

TWO WHEEL TRACTOR NEWSLETTER APRIL 2013

I have received the following report from Dr. Jack Desbiolles from University of South Australia. Among other things, Jack is assisting in an ACIAR foreign Aid project on mechanisation of rice production in Cambodia.

Tractor powered drum seeding: A Cambodian development

The Agricultural Engineering Department of the General Directorate of Agriculture (GDA) in Phnom Penh, Cambodia, has recently developed a 12 row drum seeder, powered by a 12HP two wheel tractor to enable easier and faster direct seeding in puddled rice fields using pre-germinated seeds. The high drum capacity seeder features a chain drive with on-off gear box, seed collecting cups and drop down seed tubes to improve seed row definition and can cater for dual seed rates (80 and 150kg/ha) by masking 1 of 2 rows of seed holes. A variety of dual seed rates can be achieved by modifying the transmission ratio of the tractor wheel to drum seeder chain drive. A levelling tube achieves a smooth surface before seeds are dropped and stabilises operation at work, while a side-marker arm is used for pass to pass guidance. A swivelling rear support wheel ensures manoeuvrability for transport. A first unit has been sold to a farmer while testing by the department is to be conducted during 2013. A temporary retail price is given at US\$800. For further info, please contact Mr Chea Sovandina at cheasovandina@ymail.com.

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| Size | 2400mm x 1070mm x 750mm |
| Working width | 2.4 m |
| Field capacity | 2.1 hr/ha |
| Field efficiency | 80 % |
| Operating speed | 2.5 km/h |

The GDA is an associated partner in ACIAR project CSE-2009-037 focusing on improving rice crop establishment and productivity in Cambodia. Innovative crop establishment methods are being evaluated by the project including drum seeding following reduced tillage (hydrotiller) and zero-tillage drum seeding in the recession rice areas.



Left: Messrs Chea Sovandina, Prum Cham Roeun and Chuon Sarom of GDA DAEng who developed the 2WT powered drum seeder prototype. Right: Close view of the drum with inner agitator



View over the seed cups and drop down tubes.

Jack also reports on another Cambodian project.

The General Directorate of Agriculture (GDA) in Phnom Penh, Cambodia has, of their own initiative, recently duplicated the ACIAR- Rogro seed drill (with tilled seedbed in mind I think – and showing some variance) by, for an estimated US\$1500 RRP



Left: a complete seed drill
Above: Tine arrangement including chain harrow behind each tine



Left: Two seed drills, the one on the right with traditional seed boxes and the one on the left with a locally made horizontal plate metering system.

Right: A view inside the seed box of the horizontal plate metering system.



A view from the underside showing the drive mechanism for the horizontal plate. Apparently each plate meters seed to four outlets.

Patrice Autfray (who is a member of the CIRAD team in Laos) has sent me some pictures of the ARC Gongli 2WT seed drill being tried out in Laos. I recently sent a pair of staggered double disc openers to Patrice to test in very heavy mulch (SCV) systems there. He reports:

Please find attached 5 pictures of our first test as we got some rains with the 2 double-discs coming from Australia. With mulch around 100% and 3-5 t DM /ha it is ok. We did not use the big-size wheel (*operator platform with large press wheels*) in order to see the seed quantity delivery.

With rice the seed density is good.

With maize we had a non-uniform distribution of maize due to the shape of the plastic fluted roller seed meter. We need a round shape instead of an elongated shape.

We are waiting new rains (in a greater amount) to do a first sowing with rice comparing 2 rows with double discs and the 4 tines.



The ARC Gongli fitted to a Thai made 2WT (note the weight box on the front)



A close-up of the double disc assemblies and the mulch appearance after planting.



Metering maize through the large flute option and rice through the small grain option.

I am not an expert in the metering of maize with a fluted roller system. However possibly the seed spacing could be improved by:

- A. adjustment of the cleaning brush for the fluted roller, that is in each assembly. The metering may be improved by lessening (or possibly increasing) the tension of the cleaning brush on the roller.
- B. Slow down the speed of rotation of the fluted roller and open the setting so that 2 or three seeds fit into each roller cell. There is provision to halve the rotation speed on the ARC Gongli as a two speed sprocket is fitted to the drive chain. However this option may result in more of a 'hill planting' system where several seeds are dropped at once, and a longer spacing between plants.

I understand from Prof. Li Hongwen of China Agricultural University that some Chinese colleagues have done comparative studies on the performance of large cell fluted roller meters for metering maize, as compared to inclined plate and other more complex seed meters. Results have been published, but unfortunately are in Chinese script and possibly only obtainable on subscription.

Some options for inclined plate metering on 2WT seed drill.

As a result of enquiry from various forum members (see report above as an example) I have imported two types of inclined plate seed meters to establish whether these units may be able to be fitted to a 2WT seed drill. One type is from China, and the second is from Bangladesh. The Bangladeshi unit has been manufactured in a factory in the NW of that country, whilst the Chinese units come from a single row hand pushed seed drill, similar to the Earthway unit from USA.



The Chinese made inclined plate seed meters (left) and the Bangladeshi made inclined plate meters (right)





The Chinese made inclined plate seed meters and seed boxes are initially from a hand pushed single row seed drill. Seed box capacity is 4.5 litres per unit. Seed plates are plastic and 13 cm diameter. 12 types are available, although most are specifically for vegetable seeds. My guess is that a size from one of these options could be used with crop seeds. A bevel gear drive for these units would have to be fabricated. Cost estimate \$US25 each plus the mounting, drive system and rate change gears.

The Bangladesh made meters (shown here in comparison with the Chinese units) are somewhat bigger, having a plate size of 17 cm. Both metal (aluminium) and hard plastic type plates are obtainable.

Various plate types (I think around 5 or 6) are available for all common crops.

A seed box to hold each inclined plate meter units has yet to be made up. Part of the bevel gear drive is supplied, and each unit is somewhat heavier in construction.

These components cost around \$US50 each (with several optional seed plates supplied). To this would have to be added the cost of construction of a seed box, the mounting frame, drive system and rate change gears





An ARC Gongli 2WT seed drill with the optional inclined plate seed meter fitted.

In this picture I have ‘photo shopped’ an inclined plate seed metering system and seed box to the seed drill. A pair of these seed boxes could be fitted on a frame to the existing structure, whilst retaining the original seed and fertiliser boxes.

Perhaps this could be offered as an optional extra. As most crops requiring spaced plants are sown in wide row configuration, only two boxes are required – one each side of the handlebars. In my opinion, four seed boxes positioned as shown is not feasible, as there is insufficient space to locate all four.

Possibly a major re-design of the complete seed and fertiliser box could be attempted if there was sufficient demand for a seed drill for those who did not require the fluted roller metering system as an option. However in my opinion all of the seed and fertiliser units would still need to be located beside or above the handlebars. Positioning all of the seed and fertiliser assemblies below the handlebars is not an option in my opinion, as the angle of seed tubes are severely compromised, and there is insufficient space to carry out adjustments to the soil engaging components.

Note: Some of these photos are in low resolution to keep the file size small. Let me know if higher res. pictures are required. General comment is encouraged. Contact rjesdaile@bigpond.com or rjesdaile@gmail.com