

Canola varieties and herbicide tolerance

With many different canola varieties available to choose from, it's important to understand what herbicide tolerance options suit certain situations. Herbicide tolerance has been bred into canola varieties to allow enhanced weed control, making this break crop even more effective at controlling resistant ryegrass, and broadleaf weeds.

Table 1. Summary of tolerance to herbicides in different canola varieties.

	Variety examples	Triazine tolerance	Imidazolinone tolerant (Clearfield®)	Glyphosate tolerant	Glufosinate tolerant
Conventional	No longer widely grown	No	No	No	No
Triazine tolerant (TT)	ATR-Bonito, HyTTec® Trophy, InVigor®T 4510	Yes	No	No	No
Imidazolinone tolerant (CL)	Pioneer® 44Y94 CL, Pioneer® 45Y93 CL	No	Yes	No	No
Dual triazine and imidazolinone tolerant (CT/TC)	Hyola® Defender CT, Pioneer® PY520 TC	Yes	Yes	No	No
RoundUp Ready® (RR)	Pioneer® 44Y27 RR, Pioneer® 44Y30 RR	No	No	Yes	No
TruFlex® (TF)	InVigor® R 4520P, Nuseed® Hunter TF	No	No	Yes	No
Optimum Gly® (OptiGly)	Pioneer® PY422G, Pioneer® PY525G	No	No	Yes	No
Dual imidazolinone and glyphosate tolerant* (XC)	Hyola® Battalion XC, Hyola® Regiment XC	No	Yes	Yes	No
LibertyLink® and triazine tolerant (LT)	InVigor® LT 4530P	Yes	No	No	Yes
LibertyLink® and glyphosate tolerant* (LR)	InVigor® LR 4540P, LR 3540P, LR 5040P	No	No	Yes	Yes

*TruFlex®

VARIETY SUITABILITY

Triazine tolerant (TT)

- **Unique herbicide use:** Allows use of triazine herbicides, such as atrazine (pre-emergent and post-sowing pre-emergent (PSPE)), simazine (pre-em and PSPE) and Terbyne® (pre-em, PSPE and early post emergent (EPE)).
- **Controls:** Wild turnip, mustards, prickly lettuce, capeweed, thistles, fumitory, wild radish (suppression), and some ryegrass control.
- **Advantages:** If Group 2(B) resistant broadleaf weeds (as above) are present. Triazine herbicides can provide useful ryegrass suppression if applied to small plants under good moisture conditions.
- **Disadvantages:** OP (open pollinated) TT varieties lack vigour and yield compared to hybrids. TT hybrids varieties have improved, however, still lack top end yields compared other herbicide tolerant hybrids. There is a 34month re-cropping interval after imi herbicides, (apart from the CT varieties).
- **Cost:** There are OP (open pollinated) TT lines still available to be purchased, or seed can be retained. Hybrid TT varieties are ~\$32/kg and seed should not be retained, as this can result in yield reductions.

Imidazolinone tolerant (Clearfield® - CL)

- **Unique herbicide use:** Post-emergent use of imidazolinone (imi) herbicides, including Intervix®, Intercept® and Sentry® (can be used pre-emergent). Allows for sowing onto imi soil residues.
- **Controls:** Group 2 (B) susceptible: wild radish, mustard, turnip, marshmallow, bifora, bedstraw, brome grass, barley grass, and non-CL volunteers. Some ryegrass activity where susceptible populations.
- **Advantages:** Later control of broadleaf weeds than TT varieties, which is helpful to control later germinating populations. Highest yielding varieties compared to other herbicide tolerant varieties. Tolerant to imi soil residues.
- **Disadvantages:** Many weed populations are now becoming imi resistant, including ryegrass, wild radish, mustard and bedstraw. Imi soil residues need to be managed in following years if used in crop (i.e. sowing another CL crop).
- **Cost:** Cost of seed is ~\$32/kg and seed should not be retained, as this can result in yield reductions.

Glyphosate tolerant (RR, TF or OptiGly®)

- **Unique herbicide use:** In-crop glyphosate, see Table 2 below for a comparison of number of applications, rate and timing for RoundUp Ready®, TruFlex® and Optimum Gly® systems.
- **Controls:** Ryegrass (if not glyphosate resistant), and most other grasses and broadleaf weeds.
- **Advantages:** Effective in-crop control of ryegrass if populations are clethodim or imi resistant.
- **Disadvantages:** Can't be desiccated with glyphosate, must use diquat (Reglone®) or windrowing to speed up canola maturity. This is a genetically modified (GM) variety type, so price discounts apply (see more below). Controlling volunteer glyphosate tolerant canola over summer and in subsequent years is an added challenge.
- **Cost:** Seed is a premium price (~\$50/kg) and should not be retained.

Glufosinate tolerant (LL)

- **Unique herbicide use:** A newer technology allowing the use of glufosinate (i.e. Liberty®) in-crop.
- **Controls:** Ryegrass, and most other grass and broadleaf weeds.
- **Advantages:** Alternative control method for glyphosate resistant ryegrass in-crop. Among the highest yields in trials, either equal or better yield than CL varieties. Widely stacked with other herbicide tolerances.
- **Disadvantages:** Glufosinate application requires humid, mild and sunny conditions, which narrows the window for effective control, especially in winter conditions. This is a genetically modified (GM) variety, so price discounts apply (see more below).
- **Cost:** The chemical Liberty® costs \$20/L, so this strategy can cost \$80/ha for two 2L/ha applications (see Table 2), without adding other chemicals. The seed itself also costs ~\$50/kg and should not be retained.

The following table provides an outline of common herbicide programs for the canola varieties outlined above. This is a guide based on label rates and application timing, to aid decision making. Make sure to consider the other herbicides that may be used (ie. Lontrel® in all varieties, Tenet® in all varieties, quizalofop (Targa®), Triazines in TT varieties, and imi's in CL varieties). Check out the grass spraying in canola and pulses note [here](#) for more information to optimise grass control.

Table 2. Herbicide applications registered various canola varieties, and timing of application.

	Timing	1 st grass spray	2 nd grass spray	3 rd grass spray
Conventional	2 true leaves to bud formation.	Up to 500mL/ha of clethodim 240g/L [^] .	NA	NA
Triazine tolerant (TT)	2 true leaves to bud formation.	Up to 500mL/ha of clethodim 240g/L [^] and triazine product(s).	NA	NA
Imidazolinone tolerant (CL)	2 true leaves to bud formation.	Up to 500mL/ha of clethodim 240g/L [^] and imi product.	NA	NA
Dual triazine and imidazolinone tolerant (CT/TC)	2 true leaves to bud formation.	Up to 500mL/ha of clethodim 240g/L [^] and triazine and/or imi products.	NA	NA
RoundUp Ready® (RR)	Crop emergence to 6 true leaves.	Up to 1L of glyphosate 600g/L and clethodim [^] .	Up to 1L of glyphosate 600g/L.	NA
TruFlex® (TF)	Crop emergence until first flower.	Up to 1.5L/ha* of glyphosate 600g/L and clethodim [^] .	Up to 1.5L/ha* of glyphosate 600g/L.	NA
Optimum Gly® (OptiGly)	Crop emergence until 10% flower.	Up to 1.8L/ha of glyphosate 600g/L and clethodim [^] .	Up to 1.8L/ha of glyphosate 600g/L.	Up to 1.8L/ha of glyphosate 600g/L.
Dual imidazolinone and TruFlex® tolerant (XC)	Crop emergence until first flower.	Up to 1.5L/ha of glyphosate 600g/L and clethodim [^] .	Up to 1.5L/ha of glyphosate 600g/L.	NA
Dual imidazolinone and OptiGly® tolerant (GC)	Crop emergence until 10% flower.	Up to 1.8L/ha of glyphosate 600g/L and clethodim [^] .	Up to 1.8L/ha of glyphosate 600g/L.	Up to 1.8L/ha of glyphosate 600g/L.
LibertyLink® (LT/LR)	2 true leaves to early bolting.	Up to 3.75L/ha of glufosinate 200g/L and clethodim.	Up to 3.75L/ha of glufosinate 200g/L.	NA

*TruFlex® canola can instead have 3 applications of glyphosate 600g/L at 1L/ha, however coverage is often compromised at later timing.

[^]DO NOT apply clethodim after 6 leaf / when flower buds become visible (green buds).

Note: Sequential herbicide applications must be at least 14 days apart with two new leaves of crop growth. Sometimes there is not enough time for all label applications.

GRAIN PRICE DISCOUNT

When it comes to grain marketing, GM canola varieties (glyphosate tolerant and glufosinate tolerant varieties) have a price discount compared to non-GM varieties. This is because GM canola has fewer markets to sell into, with the EU, one of Australia's biggest export destinations for canola, preferring non-genetically modified grain. The price spread between GM canola and non-GM canola depends on markets, but the 5-year average discount for GM canola is \$33/t, but can increase to well over \$60/t. It's important to consider the benefits from increased control of ryegrass, including yield increases in canola and following cereal crops while also reducing the weed seed bank for future years, compared to the profitability loss from discounted grain price.

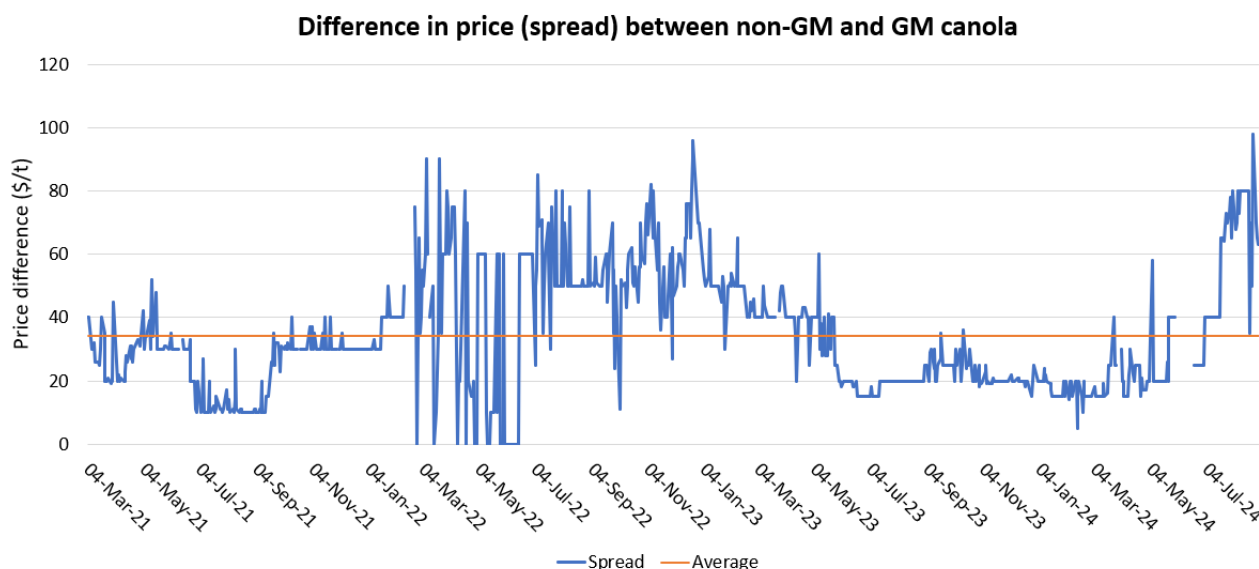


Figure 1. Canola price spreads between non-GM and GM varieties since March 2021, including an average of \$33/t over this time (orange line). The higher the spread, the greater discount placed on GM canola. Source: Pinion Advisory.

OTHER CONSIDERATIONS

- **Desiccation.** Remember that glyphosate will not desiccate GM canola.
- **Controlling volunteer canola.** Consider a chemical plan for the following year that will control volunteer canola which is tolerant to common in-crop sprays and knockdowns (e.g. imi or glyphosate tolerant canola).
- **Herbicide residues from previous crop.** Varieties with imi tolerance are useful if these chemicals were used in the last crop. Be cautious in growing non-CL canola varieties if imi's are used in the system, look back two seasons to ensure no imi's have been used.
- **Minimising the rate of herbicide resistance in weeds.** It is still important to rotate modes of action throughout the season and crop rotations. For example, paraquat is a more appropriate knockdown before sowing glyphosate resistant canola, since glyphosate will be used in-crop later. Always use a pre-emergent herbicide even in herbicide tolerant varieties.
- **Other variety characteristics:** Such as maturity timing, yield potential, blackleg resistance, vigour, cost etc.

DECISION MAKING QUESTIONS

- Do I have imi residue from previous crop?
- What is the ryegrass pressure in the paddock? What other problem weeds are present?
- Are target weeds resistant to any herbicides (i.e. imi's, glyphosate, clethodim etc)?
- Is the benefit from grass control in GM canola worth the price penalty at harvest, and the additional seed cost?