 and 5 in Zimbabwe.

Gomez (1988) note that there is loss of vast and ancient legacy of knowledge in identifying and recognition of traditional resources and elaborate technology for utilisation. He cites that it is important to preserve traditional knowledge from oral heritage in a more durable form. Braidotti in Chandler and Wane (2002) also say indigenous practices need to be documented for sustainability. Parawira and Muchuweti (2008) posit that Zimbabwe is rich in traditional indigenous foods which have not been researched. For these reasons this paper seeks to excavate and expose traditional methods of seed and crop yield processing, preservation and storage as a way of increasing food security in (arid and semi-arid) marginal areas of Matabeleland South. Deliberate efforts must be made to initiate nature to support low cost agriculture in small holder farming sector through harnessing indigenous knowledge systems and farming practices. Sporadic efforts have been made to maintain data base and to restore the dignity of traditional crops by a few NGOs. Women's indigenous knowledge of traditional food processing, preservation and storage must be harnessed for food security (Othiokpehai, 2003). Tsiko (2009) cite that challenges of production of indigenous food include seed availability, lack of information, seasonal variability as well as post harvest handling and quality control. Contributions of women in indigenous knowledge of selection, processing, preservation and storage of traditional seed and crop yields are major issues explored in this paper.

Theoretical Framework: The Contributions of Women to IKS

There has been increasing consciousness of the connection between women, human rights and exploitation of nature resulting from the rise of eco-feminism of the late 1970s (Chandler and Wane, 2002). The second and third waves of feminism have led to interconnections between indigenous rural women and their environment. Third world women's indigenous knowledge is ignored despite that they make the majority of farmers with in-depth indigenous knowledge of farming practices. Merchant and Fort man in Chandler and Wane (2002) note that even development policies, projects and educational practices ignore women's indigenous knowledge. The exclusion is based on the belief that women's ways of knowing do not seem scientific by western scientific standards. Mapara, (2009) argues that traditional education existed as a way of passing IKS to successive generations. He adds that technological advancement was not something brought to Africa by colonialists, for example iron smelting, craft-work, terraces, polyculture, food processing and preservation.

The knowledge of farming slopes before in Sanyandowa area in Nyanga, Zimbabwe started before colonialism and was stopped by colonial conservation authorities. Inter-cropping and weed control was through poisonous food and medicines. Poly-cropping was also a way of controlling weeds. Women had skills of identifying, processing and preserving good seed varieties of grain cobs. These were tied and hanged inside kitchens. Smoke wafted from the hearth to the grain to protect it from borers and rats because of a bitter taste from the soot (soot preservatives), women also had ingenuity of brewing and processing beer, mahewu and milk. This indigenous knowledge was based on the scientific knowledge of fermentation. They also had scientific knowledge of identifying the suitable site of a granary, for example, on top of rocks to be free from moisture. The top was roofed, with sealed doors and the inside treated. Other plants were used as catalyst to ripen or soften food. Mapara (2009) also postulates that people could even predict weather conditions for example in Manyika under Chief Tangwena in Zimbabwe, the art of forecasting was done through observation of weather patterns associated with birds, animals and insect behaviour.

Mapara (2009) supports post-colonial theories by Franz Fanon and Edward Said who viewed the West as destructive and unappreciative of the achievements and success of the colonised. James (2008) note that Reid in the 1970s equated traditional farming methods to lack of ambition, confining farmers to subsistence rather than modern commercial agricultural practices. Vandana Shiva an eco-feminist in Chandler and Wane (2002) also views modern scientific knowledge as corrupting indigenous knowledge of non-western people. Her eco-feminism was viewed as anti-science movement against genetically modified food and world hunger discourse (Pinstруп and Schiwler in *ibid*). She was opposed for calling for return to traditional practices. Vandana also opposed the exclusion of women from both scientific and IKS arguing that women had profound knowledge of their ecological contexts which is ignored by development policies. She argued that environmental projects failed because indigenous women's knowledge of farming, forests and trees was excluded despite feminists and environmental movements of the late 20th Century (Njiro in Chandler and Wane, 2002)

Definition of Terms

Othiokpehai (2003) defines indigenous knowledge system (IKS) as knowledge of people living together in a certain area, generated by their own and their ancestors' experience. This includes even knowledge originating elsewhere that has been internalised by the local people.

According to Hornby (1980) traditions are ways of doing things that are handed down from generation to generation. Traditional science in this paper refers to a branch or discipline of science in which tested and observed knowledge is arranged in an orderly manner and handed down from generation to generation. This knowledge is indigenous that is, native or belonging naturally to people regarded as original inhabitants of an area. For this reason traditional science in this paper is used interchangeable with IKS.

Indigenous seeds and crops in this paper refer to those originating locally in an area with respect to country, district or sub-district. These are locally produced and treated as opposed to commercial seeds and grain crops that are bought. Processing in this paper means operations deliberately undertaken to get finished and usable seeds and grain crops.

To preserve is to keep safe from decay (Hornby, 1980). Preservation of seeds and crops yields in this article refers to keeping safe from decay and risk of going bad.

Eco-feminism is a movement or a theoretical perspective that unifies gender and environmental issues by recognising the role and knowledge of women in ecological environments (Chandler and Wane, 2002)

Methodology

This article is informed by eco-feminist perspective which focuses on women's interaction with the environment. It is also influenced by post-colonial theory which emphasises the importance of pre-colonial knowledge systems and tries to conscientise societies on the need to turn back to their indigenous ways of life. The Harvard Framework is used as a tool of analysis as it looks at the gendered nature of activities in communities. The tool makes visible roles for men and women, time taken on those activities, location, access and control of resources as well as factors that have influenced such arrangements. The research design was purely qualitative to allow for use of narrative enquiry in ethnographic research (cultural studies). The sampling of respondents and villages in Gwanda, Beitbridge, Kezi, Plumtree, Filabusi and Esigodini was purposive and judgemental. Sampling targeted males and females who were well versed in traditional knowledge of seed and crop preservation. The area under study makeup Matabeleland South Province of Zimbabwe which is a fusion of different cultures namely: Sotho, Venda, Ndebele, Kalanga and Shangane.

The researchers selected a particular group who helped to identify the members who had indigenous knowledge of crop and seed preservation through network referencing (snowballing). In-depth interviews were made with a total of 50 respondents (23 males and 27 females). These were 6 females and 4 males in Beitbridge, 4 females and 4 males in Gwanda, 6 females and 5 males in Plumtree, 5 females and 4 males in Kezi, 3 females and 3 males in Filabusi and 3 females and 3 males in Esigodini. The data was collected from September 2010 to January 2011. This covers time for preparation for and the planting season. This enabled researchers to observe smoke coated tussles and dried pumpkins under granaries.

However some granaries were still sealed though researchers managed to observe food grain for consumption in unsealed granaries and seed crops that were already being prepared for the planting season, for example, groundnuts and round nuts whose outer covers were being removed (*ukucacada/lokutshokola/uthothovha*). Data was analysed qualitatively and the findings were presented in a narrative form.

Research Findings

Respondents revealed that the type of crops that were preserved through traditional means were rapoko (*uphoko/mufhoho*), sorghum (*amabele/mavhele*) and millet (*unyawuthi/luvhelevhele*). These were for thick porridge (*sadza/vhuswa*), brewing beer and drink (*mahewu*)

Respondents revealed that the types of seeds that were preserved through traditional means were rapoko (*uphoko/mufhoho*), sorghum (*amabele/mavhele*) millet (*unyawuthi/luvhelevhele*) and cane (*imfe/mphwe*). Others include groundnuts (*amazambane/nḁuhu*), round peas (*indlubu/phondḁa*) beans (*indumba/nawa*) melons (*amajodo/magwaḁi*), water melons (*amakhabe/mabvani*), green melons (*amakhomane/maranga*) and pumpkins (*amathanga/madzamanga*). However the methods of preservation and place of storage depend on the seed crop.

Preservation of seeds for the next planting season

It emerged that most seeds, for example, from varieties of melons and pumpkins are not treated with any herbs or chemicals but undergo air and sun drying after which they are kept in clay-pots, calabashes and closed granaries to protect them from weather conditions. The green pumpkin (*amakhomane/maranga*) maybe left in the fields until they are hardened and can no longer be eaten as fresh. These are dried and kept beneath granaries until the next planting season. The crushing is done towards the next planting season and the by-products are seeds and various calabashes, (*amaqhaga/zwitemba, inkezo/khavho*) which are used as containers of water, beer, herbal medicines, milk, grain among others. The seeds are kept safely in a dry place. Respondents had it that all these type of seeds can stay for a year without being attacked by borers (*impehlane/zwifheḁi*). MaBhebhe from Gwanda (Kafusi) confirmed the above when she mentioned that:

*Intanga zonke ezamathanga, amajodo, amakhabe,
amakhomane ziyalaluka.*

She meant that all varieties of melons and pumpkins when dried and kept in a safe and dry place, they can go for a year without attacks from pests.

For round peas, groundnuts and beans, drying with outer covers enable the seeds to be safe until the next planting season. Makhumalo from Plumtree (Kandana area) had this to say:

*Amazambane awacacadwa lendlubu azitshokolwa-kuyahlala
okweminyaka emibili.*

This means that if peas and ground nuts are left with outer covers, they last for 1-2 years. Storage places are drums, clay-pots, calabashes, sacks and closed granaries. Among all the seeds crops, beans were the most vulnerable to insect and fungal attacks. These rarely go beyond 12 months even after treatment.

It also emerged that for beans, besides drying with outer covers, they can also be treated with ash mixtures or be half-heated. The sun dried, ash treated and heated beans are stored in sealed containers or granaries until the next planting season. However, thorough heating result in low rate of germination hence this needs to be done by a skilled person.

Findings also revealed that for cane, millet and sorghum seeds (*inhlanyelo/mbewu*) tussles (*izikhwebu/miḁondḁwa*) are cut, dried and smoke coated in kitchens until the next planting season. Smoke produces a bitter taste which deters pests.

Preservation methods of crop-yields for consumption

Respondents in all areas revealed that melon and pumpkin fruit varieties are preserved in shades under granaries or grain barns (*ingalane/thato*). Water melons are seasonal and are for immediate use. Pumpkins last between 6-12 months while melons can go up to the next season. If melons are left in the sun, they rot or turn bad (*amakiliwane/mitili*) which is not edible.

The burden of transporting varieties of melons and pumpkins to the place of storage lies with men and owing to their demand of physical power. Wheelbarrows and scotch carts are used for transportation. Women do this type of work in instances where there is severe shortage of manpower.

Respondents pointed out that the first stage of processing millets, sorghum and rapoko for consumption start with the cutting and heaping of tassels in the fields. This is a women specific role. In cases where there is severe shortage of women labour maybe as a result of divorce, illness or death, women labour is hired or work parties are an alternative. However, transportation from the fields to the processing place (*isiza /isihonqo/matalani*) can be done by both males and females. To be noted is the mode of transporting grain crops differs for males and females. Males usually use scotch carts, wheelbarrows and sledges while females use harvesting baskets (*izitsha/zwisisi*). In some instances women use wheelbarrows and scotch carts when they run short of male labour. It emerged that traditionally males were not supposed to carry baskets (*izitsha/zwisisi*). Interesting to note is that where there is shortage of male labour, women takeover, but where female labour lacks, respondents would rather hire the labour. It was found that there were gender roles that were a 'no go area' for men for example, cutting of tassels and carrying grain using baskets (*izitsha/zwisisi*). There were meanings attached to such kind of roles.

However, the making of grain barns, (*ingalane/thatho*) using logs and stones was the role of males because of its energy demand. Logs needed to be cut down and carried to the barn site. Also heavy stones are to be carried or rolled to the barn. Males place heaps of sorghum, millet and rapoko grain on prepared barns to dry.

The drying process is followed by shelling (*ukubhula/ufhula*) and winnowing (*ukwela/uludza*). The methods of shelling differ from place to place .in Kezi, Filabusi, Matopo and Esigodini, the dominant method is shelling while in Plumtree, it is pounding (*ukutshokola*). In Gwanda and Beitbridge sometimes cattle and donkeys are used to do the shelling.

Gender roles depend on the method and technology used. For example pounding is for females while shelling can be done by both using prepared sticks for the activity. Pounding is specific role for women, men would rather hire women labour than do the pounding themselves. When animals are used for shelling, men do the work. Winnowing is also a role for women. It was unheard of to see men winnowing.

Crop selection and treatment

Winnowing was followed by separation of the seeds for planting and grain crops for consumption. Selection is based on seed size, colour, texture and resistance to diseases and pest attacks. This was found to be done by elderly women who were well versed in indigenous knowledge systems. Another reason cited was that selection role does not demand a lot of energy though time consuming. As a result it was found to be time and labour economic for elderly women to spend the whole day selecting seeds while sited as long as they have a good sight. MaDube from Plumtree (Langabi area) gave the following comment in relation to the above:

'Loba isalukazi esilodondolo siyenelisa ukutshona sikhetha inhlanyelo'.

This mean those even grown up women are able to spend the whole day selecting seeds. Interesting to note was that where there were elderly men like women, these did not select seed crops. It was viewed as specific role for women.

Treatment of grain crops for future consumption.

Sorghum, millet, maize and rapoko were treated using manure and wood ash mixture as a preservative. Respondents across the whole of Matabeleland South concurred that they used ash mixtures to preserve grain crops. However, the ingredients for the ash mixture differed from place to place. Respondents from Matopo, Filabusi and Esigodini tended to mix ash products with modern chemicals. It is important to note that these areas no longer cultivate dominant traditional crops like sorghum, millet and rapoko on a large scale for thick porridge (*sadza*). Maize has become their staple crop for *sadza*. This is partly a result of proximity to the major city, Bulawayo and changes in land tenure systems. Of interest to note is that some of these areas were affected by colonial peasantry where rural peasants were forced by colonial settlers to produce cash crops like maize and beans among others. (Prew, Pape, Mutivira and Barnes, 1993)

Filabusi is composed of formerly known as African purchase areas (plots), communal reserves and new resettlement areas receiving new varieties of grain crops from the government and NGOs.

The majority of the residents shifted to maize as a staple crop. Only the poor grow traditional crops and use traditional methods of preserving the grain. They mix ash with modern chemical to preserve maize. It was found that they did not trust ashes on maize hence mixing it with modern chemicals. Respondents pointed out that it was cheaper and secure to mix the two. Matopo and Esigodini are places that have been affected by market gardening where the majority produce fresh vegetables for sale in markets in Bulawayo. Market gardening is an economic activity which is not seasonal but perennial (throughout the year).

Respondents from Gwanda, Kezi and Plumtree hailed traditional methods of treating and preserving seeds and grain for consumption. They argued that these were affordable and reliable. MaDube from Plumtree (Madlambudzi area) related that dried maize cobs and manure are burnt with gum tree leaves, *mtshwili/mudzweri* tree or a thorny and milky type of tree (*umhlonhlo*) into ashes. The ash mixture is used to treat sorghum, millet, maize, rapoko and the granary in which the grain will be stored.

Makhumalo from Plumtree (Kandana area) revealed that goat manure *umtshwili/mudzweri* tree and a type of aloe vera (*inhlaba/tshikhopha*) are burnt separately to produce an ash mixture. The aloe vera (*inhlaba/tshikhopha*) is found on mountains and in this area it is readily available because it is a mountainous region. There is also production of a sizeable number of goats, at least each family has goats hence goat manure and *inhlaba* are readily available resources. The burning is done outside the kraal. There is no stipulated time for burning as long as everything turns into ashes. The mixture is left over night to cool. However, respondents from Beitbridge pointed out that dry manure from both cattle and goats can be used. Indicative of the above Mr Mbedzi from Beit-bridge (msane area) said:

“Muvhudela wakholomo kana mbudzi uyashumisiwa.”

The ash from trees is bitter and it is the bitterness that keeps pests and rodents off the grain for 1-2 years. The manure is burnt with barks from *muonze* trees. The ash mixture is sprinkled on the grain and thoroughly mixed. This is done at the grain garden (*isiza/isihonqo/matalani*) where winnowing takes place. The grain would have been spread on rock (*idwala/*) or on the floor cleansed using clay and dung. The preparation of the floors using clay and dung, sprinkling of the ash mixture, and mixing is usually done by women and a few unmarried men. However, the cutting down of trees, removing of manure from the kraal and burning of trees is done by males. Women did these roles in the absence of able-bodied men.

Both males and females viewed grain preservation as the role of women. Men felt that they only help where physical power is demanded. Both argued that time taken and the utensils used testify that it should be work for women, for example cleansing of floors using cow dung, *izitsha/zwisisi*, and *inkomane/luselo* for separating grain from impurities is all feminine technology. Men also pointed out that lack of seeds and food affected women more than men, so preservation is women's responsibility. Magutshwa from Plumtree (Mayembe area) had this comment to this effect:

*Umkulu lesiphala ngokukamama ngokunjalo amabele lenhlanyelo
Kuqondane labo.*

This mean that kitchens and granaries are for women and for that reason seeds and grain is their responsibility. He further revealed that if the grain goes bad women are affected more because they are the ones who look after the family. Families look up to women for food preservation, preparation and provision.

Other reason cited for grain preservation as specific work for women were that women were viewed as knowledgeable and skilled. Stereotypes of women being careful, responsible and smart were echoed. In view of the above Ndlovu from Kezi (Membeswana area) had this to say:

*Omama balonanzelelo ngalezizinto. Obaba bangachithachitha
amabele bezama ukuhlanganisa*

By this he meant that women are more careful, a lot of grain would be lost if winnowing and mixing was done by males. It must also be noted that respondents both males and females pointed out that in their areas, Gwanda, Beitbridge, Kezi and Plumtree males are not always at home. The majority were said to be working in Botswana and South Africa. It was also mentioned that though they maybe some available, men do not have time. A man cannot spend the whole day at home burning manure. Men were viewed as busy people outside the home and females as having a lot of time around the home.

Storage

Most of the crop yields in Matabeleland are kept in traditional granaries (*iziphala/maqulu*) which are four cornered mud huts divided into separate compartments. A granary stands out on big stones of ½ a metre above the ground to protect the structure from ground water while the thatched roof protects it from the rains. The numbers of stones depend on the size. On top of stones are strong logs laid in a table like foundation. This makes the foundation on which the granary wall is built. The granary symbolises success in farming. Having many of them is hailed by Matabeleland south communities.

A family that does not have a granary is looked down upon. It emerged however, that sacks can be used though respondents were quick to point out that these also need to be put in granaries. Granaries were viewed as more secure from thieves, animals, pests, rodents and weather conditions because they are sealed with mud mixed with ashes which were used to treat crops. The building of the granary is done by men. Women gather grasses to thatch the granary. Thatching is done by women.

Treatment of the granary

Before storage, the granary is cleansed using mud, cowdung and ash mixtures. The granary is left to dry. Ash mixture is sprinkled inside compartments before grain is put in granaries. Each type of grain has its own compartment. Each compartment is sealed only to be opened when the grain is needed for use. MaBhebhe from Gwanda (Kafusi) warned that cracks should be identified and dealt with as early as possible for security against moisture and rodents. Otherwise there is risk of grain waste.

Although the same mixture is used for maize, millet, sorghum, rapoko and beans with varying concentration, expiry dates for grain crops differ. Most can last up to the next planting season which is one year. Makhanye from Plumtree (Ntoli area) suggested that the common measure for the ash mixture is 2-3 cups per sack. The increase in concentration of the ashes determines the expiry date. To be noted was the fact that sorghum could go up to even 3 years. MaNdiweni from St Joseph area of Kezi hailed sorghum grain crop as the most reliable for food security. She had the following comment to make:

Unyawuthi awubolaboli sithembe wona ngezikhathi ezinzima zendlala.

This meant that sorghum is resistant to fungal attacks hence the grain is our hope for food in difficult times of drought and hunger.

Although respondents from Gwanda (Sibona and Kafusi areas) and Beitbridge concurred with these methods of preservation of grain crops, they also have other methods, though no longer common. MaNdlovu from Gwanda (Sibona) area revealed that one method involved digging a big hole or holes in the kraal. MaTshweni from Beitbridge (Malusungani area) said:

Zwisiku zwiyaqanzwa ngamavu na vhutoko zwaoma.

This meant that the holes are cleansed with mud and cow dung and left to dry. Cattle manure and tussles from which grain has been removed (*iminyane*) are burnt to ashes inside the hole. The grain is put inside and the hole is covered first with a big flat stone then mud and cow dung. Cattle hooves are important to harden the surface to ensure that there is no water infiltration. Mafu from Gwanda (Sizeze area) affirmed the above by saying:

*Inkomo kumele zilale esibayeni, zigandele kuqine
kungabi lemikenke engena amanzi.*

By this he meant that it must be ensured that cattle sleep in their kraals to harden the surface so that there would not be any cracks to allow water into the hole. The method was said to be specific for grain for consumption. It cannot be used for preserving grain seeds as this leads to failure to germinate. Sorghum preserved through this method lasted up to 2 years while millet and rapoko went up to the next planting season which is roughly a year.

Important to note also was that this method was no longer common and only sufficed in years where there are no bumper harvests. The holes are small compared to granaries. Storage granaries seemed to be the widely preferred place in the whole of Matabeleland south. Respondents also admitted that they have never trusted and have never tried preserving maize using this method. They preferred keeping maize in sacks and consume it first before millet and sorghum.

With this method, gender roles seemed to be skewed towards males. Digging of holes was done by males including directing cattle to the holes every evening. Also identifying and carrying of heavy flat shaped stones, searching, felling and carrying of tree logs was a male duty. However, burning could be done by both. In this instance, men were comfortable with the burning of ingredients because felling trees through use of fire and working around the kraal was viewed as male responsibility. The role that was specific to women was the cleansing of the hole using mud and cow dung. The carrying of the grain from *isiza*, putting grain in the pit, covering the pit with a stone were all male roles. The method is labour intensive and in families where there is no male labour its practice is a problem. Maybe this accounted for its near extinction in Gwanda and other areas in Matabeleland south where most males work in Botswana and South Africa. In view of this, Sikhosana (76) an elderly man from Gwanda (Wenlock area) made this comment:

*Omama bangawagejela ngobani amagodi bathwalelwe ngobani
amatshe. Nginje lami angilamandla angikwenelesi lokho.*

By this statement the old man admitted that women cannot dig hole and carry stones and that he himself cannot afford because it needs stronger people.

Traditional versus modern preservative methods

Respondents from Kezi, Plumtree, Gwanda and Beitbridge felt that modern chemicals had no advantages over their traditional ones. They were content and argued that some of the modern chemicals are poisonous. They are dangerous to children and even adults administering them. They pointed out that they have adopted some of them just to move with times. It also emerged that they were more comfortable to use traditional mixtures on traditional crops. For modern crops, they admitted that they had to use modern chemicals. Even Agricultural extension officers were said to be encouraging them to use modern chemicals. They also highlighted that modern chemicals needed cash which was hard to come by.

Discussion and conclusion

Seed (*inhlanyelo/mbewu*) preservation proved to be cheaper in terms of time and labour compared to grain crops for consumption. This is because amounts preserved and stored as seeds are smaller compared to crop yields for food. Seeds did not need laborious treatment serve for beans. Sun drying, smoke coating and leaving beans, round nuts and ground nuts with outer covers (*amakhasi/makanda*) was the easiest and cheapest in terms of time. Millet and sorghum are simple hanged in kitchens for smoke coating.

Introduction of new crops especially for commercial purposes has the negative impact not only on the production of indigenous crops but also on the use of traditional methods of processing and preservation of grain crops. Filabusi, Esigodini and Matopo, because of proximity to town, had changed to maize as their staple crop for sadza. They cultivated millet, sorghum and rapoko for beer, mahewu and for security in times of drought. Respondents were not confident in using traditional methods to preserve maize hence in some areas they mixed ashes with modern chemicals. Former African Purchase areas and New Resettlements models A1 and A2 in Filabusi were now relying on food and seed handouts or bought modern hybrids hence have shifted to new methods of farming and preservation. This was echoed by James (2008) who cited that introduction of modern seeds, bought foods and the belief that traditional methods of preservation have extra toil has lead to the decline in the production of traditional foods and use of traditional methods of preservation in Zimbabwe.

However, semi-arid places like Kezi, Plumtree, Gwanda and Beitbridge still relied on millet and sorghum as their staple crops for sadza. It was discovered that the people in these areas would rather plant sorghum and millet than maize especially during unpromising seasons. The findings concurred with Garwe et al (2009) who noted that sorghum was the third most important crop for sadza in Zimbabwe. Maize was not adaptable to arid and semi-arid conditions in Zimbabwe. To be noted however, is that though the people of Matabeleland south hailed sorghum and millet production, the grain was eaten by rural people. In towns and growth points, Plumtree, Gwanda, Maphisa, Beitbridge and Esigodini, maize made the staple food. Grinding processes involved were said to be labour intensive, and coming together of different ethnic groups from other parts of the country were cited as reasons why maize was preferred rather than the stigma that millet and sorghum is for the poor. Use of traditionally preserved seeds afforded farmer's independence from commercial seeds, high agro-chemical inputs such as mechanisation, fertiliser and water supply. According to the ZMDG (2004) one strategy for food security is to reduce dependency on rain fed agriculture and emphasising indigenous foods to supplement maize to increase household capacity to manage food risks.

Gender roles in Matabeleland south depended on a number of factors. Physical power determined also who does the activity between males and females. Energy demanding roles like felling trees, transportation of grain, logs, stones and digging of pits was all done by men. Women could only do these in the absence of males.

Technology used energy, demanded, place of activity, and place of storage, time taken determined whether the role would be done by male or female. If the activity is in the forest, kraal or fields, males do the role but if it is done around the home, it is done by women. This fits well with the Harvard model of analysing gender roles. The model reveals who does, what, when where, with what resources and time taken. If the activity was time consuming, it was viewed to be a role of women. This was in line with Efficiency approach during Women in Development approach (WID) (Moser, 1993 and March, 2001).

The thinking during efficiency approach was that women had elastic time that was under-utilised. Gender analysis of roles in Matabeleland south revealed that women were viewed as having a lot of unused time around the home. Both males and females felt that men were not to concentrate on work around the home but the fields, Kraals and forests. To note also is that both strongly believed that men had no time to spend on laborious work (time consuming).

Technology used determined who did the activity between males and females. Where ox or donkey drawn scotch carts, sledges and wheelbarrows were used the activity was done by males. Where simple technology is used for example kitchen utensils like knives, buckets, baskets, winnowing basket (*inkomane/luselo*) small harvesting basket (*ingcebethu*), harvesting basket (*izitsha/zwisisi*), calabashes and resources such as cow dung, as mud among others, the activity is done by females. The kitchen and what is found within is associated with females.

Gender roles were also linked to gender stereotypes. Selection, mixing and picking of grain was viewed as a role for women pointing out that women were responsible, smart and careful. Both males and females were of the view that caring, preparation and provision of food for the family was the role of women. Food shortage affected females more than males.

Although ash mixtures were found to be dominate in all areas the ingredients differed and depended on availability in the area. Cattle or goat manure were common in all areas but trees and other plants differed. Expiry date for seeds depended on the concentration of the mixture, the type of the grain crop and storage. The granary was the most preferred compared to sacks, calabashes, drums and clay pots for security from pets, water, thieves, animals and weather conditions.

Traditional ways of preservation of seed and crops was hailed as important by both males and females. Women were found to be skilled and did more than men in the processing, preservation and storage of seeds and grain. This is echoed in UNIFEM (2004) where it is noted that women play a significant role in food security though they are constrained by various factors like poverty, physical power and lack of decision making in patriarchal societies. Chandler and Wane (2002) also noted that there are interconnections between indigenous rural women and their environment though in development policies and projects their indigenous knowledge is left out. Through indigenous knowledge of seed and grain selection, processing, preservation and storage, women have contributed enormously to food security in Africa.

Both males and females especially in Gwanda, Beitbridge, Kezi and Plumtree wished to retain their traditional crops and methods of preservation and storage. They viewed as more reliable, affordable and secure in their everyday life. Their feelings were echoed by Mapara (2009) who argued that today's seed treated using modern chemicals cannot be kept for more than a year. He further argues that the short life span of today's seed is an indicator that western science does not benefit those who are interested in long term planning, that is, rural men and women in marginalised arid and semi-arid regions which are drought prone.

Way forward

There is need to include women in both scientific and IKS because they have profound knowledge of their economic contexts. Sharland in Warren, Slikkerveer and Brokensha (1999) calls this intertwining of indigenous and formal scientific knowledge. Women also need to be included in development policies and projects as they can be very useful as sources of IKS which help them to understand and to adapt to their environment as suggested by Vandara Shiva in Chandler and Wane (2002).

The same idea was echoed by Njiro in (ibid) who lamented that when foreign trained experts intervene in development and education in African based on Western Science models, rural women are often left out. If the above is not done vast legacy of knowledge of crop processing, preservation and storage existing practices that are beneficial are lost in a changing world. This knowledge need to be documented unless recorded it will be lost. Traditional food processing must be harnessed to improve nutritional security in terms of food as suggested by Othiokpehai (2003). Also intra-generational transfer of IKS of farming practices need to be encouraged. The same knowledge needs to be shared with people of other regions. Sharland in Warren, Slikkerveer and Brokensha (1999) point out that even technology can be adapted in other areas even to changing conditions in the same area. If localised IKS are not shared, they remain restricted to the area. There is also need for further research in indigenous crops for example nutritional value and varieties suitable for different regions. National Action Strategies should promote crop diversity in agricultural systems especially in marginal areas as suggested by Tsiko (2009). Sharland in Warren et al (1999) noted that understanding IKS help in the identification of gaps in local knowledge and solutions needed from outside. Also harmful practices are recognised in existing practices making it easy to develop other strategies to counter the harmful effects. Johnson in (ibid), viewed IKS as essential for change. It is based on experimentation which is an essential and very positive for change. Indigenous knowledge of subsistence farming should be fused in agricultural extension work to avoid contradictions and resistance to change. Extension officers should approach subsistence men and women farmers within the context of their values and knowledge of subsistence farming.

Overlooking indigenous knowledge of farming practices, processing, preservation and storage of food crops may create negative attitudes not only towards modern methods but even towards Agricultural extension officers who implemented modern methods. They may be viewed by indigenous societies as official who are bent on destroying their IKS as viewed by Post-Colonial theorists. If Agricultural Extension Officers get to understand IKS and use correct vernacular terms used in local environments this would boost understanding of farming practices by both subsistence communities and officials themselves. This also assists women the majority of whom are not educated.

More women need to be included in extension work and education. It is important for agricultural training institutions to incorporate IKS in their extension courses. IKS of subsistence farmers (both men and women) should be viewed as a priority because it affords them independence in decision making. It also reduces expenses relating to agricultural inputs by enabling local communities especially women to adapt and to depend on their environments rather than external assistance. Attitudes and beliefs that indigenous food and practices are for the poor need, to be deconstructed, through education on IKS. Chandler and Wane (2002) conclude that nature and culture needs to be fused with traditional conceptions of women's roles. This paper observes that in some cultural groups, traditional methods of crop and seed preservation seems to have been wrought by colonialism, mixing of cultures and modernism to such an extent that these cultural groups have reached an impasse in which they are unable to resist modern methods nor completely depend on their traditional and culturally framed methods of preservation, hence there is need to seek out a new synthesis of traditional methods and modernist methods.

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