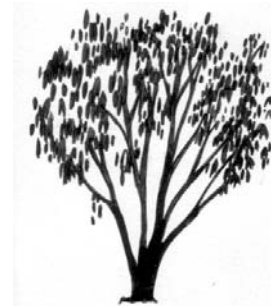


TEPHROSIA VOGELII



What is this Action Sheet about?

Tephrosia vogelii is a small African leguminous tree, which has bacteria associated with its roots that are able to fix atmospheric nitrogen. This Action Sheet is a brief guide to growing and using *Tephrosia vogelii* for soil improvement and pest control on small farms.

Scientific Name	African Names	English Names
<i>Tephrosia vogelii</i>	Swahili: kibaazi, kibazi, mibaazi, mtupa, utupa wa kibaazi, utupa wa kingindo, utupa wa mrima	Fish bean, Fish-poison bean, Fish-poison-tree, Vogel's <i>Tephrosia</i>

Where does *Tephrosia* grow?

Tephrosia vogelii is native to tropical Africa, and is found growing naturally in widely varying habitats, including savannah-like vegetation, grassland, forest margins and shrubland, wasteland and fallow fields.

Tephrosia vogelii...

...grows at altitudes between up to 2100m

...grows in areas with average annual temperature: 12 - 27 °C

...grows in areas with average annual rainfall: 850-2650 mm

...grows well on andosol soils not subject to flooding and on well drained loams with pH 5-6.5; is also tolerant to poor soils with low pH (acid soils), although can be prone to disease.

Countries where *Tephrosia vogelii* grows:

Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo, Cote d'Ivoire, Democratic Republic of Congo, Djibouti, Egypt, Equatorial Guinea, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambique, Namibia, Niger, Sao Tome et Principe, Seychelles, Sierra Leone, Somalia, South Africa, Sudan, Swaziland, Tanzania, Togo, Zambia, Zanzibar, Zimbabwe



Large carpenter bees (*Xylocopa brazilianorum*) are thought to be the main pollinators of *Tephrosia vogelii*.

What is *Tephrosia vogelii* used for?

Tephrosia can be grown to improve soil fertility, for firewood, as an insecticide against storage pests and mites on plants. It can also be used as a medicine for skin diseases and internal worms. Traditionally, it is used as a fish poison, although this is now illegal in many countries. Because of the poison in the leaves and seeds (rotenone), goats and other animals usually do not like to browse the trees. Tephrosine also makes the tree quite resistant to termites.

How does Tephrosia improve soil fertility?

Tephrosia leaves and seeds contain high amounts of nutrients, especially nitrogen, which is necessary for good plant development. When the trees are cut and the leaves worked into the soil, these nutrients can be used by the plants that are grown after Tephrosia in the field (See Action Sheet 39: Green manure/Cover crops for Biomass Transfer).

SEED HANDLING

Tephrosia can in many ways be used just like pigeon pea. Seed harvest, storage and sowing is done in the same way.

When is the best time to collect seeds?

In Southern Africa, peak seed production is between July and September. However, trees produce smaller quantities of seed throughout the rest of the year.

Should I collect seed from more than one tree?

Collect seed from as many trees as you can. If you only have a few trees available for collection, exchange a portion with your neighbours who have other trees. By doing this, a wide genetic diversity (biological variety) is kept in the planted material. This will help to ensure good tree performance and provide a safeguard against attack from pests and diseases.

What's the easiest way to collect seeds?

Pick the brown pods with the ripe seeds directly from the shrub. After you have collected the pods, dry them in the sun for 2 to 3 days until all of them are open. Then thresh the pods lightly to release the seeds and separate the seeds from the pod fragments by sieving and winnowing.

Are all seeds obtained equally good?

Sometimes seed may have been eaten by insects. This seed should be thrown away. Sometimes seed may be hollow and this also should not be used. Hollow seed can be identified by squeezing between thumb and finger.

Can the seeds be stored?

Yes. If you want to store the seeds, it is best to dry them for at least 3 to 4 days under shade. They do not need to be dried if you want to sow them within two months of harvest. You can store dried seeds for more than 1 year, if kept in sealed containers in a cool dry area.

If I can't collect seed myself where can I obtain good seed?

Get advice from extension officers or the World Agroforestry Centre. See also Action Sheet 56: Where to get tree seeds.

PLANTING

Where should I plant Tephrosia?

You can plant Tephrosia in rows or stands. For a green-manure crop, the recommended spacing is 40cm x 40cm, with 2-3 seeds per hole; when planted for hedges the spacing should be 1.5m between the rows. For large plantations, sufficient seedlings should be available for replanting in case of a low survival rate. When sown in rows, the recommended sowing rate is 5 kg/ha and when broadcast 8-13 kg/ha.

An easy way to plant Tephrosia for soil improvement is to sow it directly in the field between maize stations. The seeds should be planted at a spacing of 90cm (3 feet) with 2-3 seeds in each location in every other row of maize. The seeds can be planted on the ridge between maize, in the furrow. It is important that the site is not waterlogged, as Tephrosia does not do well on such sites.

When should I plant Tephrosia?

Tephrosia should be sown at the beginning or middle of the rainy season. If planting with maize, Tephrosia can be sown at the same time or at any time after maize planting until the middle of the rainy season to make sure it gets sufficient rains for establishment.

Does the time of planting affect the number of seeds I need?

When planting with maize, the number of stations to be planted will increase when Tephrosia is planted later in the season. The spacing needs to be reduced from 90cm to 60 or 45cm. This is very similar to pigeon pea planting, and there are two reasons for this:

Trees which are planted earlier will have more time to grow and therefore be bigger by the end of the season. If you plant later in the season, but want to have a good biomass yield, you need to plant more trees.

Trees which are sown earlier in the season, for example, together with the maize, will grow bigger and compete more with the maize. Therefore, fewer plants should be grown if the sowing date is earlier in the season.

How many days does it take for Tephrosia to germinate?

Most seeds will have germinated 8-10 days after sowing. Without treatment, the germination percentage is 65%, and the seedling survival rate about 60%. Soaking in warm water (45°C) stimulates germination.

How can I ensure that my seedlings grow healthily after germination?

Tephrosia grows rather slowly. This means that it does not compete much with the maize, but early on, there may be a problem with competition from weeds. The planting stations need to be weeded, but care is needed because it is quite difficult to tell the difference between weeds and small *Tephrosia* seedlings.

What pests and diseases could be a problem for Tephrosia?

Unfortunately, Tephrosia suffers from the same root-knot nematodes that attack tomato, tobacco, egg-plant, paprika and green peppers. This means the Tephrosia should not be planted at a site where any or these or related plants have been grown recently, or where it is planned to grow them in the next season.

SOIL IMPROVEMENT WITH TEPHROSIA

When do I cut and use the Tephrosia for soil fertility improvement?

You cut Tephrosia during land preparation for the next crop. If planted with maize, the Tephrosia plants are left to grow when the maize is harvested, and not cut until the land is prepared for the next maize planting.

During land preparation, the stems are cut at ground level. Main stems may be used for firewood or chopped up for incorporation into the soil, along with all smaller branches, twigs, and leaves. Lay the plant material along the furrows and cover it up when making ridges.

PEST CONTROL WITH TEPHROSIA

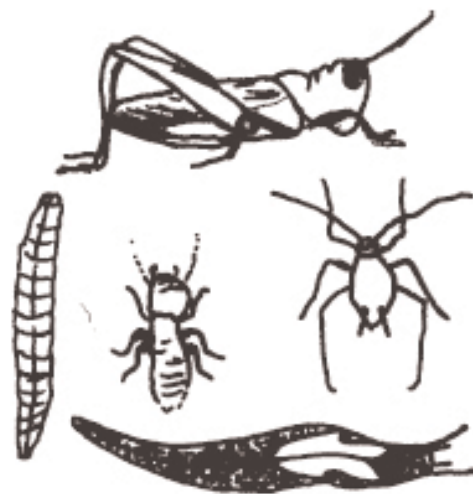
How do you use *Tephrosia vogelii* as a pesticide?

Tephrosia vogelii was widely used in pest control before the invention of DDT. The chemical in the leaves is called rotenone, and is classified by the World Health Organisation as a moderately hazardous or Class II pesticide. Extract of Tephrosia leaves can be used for the control of pests in the field, in storage or on domestic animals. The advantage of Tephrosia is that, unlike most synthetic pesticides, it leaves no residue on crops because rotenone breaks down within 3 - 5 days after application.

Control of field insects

Harvest leaves from the Tephrosia plants. When harvesting, only the leaves need to be taken off the shrub. If removed carefully, the shrub will continue to produce leaves for future use or for improving soil fertility. To extract the active ingredients, pound the fresh leaves in a mortar. The effective concentration is approximately one kilogram of leaves for every 5 litres of water. The crushing of leaves does not need to be done perfectly. After soaking the leaves in water for two hours or boiling them for 30 minutes, filter the juice through a cloth and use directly in a sprayer. Add a bit of soap to help the spray stick to the plant.

This mixture can be sprayed on garden vegetables, fruits, field crops and nursery seedlings for the control of different kinds of insect pests. It is important that the sprays have direct contact with the pests. If the pests are underneath the leaves, be sure to actually hit them. This treatment is effective up to seven days. After that time the process must be repeated. In areas of heavy termite infestation, the leaf mulch can also be very helpful.



(Image: HDRA)

Protection of stored grains

Tephrosia vogelii leaves may also be used for the protection of stored cereals and legumes. Take the fresh leaves and dry them under the sun. Grind or pound the dried leaves into a powder. Mixing 100 grams of powder with 100kg of maize or beans will protect the grains from weevils, the larger grain borer or bean bruchids. This treatment is effective up to three months. After that time the process must be repeated. Thoroughly wash the Tephrosia powder off grains before using the maize or beans for food.

Protection of domestic animals



Image: PACE

Pound the fresh leaves in a mortar and prepare the extract as described for the control of field pests. Dilute this with 5 times that volume of water and wash the animal with the mixture. This treatment will effectively remove ticks lodged in the animals fur. Rotenones are very toxic to pigs, so extreme care should be exercised if treating pigs.

WARNING: please note that *Tephrosia* is dangerous to fish, humans, domestic animals and wild life. When using *Tephrosia*, try to keep the extract away from your skin or use gloves if available. Wash hands with soap as soon as you have finished applying it on crops or people. Do not use *Tephrosia* to poison fish. It is now illegal in many countries.

ACKNOWLEDGEMENTS: This Action Sheet is based closely on the following sources: SADC-ICRAF leaflet: Growing *Tephrosia vogelii* – A very brief introduction for farmers; World Agroforestry Centre, Agroforestry database entry on *Tephrosia vogelii*. ICRAF Southern Africa leaflet: *Tephrosia* in pest control. Illustrations by Alexi Francis.

FOR MORE INFORMATION

CONTACT World Agroforestry Centre: www.worldagroforestry.org