# Durum agronomy – improving grass control in durum

Durum Weed Agronomy Project, funded by SAGIT in association with SA DGA

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**Key findings**

- Fathom barley was more competitive than Hindmarsh barley, bread wheat and durum
- New durum variety Tjilkuri was no more competitive with ARG than older variety Tamaroi
- Increasing seeding rate reduced ARG head density and increased grain yields in all durum varieties; low seeding rates led to large numbers of ryegrass heads
- Narrower row spacing increased yield and reduced ARG head density in durum
- Early applied N improved early vigour, and reduced ARG head densities, but led to yield penalties due to induced moisture stress

**Why do the trial?**

There are now limited safe and effective herbicide options in durum. Older durum varieties have typically been less competitive with annual ryegrass (ARG) than bread wheat and barley. The trial at Hart in 2012 aimed to evaluate the relative the weed competitiveness of barley, bread wheat, and durum against annual ryegrass grown under different management practices including seeding rate, nutrition, variety, and row spacing.

**How was it done?**

**Plot size:** 1.4m x 10m

**Seeding date:** 30th May 2012

**Fertiliser:** DAP (18:20) + 2% Zn @ 70kg/ha

**Post emergent nitrogen:** 50kg N @ GS31

The trial was a randomised complete block design consisting of 3 replicates, and 15 treatment combinations designed to compete with annual ryegrass (Table 1). The trial was sprayed with a knockdown at sowing and pre spread with annual ryegrass to establish a consistent level of ryegrass across the site.

*Table 1. Treatment combinations of crop type, variety, seeding rate, and additional management used to compete with ryegrass at Hart 2012.*

| Treatment | Crop | Variety | Seed rate (seeds/m$^2$) | Management change |
|---|---|---|---|---|
| **1.** | **Durum** | ***Tamaroi*** | ***200*** | ***Standard (traditional practice)*** |
| ***2.*** | | ***Tjilkuri*** | ***200*** | ***Standard (traditional practice)*** |
| *3.* | | Tamaroi | 100 | Lower seed rates |
| *4.* | | Tjilkuri | 100 | Lower seed rates |
| *5.* | | Tamaroi | 300 | Higher seed rates |
| *6.* | | Tjilkuri | 300 | Higher seed rates |
| 7. | | Tamaroi | 200 | Extra N upfront (20kg N IBS) |
| 8. | | Tjilkuri | 200 | Extra N upfront (20kg N IBS) |
| 9. | | Tamaroi | 200 | Narrow row spacing (11.5cm) |
| 10. | | Tjilkuri | 200 | Narrow row spacing (11.5cm) |
| 11. | | Tjilkuri | 200 | High vigour seed (large seed size>2.8mm) |
| 12. | Barley | Fathom | 150 | Standard |
| 13. | | Hindmarsh | 150 | Standard |
| 14. | Bread Wheat | Scout | 200 | Standard |
| 15. | | UoA Competitive Line | 200 | Standard |

**Results**

**Annual Rye Grass**

The treatments had no significant effect on the initial density of the pre spread annual ryegrass, across the trial site each plot had on average 72 ARG plants per square metre (Table 2).

**Crop plant density**

Crop plant densities differed between treatments. Fathom and Hindmarsh barley established similarly and close to their target density of 150 plants per square metre. Both bread wheats Scout and the UoA competitive line established at 176 plants per square metre. Plant densities in the standard treatment for durum were on average 170 plants per square metre (200 seeds per square metre), decreased by approximately 90 plants per square metre at the lower seeding rate, and increased by 50 plants per square metre at higher seeding rates (300 seeds per square metre). All other durum treatments established similarly to the standard treatment (Table 2).

*Table 2. The effects of management combinations on plant density, ARG density, ARG head density (maturity), and crop grain yield.*

| | Treatment | Crop density (Plants/m$^2$) | ARG plant density (Plants/m$^2$) | ARG head density (Heads/m$^2$) | Grain yield (t/ha) |
|---|---|---|---|---|---|
| ***1*** | ***200$_{sd/m^2}$ Tamaroi (standard)*** | ***175.7*** | ***67.0*** | ***85.2*** | ***0.70*** |
| 2 | 200 $_{sd/m^2}$ Tjilkuri | 163.0 | 75.9 | 96.1 | 0.63 |
| 3 | 100 $_{sd/m^2}$ Tamaroi | 89.7 | 78.2 | 160.0 | 0.62 |
| 4 | 100 $_{sd/m^2}$ Tjilkuri | 87.9 | 70.7 | 130.1 | 0.66 |
| 5 | 300 $_{sd/m^2}$ Tamaroi | 228.3 | 76.5 | 56.6 | 0.97 |
| 6 | 300 $_{sd/m^2}$ Tjilkuri | 237.0 | 73.5 | 72.9 | 0.96 |
| 7 | Tamaroi (narrow rows) | 155.4 | 64.6 | 55.9 | 0.78 |
| 8 | Tjilkuri (narrow rows) | 150.4 | 67.3 | 84.5 | 0.97 |
| 9 | Tamaroi (early N) | 147.7 | 77.1 | 58.7 | 0.42 |
| 10 | Tjilkuri (early N) | 152.6 | 79.2 | 77.7 | 0.45 |
| 11 | Large seeded Tjilkuri | 183.5 | 69.4 | 75.0 | 1.26 |
| 12 | Fathom | 154.0 | 62.4 | 39.6 | 3.28 |
| 13 | Hindmarsh | 139.9 | 68.0 | 75.0 | 2.85 |
| 14 | Scout | 176.8 | 83.7 | 113.1 | 1.53 |
| 15 | UoA competitive Line | 176.1 | 66.7 | 50.5 | 1.20 |
| | **Site mean** | 161.2 | 72.01 | 82.06 | 1.16 |
| | **LSD 5%** | 21.1 | NS | 13.2 | 0.27 |

**Competitiveness - Weed suppression and tolerance (grain yield)**

Overall, barley was the most competitive, with Fathom barley more competitive than the erect, short variety Hindmarsh. Fathom barley resulted in the greatest suppression of ryegrass at 39.6 heads per square metre and yielded highest in the presence of ryegrass, at 3.28t/ha. Hindmarsh allowed almost twice the number of ARG heads observed in Fathom, and yielded 0.43t/ha less (Table 2).

The bread wheat Scout was less competitive than barley and the standard durum treatments, but yielded 0.75t/ha higher than durum. The Adelaide University competitive line yielded 22% lower than Scout but suppressed ryegrass comparably to Fathom barley, a significant improvement over Scout and the standard durum treatments (Table 2).

Compared to the standard treatment, additional management changes improved the competitive ability of both durum varieties. Reducing the seeding rate to 100 seeds per square metrre did not result in a yield penalty, however ryegrass head numbers increased by 50%. Increasing the seeding rate to 300 seeds per square metre improved yields in both durums by 0.3t/ha and reduced ryegrass head numbers by more than 35% (Table 1 & Figure 1).

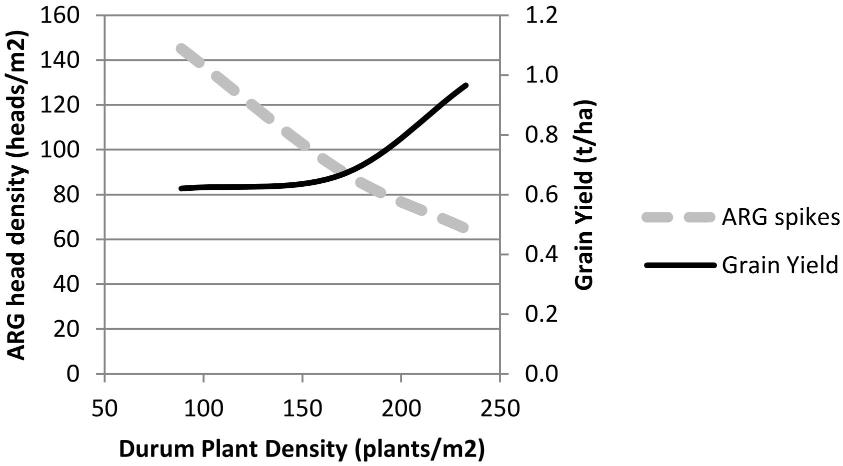


*Figure 1: The fitted relationship between durum crop plant density (plants/m2) and ARG head density (heads/m2) and grain yield (t/ha) averaged across all durum varieties in selected treatments (1-6) at Hart 2012.*

Sowing durum at 200 seeds per square metre into narrow row spacings resulted in greater suppression of ryegrass, achieved similar yields in Tamaroi, and improved yields in Tjilkuri. While early application of N led to reduced ryegrass heads, it was detrimental to yield due to a dry spring and severe crown rot. The larger seeded Tjilkuri improved yield by 0.59t/ha compared to the standard and achieved similar rye grass suppression to the higher seeding rate (Table 2).

### Discussion

Moisture stress in spring along with severe crown rot infection across this trial site meant conditions were unfavourable for durum production; the relative yields of barley (3t/ha), bread wheat (1.5t/ha), and durum (0.9t/ha) reflect commercial experience with durum under these conditions.

The trial demonstrated durum to be less competitive than barley but no less than bread wheat. New durum variety Tjilkuri was no more or less competitive than older variety Tamaroi. Compared to the current practice of sowing durum at 200 seeds per square metre, increasing the seeding rate reduced ARG head density and increased grain yields. In addition, where practical narrowing row spacing and selecting larger seed may be viable options for growers to increase crop competition and improve yields in the presence of ryegrass.

Suggestions that lowering seeding rates may reduce yield losses from moisture stress were not supported; higher seeding rates were favoured even in the presence of ryegrass and in drought conditions. Consistent with other agronomic trials, early applied N improved early vigour and reduced ARG head densities, but predisposed durum to yield penalties from moisture stress.

Additional data from other sites and seasons will help to determine the optimal management combination for improved weed competiveness in durum.


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