

Chickpeas: weed competition by variety trial

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Key Findings:

- As in 2007, dry seasonal conditions did not favor chickpea production in 2008 and consequently early maturity and low grain yields were observed.
- Ryegrass competition of 33 plants/m² at maturity reduced grain yields of chickpeas by 48%, and 120 plants/m² reduced grain yields by 82%.
- Genesis079 was the highest yielding variety and is well adapted to short season environments.
- These results confirm previous findings showing chickpeas as a poor competitor, and the unsuitability of control measures such as weed-wiping and crop-topping.

Why do the trials?

To look for chickpea plant types which are more competitive with ryegrass. Traits of particular interest included chickpea height, vigour, maturity and plant architecture (eg branching angle).

How was it done?

Plot size	1.5m x 10m	Fertiliser rate	MAP 2.5% Zn @ 76kg/ha with seed
Seeding date	29 th May 2008	Inoculant	Group N granular
Trial design	RCBD with 3 reps		
Seeding rate (1)	50 plants/m ² (desi and kabuli)		
Varieties (10)	See Table 1		
Treatments (3)	Nil ryegrass	Nil ryegrass (volunteers removed)	
	Low ryegrass	Sown with ryegrass @ 40 plants/m ²	
	High ryegrass	Sown with ryegrass @ 200 plants/m ²	

Table 1: Attributes of varieties included in this trial

	Variety	Early Growth Habit ^a	Early vigour	Canopy Density ^b	Height	Maturity
Kabuli	Almaz	semi-erect	poor	medium	medium	late
	Genesis 079	semi-erect	moderate	medium	short	early
	Genesis 090	semi-erect	good	dense	medium	mid
Desi	CICA503	semi-spread	moderate	medium-thin	medium	mid
	Genesis 509	semi-erect	moderate	thin	medium	mid
	Sonali	semi-erect	good	medium	tall	early
	01482*03HS002	erect	very good	very thin	very tall	mid
	01152-1029	semi-erect	moderate	dense	medium	mid
	01040-1057	erect	good	very dense	tall	mid
	01040-1160-1	semi-erect	moderate	very dense	medium	mid

^a Early growth habit refers to the initial branching angle, where spread denotes prostrate branching and erect denotes upright branching

^b Canopy density refers to the density of the mature canopy, and is important in preventing light penetration

Results

Yield

Due to the dry season, and particularly the severe finish to 2008, chickpea yields were very low, averaging just 0.54t/ha without competition. Competition with ryegrass reduced grain yields by 48% in the low treatment and by 82% in the high treatment (Table 2).

All lines decreased in yield as ryegrass density increased, with the exception of Almaz, which yielded similarly (and poorly) at both low and high ryegrass densities (Figure 1). The early flowering Genesis 079 generally yielded consistently higher in each ryegrass treatment. This is a reflection of both the early maturity and its suitability to short season environments.

Breeder's lines 01040-1057 and 01040-1160-1, and commercial variety Genesis 090 showed the lowest yield loss at the low rate of competition (Figure 2). At the high rate of competition breeder's lines 01040-1057 and 01040-1160-1 were once again the least affected, together with Almaz. This may indicate these varieties are more competitive with ryegrass, however as the dry season suppressed plant growth and expression of variation in growth habit, further research is required in a more favourable season to compare these genetic differences.

Figure 1:

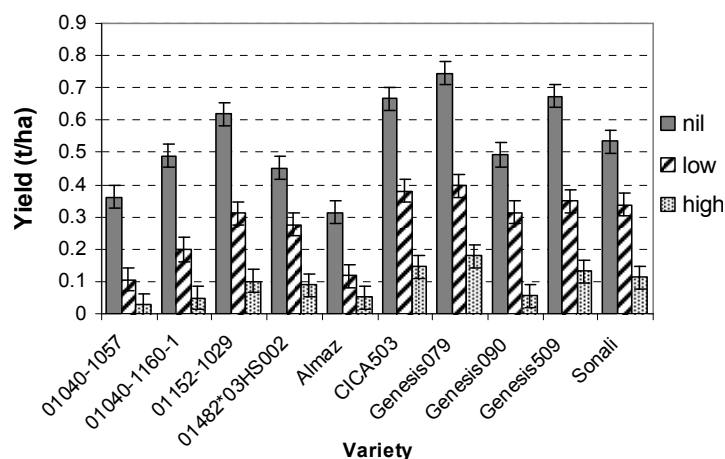


Figure 2:

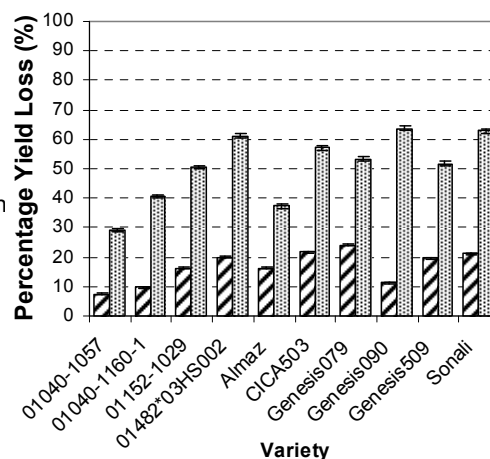


Figure 1: Effect of ryegrass density on the yield of 10 chickpea lines, Hart 2008.

Figure 2: Percentage yield loss of chickpeas under low and high ryegrass densities, Hart 2008.

Table 2: Effect of ryegrass density on various chickpea and ryegrass measurements at Hart, 2008.

Measurement		Ryegrass Density			LSD(0.05)
		Nil	Low	High	
Ryegrass Counts	Plants/m ²	0	33.4	120.5	7.9
	Tillers/m ²	0	138.1	309.5	25.1
	# tillers/plant	0	4.1	3	-
Chickpea Counts (#/m2)	July	48.1	48.2	51.5	ns
	October	49.7	46.7	43.3	3.02
Yield (t/ha)		0.54	0.28	0.095	0.023

Ryegrass counts and tillering

The ability of chickpea lines to suppress tillering in ryegrass was deemed to be one of the most important measurements at the beginning of the trial. However tiller numbers were heavily reduced by the dry season, making comparisons between varieties difficult.

Initial counts (July) were less than target densities, with the low density (target = 40 plants/m²) measuring 33 plants/m², and the high density (200 plants/m²) measuring just 120 plants/m² (Table 2). Comparisons between these two treatments showed that ryegrass tillering was reduced by 27% by the four-fold increase in rye grass plant density.

Almaz showed better tiller suppression than the four breeder's lines, but not more than the other commercial varieties (Figure 3). Findings in 2007 at Turretfield where higher ryegrass tillering and increased chickpea dry matter production occurred showed that Sonali had better tiller suppression than all other varieties tested. Further validation is required of this work.

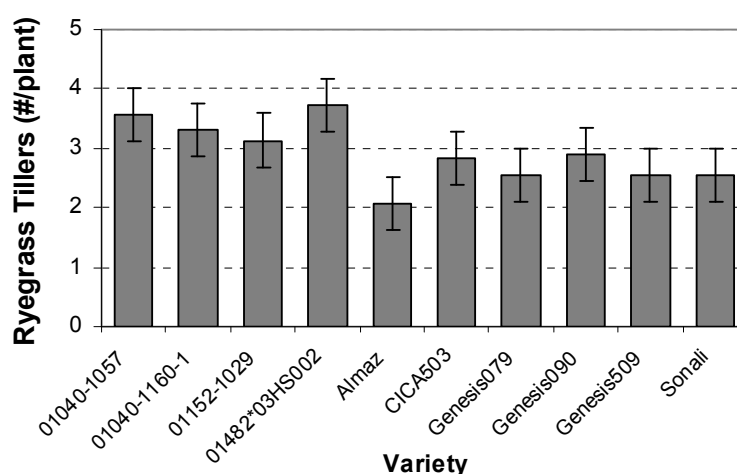


Figure 3: Ryegrass tillering capacity under competition with 10 chickpeas lines, Hart 2008.

Chickpea Density

Initial counts (July) showed no difference in chickpea density between treatments or varieties. There was also no difference in chickpea density between nil and low ryegrass treatments, however thinning of chickpeas was observed at the higher ryegrass density (Table 2), reflecting plant death due to greater competition for soil moisture.

The density of breeder's line 01482*03HS002 was the lowest at the October count, indicating that a greater plant mortality had occurred in this variety. This line was the only chickpea with a combination of erect growth habit and thin canopy, suggesting that this plant type may be less competitive with ryegrass.

Acknowledgements

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