

TRACTOR POWER

SUBSISTENCE TO SURPLUS

The right kind of machine can help transition smallholder farmers from subsistence levels of production to income-generating surplus, while also creating private-sector economic activity in rural communities through supplying and repairing machinery

FACASI field trials in Laikipia, Kenya.



PHOTOS: DR. FREDERIC BAUDRON, CIMMYT

BY KATE LANGFORD

"The hoe has to go!"

This was the catchcry repeated many times at the African Green Revolution Forum held in Ethiopia in September 2014.

In order to transition a smallholder-driven agricultural system from human to machine power has many challenges, not least of which is demonstrating the benefits of mechanisation to farmers for whom it is unknown.

Added to this is the need to ensure a functioning business sector that can supply and repair suitable farm machinery.

A 4-year ACIAR project in Sub-Saharan Africa is working to address these challenges: the Farm mechanisation and conservation agriculture for sustainable intensification (FACASI) project aims to identify and test two-wheel tractors (2WTs) that are suitable for local conditions.

The project also aims to develop appropriate business models to deliver these tractors to smallholders, and identify institutional and policy constraints and opportunities that may influence their adoption.

The project is operating in Ethiopia, Kenya, Tanzania and Zimbabwe in places characterised by smallholder mixed-cropping systems, largely maize and legumes. Work is focused on two sites in each country with the hope of wider adoption in the region.

MACHINE POWER

2WTs are relatively inexpensive, easy to operate and easy to maintain. Furthermore, they have a proven track record transforming smallholder farming practices, having been widely adopted in India and Bangladesh.

A range of 'accessories' can be fitted to these tractors to perform different farming functions,

including trailers to transport inputs and produce. The tractors can also serve as a stand-alone power source and be fitted to water pumps, wheat threshers or maize shellers.

In Africa, 2WTs have the potential to make many improvements to farming practices. They can increase the area of land that can be cultivated, thereby increasing profits and improve livelihoods. They can reduce labour costs and free up family members to pursue other income-generating activities. The tractors also have potential to increase rural employment opportunities, such as through fuel supply, repair services and hire businesses.

While the main beneficiaries of 2WT technology are expected to be smallholder farmers, particularly women, the project's efforts are strongly focused on engaging those involved in the private sector.

According to Dr David Kahan, agribusiness



Project partners demonstrating two-wheeled tractors at project launch.

specialist with the International Maize and Wheat Improvement Center (CIMMYT), the private sector in this case includes farmers, small enterprises, importers, dealers, manufacturers, mechanics and many businesses that operate as a combination of two or more of these.

“We have dealers who are also importers, and dealers who run small repair workshops or stock spare parts,” Dr Kahan says. “Then there are manufacturers of equipment and accessories such as ploughs and trailers.”

Added to this are two types of service providers: small commercial enterprises (which in some cases are farmers) and producer organisations/farmer cooperatives. These service providers typically own machinery and offer agricultural services that use the machinery.

Through the project, Dr Kahan and colleagues are seeking to unravel the complex web of potential private-sector partners. They aim to identify the main players and promote business models that can function in an unsubsidised way to support the introduction of 2WTs at the project sites and into African agriculture more widely.

“There are gaps in the chain because of the newness of this technology in Africa,” Dr Kahan says. “What we are trying to do is fill these gaps and strengthen the linkages in the supply chain.”

He outlines how, with this project, the private sector is being engaged early on to generate awareness of the potential of 2WT technologies, and to ensure that marketing systems are in place and ready for when suitable tractor models come off the ‘research line’.

This research line is the other arm of the FACASI project, which involves systematically testing the most suitable 2WT technology at the study sites over a couple of seasons and, importantly, creating awareness about them.

“Farmers in Africa are largely unaware of the existence of the tractors and what they can offer,” says project leader Dr Frederic Baudron, cropping system agronomist with CIMMYT. “In the four countries where we are working, there is a big difference in awareness about 2WTs and we need to demonstrate how the tractors can improve farm productivity.”

In 2013, public and private-sector representatives—agricultural engineers, agronomists, machinery importers and machinery manufacturers—from the four

countries took part in a study tour to India so they could see various low-cost technologies for postharvest operations and weeding, sowing, fertilising, spraying and harvesting in operation.

While 2WT technology is new to Ethiopia and Zimbabwe, in Kenya there are some machines that were introduced through non-government organisations. In Tanzania over the past 10 years, the government has had credit schemes in place to encourage farmers and service providers to purchase 2WTs imported from China. This has created a market for the technologies and the private sector is stepping in to take advantage of these business opportunities.

With a full package (2WT plus accessories) costing between US\$5,000 and US\$6,000 (A\$6,150 and A\$7,400), Dr Kahan believes it may be the better-off smallholders, private-sector service providers or farmer groups who are most likely to promote the technology in Sub-Saharan Africa—that is, once they become aware of the multiple benefits it could offer.

“This follows the general trend globally in mechanisation where it is the more ‘entrepreneurial’ farmers who are most likely to start out,” Dr Kahan says.

OPPORTUNITIES AND CHALLENGES

While the uptake of 2WT technology has been rapid in Bangladesh—with one out of every 30 users owning a tractor—there are hurdles to overcome in Africa.

“In Bangladesh, rice-paddy farming is the predominant cropping pattern and population densities are high,” Dr Kahan says. “This means there is always a demand for the equipment close by. In Africa, we are dealing with mixed-cropping systems, lower population densities and hard soils that 2WTs cannot always plough.”

The hard soils present an opportunity for the project to encourage the adoption of conservation-agriculture (CA) principles. The tractors are able to sow seeds in unploughed fields (a practice known as minimum tillage), which is a feature of CA. The use of tractors instead of animal draught power also reduces the need for crop residues to be used for animal fodder. Instead, they can be left in the field to provide soil cover, another principle of CA.

Melissa Wood, director of ACIAR’s Australian International Food Security Research Centre, highlights how Australia is considered a world

leader in CA. “The FACASI project offers an opportunity for Africa to draw on our expertise while at the same time introducing labour-saving mechanisation that allows farmers to sustainably intensify.”

Training was recently conducted for Kenyan and Tanzanian service-provision entrepreneurs on 2WT-based CA and on business models, financial management and marketing. It is anticipated that these entrepreneurs will extend this knowledge to other rural service providers as the project develops.

Another element of 2WT technology that Ms Wood is particularly passionate about is its ability to reduce the burden of farm labour, which rests heavily on the shoulders of women in Africa, literally.

In Africa, women perform most of the labour-intensive tasks involved in farming, such as weeding, threshing, shelling and transporting inputs and agricultural commodities to and from the market by head-loading. “Mechanisation of transport and postharvest operations would directly reduce women’s labour burden,” Ms Wood says.

Early gender analysis, conducted as part of the project, is showing that mechanisation of tasks considered the domain of men could also indirectly reduce women’s labour burden. Mechanising land preparation and seeding could reduce women’s workload in weeding and caring for livestock.

Dr Kahan also believes 2WT technology offers tremendous entrepreneurial opportunities for women, especially as education in Africa improves at a rapid rate, and more credit schemes open up targeting rural women entrepreneurs.

With three years still to go with the FACASI project, it remains to be seen how many hoes will be replaced with 2WTs. But as more farmers see the benefits of mechanisation, and more businesses and entrepreneurs seize the opportunities, we may well be on the verge of an agricultural revolution in Africa. ■

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