Demonstrating the relative effects of different cultural control strategies against Italian rye-grass *(Lolium multiflorum)*

Centre: East Malling

Objectives

- Demonstrate and quantify the relative effect of drilling date and cultivation strategy for the control of Italian rye-grass *(Lolium multiflorum)*

Summary

- Delaying drilling, to either late autumn or the spring, is an effective management technique to reducing Italian rye-grass populations, although herbicides are still an essential management tool
- The use of the plough is extremely effective in reducing the density of Itlaian rye-grass
- There is an interaction between these two cultural techniques, whereby a reduction in tillage requires a greater delay in the timing of the crop establishment. E.g. to spring
- Herbicides, when applied as part of a robust programme, are still effective at controlling Italian rye-grass, with a weak relationship present across the matrix of cultural control.

As a predominantly autumn emerging weed, with a similar germination to black-grass, it is common for similar cultural control strategies to be used against Italian rye-grass; namely delaying of autumn drilling, and using the plough when high seed return is expected. An un-replicated matrix of these two cultural control methods was set up to explore the validity of this approach, and if not then where the reaction between the species differed.

Overlaying the cultural element, a robust herbicide programme was applied on split plots to explore the interaction between the cultural elements with the chemical elements. In black-grass, it is observed that by delaying drilling there is the two-fold advantage of lower weed germination and improved efficacy of the herbicides used.

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Trt	Cultivation	Crop	Herbicide
1	Ploughed	Winter Wheat (Sept Drilled)	Untreated
2	Ploughed	Winter Wheat (Sept Drilled)	Treated
3	Deep Non-inversion	Winter Wheat (Sept Drilled)	Untreated
4	Deep Non-inversion	Winter Wheat (Sept Drilled)	Treated
5	No-till	Winter Wheat (Sept Drilled)	Untreated
6	No-till	Winter Wheat (Sept Drilled)	Treated
7	Ploughed	Winter Wheat (Oct Drilled)	Untreated
8	Ploughed	Winter Wheat (Oct Drilled)	Treated
9	Deep Non-inversion	Winter Wheat (Oct Drilled)	Untreated
10	Deep Non-inversion	Winter Wheat (Oct Drilled)	Treated
11	No-till	Winter Wheat (Oct Drilled)	Untreated
12	No-till	Winter Wheat (Oct Drilled)	Treated
13	Ploughed	Spring Wheat	Untreated
14	Ploughed	Spring Wheat	Treated
15	Deep Non-inversion	Spring Wheat	Untreated
16	Deep Non-inversion	Spring Wheat	Treated
17	No-till	Spring Wheat	Untreated
18	No-till	Spring Wheat	Treated

Table 1. Table of treatments

Operation	**Date**	**Relative to drilling date (days after)**
September drilled	02/10/18	0
September pre-em	04/10/18	2
September post-em	02/11/18	31
October drilled	22/10/18	0
October pre-em	22/10/18	0
October post-em	30/11/18	39
Spring drilled	27/03/18	0
Spring pre-em	27/03/19	0
Spring post-em	29/04/19	33

Table 2. Dates of major events

Results

In this trial, the same broad principles from black-grass management were observed. A reduction in the tillage intensity was associated in increasing density of Italian rye-grass. In the worst-case scenario (early autumn drilled), weed density was reduced by 54% when compared to the direct drill. The cultivation history of the land on which this trial was carried out was deep non-inversion, and more latterly, no-till, so this result indicates the effectiveness of rotational ploughing, as opposed to using this method of crop establishment regularly.

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Shifting drilling date into a later autumn slot was effective in reducing weed density; however, there was a strong interaction with establishment technique. Delaying drilling into the autumn was most effective where ploughing was carried out, whereas where plots were either direct drilled, or established with a non-inversion method, there was greater merit in switching to a spring cropping system.

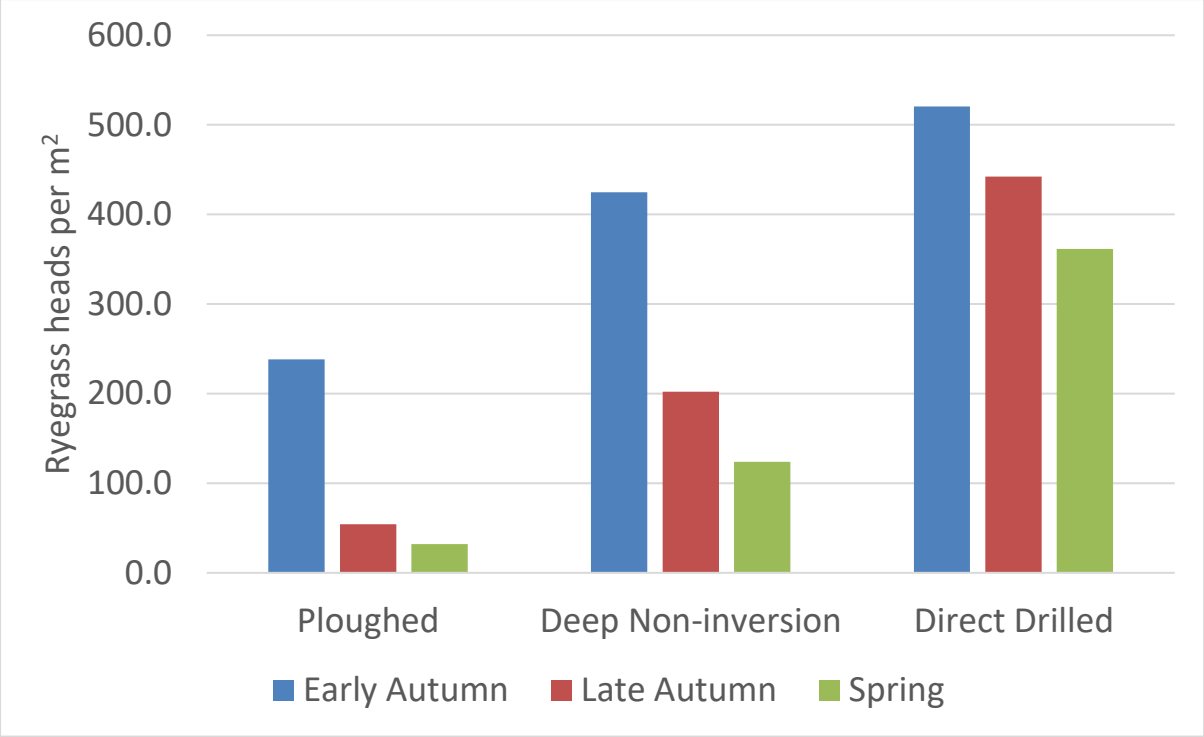

Figure 1. Density of Italian rye-grass heads

Overall, the robust herbicide programme used here was successful at controlling the weed population, although a range of 76.3%-100% existed across all treatment combinations. The strong effect of cultivation makes it difficult to fully appraise the effect of herbicide across cultivations, as the starting point (potential for weeds to emerge) was much higher as cultivation intensity decreased. It is possible to pool the results across the cultivations and look solely at the establishment timing (figure 2.). In this respect, control associated with herbicide was significantly greater when herbicide was applied in the late autumn. The herbicide was built around strong residual chemistry, which remains active in the soil for longer when soil moisture is high and solar UV is low. The conditions in late autumn are more optimal for herbicide efficacy than in either the early autumn, or the spring.

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Pre-em Products	Pre-em Actives	Post-em Products	Post-em Actives
Liberator (0.6 l/ha) + Defy (4.0 l/ha)	Flufenacet (240 g ai/ha), diflufenican (60 g ai/ha) and prosulfocarb (3200 g ai/ha)	Atlantis OD (1.2 l/ha), Stomp Aqua (2.6 l/ha) and BioPower (1.0 l/ha)	

Table 3. The products and active ingredients for the herbicide applications

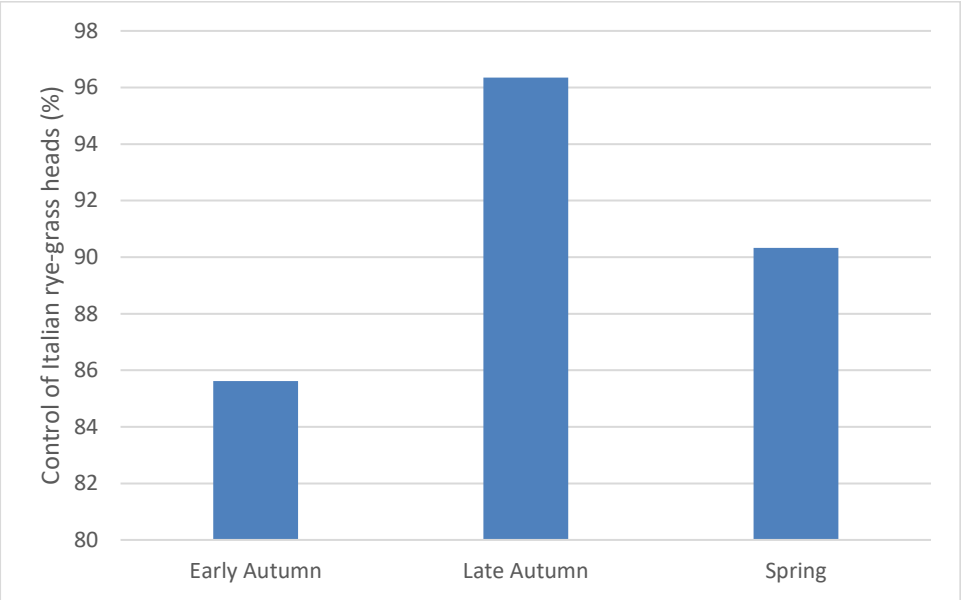

Figure 2. The control from the herbicide programme for each drilling date, pooled across all cultivation strategies

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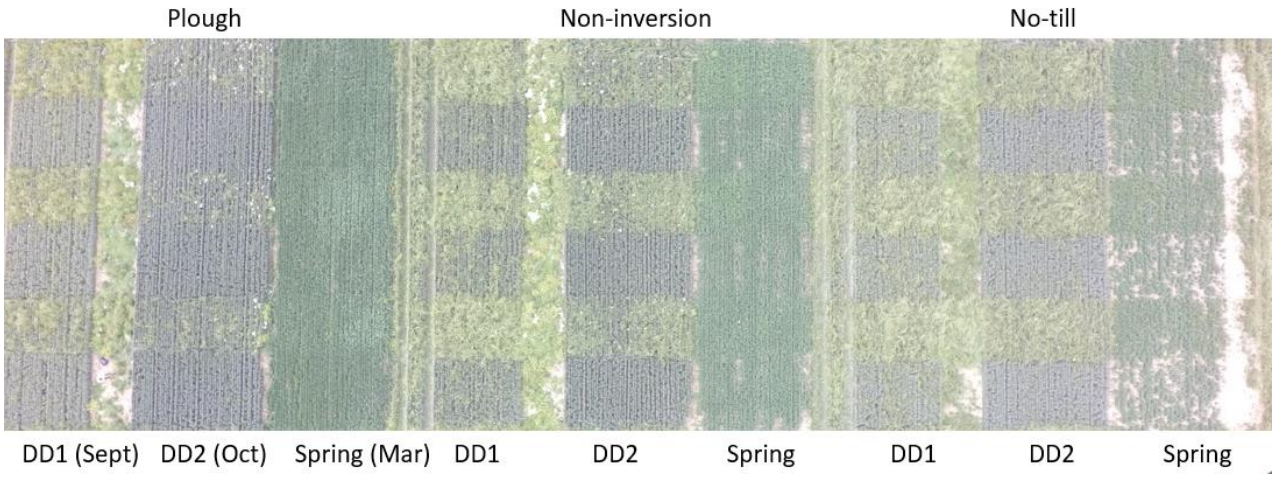

Figure 3. A drone image of the trial. The herbicide was applied in alternating strips horizontally across the trial

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