TWO WHEEL TRACTOR NEWSLETTER –DECEMBER 2013

I wish all of the two wheel tractor enthusiasts a cheerful and blessed Christmas and a prosperous New Year. A special thanks to all those who have contributed by way of comment and suggestions.
I trust we will progress further with the project in 2014.

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John Morrison (semi-retired Ag. Engineer) – ex USDA Texas, now resident in Tennessee - advises that progress is being made with his single row no till seed drill for 2WT. A prototype was recently freighted to East Africa for evaluation. John quotes below:

The "JEM CA-Seeder" is a 1-row seeder that has been designed for and field tested under conservation-agriculture (CA) conditions of non-plowed soils and with old-crop residues covering the soil. It is designed for the seeding of a wide variety of row crops and can additionally be used for strip-till and for side-dress fertilizer applications. The Seeder has been successfully used on several different 2WTs, including both petrol and diesel 8 Hp tractors and larger. Pricing and availability will be announced in 2014.

This report is also featured in the CIMMYT Blog- http://blog.cimmyt.org/?p=11454
This is a real step forward by John. '***Watch this Space'***

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Intermech 2WT seed drill.

Peter Chisawillo has provided me with a leaflet giving details of the latest Intermech Engineering 2WT seed drill. All the specifications are listed in the information table.
For further details please contact Intermech at the contact addresses below.

INTERMECH ENGINEERING LIMITED

PRODUCT SPECIFICATIONS

DIRECT SEEDER FOR TWO WHEEL TRACTORS

Name:	Seed Drill for 2WT
Purpose:	Seeding and fertilizer application in line for: Conservation Agriculture seeding system
Power requirement:	12 - 16 hp
Row Spacing:	60-75 cm
Number of tines/holders:	2-3 with independent suspended assemblies for each row
Suitable crops for Seeding:	Maize, beans,
Seed Spacing :	20-30cm,
Type of the hitching point:	Dongfeng , Kukje, Kubota 2-wheel tractors
Capacity:	0.9 - 0.16 ha per hr
Residue handling capacity:	Coulter should be provided to cut residue in advance of the tines. Residue remover optional
Operator/labour requirement:	1 (one)
Net weight approx:	Kgs. 120
Overall dimension approx:	LxWxH: 1200x1000x1000mm (fully assembled)

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I have come across an interesting article entitled 'The grease revolution –guidelines for testing of affordable farm machine prototypes'. The summary is at the link pasted below.
https://www.engineeringforchange.org/news/2013/11/02/the_grease_revolution_guidelines_for_testing_affordable_farm_machine_prototypes.html
It deals principally with the challenges of field testing and eventual acceptance of new and innovative small agricultural equipment by underprivileged farmers in rural India. Some of the pitfalls are outlined, as well as some of the essential procedures for successful introduction of new machinery. The link also directs to another site which has the full article. See https://www.engineeringforchange.org/news/files/Machinery-Tesing-Report.pdf

Wilson Baitani of CAMARTEC in Tanzania has provided some pictures of what he calls the 'Morrison-Intermech Hybrid' 2WT seed drill. This unit is still in the prototype stage. This unit also has surface following capability.

At this time I am unaware of the specifications of the unit or any results of field testing.

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Student study stimulates some interesting ideas.

A newly graduating student in Agric. Engineering from University of Southern Queensland, Mr Sant Kumar Pratap has recently submitted his thesis entitled 'Design and development of a disk opener for heavy stubble conditions for a two wheel tractor'. Sant has featured in some recent issues of the 2WT newsletter.

In his thesis, Sant critically examines the characteristics of various disc opener set-ups, whether being used as a cutting disc coulter or single disc opener. As well as the plain disc configuration, Sant has looked at various alternative disc types including wavy discs, bubble discs, scalloped discs, and ripple discs. He also checked out draft requirements, and residue cutting ability of various disc types.

Those of us who have used disc openers on seed drills know that discs can be extremely variable in performance, depending on the soil and residue conditions. The disc size, thickness, tilt and sweep angle settings, and support system also greatly affect operation.

The draft requirement of a disc opener is a prime consideration when fitted to a seed drill on a 2WT. Most 2WT seed drills are designed as two row units. However under adverse conditions, many 2WT will struggle to pull two rows, as it is right on the draft capacity limit of the tractor/motor combination.

After critically examining all of these factors, as well as an extensive literature review, Sant has proposed a radical new approach to this challenge of development of a low draft disc opener seed drill.

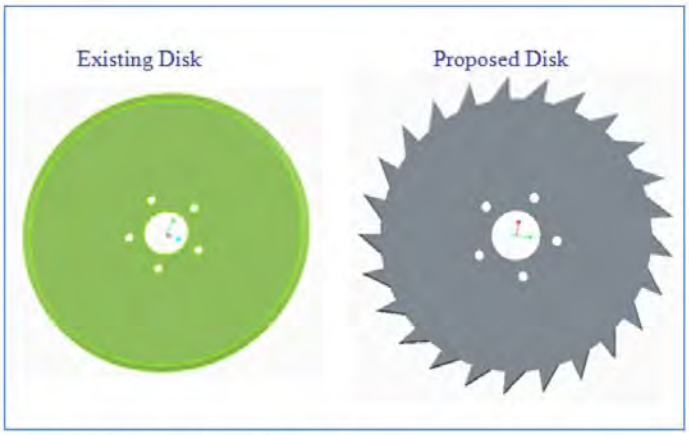

Figure 4.4-2: Side by side model of both disc openers

According to the Sant review and calculations, perhaps we should be actively considering a sawtooth profile disc opener, both as a single disc soil engaging tool, and possibly as a cutting coulter alternative. Both the Sant study and the original references (see below) indicate that draft requirements can be reduced by up to 80%, and the residue cutting ability increased by over 90%. Preliminary research data shows that a 410 mm (16 inch) disc should have 19 saw teeth, each with a tooth depth of 20 mm. In some aspects, this disc design uses the same principles (although not very similar) to the Australian 'stubble star' double disc opener design.

Unfortunately Sant did not have the opportunity to field test this option, due to time and financial limitations. However I have some disc assemblies on hand, and may with others be able to make up a pair of sawtooth discs from existing single disc units. This may involve a fair bit of work with angle grinder and cut off saw to manually cut the teeth. However it is worth a try. Perhaps it can then be field tested when fitted to the 2WT and seed drill that I have in my shed. I have made preliminary enquiry to find out whether a 2014 Ag. Eng. student from USQ is interested.

The Sant thesis can be found at:
http://www.academia.edu/4918167/DESIGN_AND_DEVELOPMENT_OF_A_DISK_OPENER_FOR_HEAVY_STUBBLE_CONDITIONS_FOR_A_TWO_WHEEL_TRACTOR_A_dissertation_submitted_by_Sant_Kumar_Pratap (note it is a very large file 22MB)

I can only see one drawback to the proposed design. Perhaps the wear rate on a sawtooth disc will be considerably greater than that on a standard disc and regular sharpening may be necessary. However this downside can be addressed. Also the area planted annually with a 2WT seed drill fitted with disc openers is not great compared to bigger seed drills behind 4WT that plant large areas.

What do you think? Other relevant references are set out below.

Magalhães P.S.G, Bianchini A., Braunbeck O.A (2007) *Simulated and Experimental Analyses of a Toothed Rolling Coulter for Cutting Crop Residues* Biosystems Engineering (96), 2, , pp. 193–200

Bianchini A., Magalhães P.S.G. (2008) *Evaluation of coulters for cutting sugar cane residue in a soil bin* Biosystems Engineering (100), 3, pp. 370–375

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Back issues of the 2WT Newsletter can be found at:
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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