Against the odds: Smallholder farmers and agricultural biodiversity in South Africa

V Black '16

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On 7 April 2015 the African Centre for Biosafety officially changed its name to the African Centre for Biodiversity (ACB). This name change was agreed to by consultation within the ACB, to reflect the expanded scope of our work over the past few years. All ACB publications prior to this date will remain under our old name of African Centre for Biosafety and should continue to be referenced as such.

We remain committed to dismantling inequalities in the food and agriculture systems in Africa and to our belief in peoples' rights to healthy and culturally appropriate food, produced through ecologically sound and sustainable methods, and to define their own food and agriculture systems.

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Tshintsha Amakhaya is an action-learning platform of civil society organisations that supports local community struggles in land and agrarian reform. Through action research, campaigns, and building active participation, TA seeks to enhance rural people's capacity to secure and realise their livelihoods and rights, and to promote alternative models of land tenure and agricultural production for food sovereignty. TA's 10 partner organisations are primarily concerned with supporting dispossessed and landless communities to gain access to land in South Africa, and also work closely with small-scale farmers to build sustainable smallholder agriculture and rural livelihoods.

Zingisa Educational Project is an affiliate of TCOE, based in Berlin, a small Eastern Cape Town situated about 20km from King Williams Town. Zingisa was established in 1979, initially expanding on the work of Ginsberg Education Fund as an education oriented organisation. Over the years they have shifted to become a development organisation, with a people-centred and community-driven approach. The focus is on supporting land access through government programmes. One aspect they focus on is around food security and food sovereignty, and sustainable land-use management, using agroecological principles and methods.

FSG is a community development and outreach unit in the School of Agricultural, Earth and Environmental Sciences at the University of KwaZulu-Natal in Pietermaritzburg. FSG uses participatory methods to provide support to rural communities with sustainable agriculture, food security, natural resource management, institutional development and entrepreneurship. FSG works with farmers' groups in the Bergville and Masinga areas in KZN.

SPP was established in the 1980s to publicise and support communities in the struggles against the apartheid state's forced removals. It thus emerged from the radical liberation tradition in South Africa. Post-apartheid, SPP's focus shifted to support community struggles for agrarian transformation, including food sovereignty, equitable land ownership and alternatives to dominant forms of production. This transformation is political, economic and social, resulting in environmentally sustainable practices. SPP mainly works in the Western Cape and Northern Cape with farmworker forums, land committees, small scale farmers' forums, youth, women and support the Right to Agrarian Reform for food Sovereignty Campaign (FSC).

Abbreviations

ACB	African Centre for Biodiversity
AFRA	Association for Rural Advancement
APAP	Agricultural Policy Action Plan
CASP	Comprehensive Agricultural Support Programme
CIMMYT	International Maize and Wheat Improvement Center
CTT	Community Task Team
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	Department of Environmental Affairs
DRDAR	Department of Rural Development and Agrarian Reform (Eastern Cape)
DUS	Distinct, uniform, stable
EDA	Economic Development Agency
FGD	Focus group discussion
FMSS	Farmer-managed seed systems
FSG	Farmer Support Group
GM	Genetically modified
HIV	Human immunodeficiency virus
KZN	KwaZulu-Natal
NGO	Non-government organisation
NPGRC	National Plant Genetic Resources Centre
OPVs	Open-pollinated varieties
PBR	Plant Breeders' Rights
PIA	Plant Improvement Act
FSC	Right to Agrarian Reform for Food Sovereignty Campaign
RWA	Rural Women's Assembly
SADC	Southern African Development Community
SDC	Swiss Agency for Development and Cooperation
SKI	Seed and Knowledge Initiative
SPP	Surplus People Project
TA	Tshintsha Amakhaya
TCOE	Trust for Community Outreach and Education
UPOV	Union for the Protection for New Plant Varieties

About this report

This research report contributes to ACB's multiyear programme in southern and east Africa to investigate seed and soil fertility practices, and related challenges facing small-scale farmers, especially in relation to various Green Revolution technologies being promoted on the continent. Since its inception in 2014, the programme has evolved to explore alternatives to the Green Revolution under the umbrella of agroecology and food sovereignty. For seed this has meant a focus on the ways in which farmer-managed seed systems (FMSS) can be supported, both in policy and practically, by partner organisations working with farmers.

In April 2016 ACB published a research report that explored the involvement of small-scale black farmers in the production of commercial seed for the market in South Africa, and the extent of government policy and programmes to support this (ACB 2016). That research found that government policy focuses on bringing small-scale black farmers into commercial agriculture, where farming inputs, including seed are supplied by agri-business, often multinational companies. To the very limited extent that programmes or initiatives aim to support black farmer seed production, this is focused on integration into the commercial seed sector, in competition with corporate seed companies. This will not transform the seed sector; at best, it will allow black small-scale seed producers to operate in niche markets on the margins of the commercial seed system. There is very little public sector support for existing small-scale farming systems, and especially farmer seed systems. In South Africa it is generally taken for granted that seed comes from the formal sector, even seed used by smallholder farmers in the deep rural areas. There is also very little information on FMSS (the varieties of ways in which farmers produce, select, save and exchange their seed) in South Africa.

The objective of the current research, in partnership with the TA network,' is to offer

a 'snapshot' investigation into FMSS in South Africa. An initial survey was carried out with TA members, after which ACB worked with three research partners to engage with farmers on the ground: Zingisa, through TCOE in Berlin in the Eastern Cape; the FSG in Bergville and SPP in the Springbok area in the Northern Cape. In the first round, TA participants identified the farming communities to work with. The research aimed to identify the extent to which smallholder farmers are using their own varieties, and to identify issues, priorities, and support organisations and institutions with regard to FMSS. It is intended as a first step towards longer-term research and analysis, with the goals to identify areas for shared advocacy on seed law and policy, and to support and promote small-scale farmer practices and FMSS as part of the larger food sovereignty struggle to transform seed and food systems in South Africa.

Key findings

South African agriculture is dominated by a highly capitalised, large-scale industrial commercial sector. There are many black smallholder farmers, but they are mostly survivalist and produce only a small portion of their household food needs. Through colonialism and apartheid, black farmers were systematically denied support and pushed into marginal spaces, and at times their production was even suppressed. After apartheid, there has been some orientation towards support for black farmers. However, this has occurred within a modernisation paradigm, with the emphasis on commercialisation of the elite, relatively speaking. Rather than enabling a majority of farmers to achieve food sovereignty, technological packages and land consolidation entrench class and gender differentiation in conditions where livelihoods are precarious and access to natural resources is already constrained and unevenly distributed. The current drought, especially in KwaZulu-Natal (KZN), has exacerbated these hardships and

^{1.} https://sites.google.com/site/tshintshaintranet/



Seed custodian Gogo Hlatswayo en route to Mlimeleni, Bergville

is a foretaste of the extreme weather that smallholders may face with climate change.

Multinational seed producers dominate the seed system, in particular Pioneer Hi-Bred and Monsanto, which have acquired all the big domestic seed companies over the past 20 years. Corporate seed, especially hybrid seed, has flooded South African agriculture, and - in the case of maize, soya and cotton – genetically modified (GM) seed. The commercial seed sector is geared towards large-scale commercial producers, but spills over into marginal smallholder production. There are a number of reasons for this spill-over, including loss of indigenous knowledge and seed varieties as the result of marginalisation of black smallholder agriculture, a highly concentrated private sector retail input supply, and provincial government input supply programmes that promote and provide input packages of Green Revolution technologies.

FMSS have largely been neglected, and there is limited information on their extent. The main seed laws in the country are designed to protect commercial breeders and govern commercial seed trade and ignore FMSS and farmers' seed rights. These laws need to be revised, to acknowledge the importance of farmers in maintaining biodiversity, and to recognise and promote farmers' seed rights. The role of indigenous and farmer varieties in supporting crop and nutritional diversity for marginalised farming households especially needs to be recognised. However, revisions currently on the table are set to entrench commercial breeders' rights, further marginalising smallholder farmers and potentially criminalising the necessary activities of saving and exchanging seed amongst themselves.

The revised Plant Breeders Rights (PBR) Bill is based on the 1991 version of the International Union for the Protection of New Plant Varieties (UPOV-1991), as was the case with its predecessor, although SA is not a Party to UPOV-1991. UPOV-1991 is a restrictive international agreement severely limiting farmers' rights to recycle, exchange and trade farm-saved seed of protected varieties. New regulations, still to be drafted, could create some small exemptions for smallholder farmers to reuse farm-saved seed of protected varieties on their own holdings, but will require focused advocacy to eke out a space for FMSS and the rights of farmers to freely exchange and sell all farmer saved seed and harvested materials at the local levels. The Plant Improvement Bill governs the production and marketing of seeds and propagation materials for sale. With the exception of some open-pollinated varieties (OPVs), all seed sold commercially in South Africa must be registered under the Plant Improvement Act (PIA) and must undergo onerous certification procedures concerned with quality standards and varietal purity. This may be appropriate for the commercial sector, but is at odds with the fluid nature and diversity of FMSS. The assimilation of certified seed, including protected varieties into FMSS and the bulk sale of seed between smallholder farmers, based on appropriate and flexible quality standards developed together with farmers as seed producers, breeders and users, are areas requiring attention to ensure protection of farmers' rights and to create space for farmers to participate in seed production and distribution.

This research, conducted with black smallholder farmers in marginal areas in the Northern Cape, Eastern Cape and KZN, revealed some agricultural biodiversity, despite the difficult circumstances facing farmers. Participating farmers recorded growing between 50 and 70 food and medicinal plants in each study site. However, there are some areas of concern. First, of the cultivated crops there are very few indigenous crops in use, and few farmer or indigenous varieties in use across all crop types. This goes especially for vegetables, where there is a heavy reliance on 'Western' vegetables derived from certified seed. These crops are generally dependent on irrigation. Second, farmers are planting a very low diversity of grain and legume crops although several varieties of maize and an assortment of beans are cultivated.

Participants in all areas emphasised the importance of indigenous plants for medicine and food, some cultivated and many harvested in the wild. This draws attention to the many cultural and livelihood purposes served by the 'underutilised land' being targeted for intense commercial production.

There is a technical base of knowledge amongst farmers that can be supported to further develop the FMSS in each area. This is most evident amongst participants in KZN, where smallholder farmers are involved in a range of technical activities, including in situ enhancement of varieties (breeding and experimentation in the field), seed production/ multiplication of farmer varieties, and seed saving and storage. Farmers across all sites are involved in some form of seed saving and storage, including some maintenance of farmer varieties although there is not very wide diversity in these banks at this stage. Farmers in all areas identified improve pest resilience in storage and the viability of saved seed as issues where they would value support.

The South African agro-food system is entrenched in a large-scale commercial production model. This model is not sustainable and generates high levels of extreme inequality. Multinational corporations have a stranglehold over input markets: seed, synthetic fertiliser, agrochemicals, finance and mechanisation. The production system is completely inequitable, with restricted access to land and natural resources and limited support for millions of smallholder producers. The production system is extractive. Many small, diverse farms with decentralised but connected support systems present a living alternative to the corporate-industrial model. Resistance against corporate encroachment into food and seed systems, coupled with the practical development of alternatives are both required to confront the conditions facing smallholder farmers and their seed and production systems in South Africa today.

Summary of key findings for each area

Berlin, Eastern Cape

Participants identified a total of 66 different crops they used throughout the year. Field visits revealed other crops on farms and in seed stores that were not identified in the focus group discussion (FGD), such as a traditional tobacco and other wild foods. All participants grew maize, beans, potatoes, marigolds and a high number of Western vegetables and herbs. A few participants grew indigenous crops, including African potato, cowpea, amaranth and okra. Women participants identified several indigenous plants used for both medicine and food as being their most important crops, revealing an interest in developing this aspect and a concern over the loss of indigenous knowledge.



A limited diversity of grains and legumes was grown. The participants in Berlin had the greatest diversity of maize varieties, with six in use. Two potato varieties were grown and seven bean types (including legumes, such as soya). The Berlin farmers have several inherited seed varieties, but also actively source seeds through exchange. They also buy some seed from local shops, which they then reproduce and save. They are enthusiastic about exchanging seed, and organise 4–5 'exposures'

to other farmers every year, where they can learn and source seed to try out. Through this initiative, they are growing a variety of exotic vegetables and herbs, having sourced seed from across the country, and from as far afield as Tanzania. However, they are very aware of the importance of traditional seed, food culture and medicinal plants, and are keen to revive traditional knowledge and plant resources within the community, and to pass on this knowledge to the youth.

The introduction of a seed bank at Quzini has created greater awareness of the importance of seed saving practices and introduced skills on seed selection, saving and storage that have enabled a high quality of saved seed in this group. At the same time, however, the procedures used are quite onerous and it may be a challenge for custodian farmers to sustain the effort involved in maintaining the seedbank without Zingisa's support. It would be useful to share the skills in seed selection and saving learnt at Quzini more widely in the network.

Bergville, KZN

Participating farmers identified 47 cultivated food crops, 11 medicinal crops, and 13 wild crops harvested in the area. Maize is the most popular grain but farmers also grow millet and sorghum. Farmers grow four local maize varieties and hybrid maize (unknown number of varieties), five pumpkin varieties, three certified potato varieties and 12 types of bean across the areas visited. Traditional melons (ibhece) and fruit trees are also grown by many farmers in their fields. The fruit, vegetables and medicinal plants harvested are important for dietary diversity, good nutrition and health. The farmers have much knowledge on the uses and production of inherited maize varieties and pumpkins, but limited or no knowledge of the hybrid varieties they use.

Participants identified two important lost varieties in the area. The one is a type of potato (usalabedla), similar to an Irish potato. It was previously harvested from the wild but is no longer found. The farmers believe that the fairly recent practice of ploughing with a tractor has led to the demise of this tuber. Another important lost variety is 'buloti', traditional maize that is both sweet and easy to grind.



Okhombe in Bergville, KZN

It would be important to restore this variety, as other traditional maize varieties have hard kernels that are difficult to grind into meal, and this encourages the transition to softer hybrid maize.

Participating Bergville farmers obtain seed from many sources: from their own fields; from exchanging within their community and at meetings organised by FSG with other farmers; through government support programmes; and by buying seed from local community seed producers, supermarkets and agro-dealers in town.

The desire for greater maize productivity in relation to early maturity, the number of cobs on a plant, and the lines of kernels on a cob is spurring farmers to cross their own varieties with hybrid maize. While innovative, this practice is also of concern. Although the farmers are aware of the problems of poor reproduction of hybrids from saved seed, they do not differentiate or even know what varieties of hybrid maize they are sourcing and, therefore, what potentially unwanted traits (such as GM traits) they may be introducing into their seed system.

Farmers identified pests in storage as the main problem they would like support with. More rigorous procedures for drying, storage and natural preservation could be investigated and shared between farmers.

Despite farmers' obvious skills in seed production, the lack of resources to purchase

seed and lack of availability of certain seed (for example, potato) provide challenges. The farmers were also currently seed insecure in relation to traditional maize varieties, due to the extreme drought conditions, which had depleted the seed stocks even of custodian farmers who are renowned in the area for always having traditional maize seed for sale.

Springbok, Northern Cape

Participating farmers recorded 34 food crops, two non-food (lucerne for fodder, and tobacco) and 34 medicinal/herbal crops. This diversity is remarkable, given the arid landscape and extreme heat. Some farmers use irrigation and one farmer had a growing tunnel to shelter his crops from the heat. The farmers produce for subsistence and the local community. Although most of the food crops are Western vegetables and fruit, and a few grains (maize, oats, barley), at least three varieties of heritage crop were recorded. The farmers demonstrated extensive knowledge and use of indigenous medicinal and food plants, both cultivated and collected in the wild.

The participating farmers saved their own seed and sourced seed through exchanges in the community and wider afield with SPP partners, and by buying from shops and through SPP, which supplies them with OPVs from Sandveld Organics. Sandveld is a certified producer and importer of a wide range of certified organic vegetable and herb seeds that are for sale in South Africa through a Swiss partner. Despite their apparent reliance on seed supplied



Smallholder farm in Komaggas, Northern Cape

through SPP, the farmers indicated they feel seed secure. Their great distance from resources and assistance has led them to be strongly aware of the need for seed sovereignty and thus seed saving, exchange and mutual support has become second nature, creating a safety net for individual farmers, where seed can be sourced from someone within the network.

The farmers use basic and practical methods to reproduce crops and save seed. Weaknesses in the seed system include pests, especially rodents, the extreme heat affecting seed storage, and the performance of saved and exchanged seed.

Why focus on farmermanaged seed systems?

FMSS include the variety of ways that farmers produce, select, save and exchange their seed. These are dynamic systems that integrate traditional, local or farmer varieties and new seed through local reproduction (ACB 2016). The main ways that farmers source seeds are through exchange with neighbours and family, purchases at local village markets or saving seed from one's own fields (McGuire and Sperling 2015). In this report we refer to the seed that is dynamically produced and conserved within FMSS as farmer varieties. These include landrace seeds – those that are morphologically distinct and adapted to placespecific stresses over many generations, and varieties that farmers call 'traditional' because they have been passed down through their families over time.

Commercial seed breeders and many researchers, as well as governments call FMSS the 'informal' seed system, because it occurs outside of the control of highly regulated 'formal' commercial seed breeding and marketing. This 'informality' is often used to infer that farmer seed and methods are inferior and should be replaced with agri-business seed and other commodified inputs.

We use the term 'farmer-managed seed systems' to recognise the ingenuity and central role of farmers as producers and custodians of agricultural diversity; using practices that over centuries have led to the diversity of our global food and seed heritage. Through in situ (on farm) conservation and development of crop diversity, FMSS enable the evolutionary processes that shaped the genetic diversity in that place to continue (FAO 1997). FMSS are responsive, adapting to changing environmental, economic and social conditions (FAO 2013). The genetic resources contained within farmer crop diversity, and introgression from wild crop relatives, may also assist in adapting to future climate change and production challenges (Anderson and Campeau 2013).

Diversity is not only a consequence, but also a necessity in FMSS. Diversity serves many purposes, including for consumption, marketing, and cultural and social needs; and enables farmers to cope in unpredictable subsistence conditions (Almekinders and Louwaars 2002). The formal seed system focuses on uniformity; maintaining varietal purity in order to assert ownership. Therefore, it cannot supply the diversity required for smallholder farming (Almekinders and Louwaars 2002).

The corporate-industrial dominance of South Africa's food and seed systems represents an anomaly in the region. This dominance results in the spread of standardised Western diets based on industrial commodity crops, and a narrowing of diversity of cultivated food crops (Anderson and Campeau 2013; Khoury et al. 2014). Despite this, farmer varieties and diversity persist even in these difficult conditions, offering hope for a more ecologically sustainable food production system. By supporting and strengthening FMSS, multiple benefits are possible, including enhanced productivity, nutrition, and resilience (McGuire and Sperling 2015), especially for smaller farmers on the margins of the commercial system.

Overview of South African agricultural sector

South Africa is markedly different than other countries in the region. Colonial land dispossession, apartheid, and then postapartheid deregulation of agriculture in the context of global trade liberalisation have all contributed to the dominance of a highly industrialised and concentrated food and commercial agricultural sector in South Africa. Thirty-five thousand commercial farmers (Okunlola et al. 2016) own and use the lion's share of agricultural land as well as 60% of fresh water resources for irrigation (DWA 2013). In contrast, 2.5 million households practise smallholder and subsistence farming (Stats SA 2013) on only 14% of available agricultural land (DAFF 2013). Large-scale commercial farming supplies up to 95% of formally marketed output (DAFF 2011; de Schutter 2012), and a significant share of the food that South Africans eat is bought from supermarkets owned by just five companies (Altman et al. 2009; ACB 2014; Ogando 2014). A TA survey in rural communities served by the TA network found that 50% of respondents sourced their food from supermarkets, and, even in the case of maize, only 26% of survey respondents said that their own production is a primary source of household supplies. Interestingly, 24% of people also relied on home grown fruit (Tshintsha Amakhaya 2012).

Reliable and detailed data on the smallholder and subsistence agriculture sector in South Africa is lacking (Cousins 2016, Okunlola et al. 2016), and these farmers remain extremely marginalised. Although the majority of smallholders engage in agriculture to obtain extra food (Altman et al. 2009) government policy imperatives have focused on channelling a relatively small layer of smallholder farmers into commercial production (Drimie 2016) rather than supporting the majority of farmers to improve their practices for increased household and community food production. Hall and Aliber (2010) analysed government spending on smallholder agriculture from 2005–2009. Only 13% of agriculturally active

households received any support, mostly in the form of extension services, and the majority of funding was allocated as large grants to less than 200 emerging farmers. Often the only support for small-scale farmers is in the form of starter packs, including chemical fertilisers, pesticides, and hybrid or GM seeds channelled through government food security funding² (Hall and Aliber 2010; GRAIN 2008).

The Agricultural Policy Action Plan (APAP) for 2015–19 focuses on high value, labour intensive opportunities, such as wine, fruits, nuts, sugar, timber and agro-fuels, and for grain crops, improving the production and distribution of wheat and the integration of maize and soya into the poultry value chain (DAFF 2014a). For smallholders, the specific focus is to turn more land in communal areas and land reform projects to commercial production. In particular, the Fetsa Tlala Integrated Food Production Intervention, funded through the Comprehensive Agricultural Support Programme (CASP), aims to bring one million hectares of so-called underutilised land into production by 2019. Maize and dry beans are prioritised as main staples, and then sunflowers and sorghum. Interventions include mechanisation, production inputs and infrastructure, and agro-processing and local markets. The Ilima-Letsema³ programme, under the Department of Rural Development and Agrarian Reform targets one hectare gardens for increased food production, as well as rehabilitating irrigation schemes and supporting other value adding projects.

Despite the large budgets invested in smallholder development, state programmes have been ineffective in meeting the needs of smallholders to produce tangible positive impacts (Thamaga-Chitja and Morojele 2014; Okunlola et al. 2016). In this context a number of private sector stakeholders have stepped in to support the black smallholder farming sector, from non-government organisations (NGOs) to multinational agri-business. As Okunlola et al. (2016) point out this support varies in form and effectiveness. Many of



Small-holders in Reserve B, Bergville, KZN

these programmes do not meet the needs of smallholders as, like government, they assume that smallholders should be upgrading to high-tech and capital-intensive production, geared to supplying formal value chains. The production systems and aspirations of farmers marketing to informal local markets as one of several livelihood strategies are largely ignored.

Seed systems in South Africa

Not surprisingly, the dynamics in the agricultural sector at large are replicated in the South African seed system. A highly industrialised and concentrated formal sector dominates, with multinational and local seed companies producing and marketing certified seeds primarily aimed at commercial farmers (ACB 2016). FMSS have largely been neglected in policy, and there is limited information on their extent, although seed saving practices are incrementally being documented through NGOs and researchers linked to the food sovereignty movement and platforms, such as TA and the Seed and Knowledge Initiative (SKI).

From available evidence it appears that farmer varieties and systems in South Africa are under pressure. Farmers struggle with poverty, climatic extremes (most recently a severe drought), and production and storage challenges (Vernooy et al. 2013). Support

2. For example, the Massive Food Production Programme in the Eastern Cape, which started in 2004 also included land consolidation, and the 'One Home, One Garden' initiative in KZN has supplied seed and fertiliser packs to households since 2009.

3. See http://www.gov.za/ilimaletsema-launch



Seeds

programmes (for example, the Massive Food Production Programme in the Eastern Cape) have corralled farmers into using certified seeds, including GM seed, and industrial inputs (GRAIN 2008), which displace local seed systems. Farmers are often discouraged by the attitudes of extension officers, who, together with formal seed sector breeders and researchers, dismiss farmer seed practices as old fashioned. Many amongst the youth have lost interest in farming and maintaining local seed systems (Maluleke *et al.* 2015). As a consequence the seed, and associated indigenous knowledge, is disappearing.

South Africa established an ex-situ seed conservation facility, the National Plant Genetic Resources Centre (NPGRC) in 1998. The purpose of the Centre is to collect, characterise, safely store, multiply and regenerate all indigenous and locally-adapted exotic plant genetic resources used for food and agriculture in South Africa. This 'gene bank' is also responsible for making genetic material available to farmers, breeders and researchers for improvement. A duplicate sample of all the materials is also sent to the Southern African Development Community (SADC) Plant Genetic Resources Centre in Zambia.⁴

Realising the need to strengthen farmer seed systems, the Department of Agriculture, Forestry and Fisheries (DAFF) Directorate of Genetic Resources has extended the mandate of the NPGRC to include community seed banks, and is partnering with Bioversity International and extension services to implement a community seedbank strategy in the country. To date, two pilot community seed banks have been established in Mutale in Limpopo and Sterkspruit in the Eastern Cape (Maluleke et al. 2015).

Southern Africa is the centre of origin for finger millet, pearl millet, sorghum and melon. Other crops originating in Latin America, West Africa and Asia have come to be seen as traditional staples, due to the long period that these have been a part of the product mix in southern Africa (FAO 1997; DAFF 2014). These include cassava, maize, groundnuts, sugar beans, mung beans, cow peas, jugo beans (Bambara nut), and amadumbe (taro). DAFF has outlined the importance of indigenous and indigenised food crops in a draft national strategy (DAFF 2014). This notes the decline in production and consumption of these crops and the paucity of research and information on them. The strategy aims to support research and the development of technologies in relation to these crops, promote their sustainable production and consumption, and improve their productivity and profitability through market development.

The key policies, laws, and programmes relating to seed production by small-scale farmers in South Africa are unpacked in the ACB's 2016 publication 'Integration of small-scale farmers into formal seed production in South Africa'. The main three pieces of legislation are summarised here.

The Plant Breeders' Rights (PBR) Act No. 15 of 1976, and its revision the PBR Bill (gazetted in January 2015),⁵ administered by DAFF, are intended to provide and protect intellectual property rights over new plant varieties developed by breeders, so that they can be compensated through royalties when the varieties are used or sold.⁶ Breeders are given rights to these 'protected' varieties for 20–30 years, after which they become public property that anyone can reproduce. For the first five

4. See http://www.nda.agric.za/doaDev/sideMenu/geneticResources/plant_genetic.htm

- 5. See https://pmg.org.za/bill/561/
- 6. See http://www.nda.agric.za/docs/GeneticResources/variety_control.htm

to eight years breeders have the sole right to produce and market the variety, after which they must provide licenses to anyone else wishing to produce and market the variety in exchange for royalties. It is against the law to use protected varieties without the consent of the rights holder. The PBR Bill is based on the pro-breeder UPOV 1991. This is a restrictive international agreement that severely limits farmers' rights to recycle, exchange and trade farm-saved seed of protected varieties. The PBR Bill provides for the drafting of regulations that could allow exemptions to breeders' rights for small-scale farmers to reuse farm-saved seed of certain protected varieties, depending on the commercial importance of the crop and size of land or income of the farmer. It is anticipated that the reuse of farm-saved seed may be restricted to use by only subsistence farmers and immediate family on the farmer's own holdings and will prohibit exchange and local rural trade. However, these regulations have yet to be drafted and distributed for public comment.

The Plant Improvement Act (PIA) No. 53 of 1976 as amended, and its revision the Plant Improvement Bill (gazetted in January 2015),7 administered by DAFF, are intended to protect people buying seed by ensuring they receive good quality seed that will grow according to the variety description. The PIA governs the registration of varieties that may be sold commercially, and all aspects relating to the way that seeds and propagation materials are produced and marketed for sale, as well as import and export. Only seed varieties that are registered and listed under the PIA and have been certified may be sold commercially in South Africa, and can't be sold under another name. The Bill does exempt 'noncommercial' varieties⁸ from the purview of the law, which it defines as unprotected OPVs that are produced and sold on a noncommercial scale. With the exception of some OPVs that may be sold in small quantities for the home garden market, varieties that are sold commercially must also be registered and certified. Certification is aimed at maintaining the quality, especially the germination rates

and varietal purity of commercial seeds, and seed registration requires that the variety is distinct from others, is uniform when grown and remains stable (still look the same after several generations). These are called the DUS ('distinct, uniform, stable') requirements. Most small-scale farmers cannot comply with these onerous requirements for variety registration, testing, and marketing, and DUS criteria are at odds with farmer varieties of seed, which are inherently diverse and adaptable. Both the PBR and Plant Improvement Bills are nearing promulgation as Acts, and are currently under consideration by the National Assembly.



Seeds

The National Environmental Management: Biodiversity Act No. 10 of 2004, administered by the Department of Environmental Affairs (DEA) is intended to ensure fair access to genetic resources. Bio-prospecting, access and benefit sharing regulations under this Act control the use, commercialisation and trade in indigenous genetic resources, and the fair and equitable sharing of any benefits derived from the commercial use of these resources and the associated indigenous knowledge. The impact of the implementation of this Act in regard to strengthening farm diversity and the conservation and sustainable use of indigenous crops bears further research and discussion. Therefore, the policy, legal and programmatic framework is oriented towards breeders'

7. See https://pmg.org.za/bill/558/

8. Clause 23(1)(d) and 23(2)

Figure 1: Map with study sites



interests and commercial production and distribution of certified seed, which threatens farmer practices of seed saving and exchange. Nevertheless, there are countervailing policy elements, especially recognition of the importance of the revival of indigenous varieties and cultures that opens opportunities for new work on farmer seed systems. But before we arrive at that point, we need to look more concretely at whether farmers are still maintaining and using their own varieties, or whether the industrial character of South African agriculture, coupled with dispossession and marginalisation, has done irreparable harm to these systems. For this reason we partnered with TA members to carry out some investigations on the ground.

Research process and methodology

The research process started with an initial survey of TA's 10 partner organisations.9 Organisations answered questions about their activities with farmers on seed, and shared initial information about issues and access in relation to seed faced by the farmers they work with. All but one organisation (AFRA) were actively supporting farmers with seed work, and six reported that farmers were trying to save some form of traditional variety. Only three organisations reported a high reliance on farmers' own saved seed or a combination of their own seed and exchange with other farmers. The remainder reported that farmer seed saving ranged from only 5–30% of total seed use, with high reliance on commercial outlets or NGOs to source seed.

Based on the survey responses, three organisations were identified as partners for this snapshot field research on FMSS: Zingisa

9. Association for Rural Advancement (AFRA), Border Rural Committee (BRC), Farmer Support Group (FSG), Legal Resources Centre (LRC), Nkuzi Development Association, Southern Cape Land Committee (SCLC), Surplus People Project (SPP), Transkei Land Services Organisation (TRALSO), Trust for Community Outreach and Education (TCOE), and Women on Farms Project (WFP).

(supported by TCOE) in Eastern Cape, FSG in KZN and SPP in Northern Cape. The partner organisations selected sites for the research based on areas where they are working with farmers on seed and agroecology:

- Zingisa is based in Berlin in Eastern Cape, where it works closely with Ilizwi Lamafama

 the 'Voice of the Farmers' – a farmers' union established in 2007 to represent farmers locally and nationally. Farmers participating in the research were drawn from Quzini, Nxarhuni and Potsdam; areas on the fringes of the urban corridor connecting King Williams Town and East London/Buffalo City.
- FSG work with farmers' groups in the Bergville and Msinga areas in KZN, and selected the Bergville area as the site for the research, due to participating farmers having a long history of seed saving.
- SPP selected Springbok in the Northern Cape as the research site because farmers in this area are heavily reliant on farm-saved seed, due to the remote nature of the area and the low level of services available. Participating farmers were drawn from Springbok, Pella, Komaggas, Spoegrivier, Wupperthal and Hondeklip Baai.

The research included FGDs (four in Bergville and one each in the other areas), with farmers using participatory methodologies; on-farm visits to individual seed custodians, to see how seed is being managed in practice; and interviews with key informants from support institutions. A total of 65 farmers (68% women) participated in six focus groups.

The objectives of the research were to find out more about:

- The types of crops and plants being cultivated by farmers;
- The extent of seed saving for the crops being grown, how farmers are saving and exchanging seed, and the source of seed;
- The four most important crops in each area for men, women (and youth where possible), and why;
- The seed varieties being grown and an assessment of their positive and negative characteristics;
- Strengths, weaknesses and challenges in the current seed management system, and farmer support priorities; and
- The institutions and associations supporting farmers with seed work, and potential areas for taking the work further.

Berlin, Eastern Cape, with the Zingisa Educational Project

Site background and methodology

The research sites are located in an area that receives rainfall all year round, but that is primarily a summer rainfall area, decreasing from the coastal belt to the interior, with some high rainfall mountainous areas in the west. The dominant biomes are Albany thicket and savannah (Buffalo City Metropolitan Municipality 2016). Climate is sub-humid to humid, and the area has a rolling topography. There is limited arable land and the main agricultural activity is extensive livestock with some irrigated horticulture, and commercial timber in the higher rainfall areas (DWA 2004). Heavy industry dominates the district economy.

The research team was comprised of two ACB staff, one Zingisa staff member, and two farmer volunteers. Methods included FGDs and participatory seed analysis with farmers. Seventeen farmers participated in the FGDs (two-thirds women, but just one participant under 35). The first entry was to list all the crops and plants being grown and used by participating farmers, and the percentage of farmers growing each crop. The groups then disaggregated into men and women, to identify the most important crops for the households. After identifying the most important crops, the participants came together again to analyse the crops and varieties identified, their characteristics,



Participatory Workshop (women), Zingisa, Berlin, Eastern Cape

origins and source, and priorities. The research team went on field visits to Quzini, Nxarhuni and Potsdam to see practical seed work of households and communities.

Crop and variety diversity

The FGD identified a total of 66 different crops used by participants throughout the year (Table 1). Field visits revealed other crops present on farms and in seed banks that were not identified in the FGD, such as traditional tobacco and wild foods. All participants grew maize, beans, potatoes, marigolds and a number of Western vegetables. Notable is the limited diversity of grains and legumes grown, as well as the strong emphasis on Western crops, although a few participants were growing some indigenous crops, including African potato, cowpea, amaranth and okra.

There is a relatively low level of variety diversity, with just six maize varieties in use, seven bean types (incorporating a number of legumes such as soya) and two potato varieties. This limited diversity poses a serious potential threat to food security.

Men identified maize, potatoes, beans and spinach as their main crops (Appendix 1). Their main priorities were: staple foods and foods important for nutrition; OPVs; foods that are accessible and useful for both humans and animals; and foods in high demand for both the local and national market.

Women chose mostly indigenous plants with diverse medicinal and nutritional uses as their primary crops (Appendix 2). Although it was surprising that no staple food crops were mentioned in the women's list, the participating women felt that they already had many of the food crops, and felt their list was complementary to the men's list. In a later discussion, Nomasomi Mjacu, seed custodian and manager at the Quzini Community Seed Bank, said the women are mostly mothers, and think about health. She said that knowledge of medicinal plants was being lost, and they are looking for ways for older women to share this information with younger generations, and learn about these plants.

Table 1: Crop diversity and number of participants planting, Berlin, Eastern Cape

Сгор	% of participants planting (n=17)
Grains	
Maize	100%
Legumes	
Beans	100%
Cowpeas	30–59%
Vegetables, gourds and tubers	
Potatoes, cabbages, beetroots, onions, peas, peppers, tomatoes, chillies	100%
Spinach, carrots, wild garlic, butternuts, turnips, Chinese cabbages	60–99%
Cauliflowers, broccoli, pumpkins, sweet potatoes, lettuces, kale	30–59%
Rape, okra, squashes, eggplants, radishes, African potatoes, Egyptian onions	<30%
Fruit	
Peaches, guavas	60–99%
Apples, figs, oranges, strawberries	30-59%
Avocados, bananas, pomegranates, lemons, grapes, gooseberries	<30%
Other	
Marigolds (nuka-nuka)	100%
Umhlonyane (African wormwood), rue, aloes	60–99%
Garlic, thyme, parsley	30-59%
Moringa, amaranth (utyutu), rose geranium, mint, fennel, catnip, origanum, nasturtium, comfrey, rocket, basil, lavender, rosemary, lemongrass, watercress, wild dagga, ginger, spekboom	<30%

This group is very active and innovative and clearly has good knowledge around local varieties and traditional medicines. They also have good knowledge about the types of crops appropriate for the local ecological and cultural contexts.

Quzini community seed bank

The research team visited the Quzini seed bank, which is centrally located, on private property. It was established in 2015 by Ilizwi Lamafama, with assistance from Zingisa. The seedbank was established to rescue indigenous seed to promote biodiversity, and as a strategy to counter the GM seeds currently on the market. It also promotes social cohesion through people working together. The seed bank has five primary seed custodians. A management team works on production with farmers who take seed from the bank. This is to ensure that the seed is of good quality, that isolation and temporal distances are maintained to prevent genetic contamination, and that the farmers are utilising agroecological methods for their production.

Eleven farmers – all members of Ilizwi Lamafama – currently use the seed bank, including the five seed custodians. So far, seed has been collected from the custodians' seed gardens. The seed bank currently has only six seed types: butternut, red Natal maize, white Natal maize, red English maize, white English maize, and coriander.

Ilizwi Lamafama and Zingisa are working on a strategy to involve the broader community in

Seed bank procedures



Aviwe Biko and Nomasomi Njacu, seed custodians, Quzini seed bank

Nomasomi Mjacu described the seed bank procedures.

Stage one (seed rescue): Seed is obtained through sharing. Information about the seed is captured on a form, including the variety, germination period, pests, etc., and the farmer's contact information. Follow-up research is done where information is not available.

Stage two: Trials are carried out, to see how the seeds and different varieties perform. The best-performing varieties are selected for further stages. The seed obtained from the trials is harvested and used as food.

Stage three: The following step is seed demonstration, also called 'treatment'. This entails cultivating three plots of the selected variety (from the seed originally collected in the rescue stage). Manure is applied at different rates to the different sites to identify optimal fertiliser application rates.

Stage four: This is followed by multiplication to increase the volume of seed. Plots are surrounded by herbs to help repel

pests. Seed selection is done by harvesting from the middle of the plots and not the borders, to ensure good quality seed. Maize is selected based on cob size, with seed taken from the middle of the cob, since 'it is big and well protected'. The farmer must be present to identify and remove sick plants in time. The plants to be selected for seed are marked before harvesting.

Stage five: Harvesting and drying is the next stage. Hygiene is important and tools and all materials used, such as bags, drying sheets, etc., must be clean. The seeds are placed outside on a clean sheet (or hung in a paper bag) from 9 a.m., in order to avoid the morning dew, and brought inside around 3 p.m. Herbs to repel pests may be placed under the cloth used to dry the seeds. Dryness is determined by listening to the sound and pitch when a bag of seeds is hit on the ground. The whole family must be present for drying, as it is important that someone is always present to take seeds inside during bad weather.

Stage six: Seeds are then sorted by colour and size, and foreign matter and stones are removed. The seeds are stored in dark, translucent glass bottles. Bottles are collected in the area, the labels are removed, and the bottles are cleaned and dried thoroughly to prevent seed spoilage. Bottles are filled to three quarters with seed, and untreated wood ash is added to fill the bottle. The wood ash absorbs remaining moisture and controls weevils. The bottles are closed with foil and wax to become airtight. Different sized bottles of the same seed are kept, because bottles cannot be closed again after opening.

The bottles are labelled with information on the name of the contributing farmer, where the seed was sourced, the crop, the variety, and date of entry. 'The seed bank needs to be kept in optimal conditions, following strict requirements, in order to ensure that the seeds do not germinate [ahead of time], and to ensure the quality of the seed is not reduced over time'.¹⁰ A seed control form is used to record who has taken seed, what seed, how much, and how much seed they must bring back.

10. Nomasomi Mjacu, seed custodian and manager at the Quzini Community Seed Bank, Ilizwi Lamafama, Eastern Cape, 2016

sustaining the seed bank, as this cannot rely solely on Zingisa support. There is discussion about instituting a monthly membership fee to ensure administration and support, as securing quality seed every season involves substantial work.

Apart from the seed bank, which operates as a collective, the research team also visited individuals who have household seed banks. Tata Ngingi Poni has 17 different seed types in his collection, including vegetables (with three pumpkin varieties), five maize varieties and five bean varieties. Three of the maize varieties – red German, Sibhozo, and Intyabontyi – are heritage seeds, passed down through generations. In addition, a variety of wild leafy vegetables were observed in the fields: imbikicane, umgcaleka, umhlaba ngula, rhawu, ityutu, ihlaa. Because it is a living seed bank, Tata Poni does not follow long-term storage procedures.

At a learning site established by Zingisa to decentralise agroecological training, a group of farmers who had formed a cooperative took ownership of equipment and agricultural infrastructure that had been part of the previous Massive Food Production Programme from the Department of Rural Development and Agrarian Reform (DRDAR). The programme had been intended to develop small-scale farmers but it had been unsuccessful, largely because of its focus on high input agricultural practices. The farmers repaired the tools and machinery, which had been abandoned and stopped functioning, and consequently have access to tractors, micro-milling machines, and other useful infrastructure for developing their agro-ecological cooperative.

Zingisa-TCOE also facilitates four or five 'exposures' annually, where they assist farmers they work with to visit different areas and countries to learn about what others are doing, which encourages development and cohesion." According to the manager of Quzini seed bank, Nomasomi Njacu, the work they are doing 'is not just about saving and multiplying seed, it also encourages the spirit



Phindiwe Msesiwe, seed bank, Quzini

of Ubuntu, raising knowledge of indigenous herbs and foods. Western civilisation has made an impression that traditional or indigenous vegetables are for the poor. We want to reverse this, so they are seen as the same [as the Western vegetables]. We promote cohesion with us and the elders, and to conserve our indigenous knowledge'.¹² There is growing interest amongst surrounding communities in reviving farming and saving seeds, particularly amongst the youth. Many of these areas have been extensively degraded, due to overgrazing, and, with the drought, rural communities experience hardship. The knowledge of seed saving and seed banks is a great resource and is reviving interest in traditional knowledge systems, including farmer managed seed.

Support for local farmer seed systems

Apart from Zingisa, a number of other research and development programmes in the area target small-scale farmers, specifically looking at food sovereignty and local economic development.

Collaborations between universities, DRDAR, and the Nkonkobe Economic Development Agency (EDA) provide support on seed saving practices. Collaboration between the Nkonkobe EDA and the University of Fort Hare's agronomy department has focused on developing OPV maize cultivars (ZM1523) through a communitybased seed production programme. It appears that formal sector quality standards apply.

11. Lulama 'Joe' Nkopo, Director, Zingisa Education Project, 2016

12. Nomasomi Mjacu, seed custodian and manager at the Quzini Community Seed Bank, Ilizwi Lamafama, Eastern Cape, 2016

A public procurement programme has been designed to purchase the seeds from these small-scale seed producers and distribute them to other small-scale farmers, as well as to purchase processed meal from the farmers.¹³

According to Mr Dongi from the Nkonkobe EDA, 'We cannot take another system that was used in another area. We believe in the reduction of input costs for production, for smallholder farmers to be competitive. We also want them to achieve sovereignty, and this requires a cut in cost of production. This needs something like OPVs, community nurseries, locally available resources, to drive this'.¹⁴



Homegarden, Quzini

Dr Charles Mutengwa from the University of Fort Hare said that around 50% of maize cultivated in the Eastern Cape consists of landraces/traditional varieties. He mentioned that the majority of the maize grown is yellow maize, and they were focusing on cultivating white maize, since the high costs of importing white maize into the province made it very expensive locally. Dr Mutengwa indicated that some scientists in his department are keen to establish seed multiplication centres for landrace varieties of various crops, but little attention has been given to this yet. 'Our target has been to provide varieties suitable for lowinput and stress-prone environments. Major stresses in the semi-arid environments of the Eastern Cape include drought, low soil fertility, low soil pH, diseases, etc.'¹⁵ The International Maize and Wheat Improvement Center

(CIMMYT) has bred varieties for tolerance to such stresses and could provide support.

The Environmental Learning Research Centre at Rhodes University is developing research commons that promote learning and actions for local seed-based systems, and will be conducting research on food sovereignty from 2017. Tichaona Pesanayi, who is doing his PhD research through Rhodes University, has included a section on the incorporation of food sovereignty into agricultural college curricula in South Africa and Zimbabwe, 'working with colleges to open up reflective spaces for inclusion of seed sovereignty, and then developing demonstration sites for lecturer, student, extension [worker] and farmer joint learning'.¹⁶

Extension workers have expressed interest in locally-driven initiatives to promote household and community seed banks and seed sharing. They have indicated their willingness to support an application from Zingisa to expand the work on seed security and agroecology.

A wide range of actors in this area are willing to support farmer managed seed systems, and find ways in which farmers can use their varieties to support local food sovereignty. There are a lot of opportunities to collaborate, expand, and strengthen farmer seed systems.

Concluding discussion and areas for further work

- The area has a number of programmes to support indigenous and farmer seed development. This offers a good technical and practical base that can be built on and strengthened.
- Many interested stakeholders are willing to engage in further research on FMSS, including the Nkonkobe Municipality, EDA, the provincial DRDAR, and the universities at Fort Hare and Rhodes.
- More systematic research on indigenous and farmer varieties and agricultural biodiversity

^{13.} Passmore Dongi, Nkonkobe Economic Development Agency, 2016

^{14.} Passmore Dongi, Nkonkobe Economic Development Agency, 2016

^{15.} Dr Charles Mutengwa, University of Fort Hare, Agronomy Department, 2016

^{16.} Tichaona Pesanayi, Environmental Learning Resource Centre, Rhodes University, 2016

is needed, but there is room to build on current activities to expand such research, and to support seed saving and storage practices.

 There are opportunities to include Zingisa and Ilizwi Lamafama as part of building a South African network of practitioners of FMSS, including those who have started seed banks.

Bergville, KwaZulu-Natal, with the Farmer Support Group

Site background and methodology

Bergville is the primary town in the Okhahlamba Local Municipality, in the foothills of the Drakensberg Mountains bordering Lesotho. The climate is warm and temperate, although there is snow on the Drakensberg Mountains in winter. Average annual rainfall is 843mm. Bergville is in the grassland biome,¹⁷ characterised by a single layer of grasses with an abundance of bulbs and few trees. Okhahlamba municipality has commercial crops in a large central area, small pockets of commercial forestry in the south and subsistence farming in the traditional authority areas in the Drakensberg foothills. Potatoes, maize, wheat and soya beans are the main crops grown, with most commercial crops under irrigation. The western portion of the municipality consists of steep mountain slopes that are only good for grazing, forestry or wildlife. The area has high biodiversity and is a centre of plant diversity and endemism. Consequently, it has a significant Protected Area Network for biodiversity conservation. Tourism is a key economic driver (Okhahlamba Local Municipality 2014).

In Bergville the research team consisted of one person from ACB and two from FSG. Two farmer representatives were to join the team



The small-holding of Gogo Hlatswayo en route to Mlimeleni, Bergville

but heavy snow at the time of the research prevented this. Research methods included a FGD with the Community Task Team (CTT), a coordinating structure comprising farmer representatives and organisers from each of the communities around Bergville with whom the FSG works. In the FGD, farmers identified crops grown, determined whether these crops were grown from their own propagation material or bought, discussed seed related activities in the area, and analysed stakeholders. The CTT then identified three areas for field visits: Reserve B. Okhombe and Mlimeleni. FGDs were held with farmers in these areas to further identify and discuss varieties, and the research team visited seed banks and interviewed stakeholders. In Okhombe, the discussion focused more on experience of seed systems and support needs, and did not go into detail on varieties. A total of 33 farmers participated in the FGDs (76% women).

Crop and variety diversity

Participating farmers identified 47 cultivated food crops, 11 medicinal crops and 13 wild crops that are harvested (Table 2).

17. http://www.plantzafrica.com/vegetation/vegmain.htm

Table 2: Crop diversity in the Bergville area (Reserve B and Mlimeleni)

Field crops

Maize (umbila), millet/sorghum (amabele), pearl millet (inyalothi), sugar cane (imfe)

Legumes

Beans (sugar beans, brown, white, small white, kaki, etc.) soya beans (izindumba), lima beans (umabhomeni), Jugo beans (izindlubu)

Vegetables, gourds and tubers

Pumpkins (amathanga), butternuts, cabbages, spinach, carrots, lettuces, green peppers, chilli peppers, cherry peppers, cauliflowers, leeks, garlic, beetroots, brinjals, onions, tomatoes, spring onions, turnips, potatoes (amazambane), sweet potatoes (ubhatata), taro (amadumbe), amasolozi

Fruit

Apples, oranges, lemons, grapess, peaches, granadillas, pears, figs (unkhiwane), mulberries (umrubheni /amatshalo), apricots, plums, avocados, bananas, guavas, traditional melons (ibhece), watermelons

Medicinal

African wormwood (uMhlonyane/ isifube), nkalane, bitter aloe (umhlaba), cannabis (insangu), brakvygie/ibohlololo, gum tree, idlebe/endlovu, ichitichithi, black stinkwood (unukani), isinaba, prickly pear (dolofiya)

Wild plants collected

Wild potatoes (amazambane), nighshade/ nastergal/unsoba, isanjani, wild bush grapes (isinwazi), uvovo, ubhucu, ugqumigqum/ ugquzu, black mangrove/umfomfo, amabele kanogwajo, intshuku, wild sweet potatoes (umhlaza), igonsi, ikhowe

Maize is the most popular grain and farmers also grow millet and sorghum. Twelve legume types were identified. Maize, beans and sugar cane are all grown by many people in a large area (although sugar cane only in Reserve B), as well as pumpkins, potatoes, traditional melons (ibhece) and medicinal plants. Fruit trees and vegetables are grown by many people in small areas, and are important for dietary diversity and good nutrition.

Maize was identified as the most important crop by participating farmers with sugar bean, potato, pumpkin, butternut and spinach as the other key crops (Table 3). In Reserve B the men proposed that cabbage is also important, as many people grow it in large areas as a cash crop. In Okhombe the men also emphasised vegetables, but the women thought that field crops were more important, especially when considering saved seed. In Mlimeleni, young women included several fruits, because these are quick, healthy foods that one can just grab and go. They said they don't have time for food that has a lengthy cooking process.

Appendix 3 summarises the varieties and characteristics of the most important crops grown in the area identified by participating farmers.

Farmers identified four local maize varieties in use, and one that is lost. Certified seed, including hybrids is in use but farmers did not distinguish between different hybrid varieties. Two local maize varieties – IsiZulu and Bhusmani/obomvu (red) – and certified varieties are in use in all three sites.

IsiZulu is well adapted to the local socioecology. In general, local seed is considered to be drought tolerant. Mantombi Mabaso from Mlimeleni said this was her 46th season planting IsiZulu. A disadvantage of IsiZulu is small cobs with few lines. Bhusmani/obomvu (red), which is fast growing, is used mainly for livestock, with some human consumption, but it is not liked everywhere. Both these local varieties grew well with kraal manure, but, as farmers use more synthetic chemical inputs, the local varieties no longer respond as well as they used to, due to the deterioration in soil health. To maintain yields they must buy hybrids and fertiliser annually. Some farmers were interested in experimenting with agroecological methods to restore the health of their soils and get off the fertiliser treadmill. Millers do not always accept the local varieties because of their hard grains, though farmers favour the heavier and tastier meal they produce.

Сгор	Total votes by area			By age (Mlimeleni)		By gender (Reserve B + Okhombe)	
	Reserve B Okhombe Mlimeleni		Youth	Elder	Women	Men	
Maize	9	5	8	2	6	6 + 3	3 + 2
Beans	9	2	3	1	2	6 + 2	3
Potato	9	3	3		3	6 + 1	3 + 2
Pumpkin		2	6	1	5	2	
Spinach	6		1	1		6	
Butternut	3	3				3	3

Table 3: Most important food crops

Okhombe raised the hardness of local maize varieties as a problem. One miller that is further away will mill it for them, but the mill in town rejects their maize. However, they have seen meal of traditional maize being marketed in Ladysmith for its good health and taste, and selling at a premium price. The maize is also sweet.

Hybrid maize was widely used in all the three Bergville sites. Farmers did not distinguish between varieties, and this category probably includes any certified seed for sale at the shop. This seed is referred to as 'isilungu' (white man's customs). It is favoured for its productivity and the number of lines of kernels on the cob, but it requires new purchases every season and specific inputs, and its taste is inferior to local varieties. Farmers expressed general distrust of isilungu seed.

One farmer said hybrid maize is used to feed chickens, and for milling. The few men who participated in the CTT and in Reserve B were particularly interested in planting maize in large areas for income generations. There is a nascent layer of commercial producers who want to expand their operations. According to an agricultural advisor at the provincial Department of Agriculture, farmers are combining their land to farm larger areas with hybrids.¹⁸ In general, farmers buy certified seed at the agricultural dealers in town, such as Farmsave, and farmers take whatever the salesperson recommends. One of the oldest women in Mlimeleni hankered after a lost variety of traditional maize named 'buloti' because it was both sweet and easy to grind, whereas the other varieties of traditional maize are very hard. However, this maize is no longer found in this area and one cannot obtain seeds for it. It was last available when she was a teenager, growing up on a farm on the other side of Bergville. The Mlimeleni women said they were aware that some areas had the 'doyilandi' and



seeds saved by Mantombi Mabaso in Mlimeleni: the large maize cob on left is 'isiZulu' from 2016, the middle size cob is 'isiZulu' from 2015, and the smallest is a hybrid maize grown in 2016

 Siyabonga Madlala, agricultural advisor in Ward 8 (Reserve), KZN Department of Agriculture and Rural Development, 25 July 2016



Farmer focus group in Mlimeleni

'vayela' varieties, but they had never had seed from these varieties and were not interested in it because the maize is too hard and the mill will not take it.

The Bergville area has experienced two years of severe drought, which has had a great impact on the farmers. The Mlimeleni group said that they have been forced to buy hybrid maize this year as stocks of local seed varieties are very low and there is no-one to buy from. They fear that, if the drought continues, they may lose these varieties altogether. Gogo Mabaso used to be a source of local seed; she produced many barrels of seed and sold to Okhombe and other areas, but now, with the drought, she has nothing and fears they will have to eat the seed she has saved. Women farmers in Okhombe said they buy farmer varieties of maize from other small growers in the area (Mr Dlamini and Mr Hlatswayo), but we did not find out whether these suppliers have seed available currently.

Farmers in all three sites were practising *in situ* enhancement without support, including through crossing farmer and hybrid varieties. One farmer mentioned a desire to 'strengthen' the maize through crossing and described planting eight lines of local maize and then three lines of hybrids. The main objective of crossing varieties was to increase the lines of kernels on a cob and yield, while retaining traditional traits, such as the good taste. One farmer said he crossed the maize until he had cobs with 14 lines of kernels and then he stopped. While this practice signifies an important base of technical knowledge amongst the farmers, it raises some concerns, in that the farmers do not know whether these are certified or GM varieties they are using or the traits they may have.

Beans are the second most important crop for the participating farmers. Twelve types were identified, although only eight of these appeared to be grown by participating farmers. Information on bean varieties was not gathered at Okhombe and the source of bean seed is not clear. It appears there is a combination of purchases from local shops (agro-dealers and supermarkets) or from farmers, and recycling. This makes sense, since, with good agronomic practices, legume seed can be recycled indefinitely without significant quality deterioration. When seed does occasionally need to be refreshed, farmers buy new seed. Farmers noted that when one has difficulty cooking shop-bought beans they also will not grow. Sometimes shop-bought beans grow but do not flower and make seed.

Three bean types are grown in both Reserve B and Mlimeleni: sugar beans (ubhontshisi); small white beans (ubhontshisi omhlophe omncane); and round beans (umaqanda kacilo). Farmers said these are local varieties. Another five types were identified in one or the other site. Not much information was gathered on the characteristics of bean types, apart from sugar beans having good yields.

Although there is reasonable diversity in bean seed and Jugo beans (which produce the bean on the root) are grown, no other legumes, such as groundnuts, cowpea or pigeon pea are grown, which indicates low legume diversity. Further work would need to be done to understand why farmers are not planting other legumes. There may be many reasons, including sociocultural, agroecological, lack of market demand and lack of supply.

Potatoes are the third most important crop in the area for home consumption and sale. Nonhlanhla Mtembu of FSG explained that people in the area do not consider a meal to be complete without potatoes. Farmers knew the names of three certified varieties and also used other varieties where they did not know the name. Farmers currently purchase planting material for Irish potatoes. They also propagate planting material for local sweet potatoes and amadumbe (taro).

A lost variety is a type of potato called 'usalabedla'. Okhombe were the first group to mention it as a 'wild' potato that one dug up in the bush. When queried, they said it was like an Irish potato, but you could just go into the fields and find it. They believe that the fairly recent practice of ploughing with a tractor has led to its demise. Mlimeleni confirmed this information and added that in the past they never bought potatoes as 'usalabedla' was always just there, and that this potato took a long time to cook.



Potato seed brought by farmers in Okhombe

Farmers prefer medium-sized potatoes, as these are good for selling because more go into a bag, which looks like better value for money. At harvest, small potatoes are kept for seed, the large ones to eat at home and the mediumsized ones for selling. Farmers also look for potatoes with a darker skin, as the texture of very light potatoes isn't good when cooked.

It is very difficult to get seed potatoes in the Bergville area. After a few seasons of replanting, farmers refresh the stock they have, even if this means using potatoes from the supermarket. This can result in poor yields or very small potatoes. The nearest supplier is more than 90km away, in Mooi River, and FSG provides support to the farmers by organising collective purchasing and transport.

Although individual vegetables do not feature on the list of priority crops for farmers, in

combination a range of vegetables and fruits are produced everywhere. Farmers indicated 24 types of vegetables and 16 types of fruit. These were overwhelmingly Western vegetables, using purchased, certified seed (Table 2).

Pumpkins were identified as an important crop. As with beans, pumpkins are grouped as a category and are identified by their appearance and characteristics. Farmers mentioned five different varieties in use, and all are farmer varieties. Researchers observed that many types of pumpkin seed were kept together. They did not appear to require much management and were planted randomly in the larger fields. Butternuts are also planted in Reserve B and Okhombe. Spinach was considered an important crop, especially by women in Reserve B.

Seed conservation, availability and storage

Farmers noted that everyone used to have indigenous crops, but nowadays fewer are grown and seed is difficult to find.

When asked why indigenous and local seed is being lost, the farmers replied:

- People just like to go with new things it becomes fashionable when you see others planting new seeds and the local variety is forgotten.
- The local seed is more difficult to access as more farmers plant hybrids.
- The perception is that to be a good businessman you need hybrids when you plant a bigger area.
- The milling station refuses to mill the local varieties because these are too hard.
- After people have used the hybrid varieties and chemical inputs, the soil is damaged and the local varieties no longer grow as they used to. The quality of local seed diminishes after using chemicals.

Participants were not aware of any community seed banks in the area, although there were a number of custodian farmers who maintained a variety of crops and seeds, including Nombuso Madondo (Reserve B) and Gogo Hlatswayo (Mlimeleni) who have ten and nine crop varieties respectively. Mantombi Mabaso (Mlimeleni) has a number of maize varieties



Mantombi Mabaso in Mlimeleni hangs seed from the roof preserving it with fire smoke

and does her own inter-breeding. Both Reserve B and Mlimeleni farmers noted that some farmers (including Mantombi Mabaso) would produce seed in bulk for sale to other farmers in the area. It was noted that only one person in Reserve B was able to supply seed currently, due to the devastating drought.

Farmers saved their seeds at home in a variety of storage containers, including glass bottles and 20 litre buckets. Various preservation methods were observed or mentioned: ash, smoke, burying ('amasolozi'), biological pest management (e.g. using the bushy plant 'gqabalaqhela'), and use of commercial chemicals ('Quickphos' aluminium phosphide as a fumigant) and paraffin. Okhombe farmers struggle to find the traditional plants used for pest control, and the commonly used 'umsuzwane' doesn't grow well in this area. Seed is readily infested with weevils and farmers resort to chemicals but are concerned about safety risks, especially for children.

Support for local farmer seed systems

FSG provides the main seed support to participating farmers, providing seed and training for sowing and saving. DAFF does offer some extension support, but this is sporadic. Seed from DAFF does not always germinate.¹⁹ While farmers say the municipality does not have a presence with regard to farmer support, the municipality says it distributes certified seed for DAFF. Although the municipality does not know if any farmers save their own seed, they are willing to provide support to farmers who do. They think that if farmers had a better way of saving seed, then more of them would use their own seed. They would like to give farmers more options and if farmers can save costs by keeping their own seed this is good.

AgriSA also distributes certified seed and other Green Revolution inputs in the area as a combined smallholder package.²⁰

The provincial department does not have any specific programmes to support farmers with their own seed systems, and their programmes are not always sustained, according to Siyabonga Madlala, an agricultural advisor with the provincial department.²¹ Madlala says farmers want commercial varieties. He identified problems in the region: water and land access are problems in some areas; ploughing of distant fields is declining because inputs are expensive and farmers do not have mechanisation; and there are livestock management issues, including goats, sheep and cattle – the cattle go into the mountains to graze from November to May, but when they return it is still too early for the maize to have dried properly in the fields, due to the late rains.

According to Madlala, the provincial department only works through cooperatives, in a three-year project cycle. The farmers sign a contract where they are fully subsidised in the first year, in the second year they only receive mechanisation, and by the end of the third year they are supposed to be self-sustaining. In

21. Siyabonga Madlala, agricultural advisor in Ward 8 (Reserve), KZN Department of Agriculture and Rural Development, 25 July 2016

^{19.} According to the provincial DAFF, this includes a GM maize variety, PAN5Q-649R maize from Pannar.

^{20.} Londi Mazibuko and Hlengiwe Ndaba, Department of Local Economic Development, Okhahlamba Local Municipality, 25 July 2016



Nombuso Madondo with her seed bank, Reserve B

practice, however, the farmers cannot sustain payments for expensive inputs and many sign up again in the next round of input subsidy schemes when political leadership changes. The department organises farmers' days at the farms where they have carried out field trials, and farmers from Cedara provide technical information.

Although Mr Madlala indicated the department's willingness to support farmers to improve their own seed systems, it is clear that the extension service is implementing national policy directives aimed at providing industrial inputs to farmers, including seed. This year (2016) the department supplied maize and bean seed to farmers. This included a new certified variety of sugar bean (ukulinga) and two certified maize varieties (SC701, PAN5Q-649R) supplied by Pannar, one of which includes Bt and Glyphosate tolerant GM traits.

Concluding discussion and areas for further work

 Diversity is low where research was conducted. There are only four local maize varieties in current use, with minor reference to other grains (millet and sorghum). There is limited legume variety, with most variety coming from within the common bean group.

- Research in this area illustrates the pressures on smallholder farmers to take on industrial inputs and hybrid and GM seed through government and private sector input subsidy packages, and highlights the way farmers respond to and negotiate this support in search of the best possible outcome to meet their production and resourcing needs.
- There is a farmer base of technical knowledge in seed production, saving and storage, and in situ enhancement. Further work could be done to interact with these farmer seed producers and custodians to identify how they could share their knowledge with other farmers to strengthen farmer seed systems, and how they could get support to meet some of the objectives they have for crop enhancement, using more appropriate OPV and farmer varieties instead of hybrids. The FSG already facilitates farmer-to-farmer exchange visits and farmer field schools. Future events could include on some of the seed issues that have surfaced through the research, with the aim of sharing farmer knowledge and varieties between the communities that FSG works in (and with extension officers where possible).
- Some local seed custodians have the capacity to bulk and sell farmer varieties in the area, and could be supported in replenishing lost and at risk varieties. Universities, the Agricultural Research Council, Cedara and the national gene bank are potential partners in sourcing and re-introducing lost varieties, such as the usalabedla potato and the buloti maize.
- In situ enhancement, by crossing farmer and certified varieties, suggests farmers are more interested in local adaption and plasticity than in varietal purity. However, the introduction of unwanted traits, especially from GM organisms, is of concern and there is an opportunity for more capacity building on these issues.
- Seed choice is closely linked to other factors, including post-harvest processing and soil fertility. Farmers have already requested support to improve their soil using agroecological interventions, and to run field trials to see if these can improve the challenges they have experienced with the performance of traditional varieties after fertiliser was introduced.

Springbok, Northern Cape, with the Surplus People Project

Site background and methodology

The Northern Cape is South Africa's largest but most sparsely populated province. The landscape is characterised by vast, arid plains with outcroppings of haphazard rock piles. Apart from a narrow strip of winter rainfall along the coast, the province is semi-arid, with little rainfall in summer. Rainfall varies from 20mm–300mm per year. In the longer term, droughts are expected to increase in frequency and the area will become even drier (Nama Khoi Local Municipality 2014). The weather conditions are extreme – cold and frosty in winter, with extremely high temperatures in summer. The cold Atlantic Ocean forms the western boundary.



Harvesting sweet potatoes – Pella Garden Association, Northern Cape

Its principal industry is mining (including quarrying). The Northern Cape mining industry makes up nearly 7% of South Africa's total mining value, and contributes 23.4% to the province's total economy. The area is not good for agriculture, and is mostly extensive small stock grazing (goats, sheep). Springbok is in the Nama Khoi local municipality in the heart of the Namakwa spring flower tourism area. The municipality has parts of both the Greater Richtersveld and Central Namaqualand Coast biodiversity priority areas within its boundaries, making it an important region for conservation activities.

The research team comprised of two ACB and three SPP staff. A meeting was held with SPP staff in Cape Town to explain the objectives and overall methodology for the work. This was followed by a three-day programme, including FGDs in Springbok in the mornings and site visits attended by all participants in the afternoon. Participants were drawn from Springbok, Pella, Komaggas, Spoegrivier, Wupperthal and HondeKlip Baai. Thirteen farmers participated (46% women). The field trips were conducted in Springbok, Komaggas and Pella. The FGDs included participatory exercises to identify the crops that were being cultivated, the four most important crops to men and women and the characteristics of varieties being cultivated for these, the source of seed, seed management practices and supporting institutions.

Crop and variety diversity

Participating farmers recorded 34 food crops, 2 non-food crops (lucerne for fodder, and tobacco) (Table 4), and 34 medicinal/herbal crops (Table 6) currently in use over the year. This is fairly significant diversity for a very marginal area for cultivation. Most of the food crops are Western vegetables and fruit produced with irrigation, and a few grains are grown (maize, oats, barley).

Farmers' own saved seed was a source for 45% of the crops listed (not including medicinal and herbs) (Table 5). According to farmers, saved seed does not always perform well. Seed storage is a problem, in particular because of damage from mice and birds. SPP plays a very important role in providing access to a range of seed, especially Western vegetables. SPP was a source of seed for 40% of listed crops, mostly OPVs purchased from Sandveld Organics, an organic farm based in Lamberts Bay that produces and distributes fresh vegetables through Cape Town's informal markets and shops. Sandveld is registered

Table 4: Crops recorded, Springbok

Сгор	% of farmers growing (n=13)
Field crops	
Maize, sunflower, lucerne	25-50%
Barley, oats	<25%
Vegetables, gourds and tubers	
Pumpkins, onions, tomatoes	>50%
Beans, beetroots, potatoes, sweet potatoes, butternuts, spinach, green peppers,	25-50%
carrots, garlic, squashes	
Peas, eggplants, cucumbers, baby marrows	<25%
Fruit	
Watermelons, makataan, lemons, spanspek/sweet melons	25-50%
Naartjies, peaches, grapes, bananas, mangos, figs, grapefruits, prunes	<25%
Other	
Olives, tobacco	<25%

as a producer, processor and seller of seed,²² and, in cooperation with Sativa Rheinau, a leading Swiss organic seed producer, Sandveld produces and imports a wide range of certified organic vegetable and herb seeds for sale in South Africa. The seed is then recycled and exchanged between farmers in the locality and further afield, facilitated by SPP (including a learning exchange to Brazil for some farmers). Fruit trees mainly come from a nursery and there are a few other sources of planting materials for some crops. Farmers said they felt seed secure, and that even if SPP were not supporting them they have built strong networks to help each other, based on a common vision for food sovereignty, and therefore do not have problems accessing seed at the right time.

Herbs and medicinal plants play an important role, in both household health and nutrition and garden health. Participating farmers explicitly embrace permaculture as a methodology, hence common 'permaculture herbs' like marigolds, comfrey and other exotic herbs are used. Most exotic herbs are sourced from SPP. There is a fantastic abundance of indigenous medicinal plants in this area and the farmers showed a deep interest in their use as well as extensive related knowledge. In some instances these plants are being cultivated purposefully, but they occur in the veld as well as in and around people's vegetable gardens. Table 6 lists only those being used, as opposed to those that people know about but are not using daily. Farmers requested a workshop on the cultivation and use of indigenous herbs.

There are some 5,400 species of plants identified in the Northern Cape, occurring in six large biomes over this sprawling province.²³ A thousand of these species are listed on the red data list, in other words they are in danger of extinction. Common threats include overgrazing, large-scale agriculture and expanding urbanisation.²⁴

23. http://www.museumsnc.co.za/aboutus/depts/botany/BotPDF/DiscoverNCPlants.pdf 24. http://www.museumsnc.co.za/aboutus/depts/botany/BotPDF/DiscoverNCPlants.pdf

Source	Сгор
Saved	Sunflowers, barley, onions, pumpkins, tomatoes, beans, beetroots, potatoes, sweet potatoes, spinach, green peppers, carrots, garlic, peas, cucumbers, baby marrows, tobacco, cancer bush, rooibos
Sandveld/SPP	Sunflowers, onions, pumpkins, tomatoes, beans, spinach, green peppers, carrots, peas, cucumbers, baby marrows
Nursery	Lemons, naartjies, peaches, grapes, bananas, mangos, figs, grapefruits, prunes, olives
SPP only	Potatoes, butternuts, squashes, eggplants, watermelons, makataan
Other/unclear	Maize (KZN exchange); barley, potatoes (Agrimark); lucerne, oats, spanspeks/sweet melons (unclear)

Table 6: Indigenous and exotic medicinal plants and herbs in use

Indigenous: Cancer bush, wild dagga/wilde als, aloe, hoodia, geneesbos, groenamara, wonderkroonbos, balderjan, sour fig, rooi wortel, swartstorm, wyn ruit, kruitjie/grietjieroer-my-nie, kraalbos, rooibos, sandsalie, brandnetel, kattekruid, vuur-ou-lap, wild garlic

Exotic: Mint, lavender, rosemary, garlic, thyme, fennel, aniseed, yarrow, comfrey, curry bush, parsley, coriander, ginger, basil, marjoram

When it came to prioritising crops in use, participating farmers identified potatoes and vegetables as the most important. This is very different from most other parts of the country (and even the region) where grains and legumes are usually prioritised. Men identified potatoes (and sweet potatoes), onions, cabbage and pumpkins. Women identified potatoes, onions, beetroots and spinach. Crops tolerant to limited water are an obvious priority. Potatoes have a good market and are a staple in the local diet. Spinach is used as a meat replacement.

Discussion on crop varieties in use did not yield much information. Farmers had little knowledge about the varieties they use, apparently because these are received from SPP and farmers don't necessarily take note of variety names. It appears that observation of the characteristics – the pros and cons – of different varieties does not play a big role in the farmers' acquisition of seed for the crops identified as the most important. However, farmers were very clear about the difference between open-pollinated and treated hybrid seed and are therefore critical in other ways. All farmers said they do not take 'blou saad' (blue seed, referring to the colour of treated seed) from government programmes and when buying from agro-dealers they choose OPVs. They were for the most part satisfied with the varieties they had received from SPP and in general with the seed that they are currently using.

Given the low level of discussion this exercise yielded, we decided to look into some of the crops that have longer histories in the area (pumpkins and squashes, sweet potatoes, melons and beans), and farmers then did describe a number of different varieties and expressed opinions on their characteristics. All of these seeds or cuttings are sourced from the previous year's harvest or from exchanges within the local and SPP partner networks. Six varieties of pumpkin or squash were recorded, four varieties of melon, two varieties of sweet potatoes and eight types of legumes (mainly beans but also groundnuts) (Appendix 4).

Support for farmers' seed systems

The research team did not meet with any other organisational stakeholders or government extension workers, as none were identified as important in supporting the agroecological methods these farmers are committed to. Participating farmers receive support from SPP and farmers have their own local associations.²⁵

25. The network includes Komaggas Tuinbou Club, Garden of Hope (Springbok), Pella Food Garden, Vaalwater Huistuine, Namabib Household Gardens, Niewe Plaas Boere (Wupperthal), Concordia Vegetable Garden, and individual farmers in other areas.

These are affiliated to the Right to Agrarian Reform for Food Sovereignty Campaign (FSC), a Cape network of farmer associations, which has an agro-ecology task team. Membership in the FSC links the farmers in this extremely remote part of the world with many other networks in South Africa and further afield, deepening political awareness and solidarity, as well as exposing them to learning opportunities and seed exchanges with other farmers.

A number of seed custodians belong to the FSC network. Jan Adams is part of Nababeep Household Gardens, where he farms for subsistence as well as the local community market. Eight years ago, Jan completed a 'master farmer' permaculture course with Old Mutual. He was also part of many learning exchanges, agroecology training and awareness processes facilitated by SPP. He is a member of the FSC and actively participate in struggles for land. Through this process he received a growing tunnel, in which he can grow crops, despite temperatures of up to 50°C and scarcity of water. Crops growing at the time of research included spinach, mustard spinach, cabbages, tomatoes, lettuces (curly, butter and another variety that resembles the shape of a rose), beetroots, chives and onions. He intercrops with sunflowers, marigolds and other herbs for pest protection. All of the crops were from saved seed that he had either saved himself or accessed from other farmers.

SPP is a member of TA as well as the Rural Women's Assembly (RWA) and la Via Campesina. The farmers that were part of the focus group have a high degree of political education and long-standing activism, so that their approach to seed is both practical and political, and they aim to challenge the dominant paradigm and promote agroecology and food sovereignty.

Concluding discussion and areas for further work

• Farmers unanimously considered themselves to be seed secure; they are satisfied with their current seed management system and have the right seeds at the right time. They did not see their dependence on SPP as problematic and were confident that, should SPP exit, they would continue with the



Jan Adams of Nababeep Household Gardens shows a packet of "blousaad" – "blue seed" due to fungicide treatement given to him by Department of Agriculture and never used

seed they have amongst themselves. Seed saving is an integral part of their agricultural practice and is done for both practical and political reasons. Ironically, it is their distance from access to resources and assistance that has led them to be seed secure.

- The four main crops did not generate much discussion on variety characteristics, and for the most part no distinction was made between varieties.
- Participants indicated that saved and exchanged seed does not always perform well for a number of reasons, including the need for better selection practices and storage challenges (pests and heat).
- There is a deep respect for medicinal plants and a wealth of knowledge was displayed regarding their uses. Despite this wealth of knowledge, there was a request for further capacity building in this area.
- Farmers did not request any further assistance on saving or enhancing seed, although they did express the need to amplify their efforts on seed security, as they rely heavily on SPP and Sandveld Organics for their supplies.
- Farmers also expressed interest in engaging further on the regulations to the Plant Improvement Act, which will set down the finer details regarding the sale of uncertified seed, and wondered how the PIA could impact their future procurement of certified seed for commercial cultivation.

Common threads and ways forward for discussion with partners and farmers

The influence and pressure from the industrial agriculture and food system is evident at all the study sites. Farmers respond in different ways, depending on the context and also influenced by the forms of support they receive. In Springbok and Berlin there is a strong ethos of food and seed sovereignty, which drives the farmers to build an alternative system in the context of failing or failed government support programmes (such as the Massive Food Production in Eastern Cape). In Springbok in the Northern Cape, farmers have created very strong solidarity bonds and networks to build an alternative system through the FSC, where their approach is both political and practical. This enables them to select government support they accept and they strongly reject hybrid seed and chemicals. In Bergville, farmers are navigating their way through often contradictory support programmes on offer through government and NGOs to satisfy both food security and economic development aspirations.

Farmers across all sites actively exchange, produce and save seed. They also purchase seeds from the formal sector, and in some cases from within the local seed system to



Aunty Anna April of Garden of Hope showing 1 of many medicinal plants used in the Northern Cape – Wild Dagga (*Leonotis leonurus*)

replenish or refresh their seed. Generally seed is saved in household seed banks, although one community seed bank is established through Zingisa at Quzini and appears to be managed and functioning well. There is not very wide diversity in these banks at this stage.

Many types of plants are grown in all the areas, including medicinal plants and fruits. However, there is very limited variety diversity of key staples grown. There is some maintenance of traditional varieties and indigenous crops, but these are under pressure from production challenges, including erratic weather, and the drought in particular; poor soil, especially after using chemicals; low soil fertility; disease; and the push to convert farmers to Green Revolution packages of certified seed and inputs.

Farmers didn't differentiate between varieties and their specific characteristics, except for maize and potatoes. The participatory exercises exploring and analysing varieties and their characteristics were a good way to raise awareness with farmers and could be deepened. Farmers may need some support in identifying the varieties they are actually using and reproducing locally, especially in vegetable crops. It would benefit them to learn more about the advantages and disadvantages of these, particularly where certified and GM seed is being introduced, both actively and inadvertently.

In all areas, indigenous medicinal and food plants were cultivated and collected in the wild, highlighting the easy juxtaposition of cultivated and wild areas and their importance to rural communities. Both Berlin and Springbok farmers highlighted the need to conserve associated indigenous knowledge and to pass this on to young people. In Springbok farmers requested that SPP host a workshop to deepen their knowledge on indigenous medicinal plants, although they already had extensive knowledge on these issues.

Bergville and Springbok identified problems with seed storage. More research and information sharing on improving seed quality (pest and temperature control during storage, moisture control, when to harvest for seed maturity, etc.) could help the farmers

enormously. Not all saved seed performs well and research into the causes and possible remedies is needed. In Springbok farmers identified seed selection as a possible cause and area needing improvement in their seed system.

Enthusiastic exchange with solidarity networks has introduced seed from diverse areas and agroecological zones and even from other countries. While this exchange and experimentation is natural in FMSS, a more organised approach to sourcing and recovering traditional seed and foods suited to agroecological zones could build diversity and resilience. This is not happening sufficiently, even within organised local networks, for example, one group of farmers in Bergville is not aware of varieties that they could benefit from in the neighbouring area. There are opportunities to better improve these processes within NGO farmer support networks and through partnerships with institutions providing technical support, such as through the national gene bank and universities, for example, Fort Hare. More research could also be done to identify and repatriate lost varieties (such as the 'usalabedla' potato and 'buloti' maize variety in Bergville). Farmers could also be assisted to increase the productivity of their traditional varieties (without using hybrids) through technical support in sourcing appropriate breeding material, and improved breeding techniques and techniques to enhance soil fertility, countering the damage from chemical inputs (as requested by Bergville farmers). There is a good technical base of knowledge amongst farmers, most evident in KZN, to take this work forward.

Seed custodians offer a strong entry point into practical work. These farmers, who are consciously working to maintain and reproduce a diversity of crops and varieties, form the foundations of a farmer-based technical network on farmer seed and related wider methodologies (agroecology). More work could be done on identifying custodians in each locality, engaging further with them and integrating them into wider exchange networks.



Farmer focus group meeting in Reserve B, Bergville, KZN

Farmer-to-farmer exchanges are a central method for sharing farmer knowledge and increasing agricultural biodiversity through sharing of seed and planting material. A substantial amount of learning exchange is already taking place between TA members, in the FSC and SKI. Future exchanges could consider a specific focus on some of the technical threads raised in this report.

The farmers in Springbok participate in processes to challenge the status quo and gain recognition for smallholders in solidarity with peasant movements. They are concerned about the ways in which developing seed laws will affect them and further capacity building on these could be well received, and the lessons spread into their many other networks, such as the RWA, TA and La Via Campesina.

Fluid farmer seed systems characterised by innovation and experimentation to enhance diversity were evident in all sites. Seed law needs to be revised substantially to include and support farmer seed systems, which have a different logic to commercial systems. For example, in Bergville farmers sell and purchase seed in the local seed system, but would not meet the requirements for registration as certified seed producers. All types of seeds are in use in local seed systems, including certified and OPV seed from the commercial sector and farmer varieties.



The winter vegetable garden of Gogo Hlatswayo near Mlimeleni, Bergville

Although all the farmers distinguished between hybrid seed and farmer varieties, sometimes all commercial seed was referred to as hybrid. Berlin and Springbok farmers actively seek OPVs when they source seed to enable saving. Compared to the knowledge of maize varieties, there is little knowledge of the varieties of legumes and vegetables cultivated, and the traits and certification these may carry and laws regarding their reproduction. Farmers may thus be criminalised for practices that are intrinsic to farmer seed systems.

However, seed and IP laws are only one part of broader policy issues that are of concern. South Africa is entrenched in a large-scale commercial production model. This model is not sustainable and generates high levels of extreme inequality. Multinational corporations have a stranglehold over input markets: seed, synthetic fertiliser, agrochemicals, finance and mechanisation. The extractive production system is completely inequitable with restricted natural resource access, including land, or support for millions of smallholder producers. Many small, diverse farms, with decentralised but connected support systems present a living alternative to the corporateindustrial model. Resistance against corporate encroachment into food and seed systems, coupled with the practical development of alternatives are both required to confront the conditions facing smallholder farmers and their seed and production systems in South Africa today.

Appendix 1: Main crops, varieties and characteristics (men), Berlin, Eastern Cape

Crop	Variety	Characteristics	Other information
Maize	Jamani Elibomvu (red German)	Advantages: Drought tolerant, OPV, good animal feed (especially chickens), easy to grow, not very labour intensive, rain fed, doesn't require heavy inputs, gives good yields, sweet, nutritious. Disadvantages: Some people don't like the colour and taste and eaten only as last resort, not used for porridge.	The variety is obtained through sharing within and between communities. It has been used for a long time – came with the Germans in the 1800s. Important to have isolation distance of stagger planting to avoid cross-pollination. Farmers tend to only plant one variety. This variety is very old.
	Sibhozo	Means '8 rows'. Advantages: White traditional variety, is very filling, sweet taste, early maturing, OPV. Disadvantages: Not appealing to the market, since it has a short cob.	People need to be made aware of the value of this variety. Seed comes from seed sharing from the Transkei. There is a scarcity of it.
	Nyanganthathu	Means '3 months'. Advantages: Early maturing, can be planted twice in a season. Yellow maize with small kernels, used for animal feed.	Seed is scarce and there is a lack of information and research.
	Gastyeketya	Advantages: Prevents prostate cancer. Red variety, cross-breed of different varieties, you never know what colour you will get. Disadvantages: Cooking time is long.	
	Ntsikivana	Description: Very sweet variety with small kernels, used for popcorn. Advantages: Early maturing, soft to eat, good for chickens (due to size of kernels).	This is a newer variety, not known by many.
	Ngesi elibomvu/ ngesi elimhlophe	Advantages: Sweet, nutritious, drought tolerant, good for processing, mix of white and red is good for pig feed.	Important to have isolation distance of stagger planting to avoid cross-pollination. Farmers tend to only plant one variety. Very old variety.

Crop	Variety	Characteristics	Other information
Potato	BP1 (British Potato)	OPV, drought tolerant. High demand in the local market with a good taste, unlike hybrids. Fast cooking and can be cooked in different ways. Peels cure ringworm, high blood pressure, poultice for burns. The peels can also be used for chips. The peels and phuthu can be mixed for chicken food. Potatoes are not good for pregnant women (all starches). If you put the peels in ash they will shoot and can be planted.	Small potatoes are saved from the harvest for the following year's seed. This variety is long established in the community; 'has always been there'.
	Red potato	Only one group plants this. It is big and produces a lot of seed potato. They spread underground and care needs to be taken when weeding not to damage them.	New variety that was bought from the co-op – perhaps a hybrid. Only been growing it for three years.
Beans	Sugar beans	Very tasty. Frost sensitive. Used for samp and beans (nqushu) as a staple food. The more you pick the more it produces.	This is mostly bought from the co-op and saved and shared. While cleaning for food the spoilt beans are kept aside for planting. These have been around for as long as anyone can remember.
	Kaki beans	Smaller plant available all year round. Pest resistant. Higher yield than sugar bean.	Available from co-op and saved and shared.
	Yellow beans	Very tasty. More traditional variety. Gives a big yield. Half a cup of seed can yield 5 litres. An Indian variety, more common in Durban. The issue of cross pollination can be a problem. Prone to weevils. Storing in plastic containers is especially problematic, must be stored in glass bottles or paper bags with ash.	Not available in shops – shared. The seed is scarce and expensive to buy. Sometimes when buying sugar beans, yellow beans are mixed in.
	Jack beans	Large white beans. Some they got didn't germinate. Others say it can produce twice a year.	Not many people know about it. Was obtained during an exchange with Limpopo. Perhaps an Australian butter bean; they are unsure of origin.
	Runner beans (ndingila)	There are a number of varieties. Has a different taste and is good for livestock. Is labour intensive because it needs staking (e.g. lazy housewife variety needs support)	Ndingila gained from seed exchange with Cala.
	Butter beans	Grow all year round, good for soil fertility.	Sourced from agricultural co-ops and shops.

Crop	Variety	Characteristics	Other information
	Soya beans	OPV. Good yields. Good for livestock.	From Tanzania exposure 2014, and is shared locally since.
Spinach	Fordhook giant	Grows big and fast, easy to sell, OPV, tasty, nutritious, attractive ('you can eat it with your eyes'), does well all year round, resistant to pests and disease. Most preferable food. Needs water.	Buy from shops and can save seed.
	Swedish variety	Also a preferable food. But bolts quickly so need to harvest timeously. Sensitive to weather.	
	Red spinach	Very nutritious, beautiful, stays longer, seeds itself, can harvest for two seasons, good for salad, needs very little water.	You can buy and save seed. It's a new variety. Can buy green, yellow, and red seeds together.

Appendix 2: Main crops, varieties and characteristics (women), Berlin, Eastern Cape

Crop	Benefits	Other information
Inongwe/African potato	Nutritional value, purify the blood, human fertility.	Get from the forest, not cultivated, easy to find.
Moringa	High value crop, full of nutrients, immune booster.	Got seed from Limpopo in 2015 – the trees are still small. Is doing well in the Amatole, must be planted at the end of October after the frost.
Garlic and wild garlic	Heart remedies, weight reduction, pesticides, immune booster, cleans the blood.	Plant from the garlic bought from the shops for cooking – sows itself. There seem to be two varieties of garlic (big and small with one bulb). Wild garlic easy to plant and share.
Umhlonyane/ African wormwood	Cures flu, essential oil possibility, pesticide.	Harvest from the wild and share seedlings. Grown amongst other vegetables as repellent. Two varieties: the bush variety, which can be transplanted during summer, and can be propagated from cuttings, and the other is a low bush. They are interested in a market for essential oil for perfumes and cosmetics.
lgcukuma/wild fig	Cures oral diseases, cures ulcers.	Harvested from the wild and cultivated. There are shrub and groundcover varieties (spekboom and carpobrotus tend to be grouped together).

Appendix 3: Varieties of main crops grown, Bergville, KZN

* Note: The X indicates that the variety was confirmed as being grown in the local area by that farmer focus group. A blank column means that the presence of that variety was not mentioned in the area or is unknown. In Okhombe there was not enough time to go through the full list of crops to identify those that were not grown or were grown in the area.

Varieties	Local (L) / certified (C)	Reserve B	Mlimeleni	Okhombe*	Benefits	Challenges
Maize						
IsiZulu	L	X	X	X	Grows well in the area; used for fermenting traditional beer; tasty, filling and healthier; grows faster (even if planted late); after milling the meal is heavier and whiter in colour than other varieties; resistant to drought and pests (Okhombe).	It used to grow well with kraal manure, but this variety no longer grows and yields well due to the introduction of chemical and inorganic inputs. It is rejected at the milling stations, as it is hard. After cooking it is dry and has no moisture (Mlimeleni). Fewer lines (4–8 lines) thus they do not get enough for mealie meal and seeds; only 1–2 cobs per plant.

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Varieties	Local (L) / certified (C)	Reserve B	Mlimeleni	Okhombe*	Benefits	Challenges
Bhusmani (yellow maize)	L	X	X	X	Best for all livestock; it improves fertility of hens; it grows fast; makes livestock, poultry and people gain weight; can make sour porridge, mahewu, and beer; does not get affected by pests easily (Okhombe); used for horse feed (cooked) (Okhombe).	Due to the introduction of chemical and inorganic inputs, this variety does not yield like before. It is rejected at the milling stations as it is hard. Smells bad (Mlimeleni). When one is not used to eating this maize one gets diarrhoea (Reserve B).
Hybrid and certified seed (called isilungu – 'white man's customs')	С	X	X	X	Can have higher yields than traditional maize; has more lines per corn (10–20); can produce up to three cobs on one plant.	Seeds cannot be saved, therefore must be bought every season. Has to be planted at the right time – if not, it won't yield well. Requires specific inorganic and organic inputs to do well. Not tasty. Unsure what they are buying and 'what it has been injected with'.
Doyilandi (can be white or yellow)	L	X		X	Grows fast (even if planted late); tastes nice; used in traditional beer and for mealie meal.	Due to the introduction of chemical and inorganic inputs, this variety does not yield like before. It is rejected at the milling stations as it is hard.

Varieties	Local	Reserve	Mlimeleni	Okhombe*	Benefits	Challenges
	certified (C)	D				
Vayela	L	-	X	X	Grows fast (even if planted late); tastes nice; used in traditional beer and for mealie meal; kernels harder and bigger.	It is hard and gets rejected by the miller. Due to the large size of kernels the farmer must switch plates on the tractor when planting.
Buloti	L (lost)	-	Х	-	Tastier; moist and soft.	No more seed available, so no longer planted.
_						
Beans	1.15	N N	N			
Sugar beans	L/C	X	X		than other types of bean.	
Ubhontshisi omhlophe omncane (small white beans)	L	Х	Х			
Umaqanda kacilo (round bean)	L	Х	Х			
Amantongomane (jugo beans)	L	Х				
Ubhontshisi ompofu (tawny beans)/ siqhweba	L/C	X				
Umzumbe (white and pink)	L	Х				
Brown	L/C		Х		Cooks quicker than other beans.	The longer it is stored the longer it takes to cook.
Umabhomeni (doubla beans)	L		Х			
Omhlophe (white)	L					
Ubhontshisi omnyama (black beans)	L?					
Ubhontshisi omnyama onamabala (speckled black beans)	L?					

Varieties	Local (L) /	Reserve B	Mlimeleni	Okhombe*	Benefits	Challenges
	(C)					
Ubhontshisi okhakhi (khakhi)	L?					
				-		
Potatoes	1	1	1	1	1	1
Mnandi	С	X	X		High yield; cooks quickly; soft but firm when cooked; tasty; plant using kraal manure; doesn't rot easily; saved seed does well when replanted.	Okombe noted that the only problem with this variety was that the moles liked it.
Mondial	С	X			High yield; cooks quickly; soft cooking and tasty; plant using kraal manure; doesn't rot easily.	First yield is high. But as the seed is saved from season to season, the yield decreases.
BP1	C	Х				
Ubhatata (sweet potato)	L	X	Х			
Usalabedla	L		Х	Х	Grows in the wild.	Mechanised ploughing is killing this variety off.
Amadumbe (taro/ Colocasia esculenta)	L	X				
Unknown certified	C					Unsure what types of variety are bought at the shop; it is difficult to get seed, let alone the correct variety.
Pumpkin						
Grey with ridges	L		Х		Thick and tasty when cooked.	
White	L		Х			Not sweet, have to add sugar; gets watery when cooked.

Varieties	Local (L) / certified (C)	Reserve B	Mlimeleni	Okhombe*	Benefits	Challenges
Orange	L	X	Х		Tasty; can mash and eat with pap.	
Brown with bumps/pimples	L		X		Thick and tasty when cooked.	
Small brown with speckles	L					Not tasty; takes long to cook; stringy and watery.

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Appendix 4: Pumpkin, sweet potato, melon and bean varieties, Springbok, Northern Cape

Crop	Variety	Characteristics	Other info
Pumpkin/ squash	Blue	Strong and good in the sun, stores well on the roof for a whole year but must be turned to stop dampness), insect resistant, tasty and easy to grow.	
	Hubbard squash	Has a soft skin so more easily attacked by insects, quick growing, quick cooking and loved by babies, tasty and more expensive than other varieties but customers often don't like them because there are so many seeds inside.	
	White/Van Niekerk/ boer	Grows very big and easily, very common variety that sells well. Watery when cooked (less desirable than other varieties in that regard). Very tasty cooked green in stews and the skin can be cooked too. Seed is saved, exchanged, bartered. Freezing the seed extends its shelf life.	This is the only variety that was around in people's youth – the other varieties have been introduced more recently.
	Butternut (murg)	Grows easily, doesn't need much water but its soft skin makes it more susceptible to pests. Farmers companion crop with marigold which repels pests and sunflowers to which the pests are attracted to. Very prolific – 1 seed/ plant can give 15 fruits and farmers can have 2 or 3 harvests from 1 plant. Leftovers are fed to livestock. They are cheap to buy.	
	Rolet squash	Tasty and healthy, grow easily but also susceptible to pests due to their soft skin. Farmers need to know which companion plants to use as there are some things they don't like to be planted with. Also a prolific plant given 10 – 15 fruits from 1 plant.	SPP staff gave us the name of this variety as it was introduced through them.
	Red pumpkin?	One farmer mentioned a pumpkin with red flesh that white farmers do not want to share. It was not clear what this was and some thought he might be referring to a variety of squash.	
Sweet potato	Red	Also known as '6 month'. It grows very big, is very tasty and has a good market. Needs very little water (but more than the white variety because it takes longer to mature).	Six and three months are not exact descriptions of the time it takes to harvest. Fetches up to R20 per kilo because organic potatoes taste better and have a longer shelf life.

Crop	Variety	Characteristics	Other info
	White	'3 month'. A smaller variety that is early maturing and needs very little water. Very good market.	Also fetches high price as an organic potato.
Melons	Sweet melon/ spanspek	Winter variety is green (most expensive) and summer variety is orange. The tastiest of the melons which is also loved by insects and birds leading to high crop losses.	
	Watermelon	Grows easily and needs little water. Sells very well/popular.	Farmers noted that while they get R5 for a melon they find the same melon for sale in Cape Town for R50.
	Makataan	Quite a tasteless variety that is used for making jams. Speculate that it's a result of crossing.	
	Chinese watermelon	Similar to Makataan but smaller.	
	Lazy housewife	Green bean that was attained in a seed exchange with other provinces. Lives up to its name and doesn't produce well in this area.	
Beans	Broad bean	Tasty, healthy and can be cultivated all year around (doesn't mind frost).	
	Grondboontjie (peanut)	Got it from a seed exchange with KZN farmers. Not yet well known, not much experience yet. A food to 'supercharge a man!'	
	Sugar bean	A 'top class' bean that will always be featured at weddings and funerals. Most delicious with blue pumpkin and yellow rice.	
	Rooiboontjie/ Sousboontjie/ spikkels	Grows well.	
	Bush bean/ contender	Suffers from a pest/worm problem which can be controlled through good companion planting	
	Rys boontjie, ouma	Grows very easily, a heritage variety, 'poep boontjie' – needs to be soaked long and known for giving gas.	
	Lappie boontjie/wit boontjie	Heritage variety from Wupperthal that is rare and when found in shops is expensive (R30 for 500g).	

References

- ACB (African Centre for Biodiversity) 2014. "GM contamination, cartels and collusion in the SA bread industry". ACB, Johannesburg.
- ACB (African Centre for Biodiversity) 2016. "Integration of small-scale farmers into formal seed production in South Africa: A scoping report". ACB, Johannesburg.
- Almekinders, C.J.M. and Louwaars, N.P. 2002. The importance of the farmers' seed systems in a functional national seed sector. *Journal of New Seeds* 4(1): 15-33.
- Altman, M., Hart, T. and Jacobs, P. 2009. Food security in South Africa. Agrekon 48(4): 345-361.
- Anderson, T. and Campeau, C. 2013. "Seeds for life: Scaling up agro-biodiversity". Geneva: Ecumenical Advocacy Alliance.
- http://africanbiodiversity.org/seeds-for-life-scaling-up-agrobiodiversity/Buffalo City Metropolitan Municipality 2016. Final draft 2016–2021: Integrated Development Plan review. Buffalo City Metropolitan Municipality, Buffalo City.
- Cousins, B. 2016. Land reform the solution to rural poverty? *Rural 21: The International Journal for Rural Development*. DLG-Verlag GmbH, Frankfurt.
- DAFF (Department of Agriculture, Forestry and Fisheries) 2011. South African agricultural production strategy 2011–2025. http://www.daff.gov.za/doaDev/doc/IGDP/AGRIC_PRODUCTION_STRATEGY_FRAMWK.pdf
- DAFF (Department of Agriculture, Forestry and Fisheries) 2013. Abstract of agricultural statistics 2013. DAFF, Pretoria. DAFF (Department of Agriculture, Forestry and Fisheries) 2014. Draft national strategy for indigenous food crops: 6th draft. DAFF, Pretoria
- DAFF (Department of Agriculture, Forestry and Fisheries) 2014a. Agricultural Policy Action Plan (APAP) 2015–2019. DAFF, Pretoria.
- De Schutter, O. 2012. Report of the Special Rapporteur on the Right to Food: Mission to South Africa. Document A/ HRC/19/59/Add.3. United Nations Human Rights Council.
- Drimie, S. 2016. Understanding South African food and agricultural policy: Implications for agri-food value chains, regulation, and formal and informal livelihoods. *Working Paper 39*. Institute for Poverty, Land and Agrarian Studies (PLAAS) and Centre of Excellence in Food Security, Cape Town.
- DWA (Department of Water Affairs) 2004. National water resource strategy. DWA, Pretoria.
- DWA (Department of Water Affairs) 2013. Strategic overview of the water sector in South Africa. http:// nepadwatercoe.org/wp-content/uploads/Strategic-Overview-of-the-Water-Sector-in- South-Africa-2013.pdf
- FAO (Food and Agriculture Organization of the United Nations) 1997. The state of the world's plant genetic resources for food and agriculture. http://www.planttreaty.org/sites/default/files/state PGRFA.pdf
- FAO (Food and Agriculture Organization of the United Nations) 2013. Investing in smallholder agriculture for food security. A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security. FAO, Rome.
- GRAIN. 2008. Lessons from a Green Revolution in South Africa. *Seedling*, October. https://www.grain.org/article/ entries/686-lessons-from-a-green-revolution-in-south-africa
- Hall, R., and Aliber, M. 2010. The case for restrategising spending priorities to support small-scale farmers in South Africa. *Working Paper 17*. Institute for Poverty, Land and Agrarian Studies (PLAAS). http://www.plaas.org.za/sites/ default/files/publications-pdf/WP17.pdf
- Khoury, C., Bjorkman, A., Dempewolf, H., Ramirez-Villegas, J., Guarino, L., Jarvis, A., Riseberg, L. and Struik, P. 2014. Increasing homogeneity in global food supplies and the implications for food security. *Proceedings of the National Academy of Sciences of the United States of America*, 111(11): 4001–4006.
- Maluleke, N., Moila, P., Phora, G., Dibiloane, A., Vernooy, R. and Sthapit, B. 2015. Savouring diversity: First steps in implementing a strategy to support community seedbanks in South Africa's smallholder farming areas. Report of follow-up field visits to Limpopo and Eastern Cape. Bioversity International, Rome and Department of Agriculture, Forestry and Fisheries, Pretoria.
- McGuire, S. and Sperling, L. 2015. Seed systems smallholder farmers use. Food Security, 8:179–195.
- Nama Koi Local Municipality 2014. Nama Koi Municipality Integrated Development Plan 2012–2017. Second revision 2014/2015. Nama Koi Municipality, Springbok.
- Ogando, N. 2014. South African retail food industry. USDA Global Agricultural Information Network (GAIN) report, 22 August. United States Department of Agriculture (USDA), Washington DC.
- Okhahlamba Local Municipality 2014. Integrated Development Plan Review 2014/15. Okhahlamba Local Municipality, Bergville.
- Okunlola, A, Ngubane, M., Cousins, B., and du Toit, A. 2016. Challenging the stereotypes: Small-scale black farmers and private sector support programmes in South Africa. Institute for Poverty, Land and Agrarian Studies (PLAAS), Cape Town.
- Stats SA (Statistics South Africa) 2013. Census 2011: Agricultural households. Key highlights. Report No. 03-11-01 (2011). Statistics South Africa, Pretoria.
- Thamaga-Chitja, J.M., and Morojele, P. 2014. The context of smallholder farming in South Africa: Towards a livelihood asset building framework. *Journal of Human Ecology*, 45(2): 147–155.
- Tshintsha Amakhaya. 2012. The agrarian rural household economy: Status report on livelihoods, rights, and land use in selected sites in the Eastern Cape, KwaZulu-Natal, Limpopo, and Western Cape. Tshintsha Amakhaya, Cape Town.
- Vernooy, R., Sthapit, B., Tjikana, T., Dibiloane, A., Maluleke, N. and Mukoma, T. 2013. Embracing diversity: Inputs for a

strategy to support community seedbanks in South Africa's smallholder farming areas. Report of field visits to Limpopo and Eastern Cape. Bioversity International, Rome and DAFF, Pretoria.

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