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# Indigenous Knowledge Systems and the Conservation of Small Grains Seeds: A case of Sangwe Communal Lands of Chiredzi in Zimbabwe.

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## Abstract

This paper endeavors to situate the process of Indigenous Knowledge Systems (IKS) in the wider context of development. The paper grapples with how IKS are conceptualized as they pertain to conservation of resources particularly small grains at community level. The paper's main concern is an analysis of small grains seed situation in Sangwe where the researchers find pleasure in getting readers to know the various small grains that are found in the area. What also come to light in this paper are the climatic conditions that are suitable for the growing of these small grains seeds.

## Introduction

Indigenous Knowledge Systems (IKS) and institutions which are central to the success of the conservation of agro-biodiversity in general and small grains in particular, are widely viewed by development professionals as an academic concern limited largely to social anthropologists, and much of it is seen as superstition. The role of IKS in the conservation of small grains at community level has been overlooked or downplayed by development practitioners who often prescribe the local people to use conventional methods of seed conservation. This has always been so, inspite of the fact that the two systems complemented and supplemented each other's efforts for decades to ensure quality grains. There has been a propensity by contemporary formal resource use and management structures to deliberately ignore and relegate IKS to the dustbin in favour of conventional small grains management techniques. This lack of recognition and IKS marginalisation and trivialization has hammered a death nail on the contribution of the indigenous people in the management of crops they would have planted, cultivated and harvested. IKS in the

Sangwe communal lands if promoted and harnessed effectively, may contribute significantly to food security in the area. The paper analyses the historical neglect of indigenous knowledge systems. It argues that it originates, in part, from the colonial heritage and has been unbelievably perpetuated in post-colonial societies. Instead of building on what the people know and have, development efforts have concentrated on implementing what the people do not know and do not have. Failures are then blamed on the people for not positively responding to extension initiatives and knew technologies.

**Conceptual Framework**

The term Indigenous Knowledge System (IKS) is complex, broad and essentially contestable. Different scholars have given various definitions, some of which are too narrow due to their ethno-centric nature. McClure (1989:1) defined IKS as an "integrative concept that keeps the focus on the individual or group as it functions in the local setting". One of the characteristics of this definition is the dynamism of indigenous knowledge. This dynamism is reflected in Norem et al (1985:67) who defined indigenous knowledge as "knowledge which is unique to a local area, culture, or society, passed down from one generation to the next, usually through oral tradition". Trends towards modernization of rural economy and changes in the standards of living since the turn of the century have triggered this dynamism of indigenous resource management systems as well as cultural norms; to the extent that it is sometimes more appropriate to talk of locally-evolved knowledge systems (LEKS) instead of strictly IKS in these contexts. LEKS acknowledge the on-going transformation and change that traditional systems have gone through and are continuing to undergo by incorporating other knowledge systems into their own. However to avoid being bogged down in semantic deliberations, both IKS and LEKS in this presentation shall be used to refer to knowledge systems that are the property of indigenous people.

To emphasize the integrative nature of the IK concept, Warren and Cashdan (1983:23) defined IK as the sum of experiences and knowledge of a given ethnic group that forms the basis for decision-making in the face of familiar and unfamiliar problems and challenges. Yet, until the early 1980s, this type of knowledge was commonly overlooked by much resource management research and development in developing countries. Cuna Junior and Muxlanga also define IKS as the knowledge accumulated by local population over the years. The knowledge encompasses the ways in which the people deal and manage their immediate environment and the way in which they relate to each other and to their institutions. (In Matowanyika: 1995:12). A related definition is provided by the International Institute for Rural Reconstruction, which defines IKS as the knowledge that people in a given community have developed over time and continue to develop and is based on experience and adapted to the local culture and environment. A slightly different

definition of IKS is given by Kalumuna (2000:22) who defines it as the knowledge system possessed by ethnic peoples and used by such people in the organization of their livelihoods.

Sambo (1995:45) argues that IKS is the basis for local level decision making in agriculture, food preparation, natural resources management and other activities in the rural areas. To this end Almiquist (1989:53) recommends that IKS and practices that conserve biodiversity should be used as a foundation and basis for developing and implementing indigenously rooted biodiversity conservation programmes. Since small grains are part and parcel of biodiversity Almiquist's recommendations also stretch as far as the management and conservation of small grains using IKS.

**Historical Perspective of Indigenous Knowledge Systems**

The last two decades have seen an unprecedented surge of programmes and projects aimed at providing solutions to agro-biodiversity management especially small grains in the Sangwe communal lands. Organizations such as Africa Resources Trust, Africa 2000 Plus Network, Global Environment Facility Small Grants Program, Chibememe Earth Healing Association and many others, have been implementing natural resources conservation programmes in the area. Of particular importance has been the conservation and management of small grains for sustainable livelihoods and ultimately food security. Despite these efforts, the depletion of agro-biodiversity has continued unabated. The inability of these programmes to include analysis of social and cultural phenomena that influence the relationship between people and nature has contributed immensely to their failure.In fact most conservation programmes, including the ecologically oriented ones, have not been particular but, instead, general in the conservation of nature. As if that is not by de-emphasizing the links and relationships between people, their culture and resources, previous and on-going development programmes have unwittingly contributed to the currently prevalent insensitivity and apathy of communities towards sound natural resources management. This resulted in bio-diversity loss in general, and in particular, agro-biodiversity. This is precisely why this research focuses on the role of IKS in Sangwe Communal Lands. As such the research tries to highlight the need for the resuscitation, revival and retrieval of the positive components of IKS. IKS is helpful as it forms the basis for the rural people's livelihoods. It plays a significant role in the management and conservation of agro-biodiversity particularly small grains in Sangwe communal lands. However, this positive contribution is currently unrecognized and negated by contemporary formal resource management structures.

That development means more than economic growth and must be sustainable is no longer a matter of debate. With the down playing of cultural norms, knowledge, skills and technologies, the ability and will to manage natural resources particularly small grains became less important. Matowanyika warns that, "… in the history of failed development efforts in Lesotho and the region, a major fault is that development programmes were not rooted in local values, institutions and local people's committed responses."(Matowanyika: 1995:43) As such it is of vital importance that farmers' knowledge, experience and demands are seriously considered in designing local small grains conservation systems.

## Small Grains Seeds Situational Analysis

Sangwe communal lands are characterized by dry conditions and fall in region 5 where rains are not as plenty as in other regions. These conditions suit very well drought tolerant crops that give better yields in drought prone areas. The spectrums of small grains crops that are normally cultivated by the Sangwe people include sorghum, pearl millet and finger millet. These small grains are more appropriate and productive under drought conditions and in areas of low rainfall and low fertility, a situation that characterizes the Sangwe Communal lands. However it is important to note that the fact that small grains particularly sorghum, pearl millet and finger millet do well in such conditions does not necessarily mean in areas of normal rainfall and good soils these crops can not do well.

The main small grain crop that is grown in Sangwe is sorghum. Sorghum is preferred more ahead of finger millet and pearl millet simply because the people have a natural liking of the crop not because it is more important than other grains. This situation is even prevalent in almost every area in Zimbabwe. One of the reasons given by respondents for the preference of sorghum ahead of other grains is that sorghum is easy to cultivate and that one is assured of high yields despite the size of arable land that the sorghum is grown. The other reason advanced by the Sangwe people has something to do with the suitability of Sangwe soils for the growing of sorghum. The Sangwe soils are naturally clayey and often crack when the rains fell. These cracks play the important role of sucking in the rains and ultimately retain the necessary moisture needed for sorghum crop to survive given that the area does not have a reliable rainfall pattern. As such the Sangwe people see it fit to concentrate more on sorghum. Important here to note is that like any other grain sorghum grain is used for a multiplicity of purposes by the Sangwe people hence the desire to grow it at a larger scale.

However, in as much as the locals have an affinity over the growing of sorghum in the Sangwe area, the sorghum seed has heavily been affected by successive droughts that rocked the country for the past years. Nevertheless the communities managed to secure sorghum seeds from donors, previous stocks and various avenues for growing in the last farming season. It is important to underscore that much of the seeds grown were taken from the previous harvests. Besides sorghum as a small grain crop that is favored most by the locals in Sangwe, finger millet follows it in terms of popularity with the locals. The Sangwe people use finger millet for a variety of reasons and chief among them is for brewing beer for commercial purposes or to appease the ancestors. Since the area is not conducive for maize production, the people would sometimes use finger millet for cooking purposes in the event of the shortage of maize. Like sorghum the finger millet seed stocks were hampered by years of droughts that the country experienced. What it meant was that farmers found it difficult to secure enough seed to grow, but it is important to note that no matter how bad the seed situation was the communities somehow managed to grow the finger millet varieties of their choice.

Apart from sorghum and finger millet, the pearl millet is another small grain variety that the farmers in Sangwe value as well. However it should be noted that this small grain variety is not a favorite grain of the locals not because it is not of value to them but the communities naturally dislike farming it. One of the reasons put forward by the locals was that the pearl millet small grain variety is favorite food for birds and as such these birds often eat it. This fact discourages the farmers from growing it. This explains why some households do not have the pearl millet variety and also why it is being grown in small quantity. As such farmers are in no hurry to secure pearl millet seeds and even conserve it at community level.

**Seed Selection**

Generally speaking, farmers prefer to retain their own seeds for the next season. This is because they know the quality of the seeds, it is available when needed, that is, at the onset of the rains, and one does not need money to pay for it. The retained seed can be supplemented with seed that is either purchased locally, purchased from outside or, given by the government or donors.

In a study carried out by the researcher in the communal lands of Sangwe on the importance of indigenous conservation techniques in the management of small grains, the results indicated that the commonly held opinion that farmers consume their own seeds in the event of drought was found to be generally wrong. Farmers professed that they put aside some seeds for the following season. Most farmers continue to plant small grains varieties as they always have done for decades, a case which could be impossible if farmers consumed their seeds. Mr. Gladman

Chibememe of the Chibememe Earth Healing Association, a community based organization added strength to the above view when he said that, “despite the drought in the 2004-2005 agricultural season, most farmers still drew the largest share of their seed from their own rural stock.” (Interview 2006). The research established that about 60 percent of sorghum and 90 percent of pearl millet crops were derived from seed from previous harvest during the 2004-2005 planting season.

To safeguard plant genetic resources, it is important that seed selection practices employed by farmers ensure seed of good quality and of distinct varieties. Most farmers said that they select seed at the homestead because the plants look uniform in the field. During the threshing operation women have the chance to look more closely at different heads. Usually varieties are separated during harvesting. The women acknowledged that contamination of varieties can occur, but they stated that this normally happens because of carelessness during threshing, rather than cross-pollination in the field.

The stage of crop growth at which a distinction is made between what will ultimately end up as food grain and what will be used for seed is an important indicator of the effectiveness of local level seed production systems. The three stages at which that distinction can be made offer varying degrees of control over the seed production process ranging from very little control to almost complete control, barring the vagaries of nature. Mr. Manjira an extension officer from AREX shares the same view as above when he said that, “seed selection is an art which needs the most experienced persons to do.” (Interview 2006). He further said that normally at community level the farmers themselves know better who is responsible to carry out the task. Indeed the research established that women are always the most suitable people for the selection of seeds. Obviously in their selection process they will be guided by their indigenous knowledge on the selection process. The gender dimension with regards to local knowledge has been observed as women play a major role as creators of plant biodiversity and proved to be active innovators, protectors and managers of natural resources; hence they are sources of valuable IKS.

A few farmers (20%) carried out seed selection before harvest. Seed selection before harvesting, they said gives the farmer the possibility for a higher degree of seed management and a wider range of options for crop improvement. The research further established that seed selection was only done on the basis of physical attributes of seed, and not with an intention to select for specific genetic traits. The most common unit of selection was individual panicles. About (83%) of farmers indicated that they look for individual small grains panicles to establish whether seed qualifies to be selected as seed to be conserved both on-farm and off-farm.

Mr. Manjira clarified the above statement when he explained that, the selection of individual panicles provides an opportunity to select for yield related heritable traits such as panicle size, shape and colour. Individual plant selection (done by 18% of farmers) is an improvement over selecting individual heads as features such as plant stature and disease occurrence can then be observed and included in selection criteria. While selection based on individual panicles and plants could result in a gradual narrowing of genetic variation within a given population, it might be viewed as resulting in a more uniform and stable population, a desirable condition in some instances. In any case, selecting individual plants increases the number of traits that can be observed and either included or excluded from the seed lot. Features such as plant height, susceptibility to lodging, disease and pest resistance and drought tolerance, which are overlooked when one selects individual kernels, can be evaluated and any observable positive features maintained or improved when the whole plant is considered for seed selection.

While the purely physical attributes of seed constitute an essential component of good quality, it appears farmers might be overlooking opportunities to exploit the genetic diversity and constant change that takes place in their own cultivated fields over time. In most cases, farmers are growing specific varieties, improved, or unimproved, which we can assume to be distinct and, if not necessarily uniform, have a degree of stability from one year to the next.

Be that as it may, both the environment and the genetic make-up of the population influence the phenotype of plants, two factors which are in constant state of change. Soil fertility status will likely drop over time as most farmers in the survey areas did not use fertilizer to replenish what is taken up by plants and the pest and disease infection potential will rise over time with continuous monoculture. Soil moisture status is another aspect of the environment that is constantly changing between one season and the next, while the most common cause of any genetic modification of a given cultivar would be contamination from external sources of pollen.

All these and other variables, both biotic and abiotic could result in small but noteworthy changes in certain phenotypic attributes of a variety which, if exploited, might result in an improvement, or at the very least, maintenance of those characteristics which make a particular plant type desirable.

**Seed Storage**

Most respondents (87%)) stored their seed separate from their grain. This is because the farmers fear that they would end up consuming the whole grain without leaving some for seed purposes

since both the grain intended for food and seed would be stored in the same storage structure. Storage conditions can adversely affect the quality of seed. Even when stored under optimum conditions, seed quality tends to decline with time. High temperatures and humidity levels lead to an even more rapid reduction of viability and germination rates. Weevils and molds have the same effect. Farmers in the survey areas had limited means of reducing the relatively high temperatures prevailing in these areas. Fortunately humidity levels tend to be low during the period of seed storage.

Apart from taking into account these two environmentally controlled factors affecting seed storage, the ideal storage structure should protect the seed from invasion by weevils and molds. Most farmers interviewed professed that they employ a variety of indigenous small grains conservation techniques to ensure small grains seeds of high quality. The research established that almost all households have granaries but it should be noted that the granaries are small in size such that they accommodate little grain. The indigenous techniques used include the following: seed storage in a clay pot sealed with cow dung; in bags, sealed tins or bottles; and the hanging of unthreshed small grains panicles over kitchen fire.

Most farmers interviewed particularly in ward 1 responding to the question on the small grains seeds storage techniques said that they store their seeds in bags. These have argued that storing their seeds in bags is the most convenient way of ensuring the conservation of small grains seeds of higher quality that would see them having good planting seasons. Lucia Sithole (Interview 2006) of the Chibememe community in Sangwe Communal Lands explained that storing small grains seeds in bags as a seed conservation mechanism has proved to be useful since the system guarantees the farmers of quality seeds for planting purposes in successive seasons.

The above view by Lucia was supported by Kwenda (Interview 2006) of Africa 2000 Plus Network, an organization which has been working with the Chibememe community on a sustainable agriculture programme that deals specifically with the farming of small grains in the chibememe area, who said that the indigenous knowledge on the conservation of small grains seeds especially their use of bags in the storage of these seeds is very effective. Mr. Kwenda's observation stems from the fact that seeds stored in bags enjoy free air space that would definitely ensures effective seed conservation. (Ibid). Therefore the seeds are of good quality and ultimately improve the overall performance of agriculture in Sangwe.

However some respondents testified that they store their seeds in sealed clay pots or even bottles. In this case the clay pots may be sealed with cow dung. This kind of response was mainly given by people from ward 4. These defended their position saying that storing seeds in sealed

clay pots or bottles is advantageous in the sense that the stored seeds are not likely to be attacked by weevils and rodents. Important here to note is that some farmers particularly in Mahlasera village said that they use indigenous seed conservation techniques concurrently depending on the type and quantity of seeds being preserved. However, in as much as the above two indigenous seed conservation techniques are popular it has been established from this research that there are some shortcomings that can prove to be disadvantageous to seed conservation. As for seeds stored in sealed clay pots it was established that these are vulnerable from temperature fluctuations unlike seeds stored in bags. Air supply is also limited in sealed containers thus prolonging shelf life due to a reduction in the metabolic rate of the seed, so said Mr. Manjira of the AREX department. Bags on the other hand, offer little protection from weevils and rodents. (Interview 2006)

Another indigenous seed conservation technique that the Sangwe community found pleasure in implementing was the hanging of unthreshed seeds above the kitchen fire. Many households testified that they normally hang their selected seeds above the kitchen fire. Sound and effective the above technique may be it was found that hanging seeds over the kitchen fire actually exposes seeds to high temperature and humidity conditions.

**Seed Treatment**

Like any other seed the small grain seed is prone to some attacks and consequently needs some preventive actions to ensure such attacks are deterred from corrupting the seed. As such seed is normally treated prior to storage to provide some measure of protection against weevils and molds. In all the areas visited by the researcher it was ascertained that farmers are very familiar with indigenous techniques that ensure effective treatment of various types of small grains seeds. Most of the farmers testified that they treated sorghum, pearl millet, and rapoko seeds before the actual storage. A Mrs. Muringai from Jekero village said that every farmer is aware of the danger of not putting in place mechanisms for seed treatment and as such they are always alert.[6] It was also established that in some cases the storage system incorporated aspects of seed treatment, as in hanging unthreshed panicles over the kitchen fire. In this case the smoke particles provide protection against weevils. This scenario was found to be prevalent in almost every area studied but it was however noted that this type of treatment was possible for the treatment of seeds that are stored in small quantities. The respondents further argued that the idea of hanging unthreshed small grains panicles over the kitchen fire is done to some particular and unique small grains panicles that the farmer would want to see multiplied in the preceding season and normally these are not many. Possibly this explains why these panicles are not hanged in large quantity.

Other traditional seed treatment techniques used by farmers include mixing the seed with ash prior to storage; mixing the seed with manure and mixing seed with a traditional herb. Some farmers mixed their small grain seed with sand, to reduce the temptation to consume the seed stock in times of food shortages. Mr. Pedzisayi, a farmer in Munyungani Village, said, “in times of drought when food becomes scarce farmers might resort to consuming grain intended for seed purposes and as such some farmers sometimes mix grain with sand so as to deter them from eating the grain.” (Interview 2006).

10 % of farmers interviewed, in conformity with the above, did testify that they at one point mixed their small grains with sand, ashes, manure, and or a traditional herb. In the case of traditional herb mixed with small grains respondents pointed the use of the opportunity to see the rapoko seed mixed with sand at Chibememe homestead where Mrs. Chibememe chronicled the sole reason that made them to employ such a tactic. It is important to note that most farmers are not comfortable using such a technique. This is because farmers have been advised by AREX Extension officers to use such chemicals like Cooper Shumba as grain protector. This has militated against the application of their indigenous knowledge in the conservation of small grains seeds in Sangwe Communal Lands of Chiredzi.

## Conclusion

The research found out that the concept of IKS as it relates to the conservation of small grains is conceptualised differently in various literatures. This conceptualization of IKS has had a bearing on the implementation of the concept at community level particularly in Sangwe Communal Lands where people of diverse background inhabit the area. The study also established that the history of development in Sangwe was characterized by initiatives that lacked the people’s knowledge since agencies of development were out of touch with the reality on the ground in terms of project implementation. However in as much as the research found to a larger extent that development agents have been lacking in them locals’ knowledge some initiatives have been recognizing the indigenous knowledge on project implementation.

The research also established that Sangwe Communal Land is a place that fits very well in the farming of drought resistant crops such as small grains varieties like sorghum, finger millet and pearl millet since these varieties suits the prevailing conditions in Sangwe. It was further established that of the above small grains varieties, sorghum is most favored by the farmers, followed by finger millet and then, pearl millet. Important here to note was the fact that the seed banks of these small grains varieties had dwindled to unsustainable levels and had it not been for

the intervention of NGOs that supplied some of the small grains seeds the 2005 – 2006 farming season would not have been a success.

As to how the locals conceptualise their knowledge in the conservation of small grains it was established that the communities view their knowledge as an important assert that ensures the conservation of small grains seeds of good quality. As such a lot of various techniques were provided by the locals confirming that indigenous knowledge is also vital like any other technique that endeavors to conserve nature in general and small grains in particular. The communities confirmed that their knowledge is important right from seed selection to seed treatment and finally to seed storage. This scenario therefore calls for a paradigm shift that entails massive support to the locals' knowledge systems.

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