

# Mechanisation requirements for rice production in South Africa

By Dr Tingmin Yu, ARC-Agricultural Engineering

The application of modern crop cultivation techniques, including mechanisation, has played a key role in the significant improvement of agricultural productivity. In the context of commercialising rice production, mechanisation has been critical across the whole production value chain.

The feasibility study for mechanised rice production has indicated that upland or dryland farming with controlled irrigation is the most practical for rice production in South Africa, rather than the paddy field system practised in other parts of the world. Accordingly, the fundamental mechanisation requirements across the rice production process can be clearly identified and investigated.

## Machinery and equipment

The operational process for rice production is illustrated by Figure 1.

## Tractor and power requirements

The tractor is the powerhouse for the majority of work conducted on the field, together with other implements. Due to the heavy soil clay content and moderate to high moisture content required for rice growing, the power requirement is categorised as between medium to heavy duty. A four-wheel drive tractor with a 50-60kW engine will be able to cover primary tillage for up to 5ha for a period of five to ten days.

## Land preparation

**Soil grading, levelling or scraping:** In case of a flood irrigation plan, it is preferable to divide the land into blocks, with the



Rice planted for the 2018/19 season on a pilot farm near the Vaal River.

terrain levelled and sloped at a certain angle. Equipment for soil grading, levelling or scraping is therefore needed to prepare the land. The work can be contracted or outsourced since it is not required for every season.

## Soil tillage and seedbed preparation:

A mouldboard plough and harrow used for conventional primary tillage will be sufficient to prepare the soil for seeding/planting.

## Planting/seeding

A row crop planter, such as a wheat planter, can be used for rice planting in dryland direct seeding. Fertiliser can also be applied with the planter when necessary.

## Weed control and cultivation

Weeding via herbicide application can be done with a boom sprayer or knapsack sprayers. Alternatively, a cultivator can be used to do mechanical weeding.

## Harvesting

A self-propelled combine harvester for rice is the ideal equipment to complete harvesting. A combine harvester with 50kW engine



Harvest time during the 2017/18 season.

power will be sufficient to cover 50ha in a limited time window. Unfortunately, combine harvesters for rice can only be imported at the moment.

## Post-processing

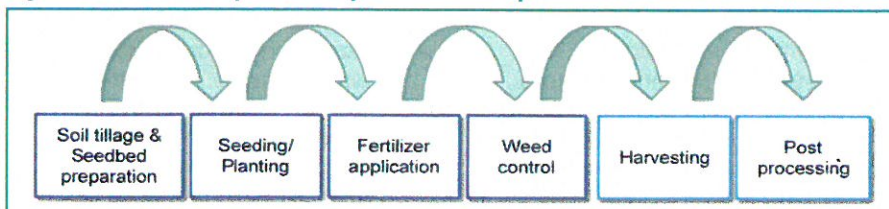
Grading and packaging equipment are necessary for paddy grain or milled rice after harvesting. However, the milling process will require different equipment to perform cleaning, husking, separating, polishing and other additional processes.

## The way forward

The implements and equipment utilised for mechanised rice production for upland or dryland soil tillage are already available in the market. The combine harvester and majority of the post-processing equipment will have to be sourced and imported from other countries such as China or India.

Sourcing, evaluation, recommendation and training on mechanisation are suggested aspects requiring further study. ■

Figure 1: Illustrated operational process for rice production.



For enquiries, send an email to Dr Tingmin Yu at YuT@arc.agric.za.