

# Management of drill sown rice

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Drill sowing rice provides several advantages over aerial sowing while still maintaining a high grain yield potential.

Increased water productivity and profitability are the most important benefits from drill sowing. Other benefits include; reduced lodging, no wind or muddy water problems, less aquatic weeds and duck and snail issues.

## Field layout

Surface drainage is a major issue when drill sowing rice and field layout is very important, slopes of less than 1:1600 are most suitable. Bankless channels and large outlets aid rapid filling and draining of the bays. This also improves irrigation efficiency and can offer the potential for automation in some cases. A good recycling system is also important to capture drainage water and supplement supply to reduce irrigation time.

## Site preparation

Early site preparation is important for successful establishment. Preparation should begin in autumn to get a level field with even slope and no hollows where

water will lay. Rebuild banks and clean out toe furrows to ensure quick drainage as this is critical during rice establishment.

Control weeds over winter using herbicides, leaving a firm seedbed to direct drill into. A firm seedbed often cracks along drill rows, improving emergence in crusting soils.

## Seed placement

Uniformity of seed depth is important as it is difficult to control weeds and manage irrigation timings when seeds are sown at variable depths and emerge at different times. Disc seeders often give superior seed placement and depth control compared to tined seeders in these dry seeding situations (Figure 1).

**Figure 1: Disc seeders provide better uniformity in seed placement depth.**



For most soil types seed should be sown at 30 mm depth. If too shallow the soil around the seed dries quickly and the field will need additional flush irrigations for successful establishment.

On crusting soils, the seed may need to be sown 40 to 50 mm deep in order to be below the dry crust layer. It is not recommended to sow deeper than 50 mm as it will be difficult for the seedlings to push through the soil and emerge.

### **Sowing rate**

Sow rice seed at the rate recommended for the variety being grown (see NSW DPI rice variety growing guides). Lower seed rates can often produce adequate plant numbers when sown into a good seed bed at an accurate and uniform depth, but may result in insufficient plants when used in difficult establishment conditions.

### **Row spacing**

Research has shown no reduction in yield when row spacing is increased from 18 cm (7") to 27 cm (10.5"). But, yield decline has been observed at 36 cm (14") row spacing. As the width between the rows increases, any gaps in the plant row reduces yield, as the neighboring rows are too far away to compensate for the gap.

**Figure 2: Rice sown at 30 cm row spacing showing incomplete canopy closure.**



Wide row spacing's restrict canopy closure (Figure 2) which can allow late germinations of grass and aquatic weeds to occur once chemical control periods have been exceeded.

### **Fertiliser at sowing**

It is often valuable to apply a starter fertiliser with the seed at sowing. The phosphorus is important for establishment and although research has shown the nitrogen will not increase grain yield, it will give some initial boost to seedling vigour. The wetting and drying of the soil associated with the flush irrigations results in much of the nitrogen sown with the seed being lost to the atmosphere.

It is recommended that extra phosphorus and zinc be sown with the seed in areas that have had topsoil removed during landforming operations. Soils deficient in zinc have been found to have problems with seedling survival when permanent water is applied. Coating the seed with a zinc treatment has also been shown to improve establishment in these situations.

### **Herbicide application**

Grass weeds can become a significant problem in drill sown rice. Start by using a knockdown herbicide in August to control any growth. A second knockdown herbicide application may be required just prior to sowing if rainfall has germinated some barnyard grass plants. If these seedlings are not controlled they will grow quicker than the rice and be difficult to control later.

An application of paraquat (Gramoxone®), pendimethalin (Stomp®), clomazone (Magister®) mix after the first flush and before any rice emerges is recommended.

This provides a knockdown for already established weeds and some residual grass weed control (refer to the NSW DPI Rice Crop Protection Guide).

Follow up herbicide applications will be required in most fields. In these situations it is important to ensure herbicides from different chemical groups are used to prevent resistance.

Aquatic weeds often do not need herbicide control in drill sown rice providing sufficient drying has occurred between the flush irrigations to kill the weed seedlings. With traditional row spacings (18 cm / 7"), canopy closure prevents later weed germinations but this may not be the case if wide row spacings are used.

### Irrigation management

#### First flush

Apply the first flush as soon as possible after sowing. Good rainfall following sowing may overcome the need for the first flush irrigation on some soils, however, in most cases a flush irrigation will be required to provide an even germination.

It is important the first flush irrigation is on and off the field as quick as possible to allow potential for future internal soil drainage to occur. If water ponds for an extended period (more than 24 hours after application) oxygen is not available for the seed to germinate and poor establishment could result.

#### Second flush

Timing of the second flush is crucial. It is a balance between managing soil moisture around the seed and having the ground dry enough to traffic spray equipment.

Good surface drainage following the second flush is crucial. Any ponded water needs to be drained from the field within 12 hours of inundation or seedling establishment will be significantly reduced.

Once the rice seedlings have successfully emerged from the soil (Figure 3), the time between flush irrigations can be extended. It is useful to dig into the soil and check the moisture around the plant roots to determine when to irrigate again.

**Figure 3: Rice seedlings just emerging from the soil.**



#### Permanent water

Permanent water can be applied any time between the 3 leaf stage and as late as 10 days prior to panicle initiation (PI). The biggest risk involved in delaying permanent water (DPW) is maintaining control of barnyard grass. If grass weeds are not an issue, delaying the application of permanent water is a viable option that provides significant water savings (See NSW DPI Factsheet 1238: Delaying permanent water for drill sown rice).

Once permanent water is applied water management is the same as for aerial sown crops. Maintain water coverage to reduce subsequent weed germinations and then increase water depth after PI to ensure

deep water (minimum 25 cm on high side of bay) over the microspore period.

## Nitrogen management

### Pre-permanent water nitrogen

The most efficient time to apply nitrogen fertiliser to drill sown rice is onto dry soil immediately prior to permanent water (Figure 4). It is important the soil surface (minimum top 2 cm) is dry for the nitrogen to move into the soil, otherwise much will be lost from the ponded water into the air.

The rates of nitrogen (urea) applied prior to permanent water in drill sown rice are similar to the rates that would be drilled into the soil pre-permanent water for aerial sown rice (see NSW DPI rice growing guides for each variety).

**Figure 4: Spreading urea onto dry soil prior to permanent water is very efficient.**



Any area of the field that has had topsoil removed during landforming may need to have extra nitrogen applied. Unless topsoiled, deep cut areas may require up to twice the rate of nitrogen that was applied to the non-cut areas of the field. Deep fill areas also often require extra nitrogen because sub-soil from the deep cut areas is commonly placed in the deep fill areas.

### Panicle initiation nitrogen

It is important to sample the crop at PI for the NIR Tissue Test to determine if further nitrogen is required.

Use a ruler or pre-cut length of stick to sample rows at each of the nine sampling sites. The length of row sampled will vary depending on the row spacing width. A table outlining the length of row that needs to be sampled for different row spacing's, can be found in the 'NIR Tissue Test crop sampling instruction sheet' available from NSW DPI or Sunrice.

### More information

NSW DPI Rice crop protection guide 2018-19.

NSW DPI Factsheet 1238: Delaying permanent water on drill sown rice.

NSW DPI Factsheet 1112: Rice variety guide 2018-19

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