

Straighthead in Australian rice crops

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Straighthead is a 'physiological' disorder of rice which 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. 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 all together. In extreme situations panicles get caught in the boot or do not emerge at all. 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.

Figure 1: Straighthead affected panicle



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 one million dollars per year in lost yield. But this could be an underestimation as the true extent of straighthead occurrence is unknown because it is often confused with cold temperature induced sterility.

Where does Straighthead occur

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

The application of excess organic matter is also known to induce straighthead.

Therefore incorporation of stubbles prior to rice growing should be avoided on susceptible soil types.

Some rice varieties are more susceptible to straighthead than others. Crop losses can range from 10-30% in medium-grain varieties 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.

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

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

Low nitrogen areas of the rice crop are more prevalent to straighthead occurrence.

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 occurrence. This can be achieved by mid-season draining or practicing delayed permanent water management, where the soil is aerobic up to the application of permanent water just prior to panicle initiation.

Mid-season drain

Draining and drying the field re-aerates the soil helping to reduce the problem. 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 before re-applying the water. The time between draining & rewatering is commonly 10-14 days, but will vary with soil type & weather conditions. Ideally, water needs to be back on the crop 10 days prior to panicle initiation, so draining should begin in early December.

Delayed Permanent Water

Delayed permanent water is an irrigation management practice where the crop is sown & initially managed the same as a conventional drill sown crop, but permanent water is not applied until the late-tillering stage. This keeps the soil in an aerobic state for much of the crops vegetative period and much longer than for aerial or conventional drill sown rice. Permanent water should be re-applied at least 7 days before panicle initiation. See

NSW DPI Primefact on delayed permanent water for more details.

Figure 2: Rice crop moisture stressed prior to delayed permanent water application



Nitrogen

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

Applying a large proportion of the crops total nitrogen fertiliser requirement prior to permanent water is a good way of reducing the impact of straighthead.

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 & Doongara and the short grain varieties Koshihikari and Opus are known to be more susceptible to straighthead.

This information can be found in the current NSW DPI Primefact: "Rice variety guide".

More information

NSW DPI Primefact 1238: Delaying permanent water on drill sown rice

NSW DPI Primefact 1112: Rice Variety guide

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