TWO WHEEL TRACTOR NEWSLETTER – AUGUST 2012

Dual range fluted roller seed meters vs. inclined plate seed meters – which is better value for 2WT CA seed drills where low cost is essential?

There has been considerable dialog between some forum members on the pros and cons of dual range fluted roller seed meters compared to inclined plate seed meters for 2WT seed drills working in CA situations. I have summarized some copy from pages 113 & 114 of Baker et al "*No tillage seeding in Conservation Agriculture"* 2nd edition as a basis for discussion.

A dual range fluted roller seed meter

An inclined plate seed meter.

Fluted roller meter:

Strengths

Copes with many seed sizes
Ideal for continuous mass metering
Cheap ($US7 each)
Easy to adjust rates and/or crop type– no extra gearing required

Weaknesses

Marginal for spaced plantings (both traditional and CA systems)

Inclined plate meter.

Strengths

Excellent for spaced plantings (in traditional systems)

Weaknesses

Expensive ($US60 each)
No advantage in continuous mass metering
Complex to adjust rates and/or crop type– extra gearing and/or extra seed plates required.

In a traditional situation, with no residue and level ground both systems operate well as designed, as the seed metering system can be close to the soil surface, and seeds drop unchecked to the seed slot.

However:

In CA situations, surface residues often protrude 300–500 mm above the ground, and may be variable in nature and extent. Vertical clearance is therefore necessary to avoid blockage. Further, there is little or no opportunity to smooth the surface of the soil. The metering mechanisms have to operate higher above the ground. Seed metering mechanisms are up to 600 mm from the soil surface. Ritchie (1982) and Carter (1986) showed that, once a single seed is released from a metering mechanism into a tube, its pathway through that tube may be somewhat random. It will have a tendency to bounce from wall to wall and at each bounce it will lose an unpredictable portion of its drop velocity. Consequently, any two seeds seldom arrive at their destinations at exactly the same time intervals from when they were released from the metering mechanism. Free drop of seed is not an option over such a distance.

The result is that, although the same precision metering mechanisms are used for tillage and no-tillage planters and the same numbers of seeds need to reach the ground in a given length of row in both cases, precise spacing between individual seeds under no-tillage is more difficult to achieve than in tillage.

The key question of whether or not these sources of inaccuracy have a measurable effect on the final yield of large, compensatory-growth plants, such as maize, will continue to be debated. However the fact remains that precision spacing has become an important marketing objective for machines designed for tilled seedbeds. Since there is no known agronomic downside to precision spacing, it makes sense for designers of no-tillage planters to attempt to duplicate these levels of precision spacing as closely as possible if they want to persuade farmers to make the switch from tillage to no-tillage.

In Summary
On a $400 seed drill, is it worthwhile spending an extra $200 on a set of inclined plate meters which may be of questionable value? Does anyone have any concrete evidence?

Practically all of the studies I have read on measurement of accuracy of seed metering systems have been done in the laboratory (with minimal seed drop) or in traditional seeding systems (with the meters close to the ground).

The Chinese made rotary tillage seed drills for 2WT (2BG-6A and similar) have the seed box close to the ground, and also the VMP unit in Bangladesh. However the seed box on the ARC Gongli is 600 mm from the soil. Should a set of inclined plate meters be offered as an option increasing the cost by $200?

I noted in my trip to PR China last year that many Chinese made seed drills were equipped solely with dual range fluted roller meters, and being sold as suitable for use in spaced plantings.

If you have any references relating to the operation of precision metering systems in CA conditions in the field where the metering units are a considerable distance from the soil it would be useful to inform me (and others in the forum) so that more informed decisions on future seed drill design can be made.
Would a triple range meter similar to this be an acceptable alternative?

John Schiller has provided me with an interesting presentation, which he recently obtained in Thailand.
It is a review of direct seeding of rice by Suraweth Krishnathreni (semi-retired Thai Ag engineer) in Thailand. This is not principally about CA (the rice is directly planted into traditionally prepared soils, and in many cases aggressive tillage is used).However it is an interesting presentation.
The PowerPoint file is quite large (5MB) so I have attached it to a new ‘twowheeltractor’ group on Google Sites. Click on the link to access the site and then download the presentation.
https://sites.google.com/site/twowheeltractorgroup/home/two-wheel-tractor--large-files
The disc planters remind me of Canadian ‘discers’ which were a popular seeding implement in the days before complete residue retention on the Prairies. Some Australian farmers also used one way ploughs with a seed box fitted to plant crops or pastures in difficult conditions in years past.

A TWO WHEEL TRACTOR DRIVEN POTATO PLANTER

This item has been submitted by M. Israil Hossain of BARI in Bangladesh and Craig Meisner (ex CIMMYT Bangladesh)

A two wheel tractor driven cup type potato planter has been developed in the Wheat Research Centre of Bangladesh Agricultural Research Institute (BARI), Bangladesh. The potato planter can plant whole tuber potato seeds as well as cut piece seeds automatically in furrows at predetermined regular intervals.

Specifications:

Row spacing: Single row 600 mm spacing
Seed to seed distance 200 mm (with seed size of 30-40 mm).
Seed pickup & delivery: Vertical pickup through secondary seed box. One seed per cup.
Other functions:., Furrow opening, seed metering, bed forming. Seed covering.
Operating speed : 2.4 kph.
Field capacity : 0.1 ha/hr.
Labour requirement: - planter (one operator plus helper) Tk.1890/ha ($US22.50) – 4 man days
Labour requirement -traditional System: Tk.5600/ha, ($US66.70) - 60 man-days.
Cost saving – 61% over traditional system
Labour saving – 93% over traditional system.
Break-even point to invest in the cup type potato planter - 5.0 ha.
Field demonstrations have been conducted in different farmer's fields
This potato planter can save on cost of production and can reduce considerably the labour requirement during the peak planting season. It can speed up the planting operation and cover a considerable area within the short planting period. It is a light machine and can easy access small fields. One operator and a helper can manage the whole operation easily. This potato planter minimizes the dependency on labour and ensures timely planting to help achieve optimum yield.

Commercial production of this potato planter has now commenced in Bangladesh. This unit complements the 2WT operated potato digger featured a couple of issues back.

Further details and more pictures available from Md. Israil Hossain at BARI , Rajshahi Research Station, Bangladesh
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Khokan Sarker – a higher degree student at China Ag, University in Beijing has advised me of the recent publication of the following article:

"Development strategies of small scale conservation farming practices on two wheeled tractor in Bangladesh"
African Journal of Agricultural Research Vol. 7(26), pp. 3747-3756, 10 July 2012
This can be found on Internet at the link below.
http://www.academicjournals.org/AJAR/contents/2012%20cont/10Jul.htm

Dry Direct Seeding of Rice – progress with ACIAR research project in Cambodia

Dr. Jack Desbiolles, University of South Australia, recently worked with project partners in Cambodia (i.e. Cambodia Agricultural Research and Development Institute, Government Directorate of Agriculture and Royal University of Agriculture) to implement some 2WT seeder machinery evaluation trials. Their focus was to evaluate improved rice crop establishment methods in rainfed systems. He has sent me some pictures of mechanised land preparation and direct seeding of rice conducted in sandy soil paddy fields. I have reproduced some of them below for members to peruse. Cambodia's fleet of 2WT sourced mostly from Thailand is rapidly increasing, currently representing close to 10% of the number of traditional animal-drawn ploughs.

Traditional rice paddy land preparation

Traditional direct seeding by seed broadcasting

zero-till land preparation (personal protection was required however not worn)


Machine planting in seed rows – Thai disc seed drill

ACIAR-Rogro design seed drill (manufactured in Phnom Penh):


A. Machine planting in cultivated and levelled soil


B: Zero-till planting in harvested rice paddy


c) Zero-till planting in grazed weedy field

Feedback to date on performance in these light soils points to the Thai drill being relatively well suited to rice planting in cultivated seedbeds and even zero-till planting in soft sandy soils. The Rogro tined drill performed best in well levelled land conditions, and was relatively well suited to firm zero-till soil conditions. Some improvements to both drills are being planned to best suit Cambodian soil conditions. Well levelled paddy fields are a must for maximising seed placement accuracy in mechanised rice seeding.

A note: hopper covers will also be added to be better prepared for significant rainfall disrupting planting operations….



Any queries, please contact Jack via this group or directly at jack.desbiolles@unisa.edu.au