



Sunseed Desert Technology  
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## Field trials and extension work in Tanzania

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Donald went to Dodoma in June 2003 to work with Justin of the Sunseed Tanzania Trust (STT). STT had been working in Dodoma region for a number of years, and was already well-connected with a network of local NGOs, including several with well-run tree nurseries and good field survival rates, and Donald found considerable interest in the mycorrhizal technique that we wanted to test; forest soil was already often used as a component, and the additional step of trap-culturing such soil to multiply its potential as inoculum was easily understood.

Our plan had been to run trials first, and only go public when we had experimental evidence of the effectiveness of the technique, but local NGOs and individuals pressed for information, so Donald and Justin gave a series of demonstrations and workshops at which the inoculation method was explained and trap cultures were set up for people to try the method for themselves.

Instead of the standard trap-pot, oblong trenches 25 cm deep were dug, lined with overlapping polythene bags, and filled with forest soil. For our own trials, at Nzuguni village, the 'trap-trough' was filled with topsoil from under the canopy of a healthy mature *Acacia tortilis*. Alfalfa and onion were sown as hosts (bait plants), but the onion failed to germinate (subsequent trap cultures used maize and beans). The alfalfa suffered some grazing damage so a barrier of thorny branches was laid round it, but this was found to offer cover for grasshoppers which also inflicted grazing damage, so was replaced by a woven fence.

The bait plants were cut down a week before the inoculum was to be used, the roots were extracted and chopped up into centimetre-long pieces, and mixed back into the trap-trough soil. This mixture, the inoculum, was then applied in a 1 cm deep layer immediately under the seed of the target tree species.

The Dodoma area has suffered considerable deforestation; official policy is to promote tree planting and to decentralize tree production to village and school nurseries and there is considerable public demand for seedlings. On average the region receives about 600 mm of rainfall a year, adequate for tree planting and crop growing. But 2003-5 saw below average and late rains, with consequent food security issues.

Further afield, Kongwa is a sloping plateau northeast of Dodoma, which was cleared in colonial times for groundnut production and for tsetse fly eradication. It is almost treeless and subject to wind erosion, and some areas have salinity problems. There was no tradition of tree planting there, but STT and MIGESADO (a Tanzanian NGO promoting enclosed, fuel-efficient smoke-free cookers), had recently started work there, and were setting up tree nurseries – firewood production was a priority here, but fruit trees were also in demand. The mycorrhizal technique was widely taken up, and since then Justin has visited regularly to support, advise and give refresher sessions, particularly in schools which had set up tree nurseries.

So Justin has had a composite role, running small scale mycorrhizal trials at Nzuguni and at the same time supporting and promoting tree production applying the mycorrhizal technique over quite a wide area. This work has included talks on local radio, and production of an instructional pamphlet in kiswahili. ([www.sunseedtanzania.org/tree.php](http://www.sunseedtanzania.org/tree.php) illustrates the procedure and the training he gives).

#### The trials:

*Tamarindus indica*, which produces the tamarind pods, a rich source of vitamin C, was selected for the first trial, and was sown in September 2003, with/without inoculum. Most of the seedlings were distributed to neighbours, but 11 inoculated and 11 uninoculated were outplanted on 23.02.04 under controlled conditions on Justin’s shamba, and monitored monthly for 28 months and occasionally thereafter.

*Annona squamosa* is a valuable fruit species considered difficult to grow; 9 inoculated and 9 uninoculated were outplanted in October 2004 and monitored monthly for 21 months and occasionally thereafter.

*Croton megalocarpus* (a fast-growing indigenous species grown for shade, firewood, fodder and bees) and *Terminalia mantali* (a species grown for shade, timber and firewood) were sown in September 2006 (100 with and 100 without inoculum in each case) and 15 *C.megalocarpus* and 23 *T.mantali* were outplanted for a monitored trial in December 2006. They were assessed in May 2007, after 5 months in the field.

#### Results:

		Time in the field					
		28 months			46 months		
<i>T. indica</i>	Trans-planted (n)	Survival (n)	Survival (%)	Mean survivor height (cm)	Survival (n)	Survival (%)	Mean survivor height (cm)
Inoculated	11	11	100	77	10	91	105
Control	11	9	82	58	9	82	78

		Time in the field					
		21 months			39 months		
<i>A. squamosa</i>	Trans-planted (n)	Survival (n)	Survival (%)	Mean survivor height (cm)	Survival (n)	Survival (%)	Mean survivor height (cm)
Inoculated	9	9	100	56	9	100	114
Control	9	5	56	33	4	44	49

	After 5 months in the field				
	Emergence (%)	Transplanted (n)	Survival (n)	Survival (%)	Mean survivor height (cm)
<i>C. megalocarpus</i> (inoc.)	60	15	13	87	39
<i>C. megalocarpus</i> (control)	25	15	15	100	23
<i>T. mantali</i> (inoc.)	76	23	23	100	57
<i>T. mantali</i> (control)	49	23	17	74	47

#### Observations:

(1) Inoculated seedlings recovered more quickly from transplant shock, and were consistently leafier, more resistant to drought, and quicker to respond to rain after drought. Inoculated *T. indica*, *A. squamosa* and *T. mantali* were more branched than the controls.

(2) The favourable effect of inoculation on rate and rapidity of emergence reported for *C. megalocarpus* and *T. mantali* was unexpected. It is probably not a mycorrhizal effect at all, but rather the effect of associated bacteria also transmitted in the inoculum, in which case it would support the findings of Zena's *Retama sphaerocarpa* trial. Mycorrhizal fungi function as part of a complex soil ecosystem, and the simple technique we are testing offers the exciting prospect of transferring this whole community of microorganisms.