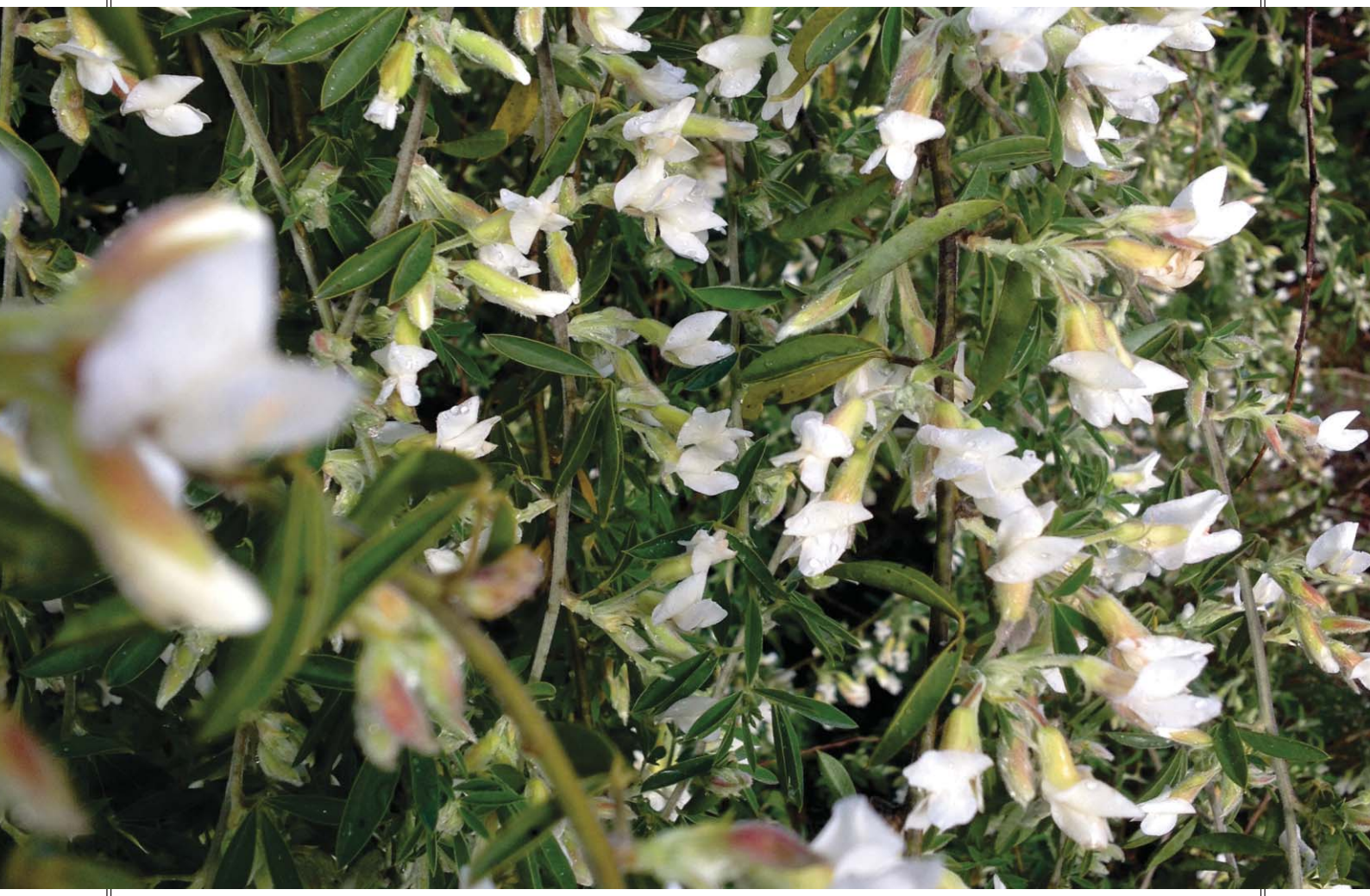
SP no. 162/22

USER MANUAL:

A guide to establishing a tagasaste nursery

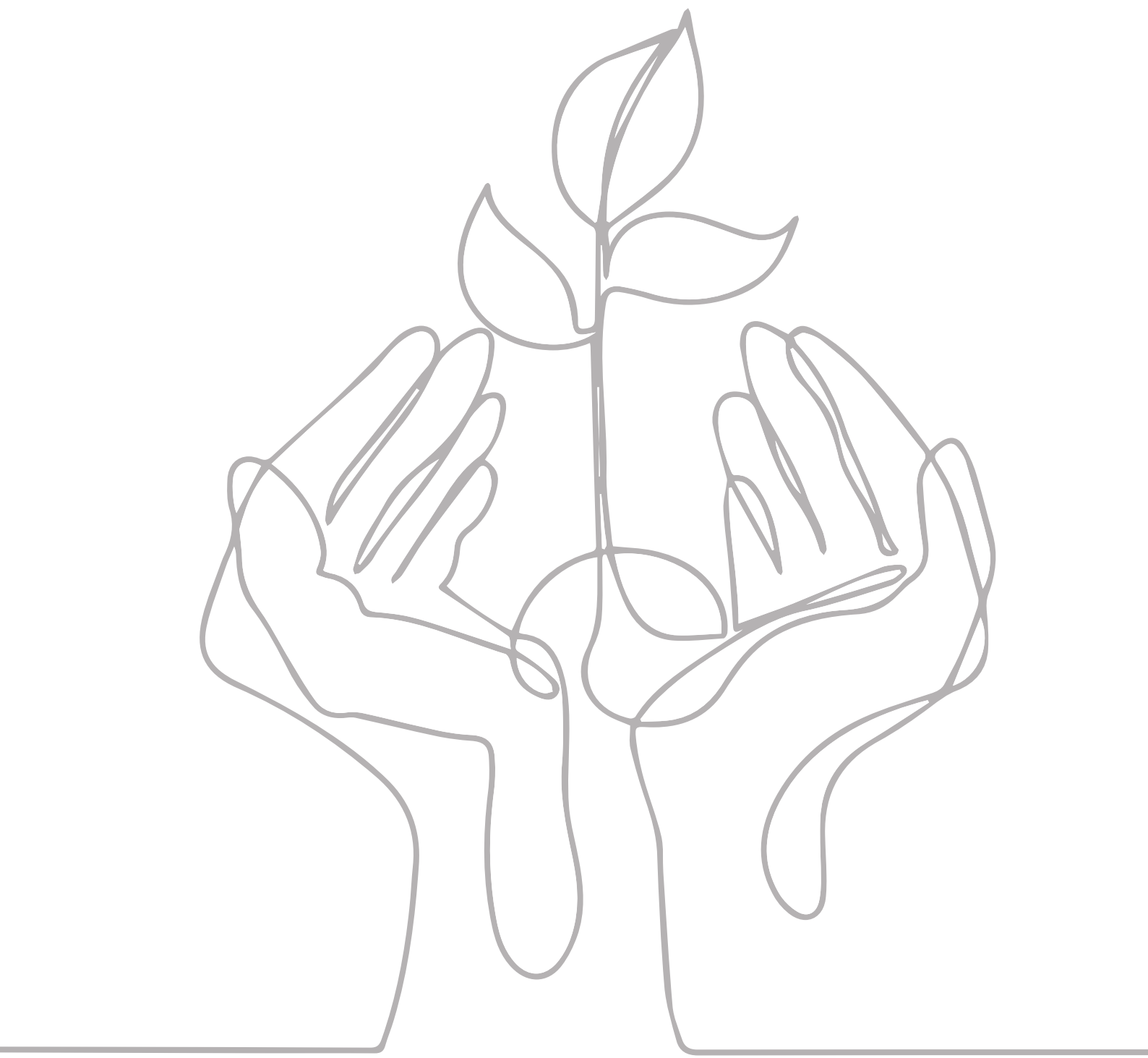


KHANIMAMBO
INNOVATIVE SOLUTIONS

WATER
RESEARCH
COMMISSION

agriculture, land reform
& rural development
Department:
Agriculture, Land Reform and Rural Development
REPUBLIC OF SOUTH AFRICA

DAMARA FARM



OVERVIEW OF: CHAMAECYTISUS PALMENSIS

Common names: tagasaste, lucerne tree, lusernboom

- Tagasaste is an adaptable, multi-purpose, woody leguminous perennial shrub used for livestock fodder, soil improvement and land rehabilitation.
- It is highly palatable, with the same nutritional value as alfalfa, and does not cause bloat in livestock.
- Foliage can be grazed directly or harvested to feed fresh. The young shoots can be dried and added to feed rations, and has the potential to be pelleted and stored.
- Flowers prolifically, making it popular with bee keepers (apiculture), and produces large amounts of seed.
- Suitable for agroecology, agroforestry, silvopasture and regenerative agriculture systems.
- The wood of old trees can be made into firewood.

17-22% CRUDE PROTEIN

25-29% PROTEIN CONTENT IN YOUNG SHOOTS AND LEAVES

16-19% CRUDE FIBRE

'GREEN' FIRE BREAKS (FIRE RETARDANT)

SUPPORTS BIODIVERSITY

SOIL STABILISATION

CARBON SEQUESTRATION

SEED SCARIFICATION

- Tagasaste seed has a hard outer coating which requires treatment to ensure good germination rates.
- Flowers from June to September.
- Each seed pod contains on average 8 - 12 seeds. There are around 42 000 seeds per kg.
- The seed pods turn black when ripe, and burst open in response to heat when fully ripe.
- Seed loses viability over time, but can be stored for up to 11 years.

There are several methods to treat tagasaste seed, including nipping each seed with a sharp blade, soaking overnight or using acid. The method below is the most effective.

You will need: boiling water, household bleach or peroxide (optional - 10ml/litre of water), a pot or dish, a sieve, timer and cold water. You will also need a flat surface to dry your seed post scarification.

1. **Get everything you need together before starting.**
2. **Boil water. If only a small amount of seed you can use a regular kettle, otherwise use a pot to fit the amount of seed you have.**
3. **As soon as the water has boiled, remove it from the heat. Pour seed into the pot of hot water and immediately start the timer for 3 minutes (add bleach/peroxide at this point). Gently stir the seed continuously.**
4. **As soon as the timer goes off, strain the seed and rinse it with cold water until the seed is thoroughly cool.**
5. **Spread seed on a clean surface to dry. To speed up the process, put seed in the sun or dry it with a fan heater, turning regularly to prevent seed from getting too hot.**

WATER REQUIREMENTS AND IRRIGATION

- Tagasaste has a dimorphic root system: two distinct root forms, which include both tap roots as well as lateral feeding roots.
- The dimorphic root system allows mature plants to adapt to variations in rainfall and climatic conditions.
- Will not grow in waterlogged conditions.
- Susceptible to stem rot diseases if overwatered or if grown in humid conditions.

Tagasaste is hardy to drought conditions, and mature trees will survive in areas with an average rainfall of 200mm per annum. Under these conditions it will grow more prolifically with supplementary irrigation. Water requirements will vary depending on conditions such as soil type, ground water level, average annual rainfall, grazing/harvesting strategy and season.

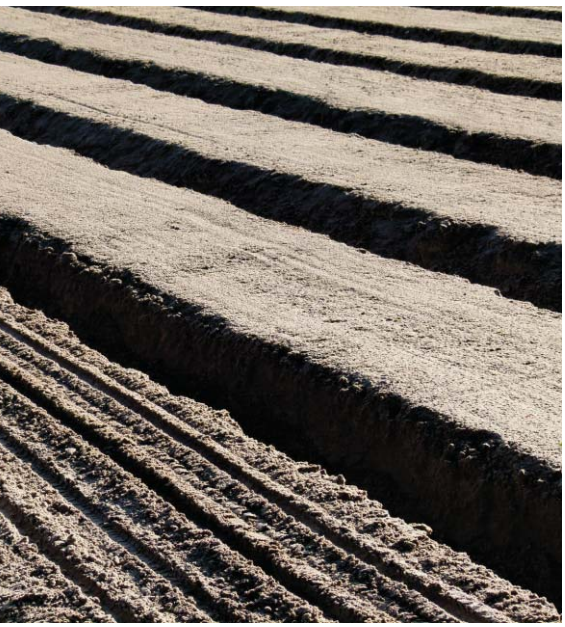
- **Direct sowing: sow in rainy season once soil is saturated, or irrigate with overhead or drip.**
- **Seedling nursery: overhead irrigation is best. Avoid fine mist sprayers. Hand watering can be done using a watering can.**
- **Transplanted seedlings: plant during rainy season once soil is saturated, with drip irrigation or hand watering.**
- **Mature trees: for maximum production, heavy grazing or harvesting, give supplementary water via drip or flood irrigation.**

SOIL AND SOIL PREPARATION

- Tagasaste is adaptable and can grow in many different conditions.
- Tagasaste is a pioneer plant, so it grows well even in degraded, leached soils.
- The most important soil requirements are that the soil is not prone to water-logging and is not heavily compacted.
- For optimum results, have soil tested and treat according to recommendations for medics.

There are two main approaches to tagasaste establishment: direct sowing, and growing bare-root seedlings in raised beds for transplanting. It is not recommended to establish seedlings in pots/ polybags because the root development becomes compromised, resulting in plant mortalities 2 - 5 years after planting.

If the soil is compacted, loosen using a single tooth ripper or choose a more suitable site. Light, well drained soils are best, especially for seedling production.



BARE-ROOT SEEDLING NURSERY

1. **First, cultivate the soil to create a smooth and light planting medium.**
2. **Create raised beds using appropriate tractor drawn implements, or with a spade.**
3. **The beds should be approximately 250-300mm high, and 600-800mm wide if mechanical implements are available.**
4. **If relying on manual labour, reduce the width of the beds to 400mm wide. This will make root pruning easier.**
5. **Flatten the surface of the beds to create a smooth and firm medium for planting.**

FERTILIZER, INNOCULATION AND PLANTING

- Tagasaste is a legume. The roots form nodules containing beneficial rhizobium bacteria which fix nitrogen into the soil.
- Tagasaste is considered a promiscuous nitrogen fixer, meaning it can colonise different strains of rhizobium. Healthy soils may not require innoculation.
- As a pioneer plant, tagasaste can survive in nutrient poor soils, but will produce better with the right nutrients and a balanced pH.
- It is crucial to follow the correct steps for propagating and planting tagasaste.

FERTILIZER REQUIREMENTS

Responds well to superphosphate at 200-300kg/ ha.

Organic alternatives such as bone-meal, Agriboost, fish hydrolosate, kelp and well composted manure.

Sensitive to deficiencies in copper, zinc and molybdenum.

Innoculate using rhizobium for alfalfa, clover or lupins if required.

PLANTING SEED: NURSERY

1. **Ensure soil is completely weed free and moist when planting.**
2. **Spacing: 4 x rows per bed 150mm apart. Plant at 10-15mm depth, with 20-30mm between each seed.**
3. **Plant by hand, or using a correctly calibrated push-planter.**
4. **Irrigate immediately, and keep soil moist for germination. Reduce water slowly as seedlings grow, keeping soil moist but NOT saturated.**

GERMINATION, WEEDING AND PRUNING

- Germination takes place around 7-10 days, and up to 21 days.
- Monitor seedlings closely after emergence and adjust irrigation and care according to climatic conditions and signs of stress.
- Regular pruning of **roots and shoots** encourages strong lateral growth, making the seedlings more hardy once transplanted.
- Seedlings will be ready for transplanting 10-14 weeks after planting.

Ensure the raised beds remain weed free to avoid competition with the young seedlings for nutrients and water. If weeds are left to grow, they can cause a moist environment and cause disease, and they may suffocate newly emerged seedlings.

1. **When the seedlings are about 10-15cm high, prune them back to about 5-7cm using garden shears or a hedge trimmer.**
2. **Prune the roots using an appropriate tractor drawn implement or by using a sharp spade, ensuring the seedlings remain IN SITU. This is an important step to ensure the seedlings can be transplanted successfully.**
3. **Irrigate the seedlings immediately to allow the roots and shoots to heal before making new lateral growth.**
4. **When the seedlings have grown to 20cm, repeat the process and trim by half. Repeat again about 2 weeks before transplanting.**

MAINTAIN THE SHAPE OF THE BEDS THROUGHOUT. THIS WILL MAKE IT EASIER TO HARVEST THE SEEDLINGS WHEN THEY ARE READY

TROUBLESHOOTING: COMMON SIGNS OF STRESS IN TAGASASTE

- Tagasaste is known to be easy to establish and propagate if the correct steps are followed.
- Small ruminants such as sheep and goats readily debark the stems of tagasaste, which can cause plant mortalities.
- Cattle can break branches, but will generally not cause serious damage.
- Rabbits and hare have been known to chew the whole stem off close to the grown, killing the plant.
- Termites and ant nests, as well as moles at the base of the stem near the roots can cause some damage or result in plant mortalities.

1. Yellowing leaves: this is either from too much water or water-logging, or can be a sign of copper deficiency.
2. 'Leggy' growth and unusually small leaves: normally a sign of stress caused by nitrogen deficiency, disease, weed competition or insufficient availability of water.
3. 'Broccoli' like growth: usually a sign of overgrazing by wildlife.
4. Grey, 'crispy' leaves: this can be a sign of insufficient macro nutrients or disease.
5. Sudden death: this can happen if seedlings are propagated in polybags or pots, or if they are planted in severely compacted soil. Other causes can be water-logging, disease or debarking.
6. How to spot disease: greyish small leaves, black at the base of the stem.
7. Holes in stem: probably tree borer, Oemona hirta. Tagasaste can continue to grow and produce well even with the presence of tree borer.

REFERENCES AND USEFUL LINKS

Prepared by Leah Armstrong, 2022
info@damarafarm.com
www.damarafarm.com

Scan QR code for video: Tagasaste management, 2014, Dept. of Regional Indutries and Rural Development, Western Australia

Scan QR code for video: Success with tagasaste, 2013, Kyknet, Damara Farm, South Africa

Adams, M. A., Simon, J., & Pfautsch, S. (2010). Woody legumes: a (re)view from the South. Tree Physiology, 30(9), 1072-1082. 10.1093/treephys/tpq061

Dawson, I. K., Carsan, S., Franzel, S., Kindt, R., Van Breugel, P., Graudal, L., Lillesø, J. B., Orwa, C., & Jamnadass, R. (2014). Agroforestry, livestock, fodder production and climate change adaptation and mitigation in East Africa: issues and options. World Agroforestry Centre (ICRAF). 10.5716/wp14050.pdf

Franzel, S., Kiptot, E., & Lukuyu, B. (2014). Agroforestry: Fodder Trees. Encyclopedia of Agriculture and Food Systems (pp. 235-243). Elsevier Inc. 10.1016/B978-0-444-52512-3.00023-1

George B, 2003, Agrifacts : Tagasaste. NSW Agriculture. Available at: https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0005/147272/tagasaste.pdf

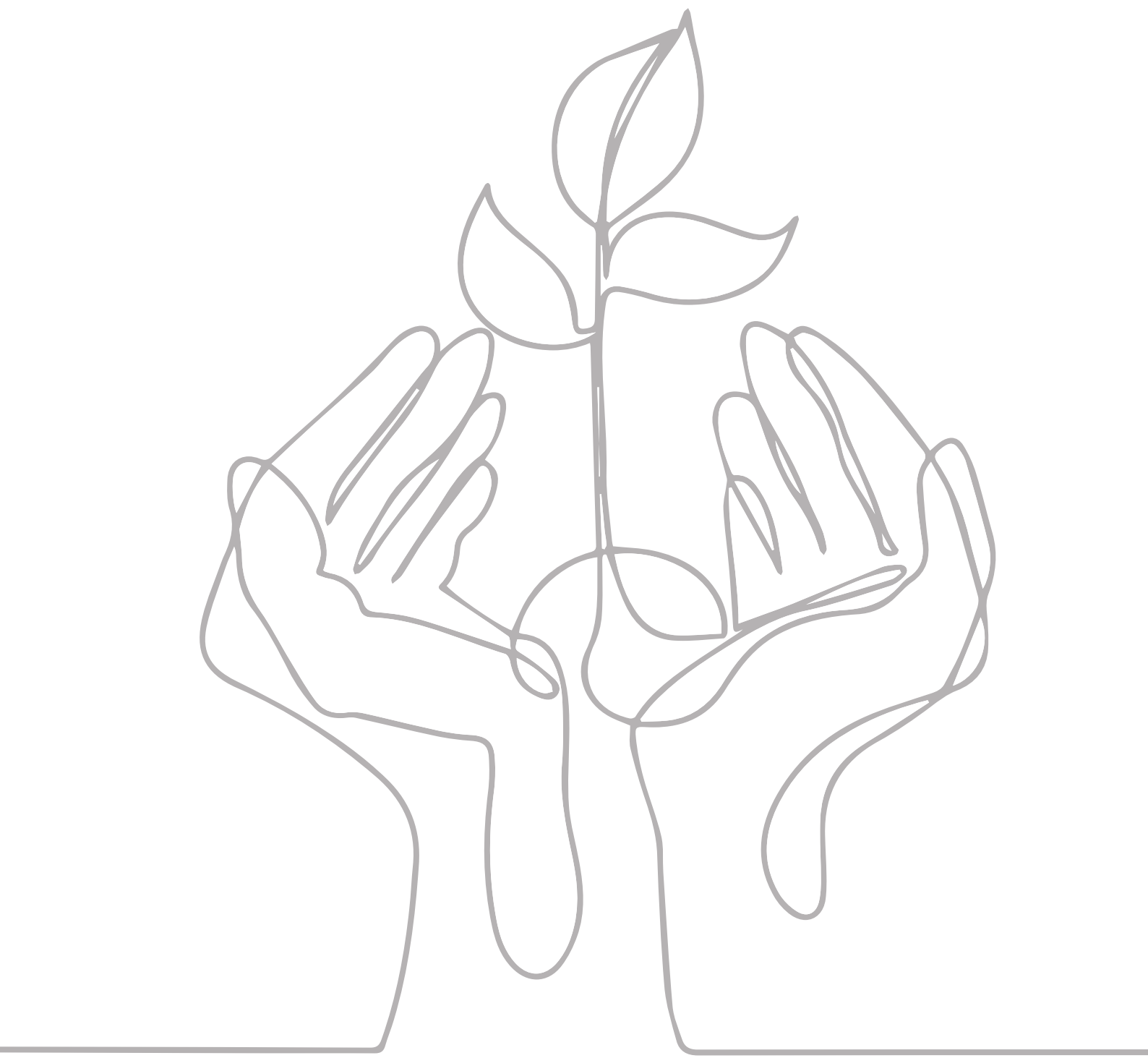
Hassen, A., Talore, D. G., Tesfamariam, E. H., Friend, M. A., & Mpanza, T. D. E. (2017). Potential use of forage-legume intercropping technologies to adapt to climate-change impacts on mixed crop-livestock systems in Africa: a review. Regional Environmental Change, 17(6), 1713-1724. 10.1007/s10113-017-1131-7

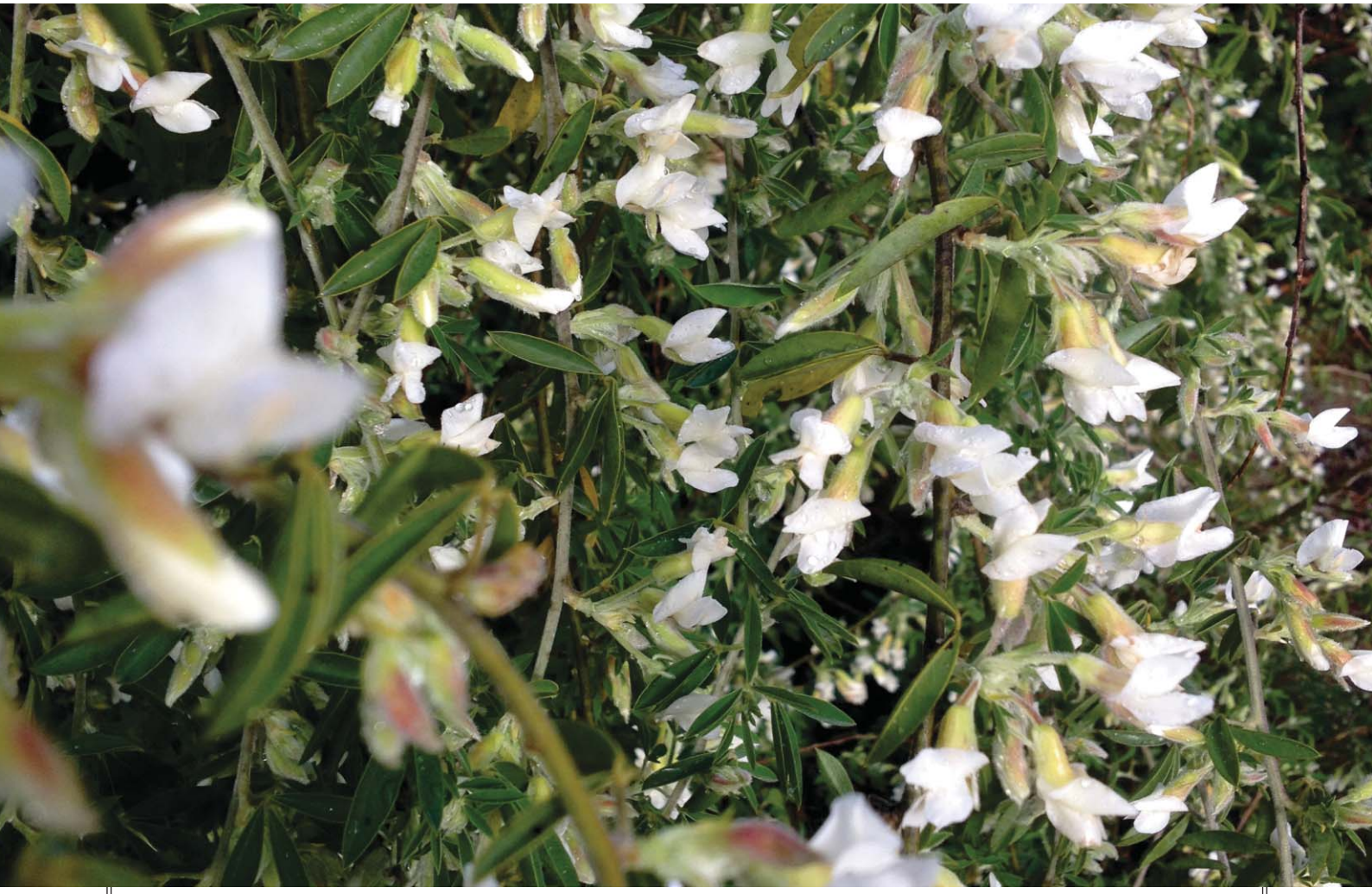
Orwa C, A Mutua, Kindt R , Jamnadass R, S Anthony. 2009 Agroforestree Database:a tree reference and selection guide version 4.0 (http://www.worldagroforestry.org/sites/treedbs/treedatabases.asp)

Wambugu, C., Place, F., & Franzel, S. (2011). Research, development and scaling-up the adoption of fodder shrub innovations in East Africa. International Journal of Agricultural Sustainability, 9(1), 100-109. 10.3763/ijas.2010.0562

Wochesländer, R., Harper, R. J., Sochacki, S. R., Ward, P. R., & Revell, C. (2016). Tagasaste (Cytisus proliferus Link.) reforestation as an option for carbon mitigation in dryland farming systems. Ecological Engineering, 97, 610-618. 10.1016/j.ecoleng.2016.10.039

Photographs courtesy of Leah Armstrong





KHANIMAMBO
INNOVATIVE SOLUTIONS

WATER
RESEARCH
COMMISSION

agriculture, land reform
& rural development
Department:
Agriculture, Land Reform and Rural Development
REPUBLIC OF SOUTH AFRICA

DAMARA FARM