TWO WHEEL TRACTOR NEWSLETTER – SEPTEMBER-DECEMBER 2015

First of all, by way of explanation, this is the first 2WT newsletter since August 2015. Things have been a little slow since that time, and I have not collated any stories for circulation. However there has been some activity in the last two months, and this has been reported in this issue.

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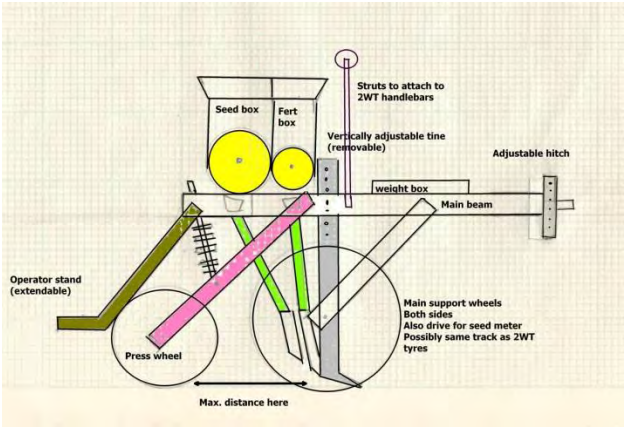
Following my visit to Indonesia earlier in the year, I was encouraged by staff at the Syngenta Foundation to investigate whether a single row maize planter for 2WT, which is suitably adapted to Indonesian conditions, could be fabricated. I approached Spring Ridge Engineering (the manufacturers of the original ACIAR-Rogro 2WT seed drill) to have them build some prototypes to suit. These planters are to be used behind Indonesian made 2WT (Quick 10 HP tractor) and similar models as well as the larger Dong Feng DF-12 Chinese made tractor.

Spring Ridge Engineering went ahead and designed a single row planter. Two were partly built in their workshop. However due to pressure of other work, they could not be completed in time for the scheduled November plantings in Indonesia. I completed construction in my shed, and then air freighted the planters to Jakarta.
The basic specifications of the single row units are:



The original concept sketch of the Indonesian single row planter

The main beam is 75x75x2mm thick RHS (rectangular hollow square steel section). All the other beams and struts are 50 x 20x 2.5 mm RHS
The support wheels are 12 inch motor cycle. Track is 800mm (same as tractor). The wheels are adjustable for height. The single tine is 50x12 high tensile steel- adjustable vertically in 10mm increments. It can also be raised to a transport position.
There is an optional swivelling coulter (adjustable vertically or removable)
Press wheel is 2.50 x 6 with spring tension adjustment. It can also be raised to transport position. It can also be removed if not required.
Main drive is from one of the drive wheels.
As the drive wheels are 400mm either side of the tine, and broadly in line with the tine, they act as depth control wheels for the tine on uneven land. When the operator is standing on the rear platform, he is carried by the support wheels – not the press wheel. Motor cycle wheels have been used, as they should be obtainable anywhere in the developing world.
Note the double shoot tine underneath the unit.

There are a pair of rails under the 75mm RHS. The support wheels are adjustable back and forth on these rails, as is the press wheel assembly and the operator stand. This allows for suitable adjustment of these components as required to suit varying soil and residue conditions.

If required, the tine can be removed, and alternative soil engaging tool such as double disc opener can be fitted (provided it is on a 50x12 shank).
Spring Ridge Engineering has attempted as much as possible to keep the weight down, by using thin section RHS.
The basic unit weighs 60 Kg.



Details of the single tine (left) and a view from the side showing the chain drives (right)


An overall view of the planter showing the press wheel, 12 spoon vertical seed meter, fertiliser mechanism, and the optional operator stand, support struts, covering chain harrow and tractor hitch (2 types available)

Due to the November deadline, the planters were sent to Indonesia immediately upon completion and are now being evaluated by Syngenta Foundation staff. As they are the first prototypes made in this configuration there may be some 'teething troubles'. These planters are not patented or covered by exclusivity agreements. Further details can be supplied on request.

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Photo story on Powering smallholder agriculture in Eastern and Southern Africa
http://facasi.act-africa.org/library.php?com=4&com2=12&com3=26&com4
http://facasi.act-africa.org/videos.php?com=23&item=89&vid=94#.Vg8DkH0nkd4

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2WT are not ‘All work and no play’ Check out the link for Two wheel tractor racing.
https://www.youtube.com/watch?v=e_N_AqBNj9c

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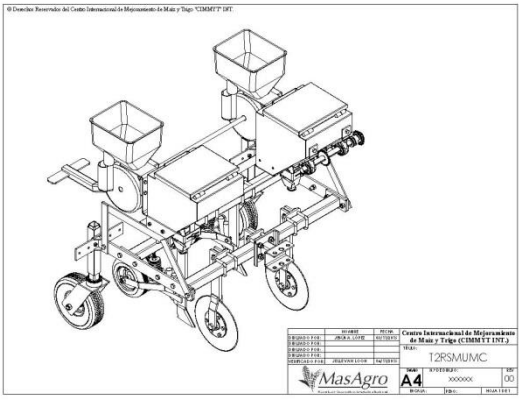
ACIAR-CIMMYT- SYNGENTA FOUNDATION.
REPORT ON VISIT TO ZIMBABWE 7-23 NOVEMBER 2015.

As part of the ACIAR FACASI Project I was asked to come to Zimbabwe in November 2015, to assist in supervision of the construction of three two row two wheel tractor maize planters, as part of the project. The aim of the exercise was to locally fabricate three planters, using local expertise and local materials. This was to give valuable experience to local agricultural engineers and fabricators and also to demonstrate that small planters can be constructed in East Africa, using practically all local parts.

The work was done at the Agricultural Engineering workshop of the University of Zimbabwe in Harare. The overall work was supervised by Dr. Jelle Van Loon, an Agricultural Engineer based with CIMMYT in Mexico. Jelle was assisted by Dr. Joseph Mutua an Ag. Engineer with KENDAT , Kenya. Joseph has experience in local manufacture of small farm implements in East Africa.

Representatives from three local short line farm implement manufacturers were invited to participate, as well as an independent fabricator, and also representatives from Ag. Engineering at the University and the Ministry of Agriculture. The three manufacturers represented were Bain & Co., Zimplow Holdings, and Grownet Investments, all of Harare.



The CIMMYT-FACASI Hybrid two row maize planter (left)

Jelle explains the engineering drawings to some of the African representatives.

Basic steel sections such as flat bar, angle iron, and square hollow sections were relatively easy to purchase at cheap prices. However 50mm x 50mm x 3mm square steel section for the tool bars had a two week delay on supply, so two 50mm x 50mm angle iron sections were welded together to make up the tool bars required. Similarly bright steel shafting, bearings, sprockets, chain, sheet metal, bolts, and other sundry parts could be found in Harare. Consumables for the job were also readily available.

I brought the six vertical 12 cell maize seed meters (originally from China) and the six fluted roller fertiliser meters (also originally from China) in my personal luggage from Australia. They were fitted by Jelle and his team as part of the manufacturing exercise.

Over the next 10 days, after delivery of materials, Jelle, Joseph, and the team members proceeded to cut out the various components as per the drawings, and then shape, drill and weld the pieces to make up the basic frame.

Members of the team at work fabricating and assembling parts (left)

The basic two bar frame (right)

The frame consists of a two row tool bar, made from 50mm x 50mm x 3mm square section. An upright frame is positioned on either side, and this supports the seed and fertiliser metering mechanisms. Drive is from the tractor wheel through a chain, countershaft and clutch. The basic frame is 1000mm wide and 343mm C/C between the two tool bars.

A pair of 50 x 16 x 500mm tine shanks was constructed from some existing tine shanks which were available from a previous CIMMYT prototype. Tine clamps with 50mm 'U-bolts were also made up. At the rear of the frame, a pair of 'T' section assemblies was fitted, to support the rear of the implement with a pair of swivelling tail wheels.

A rear view of the partly completed unit (left)

Joseph Mutua showing a side view of the implement (right)

The seed and fertiliser boxes and meters were fitted, followed by the drive sprockets and chains. After the tines were fitted, the seed tubes, cutting coulters, and other small ‘add-ons’ were installed.

On the final day, the completed planter was taken to a demonstration site about 10 Km from the University on a section of the University Research farm, which has been leased to CIMMYT. It was there given a field trial.

Field testing of the two row two wheel tractor planter.

A second view of the field test

Summary of field test evaluation.

The field where the planter was field tested was a sandy loam soil with a significant percentage of small stones and gravel. It was completely dry, as there had been no significant rain for several months. The previous crop grown on this field was soybeans, which had been machine harvested The field had not been tilled in the interim and the entire residue and tailings had been retained. It was also quite rough, with plenty of moderate undulations in the field surface.

Unfortunately the tailings of the soybean crop, as well as residual weeds, had not been spread evenly behind the harvester, and this resulted in distinct swaths of tangled residue, with areas outside the swaths having a low density of crop residues. As the soil was dry, there was only a shallow (< 50mm) depth of loose dry soil, with a firm compacted soil layer underneath.

These soil conditions were a real challenge to the planter. As well as the soil conditions, various design faults were soon evident in this initial trial These deficiencies will be addressed in later prototypes. Both the seed metering and fertiliser metering mechanisms worked well. However the unit had not been calibrated and as a result the plant population was incorrect for the circumstances.

Overall impressions:

This FACASI workshop in some ways is a ‘first’ for East Africa. All of the participants from the short line implement manufacturers received comprehensive instruction in the manufacturing techniques for small scale planter construction. There was plenty of ‘hands on’ fabrication, as well as tutoring by Jelle Van Loon and Joseph Mutua. I played a small role in this. The group worked as a team and carried out standard methods of construction using locally purchased materials. It demonstrated to all that this type of implement can be successfully made in East Africa, with only a minimum of input of specialised imported parts (mainly seed and fertiliser meters).

In my opinion, the planter has potential, and can be made to operate properly. However it needs further modification to achieve this result.

I acknowledge the support of the FACASI management team, the University of Zimbabwe, and the Syngenta Foundation who made my visit possible, as part of this venture. For further information, as well as a copy of the drawings of the planter, please contact Jelle Van Loon of CIMMYT at J.VanLoon@cgiar.org

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May I wish all of my 2WT enthusiast colleagues (all 278 of you) all the best for Christmas and the New Year 2016. In my opinion we are beginning to see real progress on several fronts in the overall field of small farm mechanisation. Let us hope that this continues into 2016.

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If you have any comment on this newsletter, please let me know.
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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