

## TWO WHEEL TRACTOR NEWSLETTER – FEBRUARY 2014

I have recently returned from two weeks in East Africa as part of the initial field start-up of FACASI (Farm mechanization And Conservation Agriculture for Sustainable Intensification) in East Africa. Scott Justice, CIMMYT 2WT small farm mechanisation specialist and I along with local organisers conducted the programs. The purpose of this visit was to introduce and familiarise key players in Kenya and Tanzania to the maintenance and operation of two wheel tractors and associated equipment (manly seed drills) as part of the FACASI project.

The visit was broadly divided into two modules, one in Kenya under the direction of KENDAT (Dr Joseph Mutua coordinator) and the other in Tanzania (Dr Ken Sariah and Dr. Wilson Baitani, coordinators). The Kenyan module was held at the KENDAT field site near the town of Nanyuki in central Kenya, and the Tanzanian module was held at CAMARTEC in Arusha, Tanzania.

Each module consisted of three days of intensive instruction. Day one consisted of lectures and discussions on the use of two wheel tractors and their associated equipment. On days two and three all delegates went to the field site, and there were practical demonstrations and ‘hands on’ operation of two wheel tractors and accompanying equipment. Two 15HP 2WT were available as power units for the demonstrations.

Equipment available for testing included:

Fitarelli two row trailing disc opener seed drill.  
Fitarelli single row disc/tine mounted seed drill.  
Morrison single row disc/tine seed drill.  
Gongli Africa mounted seed drill.  
ARC Gongli mounted seed drill.  
National Agro (Indian made) semi-mounted 2WT seed drill

2BFG 100 Chinese rotary tillage seed drill.  
2BG-6A Chinese rotary tillage seed drill  
Dong Feng standard 80 cm rotavator  
Kenyan made 2WT one tonne trailer.  
KENDAT made trailing boom spray for 2WT.



Assembling the Gongli Africa seed drill



Driving instruction with the Dong Feng rotavator



The KENDAT 2WT sprayer



Testing the Fitarelli 2 row seed drill

At the Kenyan site, the Gongli Africa unit was assembled, calibrated and tested in the field. Also the two row Fitarelli and the Morrison unit were field tested, as well as the standard rotavator, the trailer and the boom sprayer. Due to time limitations, other equipment was only described and explained, although not operated in the field.

In Tanzania, unfortunately most of the seed drills explained and demonstrated in Kenya were not available, as shipments of 2WT, Chinese seed drills, Brazilian seed drills, and the Indian seed drill had not arrived.

We therefore did extensive testing and demonstration on the Gongli Africa unit, as well as the Intermech/Morrison hybrid seed drill which was partly developed at CAMARTEC. A 2WT Nandra seed drill, made in Moshi, Tanzania was also inspected although not tested in the field.



Calibrating the Gongli Africa seed drill



Examination of the Intermech/Morrison seed drill



The Nandra 2 row 2WT seed drill



Field adjustments on the Intermech/Morrison drill

There were 15 delegates at the Kenyan module, and 12 at the Tanzanian component. At both trainings those with previous experience with 2WT operation were the most knowledgeable, asking many questions. On days two and three there were plenty of questions and much discussion on the maintenance and operation of these farm implements.

During the 'free' days between the workshops, Scott, Joseph and I used the opportunity to visit Laurie Sessions (a leading commercial CA farmer in Naro Moru, central Kenya), Ndume Ag. Machinery Manufacturing in Gilgil Kenya, three 2WT retailers in Nairobi, and African Conservation Tillage Network (ACT) offices in Nairobi. (Saidi Mkomwa)

Hopefully, following these meetings and the instruction, there will be sufficient expertise to conduct some meaningful field trials with 2WT seed drills in East Africa this season.

Some of the major points that emerged from the training and the other discussions were:

- Much more training is needed with 2WT tractors and associated implements- particularly with ‘hands on’ operators rather than administrators or other officials. Hopefully the 27 persons who attended can serve as a nucleus to instruct others in this technology.
- Links need to be further developed with 2WT retailers and other parties who are involved in 2WT marketing (tractor mechanics, spare parts resellers etc.) This is so that adequate backup can be developed once significant numbers of 2WT units are operational in the field.
- The Chinese vertical spoon feed seed meters look extremely promising for use in all 2WT seed drills. (details of these meters were shown in a recent issue of 2WT newsletter) The limited field testing done both in Kenya and Tanzania showed that these meters do a good job of maize metering, despite only average quality maize seed being available Further critical evaluation and testing as part of FACASI is required. At a base cost of \$US 50 each (ex works) these Chinese meters are a real step forward.
- Local East African potential manufacturers of 2WT equipment need to be encouraged to continue development of seed drills and associated implements (Ndume, Intermech, Nandra, Mohamed Elmi, CAMARTEC, etc.)
- Some of the other uses of 2WT for agriculture should be emphasised so that the versatility of these traction units can be recognised (transport with trailer, operation of small irrigation pump, grain threshing, grain milling, hay making etc.)
- A re-design of some of the seed drills is required, so that superior ground following ability is incorporated into the soil engaging components of the planter. We found that East African fields can be very uneven, due to old ploughing and tillage practice, cattle hoofmarks and tramping, termite mounds etc. I am already in the process of composing a discussion paper on this.
- Subsequent to improvements in the design of the soil engaging components, it will be much simpler to fit an operator seat and steerable tail wheel to the 2WT, along with a manually operated lift system.
- We still have a lot to learn regarding ballasting and weight distribution of 2WT with seed drills attached. Experience in both Kenya and Tanzania showed that extra weight (obtained on site by persons standing on sections of the tractor and/or seed drill when operating- an OH & S nightmare!) can increase tractive ability in tough conditions.

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Abdul Matin has informed me that a paper on recent studies on rotary strip tillage with a 2WT is now in the process of publication.

It is:

*Furrow parameters in rotary strip-tillage: Effect of blade geometry and rotary speed.*

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It is in Biosystems Engineering – Volume 118 (Feb. 2014) pp 7-15

Some more research papers may be forthcoming from this project.

I can forward a copy to interested persons who cannot download this publication.

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Tim Krupnik from the CIMMYT-Bangladesh team has advised me of a newly produced book on agricultural machinery made in Bangladesh that can be used for conservation agriculture and related production purposes. The details can be found below:

**Krupnik, T.J., S. Santos Valle, A.J. McDonald, S. Justice, I. Hossain, and M.K. Gathala. 2013. Made in Bangladesh: Scale-appropriate machinery for agricultural resource conservation. Mexico, D.F.: CIMMYT.**

We wish to graciously acknowledge USAID for funding the CSISA-MI project, the EU for funding the Agriculture, Nutrition and Extension Project, and ACIAR for funding the Rice-Maize project, all of which contributed to the development of this resource book.

**The book can be downloaded here:**

<http://repository.cimmyt.org/xmlui/handle/10883/3381>

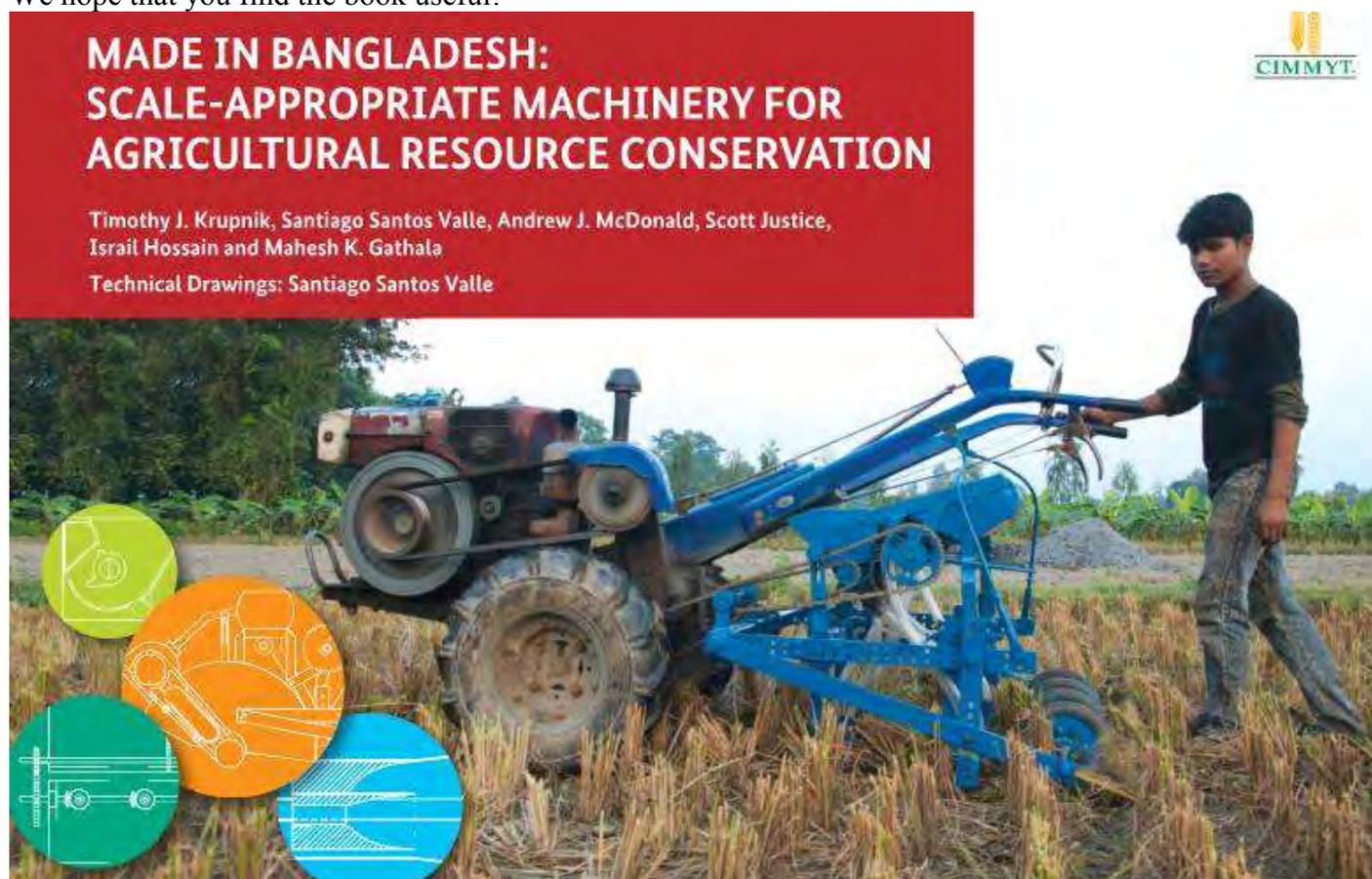
*(However note that this is a very large file -16MB Ed).*

A limited number of hard copies of the book can be made available by sending an email request to Subrata Chakrabarti ([S.CHAKRABARTY@cgiar.org](mailto:S.CHAKRABARTY@cgiar.org)).

**Please note the following if you choose to download and print this book to aid in manufacturing agricultural machineries:**

Different scales are used in the technical designs throughout the book, depending on what was most appropriate for the technical design and in accordance with the size of the paper used (some are on A3-sized paper, which is 29.7 x 32 cm, and others on A4, which is 21 x 29.7 cm). It is fundamental to understand that this allows the reader to take measurements directly from the paper since the design is scaled to the paper size. We recommend that you always use A3 size paper when printing the scaled technical designs, and/or be sure to print the technical designs on the same size of paper for each printing. The use of a different paper size than A3 will incur into measurement errors by not following these instructions.

We hope that you find the book useful!



An open-source publication targeted to machinery manufacturers, engineers, researchers and development practitioners, this book describes and provides technical designs for small-scale agricultural machinery developed or produced in Bangladesh to support the sustainable intensification of agriculture by smallholder farmers. The focus is on smart, scale-appropriate equipment – particularly for use with two-wheel hand tractors suited for the small plots typical throughout Bangladesh, but also in many countries where smallholder farmers predominate. Most of the machinery is designed for use with conservation agriculture crop management practices and allows precise and timely seeding and fertilization of crops with reduced soil disturbance. Each chapter includes written descriptions and photographs of the machines, outlining their purpose, performance and field use, followed by detailed, to-scale technical designs and other information to facilitate production of standardized copies or improvements in the original designs. The implements described include zero tillage and strip tillage seed and fertilizer drills, bed planters, axial flow irrigation pumps, strip tillage blades, improved furrow openers and seed metering mechanisms – all specialized for use with two-wheel tractors.



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Note: there was no newsletter in January 2014.

Feel free to send comment and opinion on any aspect of the subjects being discussed.

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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