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Indigenous products in the Karoo: The case for *Hoodia*
and Olives.

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Sue Taylor

1.0 Introduction

South Africa has a wealth of botanical diversity, with about 4000 plants being useful medicinally, with traditional use going back hundreds of years. Over the last twenty years there has been much academic research activity in South Africa to research active ingredients, traditional use and try and make some commercial use of these plants. The work has included setting up of high level consortia to develop medical products from indigenous plants as this type of work is complex, very expensive and requires knowledge of international markets and has a high risk factor.

The challenge of finding novel crops from the arid areas is huge, but there is one of great promise, and that is *Hoodia gordonii*. This paper reviews the commercialization process of *Hoodia gordonii*, a succulent plant that grows in arid areas, and has a pharmaceutically interesting molecule, P57, which has potential as a obesity control drug in the international obesity product market. They study

The story of the commercialisation of *Hoodia gordonii* has been interesting because it has been so complex and difficult, involving high level deals between the CSIR and major international pharmaceutical players, and local contracted farmers in the arid areas. But this exciting process has come to a jarring halt with Unilever, the major commercial partner at this stage, pulling out of further development after spending £20 million on research. In November 2008, Unilever, the current patent licensee announced that it was withdrawing from the patent and the South African *Hoodia* growing programme that it had initiated, mainly citing that the plant was "toxic" and didn't meet their safety requirements.

The complexity and difficulties associated with the commercialization of *Hoodia* leads one to wonder if the wider cultivation of tried and tested crops like olives would be better as a means to stimulate economic development in marginal, arid areas. To answer this, an investigation was also done to

discover whether olive cultivation could help with bringing more industry into the small towns and marginal arid areas in South Africa.

Poverty issues and new enterprise development in the arid areas of South Africa

The Arid Areas Programme of the Centre for Development Support, University of the Free State, is interested in the social and economic dynamics of the arid areas, both the rural activities and activities within the towns. The use of natural resources forms part of this portfolio, including commercial use of biodiversity with the hope of identifying and researching new agricultural activities that could contribute to economic development in marginal arid areas. Also, agricultural case studies that could be useful planning inputs to help climate-proof agriculture in the more arid areas of South Africa are also of interest to the Programme.

In terms of human economic and social development in the arid regions of South Africa, the government is tackling poverty through the provision of free basic services and also social grants to create a level of security so that people may be able to better themselves, or even become more mobile and move to centres where there are more economic opportunities. However, those individuals and families remaining behind on farms or in the small towns of the Karoo still need cash. Cash is needed in households to provide for school fees, funeral costs, travel costs, to protect against various shocks and for buying the daily necessities of food, clothing and cooking/lighting fuels.

The development challenge for towns, provinces and the nation as a whole is finding enterprises that would generate sustainable incomes, enterprises and local wealth in the long term.

The towns and economy of the arid regions of South Africa

The various high level planning documents for South Africa, like the National Spatial Development Framework, regard the arid hinterland as generally uninteresting economically, with some areas dismissed as “backwaters.” The size of the arid area is large and biologically and geologically diverse. The region has never been managed as a single entity. Since 2000, the Karoo (which encompasses the Nama Karoo, Klein-Karoo and False Karoo), for example, comprises four provinces and 10 District municipalities, 31 Local Municipalities, with seven in the Eastern Cape, two in the Free State, 14 in the

Northern Cape and eight in the Eastern Cape indicating the complexity of an integrated management approach for the whole region (Atkinson and Marais, 2007).

In general, these arid areas are sparsely populated and this characteristic has contributed to their marginalisation and lack of political clout. The arid areas economy is historically based on extensive livestock farming, but there are modern irrigation projects particularly along the Orange River, Fish River, Sundays River and the Riet River which allows for the cultivation of crops and orchards. Irrigation opportunities along the Orange River has allowed the development of *Hoodia* plantations, particularly around Upington, for instance (Atkinson and Marais, 2007).

The natural assets of the arid areas of South Africa

The assets of the arid region of South Africa include natural, social and economic assets including good infrastructure in many of the towns with historical buildings and reasonably good roads servicing a growing tourism and retirement market, good agricultural expertise and a growing game farming industry, and also its biodiversity. Basically, the economy of the arid areas is highly dependent on the agricultural and mining sectors, and agriculture is a major form of employment. Although agriculture is generally extensive (livestock) there are opportunities for more stable and lucrative intensive cultivation (vineyards, oranges) which need access to water (Atkinson and Marais, 2007).

Hoodia cultivation and processing would form a novel and lucrative component of this type of economic activity.

In the Namakwa District Municipality, the SKEP programme (Succulent Karoo Environmental Programme) looks to generate economically viable projects for the benefit of the region and have invested in rooibos farming, for example.

Also, the Northern Cape provincial government has been involved with *Hoodia* commercialisation and processing. To demonstrate the economic multiplier effect linked to *Hoodia* cultivation and product development, widespread cultivation in the Northern Cape would have lead to foreign investment in a drying plant in Upington to handle up to 30 tonnes of *Hoodia* material a day, and a processing plant in Paarl. This has all stopped because of the Unilever decision.

The arid regions of South Africa and Climate Change

The arid regions of the country, including the Succulent Karoo biome are expected to be decimated in their current form by climate change by 2050 as the region becomes hotter and drier, with the Fynbos and Grassland biomes also expected to suffer from serious climate change impacts.

Something dramatic in terms of agriculture in the arid regions will need to be found, notwithstanding the difficulties of this, as attested by the *Hoodia* developments.

The South African Government's Climate Change Technology Needs Assessment (Department of Science and Technology) identifies agriculture as a highly vulnerable sector that will require, novel crops or novel farming methods to make farming possible. In many of the arid areas, farming may no longer be possible, with huge consequences for the already fragile economies of the arid regions of South Africa.

Arid areas agriculture

A crop like *Hoodia* could fill the gap in creating a sustainable rural industry in the arid areas, producing a cash crop that is highly in demand locally and globally. *Hoodia* can tolerate arid conditions up to 250 mm or less rainfall a year, and temperatures up to 56 °C. However, ominously, the commercialisation process of *Hoodia* has been rather arduous, demonstrating that the cultivation of that novel plants and novel product development are expensive, high risk activities.

2.0 Purpose of this study

This current study investigated the state of play in the *Hoodia* commercialisation process, with particular focus on the Unilever decision. The study also investigated whether or not this decision had permeated the rather large network of health shops and *Hoodia* product suppliers in Johannesburg, as a sample. It was found that there was either no knowledge of this decision, or that there was a wait and see attitude, with health shops and suppliers stating that they would wait for the Medicines Control Council to issue a statement before they withdrew a product from their shelves. The issue of *Hoodia* and any toxicity needs to be quickly clarified otherwise it could have severe impacts on the local industry.

Again, the toxicity issues needs to be resolved really quickly, so that the South African and Namibian *Hoodia* industry can move forward.

The commercial development of *Hoodia* as a crop with an international market

The commercial development of *Hoodia* has been fascinating because of the number of issues that it had encompassed, from the initial food-related research at the CSIR, to the chemistry and patenting of P57, to access and benefit sharing concerns and then breakthroughs with the San people, to illegal harvesting issues and registration of the plant as a CITES II plant, to its use as a dieting aid and all the marketing hype associated with this. The safety and efficacy testing to comply with FDA regulations in the USA is another component being handled by Phytopharm over the years.

The interest in *Hoodia* "diet" properties is huge, as a scan of internet product offerings reveals. There are many companies offering diet preparations containing *Hoodia*, but use careful wording on the labels so as not to infringe the CSIR/Phytopharm patents. They cannot use the word "P57" for instance.

As an indication of the interest and 'hype' and demand for the *Hoodia* plant, in 2006, the Depart of Environmental Affairs and Tourism of the Northern Cape Nature Conservation has made a statement that the *Hoodia* industry is "short of one million plants annually" in terms of cultivation to supply the global export demand for dried material. It was this statement that prompted this current study, as it seemed that there was an opportunity for arid area farmers that was not being taken up. At that stage, it seemed that South African *Hoodia* was still waiting in the wings, yet to become a domesticated and commercialized crop for the arid areas.

However this is not entirely true, as this study has revealed. There are dozens of local products, all containing "genuine South African Hoodia" and several growers associations (Western Cape Growers Association (Pty) Ltd and the South African Hoodia Growers Association (Pty) Ltd) supplying the market. There are also a group of contract farmers producing *Hoodia* in bulk for Unilever, the current patent licensee. However, these plants are for the sole use of Unilever, to use to develop their own brands of globally competitive products.

It is indeed cinematic that after so much expensive and long term research has been focused on *Hoodia*, so many case studies, so much controversy, so much investment by farmers, and so many products already on the market, both locally and internationally, serving the dieting market, that P57 derived from *Hoodia gordonii* that this plant (and P57) should eventually fail to meet Unilever's safety and efficacy standards, resulting in this UK company announcing in November 2008 that it was dropping *Hoodia* entirely.

The *Hoodia gordonii* story demonstrates the high level of risk in taking a novel indigenous plant compound through to release as a pharmaceutical product.

What is even more important about *Hoodia gordonii* is that it is an arid area plant. Apart from *Hoodia*, the only other succulents that have been grown in large commercial plantings are *Agave* sp. (either for string or for tequila) and *Aloe barbadensis* (aloe vera).

The Unilever decision to drop *Hoodia* as one of their products after spending £20 million on it because of safety concerns has not rippled through the *Hoodia* health product sector yet, my interviews have indicated. The Health shop and health product sector in Johannesburg are unaware of possible safety concerns.

This situation appears to be a calamity for South Africa at a time when the country needs agricultural diversification and investment and when the arid areas are under pressure from a host of factors, including urbanization and people leaving farms, and also climate change. In the business arena, it indicates the extreme risk that farmers and big multinational companies take when dealing with a new plant species and developing a new plant product, and that there are no guarantees for success.

Potential subsequent phases of the *Hoodia* story

Now that Unilever has withdrawn its interest, the patent situation reverts back to Phytopharm, which is a company too small to develop products by itself, and so once again, they will need to find a commercial partner.

Unless Phytopharm can establish new partnerships with farmers in arid areas (could be South Africa, or other arid countries like India, parts of the USA, China), they will not be able to obtain enough material to develop and produce a product line. Perhaps there is still hope for South African and Namibian *Hoodia* growers for future partnerships with a big international pharmaceutical entity.

The subsequent phases of the South African *Hoodia* commercialisation story should include a fully investigation of the "toxicity" claims of Unilever.

Once this matter has been clarified, and the green light obtained for *Hoodia* and P57, there should be the full development of local products, establishing drying and processing facilities and fully exploiting the "brand names" of

Kalahari, ghaap, San, in a system that enables genuine holders of these geographical indicators to benefit.

The ongoing story of *Hoodia* should include research and development, along the lines followed by the rooibos industry, to ensure that cultivation is optimised, pests and pathogens are dealt with, and that new uses are found to keep track of "fashions" in the health industry and even ongoing product diversification.

The *Hoodia* hype and health products

There is much international and commercial interest in products that promote weight loss, from teenagers to genuinely obese people who have tried everything. Of special interest are weight loss products that enable people to lose weight "without any effort".

"Natural" products are also of global interest in that many consumers perceive these to be better than chemical products.

Safety and efficacy, and also quality control of herbal product are often of concern in products that are sold in health shops as often they have not gone through rigorous testing. A quick survey of websites offering *Hoodia* products (both local and international *Hoodia* products) shows that there is a general believe in the 'traditional remedies being safe, as typical statements will say that the plant has been used "by the San for thousands of years."

Certainly in South Africa, some advertising standards need to be set about what can be claimed by *Hoodia* products, as it may not always be a good idea to rely on the fact that a product has been used for a long time by a particular community as our lifestyles now differ markedly from San traditional lifestyles.

Marketing statements also make much of the fact that the South health Department "regards *Hoodia* as a food stuff and therefore is safe."

Quality control of *Hoodia* products

Research presented at July 2008's Indigenous Plant Use Forum meeting in Graaff-Reinet showed the development of a methodology (microscopy) to visually check product for inclusion of "non-*Hoodia*" material, a huge quality control problem for both local and international *Hoodia* products.

Adulteration by non-*Hoodia* bulking agents is a problem and needs to be checked and controlled. South African standards need to be set.

In a separate study, Unilever has also checked products on the shelves in the USA and found that many of them are adulterated, diluted or contain no genuine *Hoodia* material (either the plant material or P57) (CSIR, Dr Vinesh Maharaj, pers comm. 2008).

Illegal Hoodia products.

Illegal *Hoodia* products would be those where the *Hoodia* material was collected without a South African provincial Nature Conservation Permit, traded without a CITES permit and sold without acknowledgement of either the CSIR/Phytopharm patent and agreements with the San people.

Hoodia products came on the market about 12 years ago and about 150 products were on sale in Europe and the US, as well as a number in South Africa. None of these are paying royalties to the San People, or to the legal patent holders.

In terms of a benefit sharing agreement with the CSIR, all the San communities in the range states (Namibia, Botswana, South Africa and Zimbabwe) must benefit from the development of P57. There are many products on the market that do not transfer benefits to South Africa, the San people via Access and Benefit sharing, or via the Phytopharm patent (internet).

Unilever does not seem to be pursuing any of the *Hoodia* product makers or growers.

Legal farming of Hoodia

The scale of *Hoodia* cultivation by Unilever leaves one in no doubt that commercial cultivation of this plant is indeed possible, although not straightforward. The cultivation of *Hoodia* is generally secretive and closed society, as the growers have invested millions of rands in their plantings and irrigation systems, and don't want too many other players coming in, which might decrease the per kg price if there is an oversupply. However, cultivation is labour intensive and thus only really feasible where labour is cheap.

Also, growing *Hoodia gordonii* is a difficult and long process in the climate conditions of the Kalahari, even with the drip irrigation and tunnels that are used. There is also considerable cultivation of the plant by South African farmers who are not part of the CSIR consortium, and who export the dried material to international markets.

3.0 Survey of *Hoodia* and South African health shops

Unilever's announcement in November 2008 that it would not be pursuing *Hoodia* because of some "toxicity" issues, and while this news should plunge the global and local health industry into disarray over *Hoodia*, the news is being slow to permeate the local health industry. A telephonic survey of health shops in Johannesburg and Pretoria was carried out to determine whether or not they had heard of the Unilever announcement and what this would mean for their product lines containing *Hoodia* material.

Supplier responses

The response of one of the *Hoodia* suppliers consulted was that they had heard of the Unilever decision and were investigating.

Grower Response (Hoodia growers of Namibia, HOGAN)

They new of the Unilever decision because they track everything within the *Hoodia* industry very closely. They are somewhat suspicious of the "toxicity" issues, and will have to carry on with their enterprises because they have invested so heavily in their farms. Also community outgrower schemes in Namibia depend on the ongoing value of *Hoodia* as a health product.

Survey Conclusion

The Unilever decision to drop *Hoodia* as one of their products after spending £20 million on it because of "safety concerns" has not yet rippled through the *Hoodia* health product sector yet in Johannesburg, my interviews have indicated. The Health shop and health product sector are unaware of these concerns.

This small survey did reveal that six Johannesburg health shops and one Pretoria health shop are committed to selling local *Hoodia* products, and that also news doesn't travel very fast through this industry because all had not heard of the Unilever decision, perhaps because *Hoodia* is only one of thousands of plant extract products that are sold.

4.0 The South African olive industry and olives as a development crop

Arid areas and Olives

Olives, on the other hand, are a much lower risk crop, having been domesticated and grown since antiquity. There are thousands of different cultivars, all with different properties, allowing olives to be tested in many localities to determine which cultivar does best under different conditions. Olives do not like frost, and need irrigation to get maximum yields and quality, despite their reputation that they are tough. They should be more wide spread testing of olives in the arid areas of South Africa.

Olive oil is the easier product to produce from olives, and while table olives (both black and green) are highly in demand in South Africa, the processing is more complicated, and would present a difficulty for community participants unless there was some help, perhaps in the form of an outgrower system with a central processing and bottling/packaging plant.

Olive growing is contributing to agri-tourism, though, through olive festivals in towns like Riebeeck-Kasteel, which has a good multiplier effect on the surrounding areas.

Currently South Africa imports most of its olive oil, and so there are commercial opportunities here that could be met by local olive oil production. However, table olives are in even shorter supply locally, and this represents a market opportunity for commercial farmers and also communal farmers.

The main constraint in the olive growing industry in South Africa is that the industry is very small and is made up of well-established players, typically the wine estates. There are many new growers coming into the sector, but generally the olive growers are not in a position to pay a levy on harvests to pay for further research and development and to support emerging, disadvantaged players entering the industry. Currently there don't seem to be any big technical issues, and the crop doesn't suffer from major pests and diseases, so there is no need of biotechnology or standard agronomic research. The Agricultural Research Council is planning to bring in a number of cultivars from Tunisia for testing, as one of the issues would be to test olive cultivars in wide spread areas, particularly in the more arid areas.

The South African olive industry state that they cannot yet afford to extract a levy on production to fund research and development, and to also fund training for emerging new farmers, but would like to. Some of the big agricultural sectors like sugar and potatoes in South Africa use levy system to gather revenue which is ploughed back into the industry in terms of agricultural and product research as well as into market research, and these industries also support emerging farmers.

For the olive industry to get bigger and embrace emerging farmers and also extend into the more arid areas of the country, it would seem that the government research funds would be needed, or provincial economic development agencies, to get the industry to a level where it could have a levy system to take research and development further.

5.0 Discussion

When it comes to developing commercial products from South Africa's indigenous biodiversity, it is much more complex than one would at first think.

Hoodia has been on a roller coaster ride since the 1930's when it was first studied by modern science, with a variety of role players lured by the \$6 billion per year diet product market. The decision by Unilever to drop the patent indicates the complexity of pharmaceutical markets.

In terms of quickly producing new crops for the areas of South Africa which will be impacted upon and likely to get more arid under climate change, this route of identifying potential indigenous plants for domestication will definitely be challenging and require vision and major financial investment.

To adapt to ever drying conditions in South Africa, a variety of adaptation approaches for agriculture will be needed, including the use of drought tolerant conventional crops like maize improved through genetic engineering; the wider uptake of conventional crops grown in the arid areas of the world (dates, olives, pomegranates and figs) and the investigation of indigenous food plants from other African countries where such plants and trees have been grown or harvested for some time.

Otherwise tried and tested crops like olives should be explored in a bigger way, using state funding if the industry is too small to fund biotechnology, agronomic research, processing research and the entry of new and emerging farmers. Olives can also lend themselves to the production of antioxidants to supply the world's demand for anti-aging products.

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