

Dry sowing and a conflict with ryegrass – a methodical and measured approach

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Take home messages

- Dry sowing before the break limits the possibility of broad spectrum herbicide control of early germinating weeds
- Annual ryegrass is very competitive if it emerges before or with the crop. Delaying sowing until the first flush of weed seedlings have emerged to allow an effective knockdown with a broad spectrum herbicide is pivotal when sowing into paddocks with a high ryegrass seed bank
- The seed rate and consequently the plant density will most likely not create conditions where the rapid early growth of Revenue will out compete the germinating ryegrass. In this case, the density of plants does not play a significant role in the outcome of weed suppression
- Application of IBS herbicides (Sakura, Avadex Xtra) lose weed kill effectiveness with extended periods of hot weather and minimal rainfall

Background

With dry sowing there is always the risk of a false break where a sowing window is not followed by effective rain to sustain plant growth. The difficult task is to be able to quantify and define when the break arrives. Is there a magical equation to determine the amount of rainfall against temperature, evaporation, and soil type to enable consistent crop germination and early biomass production? Most likely there is not, however the promotion of early establishment has its benefits.

The high yielding late maturing dual purpose winter wheat Revenue has been a secure and profitable wheat variety for grain production in the south western high rainfall zone. The issue that transcends the fears of most producers with an early sown wheat crop is the risk of frost damage after flowering. Ensuring the plant flowers in the optimal period is the principal factor concerning yield and water-use efficiency. The innate characteristic of winter wheat varieties is to favour vernalisation over a photoperiod requirement, causing the plant to refrain from flowering until it has reached a certain quota of cold hours (approx 4-18 °C). This requirement allows the possibility of early sowing and doesn't have an adverse effect on the timing of flowering. A valuable asset of Revenue is the excellent resistance to current strains of stem, stripe, and leaf rust. With early sowing and a longer growing season, there is going to be an increased risk of *Septoria tritici* through suitable conditions of suitable moisture and temperature. The fact is there are not many wheat varieties available that have sufficient resistance to deter *Septoria* infections, with most expressing moderate susceptibility to susceptible rating. Without a seed dressing or a foliar fungicide the risk of chlorosis or necrosis from a fungal infection is greatly increased. The benefit of Revenue is the option of defoliation through grazing or the application of a foliar fungicide to maintain green tissue and photosynthetic activity.

Dry sowing trade-off

The gamble between sowing dry early and waiting for the break is a risk a small percentage of farmers are willing to take. The possibility of starting the growing season early is an enticing plan with the benefits more often than not resulting in extra grain yield at harvest time and reduced stress concerned sowing when the break arrives. An April or early May start is ideal for a long season winter wheat like Revenue as it permits growth before the cooler temperatures and water logging limit the plant's capacity for nutrient uptake. As a result of early sowing there are limitations to the available control of germinating weeds with the first rainfall. Sowing into weedy paddocks is a major dilemma as there is very little opportunity to achieve an effective pre-sowing knockdown. Sowing the crop dry allows for increased yield potential and a wider sowing window but the target paddocks must be clean. The "no seed no weed" policy has been drilled into producers for years and the recent push towards an integrated weed management strategy has presented a great opportunity to early sow long season cereal cultivars. The question is can the initial growth and vigour act as a contender against the army of rapacious ryegrass at Lake Bolac? The jury is out on whether a high seeding rate functions to compete against the grass weeds and be consolidated into high yield at the end of the season. But one thing is for sure – SFS was going to find out.

Method

The trial was located at the SFS Lake Bolac research site. With the annual ryegrass pressure being notoriously high at the site it was the perfect opportunity to investigate the effectiveness of weed control techniques using herbicide treatments and crop population. Revenue was sown on three different dates in April, May and June using the SFS cone seeder on 20 cm row spacings using 2.5 cm knifepoints. All plots received Sakura, Avadex Xtra, and Roundup via pre sowing and IBS treatments at their respective sowing dates. All seed was treated with Dividend and Emerge to protect against early disease and insect pressure.

Nine different treatments were included in the trial consisting of two variables - sowing rate and time of sowing as listed in Table 1.

Table 1. Treatments used in the trial at Lake Bolac

Trt No.	Treatment Name
1	17 th April x Density 100 pl/m ²
2	17 th April x Density 150 pl/m ²
3	17 th April x Density 200 pl/m ²
4	30 th May x Density 100 pl/m ²
5	30 th May x Density 150 pl/m ²
6	30 th May x Density 200 pl/m ²
7	28 th June x Density 100 pl/m ²
8	28 th June x Density 150 pl/m ²
9	28 th June x Density 200 pl/m ²

It's about time

At the Lake Bolac site the spotlight was on the battle against ryegrass. With the declining effectiveness of Group A and B herbicides through resistant ryegrass strains, the focus on IBS herbicides was closely observed. The efficacy of IBS Sakura and Avadex Xtra combination was put to the test on the 17th of April as it lay in the soil in hot and dry conditions for over a month without substantial rainfall. These IBS herbicides require significant rain after application for the constituents to incorporate into the weed-seed zone. Sakura is known to be stable in sunlight without rain for up to three weeks however the break didn't arrive until the middle of May. Bayer explains that Sakura works best if there is sufficient rainfall within 10 days after the application for successful integration into the soil and enable the uptake by germinating weeds. A considerable decline in ryegrass numbers was seen from the first time of sowing to the second time of sowing on the 30th of May. The knockdown and residual herbicides succeeded in the endeavour to reduce weed establishment in between the 20 cm row spacing of wheat. A 451% decrease in weed numbers was seen between the first and second time of sowing. A further decrease in weed numbers is visible with the latest time of sowing on June 28th which is likely due to a valuable pre-crop emergence knockdown and victorious residual herbicide action. However, the Revenue variety being a long season winter wheat experienced a notable yield decrease as a result of its late sowing. These results are displayed in Figure 1.

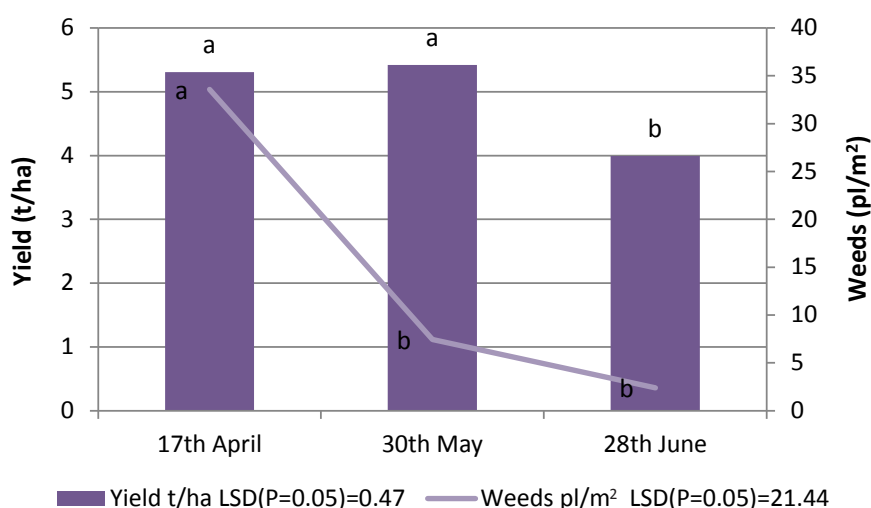


Figure 1. Mean yield (t/ha) and weed population (plants/m²) of April, May, and June sowing dates of wheat (cv. Revenue) at Lake Bolac. There was a significant drop in yield at the third sowing date, but a much higher weed population in the earliest sowing due to ineffective chemicals and no knockdown opportunity. Analysis performed on log transformed weed numbers. Treatments with the same letter do not significantly differ (P=0.05, LSD).



Figure 2. The observable difference in weed numbers between in TOS1 (left) to TOS2 (right) show the value of a successful pre sowing knockdown and effective IBS application of Sakura and Avadex Xtra. Photos taken 23/7/13.

It's not about how much

Now that the crop has established what direct effect did the plant density have on the weed suppression? Although crop varieties are being bred for their rapid early grow as an offensive weed control strategy, the rate of sowing has very little effect on weed suppression. When ryegrass numbers (plants/m²) are compared to sowing rate, the burden of weeds remained relatively consistent (Figure 3). The fact is that plants spaced on 20 cm rows are more like to compete against each other than have a considerable impact on ryegrass suppression. No statistical difference is observable between the three rates of sowing, with weed numbers averaging between 8-10 weeds/m². This is illustrated in Figure 3 where there is little disparity between yields based on the seeding rate. Although a rate of approximately 160 plants/m² is ideal, the excellent tillering properties of Revenue allowed the plants to fill any gaps in the canopy and consequently have delivered comparable yields at the end of the season.

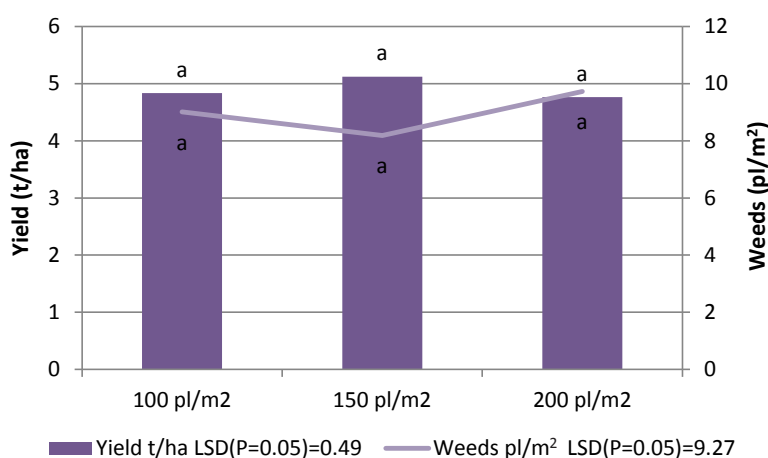


Figure 3. Mean yield (t/ha) and weed population (plants/m²) of April, May, and June sowing dates of wheat (cv. Revenue) at Lake Bolac. There was no effect of sowing rate on final grain yield or weed numbers. Analysis performed on log transformed weed numbers. Means followed by the same letter do not significantly differ (P=0.05, LSD)

Summary

So, how do we combat the weed situation in a dry sown crop? The first choice would be to select a paddock with a known low weed burden and residual seed bank. An individualised calculation of each paddock on weed burden, group A and B herbicide resistance, and prior herbicide uses will provide an indicator on how effective a dry sown crop will be for the following growing season. As in all things agricultural, there is no silver bullet to solve all problems. The build-up in the number of herbicide resistant biotypes has been increasing since the early 1970s when herbicide use became widespread. One chemical might have an excellent result on ryegrass, however too much of a good thing can lead to the operational ineffectiveness of the active ingredient. Resistance to Group J and K herbicides has not yet been found and if used with correct practice it will prolong the useable life of the product. Sub-lethal doses and improper integration into the soil surface could lead to rapid evolution of a resistant population of ryegrass. Everywhere you use the same herbicide repeatedly, you will be selecting for the survival of those weed genotypes that are resistant to the herbicide. If there is a low categorical analysis of weed burden in a paddock then the option to dry sow is viable, and if mother nature cooperates, the reward from a long season winter wheat are there for the taking.