



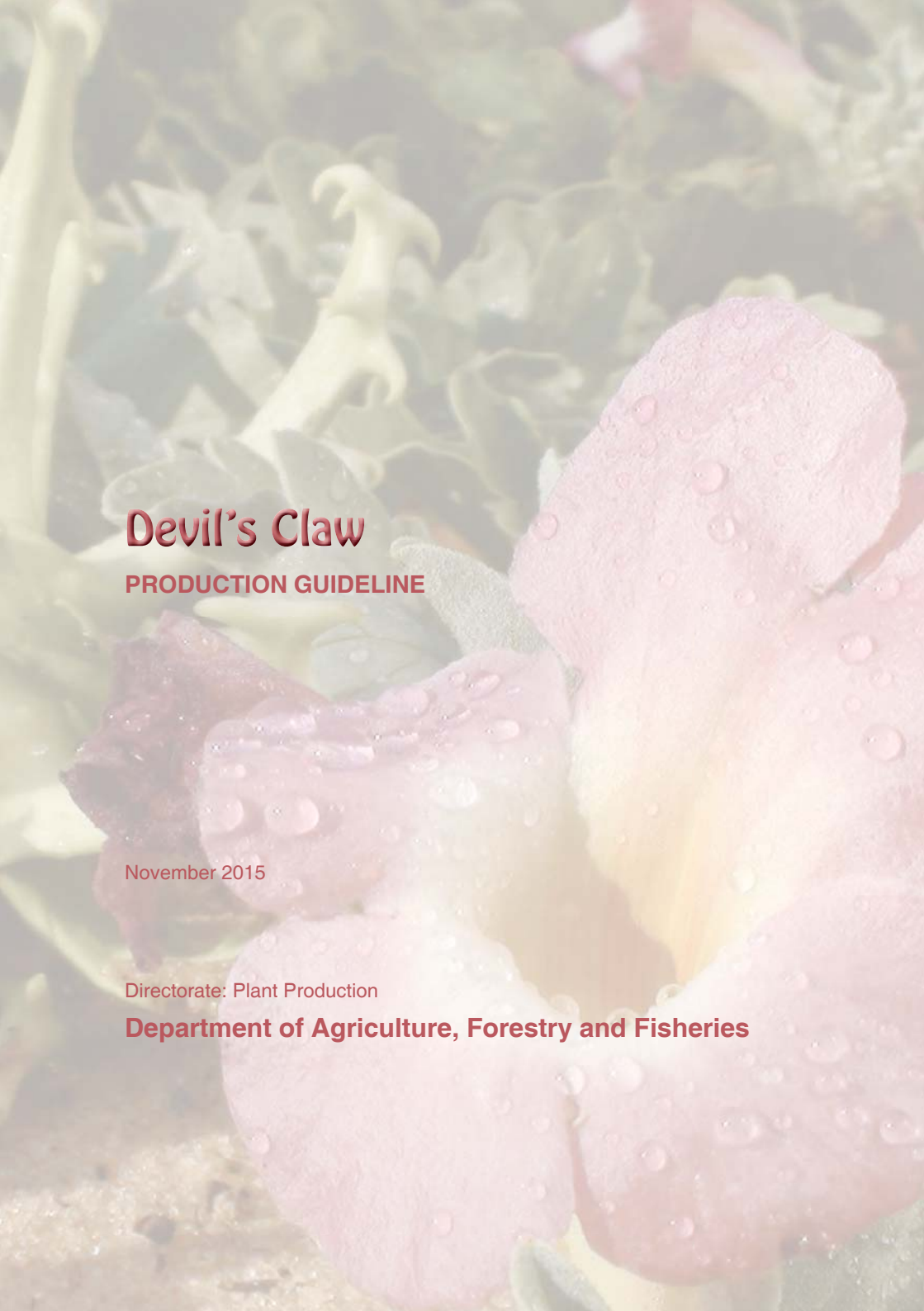
Devil's Claw

PRODUCTION GUIDELINE



agriculture,
forestry & fisheries

Department:
Agriculture, Forestry and Fisheries
REPUBLIC OF SOUTH AFRICA



Devil's Claw

PRODUCTION GUIDELINE

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PART I: GENERAL ASPECTS

1. Classification

Scientific name: *Harpagophytum procumbens*

Common names: Wood spider, grapple plant/thorn, Devil's Claw (English), duiwelskloof, beesdubbeltje, kloudoring, ouklip, rankdoring, skerpi-oendubbeltje, tubercule de griffe du diable (Afrikaans), sengaparile, kanako, lekgagamare (Setswana), mmonyane (Sepedi)

Devil's Claw is the most commonly used name for the plant *Harpagophytum*. Another common English name for Devil's Claw is Grapple Plant, because the form of the fruit resembles a hook which is designed to protect the plant against animals. Its botanical name is derived from the Greek "harpago" meaning "grappling hook." The nature of its name originates from the hooked, claw-like seed pods attached to the flowers. This genus is comprised of two species: *Harpagophytum procumbens* (with two subspecies, *procumbens* and *transvaalensis*) and *Harpagophytum zeyheri* (with three subspecies, *zeyheri*, *sublobatum* and *schiffii*). The two species occur in South Africa. In *H. procumbens*, the arms on the fruit are longer than the width of the fruit, while they are as long as or shorter than the width of the fruit in the other species, *H. zeyheri*.

Harpagophytum procumbens is a native plant of Southern Africa, particularly in South Africa (Kalahari region, Namibia and Botswana). It has been harvested traditionally for at least several hundred years and has been exported internationally for about fifty years.

2. Origin and distribution

Devil's Claw is indigenous to Southern Africa and was introduced into Europe where the dried roots have been used to restore appetite, relieve heartburn, and reduce pain and inflammation.

Devil's Claw is found in the sandy Kalahari areas of Namibia, Botswana and South Africa, and to a lesser extent Angola, Zambia, Zimbabwe and Mozambique.

3. Production levels

3.1 South Africa

In 2002, the first plantations in South Africa and Namibia, the home of the Devil's Claw, were so successful that it was possible to plant 250 000 seedlings on a large scale in 2003. Harvesting took place in June 2004, when around 40 metric tons of *Harpagophytum procumbens* were collected.

3.2 Internationally

Namibia is the largest supplier of Devil's Claw in the world, providing at least 90% or more of the product worldwide, followed by Botswana, Angola and Zambia but they supply smaller quantities. Namibia exported a total of more than 9 500 tons to European markets between 1992 and 2013, with average exports of approximately 435 tons per year, between 2001 and 2013.

Countries such as France, Italy, Germany, Poland, Spain and South Africa have been reported as the largest importers of Devil's Claw from Namibia between 2009 and 2013. In total, 12 countries imported Devil's Claw from Namibia during this period. The above mentioned countries all imported 100 tons or more in total while the "other" countries, Switzerland, China, Brazil, South Korea, United Kingdom and the United States imported less than 100 tons in total.

4. Major production areas in South Africa

Devil's Claw is found in the Northern Cape, North West and Limpopo provinces of South Africa and commercial harvesting of the plant currently takes place in the North West province and to a very limited extent in the Northern Cape.

5. Description

5.1 Mature plant

Devil's Claw is a prostrate, mat-forming perennial herb, considered as a weed. It is a herbaceous plant that can grow up to 1,5 m in length.

5.1.1 Stem

The plant has creeping annual stems of up to 2 m long, spreading from a tuberous fleshy rootstock. They have many hollow branches and are covered with glandular hairs which exude a slimy, sticky sap.

5.1.2 Roots

Devil's Claw has a strong central taproot and secondary root tubers (storage roots) branching off horizontally. The roots can be up to 50 cm in length and found up to 2 m deep and the secondary storage roots are up to 25 cm long and 6 cm. The plant can store up to 90% water in these storage roots. It is these storage roots that are used medicinally. It has secondary roots, called tubers that grow out of the main roots. Its tubers grow off its taproot and are shaped like elongated sweet potatoes. Although the name comes from the fruit, the part of the plant used for its medicinal value is the tuber.

5.1.3 Leaves

The weedy plant has grey or green leaves. The leaves are large and heart-shaped. The opposite leaves of Devil's Claw are blue-greyish-green and irregularly divided into several lobes.

5.1.4 Flowers

Flowers and leaves can only be found during the rainy season. The tubular flowers are dark violet with a yellow and white throat. The plants flower mainly from about November to April (summer).

5.1.5 Fruit

From the flowers grow woody, sharply curved, sticky, barbed fruit, which give Devil's Claw its name. The characteristic fruit have numerous long arms with sharp, hooked thorns, as well as two straight thorns on the upper surface. The fruit looks like a giant claw.

5.2 Essential part

The roots are the essential part of the Devils' Claw plant.

6. Climatic requirements

6.1 Temperature

Devil's Claw grow well in temperatures between 17° C and 30° C. Optimum soil temperatures needed for germination vary depending on species.

6.2 Water

Watering should be done in October but rainfall from 1 October of 50 mm to 100 mm is preferable. In regions like the Kalahari region, an average amount of 200 mm of rain is more than enough for the Devil's Claw. After seedlings have appeared, allow the surface of the soil to dry between watering. In areas with summer rainfall, only supplement watering if rain is light. In areas without summer rainfall, imitate this rainfall pattern by watering once every two to three weeks. Once the seedpods have started to ripen, stop watering.

7. Soil requirements

The Devil's Claw is most abundant in the veld (grasslands) of the Transvaal region in South Africa. The type of habitats that the Devil's Claw thrives best is in well-drained

deep, red, light sandy rocky soils; it seems to prefer the soils along roadsides and grows well in waste grounds. The herb crowds especially in places where the natural vegetation has already been cleared for other uses. The plants can withstand slight frost.

PART II: CULTIVATION PRACTICES

1. Propagation

The plant is propagated by seeds or planted secondary tubers. The seeds are planted during the spring season, and the young/secondary tubers are usually retrieved in the autumn. After they are harvested, they are cut into many pieces, each about 2 cm in length.

2. Soil preparation

Planting of Devil's Claw seed requires loosening of the top quarter of soil with a rake and clearing all other vegetation on the ground in a strip of 3 m wide. If the soil is too compact, preparation for planting by digging and turning the soil to a depth of approximately 8 cm is required. After preparation of the soil, the bed should be levelled with a rake to create an even surface on which to sow the seeds.

3. Planting

Devil's Claw can be planted in late spring or early summer. The seeds should be scattered evenly over the prepared beds or should be sown in a furrow of 20 cm deep and 60 cm wide. After sowing, the seeds can be raked up slightly and covered with a thin layer of soil. Seed planted too deeply can cause poor germination. The small tubers should be planted 10 cm deep and 50 cm apart. The young primary tubers are planted in carefully prepared strips of land using an organic protocol, both to ensure top quality plants and to minimise impact on the natural environment. Growing wild, the complicated desert plant needs to grow for four years or more before it is ready for harvesting.

4. Fertilisation

A lime fertiliser or compost is needed. Five to seven centimetres of organic matter should be added to the soil. Organic matter provides food for the plants and microorganisms living in the soil, and it also provides essential nutrients and micronutrients to plants.

5. Irrigation

The seeds should be irrigated daily with a fine mist sprayer, keeping the bed evenly moist until the seedlings emerge. After emergence, irrigation should be applied every second day, keeping a careful watch over the small plants and not allowing these to dry out. As temperatures drop, the frequency can be extended. Frequency of irrigation depends on the temperature and soil. Once the plants are showing four to five leaves and are well established, further irrigation once or twice a week will be sufficient. For maximum seed production, continue irrigation until the flowers stop blooming.

6. Pest control

There are no major pests and diseases affecting the devils claw, however, very rarely it is disturbed by aphids and powdery mildew.

The only pests of concern are animals feeding on the tubers, e.g. porcupines and antelope such as duiker and steenbok. Birds are attracted to the freshly seeded wild-flower beds. In areas that are small (i.e. the beds) bird netting can be used and a mulch of dried leaves or shredded palm fronds can be spread over the bed. The mulch should be removed immediately once the seedlings appear.

7. Disease control

Overwatering could lead to fungus problems. Registered fungicides can be used.

8. Other cultivation practices

8.1 Drying

Fresh material should be dried quickly by using a net or plastic sieve. During drying the plant material must be protected from rainfall and dew. Facilities for drying must be clean, well-aerated and never be used for animal keeping. Air-drying in a thin layer on nets requires a sufficient distance from the ground to provide adequate air circulation. It is possible to dry the sliced tubers on the ground because of sand being blown on the fresh material. Protect plants during drying from any types of animals.

The drying process influences the colour of the dried slices of the root tubers. The bright coloured slices are suitable for herbal tea preparation, the dark coloured ones only for extraction.

9. Harvesting

9.1 Harvest maturity

Devil's Claw takes three to four years to reach maturity and the matured plant is very hardy. Devil's Claw harvesting takes place during the rainy season, from November to June/July each year. The harvesting season usually stops at the end of July, but not earlier than the end of June, unless there is a hard frost.

The rainy season is thought to be preferable because the plants are most easily identified during this time and the soil is softer, which makes the digging up of the secondary tubers easier than in the dry season. The best time to harvest is in the autumn, when the seed pods are ripe and after the fruit weed has formed. If the collecting area is divided into four quarters and harvesting takes place only in one quarter every year, then the harvest is possible from autumn to spring when the soil is wet and it is easy to dig and 10-15 plants can be harvested per day. The harvesters dig 1 to 2 m deep to find the tubers. Large secondary tuberous roots of the plant are harvested in April to September (after the rains), sliced and dried.

9.2 harvesting methods

Only the secondary root tubers are harvested and the primary root is saved for re-planting. Harvesting can be done by hand or cutting the fresh root tubers to slices using a stainless-steel knife or digging stick and the clean cutting board is used for this purpose. The other tools that can be used are spoons, spades, axe and blades. Local people harvested Devil's Claw according to traditional methods and practices. Presently there are three basic systems/methods:

- Wild harvesting: the harvesters harvest on their own, following traditional methods.
- Controlled/Organised harvesting: native harvesters receive organisational support, training and education from NGOs which they then apply to harvesting.
- Commercial cultivation: Devil's Claw is cultivated and harvested on farms, often pre-existing stock farms.

After harvesting, the long, thin secondary storage tubers are cut into many pieces, each about 2 cm in length.

PART III: POST-HARVEST HANDLING

1. Packing

Dried materials should be packed in clean containers and should also be packed in aluminium foil bag with plastic bag inside. Devils' Claw powder should be packet in a bottle, drum, plastic container or vacuum packed.

2. Storage

The tubers can be stored in a dry place before slicing and drying. Store the bags with dried material in well-aerated warehouses that must never be used for animal keeping or in a cool and dry, well-closed container and keep it away from moisture and strong light/heat. Devils Claw has a shelf life of 2 years.

3. Transport

For transportation of Devil's Claw dried material, use clean bags/containers.

4. Marketing

The dried side tubers may be sold to local communities within the country and in the foreign countries. The traditional harvesters sell their produce on the local market; it is bought by the local people for their own use and it can be exported. There is both a local and an international market. The local market is very small in comparison to the international one.

PART IV: PRODUCTION SCHEDULES

ACTIVITIES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
Soil sampling						X	X					
Soil preparation							X	X				
Planting									X	X	X	
Fertilisation												
Irrigation										X	X	
Pest control		X	X	X								
Disease control		X	X	X								
Harvesting	X	X	X	X	X	X	X				X	X
Marketing								X	X	X		

PART V: UTILISATION

Devil's Claw has been used for numerous conditions in several areas of the world. In South Africa, the root and tuber have been used for centuries as an all-purpose folk remedy. Devil's Claw has been used to reduce fever and to relieve pain (e.g. in childbirth, as well as in the treatment of wounds, swellings and boils), to treat allergies and headaches, and to stimulate digestion. Traditional healers also used Devil's Claw to treat inflammatory conditions such as arthritis, rheumatism, and lower back pain. Devil's Claw has also been used as a remedy for liver and kidney disorders. It has been used by the people to treat indigestion, as a laxative and for blood related problems.

Devil's Claw root was also used in folk medicine as a pain reliever and for complications during pregnancies. In addition, an ointment made from Devil's Claw is used for skin injuries and disorders. The root of Devil's Claw is used widely as a medicine, both traditionally and in Western preparations. The tuber is traditionally used as an analgesic during pregnancy. In addition, pulverised root material is used as an ointment for sores, ulcers and boils and for difficult births. Infusions of the dried root are also commonly used as a cure for digestive disorders, to stimulate appetite, and for postpartum distress.

The indigenous people use Devil's Claw in many more cases than are prescribed by Western medicine. In the Western world, Devil's Claw is generally used to treat rheumatism and arthritis. The medicine can be found in the form of pills, capsules, teas, tinctures and creams.

African traditional remedy: Devil's Claw is used by various peoples in South Africa, including the Khoikhoi and the Bantu. Additionally, the herb provides some relief for connective tissue pain (muscle, tendons and ligaments), is used as a digestive assistant and to calm a mildly upset stomach because of indigestion.

The black fibre of the fruit or "claw" is used in basketry and the dried seeds can be peeled and eaten. The young fruit can be cooked as an okra-like vegetable.

PART VI: ACKNOWLEDGEMENTS

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