

Lentil, Herbicide Tolerance Group B (SU), HRZ Eyre Peninsula (Yeelanna), South Australia
Lentil, Herbicide Tolerance Group B (SU), MRZ Eyre Peninsula (Tooligie), South Australia
Lentil, Herbicide Tolerance Group B (SU), MRZ South East (Mundulla), South Australia

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Aim

To evaluate Group B herbicide tolerance in lentil XT varieties in response to simulated residues and post-emergent herbicide applications.

Treatments

Varieties: Group B herbicide tolerant varieties (PBA Hallmark XT and PBA Hurricane XT) and a conventional variety (PBA Jumbo2)

Herbicide treatments: Table 1

Chemical (concentration of active ingredient)	Chemical family	Rate of application	Time of application
Metsulfuron-methyl (600 g/kg)	SU ¹	7 g/ha	IBS
Chlorsulfuron (750 g/kg)	SU	12 g/ha	IBS
Triasulfuron (750 g/kg)	SU	10 g/ha	IBS
Imazamox (33 g/L) + Imazapyr (15 g/L)	IMI ²	750 g/ha	Post-emergent (4-5 node growth stage)
Imazethapyr (700 g/kg)	IMI	100 g/ha	Post-emergent (4-5 node growth stage)

¹ Sulfonylurea (SU) chemical class

² Imidazolinone (IMI) chemical class

Results and Interpretation

- Key messages: PBA Hallmark XT and PBA Hurricane XT, which are tolerant to Group B herbicides displayed less herbicide damage at all three locations.
- Normalised difference vegetation index (NDVI): NDVI was not different between treatments and varieties at Tooligie (data not shown) and Yeelanna (Figure 1) eight weeks following incorporation by sowing (IBS) treatment. PBA Jumbo2, a conventional lentil variety, had a reduction in NDVI from all IBS herbicide treatments, but not due to post-emergent herbicide applications. This is because the NDVI measurements were done eight weeks after IBS treatment where herbicide damage was visible. However, the NDVI measurements did not capture the herbicide damage due to imidazolinone herbicides, which may have occurred beyond the day the NDVI measurements were done. NDVI results at Mundulla indicated no differences in both XT lentil varieties to all herbicide treatments, except for PBA Hurricane XT treated with chlorsulfuron at IBS, where there was a reduction in NDVI (Figure 2). As expected, the conventional variety PBA Jumbo2 had a reduction in NDVI from all IBS and post-emergent herbicide treatments compared to the nil.

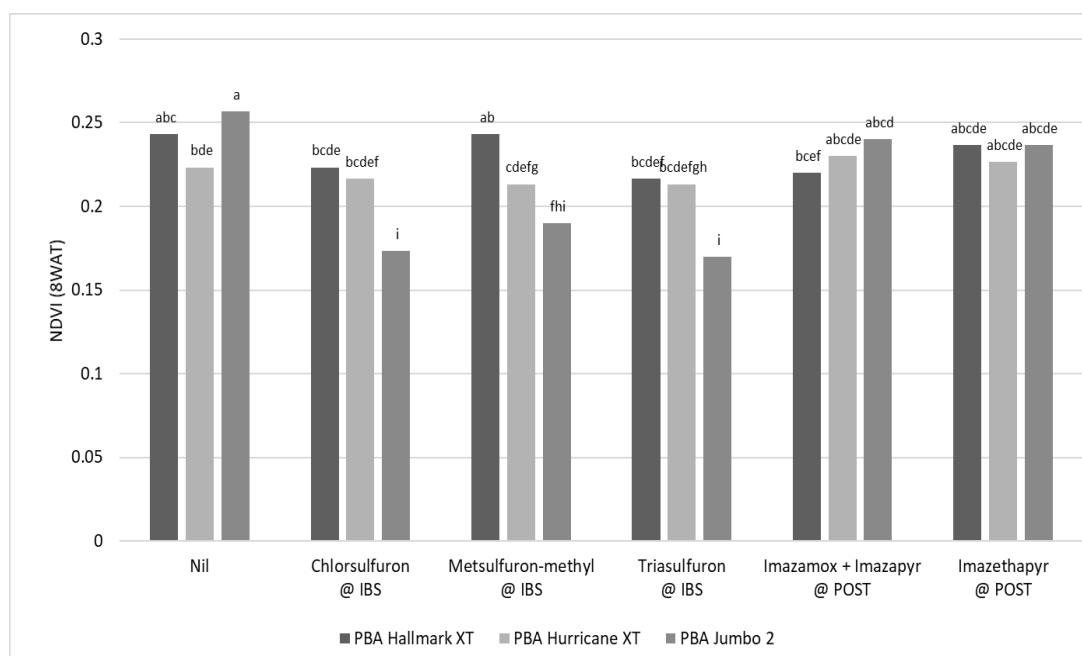


Figure 1. Effects of Group B herbicides on NDVI response of lentil varieties 8 weeks after treatment (WAT) at Yeelanna in 2019. Bars labelled with the same letter are not significantly different ($P \leq 0.05$). IBS = incorporated by sowing. POST = post-emergent.

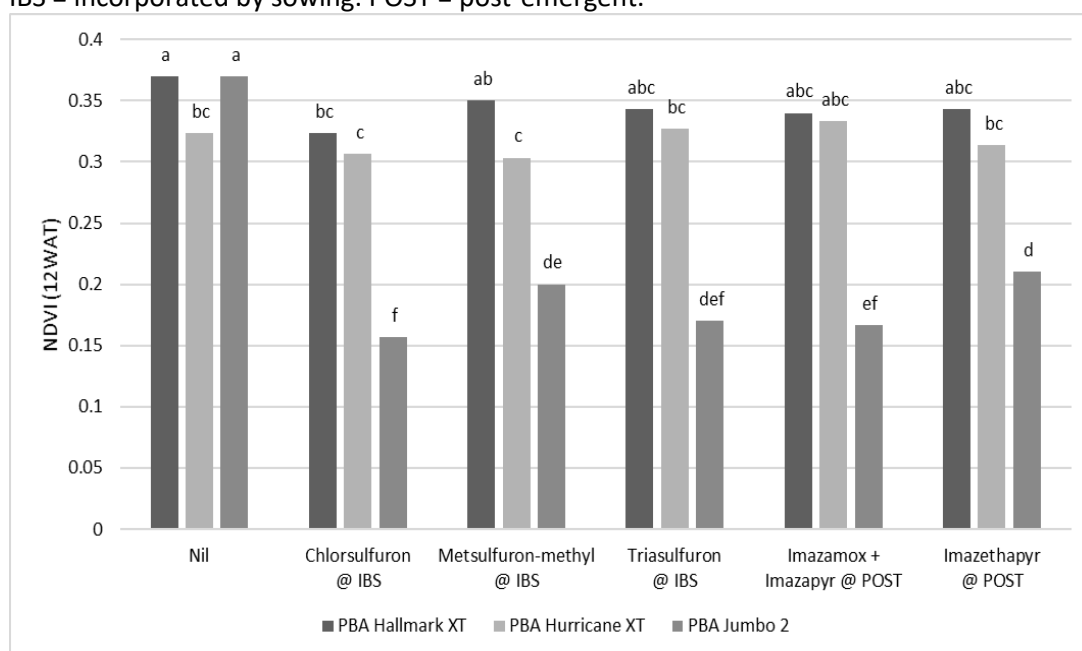


Figure 2. Effects of Group B herbicides on NDVI response of lentil varieties 12 weeks after treatment (WAT) at Mundulla in 2019. Bars labelled with the same letter are not significantly different ($P \leq 0.05$). IBS = incorporated by sowing. POST = post-emergent.

- Plant Height: PBA Jumbo2 recorded the highest average plant height in the nil treatment, with an average height of 43.7 cm, at Yeelanna 2019 (Figure 3). However, plant height was significantly reduced by all IBS and post-emergent herbicide treatments compared to the nil for this variety. Both XT lentil varieties, on the other hand, had no reduction in plant height from any herbicide treatment. The Tooligie site had similar findings to Yeelanna, where plant height of both XT lentil varieties was not affected due to the application of herbicides as IBS or post-emergent (Figure 4). Plant height was reduced in PBA Jumbo2 by all IBS herbicide treatments and the Imazamox + Imazapyr post-emergent treatment, but not Imazethapyr as a post-emergent. Herbicides were not significant on the plant height of PBA Hallmark XT at Mundulla in 2019 (Figure 5). PBA Hurricane XT had no reduction in plant height from both post-emergent treatments and the Triasulfuron IBS treatment, but plant height was reduced in the Chlorsulfuron and Metsulfuron-methyl IBS treatments, when compared to the nil. As expected, the conventional variety PBA Jumbo2 had a reduction in plant height from all herbicide treatments when compared to the nil.

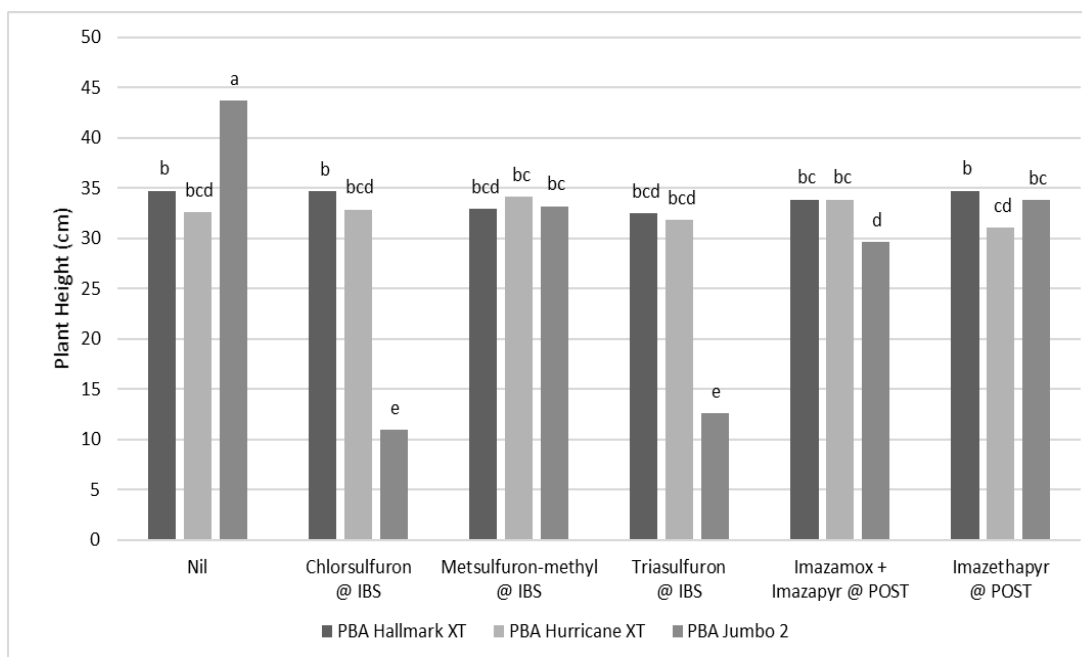


Figure 3. Effects of Group B herbicides on plant height of lentil varieties at Yeelanna in 2019. Bars labelled with the same letter are not significantly different ($P \leq 0.05$).

IBS = incorporated by sowing. POST = post-emergent.

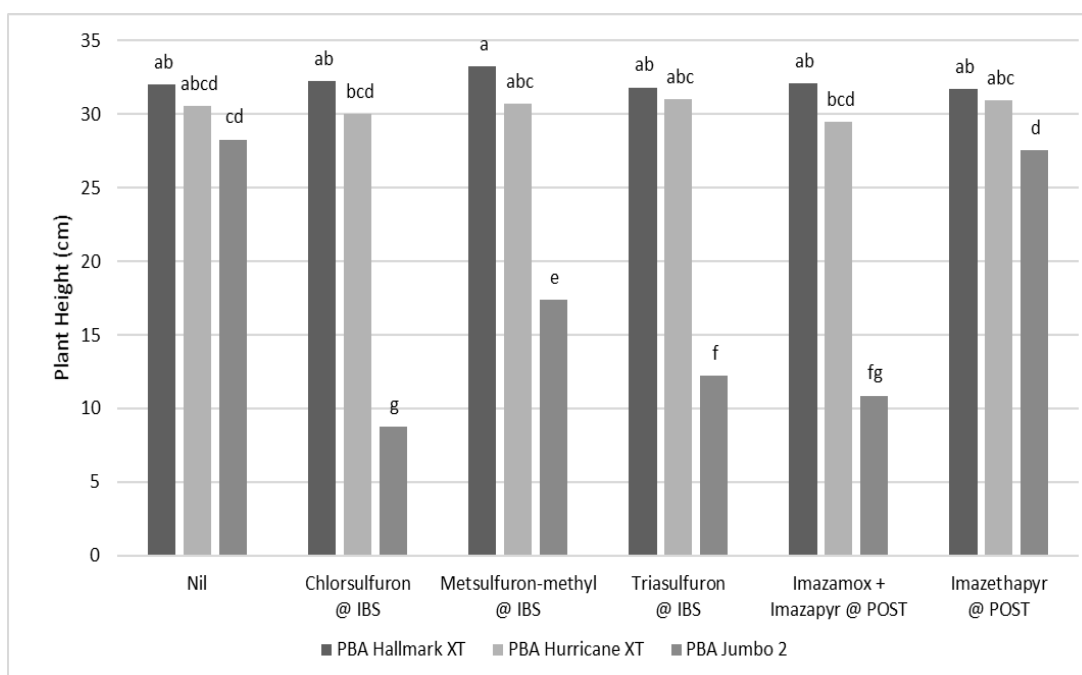


Figure 4. Effects of Group B herbicides on plant height of lentil varieties at Tooligie in 2019. Bars labelled with the same letter are not significantly different ($P \leq 0.05$).

IBS = incorporated by sowing. POST = post-emergent.

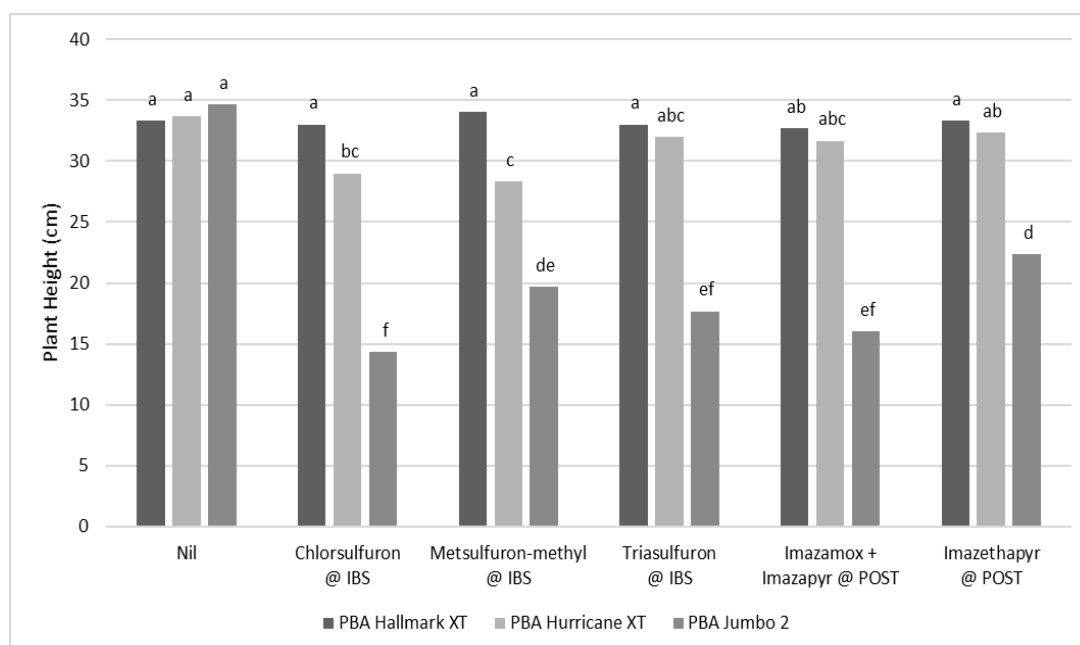


Figure 5. Effects of Group B herbicides on plant height of lentil varieties at Mundulla in 2019. Bars labelled with the same letter are not significantly different ($P \leq 0.05$).
IBS = incorporated by sowing. POST = post-emergent.

- Biomass production: At Yeelanna in 2019, none of the herbicides decreased the biomass of the tolerant lentil variety PBA Hallmark XT compared to the nil treatment (Figure 6). The biomass of PBA Hurricane XT was only decreased when Chlorsulfuron was applied IBS. Of the varieties, the conventional variety PBA Jumbo2 had the lowest biomass yield. The biomass yield of PBA Jumbo2 was decreased by Chlorsulfuron and Triasulfuron IBS, and Imazamox + Imazapyr as a post-emergent application. Similar to the results obtained in Yeelanna, PBA Hallmark XT had no reduction in biomass due to herbicides at both Tooligie and Mundulla in 2019 (Figure 7 and 8). PBA Hurricane XT also exhibited this result at both Tooligie and Mundulla (Figure 7 and 8). As expected, the biomass of PBA Jumbo2 decreased by all herbicide applications, when compared to the nil treatment at Tooligie and Mundulla (Figure 7 and 8).

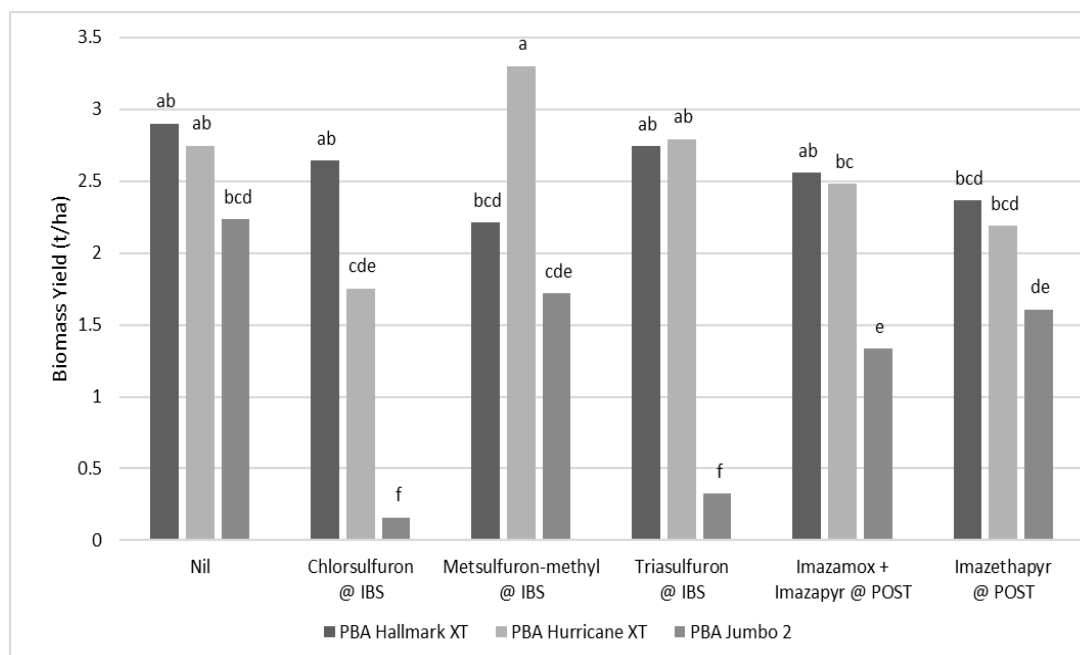


Figure 6. Effects of Group B herbicides on biomass of lentil varieties at Yeelanna in 2019. Bars labelled with the same letter are not significantly different ($P \leq 0.05$).
IBS = incorporated by sowing. POST = post-emergent.

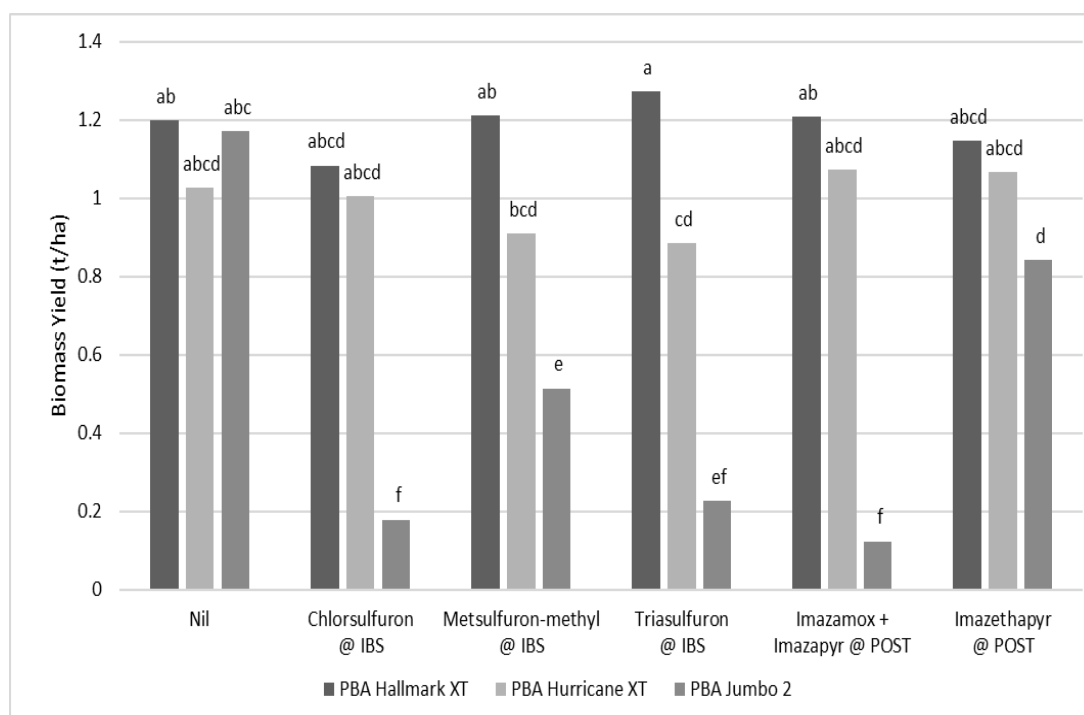


Figure 7. Effects of Group B herbicides on biomass of lentil varieties at Tooligie in 2019. Bars labelled with the same letter are not significantly different ($P \leq 0.05$).

IBS = incorporated by sowing. POST = post-emergent.

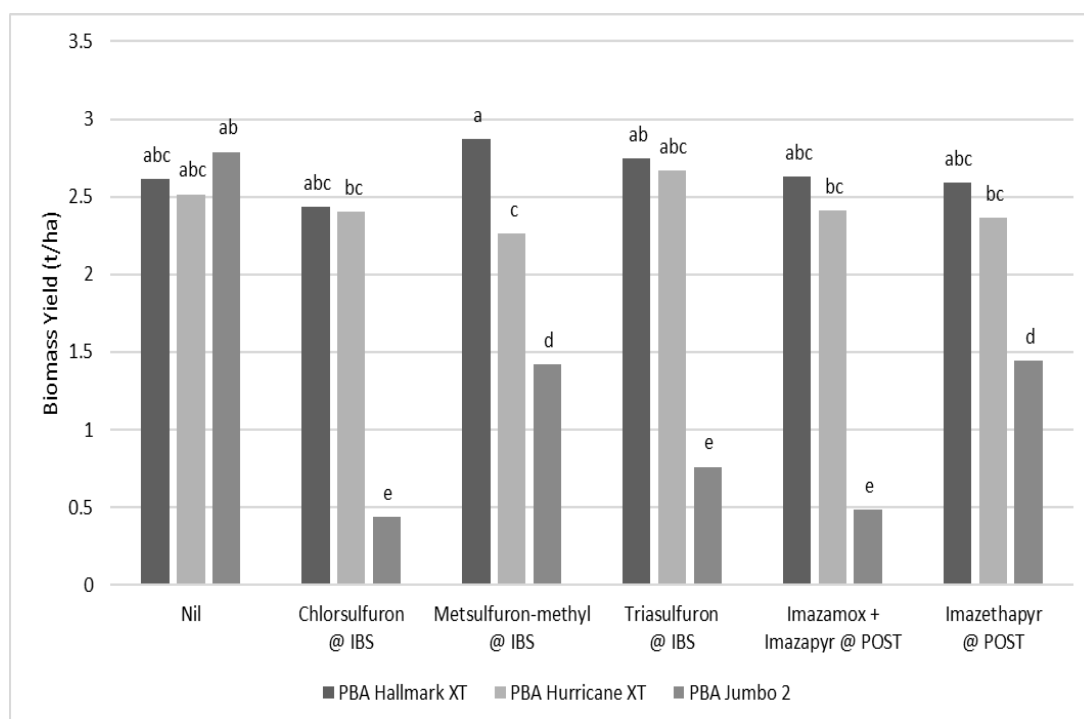


Figure 8. Effects of Group B herbicides on biomass of lentil varieties at Mundulla in 2019. Bars labelled with the same letter are not significantly different ($P \leq 0.05$).

IBS = incorporated by sowing. POST = post-emergent.

- Grain Yield: The nil treatment of PBA Jumbo2 at Yeelanna produced the highest grain yield, with an average of 2.4 t/ha (Figure 9). However, as expected the grain yield was reduced by all herbicide treatments in this variety where Metsulfuron-methyl IBS treatment and the Imazamox + Imazapyr post-emergent treatments did not produce any grain. Similar results were obtained for PBA Jumbo2 at Tooligie and Mundulla where grain yields decreased due to all herbicides (Figure 10 and 11). The grain yield of PBA Hallmark XT was not decreased by any of the herbicide applications, when compared to the nil treatment for all sites (Figure 9, 10 and 11). PBA Hurricane XT showed similar results to PBA Hallmark XT at each site in 2019, although there was a reduction in grain yield from the application of Metsulfuron-methyl applied IBS at Yeelanna, 2019 (Figure 9, 10 and 11).

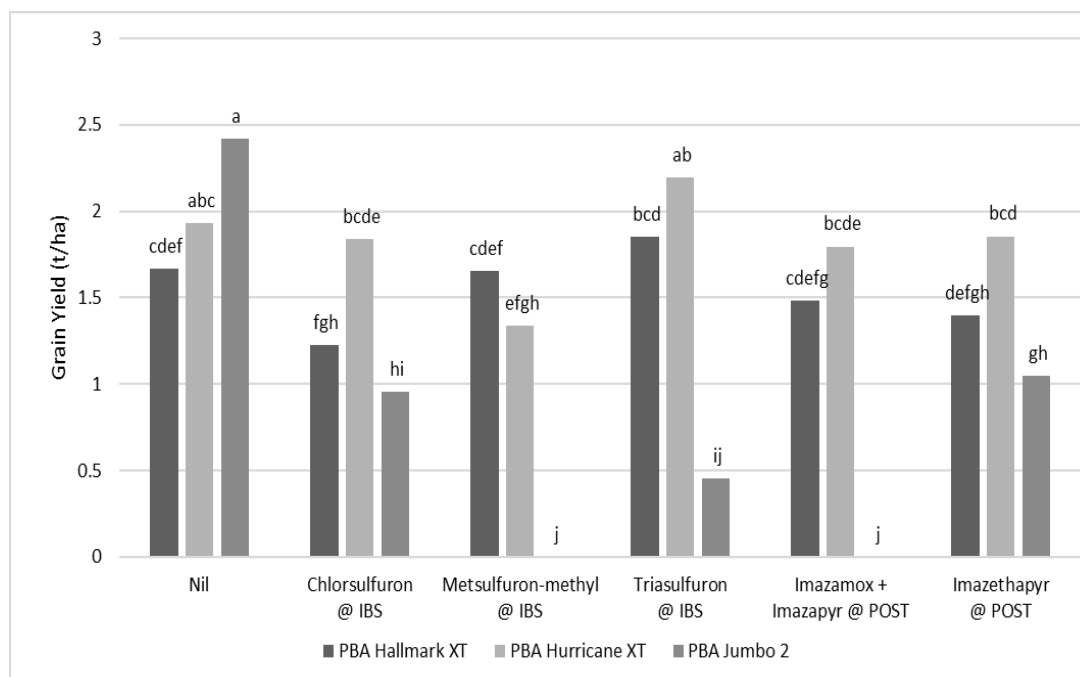


Figure 9. Effects of Group B herbicides on grain yield of lentil varieties at Yeelanna in 2019. Bars labelled with the same letter are not significantly different ($P \leq 0.05$).
IBS = incorporated by sowing. POST = post-emergent.

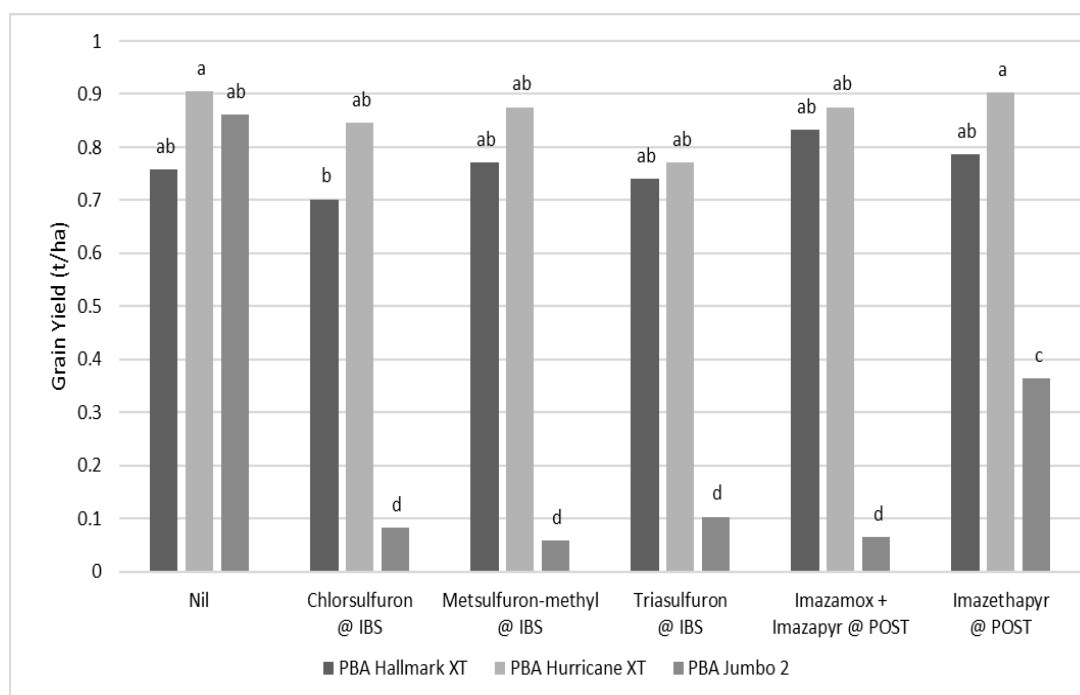


Figure 10. Effects of Group B herbicides on grain yield of lentil varieties at Tooligie in 2019. Bars labelled with the same letter are not significantly different ($P \leq 0.05$).
IBS = incorporated by sowing. POST = post-emergent.

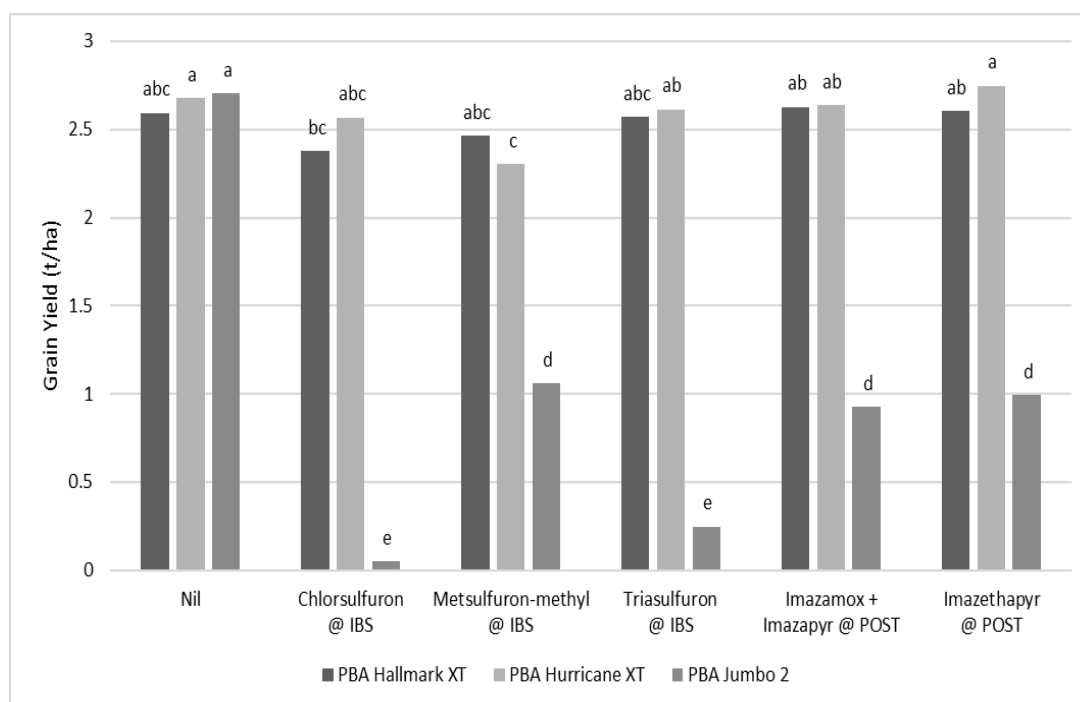


Figure 11. Effects of Group B herbicides on grain yield of lentil varieties at Mundulla in 2019. Bars labelled with the same letter are not significantly different ($P \leq 0.05$).

IBS = incorporated by sowing. POST = post-emergent.

Acknowledgements

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