TWO WHEEL TRACTOR NEWSLETTER -SEPTEMBER 2012

John Schiller of Univ. of Queensland has sent me some pics. Of a Thai built 2WT seed drill courtesy of a Thai colleague.

No description of the seed drill was provided. However much of the mechanism can be understood from the pictures.

It is a four row machine, with a hitch that suits a Siam Kubota 2WT. It appears to be a 'seed only' unit with a horizontal plate seed metering system (note the bevel gear drive under the boxes). The drive is from the ground wheel at the rear. This ground wheel also acts as a partial depth control system through the spring loaded support bracket. Another depth adjustment mechanism is positioned immediately behind the hitch point.

There appears to be some scope for change the seed rate. To change the rate, the drive sprocket on the drive wheel would need to be changed to an alternative size.

The tines, which are not adjustable, are made from flat steel, with angle iron openers. No seeding point seems to be fitted. Seed covering is by the angled deflector plates.

The unit also appears not to be rigidly attached to the tractor and swivels on the hitch, as no support struts, (or brackets for them) are shown.

In my opinion, this unit is designed for direct seeding of rice and possibly other crops, using a traditional system of land preparation, seeding into a bare loose tilled soil. (see the report on Thai direct seeding systems in the last newsletter)

Enamul Haque has sent me details on a conference to be held in Bangladesh from 8-13 December,
Full details are set out below.

CONFERENCE ON CONSERVATION AGRICULTURE FOR SMALLHOLDERS IN ASIA AND AFRICA

2013
8-13 December

Many small holder farmers in Asia, Africa, and other regions are practicing aggressive soil tillage to grow crops. Tillage is practiced with the intention of loosening seedbeds, controlling weeds, aerating soil by creating artificial porosity to facilitate sowing and covering of seed in the seedbed. However, research results from many regions of the world show that increase of tillage intensity may harm soil physical, chemical and biological properties which limit crop yield. This is primarily caused by declining soil organic matter, its oxidation being accelerated by tillage, particularly in warmer climates, and exacerbated by the limited return of above-ground biomass to the soil due to its competing use for other purposes. In large-scale commercial agriculture, declining soil quality has been effectively addressed in many parts of the world by conservation agriculture (CA) —cropping systems based on minimum tillage, crop residue retention and appropriate crop rotations and associations. Various forms of CA are now practiced on more than 110 million ha annually, mostly in USA, Canada, Brazil, Australia, Argentina etc.

Small holder farmers have not adopted CA practices yet for many reasons, including —lack of knowledge, perceived complexity of new system, unavailability of market-ready minimum tillage implements, limited access to herbicides, and the change of mind set required before shifting to CA. However, opportunities are opening up to make it easier for small holder farmers to change from excessive tillage to various forms of minimum tillage. A more diverse range of CA implements are being developed for small holders starting from hand tools or animal-drawn implements to planters mounted on two-wheel tractors or small 4W tractors (up to 35 hp). Effective CA practices for small holders would also enable them to capture the economic benefits already enjoyed by the large-scale users of CA, *viz*. reduced fuel and labour costs and improved timeliness of operations. However, there are many biophysical and socio-economic constraints to small holder farmers in adopting CA and it will be necessary to develop effective strategies to jointly improve the emerging technologies with them. It is noted that CA in many areas evolved through innovation networks linking farmers, extension personnel, researchers, engineers, mechanics, input suppliers, and credit providers. Such a partnership approach would also seem necessary to bring CA to small holder farmers.

Much has been learnt already about the development of CA for smallholders in Asia and Africa. It is timely to bring together the learning and to chart a course for future developments that can help smallholders find CA an attractive option. To assemble and document CA developments to date and to establish linkages among the collaborators working on CA for small holders, an international conference on Conservation Agriculture for Small Holder Farmers in Asia and Africa is planned in Bangladesh from **8-13 December, 2013**.

Themes for the conference are - i) Machinery: Design and development of CA-based crop establishment and herbicides spraying machinery, implements, tools for smallholders; ii) Weed management: Suitable weed management options (chemical, mechanical, crop rotation and biological); iii) Soil, water and agronomy; iv) Commercialisation adoption and continuous improvement of CA-based technologies; and v) Policy and institutional framework for the adoption of CA.

We welcome your active participation in this event!

Further information and expressions of interest: Professor Dr. Richard Bell <r.bell@murdoch.edu.au> or Dr Md. Enamul Haque <enamul.haque@ide-bangladesh.org>

Barney Muckle (a semi-retired academic and Ag. Research worker from Kenya) has offered comment on the seed metering issue, as discussed in the last newsletter. I have set out below his comment.

You asked for discussion on seeding mechanisms so I have a few comments to make. There are two distinct types of need for crop establishment. The first is for small seeds, rice, wheat, sorghum and many others. These are sown in a thin line or mass seeding is one expression used. Many mechanisms exist as you have shown by the photos which will give satisfactory results. They need calibrating for a rate per length of line or per unit of area but that is not difficult.

Other crops with larger seed such as maize, sunflower, peas and beans require precision planting for optimum results of both target plant population and spacing between plants. Careful hand planting can and does produce the desired result but the simple planting devices of plates and wheels will only work well with evenly shape/size of seeds and this excludes some of the most important - those of maize and beans.

Maize seed has a very variable size and shape not only on one cob but between types and varieties and for each there is a seasonal effect due to the environment. None of the simple mechanisms will give results as good as hand planting which is why they have been replaced by air type of singulating mechanisms. However these are suitable only for large scale use due to their cost.

Due to the lack of choice simple plate mechanisms have been used for decades but an examination of the results show they are far from those of hand planting in that the plant spacing is erratic giving variable cob sizes.

I have been working with an enthusiastic CA farmer for a long time and he does contract planting with his Fitarelli now for some seven years so he has good experience of its horizontal flat plate planting performance. On a recent visit I put to him the problems of seed spacing and plant population with the machine. He agreed that planting maize is very difficult and to satisfy the farmers. He has to increase the plate speed to give more seeds than needed to avoid gaps so that the farmers are happy with the results.

On doing some static trials of counting falling seeds per 20m it was seen that the plate became blocked with the largest seeds and the ejector did not push them free hence the reduction in the seeding rate. This was a common problem and he was using the largest plate provided so, as stated, his solution was to increase the plate speed to plant more seeds. This increased the cost when using hybrid seed. He also removed and cleaned the stuck seed from the plate regularly.

So the questions for discussion are either to find some simple method of mechanically planting maize seed with a performance level not inferior to hand planting or accept that the target cannot be reached.

My efforts led me to use hand dropping seed/fertiliser for simple planters and hand dropping for animal drawn planters but with a prototype fertiliser attachment for thin line dropping.

With respect to 2WT there is a need to do static and field trials with the mechanisms you have shown and get performance figures to see if they reach the standard for acceptability.

Hand planting – even spacing

Machine planting – more irregular

Seeds jammed in plate – Fitarelli planter.

Following Barney's comments I ask the following questions.
If a machine planter may give an irregular result, how much variation in plant spacing can be tolerated before crop yield is affected? 10% deviation, 20% deviation?
Is there a number that has been calculated by research results?
Can the complicating factor of having the seed meters a considerable distance from the soil upset even the best seed metering system and cause unacceptable variation?

Upon reflection, I did a Google search, and also checked out 'Google scholar' for research papers on the issue of variable plant spacing when planting maize (corn). I have collated the search findings on a page in the 'two wheel tractor group' in Google sites. Check the link below:
https://sites.google.com/site/twowheeltractorgroup/corn-maize-plant-spacing-variability-references

This is just a sample of many more research items that can be found. If you do not wish to check them all, then the Lauer (2004) reference in my opinion gives a good summary.

CIMMYT Bangladesh has released a video entitled 'Save more, Grow more, Earn more' outlining the development and operation of CA in Bangladesh. Click on the link below to view this video. Note: The video is 20 minutes long.

http://www.youtube.com/watch?v=TqeU1ZRov3Y&list=UUc_U8b1lLAaujXzx1kH2FCw&index=1&feature=plcp