ROUNDUP READY® CANOLA TECHNOLOGIES

CROP MANAGEMENT PLAN

BAYER

TruFlex® CANOLA

Roundup Ready® CANOLA

OBJECTIVE

The Roundup Ready® Technology Crop Management Plan (CMP) details strategies that can be implemented on-farm to help manage risks to the integrity of grain supply-chains and the sustainability of agricultural production. It does not attempt to capture or reflect existing legal obligations and, unless explicitly stated, does not mandate particular strategies.

COEXISTENCE

Coexistence in agricultural production systems and supply chains is well established and well understood. Standards and best practices for coexistence were established decades ago and have continually evolved to deliver high purity seed and grain to support production, distribution and trade of products from different agricultural systems. For example, the successful coexistence of canola varieties with low erucic acid content for food use and high erucic acid content for industrial uses has occurred for many years.

The introduction of biotech crops generated renewed discussion focused on coexistence of biotech cropping systems with conventional cropping systems and organic production. These discussions have primarily focused on the potential marketing impact of the introduction of biotech products on other systems. The health and safety of biotech products are not an issue because their food, feed and environmental safety is well established by national regulators before they enter the agricultural production system and supply chain.

The coexistence of conventional, organic and biotech crops has been the subject of several studies and reports. These reports conclude that coexistence among biotech and non-biotech crops is not only possible but is occurring. They recommend that coexistence strategies be developed on a case-by-case basis considering the diversity of products currently in the market and under development, the agronomic and biological differences in the crops themselves and variations in regional farming practices and infrastructure. Furthermore, coexistence strategies are driven by market needs and should be developed using current science-based industry standards and management practices.

Successful coexistence of all agricultural systems is achievable and depends on communication, cooperation, flexibility and mutual respect for each system among growers. The primary responsibility for implementing practices to satisfy specific marketing standards or certification lies with that grower who is growing a crop to satisfy a particular market. This is true whether the goal is high oleic, low linolenic canola, non-GM canola or organically produced crops. In each case, the grower is seeking to produce a crop that is supported by a market price and consequently that grower assumes responsibility for satisfying reasonable market specifications. That said, good communication and understanding between neighbours is essential to maintaining segregation and coexistence. As such, growers of Roundup Ready Technologies are encouraged to work with their neighbours, in keeping with good industry practice. For example, it may be appropriate for neighbouring farmers to consider and discuss how they might each use additional management measures to help ensure reasonable coexistence, such as a seed production minimum distance or direct heading, where a neighbour is growing an organic or other specialty crop. Australian agriculture as a whole, benefits when Australian farmers are working together to meet all market demands.

IDENTITY PRESERVED PRODUCTION

Some canola growers may choose to preserve the identity of their crops to meet specific markets. Examples of Identity Preserved (IP) crops include specialty oil canola, food grade crops and any other crop that meets specialty needs, including organic and non-genetically enhanced specifications. Growers of these crops assume the responsibility and receive the benefit for ensuring that their crop meets mutually agreed-upon contract specifications. Based on historical experience with a broad range of IP crops, the industry has developed generally accepted IP agricultural practices. These practices are intended to manage IP production to meet quality specifications and are established for a broad range of IP needs. The accepted practice with IP crops is that each grower of IP crops has the responsibility to implement any necessary processes. These processes may include sourcing seed appropriate for IP specifications, field management practices such as adequate isolation distances, buffers between crops, border rows, planned differences in maturity between adjacent fields that might cross-pollinate, and harvest and handling practices designed to prevent mixing and to maintain product integrity and quality.

GENERAL RECOMMENDATIONS FOR MANAGEMENT OF MECHANICAL MIXING AND POLLEN FLOW

For all canola crops that they wish to identity preserve or otherwise keep separated, growers should take steps to prevent mechanical mixing. Growers should make sure all seed storage areas, seed handling equipment, transportation vehicles and seeders are cleaned thoroughly both prior to and subsequent to the storage, transportation or planting of the crop. Growers should also make sure all planting equipment, seed handling equipment, harvesters and transportation vehicles used at harvest are cleaned thoroughly both prior to and after their use in connection with the harvest of the grain produced from the crop. Growers should also make sure all harvested grain is stored in clean storage areas where the identity of the grain can be preserved.

It is recognised in the industry that a certain amount of incidental, trace level pollen movement occurs, and it is not possible to achieve 100% purity of seed or grain in any crop production system. Several factors can influence the occurrence and extent of pollen movement. As stewards of technology, growers are expected to consider these factors and talk with their neighbours about their cropping intentions. Growers should consider the following factors that can affect the occurrence and extent of cross-pollination to or from other fields.[1]

CROSS-POLLINATION CANOLA TO CANOLA

The rate of cross-pollination between two adjacent canola fields is generally low and this declines with distance (leptokurtic response). An Australian study by Rieger et al. (2002) showed that in the great majority of cases, even adjacent canola paddocks in Australia had pollen flow in a range of 0.00 to 0.07%. Whilst in a total of 197 individual samples of paddocks in a range of 0–5 km away from each other, pollen flow from paddock to paddock was always less than 0.25%, with no outcrossing detected at 69% of sites.[1]

Based on extensive review of scientific studies, GM canola may be grown in proximity to non-GM canola, with little risk that the non-GM canola will exceed the 0.9% adventitious presence industry threshold level (refer to table below).

RECOMMENDED SEPARATION DISTANCES FOR GROWING ROUNDUP READY CANOLA TECHNOLOGIES NEAR OTHER CANOLA IN AUSTRALIA	
Minimum distances for managing Adventitious Presence of GM seed to be less than 0.9%, between GM canola and:	
COMMERCIAL SEED PRODUCTION	**PLANTING SEED PRODUCTION**
Non-GM canola & all other canola	Foundation seed canola (or farmer saved seed)
5 metres	400 metres

Pollen movement between canola crops will always occur. Although the risk is very low, the development of canola plants tolerant to more than one herbicide could occur through cross-pollination between crop varieties. The above separation distances are recommended to minimise this potential.

POLLEN MOVEMENT – CANOLA TO WEEDY SPECIES

Canola is largely (~70%) self-pollinating. However, it can be cross-pollinated (by insects and wind) with other varieties of canola, and to a lesser extent, with other close relatives. Studies have shown that there is the potential for naturally occurring hybrids to form between canola and wild radish, buchan weed or charlock. These events are extremely rare and often result in infertile hybrids. Attempts to transfer Herbicide Tolerance (HT) genes from canola into wild radish, buchan weed or charlock populations by backcrossing the hybrids to the weedy parent species have failed (i.e. no introgression of HT traits has been possible). Good agricultural practice will ensure these weeds are controlled in crop and non-crop situations, thus, there will be minimal opportunity for Roundup Ready Technologies to form hybrids with them.

B. rapa and *B. juncea* are crops/weeds that are very closely related to canola and have the potential to hybridise with canola. Introgression of HT traits is possible but unlikely to occur naturally, and would not confer increased fitness or spread as a weed, relative to conventional *B. rapa* and *B. juncea*. In areas where *B. rapa* or *B. juncea* occur within or adjacent to Roundup Ready Technologies paddocks, they should be managed similarly to volunteer Roundup Ready Technologies (i.e. they should be controlled with other herbicides or cultural techniques).

MANAGEMENT OF OUTCROSSING EVENTS

Multiple herbicide tolerant canola volunteers and herbicide tolerant weed hybrids could occur at very low to extremely low levels, respectively. These plants can be controlled by an integrated weed management program, including the use of other herbicides and cultural methods.

MANAGEMENT OF VOLUNTEER CANOLA

Volunteer canola is a weed of crop and non-crop situations throughout southern Australia. The majority of Australia's canola crop is herbicide tolerant so most growers are already familiar with managing herbicide tolerant canola volunteers. Many options currently exist for the control of volunteer canola. All these options except Roundup® branded products (or glyphosate) continue to exist for the control of Roundup Ready Technologies.

It is essential to monitor and manage the appearance of volunteer canola in both crop and non-crop situations. Depending on the circumstances, particularly any steps taken to manage emerging volunteers and to limit the potential persistence or development of a seed bank, volunteers may be found for a number of years after growing the crop and should be controlled prior to flowering. The following situations should be assessed for the presence of volunteers:

- In a paddock where Roundup Ready Technologies have been grown.
- In a paddock immediately adjacent to where Roundup Ready Technologies have been grown.
- In areas where there has been seed or grain spillage during transport (e.g. roadsides).
- In areas where seed from machinery clean-down has been ineffectively contained.
- In areas where grazing animals excrete for 7 to 10 days after digesting seed.
- Any areas where physical movement of seed may result in volunteers.

Burial of canola seed to a depth greater than 5 cm is not recommended as this can substantially delay the emergence of volunteers (secondary dormancy can be induced). Inspection regimes for identifying volunteers should take tillage practices into consideration.

Any plants present in a paddock that may be suspected to contain resistance to glyphosate conferred by Roundup Ready technologies should be controlled as outlined below:

- Prior to crop establishment - through the use of a knockdown herbicide (with an appropriate tank-mix partner if using glyphosate based products) and/or cultivation.
- In-crop - through the use of an appropriate registered herbicide for the crop being grown.
- In non-crop situations - through the use of grazing, mowing, mechanical removal or herbicide application as appropriate for the situation to prevent the canola reaching maturity.

When making spray decisions to control volunteer canola, growers should be aware of previous herbicide tolerant canola cropping both on their farm and that of their neighbours and modify herbicide choice appropriately.

To find your local Bayer representative, visit **crop.bayer.com.au**

roundupreadycanola.com.au
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Reference: 1. Rieger, M.A. Lamond, M. Preston, C . Powles, S .B. and Roush, R.T. (2002). Pollen-Mediated Movement of Herbicide Resistance Between Commercial Canola Fields. Science. Vol. 296. no. 5577, pp. 2386–2388.

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