

African Ag. Scientists try out 2WT seed drill in Tamworth.

A group of 22 Ag. Scientists from Tanzania, Nigeria, Malawi, Uganda & Sudan visited Tamworth in early August as part of a short soils course conducted by University of Queensland under Aust. Govt sponsorship. The group was led by Dr. Gunnar Kirchhof of the University, who was assisted by local Ag. Professionals Jonathan Banks and Lew Hyson.



The entire group showed a keen interest in the demonstration, and some took the opportunity to try out the tractor and seed drill for themselves.



As the ground following tine setup has not yet been completed, the seed drill was set up in a standard two row rigid tine and tool bar arrangement to show the visitors. The various alternative systems of seed metering and alternative soil engaging tools were shown in a nearby static display.

Progress Report on ‘Gongli Africa’ 2WT seed drill.

This project is continuing with yet another model being fabricated in my shed. Unfortunately the torsion spring arrangement to hold the tine assemblies in the ground was unsatisfactory, and I have moved ‘back to the drawing board’ with a totally different spring set-up. More details in the October newsletter.

On the next four pages is a report from Dr. Jack Desbiolles (Univ. of South Australia) on progress with investigations into mechanised seeding of rice in Cambodia. This work is along similar lines to the Laos report by Dr. John Schiller (Univ. of Queensland) featured in last month’s newsletter. Is this system now ready for full commercial adoption in South Asia?

ACIAR Project CSE-2009-037

Improved rice establishment and productivity in Cambodia and Australia

Development of Cambodian drill for mechanised dry direct seeding of rice

Date: March 2014

Cambodia is witnessing a shift away from transplanting to direct seeding of rice using manual broadcasting techniques, due to increasing labour shortage. Dry seed broadcasting is easy to implement, requires low labour, and achieves fast crop establishment in irrigated areas. Farmers practice dry seed broadcasting mainly in early wet season and sometimes strategically in the main wet season in upper field areas. However, limitations include high seed rate, high losses to predation, risk seed entrainment from water runoff, often poor and staggered crop establishment and high weed burden due to generally uneven land levelling and non-uniform seedbed preparation, and generally this technique is not well adapted to rainfed systems.

Cambodian agriculture is also undergoing a significant mechanisation shift, with a rapidly increasing adoption of 2 wheel tractors (2WT) used for land preparation and transportation – currently numbering in excess of 150,000 – achieving a broad farmer outreach via the use of contracted services.



Dry seed broadcasting often lead to variable rice crop establishment results

Project CSE-2009-037 (2010-14) aims to improve rice crop establishment efficiency and crop productivity in Cambodia's lowland rainfed systems, via the use of mechanised seeding techniques. The concept of a simple drill implement adapted to the existing and expanding 2WT power source was adopted in the project as a key strategy to improve crop establishment quality under dry direct seeding contexts, and anticipating a range of possible cropping system benefits:

- Accurate seed placement at optimum depth to maximise field establishment rate
- Row seeding to facilitate mechanical/manual weeding
- Limited or no predation risks with buried seeds
- Limited or no lodging relative to surface established crops
- Time and cost saving when used as zero-till to direct sow into residue
- Possibility to establish rice in stored moisture in rainfed systems
- Opportunity to place fertiliser in the seed row for better nutrient use efficiency

The development of a readily adoptable mechanised drill technology suited to sowing rice into prepared seedbed, as an alternative to seed broadcasting was targeted in an initial mechanisation step. Imported drill machinery was firstly evaluated and modifications were made to improve their performance under Cambodian soil conditions, also responding to farmer feedback received at field sites. Following a process of adaptive field research, the following specifications were finalised for the development of a locally adapted seeder solution:

1. 'Trailer-like' pulled seeder unit with depth-gauging wheels on two sides, adjustable for depth and for transport position
2. Self-contained unit with a simple 'pin and go' hitching process
3. Seed-only hopper in full view of the operator and including seed funnelling shallow partitions
4. Four disc openers set at 23cm row spacing, with adjustable furrow closers

5. Independent and contour following star wheel ground drive with on/off clutch positions activated from tractor handle bar
6. Adjustable metering system with fluted roller and contour following ground drive (rice seed rate calibration constant = 8 kg/ha per mm flute setting)



Commercial seeder evaluation and development work with industry partner Mr Ouchhoeun Larano (LHS) and GDA DAEng design collaborator Mr Pen Nouv (RHS)

The seeder development activities were conducted as a joint effort between the CARDI and GDA agricultural engineering teams in collaboration with the University of South Australia, and its manufacturing was carried out at a local agricultural machinery manufacturing workshop (Mr Ouchhoeun Larano) in the Russeykeo District of Phnom Penh.



Adaptive field research as a necessary step to new product development

The Cambodian drill has been tested at several locations in cultivated sandy and sandy-loam soils and a version with tine openers is also being evaluated for use in harder soil conditions where disc opener penetration is not suitable. These two drill options are currently being demonstrated by GDA DAEng in Takeo, Kampot and Kampong Thom with positive feedback received to date from the farmers. CARDI is also planning to undertake large field evaluations and demonstrations in Prey Veng, Kampong Cham and Kampong Thom during 2014. Its retail price is expected to lie around the US\$600 mark.



SE-2009-037 project developed Cambodian disc and tine drill prototypes demonstrated in the provinces

The simplicity of the drill and its design as a trailed unit is an operator friendly feature helping to facilitate gender mainstreaming of mechanised direct seeding technology, in particular by requiring little or no lifting during a field seeding operation. A specific field seeding procedure is to be followed by the operator for best results.

Further improvements are being built into the latest models such as spanner-less depth adjustment and work/transport change-over. While this drill is being evaluated as a rice drill, its metering system can handle a large range of seed sizes and can be used for rotation crops. A double hopper option for combined seed-fertiliser application and a centralised seed rate adjustment are planned as next development.



Cambodian drill rice establishment assessment in irrigated dry season rice

Seeder technologies suited to zero-till direct seeding into unploughed rice paddies have also been evaluated as part of the project as an option providing maximum cost-saving and timeliness. While the zero-till technology evaluated shows promising results for the lowland rainfed systems, its adoption is limited by the ability to handle existing residue and the levelling conditions of the field after mechanised harvesting.

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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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