Faba Bean, Herbicide Tolerance Group B (SU), HRZ Eyre Peninsula (Yeelanna), South Australia
Faba Bean, Herbicide Tolerance Group B (SU) herbicide tolerance, MRZ South East (Mundulla), South Australia

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Aim
To evaluate the level of herbicide tolerance in a faba bean mutant derived line with Group B herbicide tolerance traits in response to simulated residues and post-emergent applications of Group B herbicides.

Treatments
Factor 1: Three varieties of faba bean (Table 1)
Factor 2: Herbicide treatments

Chemical (concentration of active ingredient)	Chemical family	Application rate	Application timing
Metsulfuron-methyl 600 g/kg	SU[1]	7 g/ha	Incorporated by sowing (IBS)[3]
Chlorsulfuron 750 g/kg	SU	12 g/ha	IBS[3]
Triasulfuron 750 g/kg	SU	10 g/ha	IBS[3]
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
[3]***Application of a lower rate IBS is to simulate residues in the soil***

Table 1. Faba bean varieties at each site in 2019.

Site	Variety
Yeelanna & Mundulla	Nura (conventional)
Yeelanna & Mundulla	PBA Bendoc (Group B herbicide tolerant)
Yeelanna & Mundulla	PBA Samira (conventional)

Results and Interpretation
- Key messages: High levels of crop safety were observed in the imidazolinone tolerant faba bean variety at both Mundulla and Yeelanna sites in 2019.

- Normalised difference vegetation index (NDVI): NDVI of PBA Bendoc was unaffected by any of the herbicides (Figure 1 and 2). NDVI of the conventional varieties, Nura and PBA Samira, was decreased by all herbicide treatments at 12 weeks post treatment compared to the nil treatment (Figure 1). At Yeelanna as expected, there were reductions in NDVI in both Nura and PBA Samira due to all herbicide treatments except in the simulated chlorsulfuron residue treatment on PBA Samira and imazethapyr on Nura (Figure 2).

- Plant Height: Overall, PBA Samira produced tallest plants on average in the nil treatment at the Mundulla, 2019. However, all herbicide treatments decreased the plant height of both conventional varieties, Nura and PBA Samira, compared to the nil treatments (Figure 3). In contrast none of the herbicides decreased the height of PBA Bendoc. Imazethapyr is a registered herbicide for pre-emergent weed control in faba beans, where the risk of crop damage could increase in dry alkaline soils.
The Yeelanna site produced a slightly different result for the two non-tolerant varieties Nura and PBA Samira. Their plant height decreased when most herbicides were applied except for the Imazethapyr treatment (Figure 4). PBA Samira also consistently maintained a higher plant height than Nura across all treatments. Plant height of the herbicide tolerant variety PBA Bendoc was unaffected by any of the herbicide treatments.

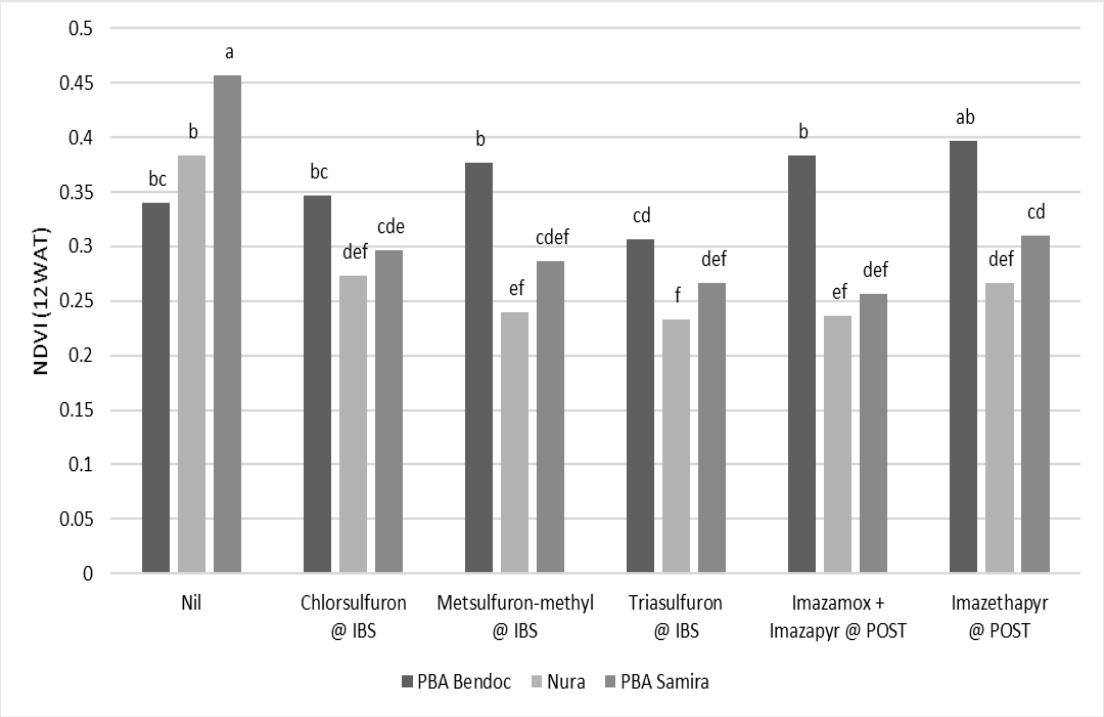

Figure 1. Effects of Group B herbicides on NDVI response of faba bean varieties 12 weeks after treatment (WAT) at Mundulla in 2019. Bars labelled with the same letter are not significantly different (P ≤ 0.05). IBS = incorporated by sowing. POST = post-emergent.

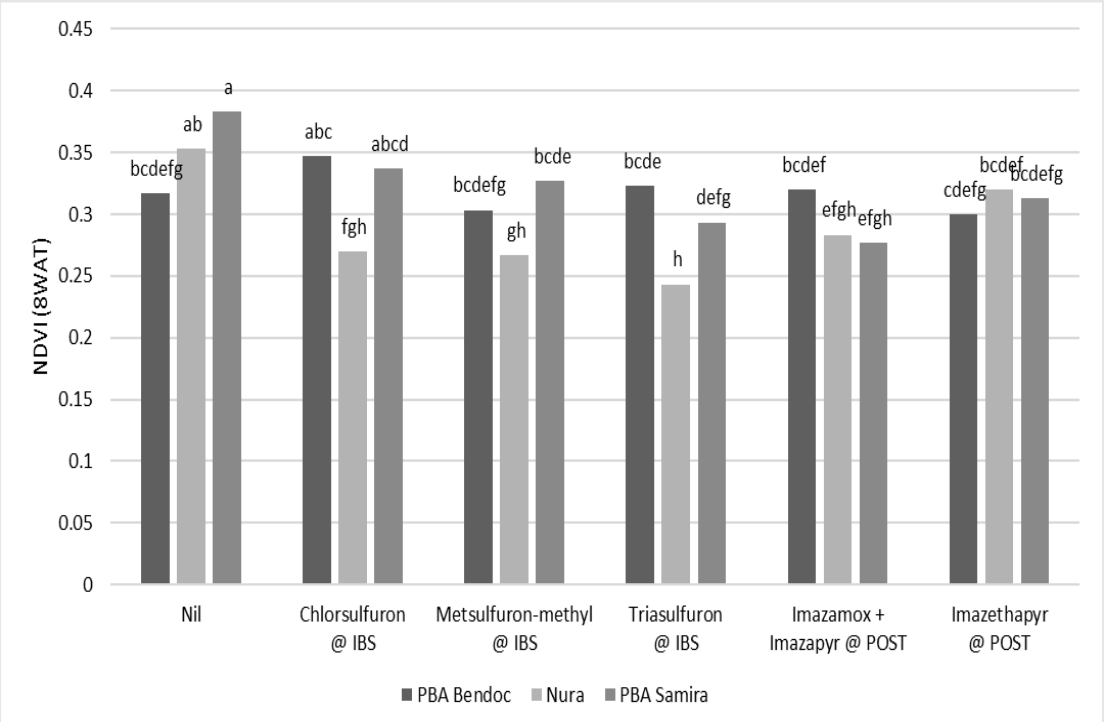

Figure 2. Effects of Group B herbicides on NDVI response of faba bean varieties 8 weeks after treatment (WAT) at Yeelanna in 2019. Bars labelled with the same letter are not significantly different (P ≤ 0.05). IBS = incorporated by sowing. POST = post-emergent.

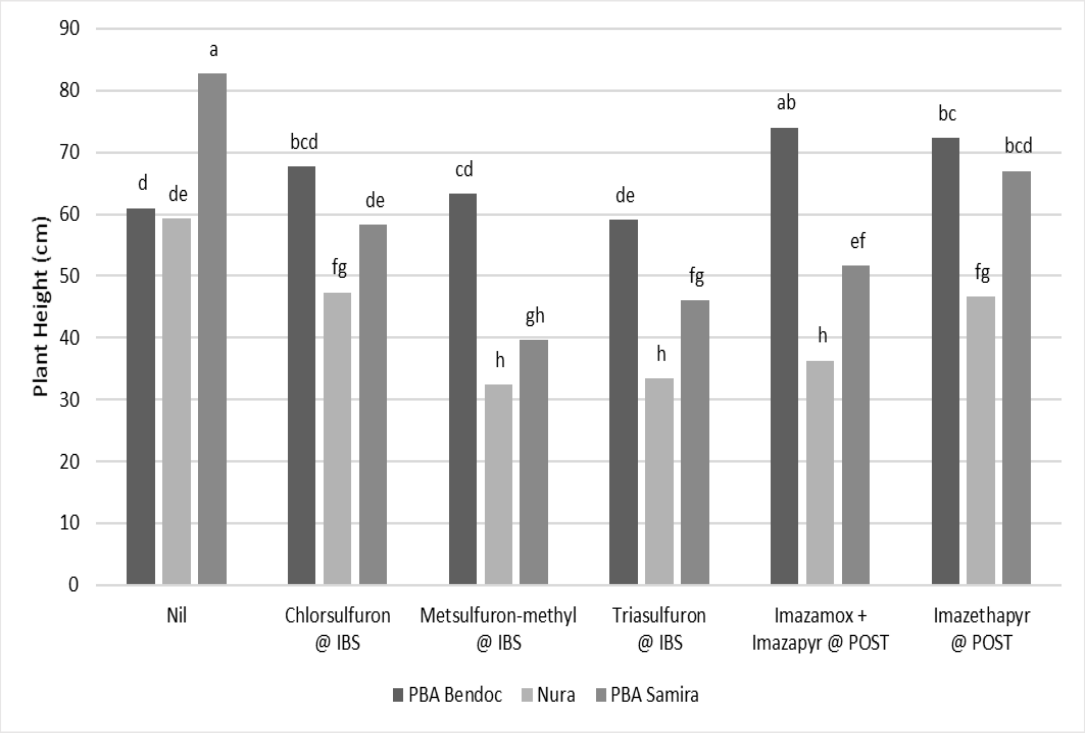

Figure 3. Effects of Group B herbicides on plant height of faba bean varieties at Mundulla in 2019. Bars labelled with the same letter are not significantly different (P ≤ 0.05).
IBS = incorporated by sowing. POST = post-emergent.

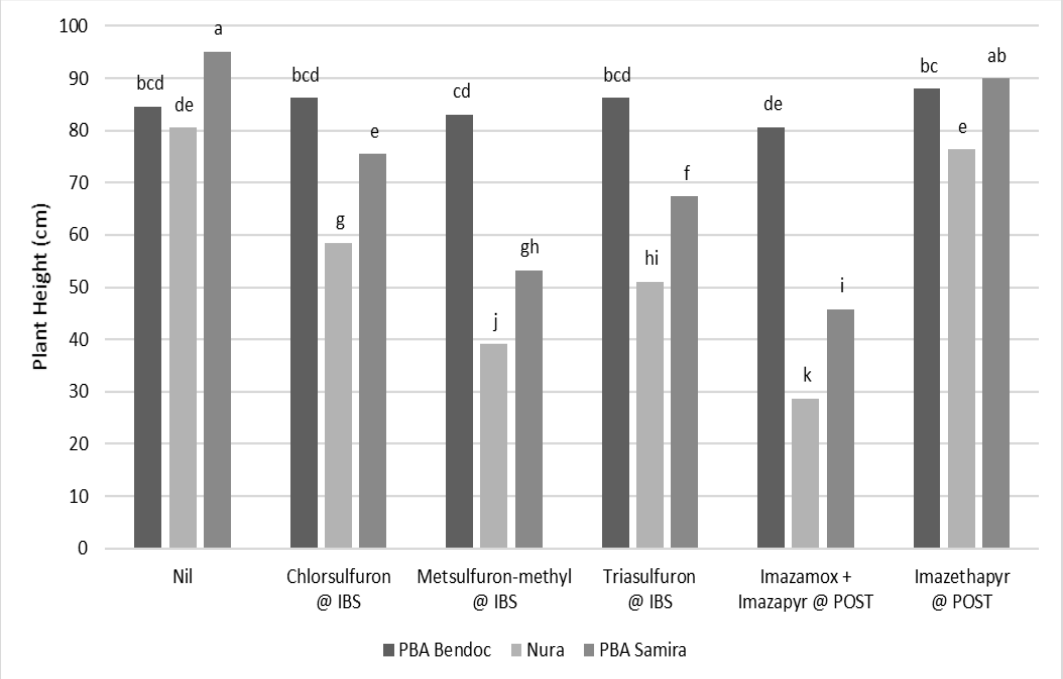

Figure 4. Effects of Group B herbicides on plant height of faba bean varieties at Yeelanna in 2019. Bars labelled with the same letter are not significantly different (P ≤ 0.05).
IBS = incorporated by sowing. POST = post-emergent.

• Biomass: All herbicide treatments, aside from the post-emergent application of Imazethapyr decreased the biomass yield of both conventional faba bean varieties at Mundulla in 2019 (Figure 5). Herbicides did not decrease the biomass of PBA Bendoc compared to the nil, because the biomass of the nil was significantly lower than the herbicide treatments. This anomaly maybe due to several factors, which requires further investigation. Similarly, at Yeelanna biomass yield did not decrease due to herbicide treatments compared to the nil treatment (Figure 6). However, a significantly higher biomass yield was observed for the Imazamox + Imazapyr post-emergent treatment compared to the nil. Nura exhibited a reduction in biomass from all herbicide treatments, apart from Imazethapyr applied as a post-emergent. The biomass yield of PBA Samira was reduced by two of the IBS treatments and one post-emergent treatment.

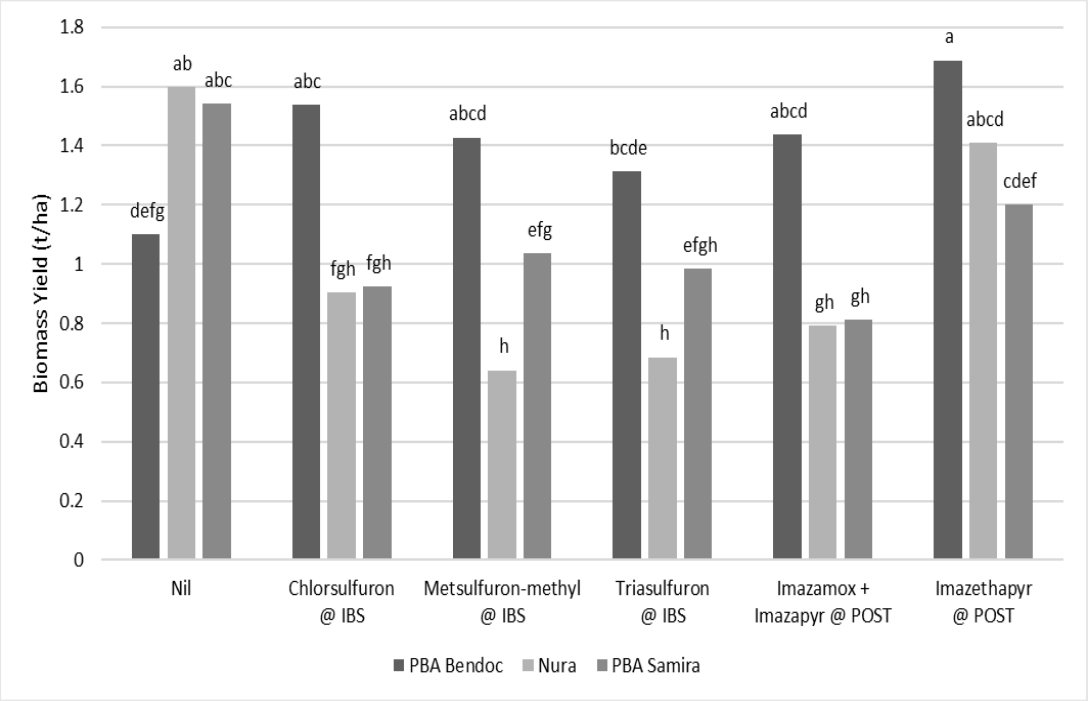

Figure 5. Effects of Group B herbicides on biomass of faba bean varieties at Mundulla in 2019. Bars labelled with the same letter are not significantly different (P ≤ 0.05).
IBS = incorporated by sowing. POST = post-emergent.

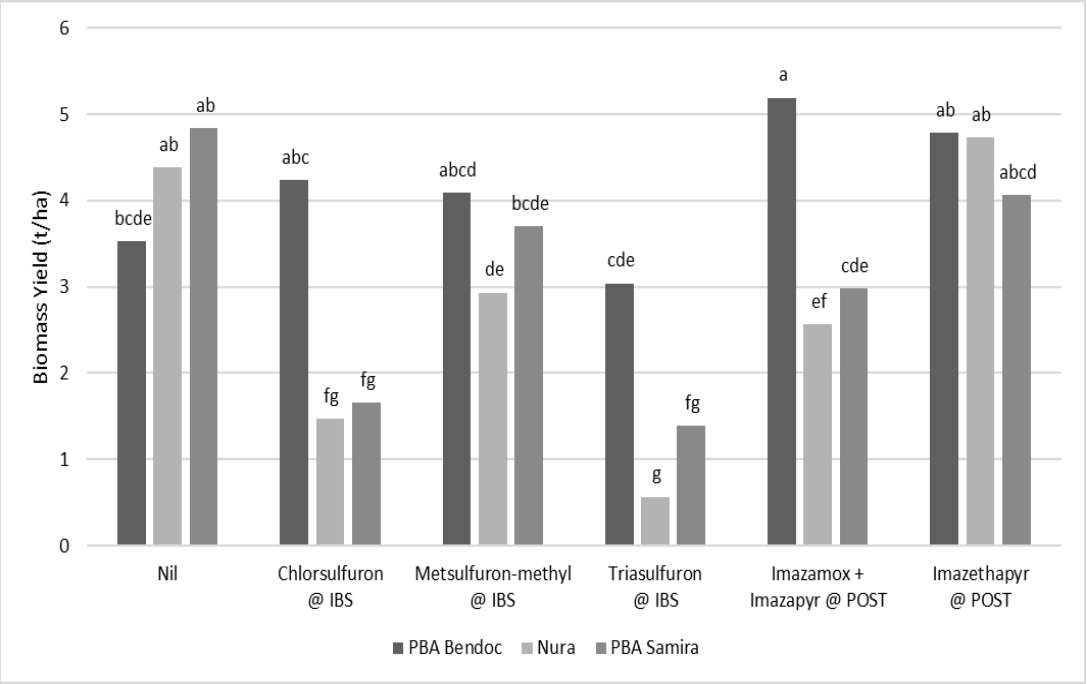

Figure 6. Effects of Group B herbicides on biomass of faba bean varieties at Yeelanna in 2019. Bars labelled with the same letter are not significantly different (P ≤ 0.05).
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• Grain Yield: Like the biomass result at Mundulla, the grain yield for the nil treatment of PBA Bendoc was significantly lower than all herbicide treatments, excluding the Triasulfuron IBS treatment (Figure 7). As expected, both Nura and PBA Samira exhibited losses in grain yield from all herbicide treatments, when compared to the nil, with the least affected being the Imazethapyr post-emergent treatment. The grain yield of the Imazethapyr treatment was higher than all IBS herbicide treatments. PBA Bendoc recorded no reduction in grain yield from all herbicide treatments, with an average yield of 3.6 t/ha at Yeelanna in 2019 (Figure 8). However, both Nura and PBA Samira, commercial varieties without the herbicide tolerance traits, recorded losses in grain yield from all IBS herbicide treatments (ranging from 36% to 100%, and 24%

to 80%, respectively), and the imazamox + imazapyr post-emergent herbicide treatment (35% and 33%, respectively). No loss in grain yield was recorded for the imazethapyr post-emergent herbicide treatment.

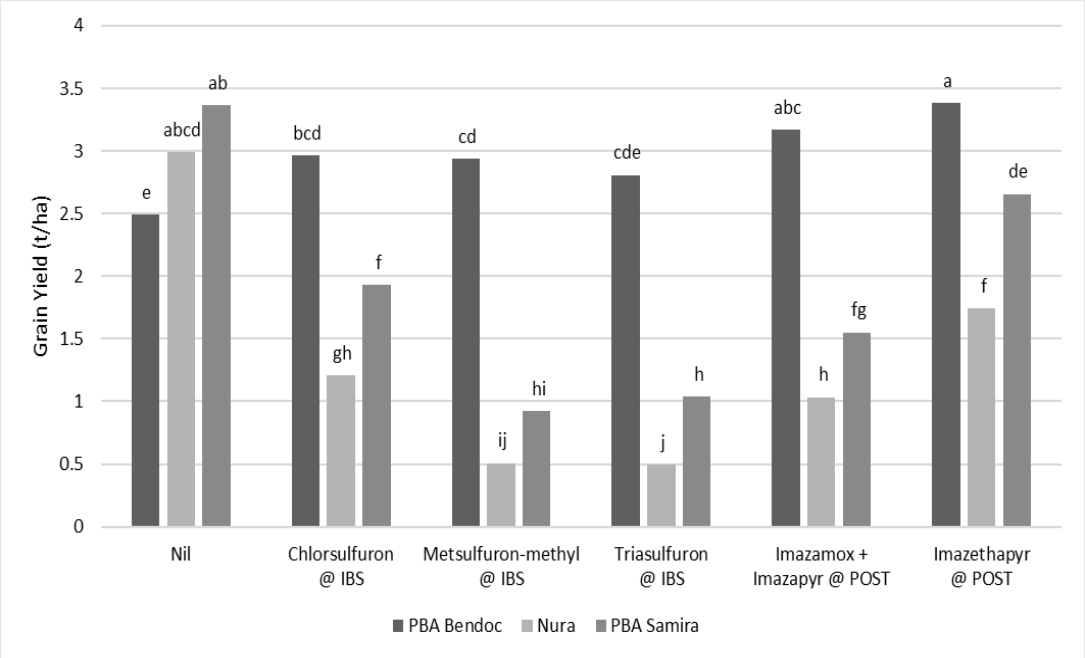

Figure 7. Effects of Group B herbicides on grain yield of faba bean varieties at Mundulla in 2019. Bars labelled with the same letter are not significantly different (P ≤ 0.05).
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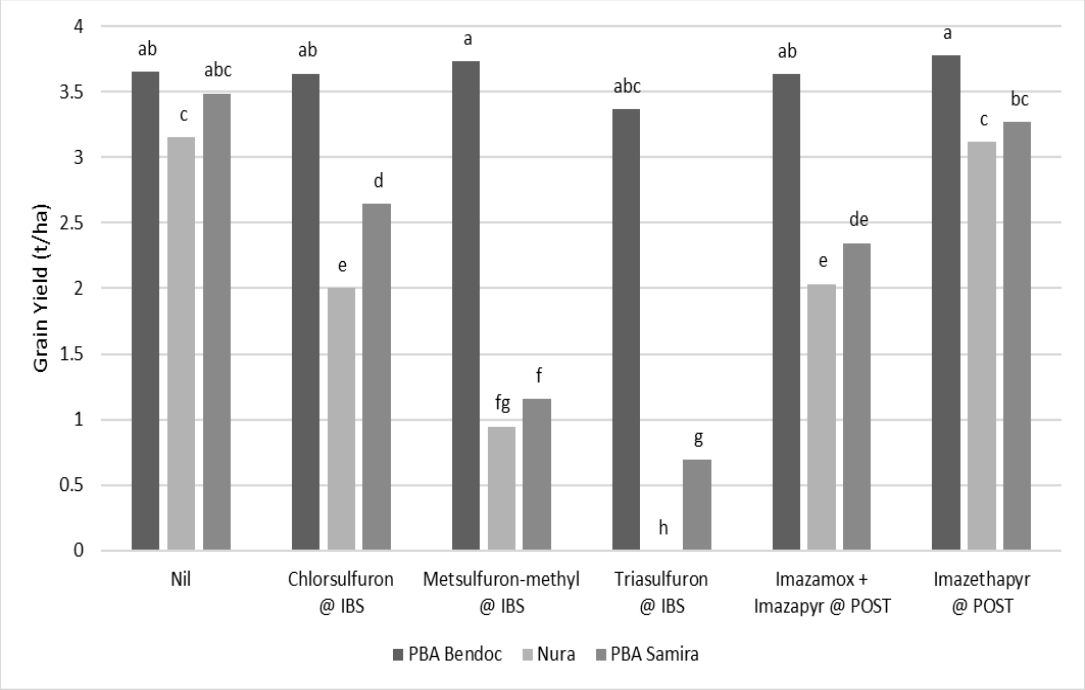

Figure 8. Effects of Group B herbicides on grain yield of faba bean varieties at Yeelanna in 2019. Bars labelled with the same letter are not significantly different (P ≤ 0.05).
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