TWO WHEEL TRACTOR NEWSLETTER – NOVEMBER 2012

African visitors check out 2WT seed drill.

A group of 14 Agricultural research workers from East and North Africa (10 countries in all) visited North West New South Wales in mid October.

They were sponsored by AusAID and have been doing a short course in dryland agricultural systems at University of Queensland in Brisbane.

Because most local fields currently have crop growing in them, and there is very little fallow with adequate top soil moisture (last three months here have been particularly dry), the two wheel tractor with the seed drill was demonstrated on the edge of an irrigated cotton field. This field had good seed bed moisture at about 5-7 cm below the surface, and was ideal for the demonstration.

All of the 14 Africans showed a keen interest in the seed drill. Due to the prevailing conditions, the seed drill could not be demonstrated in a high residue area. The Tour group was supervised by Dr. Gunnar Kirchhof of University of Queensland, with assistance from a local soil scientist, Robert Banks.

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Two new Youtube videos, showing the progress of CA in Bangladesh, have been recently posted on Internet. See details below.

http://www.youtube.com/watch?feature=player_embedded&v=KPc4RA8NXe4 (6+ minutes)

http://www.youtube.com/watch?v=yp8UXWjwUy0&feature=relmfu (4+ minutes)

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Use of 2WT on hilly land.

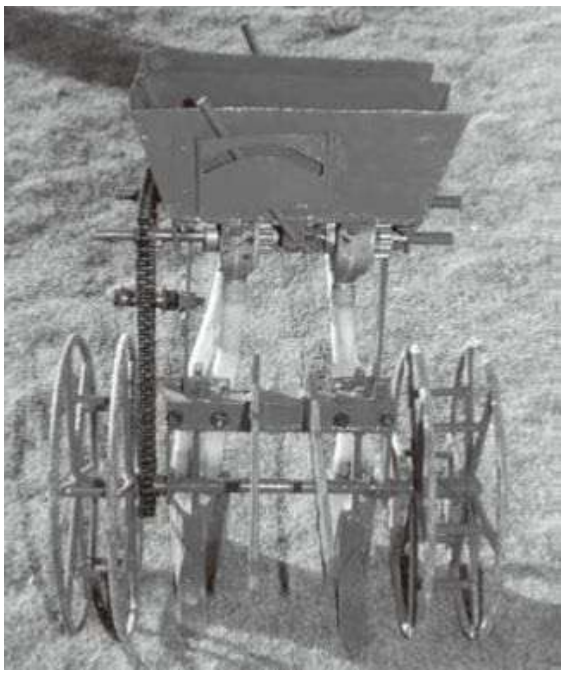
There has been some discussion in recent issues of the use of 2WT on hilly land, and the most practical means to introduce mechanisation and CA for small holder farmers who are cropping on steep slopes.

I have been made aware of a paper by Singh & Vatsa writing in the journal '*Agricultural Mechanisation in Asia, Africa, and Latin America*'(2007) 38. No 3 pp. 45-48

I have copied the full article which can be found at:

https://sites.google.com/site/twowheeltractorgroup/2wt-equipment-for-hilly-land

Below I have inserted some of the pictures from this article.



Some of the main points of the article include:

- The tractor and seed drill must be very light in weight, to allow for two men to physically lift the combination between terraces on steep slopes.
- The base cost of the 2WT and the seed drill must be affordable by the farmer.
- The equipment must be simple in design so that it can be easily maintained by local artisans.

This unit was used to sow wheat (2 rows) in hill country and achieved a labour saving of 78% over the traditional system. Cost of seeding was 922 Rs. /Ha compared to 2438 Rs. /Ha with the traditional system. The small Amar tiller had a petrol motor of 5.5hp and weighed 110 kg. The seed drill weighed 27 kg.

On checking the internet I find that there are many of these 'mini-tillers' featured on Chinese trade websites. I have extracted a few pictures and a selection is shown below.

Some of these Chinese 'mini tillers' have petrol motors, others have diesel power.
Motors range from 4 HP to 9 HP in power.
They vary in weight from 100 kg. (without attachments) to over 150 kg.
Some even have attached seed drills available!
They are generally around $US500 each (ex works).

Bearing in mind the recommendations of Singh & Vatsa, a lighter weight type may be preferred. However lighter models may have less tractive ability due to the lower mass of the unit.
Also the Indian seed drill is designed for planting of two rows of cereal. Is a single row unit for maize or other row crop preferable? Or perhaps a dual purpose unit?

Chinese trade websites show quite a few single row seed drills designed for manual operation. These could possibly be modified for operation behind a 'mini tiller'. Some of the South American and African designed single row units intended for animal traction may also suit after modification.

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Adding a Power Take Off (PTO) to a 2WT.

Most 2WT units do not have a PTO. This hampers the convenient installation of a spray pump assembly. I have discussed this with Mr. Sun of Dong Feng. Mr. Sun has provided me with a picture of a PTO attachment which has been fitted to a 2WT.

This PTO is coupled to a hydraulic pump. The hydraulic unit is used to power a power operated tilt hydraulic ram, when a tilt trailer is operated with a 2WT.

This pump unit is quite compact, and possibly could be used 'as is' when fitting a spray pump. However I suspect that it will be a little too expensive, and perhaps too complex for most small area farmers to operate and maintain.

I have suggested to Mr. Sun that a PTO similar to that shown on the left may be an alternative. I have photo shopped a PTO shaft to the clutch section of a Dong Feng 2WT.
With a simple shaft similar to this illustration, a spray pump or other similar PTO operated farm device could be easily fitted to a 2WT.
Mr. Sun has advised he will check with the Dong Feng factory engineers to determine whether a PTO unit such as this is feasible, and can be conveniently offered as an optional extra to a 2WT.

However the fitment of a boom spray to a 2WT is considerably more complex than installation of a spray pump to the PTO. It is essential that the spray boom is behind the operator, and this means that the operator must be seated on a separate sub-assembly behind the 2WT, with the boom behind, or alternatively the whole spray unit on a separate trailer. I have inserted below several pictures of some prototype spray units that were made up in Bangladesh and Cambodia a few years back. Ideas from these sprayers may be a basis for future work.

Type A

The Bangladeshi made boom is 4 metres wide. It is a trailing unit which has a 150 litre spray tank. The track of the boom spray unit is similar to that of the 2WT (80 cm). This unit has a three piece fold up boom with Teejet nozzles at 50 cm spacing. It is adjustable for height. The pump is a 12 volt diaphragm type, with a separate pressure regulator. Power comes from a 12 volt automotive battery which is positioned under the operator's seat. For large scale spraying, the battery must be recharged every three hours.
The main drawback of this unit is the lack of manoeuvrability in small fields, due to the relatively large turning circle.

Type B

This Bangladeshi made boom is also 4 metres wide. It is integral with the mounted tool bar that is under the handlebars. The boom is behind the operator, and the unit is steered by the tail wheel. This boom spray has a small centrifugal pump powered by an integral small petrol motor. A separate pressure regulator is fitted. Both are positioned on the tool bar under the handlebars.
This unit is much more manoeuvrable. However the front mounted tank upsets the balance of the unit, and the operator's weight must balance the weight of spray liquid in the tank.

Type C

This Cambodian made sprayer has a 6 metre boom and is trailing. It has a 300 litre tank. This unit also has a small centrifugal pump powered by an integral small petrol motor. A separate pressure regulator is fitted. An operator seat is provided. The design is somewhat similar to the Bangladeshi Type A unit.

Summarising the concept, in my opinion the ideal sprayer unit will be a design similar to the Type B unit with a custom made poly tank under the handlebars of the 2WT, which is supported by a cradle. A PTO spray pump operated from the drive of the 2WT (as outlined on previous page) would be used. This would remove the need to have a separately powered pump unit (either electric or motorised) fitted to the sprayer.

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