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# **Bio-fuels and Food Security in South Africa: The Role of Indigenous and Traditional Food Crops**

By

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## **Abstract**

*The level of food security in South Africa is largely being influenced by income inequalities and food prices with a large part of the population that has access to food but do not have the financial means to obtain it. Despite ever increasing food inflation, South Africa is still adopting policies and strategies which may contribute towards even higher levels of food inflation and consequently food insecurity in the near future. These include amongst others the National Bio-Fuel Industrial Strategy.*

*Previous studies suggest that indigenous and traditional food crops play a substantial role in ensuring food security in several African countries. The question that arises is whether these alternative food crops do not hold the answer towards balancing the trade-off between fuel and food in South Africa. In order to answer that question, a literature review was conducted to understand the inter-linkages between food and bio-fuel as well as to understand the role that indigenous and traditional food crops are currently playing in Africa. To analyse the current status and potential of indigenous and traditional food crops in South Africa, a topical survey amongst 600 African households in the North-West Province was conducted.*

*Contrary to other parts of Sub-Saharan Africa, the survey showed that current production and consumption of indigenous and traditional foods crops in South Africa is modest. This is mainly due to ignorance and unavailability of these specific crops. Despite this, the potential of these crops is evident in the South African context due to affordability, positive perceptions, and land availability near poor rural and peri-urban communities. Hence, indigenous and traditional food crops hold significant opportunities for South Africa to pursue bio-fuel production without compromising food security. To achieve this, specific interventions are needed to stimulate the production and consumption of indigenous and traditional food crops.*

**Keywords:** bio-fuels, food security, indigenous and traditional food crops, South Africa, household consumption

**JEL Classification:** Q10, Q18, D10

## 1. INTRODUCTION

Within the South African context, a strong link exists between poverty, income inequality and household food security. South Africa is deemed a food secure country i.e. producing sufficient staple foods and capacity to import foods to feed its population. However, at household level between 20 percent and 52 percent of the South African households, depending on the source, are regarded as food insecure (Labadarios *et al.*, 2008 and StatsSA, 2009). A large majority of the population has the physical access to food, but do not have the financial means to obtain it. The National Department of Agriculture (2006) is of the same view, stating that food insecurity in South Africa is not due to a shortage of food, but rather to inadequate financial access to food by certain individuals and households in the population.

This situation has been exacerbated by the ever increasing level of food prices. According to a report by IFPRI (2008), food prices worldwide are being driven by supply disruptions, changing diets, use of food crops for bio-fuel production, and inappropriate agricultural policies. This has also impacted on food prices in South Africa. Since October 2010, food price inflation in South Africa showed a strong increasing trend, from 1 percent to 7.4 percent in less than a year. Moreover, when comparing prices of selected food items in the rural and urban areas of South Africa, rural consumers paid on average R 12.06 (US\$ 1.6<sup>3</sup>) more than urban consumers for the same food basket (NAMC, 2011).

Despite the ever increasing food inflation, South Africa is still adopting policies and strategies which may contribute towards even higher levels of food inflation and consequently food insecurity in the near future. These include amongst others the National Bio-fuels Industrial Strategy. In 2007 the South African government approved this strategy to develop industrial bio-fuels locally. It proposes that bio-fuels are mixed with fossil equivalents contributing to a 2 percent penetration level of the fuel market and contribute 30 percent to the government's renewable energy target by 2013. The strategy suggests that the following crops could be used

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<sup>3</sup> Exchange rate of R7.10 /US\$1.00 (Oanda, 2011)

for bio-fuel production; sugarcane, sugar beet, sunflower, and soya beans. Maize is also targeted as a possibility, however, further research on its usability in relation to food security is proposed. Without government subsidies and blending regulations the production of bio-fuels in South Africa is not yet a viable concern and to date this strategy has not yet been transformed into national policy.

Besides the direct impact of bio-fuel blending policies on food crop prices, the policy also indirectly affects food prices by a possible increase in prices for feed used in meat production. It is estimated that feed prices in South Africa for cattle production can increase by as much as 10 percent and with 6.5 percent for pork and poultry production due to a national bio-fuel policy (BFAP, 2007). Besides the possible direct impact of local bio-fuel policies, the South Africa is indirectly affected by bio-fuel policies of major agricultural producers through the world markets for grain crops, oilseeds and sugarcane. South African maize is often traded around the export parity price thus an increase in world prices will stimulate exports and increase domestic prices.

Elobeid and Hart (2007) postulate that countries where maize is the major food grain (like South Africa) experience relatively larger increases in the price of the food basket than countries where wheat, sorghum and rice are the major food grains. This could have a detrimental effect on the already increasing food price in South Africa as diverting crop cultivation away from food production will force the poor to compete for the basic life necessities with fuel production.

Against this background, the question that arises is whether alternative foods like indigenous and traditional food crops<sup>4</sup> do not hold the answer to food security in a world that is driven towards a goal of energy self-sufficiency. According to Van Vuuren (2006), South African communities have traditionally supplemented their diets with an array of indigenous food crops. Van Vuuren (2006) elaborates by arguing that traditional African crops can be grown

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<sup>4</sup> Indigenous and traditional food crops: vegetables, fruits, nuts, and grains that are native to the region and / or that are produced and consumed due to culture and heritage.

more easily in rural subsistence farming as compared to adopted crops, since natural selection has adapted them well to local growing conditions. Yet, indigenous crops have received limited research attention. Hence, this paper aims to enlighten on the status of production and consumption of indigenous and traditional food crops in South Africa. The second objective is to investigate the potential of these crops within the framework of a national strategy for improved household food security in South Africa.

The North-West Province (NWP) of South Africa will be used as a case study due to its rural nature coupled with the large percentage of poor households residing in the region. The analysis will provide insights into the role that indigenous and traditional food crops can potentially play in ensuring higher levels of food security in an ever changing global environment that is characterised by high food price volatility, a slowdown in food production, and an increasing demand for food and bio-fuels (OECD/FAO, 2011). The next section provides a literature review on the food versus fuel dilemma as well as the position of indigenous and traditional food crops in the fight against food insecurity. In the third section discusses the methodological procedures of the survey on production and consumption of indigenous and traditional food crops. The survey results are presented in the fourth section followed by concluding remarks and recommendations in section five.

## **2. BACKGROUND AND MOTIVATION**

### **2.1 The food versus fuel dilemma**

From the literature it is evident that there are different perspectives in the food versus fuel debate. The first view is that the growing dependence of agriculture on energy markets has contributed to apprehensions and that high and volatile energy prices may create new, or augment existing food security problems. For instances, Schmidhuber (2006) as cited by Sparks, (2010); Coyle, (2007); Worldwatch Institute (2007); Pingali *et al.*, (2008); Hochman *et al.*, (2008)

are all of the view that the rapid growth of bio-fuel production in recent years holds considerable and growing concerns over the potential negative implications of diverting food crops for the production of bio-fuels, and subsequently rises in commodity prices, will have on global food and related markets, as well as on food security. Elobeid and Hart (2007) and Pingali *et al.* (2008) elaborate by arguing that higher commodity prices due to bio-fuel demands would benefit producers though higher product prices. However, food items constitute a significant proportion of the consumption bundle of relatively low-income earners thus higher product prices that may have substantial adverse impacts on the purchasing power of the impoverished. Thus, rising commodity prices may have both positive and negative impacts on both developed and developing countries' economies. Moreover, developing countries, particularly low-income and food deficit countries are often characterised by having relatively large numbers of poor, rural, food insecure and undernourished populations. Subsequently, distributional considerations tend to suggest that these groups are most vulnerable to rising and volatile food prices and are, therefore, expected to be most adversely affected by increased bio-fuel production (Cassman and Liska, 2007; Elobeid and Hart, 2007; Pingali *et al.*, 2008; Rosegrant *et al.*, 2008).

Another view that emerges from literature links to the above suggests that an adverse effect may be realised in that a positive supply response, even from small-scale agricultural systems may emerge (Pingali *et al.*, 2008). Pingali *et al.* (2008) argue that bio-fuels will serve as a new source of demand for agricultural commodities which could assist in revitalising agriculture in developing countries. This holds potential positive impacts for economic growth, poverty reduction, and food security. Similarly, Schmidhuber (2006) emphasis the benefits of increased producer prices and positive income effects from increased bio-fuel production, particularly in the rural economies. However, it is clear that when energy and agricultural commodities converge, a food versus fuel trade-off emerges.

There appears to be consensus in literature that expansion of specifically maize-based bio-ethanol is likely to have the most significant impact on food prices. Harrison (2009) reports

evidence indicating that higher maize prices contributed to inflated food prices for those items that depend on maize such as a primary feed, such as eggs, poultry, pork, beef and milk. Sub-Saharan Africa is heavily dependent on cereal imports (Cassman & Liska, 2007), and is particularly vulnerable to price increases for various food commodities, reductions in the availability of calories, and subsequent increased levels of malnourishment (Mulugetta, 2008; Rosegrant *et al.*, 2008). Accordingly, the OECD/FAO (2011) estimate that prices for all food commodities are, likely to remain high and volatile in the period 2011 to 2020. Prices of livestock products are estimated to increase with 30 percent and prices of cereals with 20 percent higher in the 2011-2020 period compared to the last decade (OECD/FAO, 2011). Taking into consideration that poor households in developing countries spend up to 50 percent of their income on food (OECD/FAO, 2011) the impact of these increases in prices can be detrimental for food security.

The dynamics of the food vs. fuel dilemma are summed up in Figure 1.

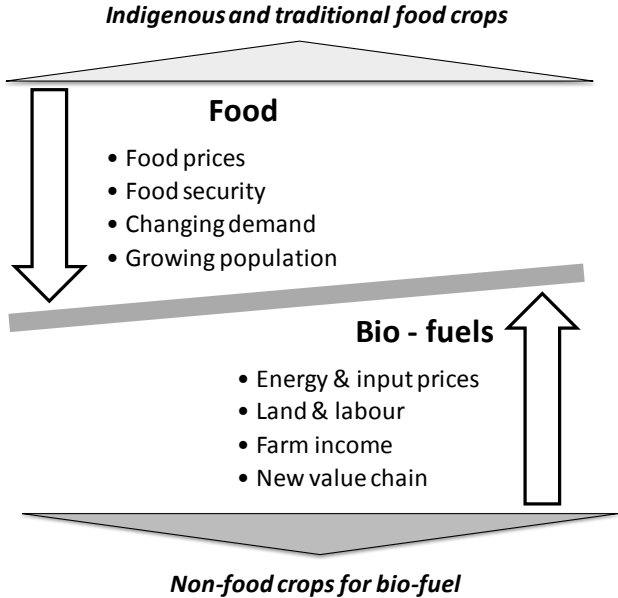


Figure 1: The dynamics of the food vs. fuel dilemma



Whether mandated through blending requirements or planned according to goals of energy self-sufficiency, the increased farm income and rural economic activity from the expansion of bio-fuel production will undoubtedly have significant implications for the food and related sectors (Rosegrant *et al.*, 2008). This leads us back to the research question of this paper: can alternative crops like indigenous and traditional food crops contribute towards ensuring food security in a world that is driven towards energy self-sufficiency and sustainability by amongst others bio-fuel production.

## **2.2 The position of indigenous and traditional food crops in food security**

Little research has been conducted on the benefits of indigenous and traditional food crops. However a review of literature identified the following important contributions to local economies and diets by these specific food crops:

- i. The high nutritional status and role in countering malnutrition (Maxwell *et al.*, 1998; Steyn *et al.*, 2001)
- ii. The ease of cultivation and drought resistance (Modi, 2003; Slabbert *et al.*, 2004)
- iii. The contribution and conservation of bio-diversity and local knowledge (High and Shackleton, 2000; Keller *et al.*, 2006; Maundu *et al.*, 2009)
- iv. The potential to provide an household income (Shackleton, 2003; Yiridoe and Anchirinah, 2005)
- v. The contribution to the food security of poor households (Shackleton *et al.*, 1998; Batuuka and Nkanda, undated; FAO, 2009; Frison *et al.*, 2010)

Relevant studies on South Africa specifically are limited. Research in other parts of Africa suggests that the local and traditional knowledge, skills and practices related to indigenous and traditional food crops should not be ignored and overlooked in the fight against food insecurity, especially amongst rural poor populations (Batuuka and Nkanda, undated; FAO, 2009). Batuuka and Nkanda, (undated) suggest that indigenous and traditional food crops have a critical role in ensuring food insecurity in Uganda. Moreover, the FAO is of a similar view and has included

traditional and local knowledge in policies, programmes and projects that seek to manage the risks to food security induced by amongst other the soaring food prices (FAO, 2009).

Frison *et al.*, (2010) elaborates by arguing that strategies adopted to address the ongoing food insecurity, hunger and malnutrition, particularly in developing countries, continue to narrow the food supply base through technological options that neglect indigenous and traditional food systems while focussing on a few staple crops. Moreover, Smith (2002) is of the view that strategies to counter food insecurity through indigenous and traditional food crops in sub-Saharan Africa have been met with limited successes. Frison *et al.*, (2010) suggest that this is due to the fact that indigenous and traditional food systems are seldom considered as a basis for a food security strategy. They argue that this is not surprising considering the lack of knowledge amongst programme planners and implementers on the nutritional and functional properties of indigenous and traditional food crops that are often more familiar and accessible to the targeted malnourished populations. Thus, success in redressing the food insecurity situation in the sub-continent, hinges upon revitalizing indigenous and traditional food systems. Batuuka and Nkanda, (undated) are of the view that food insecurity in Africa should be addressed by building on local values and knowledge rather than to copy western systems.

From the above it is evident that convincing evidence exists on the important role that indigenous and traditional food crops can play in countering food insecurity in Africa. However, literature also provides evidence that the availability and indigenous and traditional food in many African countries has declined. Tabuti *et al.* (2004) report that the availability of some indigenous and traditional food crops in Uganda have declined due to erosion of the ecosystem diversity. Batuuka and Nkanda (undated) suggest that modernization of agriculture and livestock had far reaching consequences for smallholder peasant farmers in Uganda. The introduction of modern crop varieties and animal breeds displaced traditional crop varieties despite being adapted to the climatic and environmental conditions (Pretty, 1995). Robson (1976) is of the same view arguing that forests in the sub-continent were cleared to make way for cash crop farming and in the process clearing and cultivating activities modified the existing

ecosystems and eliminated some wild indigenous food trees, and other gathered foods. The trend towards commercial farming also had a negative effect on the cultivation of the less commercial indigenous food crops (Frison *et al.*, 2010).

### **2.3 Production and consumption of indigenous and traditional food crops in South Africa**

Few studies have specifically investigated the market- and supply chains for indigenous and traditional food crops in South Africa. Shackleton *et al.* (2010) studied the production and trade of indigenous vegetables in the greater Durban area. Findings show that most households grow the vegetables themselves and collect them from the veldt, primarily for home consumption. They also found that the income from sales was low due to low market demand and adverse climate. The study furthermore identified that pumpkin leaves, taro and amaranth were the most commonly cultivated indigenous crops in the Durban area.

A study by Weinberger and Pichop (2009) investigated the marketing of indigenous vegetables in seven African countries (including South Africa). This study showed that the production and variety of these vegetables in South Africa is far lower than in other African countries, since most of these vegetables are not cultivated, rather collected. The research furthermore found that in South Africa fewer actors are involved in the supply chain as it only consists of a farmer and retailer and not a trader or middleman as in many other African countries.

Matenge *et al.* (2011) studied the differences in health between consumers and non-consumers of traditional leafy vegetables. The study also looked at socio-demographic factors and found that rural inhabitants, females, people aged 46-50, and people with only primary education were more likely to consume traditional leafy vegetables. These vegetables were consumed up to ten times a month by most rural households, mainly motivated by price, culture and availability. The most predominantly consumed traditional vegetables were amaranth, cowpea leaves, pumpkin leaves and spider plant.

However, none of these studies looked beyond traditional and indigenous vegetables, to other indigenous food crops such as grains and fruits. Previous studies also failed to investigate the consumer preferences, expenditures, reasons for non-consumption, market outlets and household production characteristics of indigenous and traditional food crops. This study will therefore attempt to fill that void with special emphasizes on the potential for increased consumption and production of these specific crops.

### **3. METHODOLOGY AND DATA**

#### **3.1 Study area**

The North West Province (NWP) of South Africa was used as a case study (see Figure 2). The province was created in 1994 by the merger of Bophuthatswana, one of the former homelands, and the western part of the Transvaal, one of the four former South African provinces. The medium-size province is mostly rural in nature with much of the area consisting of flat areas of scattered trees and grasslands. The province is also host to a wide array of plant and animal species, ecosystems and habitats, which is largely due to the diverse nature of the province's landscape and variation in climate (Tswelopele Environmental, 2008). As a result, approximately 54 percent of the province's surface area has been transformed by agriculture, with an estimated one third of South Africa's maize being produced in the province. The fertile areas in the northern parts of the province allow for extensive mixed-crop farming, which includes crops such as tobacco, citrus, paprika, wheat, peppers, cotton, groundnuts and sunflowers. Agriculture towards the eastern, wetter parts, of the province comprises livestock and crop farming, while the semi-arid central and western parts support livestock and wildlife farming. In total, the agriculture and food sector contributed an estimated 3.6 percent to the total provincial economic output and 7.5 percent to provincial employment in 2010 (Global Insight, 2011). The predominant economic sector in the province is mining (e.g. platinum, metal

ores) contributing 40 percent to the total provincial output and 25 percent to provincial employment in 2010 (Global Insight, 2011).

The rural regions of the NWP (where agriculture is the main economic activity) accommodate 65 percent of the provincial population. An estimated 53 percent of the population in the NWP lives in poverty, and although relatively small fluctuations have occurred over the past five years; the 2006 level of poverty was 8.4 percent higher than what it was ten years earlier (Tswelopele Environmental, 2008). As mentioned, poverty is one of the main reason for food insecurity, thus, the NWP is regarded as one of the provinces in South Africa with the highest levels of food insecurity. Cloete (2010) argues that this is a matter of concern, as it means that poverty reduction initiatives and policies (which mostly reflect to agricultural development initiatives) that have been implemented over the past 10 years have not met the targets in terms of alleviating poverty and food security in the province. Moreover, a review of the main agricultural development initiatives and policies revealed that the role of local and traditional knowledge, skills and practices that relates to indigenous and traditional food crops has been overlooked.

### **3.2 Methodology**

In order to reach the objectives of the study, primary data was needed. Therefore, during 2011 a household survey was conducted amongst African households in the NWP to investigate the level of production and consumption of indigenous and traditional food crops. Only African households were considered in the sample as they are historically and culturally the most important users of indigenous and traditional food crops as well as the group that is most affected by food insecurity. In order for the survey sample to be representative for the population, the sample size was determined at 600 households. This sample size represents a confidence level of 95 percent and a confidence interval of 4 percent.

The sample was stratified according to rural<sup>5</sup> and urban<sup>6</sup> composition of the population and geographical spread in the NWP. This was reflected by surveying 370 households in the rural areas represented by the Makwassi, Pampierstad and Setlagole and 231 households in the urban areas represented by the towns of Potchefstroom, Rustenburg and Mafikeng. Figure 2 provides an overview of the survey areas. The respondents were randomly selected<sup>7</sup> in various neighbourhoods of the above-mentioned areas. The survey was conducted with the person in the household responsible for the food supply by local field workers that were instructed and administrated by a fieldwork-coordinator.



**Figure 2: Overview of the six survey areas in the North West Province of South Africa**

<sup>5</sup> Rural is defined as an area with formal- and informal housing settlements that fall outside of legally-proclaimed urban areas, and include commercial farms, small settlements and rural villages.

<sup>6</sup> Urban is defined as an area with formal and informal housing settlements within the boundaries of a city or town and that has been legally proclaimed as such.

<sup>7</sup> This random selection was assured by instructing the fieldworkers to survey no more than four households per street and to survey subsequently the third house on the left-hand-side of the street and then the third house on the right-hand-side of the street

The questionnaire consisted of 31 questions divided into four sections, namely socio-demographic, consumption, sourcing and production. To assist the fieldworkers with the survey and to avoid confusion, a supporting photo atlas was developed depicting the 31 indigenous and traditional food crops under investigation<sup>8</sup>. The survey data was analysed with PASW Statistics software package in order to investigate the descriptive statistics as well as significant relationships.

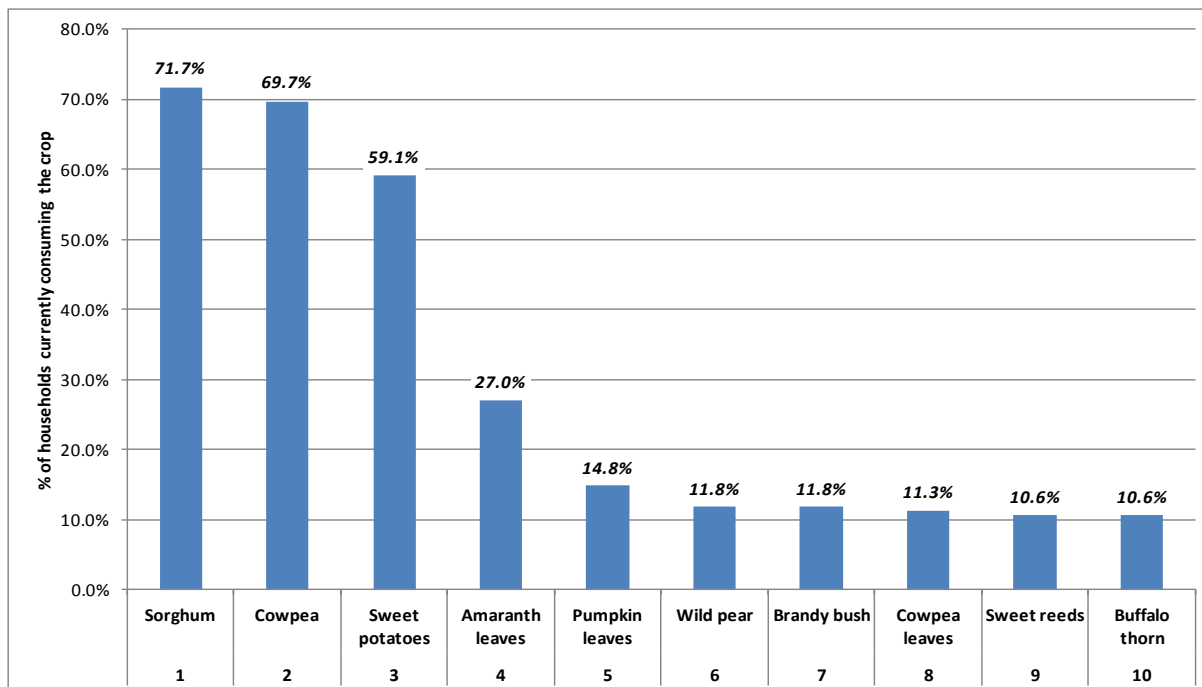
## **4. RESULTS**

### **4.1 Consumption patterns**

The analysis of the consumption patterns of indigenous and traditional food crops revealed that the most commonly consumed crops were sorghum, cowpeas and sweet potatoes (See Figure 3). These three crops are consumed by more than half of the households. Although these crops are implicitly indigenous they can be characterised as more conventional since they are produced commercially and widely available. The crops ranked four to ten are consumed by a much smaller share of the population and can be characterised as unconventional food crops and less commonly available. However, the majority (21) of the 31 investigated indigenous and traditional food crops were consumed by less than ten percent of the population. The shift in consumption patterns is illustrated by the fact that more than a quarter of the households indicated that they used to consume certain indigenous and traditional crops in the past.

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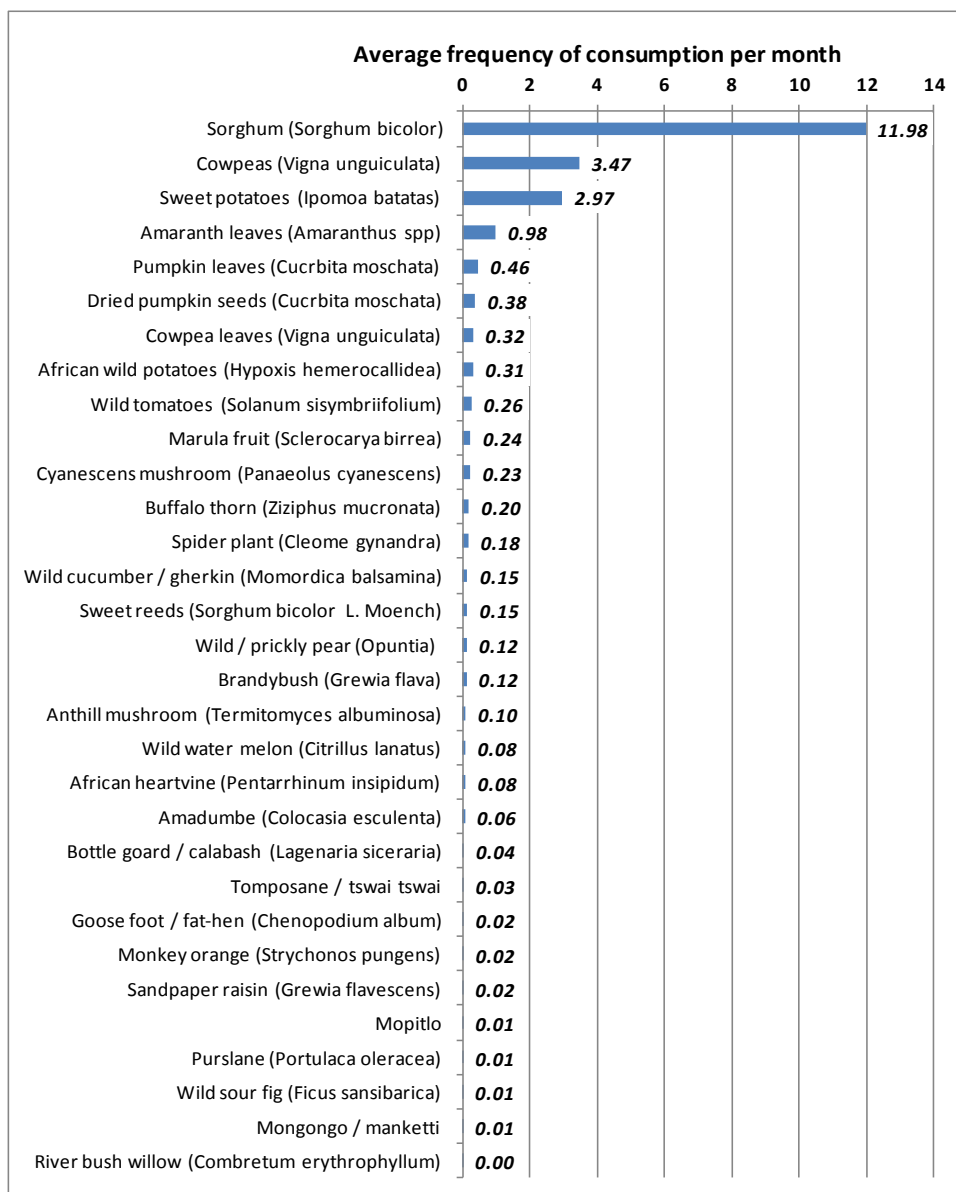
<sup>8</sup> Survey respondents had the option to add any additional indigenous and traditional food crops they consume



**Figure 3: Most commonly consumed indigenous and traditional food crops (% of households consuming the specific crop)**

In Figure 4, the average monthly frequency of consumption per household for the various indigenous and traditional food crops is provided. From the figure it is evident that although a large variety of crops are consumed the frequency of consumption is generally very low. This may be explained by the fact some of the crops are seasonal and not available year-round (e.g. wild pears, marula fruit, buffalo thorn).



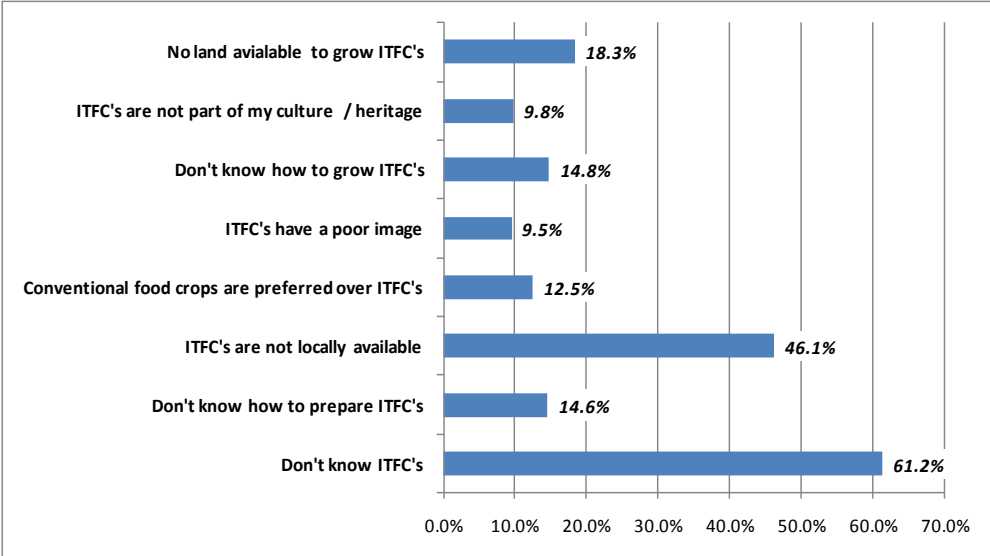


**Figure 4: Average frequency of household consumption of indigenous and traditional crops on a monthly basis**

The three main reasons for consuming indigenous and traditional crops by the respondents were taste, health & nutrition. These last two attributes are in line with common consumer trends, and thus extrapolated from the conventional food market into this specific food segment. Affordability was also listed as an important motivation for consumption. This is not surprising as a number of indigenous and traditional crops can be obtained freely from the veldt. It was remarkable that cultural and traditional reasons were not a dominant motivation for consuming indigenous and traditional food crops. Hence, in contrast to expectations the link

between culture or tradition and consumption of indigenous and traditional food crops does not seem that strong.

As evident from the two previous figures the overall and frequency of household consumption of indigenous and traditional food crops is relatively low. The main reasons for not consuming these crops, as indicated by the households, are shown in Figure 5.



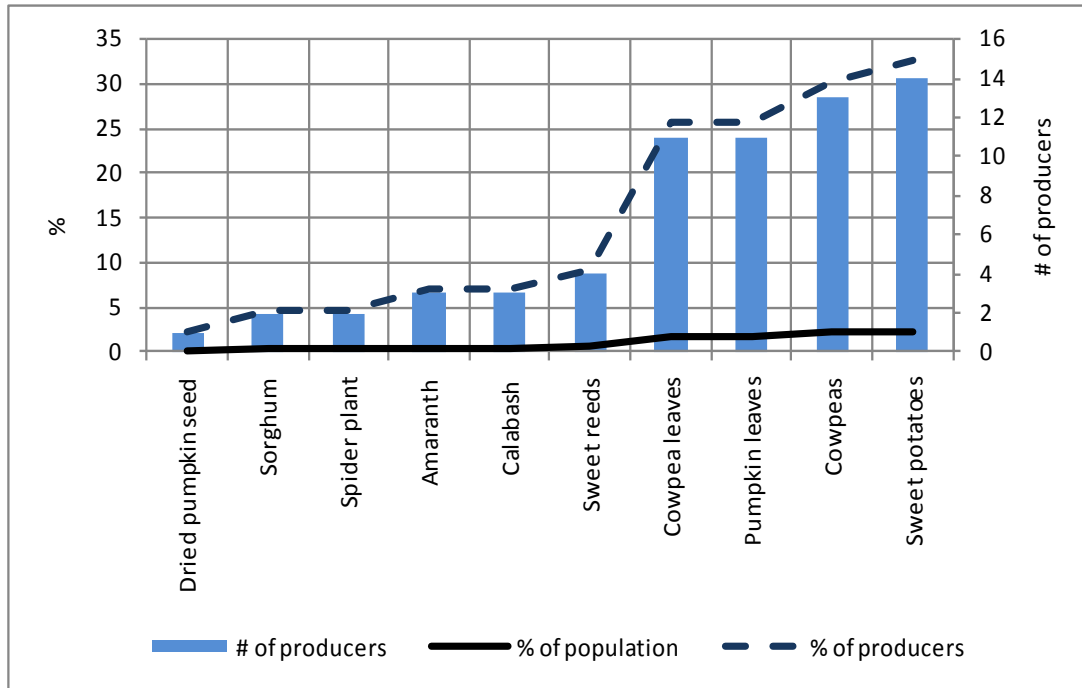
**Figure 5: Main reasons for not consuming indigenous and traditional food crops (ITFC)**

A decrease in indigenous knowledge systems seems to be the main cause for the limited consumption of indigenous and traditional crops. Hence, most of the households (61 percent) indicated non-familiarity with indigenous and traditional crops as the main reason for not consuming a variety of these food crops. Another important reason for not consuming these specific food crops is that they are not locally available. The image of the crops was not perceived as an important motivation for not consuming these crops. This is in contrast with the perception that the image of indigenous and traditional food crops as “poor people’s food” is hampering its consumption.

## **4.2 Household food production**

Only seven percent of the African households produce indigenous and traditional food crops themselves. All of these households sold a share of the production of these specific crops to the market. In order to determine the demographical differences between household that produce indigenous and traditional food crops themselves, and the households that do not, the independent T-test was applied. The results show that the producing households do predominantly live in an urban environment, have a higher average monthly household income, spend more on food, and are more dependent on a salary as a main source of income. For all the other demographic factors there were no statistical differences between the two groups of households. It seems that the poorer and more vulnerable African households do not produce these specific crops.

Figure 6 provides an overview of the most important indigenous and traditional crops produced by households. From the figure it is evident that sweet potatoes and cowpeas are the most predominant crops produced. Remarkable is that these crops are also available from the conventional supply chains such as supermarkets and street vendors.



**Figure 6: Top ten of indigenous and traditional food crops produced by African households**

The main motivations for households production of these crops is it is cheaper to produce them than to buy them, that the household has the necessary knowledge and skills, as well as the availability of land. Hence, the most important constraint for expanding the household production of indigenous ad traditional crops seems to be limited knowledge and skill as most households, especially in the rural areas, have land available either in terms of a garden or communal land.

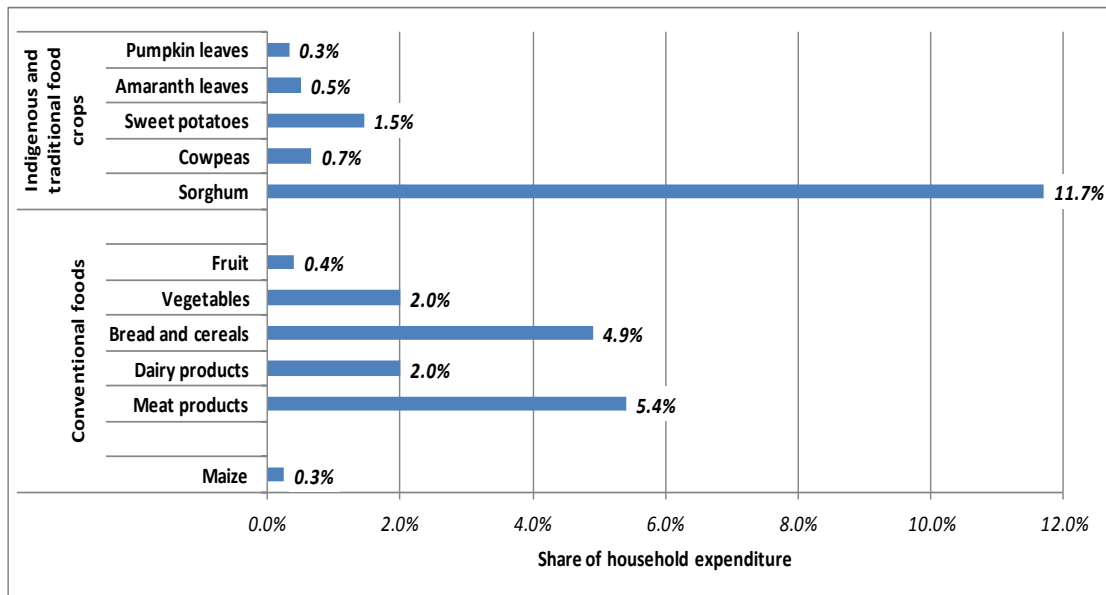
### **4.3 The potential of indigenous and traditional food crops**

Based on the results of the previous sections the potential for increasing the consumption and production of indigenous and traditional food crops in South Africa is discussed in this here.

#### **4.3.1 Consumption**

From the analysis it becomes evident that, apart from sorghum, sweet potatoes and cowpeas, the overall consumption of indigenous and traditional food crops is low. This is mainly attributed to the fact that many households are not aware of a variety of these crops or that they are simply not available in the area. The consumption of indigenous and traditional food crops is, apart from taste and health, motivated by affordability (e.g. low price or freely obtainable). This unawareness on one side, and affordability on the other side, poses great potential for successful interventions for increasing the use of these specific crops. This holds especially for amaranth leaves, cowpea leaves, pumpkin leaves, brandy bush and prickly pears as these are relative broadly available and consumed. Hence interventions for these crops are less costly and extensive as they can be based on existing indigenous knowledge systems.

The affordability of food is an important driver for food security of especially the poorer African households. Figure 7 shows the expenditure on indigenous and traditional crops is compared with conventional crops. The figure implies that there exists some space in the budget of African households to increase consumption of these specific crops, due to their relative low shares in total household expenditure. Taking into consideration the shares of household income spend on vegetables (2.0 percent) and bread & cereals (4.9 percent), the figure shows that the budgetary space for indigenous and traditional starch and cereal products (e.g. sorghum and sweet potatoes) is limited. However, an expenditure increase, or substitution, with traditional leafy vegetables and legumes (e.g. amaranth leaves, pumpkin leaves, and cowpeas) shows good potential.



**Figure 7: Average share of income spend by African households on selected food items**

Source: Own data & StatsSA (2011)

#### 4.3.2 Production

Only the three most commonly consumed indigenous and traditional food crops (e.g. sorghum, sweet potatoes and cowpeas) are commercially produced at a relative large scale in South Africa. Hence, this underpins the natural link between production and consumption patterns. Thus market development should be an initial focus point when stimulating production of indigenous and traditional crops. As argued in the previous section, interventions with regards to traditional leafy vegetables are foreseen to be the less complex and costly.

Apart from the potential of increased household production of indigenous and traditional food crops, the commercial production of these crops can also stimulate food security. This can be directly by producing food, and indirectly by creating wealth by employment in production and value chain activities. The commercial potential of cultivating indigenous and traditional crops is conditionally linked with the availability of land and water.

Only 12.6 percent of South Africa's surface is classified as moderately to highly adaptable for arable cropping. A further 11 percent is marginally suitable for arable farming; however these lands require very specific cultivation techniques (ARC, 2004). The underutilisation of high potential crop land is limited in South Africa. Analysis shows that most fallow high potential crop lands can be found in the former homelands of Transkei in the Eastern-Cape Province and Bophuthatswana in the NWP (NAMC, 2008). These are areas with large population of poor rural African households thus markets are close. The low success of South Africa's land redistribution program further contributes to high potential cropland lying fallow. Hence, it is evident that there exist untapped potential to commercialise the production of indigenous and traditional crops from a land perspective.

Water is another constraint for agricultural development in an arid country such as South Africa. Especially the cultivation of food crops, such as traditional leafy vegetables, requires relatively large amounts of water. About 65 percent of South Africa does not receive sufficient rain (more than 500 mm) to allow for sustainable rain-fed cash crop production (Encyclopaedia of the Earth, 2011). Irrigation is thus required in those areas of relative low rainfall. However, irrigation is also limited by the available water supplies. An assessment of the water management areas shows that South Africa has limited additional irrigation potential. By efficiency gains, usage of existing storage and additional storage capacity it is conservatively estimated that at least an additional 145 000 ha can be brought under irrigation in the next ten years (BFAP, 2011). With regards to the utilisation of groundwater it is estimated that another 270 000 ha. can potentially be brought under irrigation (BFAP, 2011).

Natural resources are not expected to be a limiting factor in unlocking the potential of small-scale commercialisation of the cultivation of traditional and indigenous food crops. However, to minimise transaction cost in the supply of traditional and indigenous food crops the identification of potential suitable land should take cognisance of the vicinity of poor food insecure African households. As with any agricultural development, the institutional

environment also needs to be addressed in terms of training, finance, input markets and distribution channels.

## **5. CONCLUSIONS AND RECOMMENDATIONS**

From the literature and the survey, it is evident that Indigenous and traditional food products have the potential to play a significant role in balancing the trade-off of converting food into fuel in the South African context. Based on the results, specific interventions are needed to unlock the potential of indigenous and traditional foods in South Africa. These include amongst others:

- Research. As mentioned, studies investigating the role of indigenous and traditional food in South Africa's food security situation are few. This limited knowledge base resulted in South Africa, like other countries, narrowing the food supply base through technological options that neglected indigenous and traditional food systems while focussing on a few staple crops;
- Policies and strategies to promote the production and consumption of indigenous and traditional food products. As mentioned, unawareness on the one side, and affordability on the other side pose great potential for increasing the use of specific crops. A good starting point may be to include indigenous and traditional food products in the South African food security strategy (e.g. school feeding schemes, institutional markets);
- Supply chain development. As mentioned, the top three of most commonly consumed indigenous and traditional food products is underpinned by well functioning formal markets. Commercialisation of some indigenous and traditional crops should however not overshadow the potential of subsistence farming of these crops from a food security perspective.

Conclusively, indigenous and traditional food products can play an important role in ensuring food security within a world that's driven towards fuel self-efficiency. However, the



contribution will depend on the level of intervention i.e. market development of indigenous and traditional food productions through efficient policies and programs.

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