



Worlds first metribuzin and IMI herbicide tolerant red lentil



KEY FEATURES



First and only Metribuzin (MET) + Imidazoline (IMI) tolerant red lentil variety

- tolerance to PSPE applied metribuzin at label rates
- tolerance to POST applied metribuzin at label rates in accordance with APVMA permit (PER92810)
- imidazolinone tolerance equivalent to other IMI tolerant lentils
- IMI and sulfonylurea (SU) soil residue tolerance equivalent to other IMI tolerant lentils



Unique combination of herbicide tolerances to expand weed control options and production in lentil

- offers both metribuzin and IMI in-crop herbicide options to broaden weed control
- provides an alternative in-crop herbicide weed control option to IMI, enabling superior control of some weed species and Group 2 herbicide resistant weeds
- improved crop safety, particularly on light textured soils, prone to damage from Group 5 herbicides
- dual herbicide tolerance allows improved integrated weed management cropping rotations and herbicide resistance management for growers



Grain yield is significantly lower than existing lentil varieties in the absence of weeds, or where weeds are controlled effectively without crop damage from Group 5 herbicides



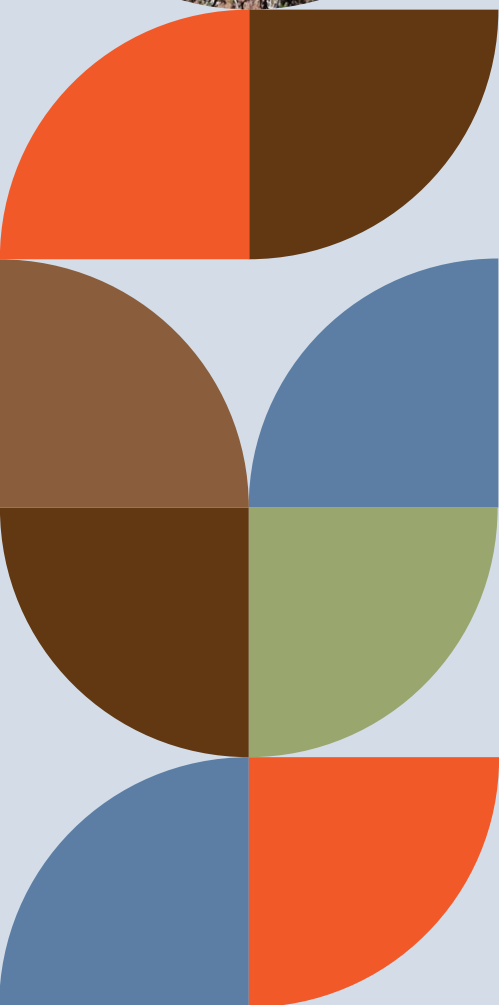
Rated moderately resistant and resistant/moderately resistant to the Nipper and Hurricane pathotypes of ascochyta blight, respectively



Moderately resistant/moderately susceptible to botrytis grey mould



Large, lens shape, red seed with a grey seed coat



METRO[®] PBR

MET+IMI Lentil



ADAPTATION & GRAIN YIELD

GIA Metro[®] is the world's first dual herbicide tolerant lentil combining both metribuzin and IMI herbicide tolerances. GIA Metro[®] will provide growers in all areas with improved in-crop weed control options. In particular, GIA Metro[®] provides an alternative herbicide option to IMI for hard to control weeds in lentil such as medic, brassicas, bifora, common sow (milk) thistle, prickly lettuce (whip thistle), cape weed, Group 5 herbicide resistant weeds and Clearfield[®] canola.

On light textured sandy soils GIA Metro[®] will allow the safe application of the Group 5 herbicide metribuzin at both pre and post emergent application timings (Graphs 1 & 2). GIA Metro[®] now provides the first POST emergent Group 5 herbicide option on all soil types, widening the application period and improving weed control from this popular herbicide group in lentils. GIA Metro[®] also provides lentil growers with a POST emergent herbicide alternative to IMI, potentially reducing the reliance on this herbicide and the need for an IMI tolerant wheat or barley variety in the following crop.

The metribuzin tolerance in GIA Metro[®] is attributable to a target site mutation in the chloroplast psbA gene.

GIA Metro[®] has a significant fitness penalty associated with the chloroplast mutation, leading to a net lower photosynthetic rate and an associated reduction in plant productivity and grain yield when compared to varieties without metribuzin tolerance to POST applications.

GIA Metro[®] has significantly lower grain yields than IMI and conventional lentil varieties in the absence of weed competition or where weeds are controlled effectively without crop damage from Group 5 herbicides.

NVT evaluation of GIA Metro[®] across Australia in 2021 and 2022 suggests it is consistently 20 to 30% lower yielding than PBA Hurricane XT[®], and even lower than the highest yielding variety GIA Thunder[®].

GIA Metro[®] is relatively late flowering and maturing and is therefore not suited to low rainfall conditions, short season environments and the practice of late sowing.

GIA Metro[®] is only suited to lentil growing soils and environments where weed competition and/or current herbicide options prohibit economic and sustainable lentil production.

2021 and 2022 Australian NVT predicted MET grain yield performance of GIA Metro[®] and selected lentil varieties (as a % of mean yield) as grouped by state and year.

Variety	South Australia		Victoria		Western Australia		New South Wales	
	2021	2022	2021	2022	2021	2022	2021	2022
Mean yield (t/ha)	3.56	3.22	2.72	2.95	1.76	1.47	0.9	3.41
Trial #	3	7	1	4	4	2	1	1
MEtribuzin+IMI								
GIA Metro[®]	74	72	NA	73	72	79	74	63
IMI								
PBA Hurricane XT [®]	101	100	101	100	102	101	93	107
PBA Highland XT [®]	105	94	105	92	104	106		
GIA Leader [®]	100	102	100	103	101	98	97	106
GIA Thunder [®]	113	127	106	125	114	109	105	123
Conventional								
PBA Jumbo2 [®]	103	111	101	118	104	99	136	92

(Data accessed from the GRDC NVT website on 28/04/2023)

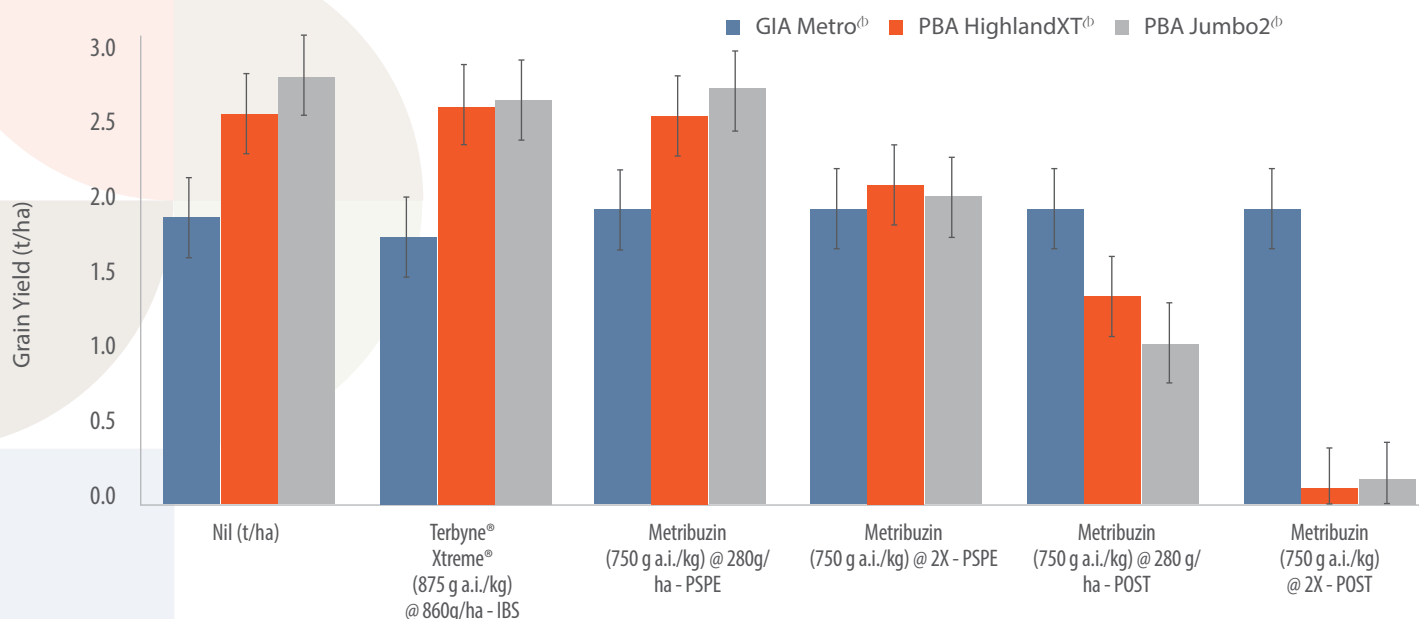
METRO[®] PBR

MET+IMI Lentil



Graph 1: Effect of metribuzin herbicide on grain yield of GIA Metro[®] in the absence of weeds on a light textured soil at Pinery SA, 2020. Yield expressed as t/ha for Nil treatment and as a % of each varieties Nil treatment for all other treatments. Treatment x variety interaction significant ($p < 0.001$). Error bars indicate significant differences within or across treatments and varieties (LSD 0.05).

(Data courtesy of Sarah Day, SARDI Clare)



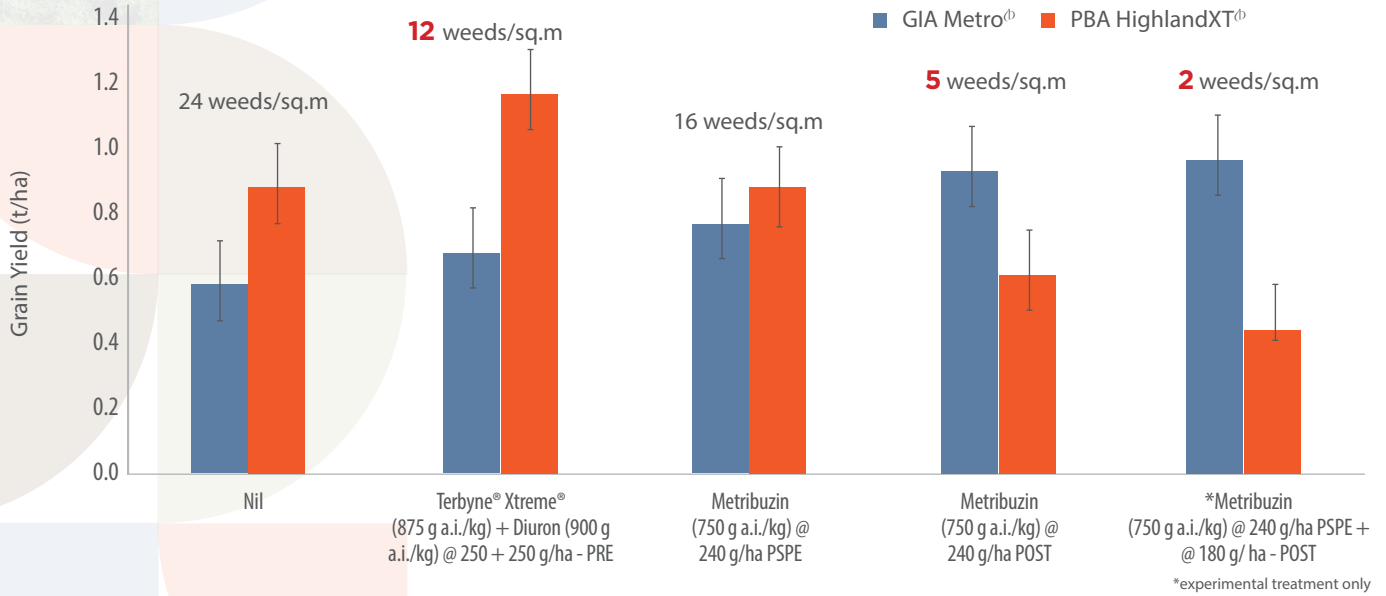
GIA Metro[®] with a high level of tolerance to post-emergent Metribuzin, compared to intolerant variety, PBA HighlandXT, applied on light soils at Pinnaroo, 2021



METRO^{db} MET+IMI Lentil



Graph 2: Effect of metribuzin herbicide on grain yield and weed control in GIA Metro^{db} on a sandhill at Pinnaroo SA, 2021. Yield expressed as t/ha for Nil treatment and as a % of individual variety Nil treatment for all other treatments. Weed figures in **RED** are statistically different from the Nil treatment, LSD (0.05).



Improved broad leaf weed control in GIA Metro^{db} from post-emergent application of Metribuzin compared to the nil treatment, applied on light soils at Pinnaroo, 2021



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AGRONOMY

General paddock selection and agronomic production requirements for growing GIA Metro[®] are the same as for other IMI tolerant lentil varieties. Refer to GRDC Lentil Grownotes and Lentil Ute Guide (www.grdc.com.au).

GIA Metro[®] is the only lentil variety with tolerance to PRE and POST applications of metribuzin herbicide for use under AVPMA permit (PER92810). GIA Metro[®] combines metribuzin tolerance with IMI tolerance, the latter similar to that in all other IMI lentil varieties. However, plant injury and biomass reduction can occur when metribuzin and IMI herbicides are applied together to GIA Metro[®]. **If growers are wanting to apply both IMI and metribuzin herbicides to GIA Metro[®] they should be applied in separate applications to reduce any potential plant damage and grain yield loss. The metribuzin application should also not be sprayed in conjunction with Group 1 (grass selective) herbicides.** GIA Metro[®] also has tolerance to soil residues of SU herbicides that is similar to other IMI herbicide lentils.

Of the Group 5 herbicides commonly used in pulse production GIA Metro[®] is only tolerant to metribuzin. GIA Metro[®] is more sensitive than PBA Hurricane XT[®] to the other Group 5 herbicides used in lentil. Metribuzin should be the Group 5 herbicide used on GIA Metro[®] and others only used with extreme caution in this variety. Preliminary observations from herbicide tolerance

screens also suggest GIA Metro[®] may be more sensitive to Reflex[®] and Brodal Options[®] than some other lentil varieties under some conditions.

All growers of GIA Metro[®] must adhere to all product label rates, plant-back periods and label directions for all herbicides.

GIA Metro[®] generally flowers 5 to 10 days later than PBA Hurricane XT[®] and is also later maturing. Avoid low rainfall, short season environments and agronomic practices that limit plant growth such as late sowing, low sowing rates and those that induce herbicide injury.

Harvestability, resistance to pod drop and shattering of GIA Metro[®] is generally similar to PBA Hurricane XT[®] although it can lodge severely under high botrytis grey mould pressure as seen in the 2022 season. Early vigour of GIA Metro[®] was slower than many other lentil varieties in 2022 however, in previous seasons it has been similar to that of PBA Hurricane XT[®].

As with all lentil varieties the correct application, timing and product selection for effective desiccation is required in GIA Metro[®], refer to GRDC Lentil Grownotes and Lentil Ute Guide (www.grdc.com.au).

Agronomic and disease characteristics of GIA Metro[®] compared with select lentil varieties

Variety	Vigour	Vegetative frost tolerance	Flower time	Maturity	Lodging resistance	Pod drop	Shattering	Ascochyta blight [‡]		BGM#
								Hurricane virulent [‡]	Nipper virulent [‡]	
METribuzin+IMI										
GIA Metro[®]	Mod-poor	Good	Late	Mid-late	MR	MR	MRR	RMR	MR	MRMS
IMI										
GIA Leader [®]	Mod	Mod-good	Mid-late	Mid-late	MR	MR	MRR	MR	MR	MRMS(p)
GIA Thunder [®]	Mod	Mod-good	Mid	Mid	MRMS	MR	MRR	MRMS	R	MRMS
PBA Hurricane XT [®]	Mod	Poor	Mid	Mid	MR	MR	R	MRMS	RMR	MS
PBA Highland XT [®]	Mod-good	Mod-poor	Early	Early-mid	MR	MR	MR	MR	MR	MS
Conventional										
PBA Jumbo2 [®]	Mod-good	Mod-good	Mid	Mid	MRMS	MR	R	RMR(p)	R	MR(p)

Legend: (p) = provisional, #Data source NVT National Pathology Ratings www.grdc-nvt.com.au, Ratings for PBA varieties via GRDC Crop Sowing Guide 2023, except for frost rating



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DISEASE AND ABIOTIC TOLERANCE

GIA Metro[®] is rated as moderately resistant (MR) and resistant/moderately resistant (R/MR) for the Nipper and Hurricane virulence strains of ascochyta blight, respectively (GRDC NVT National Pathology Rating system). GIA Metro[®] is rated moderately resistant/moderately susceptible (MR/MS) to botrytis grey mould, but can incur significant yield loss if BGM is not adequately controlled. **Disease management for GIA Metro[®] should follow the GRDC Lentil Grownotes and the Lentil Ute Guide (www.grdc.com.au) recommendations for the relevant disease ratings.**

GIA Metro[®] has not been assessed for virus resistance, or boron, salinity and heat tolerance ratings and should be treated as susceptible, or intolerant, for these characteristics.

GIA Metro[®] shows the highest level of tolerance of all lentil varieties to vegetative frost. There is no improvements in reproductive frost tolerance compared to other varieties.

Grain characteristics of GIA Metro[®] compared with other lentil varieties

Variety	Market category	Seed Shape	Seed coat colour	Cotyledon colour	Seed size (g 100 seeds)#
GIA Metro[®]	LRS	Lens	Grey	Red	4.71
PBA Jumbo2 [®]	LRS	Lens	Grey	Red	4.83
PBA Kelpie XT [®]	LRS	Lens	Grey	Red	4.71
GIA Leader [®]	MRS	Lens	Grey	Red	4.41
PBA Bolt [®]	MRS	Lens	Grey	Red	4.22
GIA Thunder [®]	SRP	Round	Grey	Red	3.71
PBA Hurricane XT [®]	SRP	Round	Grey	Red	3.54
PBA HighlandXT [®]	SRP	Round	Grey	Red	3.79

Legend: SRP=small red premium round, MRS=medium red split, LRS=large red split. #Data source NVT Trials 2021 & 2022, 22 trial sites across western and southern Australia, www.grdc-nvt.com.au

SEED PROTECTION & ROYALTIES

GIA Metro[®] is protected under Plant Breeders Rights (PBR) legislation. Growers can only retain seed for their own sowing or for sale as a commodity. GIA Metro[®] is open marketed with an End Point Royalty (EPR) of \$7.50/t (excluding GST), applying upon delivery of this variety, which includes a metribuzin trait end point royalty levied on GIA by SARDI and GRDC.

BREEDING

GIA Metro[®] was developed by Grains Innovation Australia (GIA) from the IMI tolerant variety PBA Hurricane XT[®] and a metribuzin tolerant line using conventional breeding techniques. The metribuzin tolerant line was developed in a PBA Flash[®] background by SARDI and GRDC from projects led by Dr Larn McMurray. GIA Metro[®] is commercialised by PB Seeds.

GIA does not receive any funding from grower levies, the GRDC or state or federal governments for breeding varieties. End Point Royalties (EPRs) are essential for GIA to continue to deliver leading and innovative varieties that increase on-farm profitability for growers.

SEED ENQUIRIES

PB Seeds-Head Office
1324 Blue Ribbon Road Kalkee VIC 3401
Ph 03 5383 2213 Email admin@pbseeds.com.au
www.pbseeds.com.au

VARIETY AND AGRONOMIC INFORMATION

PB Seeds Rob Launder Mob. 0467 844 231
Janine Sounness Mob. 0407 827 292
GIA Dr Larn McMurray Mob. 0466 113 848

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