Demonstration of Legumes for Reliable Profitability in the Western Region - Chickpeas, Dalwallinu

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Take Home Messages

- The combined Simazine and Isoxaflutole (Treatment 1) resulted in the lowest early weed counts, with less than 30 weeds per m² at four weeks post emergence.
- Simazine and Isoxaflutole (Treatment 1) had a profound impact on inhibiting Medic growth relative to other treatment styles.
- Application of Isoxaflutole & Terbuthylazine (Treatment 2) completely mitigated all weed species except the medic.

Aim

1. To identify the optimal agronomy for chickpeas, grown in medium to low rainfall zones of northern Western Australia.
2. To address the issue of adequate weed control that impacted the profitability of chickpea crops grown in medium rainfall zones in earlier trials in this project.

Background

The Liebe Group have identified a need to continue to demonstrate legume crops throughout the region and build on the existing momentum developed through this project. The aim of establishing new demonstration sites in 2020 explored the constraints to adoption, as well as demonstrate the agronomy packages available to growers to determine if particular legumes are profitable in their farming system within a different season. Weed control was a significant constraint on chickpea crop performance in 2018/2019. This demonstration aims to explore the agronomic options for weed control through the use of a variety of herbicides treatments.

Trial Details

Trial location	Ian Hyde's Property, Dalwallinu
Plot size & replications	36.6m x 500m x 2 replications
Soil type	Heavy red-brown clay
Paddock rotation	2017 Wheat, 2018 Fallow, 2019 Wheat
Sowing date	15/05/2020
Sowing rate	85 kg/ha Striker Chickpeas
Fertiliser	15/05/2020: 7.05 kg/ha N, 7.2 kg/ha P, 4.6 kg/ha S, 0.05 kg/ha Cu, 0.1 kg/ha Zn 20/07/2020: 1.786 kg/ha $(NH_4)_2SO_3$
Herbicides Insecticides & Fungicides	See treatment list, plus 24/06/2020: 200 g/ha mecoprop-P, 200 g/ha MCPA, 25 g/ha dicamba, 34 g/ha clopyralid, 90 g/ha bromoxynil 20/07/2020: 45 g/ha haloxyfop, 129 g/ha clethodim 24/06/2020: 79 g/ha chlorpyrifos 29/08/2020: 200 g/ha azoxystrobin, 80 g/ha cyproconazole

Treatments

	Treatment
1	Simazine 1.1 kg/ha + Isoxaflutole 75 g/ha PSPE (Control)
2	Isoxaflutole 75 g/ha + Terbuthylazine 750 g/ha pre-emergent
3	Terbuthylazine 1.05 kg/ha + Flumioxazin 90 g/ha pre-emergent
4	Terbuthylazine 1.05 kg/ha + Metribuzin 150 g/ha pre-emergent + Imazethapyr 35 g/ha PSPE

Chemical	Active
Simazine	900 g/kg Simazine
Balance	150 g/kg Isoxaflutole
Palmero TX	75 g/kg Isoxaflutole, 750 g/kg Terbuthylazine
Terbyne Xtreme	875 g/kg Terbuthylazine
Terrain	500 g/kg Flumioxazin
Metribuzin	750 g/kg Metribuzin
Spinnaker	700 g/kg Imazethapyr

Soil Composition

Depth (cm)	pH ($CaCl_2$)	Col P (mg/kg)	Col K (mg/kg)	S (mg/kg)	N (NO_3) (mg/kg)	N (NH_4) (mg/kg)	EC (ds/m)	OC (%)
0-10	7.6	28	625	18	23	8	0.20	0.8
10-20	8.1	11	554	31	26	2	0.31	0.7
20-30	8.1	4	449	53	19	<1	0.53	0.4
30-40	8.3	4	413	72	7	<1	0.63	0.3
40-50	8.5	3	405	54	5	<1	0.62	0.2

Results

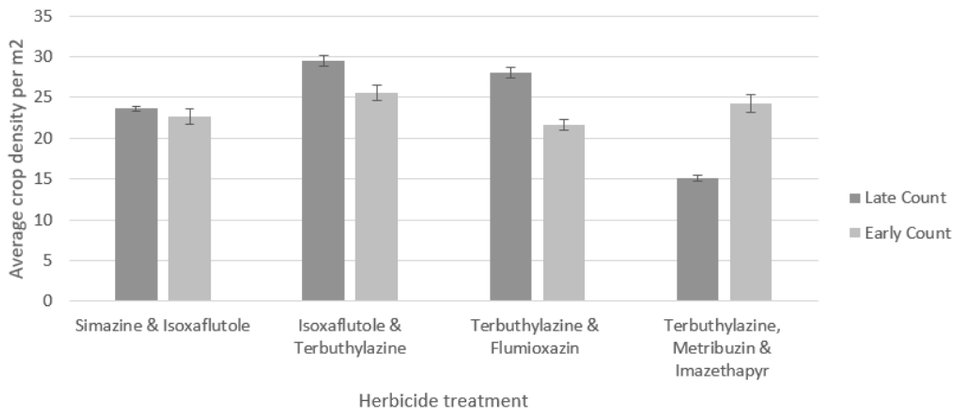

Figure 1: Early (25/06/2020) and late (20/08/2020) crop density (per m²) of PBA Striker Chickpeas in herbicide trial at Dalwallinu in 2020. Error bars are ± 1 S.E.

There was no significant difference in mean Striker Chickpea plant emergence (per m²) between the four herbicide treatment compositions (Figure 1). Large variation was observed within plots. Inconsistencies in seedling emergence frequencies were common amongst the treatment levels. This may be due to the large irregular clods that were observed over the trial plots and the irregular structure of the seedbed.

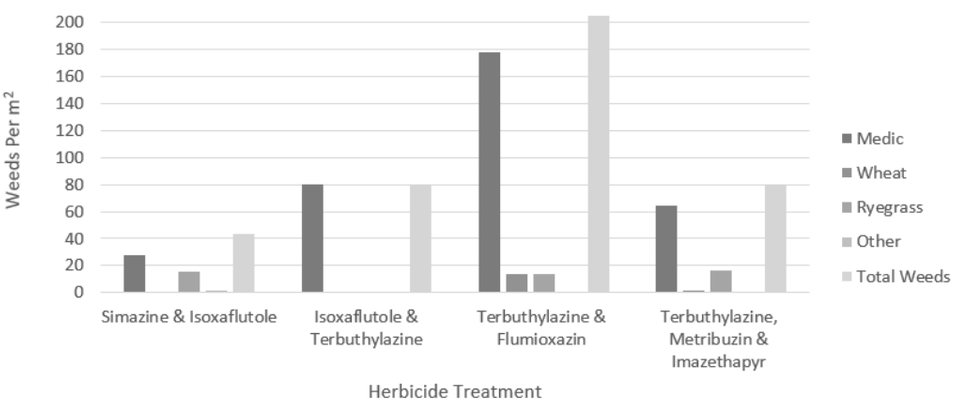

Figure 2: Average weed density (per m²), by weed type, taken on 25/06/2020 and 20/08/2020, relative to each herbicide treatment type.

Weed development was not the same in all treatment types, with average weed count (per m^2) significantly higher when treated with the Terbuthylazine and Flumioxazin combination herbicide. Contrastingly, the application of the Simazine and Isoxaflutole (Treatment 1) resulted in a weed growth frequency of <30 plants/m^2 (Figure 2).

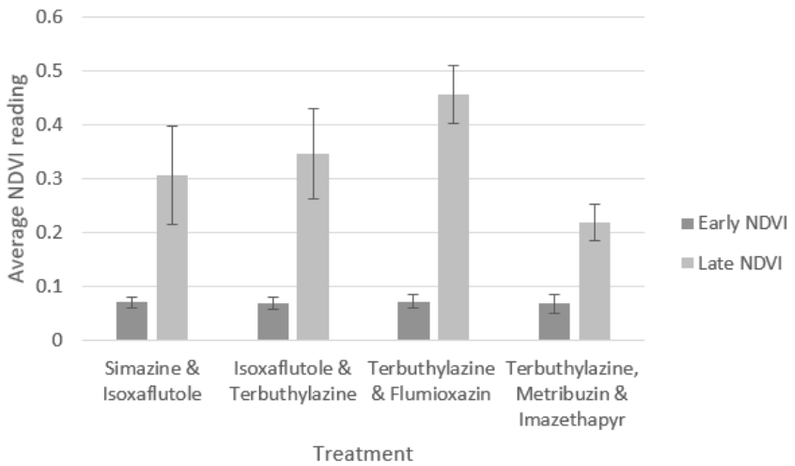

Figure 3: Average Normalized Difference Vegetation Index (NDVI) reading, taken on 25/06/2020, relative to each herbicide treatment type.

Mean NDVI readings (per m^2) were not significantly different between herbicide treatments (Figure 3). All Striker Chickpea plots displayed an average NDVI reading range within 0.003 (0.069-0.072).

Comments

Medic was the most prevalent weed found in all trial plots, regardless of treatment (Figure 2). Application of the Isoxaflutole & Terbuthylazine treatment (2) completely mitigated all weed species except the medic in the observed areas of the Chickpea trial zone. The Terbuthylazine, Metrabuzin & Imazethapyr treatment (4) had a substantial impact on inhibiting Medic growth relative to other treatments.

Differences in crop density and NDVI were not relevant to treatments.

Yield data is not available at time of publication. An update with analysis of yield and a cost-benefit analysis will be published when it becomes available.

Acknowledgements

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Peer review

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