

TWO WHEEL TRACTOR NEWSLETTER _ JANUARY/FEBRUARY 2015.

Abdul Matin (now with CIMMYT Bangladesh) has recently completed a higher degree at Univ. of South Australia. His thesis related to improved design for strip tillage blades for rotary tillage seed drills on 2WT.

The references are set out below.

Md. A. Matin John M. Fielke, Jacky M.A. Desbiolles

Torque and energy characteristics for strip-tillage cultivation when cutting furrows using three designs of rotary blade

Biosystems Engineering Vol 129 (2015) pp 329-340

<http://www.sciencedirect.com/science/article/pii/S1537511014002001>

M.A. Matin J.M. Fielke J.M.A. Desbiolles

Furrow parameters in rotary strip-tillage: Effect of blade geometry and rotary speed

Biosystems Engineering Vol 118 (2014) pp 7-15

<http://www.sciencedirect.com/science/article/pii/S153751101300175X>

Dr. Matin will send pdf. copies to those who are interested. I also have copies available and can forward if required. Contact Dr. Matin at m.a.matin@cgiar.org

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A group of Indian research workers has recently published a paper on their version of a rotavator mounted 2WT seed and fertiliser drill. The link can be found at:

http://www.academicjournals.org/article/article1418744778_Kumar%20et%20al.pdf

I see nothing remarkable about this unit, and in my opinion it is possibly a clone of the National Agro 2WT rotavator mounted drill.

How much work is necessary for a 2WT for it to be a profitable investment?

Whilst in Addis Ababa in November I had a good chat with Dr. David Kahan, an agribusiness resource specialist with CIMMYT. He is doing an economic study on the profitability of 2WT seed drills in East Africa. He assumes that those small area African farmers who purchase a 2WT and seed drill will undertake planting and other field operations on neighbouring farms, as well as their home area. This is to fully utilise the unit. The owner can carry out contract work to assist in paying off the capital investment and make a reasonable profit.

David has a large spreadsheet with much data on it including service life of the tractor and seeder, depreciation, repairs and maintenance, area planted annually, hours worked annually, labour costs, opportunities for other uses (e.g. transport, grain milling etc.) and many other fixed and variable charges. He has limited data from Africa plus a reasonable amount of information from Bangladesh and Cambodia.

From data that collected from Zimbabwe the 2WT + accessories would not be viable for individual farmers operating on their small plots and even providing hiring services to neighbouring farmers owing to the distances involved and the poor access in most areas. However, a business model of a more entrepreneurial person providing hiring services as a specialized business could be attractive if ways are available to transport the machine effectively to serve farmers or transport produce to markets. So far it seems that the viability of the machine is likely to come from the post production operations – shelling/ threshing/ transportation.

So efficiency in operation is a vital factor. Having a unit which can only travel between sites at walking speed (3-4 kph) is not good enough, and the unit must have the capacity to move at road speed (25 kph). Also a mechanical lift for the soil engaging components is essential, as a manual lifting system at the end of each row when turning in small fields is too tiring. Overall if these improvements are not built-in the machine will not be cost-effective.

We await the final analysis with interest.

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**NEED SOME EXTRA WEIGHT TO AID PENETRATION OF YOUR 2WT SEEDER?
Check out these innovative solutions from Kenya & Tanzania**



Fitarelli two row disc seeder



Fitarelli Single row coultter-tine seeder



Gongli Africa tined seeder



National Agro Rotary tillage seeder



Is a Three wheel tractor the answer?



This is a three wheel tractor made from surplus motor cycle and car parts. These pictures were taken recently in Ghana by Tim Ellis (ex CSIRO). Apparently both 2WT and small 4WT are scarce in that country, whilst dead and dying motor cycles are in abundance. This unit was made from surplus iron pieces, on which sections of a motor cycle are mounted.

Motor to ground speed reduction is achieved by the use of two old motor car differentials in series, with the sun gears suitably welded up to give a more positive drive.



This unit is used for hilling up and seeding. Note the simple inclined plate seed meter in the right hand picture. No worries about operator visibility on these rigs!

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Lewis Mataba of Grownet, a local farm implement manufacturer in Zimbabwe, in cooperation with Raymond Nazare of University of Zimbabwe have modified a no till planter based on the Brazilian Fitarelli single row planter frame. He has used a Chinese finger metering device instead of the standard meter for evaluation. The metering device was supplied by me (Jeff Esdaile) when I came to Zimbabwe for the Skills training course in November 2014. They will be undertaking the first preliminary evaluation in the near future.

Pictures of the prototype are shown on the next page.



The Fitarelli/Grownet single row 2WT seed drill

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Progress report- Gongli Africa Mark 2.

Progress is gradually being made with development of the Gongli Africa Mark 2 2WT seed drill. CA seed drills for 2WT are a particular challenge to design a capable and versatile unit. This is due to (1) lack of power and traction with the tractor unit (2) limited front to rear clearance (3) limited under-frame clearance, (4) weight issues: all of which greatly restrict the options compared to a 4WT seeder.

With the latest prototype, some of perceived deficiencies of the earlier Gongli Africa seed drill, as well as unfavourable features observed in other 2WT seed drills are being addressed.



The latest prototype of the Gongli Africa Mark 2 showing the three seed boxes and the contour following tines.

Some significant changes include:

Widening of tool bar frame from 1000 mm to 1200 mm. It allows maximum row width of the unit when in row crop mode to now be 1000 mm. There is now room to mount the seed and fertiliser boxes beside the handlebars, rather than above the handlebars, as on previous versions. The implement has now been redesigned to allow connecting and removal from the tractor in one operation.

There is room on the widened tool bar for both dual range fluted roller seed box, as well as single seed metering systems be fitted, as well as a fertiliser box.



Rear view showing the widened tool bar with seed boxes beside the handlebars (left) and the swivelling tool bar to raise and lower the tines or discs (right)

Conversion of the Gongli Africa Mark 1 tool bar frame from a rigid setup for the tines to a contour following tine arrangement. (See October r 2014 newsletter). The two row crop tines can now move up and down around 200mm each way through 20 degrees to follow undulations of the land. Depth is controlled by an integral press wheel behind each tine. A swivelling front tool bar has been inserted immediately behind the main structural tool bar which has the hitch attachment. This tool bar, to which the tine assemblies are attached, can move up and down, and this raises and lowers the soil engaging components

Fabrication of an alternative small grains (rice, wheat) tool bar which can be fitted as an alternative to the row crop tool bar. This will allow the planting of up to four rows of close drilled cereal and other crops using the same basic implement frame.



The alternative tool bar for cereals (left) and the rope trip lift mechanism (right)

Mechanical lift system.

. A rope trip lift is used to operate the swivelling tool bar. It is driven by a chain from both of the tractor drive wheels. (See October 2014 newsletter)

There are still issues with the rope trip lift mechanism. The current 65 year old lift unit is too big, too heavy, and unwieldy. I have been searching unsuccessfully for an alternate compact, lightweight modern unit to replace the old component. Several contacts have suggested that a more up-to-date version of the old design should be made up and this may be the best option. At the present time Spring Ridge Engineering

(manufacturer of the original Rogro seeder) is making up this replacement, using a section of 150 mm (6 inch) steel pipe, with a lighter, more compact internal structure.

The mechanical lift will incorporate a clutch system, which automatically disengages the seed and fertiliser drives when the tines are raised.

The rope trip lift operating on a Gongli Africa seed drill is now on Youtube. And can be viewed at:
<https://www.youtube.com/watch?v=m3eEqIBDXjg>

Seat.

A modified Dong Feng type seat, together with steerable centre tail wheel has now been fitted. When used in conjunction with the mechanical lift system, the operator can remain seated whenever the tractor/seed drill combination is used, including sowing, turning and travelling. All controls can be operated from the seat.

In late February I will be meeting with Professor Guangnan Chen of University of Southern Queensland Toowoomba and final year Agricultural Engineering student Amy Brumpton. Amy intends to conduct a project to refine the overall design of the Gongli Africa Mark 2 seed drill. Also participating in the discussion will be John Blackwell, Adjunct USQ Professor Jeff Tullberg and Clive Murray the Australian rep. of the Syngenta Foundation. The Syngenta Foundation along with other International co-operators are interested in the project.

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If you have any comment on this newsletter, please let us know.

Back issues of the 2WT Newsletter can be found at

[:http://conservationagriculture.mannlib.cornell.edu/pages/resources/twowheel.html](http://conservationagriculture.mannlib.cornell.edu/pages/resources/twowheel.html)

Note: This newsletter has been sent in a low resolution pdf. format for those on slow internet connections. If you require the newsletter or parts of it in higher resolution please let me know.

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