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#91

# RICE 2018 TECHNOLOGY BULLETIN

PHILIPPINE RICE RESEARCH INSTITUTE

## MULTICROP REDUCED-TILL PLANTER



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# FOREWORD

In the book *Competitiveness of Philippine Rice in Asia*, crop establishment and harvesting are the most labor-intensive farm operations in our country. Labor cost contributes 30% to total rice production capital. This means a farmer needs to spend P3.60 in labor fees alone to produce a kilo of palay.

According to PhilRice economists, machines such as combine harvesters, four-wheel tractors, and mechanical planters can reduce total production cost and jack-up the competitiveness of farmers.

This bulletin sheds light on use of the multicrop reduced-till planter in direct-seeding. The planter can simultaneously drill seeds and apply basal fertilizer at pre-calibrated and precise rates. It is ideal for rainfed condition. In addition, the planter complements the reduced tillage practice that may improve soil conditions over time.

It is hoped that with this bulletin farmers may be encouraged to use this planter to save on production cost, enrich farm income, heighten competitiveness, and maximize labor productivity.



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## INTRODUCTION

Rice production systems in the Philippines are changing; and farmers are moving from manual to technology-based farming activities. Reduced tillage and direct seeding for example offer several advantages in terms of reduced labor, energy, and water. These practices are ideal for rainfed areas.

Direct seeding has been getting wider attention recently owing to increasing scarcity of irrigation water and rising labor cost for crop establishment. The availability of short-duration varieties and several weed control measures have also made direct seeding technically viable and easier to adopt by farmers.

Direct seeding improves water-use efficiency, provides opportunity for crop intensification, and reduces production risk especially when rainfall is highly variable.

Reduced tillage, on the other hand, saves on labor cost during land preparation by reducing the number of tillage passes, and preserves



soil with corresponding benefits for the natural resource base. It also reduces greenhouse gas emission owing to dry soil condition during crop establishment and crop growth, and less burning of fuel during land preparation.

Combining direct seeding and reduced tillage is therefore a viable option to improve rice production in rainfed areas. This can be made possible by developing a machine to address constraints on shortage of labor and water. The improved Reduced Till Planter or RTP, a localized version of the multi-crop planter from India that was developed to address such problems including the lack of cheap machines for rainfed condition and reduced tillage. This machine considerably reduces labor requirement and water usage during land preparation and crop establishment. It also improves direct seeding by placing seeds at a more uniform depth and precise seeding rate. The RTP also provides flexibility for users to seed/drill different crops using the same planter.





## What is multicrop reduced-till planter (MRTP)?

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Multicrop reduced till planter (MRTP) is a localized version of the Multicrop tillplanter from India (Kapil, 2012) used for direct seeding several crops such as rice, corn, and mungbean. without going through the conventional tillage. It was improved to suit local field condition and developed using available and relatively cheap materials for local market. The planter can drill seeds and apply basal fertilizer in one operation at pre-calibrated and precise rate. It is ideal for rainfed condition.

## Design specifications

Prime mover	4-wheel tractor
Field Capacity	2-3 ha/day
Labor Requirement	1 person
Number of row	9
Width of cut	1.8 m
Seeding rate	20-60 kg/ha (rice) 15-20 kg/ha (corn)

## Advantages in using MRTP

- ▶ Can be attached to a 4-wheel tractor for faster field operation, reduces labor, and saves on water under dry-direct seeding and reduced tillage
- ▶ Saves on unit production cost (P/kg) by 22-30% relative to farmer practice
- ▶ Can plant different crops such as rice, corn, and mungbean with variable seed size and rate, and planting depth and spacing
- ▶ Has precise seed metering system using inclined rotary plates that can be adjusted based on desired seeding rate
- ▶ Has the provision of drilling both seed and basal fertilizer in one operation if the farmer opts to do so
- ▶ Under clay loam soils, tilling is not needed. For heavy clay soils, reduced tillage (one-pass rotavation) is recommended
- ▶ Provides opportunity to use primed seeds for seeding

# Main Parts of RTP

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Main frame



Fertilizer metering chute



Seed hopper with cover

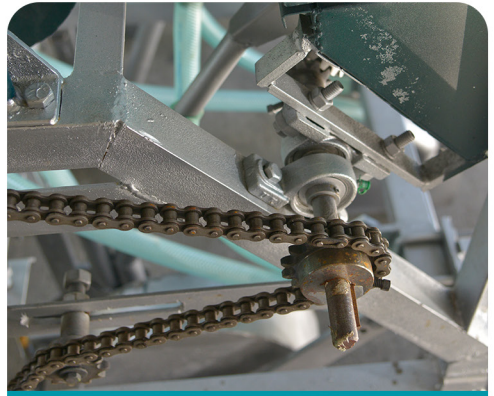


Furrow opener





Seed metering plate with housing, shafting, bushings



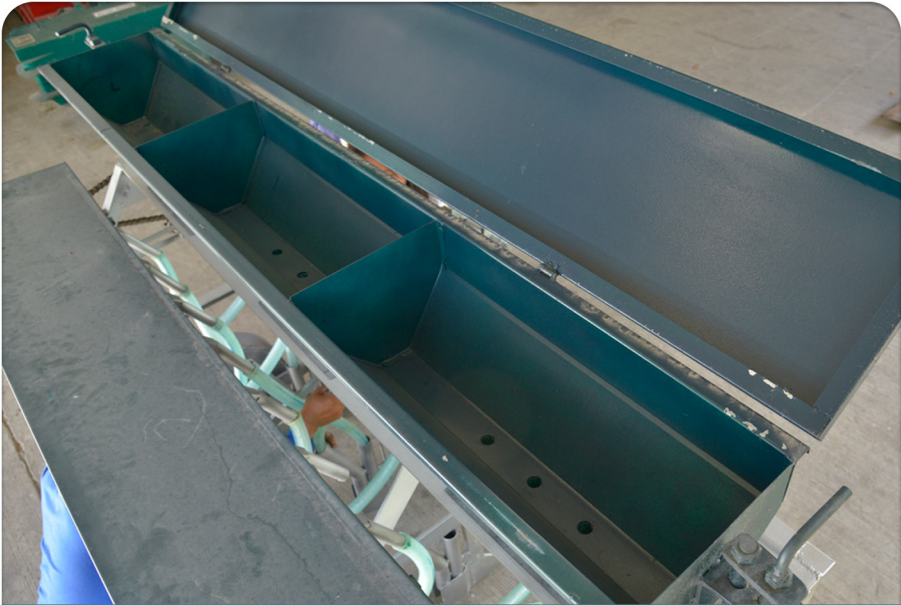
Seed hopper mounting brackets



Fertilizer hopper adjustment assembly



Hitch assembly



Fertilizer hopper with cover



Ground wheel



Depth guide with axle and connector assembly

## Recommended land preparation suitable for the RTP

- § Ensure that there is an optimum soil moisture (not too wet and not too dry) for seeding
- § Rotavate the soil (1-2 passes) if possible . Clod sizes should be at 2-3 cm
- § Incorporate thoroughly the crop residues such as corn stalks, rice straw, and weeds to avoid clogging of furrow opener during seeding
- § Drill seeds according to recommended seeding rate of the crop
- § Fertilizer may be applied during planting

## NOTES

**1** Reduced tillage is best for fields that have no heavy weed pressure.

**2** Use crop residues as mulches for reduced tillage.



## How to operate multicrop reduced-till planter

- 1 Attach the planter to the tractor (i.e., 35 HP) by three-point linkage.  
.....
- 2 Select the proper row spacing, seed quantity, and planting depth according to the field condition and crop. Re-adjust seed rate and planting depth after trial.  
.....
- 3 Place the seed on the box. Do not fill the seed box more than quarters full to prevent the seeds from dropping from the opening found in the inclined seed plates during vibration under operation.  
.....
- 4 Calibrate the planter when necessary.  
.....

## NOTES

1

Familiarize the major components of the planter, mechanism, adjustments, and operating systems.

2

Check the condition of the planter, and make the necessary adjustment or repair particularly with the fasteners, blade bolts, and welds before using. Replace any broken or worn-out part.


3

Make sure that the seeds are clean and free of soil and pebbles. Do not mix fertilizer with the seeds when seeding, as this will damage the seed metering device.

## Actual Performance Data of MRTP

 Actual measurements of the performance of the machine at the farmers' rice field in Barangay San Agustin, Talavera, Nueva Ecija, 2016 Dry Season (DS)

Parameters	RTP	Commercial seeder	Drumseeder
Prime Mover	4WD tractor	4WD tractor	None
Number of rows	9	11	4
Spacing between rows (cm)	20	20	20
Distance per hill (cm)	8	15	10
Seeding rate (kg/ha)	54.5	34.2	41.5
Field capacity (ha/day)	1.4	1.6	0.8
Labor requirement	1	1	1

 Comparison of grain yields, unit production cost, labor productivity, and energy efficiency of the different seeding methods, 2016 DS

Seeding method	Grain yield (kg/ha)	Unit Production cost (P/kg)	Labor productivity (kg/ person-day)
MRTP	2362.8	16.9	91.5
CS	1846.5	21	72.5
DS	1607	24.2	61.7

*RTP- reduced till planter; CS- commercial seeder; DS- drumseeder*

## Basic Troubleshooting of MRTP

Problems	Remedy
Seed not placed at desired depth	Properly adjust the depth of furrow openers with the help of depth control wheel.
Seed/fertilizer is not dropping from furrow opener	<ul style="list-style-type: none"><li>• Check the seed/fertilizer box if empty and refill.</li><li>• Clean mud out of the opener and/ or seed delivery tubes or the fluted rollers if they are blocked by muds.</li><li>• Check if the drive wheel does not touch the ground; lower down the hitch to get the drive wheel in contact with the land</li></ul>
Unequal depth of seeding among different rows/furrow openers	Put the machine on a fairly level ground and then level all the furrow openers with the help of top link/right lower link of the tractor.

*Adapted from Kapil et al., 2012*

## References

- Kapil., Kamboj, B.R., Jat, M.L., Kumar, Anil, Kumar, Dalip, Sidhu, H.S., Gathala, M.K., Saharawat, Y.S., Kumar, V., Kumar, Anil and Kumar, Vivak. 2012. Operational manual for multi-crop zero till planter. Cereal Systems initiative for South Asia (CSISA), International Maize and Wheat Improvement Center (CIMMYT), International Rice Research Institute (IRRI), NASC Complex, New Delhi, India, p. 24.
- Pandey S, Mortimer M, Wade L, Tuong TP, Lopez K, Hardy B, editors. 2002. Direct seeding: research issues and opportunities. Proceedings of the International Workshop on Direct Seeding in Asian Rice Systems: Strategic Research Issues and Opportunities, 25-28 January 2000, Bangkok, Thailand. Los Baños (Philippines): International Rice Research Institute. p383.

<http://www.knowledgebank.irri.org>



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We are a government corporate entity (Classification E) under the Department of Agriculture. We were created through Executive Order 1061 on 5 November 1985 (as amended) to help develop high-yielding and cost-reducing technologies so farmers can produce enough rice for all Filipinos. With a “Rice-Secure Philippines” vision, we want the Filipino rice farmers and the Philippine rice industry to be competitive through research for development in our central and seven branch stations, coordinating with a network that comprises 59 agencies strategically located nationwide. We have the following certifications: ISO 9001:2008 (Quality Management), ISO 14001:2004 (Environmental Management), and OHSAS 18001:2007 (Occupational Health and Safety Assessment Series).

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