

USING TITHONIA AS A FERTILISER

Compiled by RESCAP

WHAT IS TITHONIA?

Tithonia was initially introduced from Central America as an ornamental. It is now a common flower that grows along roads and on waste ground throughout the humid and sub-humid tropics at between 1000-2000m asl. It is a tall, bushy herb with several stems from the base to the crown, and can grow up to 4 metres tall in fertile soil. It has yellow flowers. It is generally considered as a weed, but in recent years it has attained a new significance and is valued by many who know its properties as a fertiliser.



Tithonia accumulates a large amount of nitrogen and phosphorous from the soil and therefore makes a very good organic fertiliser. The stems and leaves are soft and rot easily. When it is cut and dug into the soil it rots quickly and releases nearly all the nitrogen into the soil in about two weeks, making it available for crops.

Chemical characteristics of Tithonia from Northern Province in Zambia

Nitrogen (N) 2.7%
Phosphorus (P) 0.14%
Potassium (K) 4.2%
Calcium (Ca) 0.98%
Magnesium (Mg) 0.32%

Source: Mutuo, at el., 2000.

MANY USES:

Fodder: A suitable species for fodder for cows and goats. The leaves, soft branches and even the plant's yellow flowers are eaten. *T. diversifolia* has a high nutritive-quality index.

Compost for fish pond: Tithonia can be applied into fish pond as compost material.



Fuel: Tithonia provides farmers with firewood.

Medicine: An infusion of leaves is used as a medicine for constipation, stomach pains, indigestion, sore throat and liver pains. The leaves should be ground into small pieces, mixed with water, and then drunk.

Water extracts from Tithonia can be used to control termites and insect pests.

Tithonia can be planted on contours as hedges for soil and water conservation.

Other products: Biomass from the existing locally available shrubs of *T. diversifolia* that commonly grow on field and farm boundaries might be a more economic source of nutrients for crops than the biomass from planted trees.

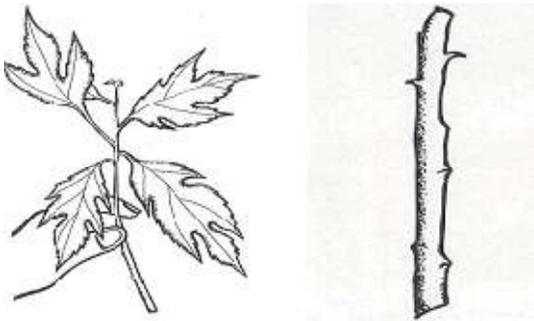
PLANTING TITHONIA

Tithonia diversifolia can be applied as green manure to maize, sorghum, cowpeas, kale, tomatoes and beans as well as to high-value crops such as French beans and pineapples. For efficient use of labour, farmers can plant Tithonia in different niches on their farm by direct seeding or by using cuttings or bare-root seedlings. This will make Tithonia available within the farm.

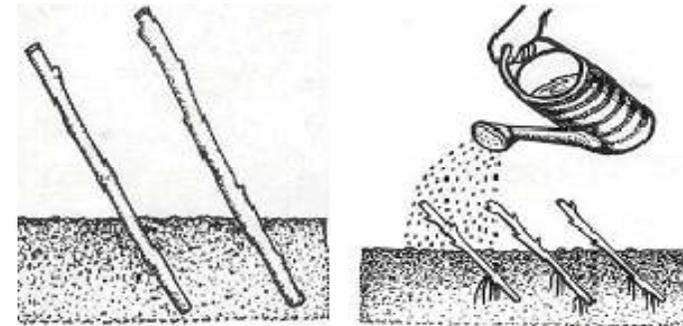
Tithonia can be cut back twice a year i.e. at the start of each season.

To make cuttings, cut mature wood into pieces about 20-30 cm long. Make sure they are cut cleanly as split pieces do not root. Put the cuttings in the ground at an angle, with about two nodes above the ground and about two below the soil. The cuttings root from the nodes below ground and establish as strong plants.

Cut a piece with 4 or 5 nodes
Select a mature stem

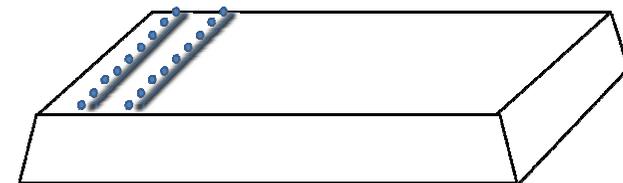


Plant at an angle of 45° - 60°
Water the cuttings



You can easily propagate Tithonia by direct seeding. The best method is to make a furrow for the seeds and cover them lightly with sandy soil. Then apply mulch to prevent the seeds from being washed away and to retain the soil moisture.

Make a shallow furrow and plant the seeds
Cover with sandy soil and apply a mulch



USING TITHONIA AS GREEN MANURE:

Cut leaves and soft twigs of Tithonia from the hedges, chop them into small pieces. Digging is easier if the plants have been chopped into small pieces before digging. This also helps prevent the problem of re-growth if this should occur.

Chopping leaves by panga knife



The green manure is dug back into the soil before the crop is grown. As basal dressing, place two double handfuls of fresh chopped leaves and soft twigs per station equivalent to 400g in each planting hole two weeks before transplanting. Banding method can also be used for basal dressing.

Basal dressing by banding method



As top dressing, you can continue applying the same rate of the green manure throughout the active growing period of the crop but preferably 2 weeks and 4 weeks after transplanting depending on the plant growth.

Top dressing around the plant



Tips for digging in:

The green manure should not be buried too deep but they should be turned in just under the soil surface. If digging-in is difficult the plants can be dug in roughly, left for a few days and dug over again.]



When should a green manure be dug in?

Younger leaves and twigs of Tithonia are easier to dig into the soil than older ones. The best time to dig in is just before flowering begins. If plants become too old and tough, they will be more difficult to dig in. Soil organisms will find it difficult to break down and decompose old, tough plants. It is better to avoid old or tough stems because they may take roots in the soils and turn to weeds.

NOTES

Tithonia is not a legume so it does not fix nitrogen. Where Tithonia is grown and used on-farm the use of Tithonia cycles nutrients within the farm but does not supply a net input of nutrients to the farm. So farmers can be encouraged to use a combination of Tithonia with inorganic sources of phosphate or other organic sources such as animal manure.

It is also important that green manure transfer has greatest potential when (a) the costs of labor are low, (b) when the value of the crop is high.

This information is adopted from the following source edited by RESCAP:

'Using the wild sunflower, Tithonia, in Kenya' (ICRAF 1997)

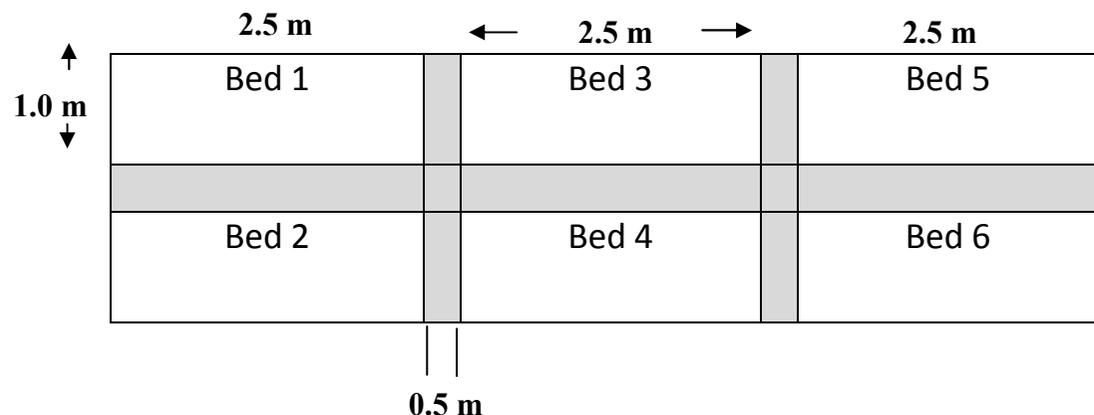
World Agroforestry Centre – www.worldagroforestry.org

Agroforestry Database 4.0 (Orwa et al.2009)

The yellow colour indicates flowers of Tithonia in Kasama in Northern Province, Zambia



FIELD LAYOUT OF PILOT ON GREEN MANURE APPLICATION OF TITHONIA TO LEAF VEGETABLE



INSTRUCTIONS ON TITHONIA APPLICATION

1. Site Selection & Land Demarcation

- 1.1.** Select a suitable area with relatively good soils, free from natural barriers, and with minimum undulations;
- 1.2.** The selected site should be in a strategic place, e.g. near a major road for easy access and passersby to observe;
- 1.3.** Demarcate or measure the piece of land earmarked for the pilot demo plot using a field measuring tape and a rope and mark accordingly using pegs;
- 1.4.** Clear the demarcated plot to free it from thickets, trees, shrubs, tall grass, etc that would make cultivation difficult;

- 1.5.** Divide the plot into six (6) subplots as shown on the Field Layout Plan.

2. Land Preparation

- 2.1.** Digging – Dig the land thoroughly using hoes to loosen up the hard pan for proper penetration of roots of the crops;
- 2.2.** Bed making – Make sunken beds using hoes so as to retain moisture.

3. Nursery management and planting

- 3.1.** Sterilized nursery soil by fire well in advance.
- 3.2.** Sow seed 1cm between seeds and 10cm to 15cm between rows. Germination expected 5-8 days. Avoid thick sowing to raise healthy seedlings.

4. Transplanting and Basal-dressing Fertilizer Application

- 4.1.** Apply D Compound fertilizer 10g per station in all beds followed by incorporation;
- 4.2.** Plant healthy seedlings of 10 to 15cm height with spacing of 45cm between plants and 45cm between rows in all beds;

5. Weeding and Top-dressing Fertilizer/Tithonia Application

- 5.1. Weed in all beds when necessary;
- 5.2. Apply Urea fertilizer 2.5g per station in beds 1, 2, and bury two double handful of chopped leaves and soft stems of Tithonia per station in beds 3,4, after 2weeks of transplanting.
- 5.3. Apply Urea fertilizer 2.5g per station in beds 1, 2 and bury two double handful of chopped leaves and soft stems of Tithonia per station in beds 3,4, after 4weeks of transplanting.

6. Pest and disease control

- 6.1. Prevent pest and disease occurrence by doing cultural practices such as field hygiene and crop rotation.
- 6.2. Whenever they occur, control them using recommended methods. Record the data on pest and disease occurrence.

7. Harvesting

- 7.1. Harvest the leaves bed by bed and weigh the quantity using scale or recording and counting the number of buckets.

DATA COLLECTION FROM PILOT DEMONSTRATION PLOTS

Bed N ^o .	DOS	DOT	DSH	Y	PDS
1					
2					
3					
4					
5					
6					

1. DOS-----Date Of Sowing
2. DOT-----Date Of Transplanting
3. DSH-----Days to start harvesting
4. Y----- Yield (Kgs)
5. PDS-----Pest & Disease Score:

0 – Nil;
1 – Low;
2 – Medium;
3 – High