

DPI Primefact

Straighthead in Australian rice crops

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Straighthead is a physiological disorder of rice that causes floret sterility and reduced grain yield. The symptoms are only obvious at panicle emergence, and it is often confused with cold-induced sterility, particularly in less severe cases.

Although there is no known cause of straighthead, it is thought to be related to soil conditions induced by permanent flooding. It is not seed-borne or transmitted around the farm.

Identifying straighthead

Panicles without the weight of filled grains remain erect (Figure 1). The florets in the worst cases are distorted and can show the characteristic symptom termed 'parrot beaking', particularly in long grains. Florets are sometimes completely missing. In extreme situations, panicles get caught in the boot or do not emerge. There is no set pattern to its occurrence – it can affect a whole field, just a few bays or only a small area in a crop.

Why is straighthead important?

Straighthead has been recorded in NSW rice crops since the 1960s. In 2007 it was estimated that straighthead was costing the rice industry over \$1M per year in lost yield. This could be an underestimation as the true extent of straighthead is unknown because it is often confused with cold temperature-induced sterility.

Where does straighthead occur

Straighthead has been found throughout all rice-growing areas in southern NSW, but it is more prevalent in the Murray Valley. It can occur in various soil types and rice crops grown after periods of legume pasture.

Applying excess organic matter is also known to induce straighthead. Therefore, incorporating stubble before rice growing should be avoided on soils with a history of Straighthead.

Some rice varieties are more susceptible to straighthead than others. Crop losses can range from 10–30% and be as high as 90% in some long grain varieties such as Langi and Doongara. Short grain varieties such as Koshihikari and Opus[®] are also susceptible.



Figure 1. Normal (left) and straighthead affected panicles (right).

Low N areas of the rice crop are more likely to develop straighthead.

Hot weather during establishment and early vegetative growth can often exacerbate the condition due to warm water containing less dissolved oxygen.

The use of arsenical herbicides or insecticides on fields where flooded rice is grown has historically been shown to induce straighthead symptoms in rice.

Straighthead-like symptoms can sometimes be seen along the edge of bays due to overspray when spraying banks with knockdown herbicides. This is not true straighthead.

Options to manage straighthead

Drying of the soil mid-season allows the soil to change from an anaerobic to an aerobic state, which has been shown to reduce straighthead. This can be achieved by mid-season draining or using delayed permanent water (DPW), where the soil is aerobic up to applying PW just before panicle initiation (PI).

Mid-season draining

Draining and drying the field re-aerates the soil, helping to reduce straighthead. Remove all surface water from the field during the late vegetative growth period. Allow the soil to dry until the crop shows signs of moisture stress ([Figure 2](#)) before re-applying the water. The time between draining and rewatering is 10–14 days, but will vary with soil type and weather conditions. Ideally, water must be back on the crop 10 days before PI, so draining should begin in early December.



Figure 2. A rice crop that is moisture-stressed by a mid-season drain.

Delayed permanent water

Delayed permanent water is an irrigation management practice where the crop is sown and initially managed the same as a conventional drill sown crop, but PW is not applied until the late-tillering stage. This keeps the soil aerobic for much of the crop's vegetative period and much longer than for aerial or conventional drill sown rice. Permanent water should be re-applied at least 7 days before PI. Refer to NSW DPI Primefact 1238: [Delaying permanent water on drill sown rice](#) for more details.

Nitrogen

Straighthead is more prevalent in low N areas of the crop, e.g. combine misses. This is the opposite of cold-induced sterility, thus often alerting growers to the presence of straighthead in their crops.

Applying a large proportion of the crop's total N fertiliser requirement before PW is a good way of reducing the effect of straighthead. If growing Koshihikari, be careful not to increase lodging by applying high rates of N pre-PW.

Varietal selection

It is recommended that known straighthead-susceptible rice varieties are not grown on soils that have a history of straighthead. The long grain varieties Langi and Doongara and the short grain varieties Koshihikari and Opus[®] are known to be more susceptible to straighthead and should be avoided.

More information

Dunn B. 2023. Delaying permanent water on drill sown rice. Primefact 1238, third edition. NSW Department of Primary Industries. <https://www.dpi.nsw.gov.au/agriculture/broadacre-crops/summer-crops/rice-agronomy/dpw>

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