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RESIDUAL HERBICIDES AND WEED CONTROL

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Pulse growers need to be aware of:

- **Possible herbicide residues impacting on crop rotation choices where rainfall has been minimal.**
- **Herbicide residues could possibly influence crop rotations more than disease considerations.**
- **Weed burden in the new crop will depend on the seed set from last year.**
- **Herbicide efficacy and crop safety of the new crop can suffer if the soil is dry at application time.**

Residual herbicide implications: Herbicides applied to paddocks in 2006 may not have broken down adequately for re-cropping plans because of insufficient rainfall. Summer rainfall is not necessarily as effective as growing season rainfall in breaking down herbicide residues, so needs to be substantial and to keep the soil wet for a specified time. Read the herbicide label. It will be extremely important to know the chemical type used, as well as the plant-back periods, and the soil pH, rainfall and other requirements for breakdown. Herbicides applied two years ago could still have an impact too, as could the presence of cereal stubble with herbicides like Lontrel®.

Withholding periods for dicamba or similar 'spikes' to knockdown sprays used pre-sowing may need to be longer if there is no rainfall to activate chemical breakdown, otherwise poor establishment can occur. Note that dicamba plant-backs only commence after 15mm of rain. Lentils, faba beans are not listed on label. Alternative products with lesser or no residual may be more appropriate (eg carfentrazone-ethyl, oxyfluorfen).

Crop sensitivities: Pulse types differ in their sensitivity to residual herbicides, so check each herbicide used:

- Lentils and chickpeas are the worst for group B sulfonyl urea residues (eg Glean®, Logran®), with peas and beans the least.
- Beans are more sensitive to Monza® residues at low pH (<6.5) than chickpeas, lentils, lupins and peas. All are sensitive at higher pH (>6.5).
- Beans, lentils and lupins are more sensitive to group B sulphonamide residues (eg Broadstrike®), and be aware of the impact on shallow duplex soils.
- Chickpeas, faba beans and peas are least sensitive to the group B imidazolinones (imis, eg Spinnaker®, Raptor®, Midas®), with lentils extremely sensitive, and lupins, vetch intermediate.
- Raptor® has no minimum re-cropping interval if peas are being sown.
- All pulses are vulnerable to group I pyridine residues, and the rate applied (eg Lontrel®), but beans appear more vulnerable than lupins.
- Lentils cannot follow straight after chickpeas if Balance® (group F) has been used in the chickpeas.
- Lentils cannot immediately follow after beans or field peas if some group B's were used (eg Spinnaker®, Broadstrike® or Raptor®).

In areas that receive minimal summer-autumn rains and delayed opening rains, then the herbicide residual effect becomes far more pressing on rotation choices. Pulse following cereal could then become a higher risk situation than pulse following a pulse!

Weed burden: Weed burden in 2007 will depend on past history and how effective seed set was prevented, and will influence sowing choice and strategies. There was minimal weed germination after good early rains in 2006, but weed seed set may have been minimised through drought, hay cuts, desiccation, crop top or grazing of crops, unless the crop was let go or weed control failed.

Pulses can fit a rotation to ensure herbicide diversity and the ability to crop top or desiccate to prevent weed seed set. Resistant ryegrass has been a major target, but Giant Brome resistant to group A herbicides also poses a new threat in areas like the Wimmera and Mallee.

Herbicide efficacy in the dry: Instances of herbicide damage that ocurred under dry conditions in 2006 can be avoided in future, eg metribuzin and diuron in field peas and lentils, and with Balance® in chickpeas.

- If applied to dry soils, the risk of herbicide damage is increased greatly when rains occur, particularly if the soil is left ridged.
- PSPE herbicides should be applied to moist soil regardless of the sowing time.
- IBS may be more appropriate in dry conditions, or a split application to minimise risk in future.

Table 1: Minimum re-cropping intervals and guide-lines (but read labels to confirm).

Group and Type	Product	pH (H_2O) or product rate (ml/ha) As applicable	Minimum re-cropping interval (months after application), and conditions		
			Pulses	**Oilseed**	**Cereal**
I, Pyridine	clopyralid eg Lontrel®	Rate <300ml	Chickpea, faba bean, Pea, lentil, lupin, vetch = 9 >150mm rainfall, with >25mm summer-autumn	Canola = NA	NA
		Rate of 300-500ml	Chickpea, faba bean, Pea, lentil, lupin, vetch = 12 >150mm rainfall, with >25mm summer-autumn	Canola = NA	NA
		Rate of > 500ml	Chickpea, faba bean, Pea, lentil, lupin, vetch = 24 >150mm rainfall, with >25mm summer-autumn	Canola = NA	NA
F, isoxazoles	isoxaflutole eg Balance®	> 7.0	Chickpea = 0 Faba bean, pea = 9 (>250mm rainfall) Lentil = 21 (>500mm rainfall) Prolonged dry or cold periods may extend re-cropping intervals	Canola = 9 (>350mm rainfall)	Wheat, barley, oats = 2.5 (>100mm rainfall), BUT =9 if simazine was in the mix with isoxaflutole
		< 7.0	May result in extended re-cropping intervals	See pulses	See pulses
B, sulfonyl urea (SU)	chlorsulfuronseg Glean®, Seige®, Tackle®	< 6.5	Faba bean, pea, lupin = 12 Others >>18 (rainfall not specified)	'imi' canola = 3, others = 12	Wheat, triticale = 0, rye, =3 Oats = 6 Barley = 9
		6.6 – 7.5	Faba bean, pea = 22 (all states) Minimum 700mm Lupin = 22 (Vic, NSW), but >> 22 (other states) minimum 700mm Other s >> 22	'Imi' canola = 3, Others = 22 See pulses	Wheat, triticale = 0, rye = 3, Oats, barley = 9 minimum 700mm
		7.6-8.5	24 + (if test strip grown to maturity year before)	'imi' canola = 3, others = 24 or longer	Wheat, triticale = 0, rye, oats, barley = 18 minimum 700mm
		> 8.6	NR	NR	NR
B, sulfonyl urea (SU)	triasulfuron, eg Logran®, Nugrain®	< 6.5	Faba bean, pea, lupin, chickpea = 12 (> 300mm rainfall spraying to sowing) Lentil, others >> 18	Linseed, canola = 12 (> 300mm rainfall)	NA
		6.6 – 7.5	Faba bean, pea, lupin = 22 chickpea = 12 (NSW/Qld) or 22 (rest) (> 500mm rainfall spraying to sowing) Lentil, others >> 22	Canola = 12 (NSW), 22 (rest) (> 500mm rainfall)	NA
		7.6 – 8.5	Chickpeas (NSW/Qld) = 12 (500mm spraying to sowing rainfall). Chickpeas (rest), lupin, faba bean, pea =24 (> 700mm rainfall spraying to sowing) Lentil, others >> 22	Canola = 12 (NSW/Qld), (>500mm rain) or 24 (rest) (> 700mm rainfall spraying to sowing)	Oats, Barley, rye = 12 (>250mm grain, 300mm hay)
		> 8.6	Chickpeas, lupin, faba bean, pea =24 (> 700mm rainfall spraying to sowing) Lentil, others >> 24	Canola, linseed = 24 (> 700mm rainfall spraying to sowing)	Oats, Barley, rye = 12 (>250mm grain, 300mm hay)
B, Sulphonamide	flumetsulam eg Broadstrike®	NA	Pea, chickpea =3 Faba bean, lupin = 9, but = 24 on shallow duplex soils (sand over clay) with low organic matter (rainfall not specified)	Canola = 9 but 18 on shallow duplex soils (sand over clay) with low organic matter	Wheat, triticale, rye = 0 Barley, oats = 3
B, Sulphonamide	metosulam, eg Eclipse®	NA	Not specified = 9? (rainfall not specified)	Not specified = 9? (rainfall not specified)	NA
B, sulfonyl urea (SU)	metsulfuron eg Ally®, Associate®	5.6 – 8.5	= 9 (rainfall not specified)	= 9 (rainfall not specified)	Barley, rye, triticale = 1.5 Wheat = 0.33
		> 8.5	Tolerance of crops grown through to maturity should be determined (small scale) previous season before sowing larger area	As for pulses	As for pulses

Table 1 (cont): Minimum re-cropping intervals and guide-lines (but read labels to confirm).

Group and Type	Product	pH (H_2O) or product rate (ml/ha) As applicable	Minimum re-cropping interval (months after application), and conditions		
			Pulses	**Oilseed**	**Cereal**
B, sulfonyl urea (SU)	Metsulfuron + thifensulfuron eg Harmony® M	7.8 – 8.5 Organic matter > 1.7%	Faba bean, pea, lupin, chickpea = 9 (= > 400mm rainfall spraying to sowing) Lentil, others >> 14	Linseed, canola, safflower = 9 (> 400mm rainfall)	Rye, triticale, wheat = 3 Barley, oats = 9 (> 400mm rainfall)
		> 8.6 or organic matter <1.7%	Tolerance of crops grown through to maturity should be determined (small scale) previous season before sowing larger area	As for pulses	As for pulses
B, Imidazolinones ('imis')	imazapic + imazapyr eg Midas®, OnDuty®	-	**NB label changes** occurring are to be: faba bean, pea = 10 (>100-150mm), Chickpea = 10 (>150-200mm), lupin, vetch = 10 (>200-250mm) Lentil, others = 34 (.>200-250mm) **Old labels** may specify 0 or 8 for pulses	Clearfield canolas = 0 Other canolas = 34, safflower = 22	Clearfield wheats = 0 Other wheats, barley, triticale = 8, oats =34 If intend resow to cereals, do not apply later than end of August. >250mm spraying to sowing needed)
B, Imidazolinones ('imis')	Imazamox + Imazapyr eg Intervix®	-	faba bean, pea = 10 (>100-150mm), Chickpea = 10 (>150-200mm), Lupin, vetch = 10 (>200-250mm) Lentil, others = 34 (.200-250mm)	Clearfield canolas = 0 Other canolas = 34	Clearfield wheats = 0 Other wheats, barley, triticale, oats =10 If intend resow to cereals, do not apply later than end of August. 150-250mm needed (rate dependant))
B, Imidazolinones ('imis')	imazapic eg Flame®	-	Chickpea = 4 faba bean =3 Lentil, pea, lupin, vetch = 36? (>200mm rain spraying to sowing needed)	Clearfield canolas = ? Other canolas, safflower = 36	Clearfield wheats = 0 Other wheats, barley = 4, triticale = ?, oats =36 >200mm spraying to sowing needed)
B, sulfonyl urea (SU)	iodosulfuron eg Hussar®	< 8.5	Chickpea, faba bean, pea, lupin, vetch = 9 Lentil = 21 (>250mm rain spraying to sowing needed. Patchy rain with extended dry periods may also extend re-cropping interval)	Canola = 9	Wheat = NR barley, triticale, oats = 9 (>250mm spraying to sowing needed)
		> 8.5	NR	NR	NR
B, sulfonyl urea (SU)	mesosulfuron eg Atlantis®	< 8.5	Chickpea, pea, lupin, vetch = 9 Faba bean, Lentil = 11 (>250mm rain spraying to sowing needed. Patchy rain with extended dry periods may also extend re-cropping interval)	Canola = 9	Wheat = NA barley, triticale, oats = 9
		> 8.5	NR	NR	NR
B, Imidazolinones ('imis')	imazethapyr eg Spinnaker®	< 5.5 ($CaCl_2$)	Chickpea, faba bean, pea = 0 Lupin, vetch = 10 Lentil, others = 34 (>400mm spraying to sowing)	Clearfield canolas = 0, other canola = 34, Safflower = 22	Clearfield wheat = 0 Other wheat, barley, triticale =10 (>400mm spraying to sowing)
		> 5.5 ($CaCl_2$)	Chickpea, faba bean, pea = 0 Lupin, vetch = 10 Lentil, others = 34 (>300mm spraying to sowing)	Clearfield canolas = 0, other Canola = 34, Safflower = 22	Clearfield wheat = 0 Other wheat, barley, triticale = 10, Oats = 22 (>300mm spraying to sowing, but >400mm if using high rate)
B, sulfonyl urea (SU)	Sulfosulfuron eg Monza®	< 6.5	Chickpea, pea, lentil, lupin, vetch = 10 faba bean = 12 (Minimum 300mm rainfall spraying to sowing)	10	Wheat, triticale, rye = 0 Oats = 10, barley = 12
		6.5 – 8.5	Chickpea, pea, lentil, lupin, vetch, faba bean = 22 (minimum 600mm rainfall spraying to sowing)	22	Wheat, triticale = 0, If =, >300mm, then Rye = 10 and oats, barley = 22
B, Imidazolinones ('imis')	Imazamox eg Raptor®	-	Pea = 0, Chickpea, faba bean, lupin, vetch = 10 Lentil, others = 21 (minimum 200mm rainfall spraying to sowing) If late, wet seasons when soil is cold when wet, plant-backs will be extended	Clearfield canolas = 0 Other canolas, safflower = 21	Clearfield wheats = 0 Other wheats, barley, triticale = 10, oats =21 If intend resow to cereals, do not apply later than end of August.
		< 5.5 ($CaCl_2$)	Do not use in cereals when rainfall from spraying to sowing in cereals is expected to be < 300mm rainfall.	See pulses if rainfall <300mm	See pulses if rainfall <300mm

The decision as to which pulse to grow, and where, in 2007 will be based on risk and rotation need. Assess the disease risk versus residual herbicide risk. Assess any quality issues that arise from re-cropping, eg chickpeas after field peas, lentils after vetch. The rotation solutions will not become apparent until we know what summer-autumn rainfall has fallen.

Disease implications:
Despite the very low starting disease levels from pulse stubble after a dry year, it is the rainfall conditions in the new growing season that will have the major influence on the severity of pulse diseases in 2007.

Paddock selection is still critical, and sowing time along with canopy management is always important in disease management, and the cheapest to implement.

If considering growing a pulse again on a failed pulse from 2006, then consider what pulse to choose. Disease risk is one of the main considerations, and whether it can be managed. Botrytis Grey Mould, phoma and sclerotinia are common across most pulse species, but ascochyta is not. There is an ascochyta specific to each pulse species that do not cross infect. Assess any quality issues that arise from re-cropping, eg chickpeas after field peas, lentils after vetch.

Table 2: Pulses - risk rankings for disease versus herbicide residue* as factors for re-cropping

2006 CROP	FACTOR to consider	RISK FOR 2007 CROP		
		Least risk →	→ Intermediate risk →	→ most risk
Peas	***Disease***	***Bean#, lupin***	***Lentil, vetch, chickpea#***	***Pea***
	ex Broadstrike®	Pea, chickpea#	Bean#, lupin	Lentil
	ex Raptor®	Pea	Lupin, chickpea#, bean#, vetch	Lentil
	ex Spinnaker®	Pea, chickpea#, bean#	Lupin, vetch	Lentil
Beans	***Disease***	***Pea, lupin, chickpea#***	***Lentil, vetch***	***Bean***
	ex Spinnaker®	Pea, chickpea#, bean	Lupin, vetch	Lentil
Lentils	***Disease***	***Pea, lupin***	***Chickpea, bean***	***Vetch, lentil***
	ex Broadstrike®	Pea, chickpea	Bean, lupin	Lentil
Chickpea	***Disease***	***Lupin, pea#***	***Bean#, lentil, vetch***	***Chickpea***
	ex Balance®	Chickpea	Bean#, pea#	Lentil, lupin, Vetch
	ex Broadstrike®	Pea#, chickpea	Bean#, lupin	Lentil
Lupin	***Disease***	***Pea#, bean, lentil, chickpea#, vetch#***		***Lupin***
	ex Eclipse®	all?		
Vetch	***Disease***	***Lupin#***	***Bean#, chickpea#,***	***Vetch, lentil#***
				lentil#
Cereal	***Disease***	***All pulses***		
	ex On duty®	Chickpea, bean, pea	Lupin, vetch	Lentil
	ex Midas®	Chickpea, bean, pea	Lupin, vetch	Lentil
	ex Monza®	Pea, chickpea, lentil, lupin	Bean	
	ex Hussar®	Bean, pea, lupin		Lentil
	ex Atlantis®	Pea,	Lentil, bean	
	ex Harmony®	Pea, bean, chickpea, lupin		
	ex Logran®	Bean, pea, lupin	Chickpea	Lentil
	ex Glean®	Bean, pea, lupin	Chickpea	Lentil
	ex Lontrel®	All pulses		
Canola	***Disease***	***All pulses***		
	ex On duty®	Chickpea, bean, pea	Lupin, vetch	Lentil
	ex Lontrel®	All pulses		

* determined from re-crop intervals on herbicide labels # grain quality issues can arise through contamination

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