



GTAC/CBPEP/ EU project on employment-intensive rural land reform in South Africa:
policies, programmes and capacities

Commodity study
Subtropical fruit production by small-scale farmers in South Africa and employment-
intensive land reform

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Abbreviations and acronyms

ha	hectare
kg	kilogram
LDARD	Limpopo Department of Agriculture and Rural Development
LWAU	Letaba Water Users Association
LEDET	Limpopo Economic Development, Environment and Tourism
NDP	National Development Plan
PLAS	Pro-active Land Acquisition Strategy
SAAGA	South African Avocado Growers' Association
SAMAC	South African Macadamia Growers' Association
Subtrop	Subtropical Fruit Growers' Association

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Executive summary

The subtropical fruit and nut sub-sectors of South Africa are among the fastest growing agricultural sectors in the country. Growth in these sub-sectors is driven by export demand and high prices, which in turn drive innovation and productivity. Together with citrus fruit, deciduous fruit and table grapes, subtropical fruit and nuts are considered 'winners' in terms of job creation and growth potential by the National Development Plan (NDP).

While most of the fruit volume and monetary value are produced by large-scale white commercial farmers, significant numbers of small-scale black farmers are growing subtropical fruit and nuts for a variety of purposes and value chains, most often for household food security and local informal markets. Many small-scale black commercial farmers also sell in tight value chains. Research shows that smallholder farmers are differentiated by the focus and scale of production, assets owned, access to markets, capital and other livelihood strategies.

Opportunities to expand the production of subtropical fruit and nuts by smallholder farmers do exist and are supported by their proven farming and marketing skills as well as organisational capabilities among them, a relatively well-functioning extension support system in some areas, a strong demand for subtropical fruit and macadamia nuts and the involvement of the industry bodies for subtropical fruit and nuts.

Constraints, such as access to land and water rights, access to capital for orchard expansion or the establishment of new orchards, inputs and infrastructure development, access to markets and infrastructure challenges may hamper the realisation of these opportunities.

1 Introduction

South Africa's National Development Plan (NDP) pitches its hopes for job creation on agricultural sub-sectors that are labour-intensive and display high potential for growth. Growth in these sub-sectors is driven by export demand and high prices as a result of a weak Rand, which in turn drive innovation and productivity in orchards. Together with citrus fruit, deciduous fruit and table grapes, subtropical fruit and nuts are considered 'winners' in this regard.

Most of the fruit volumes and monetary value are produced by large-scale white commercial farmers in Limpopo, Mpumalanga and KwaZulu-Natal provinces, yet significant numbers of small-scale black farmers are growing subtropical fruit and nuts for a variety of purposes and markets. While the bulk of the fruit serves to supplement household food security or is sold in loose value chains, i.e. in local markets and to small traders, many small-scale black commercial farmers sell their fruit and nuts to fresh produce markets, supermarkets or processors. Research shows that these farmers are differentiated by the focus and scale of production, assets owned, access to markets and livelihood strategies.

Opportunities to expand the production of subtropical fruit and nuts by smallholder farmers on redistributed land are supported by existing farming and marketing skills as well as organisational capabilities among small-scale farmers, a functioning extension support system in some areas, domestic and international demand for subtropical fruit and macadamia nuts and the involvement of the industry bodies for subtropical fruit and nuts.

Constraints such as access to land and water rights, access to capital for orchard expansion or the establishment of new orchards, inputs and infrastructure development, skills to produce for sophisticated markets, access to markets, infrastructure challenges and the age of farmers may hamper the realisation of these opportunities and will have to be addressed.

This commodity study on subtropical fruit and nuts forms part of the 'CBPEP/GTAC project for employment-intensive rural land reform in South Africa: policies, programmes and capacities', a broader national project aimed at formulating a set of options for rural land reform in South Africa that will generate a substantial amount of employment, self-employment and livelihood-enhancing opportunities through the promotion of small-scale agriculture. The project makes provision for commodity studies for subtropical fruit and nuts, livestock, wool, sugar and fresh produce, as well as thematic studies on finance, support services, tenure and the social and cultural aspects of small-scale farming.

This study seeks to quantify the current scale of subtropical fruit and nut production by smallholder and small-scale black commercial farmers in South Africa and to characterise the key features of their production and livelihood systems. It attempts to describe and assess the effectiveness of the support services offered to such farmers, as well as the character of the value chains in which they participate. The study further aims to quantify and assess the outcomes of both current and potentially expanded systems of subtropical fruit production by such farmers, in relation to income, employment and social differentiation and to explore the implications of research findings for land reform policies and implementation frameworks, with an emphasis on land redistribution.

The first section of this report will set the scene by putting production and marketing in the avocado, mango and macadamia nut sub-sectors in perspective. It will be followed by a discussion of the state of subtropical fruit and macadamia nut farming by smallholder farmers and small-scale black commercial farmers. Findings from the literature and interviews with key stakeholders about the number of smallholders and small-scale black commercial farmers and the markets they serve, how they organise their production, the other kinds of farming undertaken by them, land types, infrastructure and other resources available to them, the support services they have access to and the loose and tight value chains into which they sell their produce. Sub-sections on the production and incomes realised by smallholder subtropical fruit and macadamia nut farmers and the processes of social and class differentiation conclude the section on the key features of subtropical fruit and nut growing by smallholder farmers and small-scale black commercial farmers. The penultimate section assesses the potential for expanding small-scale subtropical fruit and macadamia nut production through land reform by weighing the opportunities and the constraints. In the final section the implications for land reform policy are spelled out in recommendations for support for different categories of farmers.

1.1 Definitions

Terms that will be used in this report are defined as follows:

Smallholders are farmers who rely mainly (but not exclusively) on household labour in their production systems.

Small-scale black commercial farmers are farmers who rely mainly on hired labour in their production systems. The degree to which their enterprises are capitalized falls within the bottom third of all commercial farming enterprises producing similar products in South Africa.

Employment includes both employment by others and self-employment and includes such employment in both the formal and informal agricultural sectors.

Tight value chains (formal markets) are value chains that are governed by relatively onerous contracts and/or standards, e.g. supermarkets and export markets.

Loose value chains (informal markets) are value chains in which most sales are 'spot' transactions, e.g. selling to street hawkers or bakkie traders.

1.2 Research Methods

This study combines a review of literature on subtropical fruit (avocado and mango) and macadamia nut production and marketing in general, and by small-scale farmers in particular, and interviews with key informants. Certain aspects of subtropical fruit and macadamia nut production by smallholders and small-scale black commercial farmers in Limpopo, especially in the Vhembe and Mopani Districts, are well-documented in research reports, journal articles and postgraduate theses. See for example, Aphane (2011), Chawiche (2015), De Hon (2015), Jaskiewicz (2015), Masikhwa (2018), Olofsson (2019) and Sikhapha (2019a, b). Furthermore, Lahiff's 2000 book, *An apartheid oasis? Agriculture and Rural Livelihoods in Venda*, on the history of agricultural production, extension and marketing in the Venda homeland during apartheid provided valuable historical perspective.

Insights gained from these documents were supplemented by interviews with the chief executive officer of Subtrop, the umbrella body for the subtropical fruit industry, extension managers in the Limpopo provincial Department of agriculture and Rural Development, as well as large-scale and small-scale subtropical fruit farmers. Interviews with the chief executive officer of the Letaba Water Users Association and agricultural economists of Source BI in Tzaneen yielded valuable information on water constraints and financial considerations respectively. Recent data about markets and harvests were collected from agricultural and business news websites and agricultural magazines to give a perspective on the respective industries.

2 Perspective on the subtropical fruit and macadamia sub-sectors

South Africa produces a range of subtropical fruits, avocados, mangoes, bananas, litchis and pineapples, as well as a variety of nuts like macadamia, pecan, pistachio and almonds. This report focuses on avocados, mangoes and macadamia nuts. A snapshot of the avocado, mango and macadamia sub-sectors is presented in table 1. Only a few hundred farmers grow these tree crops on 57 000 hectares and earn an annual income of more than R5 billion. These sub-sectors are all labour-intensive, especially during harvest when hundreds of temporary workers are employed in orchards and packhouses.

Table 1: Industry statistics for avocado, mango and macadamia nuts

	Avocado	Mango	Macadamia¹
Number of commercial growers (members and non-members of Subtrop)	Approximately 360	120	Not available
Number of emerging growers (only members of Subtrop)	62	78	Not available
Area planted	17500 ha	7000	32500 ha
Annual expansion	1500 ha	100 ha	500 ha (2017)
Annual production	115 000 ton (2019), after a record 170 000 tons in 2018	75000 ton	61200 ton
Annual value (free on board Cape Town and local)	Approximately R1,85 billion	R320 million	R3,3 billion (value of exports in 2017)
Employment (seasonal and permanent)	11000	5000	² Estimated 3 500 new jobs on macadamia farms & 300 permanent jobs in cracking facilities In peak season, industry employs 6000 farm workers & 1400 factory workers

Source: Donkin, 2019, ¹Macadamias South Africa and ²DAFF, 2012b in Manenzhe (2015)

2.1 Avocado production and markets

A greater appreciation of the health benefits of avocado, shifting dietary trends to higher fat and higher protein diets and co-ordinated marketing by the World Avocado Organisation since 2016 have led to a world-wide growth in consumer demand for avocado. In 2018 global demand for avocados increased by 35%, while avocado consumption has increased by 60% in Europe since 2016 (McShane, 2015, SAAGA, 2018, *The Produce News in Landbouweekblad*, 2019).

The South African avocado sub-sector is 'young' compared to the century-old deciduous fruit and citrus sub-sectors but has expanded gradually from plantings of approximately 2 000 ha in 1970 to 12000 ha in 2003. From 2003 to 2008 little growth took place, but since 2009 total plantings have increased due to growing consumer demand for avocados. The area under commercial avocado orchards is estimated at 17 500 ha with new plantings amounting to approximately 1 000 to 1 500 ha per year (Donkin, 2019, SAAGA, 2019).

Most of South Africa's avocado orchards are in Limpopo (60%) and Mpumalanga (29%). Smaller amounts of avocados are also grown commercially in certain areas of KwaZulu-Natal (9%), the Eastern Cape and Western Cape. Of the record total avocado production of 170 000 tonnes in 2018, approximately 86 000 tonnes (50%) was exported, mainly to Europe and the United Kingdom. The remainder of the crop was consumed domestically and approximately 10% is processed to oil and purée. Avocado production employs one permanent worker per 2,6 ha of avocado. It takes six to eight years for an avocado tree to reach full production (SAAGA, 2019).

2.2 Mango production and markets

Mangoes is a relatively small crop in the South African subtropical fruit basket and differ from avocados and macadamia nuts in the sense that the bigger proportion is sold, processed and consumed domestically. Of the annual production 20 to 25% is sold green (unripe) to achar processors, whereas the same proportions are sold to juice processors or driers. The rest is sold to bakkie or informal traders and fresh produce markets or supermarkets. Less than 5% is exported, mostly to the European Union, the Middle and Far East (Donkin, 2019). South Africa is still trying to get access to export mangoes to lucrative markets in the United States of America (USA), China, India, Thailand and Vietnam (Fresh Plaza, 2016).

The informal market for fresh mangoes is significant. Even commercial farmers from Malelane and Tzaneen often sell as much as 40% of their mango harvest to informal markets. Van Rooyen (2013) writes in *Farmers Weekly*:

Some 40% of Radley Estate's mangos are marketed directly from the farm to hawkers and vegetable shops. Another 40% is sent to municipal markets and the remaining 20% is sent to a nearby dried mango and juice factory. 'The hawkers are getting increasingly fussy over quality, but the advantage of this market is that they want a variety of sizes to fit into crates or to sell loose so it makes it easier to sell fruit that does not conform to formal market standards.'

One of the mango farmers near Tzaneen in Genis's sample (2015:188-189) said he sells 40% of his harvest to "hawkers with so many different preferences ... you can do a thesis on that":

There is a hawker who only buys the katballetjies (very small mangoes). He sells them for 20 cents or 25 cents each at schools. He manages to get 200 of those small mangoes in a crate. Then there is a woman from Gyiani who waits till we harvest the big Keitt mangoes that weigh about 1,5 kg each. She sells them for R10 a mango that is three times the size of a mango that Spar charges R5 for. Other hawkers want their mangoes polished ... This year we had Indian buyers

from Durban who came with big lorries and bought 600 crates of mangoes and 400 crates of litchis. They packed the fruit in banana boxes and left.

2.3 Macadamia production and markets

South Africa is the biggest producer of macadamia nuts in the world (table 2). Growth in macadamia production in South Africa is on par with growth in the avocado and citrus industries. According to tree data from nurseries for 2017, the macadamia industry is still growing rapidly. In 2017 South African macadamia producers planted 5 000 new hectares of macadamias (Macadamias South Africa, 2018).

Macadamias are grown in Mpumalanga, the north coast of KwaZulu-Natal and Limpopo. According to the latest tree census, conducted in 2012, there were approximately 19 000 ha established in South Africa. When the growth by the number of trees sold is taken into consideration, there is already approximately 32 500 ha established in South Africa. Macadamia production in South Africa has increased exponentially and the rate of production is expected to increase even more due to an increase in new plantings annually (Macadamias South Africa, 2019). More than 95% of South Africa's macadamia produce is exported. In 2017 the total value of macadamia exports was R3 269 599 858 (approximately R3,3 billion).

Table 2: World macadamia projections, as presented at the 7th International Macadamia Symposium in 2015

Country	Total Area (ha)	Projected new plantings (ha / year)	Projected production (Metric tonnes nut in shell)					
			2015	2016	2017	2018	2019	2020
South Africa	19 500	1 500	46 950	50 500	54 000	57 600	61 200	64 800
Australia	17 500	1 000	43 945	46 000	50 000	53 000	55 000	58 000
USA	8 160	-	16 500	16 500	16 500	16 500	16 500	16 500
Kenya	17 500	720	24 000	27 500	32 000	36 000	42 000	47 000
Malawi	6 058	270	6 559	7 573	6 967	7 803	7 178	8 040
Guatemala	10 000	1 000	8 867	9 050	9 225	9 400	9 575	9 800
Brazil	6 000	400	6 000	6 300	6 600	6 900	7 200	7 500
China	65 000	10 000	5 000	8 000	12 000	20 000	30 000	50 000
Vietnam	2 000	2 000	100	500	1 000	2 000	3 000	5 000
Mozambique	1 000	500	500	1 000	2 000	5 000	8 000	10 000
TOTAL	152 718	17 390	158 421	172 923	190 292	214 203	239 653	276 640

Source: Macadamias South Africa, 2018

Macadamia production and processing are quite labour-intensive. Most of the workers in the macadamia sub-sector are employed on a seasonal basis for harvesting and processing, usually between February and August. It is estimated that at least 3 500 new job opportunities have been created on macadamia farms over the last decades and another 300 permanent jobs in cracking facilities. In the peak season, the industry employs approximately 6 000 farmworkers and about 1 400 factory workers (Manenzhe, 2015).

After harvesting macadamia nuts need a preliminary processing by the farmers, through a process called de-husking in which the outer shell of the nut is removed (Jaskiewicz, 2015:41). Further processing is needed to remove the kernel from the inner shell. This is done by processing companies.

3 Key features of subtropical fruit production by smallholders and small-scale black commercial farmers

The production of subtropical fruit and macadamia nuts is concentrated in Limpopo, Mpumalanga and KwaZulu-Natal, the warm and subtropical north-eastern parts of the country. Lahiff (2000) reports a long history of smallholder farming in the former Venda bantustan, which was situated in

the present-day Vhembe District of Limpopo. Several studies have since been conducted on various aspects of smallholder farming there, and most of the discussion in this section will refer to that area.

3.1 Numbers of smallholders and small-scale black commercial farmers producing subtropical fruit and the markets they use

Parts of Limpopo, especially the former Venda 'Homeland' in present-day Vhembe District, have a long history of smallholder agriculture (Lahiff, 2000). Smallholder farming systems on an average of 1,5 ha per household persists in the area, yet many households have "little or no access" to productive land (Manenzhe, 2015).

The smallholder sector is characterised by low levels of production technology and constrained by its low incomes and a poor resource base, yet they do not form a homogenous group (Manenzhe, 2015). They are in fact highly differentiated in terms of the objective for production, proportion of marketed output, contribution to household income, labour, capital intensity, access to finance and mechanisation (Cousins, 2010).

Available literature suggests that the numbers of smallholders and small-scale black commercial farmers involved in subtropical fruit and macadamia production can be considered significant. In Vhembe District of Limpopo Province study group chairman Mr Ntamiseni Mankhili (2019) represents "at least 1000 farmers" producing subtropical fruit (avocado, mango, litchi), citrus fruit and macadamia nuts. In terms of market participation, these farmers include the whole range of households with "a few trees in their backyard" which they harvest for household consumption to 24 farmers who have attained GlobalGAP accreditation which qualifies them to sell on national fresh produce markets and export their produce (Sikhipha, 2019b; Raats, 2019b).

According to data that Olofsson (2019:8-9) acquired from the Limpopo Department of Agriculture and Rural Development there are 1163 smallholder orchard owners in Vhembe District. Her research suggests that the actual number could be "substantially higher" because data collected from the eight tribal authorities of Tsianda, Lwamondo, Khaku, Njhakanjaka, Tshakuma, Rambuda, Mphephu and Tshivase show 4713 registered orchards covering 9746 ha, or an average of 2,07 ha per orchard.

Ms Namadzavo Sikhipha (2019b), an assistant director in the Limpopo Department of Agriculture and Rural Development (LDARD), says 538 mango farmers, 184 macadamia farmers and 204 avocado farmers – a total of 926 - are registered with LDARD in Vhembe District. This seem to concur with Mankhili's number of 1000 study group members which also includes citrus and litchi farmers. Once again, these numbers do not tell the full story because not all growers of subtropical fruit and macadamia nuts are registered with the department.

In Vhembe District mangoes are grown on plots of 10 ha, 1 ha or half a hectare. Most of the 538 mango farmers registered with the LDARD sell the mangoes to the achar factory when they are still green (unripe). A number of them also sell mangoes for drying, but only the cultivar Keitt can be dried, while any mango can be made into achar, "even the traditional mango, the one with a lot of fibre which is very sweet" (Sikhipha, 2019b).

Avocado growers seem to have more options:

There are a few of the avocado farmers who are doing very well, they even have GlobalGAP (accreditation allowing them to export their produce). They take their avocado to Westfalia (an integrated grower, packer, processor and exporter of avocados near Tzaneen). A lot of avocado we are eating here at home. You can come with your bakkie around here and buy avocado. The bigger proportion of what is produced, is sold here (Sikhipha, 2019b).

Sikhipha (2019b) says macadamia farming is “more commercial” because farmers need to take the harvested nuts to a processing plant to be de-husked and shelled:

You can't open it. It is very tough. The price they get for a kilogram of macadamia nuts depends on the season, it depends on the demand and the quality, especially the quality. (At harvest time) farmers take a sample to the processor to have it valued. Different qualities are used for oil or exported (Sikhipha, 2019b).

Although this report's focus is on avocados, macadamia nuts and mangoes, Sikhipha (2019b) reports that fewer banana (25-30) and litchi (92) farmers are registered with the Limpopo Department of Agriculture and Rural Development in Vhembe District. They sell all their produce locally:

(They produce) a lot of bananas, and a lot is eaten here. I don't think the bananas are going anywhere. Everybody is selling bananas. They are very cheap, for R5 you can get 10 of them (Sikhipha, 2019b).

For her study on the determinants of competitiveness among smallholder avocado farmers in two municipalities of Vhembe District Masikhwa (2018:76, 41) surveyed “a small sample” of 60 farmers out of a population of 142 smallholder avocado farmers in 14 villages. Of them, 42 (71%) participated in informal markets and eight (8) were exporting avocado. The rest sells to shops and processing companies (Masikhwa, 2018:42). She also found that their competitiveness would improve if they had more trees, i.e. more land.

In order to determine transaction costs and changing agro-food markets in Vhembe and Mopani Districts, Aphane (2011) interviewed 234 small-scale mango farmers. Due to high transaction costs only 54 (23%) of these farmers participated in formal markets, e.g. export, supermarkets or processing companies (Aphane, 2011:146). The rest of the farmers sell to bakkie traders and buyers in their communities.

The fact that a significant number of smallholder farmers and small black commercial farmers are involved in producing subtropical fruit and macadamia nuts, albeit it with mixed success, points to opportunities for expansion of their numbers and the area grown by them. It further demonstrates a class of emerging commercial farmer who could potentially move out of the communal areas of Vhembe District to farm on redistributed land.

3.2 Organisation of the production of subtropical fruit by smallholders and small-scale black commercial farmers

Although there are a handful subtropical fruit and macadamia farmers with land title, or leases on PLAS farms, Sikhipha (2019b) says most of the farmers registered with the LDARD have a PTO (permission to occupy) on communal land. She regards their tenure as rather secure:

We never see it as a problem. The challenge that they mention is when farmers want to borrow money from a bank. For development it is OK, and for infrastructure. A PTO is like owning that farm, nobody will take it from you. We don't have a problem with PTOs. Land Bank accepts a PTO (as security). Everywhere you ask money ... at Land Bank, the dti (Department of Trade and Industry), a PTO is recognised (Sikhipha, 2019b).

Donkin (2019), on the other hand, considers PTO-holders' tenure situation “one of their big constraints”. He says most of the farmers that are members of the Subtrop growers' associations are “smallholders with 1 to 3 hectares, with an average of around 3 to 4 hectares and the biggest holding of 10 ha”. Fruit South Africa's (2019) transformation report also considers the fact that communal land cannot be used as collateral finance for input and equipment “the most serious constraint preventing smallholder farmers from expanding their operations and becoming commercially viable”.

The problem is that land under a PTO cannot be used as collateral for a bank loan. Maybe it is time to accept PTO's as "records of formally allocated individual land rights" (Smith, 2008:54), and find creative ways to transform these rights to include women and make it possible for PTO holders to use it as security to access finance.

Most farmers in Vhembe District operate under many constraints. Although there are 69 public smallholder irrigation schemes in Vhembe district, few of them are used for tree crops (Van Koppen et al, 2017). Barely 1% of farmers irrigate their trees. Farmers also do not apply fertilizer or pesticides, most likely because they cannot afford it (Sikhipha, 2019b).

Most of the mango growers sell their mangoes green/unripe to achar processors in Levubu. Sikhipha (2019b) says it is better to sell the mangoes before they are ripe because "when the mangoes are ripe there is a lot of mangoes in Venda. *Bacteria invadens* had been declared present here because every household has five mango trees, ten mango trees. Household mango growers don't care about pests and when the mangoes rot, they leave them under the tree."

Sikhipha (2019b) says for certain farmers selling green mangoes are the best option, especially because there is a demand for them.

When the green mangoes are ready to be processed to achar many processors want mangoes. They (processors) will come to pick the mangoes or to collect them. Different firms come with a bakkie or a big truck. It is not too much of a problem, but we have a lack of value chains, we should be making juice ourselves, the ripe mangoes are just rotting (Sikhipha, 2019b).

Access to water and the lack of water rights and irrigation infrastructure are limiting production, especially during recent droughts. Where irrigation schemes exist, many of them are dysfunctional. (Van Koppen et al, 2017), or predominantly used for vegetable production. Most farmers do not irrigate their tree crops beyond the first couple of months after planting new trees which usually result in yields that are much lower than the averages for commercial production (Sikhipha, 2019b).

Chawiche (2015:47) found 86 avocado growers and the size of their land ranged from 0,25 ha to 48 ha with an average of 6,18 ha. Their land was also acquired through a PTO, and therefore not considered an asset. At least 70% of these farmers owned agricultural implements, while just under 20% rented machinery. Women are growing subtropical fruit on PTOs where their husband had passed on and they have inherited the land (Sikhipha, 2019b).

Two challenges faced by farmers in Vhembe District are theft and a lack of farm records (Sikhipha, 2019b). "These farmers are not keeping records. (They display) poor management. They are doing a lot of things and are so everywhere ... they don't focus. We also have lot of production waste."

Even if small-scale farmers get macadamia trees from registered nurseries and do the right soil preparation before the plant the tree, Jaskiewicz (2015:55) found that it takes much longer for small-scale farmers' trees to start producing nuts because of a lack of water. A farmer said to her "Macadamia they take long. They take almost seven years before you can harvest. Especially in a dry land like this. It will be 8 years maybe. We are cultivating in dry land. That is the reason why they take so long. We don't have water. Look at what those plants at Maclands [commercial farm] look like. They have two years and now they are big, because they got water."

Although some researchers (Chawiche, 2015; Manenzhe, 2015) found that smallholders did not have access to enough land, Jaskiewicz (2015) and Sikhipha (2019b) says that farmers are *not* using all the land they own. This is ascribed to a lack of workers, time and resource constraints, e.g. low levels of mechanisation.

They seldom own tractors, spraying equipment or other machinery. Nevertheless, they realize that the machinery is crucial while running a macadamia nut farm as shown by the quote: 'If you don't have modernized equipment you can't make it, you won't. It needs modernized equipment'. Moreover, an irrigation system is usually not in place on the farm or is not functioning. The problem of water has been also identified during the focus group as the most pressing problem (Jaskiewicz, 2015:55).

Because it can take up to five year to get new avocado seedlings, farmers find it difficult to expand their orchards. “We can only get avocado trees in 2023. There are no certified nurseries in Vhembe. We always preach to the farmers ‘buy only from certified nurseries, we are professionals’” (Sikhipha, 2019b). Donkin (2019) considers this as one of the biggest constraints. He ascribes the scarcity of avocado trees to the demand for trees and the fact that it takes 18 months to two years to make a virus-free tree. It is often suggested that government establishes tree nurseries, but it is not an operation that is as straightforward as it seems. Farmers can grow avocado trees from the stones, but it is not guaranteed that these trees will be resistant to soilborne diseases.

Most of the work is done by hand, says Sikhipha (2019b). “We have zero machinery to prepare the soil. Everything is done with hoes. Can you believe, a person will buy 500 trees, de-bush 5 hectares of land by hand, dig the holes by hand, plant by hand and water every tree with a bucket until it becomes stable and then he will no longer irrigate?”

Once they have harvested the fruit, the farmers’ challenges continue because they have no room to pack and store their fruit. Sikhipha (2019b) says they try and encourage farmers to at least do the packing in the shade or under a tree. “That’s the other challenge, if you pick it today, it must leave today.”

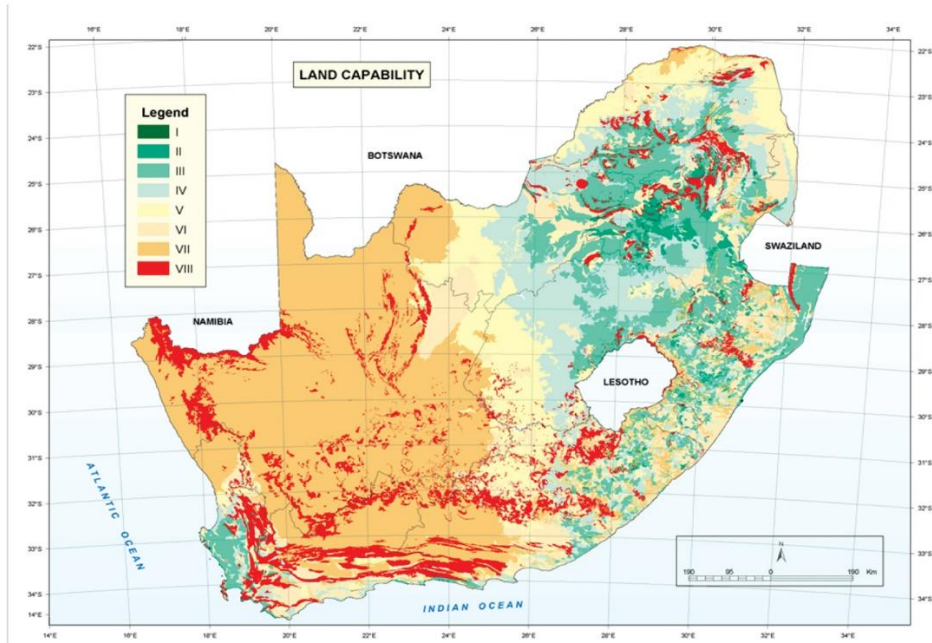
Farmers often do not have their own transport, and Sikhipha (2019b) considers the renting of transport to cart fruit to the market as a form of job creation. But even if the farmers can arrange transport, there is often no access road to the orchards. Sometimes the orchards are in mountainous areas. “They will carry the fruit on their head from their farms to the access road nearby. Farming is their passion, that why they are doing it” (Sikhipha, 2019).

3.3 Land types, infrastructure and other resources

The agro-ecology of Vhembe District is particularly well-suited to subtropical fruit and macadamia nut production. According to Oni et al (2012) Limpopo province is “endowed with abundant agricultural resources ... it is one of the country’s prime agricultural regions for the production of fruit and vegetables, cereals, tea and sugar”. Donkin (2019) says the quality of land in the (old Venda) area is “good ... some of the best and most beautiful land with deep soils, good climate and good rainfall of 800 to 1000 mm per year, very similar to Tzaneen”.

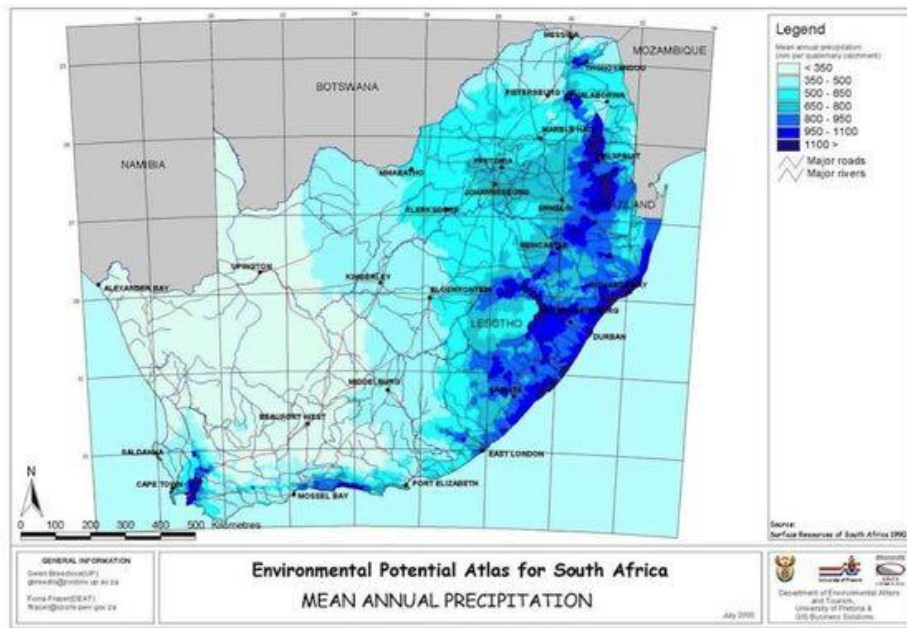
The land capability map of South Africa (figure 1) and rainfall map for the country and Limpopo (figure 2 and 3) show that the part of Vhembe District where smallholder farmers and small-scale black commercial farmers grow subtropical fruit orchards and macadamia nuts are situated in the higher rainfall areas with some of the highest land capabilities.

Figure 1: Land capability map of South Africa



Source: Anneliza Collett, DAFF, 2013

Figure 2: Mean annual rainfall, South Africa

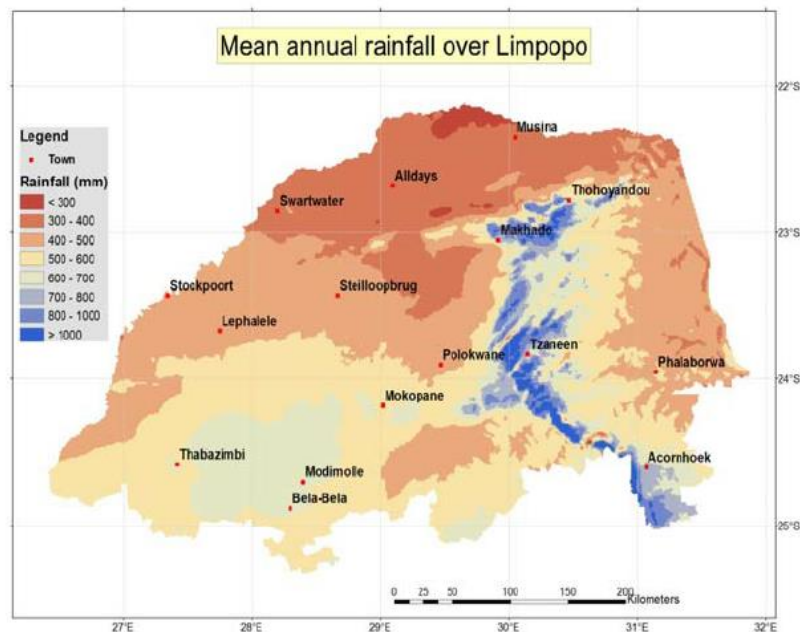


Source: Department of Agriculture, Forestry and Fisheries

The area has a subtropical climate. Daily temperatures at Thohoyandou vary from about 25°C to 40°C in summer and between 22°C and 26°C in winter. The average annual rainfall is approximately 800 mm, and 95% of the rain occurs between October and March. Mid-season dry spells during critical periods of growth are not uncommon. Soils in this area are predominantly deep (more than 1,5 m), red and yellow well-drained clays (Mzezewa et al, 2010), characteristics which make them ideal for subtropical fruit and macadamia nut trees (Taylor and Gush, 2007).

According to the South African System of Soil Classification of the Soil Classification Working Group, 1991) most of the soils are classified as the Hutton form (Mzezewa et al, 2010). This is one of the soils most suited for growing avocados and mangoes (Taylor and Gush, 2007). Macadamias grow on a wide variety of soil types, as long as the soil is well drained (Taylor and Gush, 2007).

Figure 3: Mean annual rainfall, Limpopo



Source: ARC-ISCW (2014) in Mpandeli et al, 2015

Infrastructure in Vhembe District is lacking. Farmers do not have fences to protect young trees against livestock and wild animals (Mankhili, 2019), and most of the hard and backbreaking work to establish orchards is done manually, from preparing the land to weeding and watering it (Sikhipha, 2019b). Many farmers do not have water rights (Sikhipha, 2019b):

Hey, the situation with water rights is difficult. The majority of smallholder farmers don't have water rights. Most of them do dry land agriculture and may water their trees with buckets, even 20 hectares, especially when they start a new orchard. There is no irrigation on these farms (Sikhipha, 2019b).

Van Koppen et al (2017) found that few of the public irrigation schemes in Limpopo are aimed at small-scale subtropical fruit and nut growing and no evidence could be found of tree farmers using that water for their orchards in a form of farmer-driven irrigation (Scoones, 2019).

3.4 Other kinds of farming undertaken by smallholder farmers and other sources of income pursued in order to secure their livelihoods

Smallholder farmers pursue a wide range of activities to secure their livelihoods and earn an income, e.g. farming, salaries, pensions and government grants. Similar diversification is evident in their farming enterprises. Research shows that smallholders and small-scale black commercial farmers seldom grow only subtropical fruit or nuts. In fact, Aphane's (2011:118, 120) found that "almost every household owned some kind of livestock" and produced a "mix of agricultural commodities" which includes vegetables such as cabbages, beetroot, pumpkin, spinach and butternuts as cash crops, and subtropical fruit and nut orchards.

Even home gardens in Muthale and Tshakuma villages in Vhembe District demonstrates such diversification, and De Hon (2015) found:

Fruit trees were abundant in the home gardens visited. Only one of the 30 households engaged in this research did not have a fruit tree in their garden. In the other households there were always at least one or more mango trees, mostly some banana trees and often an avocado tree. Other trees that were pretty common were: nartjie (mandarin), orange, lemon and lychee. Guava and pawpaw(papaya) also grow in a lot of gardens (De Hon, 2015).

Sikhipha (2019b) agrees: “Farmers will be living off different kinds of things. You will find half of them, they keep cattle, chicken, goats (and) plant maize and vegetables like cabbage. Orchard farming is just a seasonal crop.”

In their survey of 76 public smallholder irrigation schemes in Limpopo Van Koppen et al (2017:13) found that the main crops cultivated were maize, vegetables (including tomato, onion, peas, butternut, dry bean, groundnut and nuts) and trees (banana, mango, avocado and other fruits, cotton, sorghum or tobacco. “Most often, the crop choice was mixed.”

Sikhipha (2019b) also mentioned that some of the farmers were teachers or had pensions from working elsewhere before they retired in Vhembe District. Olofsson (2019:12) found that non-farm income was “of critical importance” to sustaining agricultural activities by cross-subsidising initial capital investments, running costs and labour. Aphane (2011) found that the average monthly income for mango farmers in his sample was R11 104, while their average savings were R14 538.

3.5 Support services for subtropical fruit production

Compared to smallholder farmers in the rest of the country, subtropical fruit and macadamia farmers in Vhembe District of Limpopo appear to be served well by public extension services with support from the respective industry bodies.

Study groups for avocado, mango, macadamia and citrus farmers in Vhembe District were initiated in 2007 after LDARD signed a memorandum of understanding with Subtrop, the Agricultural Research Council (ARC) and the Citrus Growers Association (CGA). This initiative flows from LDARD’s strategic decision to have a commodity approach whereby farmers were “mobilised and grouped” into different commodities (Sikhipha, 2019a).

Sikhipha (2019a) says the purpose of the commodity groups is to empower emerging fruit growers and improve extension services with technical advisory services, skills development and capacity building, mentorship and project feasibility. Study group activities are aimed at creating marketing opportunities, developing packing facilities, industry information sharing, research and development. Each commodity group has four study group meetings per year and two information day sessions. It is not clear how these activities are or will be financed.

According to Fruit South Africa’s (2019) transformation report researchers, commercial farmers and members of Subtrop’s technical staff present talks and provide practical orchard management advice at these study group meetings. Visits are also arranged to commercial farms, during which smallholder producers get “first-hand experience of world-class production systems”.

Sikhipha (2019a) said at the 2019 Subtrop transformation summit in Witrivier that participation in study group activities had helped farmers to improve their production and yield in terms of more trees, better fruit quality and higher income. “They are focussed on national fresh produce markets and export marketing. The smallholder farmers are more organised and focused and relationships among farmers have improved through sharing information.”

She added that more farmers have received GlobalGAP certification and their knowledge of pruning, spray programmes and the importance of using seedlings from certified nurseries has improved.

“They understand the importance of affiliation to commercial farming associations and attending symposiums” (Sikhipha, 2019a).

This initiative is aimed at “encouraging commercial production” and the need to help emerging fruit farmers in Vhembe District to produce more fruit of high quality that will be sold on national and international markets. To further this aim, from 2008 to 2012 the national Department of Agriculture, Forestry and Fisheries subsidised the donation of 282 292 fruit tree seedlings to 181 beneficiaries (Sikhipha, 2019a). She says the support service is good for training, but financial support is quite constrained. “Agriculture needs a lot of money. Even R1 million is just enough for one person” (Sikhipha, 2019b).

Mr Jack Murado (2019), a black commercial mango farmer on a Plas farm near Letsitele says the present manner in which government supports farmers does not work. “They give you money once, and then they move on. We need an institution that can give us loans at subsidised interest rates.”

Subtrop does not offer extension services to smallholder farmers but have been training extension officers employed by the Limpopo Department of Agriculture and Rural Development for the past ten years. They also support study groups for the different subtropical fruits and macadamia nuts (Donkin, 2019). He thinks they are making progress, because the smallholder farmers have become more autonomous. “They work out the annual programme for their study group and decide what they want to have addressed at meetings” (Donkin, 2019).

“Selected” macadamia growers have been assisted to buy trees, sprayers, fences and irrigation pipes. The farmers have to pay 50% of the cost and the SA Macadamia Growers’ Association the rest. At least 18 farmers have been assisted by this scheme to date” (Fruit SA, 2019).

According to Fruit SA’s transformation report the study group initiative is ready to be rolled out in other subtropical fruit and macadamia producing provinces, KwaZulu-Natal and Mpumalanga. It has already signed memoranda of understanding (MOUs) with the Departments of Agriculture and Rural Development in Limpopo and in KwaZulu-Natal and is in the process of signing a similar MOU in Mpumalanga:

Under these MOUs, Subtrop trains government extension officers in the technical aspects of the Subtrop crops in order to equip them to assist smallholder farmers. In addition, Subtrop is providing input to provincial research and extension programmes, information days and the placement of interns on commercial farms (Fruit SA, 2019).

Smallholder subtropical fruit and macadamia farmers also receive support from two of the big farming groups, Westfalia and Z22 (Khumalo, 2013, Van der Walt, 2018). Z22 offers ten internships per year to students who do short projects on production, packing and marketing within the group’s operations under the guidance of a mentor (Van der Walt, 2018). Westfalia started a smallholder farmer development programme in 2009 to facilitate the strategic inclusion of small farmers along the value chain (Khumalo, 2013:30-31).

The study group approach was criticised by one of the macadamia processors who said “You have to understand their [emerging farmers’] limitations. They barely have diesel to bring their nuts and getting to a study group is ridiculous” (Jaskiewicz, 2015:50).

Masikhwa (2018:75-6) found that agriculture is not served well by the current system whereby extension officers are expected to be “all-rounders and serve a large number of farmers”.

The support to emerging farmers must be provided collectively in relation to production facilities; technical skills; credit access; marketing and marketing information; leadership capacity building; infrastructure support and so on.

Most of the farmers Jaskiewicz (2015:61) interviewed said while they appreciated the technical support, they were not receiving the kind of support that will help them to overcome their challenges. She quotes a farmer as saying:

With this technical support there is no problem. The main problem is with infrastructure, equipment, irrigation, because that one is installing progress. ... once we have (an) irrigation system it will be easier for us to harvest quickly and to have income so we can come up with other infrastructures in the field like packhouses and a place where we can put a de-husker and de-husk macadamia nuts from the field. Because they need to be de-husked as soon as possible before they can be sent to the processing company (Jaskiewicz, 2015:61).

The Limpopo Department of Agriculture and Rural Development acknowledges only one future trajectory, and that is making commercial farmers of all smallholders, but does not necessarily give them the tools to become commercial farmers. It does not take farmer differentiation into account and extension is therefore on a one size fits all basis.

3.6 Subtropical fruit value chains

Subtropical fruit and macadamia nut value chains are relatively long. Value can be extracted at every node, from tree nurseries and companies that install irrigation and earthmoving companies, production, packing, processing and selling at local markets and exporting, but in none of the value chains are the growers the leaders. These sub-sectors all have a fresh and processed component, which utilises a considerable proportion of mango production and less of avocado and macadamia production. Several integrated businesses operate in the avocado sub-sector.

3.6.1 Avocado

The basic value chain for avocado is as follows: Input suppliers (tree nurseries and agrochemicals, e.g. fertilizer and copper) → Producers → Ripening, packing and storage facilities → transport → “market” → (hawkers selling on street corners, bakkie traders, fresh produce markets, export, processing into avocado oil and guacamole).

No data could be found on concentration in the subtropical fruit and macadamia nut sub-sectors, but anecdotal evidence and observation suggest that the smaller avocado farmers in the Tzaneen area have all been bought out by large farmers. At least three companies, ZZ2, Westfalia Fruit and Halls (Van Zyl, 2019, Fruit South Africa, 2019, Westfalia, not dated) contain complete avocado value chains within their operations. Through these vertically integrated supply chains they “grow, source and ripen, pack, process and market” avocados and other produce “across the year and across the globe” (Westfalia, not dated). They perform some of these functions on behalf of small-scale avocado farmers (Sikhipha, 2019b). “There are a few of the avocado farmers (in Vhembe District) who are doing very well, they even have GlobalGAP accreditation. They take their avocado to Westfalia.”

However, Sikhipha (2019b) says a lot of avocado is consumed “at home”, or “you can come with your bakkie around here and buy avocado. The bigger proportion of what is produced, is sold here”. Of the 60 smallholder avocado farmers that Masikhwa (2018:76, 41) surveyed in in Vhembe District 42 (71%) participated in informal markets and eight (8) were exporting avocado. The rest sells to shops and processing companies (Masikhwa, 2018:42).

The nurseries and royalty holders probably play the leading role in the avocado value chain in general. The demand for young avocado trees can be so high that producers can wait up to five years

to get the trees after they've paid a deposit and placed an order with a nursery. The price of a tree includes once-off and annual royalties (Farmer AV).

3.6.2 *Macadamia*

The value chain for macadamia nuts is predominantly formal due to the amount of processing the nuts need to undergo before they can be sold and consumed. A basic simplified value chain is shown here: Input suppliers (tree nurseries and input suppliers) → Producers → Processors (de-husking and/or shelling, drying, packaging or macadamia oil) → transport → buyers/marketers (local market and export).

The South African macadamia industry is export driven, and more than 95% of the annual production is exported "in shell" or as macadamia kernels (Macadamias South Africa, 2018). Although some news outlets predict on a regular basis that the macadamia bubble is about to burst (Fresh Plaza, 2017b), prices are high, and even the macadamia shells, the waste products from processing, can be used gainfully. Macadamia nut shells are burnt to make carbon filters to purify water, to provide energy to drive macadamia dryers, or as a mulch in gardens (Engineering News, 2019, Groenewald, 2013, Raats, 2017).

The 184 small-scale macadamia farmers in Vhembe District who are registered with the Limpopo Department of Agriculture and Rural Development sell their produce to processors such as Green Farm at Levubu or MacRidge. Sikhapha (2019b) says macadamias are "more of a commercial enterprise" and the price farmers get for their produce depends the "season, demand for macadamias and quality, especially the quality, which determines whether the nuts will be processed to oil or exported".

No legal informal market value chain seems to operate for macadamias, but at least 2000 tonnes of macadamia nuts, valued at R146 million, are stolen every year and sold to "syndicates in Mpumalanga" or exported to Zimbabwe. Theft occurs "all the way along the value chain, from farm workers to independent harvest contractors to theft at processing facilities or by hawkers" (Fresh Plaza, 2017c).

3.6.3 *Mango*

Most mangoes produced in South Africa can be sold more profitable in local markets than in export markets. Export markets are "needed in peak season for mangoes when there was an oversupply in the market". Mangoes are versatile and can be picked green/unripe to make achar, while ripe mangoes can be sold to local or international fresh produce markets, dried or processed into juice (ftwonline.co.za, 2019). The value chain for mangoes: Mango tree nurseries and input suppliers → mango growers → green mangoes sold to achar processors, ripe mangoes sold to processors (juicing or drying), bakkie traders, on fresh produce markets or exported.

Most smallholder mango farmers in Vhembe sell their mangoes green/unripe to achar processors. Due to weak pest control, orchard sanitation and unsuitable cultivars ripe mangoes which are not sold to achar processors often rot and cannot be sold. Smallholder farmers who grow Keitt, the mango cultivar most suitable for drying, sell their mangoes to dryers (Sikhapha, 2019b).

In order to determine transaction costs and changing agro-food markets in Vhembe and Mopani Districts, Aphane (2011) interviewed 234 small-scale mango farmers. Due to high transaction costs only 54 (23%) of these farmers participated in formal markets (Aphane, 2011:146). The rest sells to informal traders and consumers in their community.

In loose value chains mango farmers play a leading role in terms of price setting and even get buyers to collect the fruit from them, but when farmers sell in tight value chains, the supermarkets and processors play the leading role. When farmers sell to informal traders or hawkers, Aphane

(2011:122) found that 76% of the smallholder farmers in his sample set the price, while the rest negotiated a price with the traders. However, when selling to supermarkets, most of the households are price takers: 60% of the farmers said that the supermarkets set the price. In the case of processing companies, 84% of farmers in Aphane's (2011) sample said that these companies set the price. When selling to the national fresh produce markets, all the farmers said they were price takers.

While farmers are usually expected to deliver their produce to "markets", approximately 80% of farmers in Vhembe indicated that informal traders and consumers in the community collected the commodities from them. However, when selling to formal markets most of the farmers said they have to deliver the commodities themselves (Aphane, 2011).

Finally, while tight value chains, especially contracts with large supermarkets and export agents can be quite lucrative, the present role and potential of loose value chains in enhancing farmers' income earning opportunities should not be underestimated. Because transport is often a challenge in rural areas, the proximity of buyers to farmers are an advantage. "Informal" buyers demand a range of different sizes and qualities of products, often collect produce from growers and pay cash on the spot.

3.7 Production, income and employment

Information about the levels of production achieved by smallholder farmers and small-scale commercial farmers of subtropical fruit is scarce, as is information about the incomes they earn and the numbers of people that are employed. What little information that could be gleaned from literature and interviews will be supplied here.

Sikhipha (2019b) says smallholder farmers' yields are half that of the industry average. She is probably referring to small-scale black commercial farmers:

Remember they don't have irrigation, and some are not fertilizing. They maybe do spraying (sic). For avocado they get 10 t/ha instead of 25 t/ha (no irrigation, no fertilization), for macadamia 2 t/ha instead of 4 t/ha and for mango 12 t/ha instead of 35 t/ha. We do have farmers who can reach up to 25 t/ha, but we don't count them that much because they are few (Sikhipha, 2019b).

Olofsson (2019:17) found that small-scale capitalist farmers on average earned a gross annual agricultural income of R420 500, though it is highly differentiated. Hired labour is their main source of labour, and they employ on average six fulltime and 20 seasonal workers and no family labour. Gross margins attained by the 60 farmers in Masikhwa's (2018) sample ranges from a couple of farmers for whom costs were more than income to farmers who made gross margins of R675 000/ha.

Sikhipha (2019b) says even though people farm on a very small scale, employment is being created:

Let us take mango for example. This grower does not have a bakkie, so he will hire a bakkie to take his green mangoes to the achar factory. Those farmers who are going to pick ripe mangoes, will need say 10 pickers ... And those who are stealing, they are also employed, because they steal and sell (Sikhipha, 2019b).

Most of the macadamia farmers get help from their wife and employ one or two permanent workers on their farm, yet during harvest they would hire additional part-time workers. "Also, ... some farmers are not using all the land they own due to a lack of labour force, time constraints or shortage of resources. Mostly, they draw on hired labour, which tends to be very casual" (Jaskiewicz, 2015:53, 55).

The sketchy evidence in this section demonstrates that some small-scale commercial farmers are farming profitably and are creating jobs. However, the only way that large numbers of jobs can be created is to expand the hectares grown of these labour-intensive fruits and nuts. Water available for irrigation and markets may limited these opportunities.

3.8 Processes of social and class differentiation

The differentiation of smallholder farmers in general is well-documented, even if researchers use different categories. For vegetable farming in South Africa Cousins (2014) suggests four categories: subsistence-oriented smallholders, market-oriented smallholders in loose value chains, market-oriented smallholders in tight value chains and small-scale capitalist farmers (Table 3). These farmer categories are differentiated in terms of the objective of their production, i.e. household consumption and/or cash income, proportion of their output that is marketed, the contribution that their agricultural production makes to the household's income, the type of labour employed, the extent of mechanisation, capital intensity and their access to finance.

Table 3: Cousins and Chikazunga's typology of smallholders in SA today

	Subsistence-oriented smallholders	Market-oriented smallholders in loose value chains	Market-oriented smallholders in tight value chains	Small-scale capitalist farmers
Objective of production	Household consumption of additional food	Household consumption + cash income	Cash income + some home consumption	Profit
Proportion of marketed output	None or insignificant	50% or >	75% or >	100%
Contribution to household income	Reduces expenditure on food	Variable – from small to significant	Significant	Very significant
Labour	Family	Family + some hired	Family + significant numbers hired	Hired
Mechanisation	Very low	Low	Medium to high	High
Capital intensity	Very low	Low	Medium to high	High
Access to finance	Absent	Some	Significant	Very significant
Numbers in SA	2 – 2.5 million hh	200 – 250 000 hh	5 to 10 000	5 – 10 000

Source: Cousins and Chikazunga (2013) in Cousins, 2014

A further useful typology of smallholder farmers, especially because it was developed for tree crop farmers, was designed by Olofsson (2019). She found four “clusters” of farmers, differentiated in terms of accumulation and agricultural capitalisation. Her three variables are the primary means of securing a livelihood, capital investment in agricultural production and the degree to which hired labour could be accessed. She developed the following typology for tree crop farmers in Vhembe District, Limpopo: (a) Cluster 1: welfare dependent petty commodity producer, (b) Cluster 2: Agricultural petty commodity producer, (c) Cluster 3: Salaried small-scale capitalist and (d) Cluster 4: Agricultural small-scale capitalist (Table 4).

Table 4: Olofsson's typology for smallholder subtropical fruit and macadamia nut farmers

Categories and criteria	Welfare dependent petty commodity producer	Agricultural petty commodity producer	Salaried small-scale capitalist	Agricultural small-scale capitalist
Primary means of securing a livelihood	Welfare (state pension) and farming	100% of income from farming	Salary from profession and farming	Some additional non-farm income

Capital investment in agricultural production	Own money	Own money	Personal	Bank
Access to finance	None or limited	None or family	Banks	Banks and other
Labour	Own labour, limited hired labour, some family labour	Own labour and limited hired labour	Hired labour and some family labour	Hired labour

Source: Olofsson (2019)

Cousins and Olofsson (2019) are explicit about farmer differentiation, whereas Sikhipa (2019b), Jaskiewicz (2015) and Aphane (2011) imply differentiation (see table 5) on grounds of investment in farming, assets, networks and farming experience. Sikhipa (2019b) once collected data and found that people who “are doing well in small-scale farming ... when you ask about their backgrounds, they were teachers, they had worked in Johannesburg, they had a little bit of a pension”:

Those who are struggling are subsistence farmers, they are eating everything they grow. They are not even able to buy a tank. They cannot say I made so much money ... If they take the bakkie (load of green mangoes) to achar, they get R600, but as soon as they get home the child is waiting for R200, the mother is waiting for another R200. ... in the end, they cannot show anything for it. A big proportion is subsistence farmers, even 80% (Sikhipa, 2019b).

Aphane (2011:vi) found differentiation based on assets, size of land, networks and experience. He found that mango farmers who sold more to formal markets than informal markets had storage facilities and their own transport. They were on average 8 years older than other farmers and used their “stronger networks and acquired experience” developed over a longer period to sell to formal markets.

A large proportion of households that own larger pieces of arable land participate in the formal markets, which implies that they are able to produce a marketable surplus. Households that have a high mean value (in Rand) of cattle participate more in formal markets than in informal markets (Aphane, 2011:vii).

For macadamia nut farming by small-scale black commercial farmers Jaskiewicz (2015:67-68) found that some of them were successful because they had other sources of income, mostly from teaching, whereas “others couldn’t make it work ... 4-5 years is too long to wait for the trees to produce and live without any income ... Of the 15, seven are quite successful. These are the ones who have other jobs.”

The “long wait” for tree crops to become productive and realise an income has implications for land reform policy. Farmers will either need financial support, in terms of bridging finance, or should be able to grow cash crops, e.g. vegetables or herbs.

Table 5: Smallholder differentiation found or implied

Olofsson (2019)	Aphane (2011)	Jaskiewicz (2015)	Sikhipa (2019a, 2019b)
Welfare dependent petty commodity producer		Unsuccessful farmers	“Subsistence farmers” who eat everything they grow and occasionally sell to achar processors

Agricultural petty commodity producer	Asset-poor and younger (avg age 44) farmers who sell to informal markets. Do not have storage facilities or transport Land size smaller, fewer cattle		
Salaried small-scale capitalist	Asset-rich, older, more experienced farmers with strong networks that enable them to sell to formal markets. Farms are bigger and own more cattle.	Successful macadamia farmers are “those with another income from jobs” to carry them over the period before the trees begin to produce nuts	Farmers whose success is based on the fact they’ve worked elsewhere and earn a pension from that employment
Agricultural small-scale capitalist			Farmers who sell to formal markets and export (24 farmers who’ve attained GlobalGAP accreditation)

4 The potential for expanding small-scale subtropical fruit and nut production through land reform

The evidence presented in earlier sections demonstrate that smallholders and small-scale black commercial farmers are active in the avocado, mango and macadamia sub-sectors, albeit with mixed success. There are opportunities and potential to build on their success with adequate and targeted financial, infrastructure and technical support, but also to extend it to other districts. Unfortunately, the many and varied constraints threaten to engulf the opportunities.

4.1 Opportunities

There are opportunities or potential to expand subtropical fruit and macadamia production by smallholder farmers, especially in parts of Vhembe District and other parts of Limpopo where residents have been farming for years and been able to earn a living through producing subtropical fruit, macadamia nuts and vegetables (Lahiff, 2000), but most certainly in parts of Mpumalanga and KwaZulu-Natal as well. This legacy or culture of farming vests abilities, skills and knowledge in people of the area and provides a certain continuity which should make scaling up and expanding to other areas not too difficult, provided the right support is given.

The three tree crops discussed in this report have good income potential as well as opportunities in different markets. Mangoes are versatile fruit with a sizeable local market and many opportunities for processing, while avocados and macadamia nuts are both high value crops. A benchmark survey of 19 commercial avocado farmers in Limpopo shows that incomes can range from R75 000 to R300 000 per hectare (Winter, 2019a). Macadamia prices are R224,72 per kilogram for kernel and R75,58 per kilogram for nut in shell (Macadamias South Africa, 2019). This roughly translates into an income of R375 000 per hectare. Costs are in the region of R25 000 per hectare (Van Wyk, 2018). Fears about a decline in prices, demand and markets for these fruit and nuts have not yet materialised (Fresh Plaza, 2017b, Van Wyk, 2018).

Research by Aphane (2011) and Van Koppen et al (2017) also shows that many small-scale farmers possess marketing skills, are producing for ‘the market’ and a certain determination that helps them to overcome many obstacles to reach buyers or markets:

Unlike the belief that smallholders are not ‘commercial’ and primarily produce for subsistence and own consumption, the opposite belief was found to be a fact. In

spite of problems with lack of access roads, expensive transport, market gluts and middlemen, marketing was the most important aim, and informal markets were the main outlet (Van Koppen et al, 2017).

They find a way to sell their produce, set prices and arrange transport or get buyers to collect produce from them and thus lower their transaction costs (Aphane, 2011). Literature also shows that there is a desire to farm and to produce for high value markets, as well as a willingness to invest their own savings, part of their non-farm salaries or pensions in agricultural production (Jaskiewicz, 2015; Olofsson, 2019).

4.2 Constraints

There are numerous constraints to realising the potential for successful expansion of the number of smallholder and small-scale farmers producing subtropical fruit through redistributive land reform. Most of them are associated with water and climate challenges, a lack of capital, skills and market access. In fact, a lack of capital for agricultural development already make smallholder farmers unable to use all the land they have access to as PTO holders (Sikhipha, 2019b, Olofsson, 2019).

Depending on the markets these farmers aspire to sell in, the entry barriers can be quite high in terms of quality requirements and transaction costs. Chawiche (2015) found that because payment for avocados is tied to the quality and quantity of the fruit it is also tied to a variety of requirements to meet market standards:

When asked about the biggest constraints in production and marketing, issues concerning irrigation, input costs and the condition of the roads to and locations of the farms were the main themes arising ... Water being the life source of every agricultural production meant that the lack of adequate irrigation schemes resulted in the reliance on rainfall and prohibited most of the avocado growers in the area to yield high volumes and a qualitatively good crop ... (Chawiche, 2015:54).

Chawiche's study found that 61 % of 77 avocado farmers did not have access to irrigated land and their production was also limited by high input costs in terms of fertiliser, herbicides, machinery, petrol or diesel and the payment of labour. According to one of the farmers "Prices of avocados have stayed the same for the last ten years ... prices of fertilizer, petrol, diesel, labour ... everything has gone up ..."

Also, because their children were often not interested in farming or held jobs in Johannesburg or elsewhere, farmers had to find and pay for labour. Chawiche (2015:54) found that low levels of mechanisation made labour costs inevitable.

Interviews with macadamia farmers in Limpopo showed that the main constraints the farmers are facing are the lack of financial and natural resources (land, water) as well as a lack of agricultural implements and inputs like machinery, herbicides, pesticides and fertilizers. Further challenges include "labour, fires, theft, a lack of infrastructure (roads), price fluctuations and damage caused by animals". A farmer said farming "needs money ... when you employ people you must expect that at the end of the day, they want payment. So, if you don't have money it is a problem. And you must have water. It needs a lot of equipment" (Jaskiewicz, 2015:57).

The threat of drought and the negative consequences of climate change are real, even for Limpopo, Mpumalanga and KwaZulu-Natal, the country's proven relatively high-rainfall provinces. Farmers' skills levels are being addressed (see section 3.5), but there are gaps and the approach is a one-size-fits-all commercially-oriented model that is not suited to everybody's needs and aspirations.

4.2.1 Water and climate change

Water may prove to be the biggest hindrance to the expansion of smallholder and small-scale commercial farming unless more efficient use and management and redistribution of this resource takes place. The NDP considers access to irrigation water to grow labour-intensive agricultural produce key to job creation. The plan suggests that the 1,5 million hectares currently under irrigation be increased by 'at least 500 000 hectares' through the improved use of existing water resources and by developing new water schemes (NPC, 2011:219).

Citrus farmers in Limpopo told Genis (2018) that a lack of access to water is already limiting their capacity to expand and that they only used half the land that they owned because they did not have water to plant the rest. It should be added during the drought of 2015 and 2016 farmers attained water savings of 20 to 30% through better management of irrigation and monitoring of water losses.

In October 2019 the water situation in Mopani District of Limpopo was so dire that farmer members of the Letaba Water Users Association (LWAU) only received 30% of their usual allocation. The Tzaneen Dam's level was at 8%. The LWAU manages water from the Ebenezer and Tzaneen dams and the Letaba River and distributes water to farmers in an area stretching from below the Ebenezer Dam to the area west of the Kruger National Park. It makes provision for different allocations to three climate zones which receive 6900 cubic metres per hectare, 9000 cubic metres per ha and 10600 cubic metres per ha respectively. The Tzaneen Irrigation Board governs water for users in Magoebaskloof and the areas to the west of Tzaneen (Kruger, 2019).

If the rainy season has not commenced by the end of October, all irrigation water will be cut off. Kruger (2019) says had they not impose water restrictions on their members since June, the water would have run out long ago. Most surface water sources in South Africa are over-allocated and farmers seldom get a 100% assured delivery of their allocation. This and the drought in Mopani District had led to an increase in groundwater extraction, which is expected to affect the availability of surface water negatively in the long run (Kruger, 2019).

The fast-growing macadamia sub-sector is concerned about its water footprint, but preliminary research in the Nelspruit area of Mpumalanga has found that water efficiency can be improved without compromising yields (*The Macadamia*, 2018b). Due to the profitability of avocado and macadamia nuts farmers are taking out timber plantations and sugar cane to plant avocado and macadamia trees. In the Tzaneen area hundreds of hectares of unirrigated Eucalyptus plantations are replaced by avocado orchards under drip irrigation, while the same is happening with the replacement of sugar cane fields by macadamia orchards in KwaZulu-Natal. In neither case has the effect on water available for irrigation of these crops been assessed (*The Macadamia*, 2018a, Van Zyl, 2019).

Furthermore, the National Water Resource Strategy, Version 2 (DWS, 2013:52), states that the increasing demands on South Africa's water resources also increase the competition between agricultural, industrial, power generation, mining, commercial and domestic needs. The strategy does not envisage an increase in the amount of water allocated for agriculture but suggests that all sectors must improve their water-use efficiency and conserve water ... "all land reform projects, and revitalisation of smallholder irrigation schemes will use the same amount of water as before. An increase in irrigation will be effected through water-use efficiency, and selected new developments, such as in the Mzimvubu" (DWS, 2013:10). The strategy further states that new water infrastructure will only be developed or authorised if effective water conservation and water demand management interventions have been put in place in the affected area (DWS, 2013:28).

The question is whether the knowledge and technology exist to improve water-use efficiency beyond the levels of efficiency that citrus farmers have already achieved or the 20 to 30% that they managed to save during the recent drought. It is also not clear whether it is known how far such water-saving

efforts can be implemented before production and the future productivity and quality of subtropical fruit and nut trees and fruit are jeopardised (Genis, 2015, 2017).

Finally, one can expect an increased demand for water for irrigation in response to heat and higher rates of evapotranspiration due to climate change. Research shows that Limpopo is “perhaps the most vulnerable province to climate change in South Africa ... expecting a high increase in temperatures, strong variations in rainfall patterns and greater frequency of extreme events” (LEDET, 2015:15):

Observed data indicates increases in temperatures and variations in rainfall across the province, and it could be said that Limpopo is already experiencing the effects of climate change. The consequences of experienced extreme events between 2014 and 2015 are exposing the lack of preparation of the province to handle climate variations (LEDET, 2015:15).

Long-term research is urgently needed to assess the minimum irrigation needs for optimum yields of different fruit trees, especially given a warmer future with higher evapotranspiration rates. Covering orchards in shade net may reduce water needs, but it will add another R450 000 per hectare to the cost of establishing a hectare of trees and may pose challenges for disease and pest control.

4.2.2 Capital and infrastructure

It is quite expensive to establish subtropical fruit and macadamia orchards, and income from other sources or bridging finance is needed for the time that it takes for the trees to start bearing fruit and nuts. While it is possible to grow subtropical fruit and nuts without irrigation in the high rainfall areas, it is not advised because the yields are so much lower.

Farmer AV who has established new orchards during the past two years paints the worst-case scenario for establishing avocados on very steep land:

There is a cheap way and a right way. If you want to do it right with the new standards for ridges and contours developed for hilly areas, it can cost anything from R120 000 to R250 000 per hectare. If you establish the avocado trees where a Eucalyptus plantation used to grow, it will cost a further R250 000/ha to remove the trees. Clonal trees that are resistant to Phytophthora (fungus-like organisms that cause root and stem rot and destroy trees) can cost R220 per tree and it may happen that some trees do not ‘take’ or the baboons or bushbuck destroy it.

Regarding macadamia nuts, the demand for trees is so high that registered nurseries have three-year waiting lists, and the South African Macadamia Growers’ Association (Samac) reports that it could cost R100 000 to establish a hectare of macadamia trees (Van Wyk, 2018).

4.2.3 Market access, skills, expectations, scale of production

Tree crop farming requires sophisticated technical skills from growers, especially because the trees take so long before they start to bear fruit, the trees must be kept productive for 20 to 25 years and the fruit, in the case of mangoes and avocados, are quite perishable. The perishable nature can be avoided by processing it, but farmers prefer to take part in the more lucrative fresh produce and export markets.

While farmers do not need GlobalGAP and other certifications, e.g. Rainforest Alliance, etc. to sell in loose value chains and at fresh produce markets, certification is a prerequisite for selling in tight value chains like supermarkets and to international buyers. Farmer Jack Murado (2019) of Letsitele says just to open a file for GlobalGAP costs R20 000. Doing water tests, getting all farm systems up to standard for annual audits can add tens of thousands of Rands to that. In fact, he remembers with fondness the days of cost-plus prices paid by the development corporations in the former bantustans

because fluctuating prices on the national fresh produce markets can put cash-strapped farmers in a difficult position. A farmer told Chawiche (2015:41-42) “when you have a good crop, the markets are flooded, and you get a low price”. In loose value chains, e.g. selling to hawkers and bakkie buyers, the farmers can usually set the price and the cash nature of these transactions means that they do not have to wait for their money.

While the best prices are often realised in export markets, payment in those markets take a long time after the produce was shipped, leaving black commercial farmers with a considerable time to bridge with other sources of income. Taking part in export markets can leave small-scale farmers vulnerable. Chawiche (2015:63) relates the anger of a farmer who did not fully understand the costs associated with exports and was left with huge bills from the packhouse and transport companies because the volume of fruit he delivered was not large enough to cover all costs.

Furthermore, the quality standards for the avocado sector set by overseas retailers and consumers almost prevent small-scale farmers from participating in these markets (Chawiche, 2015).

Over the last few years European countries have increased their requirements for importing fresh fruit produce demanding certification such as Global Gap (GG) and more recently the Sustainability Initiative South Africa (SIZA) audit which not only deals with the quality of the product itself but also how it is produced and under what conditions for the work force (SIZA, 2015). Here risks for the smallholders emanate from the fact that meeting these quality standards demand higher input costs for spraying machines, minimum wages and on-farm infrastructure to invest in posing an entry barrier for many small-scale producers. Furthermore, as these high-quality fruits are susceptible to fluctuations in world market prices cash flows back to the grower can vary tremendously; a risk which the small producer cannot absorb (Chawiche, 2015:42).

Jaskiewicz (2015:51-52) found that calculations made by macadamia processors create expectations in small-scale farmers: “The discourse of returns with low inputs is prevalent amongst the processors who attempt to prove it with such calculations ... ‘an average smallholder has 1 000 trees on three hectares; 320 trees per hectare mean four tons per hectare. The price is R40 per kilogram of nut in shell. So, R40 times 4 000 kilograms gives R160 000 per hectare’”. However, small-scale farmers do not manage to harvest the volumes foreseen in these calculations, nor the quality required to achieve such a high price per kilogram.

It is a David and Goliath situation, and the shift of power from producers to retailers is well-documented, e.g. by Ruben et al (2006), Lee et al (2012) and Barrientos and Visser (2012), and means that the “enormous buying power and well-known consumer brands” of retailers allow them to “dictate cost-cutting measures and enhanced standards to their suppliers”, while exporters as intermediaries and organisers in value chains, also hold power because they often “decide how suppliers will meet supermarket demands” (Lee et al, 2012:12326).

The rise of supermarkets can be ascribed in part to growing urbanisation and an increase in middle-income consumers (Barrientos and Visser, 2012:10-11). The position of supermarkets as lead firms in value chains for fresh fruit enables them to exercise control through the “specification of what product needs to be delivered, in what quantity and when, how it should be produced and at what price” (Ponte and Gibbon, 2005:5). These private quality standards “set entry barriers to new participants to a value chain and raise new challenges to existing ... suppliers”, but they also provide opportunities to add value and improve their products and operations (Gibbon and Ponte, 2005:161).

Large-scale commercial farmers are better equipped to deal with these supermarket-dominated value chains whose need for “economies of scale in processing, transport and distribution also lead

to demands for growing volumes of commercial agricultural production and stable delivery capacities of homogeneous quality” (Ruben *et al*, 2006:2). However, by working together, or forming co-operatives to pool the fruit they offer to buyers, groups of small-scale farmers can achieve similar economies of scale.

4.2.4 Trade diplomacy and access to foreign markets

The export of agricultural products is an important way to hedge against a deteriorating currency and provides markets for the surplus that cannot be sold in the relatively small domestic market. Exports contribute approximately 40% of the gross income from agriculture of South Africa (Willemse, 2019), and the country earns R26 billion per year from fresh fruit exports to more than 90 countries (FPEF, not dated).

Gaining and maintaining market access for South Africa’s subtropical fruit remain a focus area for the industry. This includes cultivar development to ensure that the industry has the desired varieties for specific markets and adhering to phytosanitary requirements and maximum residue levels (MRLs) in export markets (FTWonline, 2019). Derek Donkin, CEO of Subtrop said at the industry body’s 2018 marketing symposium in Witrivier that phytosanitary requirements and MRLs were becoming more stringent and non-compliance could cost the sub-sector existing markets. He said that gaining access to new markets was a “notoriously slow process, taking on average 15 years” (FTWonline, 2019).

While government does and should play an important role in gaining access in export markets, there is concern about its long-term commitment to fostering the expertise needed to successfully conclude trade negotiations (Cramer and Sender, 2015; Lemmer, 2016). Cramer and Sender (2015:33) suggest an expansion of South Africa’s commercial diplomatic capabilities because of a shortage of “experienced, well-trained trade negotiators”:

... embassy staff do not appear to have appropriate training to support strategic exporting interests. Not only is there a need for more staff who understand agribusiness, but also, they need to be clear about the priorities in negotiations, rather than turning up for trade talks pitching broad shopping lists against the acumen and resources of US or Chinese or EU trade negotiators.

ABSA economist Wessel Lemmer (2016:26) warns that government should find the expertise and good negotiators to ensure that South Africa’s competitors do not make inroads in export destinations also served by South Africa. Lemmer said that government officials were doing good work, but that the state’s investment in expertise is not keeping up with investments made by the country’s competitors.

5 Implications for land reform policy

A considerable amount of high potential land is located in Limpopo, Mpumalanga and KwaZulu-Natal. These provinces offer the most suitable conditions for subtropical fruit and nuts. Besides the commitment to transfer land ownership and support to smallholders, the state must give effect to the stipulations of the Spatial Planning and Land Use Management Act (SPLUMA), 16 of 2013 and "ensure that special consideration is given to the protection of prime and unique agricultural land" (South African Government, 2013).

Compared to growing vegetables or other annual crops, the production of subtropical fruit and nuts is expensive and demand a long-term view. To prevent setting black farmers up for failure, the land most suited for subtropical fruit and macadamia nuts should be acquired. As mentioned earlier, this will necessitate a close look at land capability maps, e.g. figure 1. While this seems like a simple exercise on paper, the reality is some of the land with the highest potential is in communal areas and thus already utilised, while the second problem is that it will be difficult to defend redistribution of land in regions, e.g. Tzaneen in Limpopo, where 90 land reform farms are lying unproductive (Burgess, 2019).

In any case, suitable land bordering communal areas and urban areas should be earmarked for redistribution to welfare dependent petty commodity producer and petty commodity agricultural producers. In the case of salaried small-scale capitalists and agricultural small-scale capitalists, large tracts of land with access to infrastructure, e.g. electricity, water reticulation systems, packhouses and good roads should be acquired to settle beneficiaries as groups of individual independent farmers. This should help to prevent the kind of fragmentation that can make it almost impossible to give the farmers adequate support.

Aliber and Hall (2012:548) suggest that policymakers will have to make a “strategic choice” between supporting a few farmers to become large-scale commercial farmers or helping many farmers to diversify their produce to become sustainable small-scale black commercial farmers. This report supports innovative policy that provides support to a larger number of producers as dictated by the needs and aspirations of different categories of smallholder farmers and small-scale black commercial farmers.

Smallholder farmers and small-scale commercial farmers who farm with subtropical fruit and macadamia nuts are not a homogenous group and may have different aspirations and needs. Policy decisions need to take this into account. In fact, policy makers and public servants need training to understand the concept of farmer differentiation, how it pertains to smallholder farmers and small-scale black commercial farmers and what the implications are.

It would be short-sighted to put too much trust in the public sector to deliver all the necessary services to any of the categories of smallholder farmers or small-scale black commercial farmers, or to ignore the contribution that the private sector and non-governmental sector can make. In the case of the production of subtropical fruit and macadamia nuts, the technical knowledge of every aspect of these sub-sectors is vested with large-scale commercial farmers and other actors in the value chains. It is therefore not such a far-fetched idea to suggest that the latter should take the lead in providing technical training to certain categories of black farmers. In addition, South Africa has a rich history and present experience of non-governmental organisations, e.g. Surplus Peoples Project (SPP), Soils for Life, Biowatch, Conservation South Africa and the Drylands Conservation Programme of the Endangered Wildlife Trust (EWT), that support smallholder farmers to produce food in a low-cost and sustainable manner.

Joint ventures and strategic partnerships between large-scale commercial farmers and new black farmers have been criticised by many, e.g. Davis and Lahiff (2011), Bitzer and Bijman (2014), Lahiff et al, 2012, Davis (2014), Manenzhe (2015) and Hall and Kepe, 2017, but it will be nearly impossible for the state to find and replicate the collective knowledge of the commercial farming sector. What government can do, however, is to understand and monitor the power dynamics in joint ventures. Black farmers or communities also need to be realistic in their expectations and ensure that they know exactly what they enter into when they conclude joint ventures or other partnership agreements.

The kinds of jobs that may be created in this way are unlikely to be full-time or highly paid. They will be seasonal jobs picking fruit and nuts, working in packhouses or transporting fruit, and if land that is utilised productively at present, is bought, it may just mean a change of employer for workers.

With the above in mind, it is recommended that smallholder farmers and small-scale black commercial farmers be supported as discussed in the rest of this section. In the next section I use Olofsson’s disaggregation of beneficiaries to recommend the support they should get, with a summary in table 6.

5.1 *Welfare dependent petty commodity producer*

In the light of pressure from residential expansion in the provinces where subtropical fruit and macadamia nuts can be grown and national legislation to preserve high potential land being processed (Collett, 2013 and 2017, Zwane, 2019), one of the most important tasks would be to conduct an agro-ecological audit of agricultural land in the affected provinces. This is especially important in the communal areas where unplanned residential expansion takes place and should help to prevent a further loss of high potential agricultural land in favourable climate conditions.

Access to land in communal areas is uneven and often favour men. More people, especially women, should get access to small plots of land with secure tenure, which does not have to be title, but can be other “social or off-register tenures”, as recommended by Hornby et al (2017).

This group is resource-poor and should gain skills to grow annual crops (vegetables and maize) and tree crops at low cost and with minimal inputs. As suggested earlier, farming practices like permaculture, regenerative agriculture or agro-ecology may be suitable, as it also teaches water harvesting, moisture conservation, crop diversity and in-field organic nutrient building. These skills can be taught in their fields by experienced non-governmental or non-profit organisations, e.g. Biowatch or Soil for Life. In commissioning non-governmental or non-profit organisations, government should add a requirement that extension officers also receive intensive training in these philosophies and practices.

Access to water is often a constraint, even though the areas suitable for subtropical fruit and macadamia nuts are situated in areas of relatively high rainfall. Therefore, these farmers need to learn water-harvesting skills and be supplied with tanks to store the water and pipes to feed it to their fields. The training and support will enhance their existing skills as described in Aphane (2011), De Hon (2015) and Oloffson (2019).

5.2 *Agricultural petty commodity producers*

Market-oriented smallholders in loose value chains can be supported in the same way as subsistence-oriented farmers in order to make their farms more productive and sustainable, but with minimal expenses. They will also benefit from learning about producing and preserving product quality, how they offer products, e.g. single fruits, packaged, cut-up, etc. and improved marketing and negotiation skills. Self-organised groups of these smallholders may come together to offer to sell their products to school feeding schemes, etc.

5.3 *Salaried small-scale capitalists and agricultural small-scale capitalists*

Cousins (2014) suggests that market-oriented smallholders in tight value chains and small-scale capitalist farmers must be “adequately capitalised and mechanised, but not placed under an unmanageable burden of debt”. He further recommends “sophisticated technical support that is able to help farmers identify and resolve problems in relation to both technical and farm management issues”. This also applies to Olofsson’s (2019) categories of salaried small-scale capitalist and agricultural small-scale capitalist farmers.

Avocado, mango and macadamia orchards planted on high potential and well-drained soil that was prepared properly for young trees propagated by registered nurseries is indeed the way to go for small-scale black commercial farmers. They will struggle to produce fruit of the required volumes and quality if they are set up with sub-standard soil preparation and seedlings. Furthermore, they need to receive in-depth mentoring by experts in the fields of avocado, mango and macadamia production, as well as support to buy other inputs, e.g. fertiliser and pest control products. In the South African context this means initial involvement of large-scale commercial farmers and commodity associations, e.g. the different growers’ associations under the Subtrop umbrella. The public extension service does not have the expertise to do this.

In this context it may make sense to buy land from prospective mentors for settlement of black small-scale commercial farmers. Commercial growers of subtropical fruit and macadamia nuts often divide their farm into blocks and manage the different blocks, and by buying one or more of these blocks the conveyancing process could be speeded up. It may also make sense to buy an orchard that the farmer was about to replace and give an adequate grant to help new farmers to prepare the land and establish the latest cultivars.

Unfortunately, there are no low-cost, low input options for this category of farmers. Large-scale commercial farmers consider land size ranging from 10 ha to 50 hectares as the lower limit for making a profit. In the case of avocados and macadamia nuts, the area could even be smaller. A second option is buying large-scale commercial farms and water rights from farmers who cannot afford to take the next step to modernise their operations. By subdividing such farms and lease them to a number of different small-scale black commercial farmers ought to make irrigation infrastructure and soil preparation works and getting a critical mass to order trees from nurseries or access to packhouses and markets more cost-effective.

However, in both these cases it may just mean replacing white commercial farmers with black commercial farmers, without any gains in nett employment. Job creation will only take place with more hectares in production and bigger volumes to harvest, pack and transport. This will only be possible if more water for irrigation and adequate water infrastructure are available.

Tree crops take a long time before they start bearing fruits and even longer before the break-even point between cost and income is reached. Policy options should include access to bridging capital and/or opportunities to grow vegetables or other cash crops.

Production of avocados, mangoes and macadamias is often the easy part, but these products need to be packed, stored, transported and sold. While one hopes that black commercial farmers would soon be able to own and operate their own ripening and cold-storage facilities, packhouses and export logistics companies, in the meantime it will be worth their while to hook up with existing facilities. The pressing issue is to find honest brokers and committed partners.

Record-keeping and understanding the costs associated with producing, processing and selling subtropical fruit and macadamia nuts are further critical requirements. Finally, as more tertiary students in agriculture do not have previous experience of commercial farming, policy measures should include practical training for these aspiring soil scientists, horticulturalists, entomologists, plant pathologists, etc. along with the training of farmers. These students will become the farm advisors, extension officers and researchers of the future.

Table 6 Recommendations for land reform and support to different categories of farmers

Category (Olofsson, 2019)	Land, soil and water	Support	Finance/ funding/ capital	Comments, caveats, etc.
Welfare dependent petty commodity producer	Do a soil audit in communal areas to ensure that fertile soil is not lost to residential development Land adjacent to communal areas and urban areas Make broader access to arable and grazing land possible Secure tenure Facilitate water harvesting and storage (tanks, pipes, etc.) on site, as well as moisture conservation	Support farmers to grow both tree and annual crops Government grant to NGOs ¹ or NPOs, e.g. Biowatch, to teach farmers low input, low cost farming methods, such as agro-ecology or permaculture, which will mostly be strengthening or enhancing their existing knowledge and skills Learn about seeds, i.e. open-pollinated seeds that can be saved and used to plant year after year without losing their vigour	Government grant paid to NGO Funds needed for trees and seed initially, and water storage equipment Information re opportunistic or niche marketing	Pro-poor, household food security in terms of diversity and larger volumes produced Small surplus to sell or exchange Extension officers to be trained with farmers to support them in future
Agricultural petty commodity producer	Do a soil audit on land near urban areas to ensure that fertile soil is not lost to residential development Give access to arable land that is suitable for growing tree crops near communal areas or urban areas Secure tenure Facilitate water harvesting and storage (tanks, pipes, etc.) on site, as well as moisture conservation	Support farmers to grow both tree and annual crops Government grant to NGOs ² or NPOs, e.g. Biowatch, to teach farmers low input, low cost farming methods, such as agro-ecology or permaculture, which will mostly be strengthening or enhancing their existing knowledge and skills Learn about seeds, i.e. open-pollinated seeds that can be saved and used to plant year after year without losing their vigour Training to improve marketing skills	Government grant paid to trainer (NGO) Grant to buy trees of more productive fruit cultivars Support for simple packing and storage facilities to maintain quality of fruit produced Transport? Market information system for informal markets	Improved household food security and more produce to sell in terms of diversity and larger volumes produced Better quality produce and training to negotiate a higher price

¹ Non-governmental organisations, e.g. Conservation South Africa (Namaqualand), WWF (Central Karoo) and Hamburg University (Soebatsfontein) already supply extension to small-scale livestock farmers on sustainable veld utilization in order to protect biodiversity and increase resilience.

Salaried small-scale capitalist	High potential land in area with adequate water, electricity and road infrastructure	Support to establish small, but highly productive orchards	Extension funded by proportion of statutory levy on formal market sales	Farm subdivided among small-scale black commercial farmers
Agricultural small-scale capitalist	Large enough pieces of land to install bulk irrigation, do earth works and soil preparation, ability to order a substantial number of trees and subdivide land to establish individual and independent farmers Secure tenure Irrigated land for growing annual crops to earn some cash while the trees are maturing Secure water rights and supply	Commercial farmers as mentors and/or partners for at least ten years Member of relevant commodity organisation to get support from that organisation, e.g. Subtrop associations study group model Support to get and maintain GlobalGAP certification, access to markets through joint marketing with other small-scale commercial farmers	“Buy” advice from advisors at input supply companies Recent graduates in agricultural science to be scientists trained with farmers as future extension officers for commercial farmers Bridging finance while trees are maturing	Not present productive farms because of implications for farm workers

6 Conclusions

Establishing large numbers of small-scale black commercial farmers in the subtropical fruit and macadamia nut sub-sectors will be one of the most difficult tasks because of the cost of infrastructure and orchard establishment, as well as the lack of skills and high entry barriers. Also, without adequate road and water infrastructure and water allocation, such projects will be doomed.

Having said that, the rewards can be immense, especially if self-selected groups of farmers – each farming his/her own orchard – can be settled on high potential land and orchards that were established according to the latest and most productive standards. Such an approach can mean that the installation of irrigation infrastructure and packing and storage facilities can be cost-effective. It may also create opportunities for combining harvests to reach a critical mass to get contracts in certain lucrative markets.

In all this there is a role for the private sector, e.g. commodity organisations and neighbouring large-scale commercial farmers.

As for welfare dependent petty commodity producer and petty commodity producers in loose value chains, they need support to make their farming operations more resilient to climate stress and less dependent on bought-in inputs. Certain non-governmental organisations can help to deliver such training. By also training extension officers while they train farmers will ensure a future supply of extension officers who understand that farmers in these categories have different needs and aspirations.

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