SASRI
HERBICIDE SELECTION GUIDE
2018

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USING THE GUIDE

1. Information in this guide must be used in conjunction with herbicide label instructions.
2. Start by selecting the weed type and weed stage you wish to target by using the WEED STAGE tables to on pages 1 -3.
3. Take note of the active ingredients in the corresponding TREATMENT column.
4. Select a product that corresponds with the active ingredient by using the PRODUCT TRADE NAMES list on pages 4 - 9.
5. While some additional information is provided for each active ingredient, you must consult the label of the selected products for application guidelines and restrictions.
6. When using tank mixtures, refer to the Registration L Number on every label of products to be mixed and read the information under the heading Compatibility (Mixing and Application). The label will specify which products are registered as being compatible for the required tank mixture.
7. It is illegal to use a chemical in a manner not prescribed on the label.
8. This Herbicide Selection Guide is also available from SASRI in the form of an Excel Spreadsheet Application which allows for easy selection and filtering.

DISCLAIMER

TREATMENT SELECTION TABLES

Note: BL = broadleaf weeds | ROT = rottboellia | SOR - sorghum | YWG = yellow watergrass | PWG = purple watergrass

PRE-EMERGENCE

BL	GRASS	UBABE	ROT	SOR	YWG	PWG	CROP RESTRICTION	TREATMENT	WEEKS CONTROL
*								MCPA	5
	*			*	*	*	PLANT CROP ONLY	EPTC	8
*	*	*			*			Alachlor + MCPA	8
*	*	*			*			Alachlor + Atrazine	8
*	*	*			*			Alachlor + Diuron	8
*	*	*			*			Alachlor + Ametryn	8
*	*	*			*	*		Chlorimuron ethyl + Metribuzin	12
*	*	*	*		*	*		Pendimethalin + Metribuzin + Chlorimuron-ethyl	12
*	*	*	*		*			Pendimethalin + Amicarbazone	12
*	*	*	*					Diuron + Pendimethalin	12
*	*	*	*					Pendimethalin	12
*	*	*			*			Metazachlor + Diuron	9
*	*	*			*			Metazachlor + Atrazine	9
*	*							Mesotrione + S-metolachlor + Terbuthylazine	10
*	*	*			*			Acetochlor + Atrazine	9
*	*	*			*			Acetochlor + Diuron	9
*	*	*			*			Acetochlor + Ametryn	9
*	*	*			*			Saflufenacil + Dimethenamid-P	10
*	*	*			*		RATOON CROP ONLY	Amicarbazone + Acetochlor	14
*	*	*			*			Metribuzin + Diuron	12
*	*	*		*	*			S- metolachlor + Ametryn	9
*	*	*		*	*		RATOON CROP ONLY	S- metolachlor + Hexazinone	12
*	*	*			*			Metolachlor + Ametryn	9
*	*	*			*			Tebuthiuron + Acetochlor	12
*	*	*						Tebuthiuron + Diuron	12
*	*	*						Tebuthiuron + Ametryn	12
*	*	*			*			Sulfentrazone	12
*	*	*					RATOON CROP ONLY	Hexazinone	12
*	*	*					RATOON CROP ONLY	Hexazinone + Diuron	12
*	*	*					RATOON CROP ONLY	Isoxaflutole + Diuron	14
*	*	*					RATOON CROP ONLY	Isoxaflutole + Hexazinone	14
*	*	*					RATOON CROP ONLY	Isoxaflutole + Ametryn	14
*	*	*			*		RATOON CROP ONLY	Amicarbazone + Hexazinone	14
*	*				*		RATOON CROP ONLY	Amicarbazone + Isoxaflutole	14
*	*	*	*	*	*		RATOON CROP ONLY	Amicarbazone + Hexazinone + Clomazone	16
*	*	*	*				RATOON CROP ONLY	Isoxaflutole + Indaziflam	no info

EARLY POST-EMERGENCE									
BL	**GRASS**	**UBABE**	**ROT**	**SOR**	**YWG**	**PWG**	**CROP RESTRICTION**	**TREATMENT**	**WEEKS CONTROL**
*	*	*			*			Alachlor + Atrazine + Paraquat	8
*	*	*			*			Alachlor + Ametryn + Paraquat	8
*	*	*			*			Alachlor + Diuron + Paraquat	8
*	*	*			*			Alachlor + Ametryn	8
*	*	*			*			Chlorimuron ethyl + Metribuzin	12
*	*	*			*			Acetochlor + Ametryn	9
*	*	*			*			Acetochlor + Ametryn + Paraquat	9
*	*	*			*		RATOON CROP ONLY	Amicarbazone + Acetochlor + Paraquat	14
*	*	*			*			S-metolachlor + Diuron + Paraquat	8
*	*	*			*			Metolachlor + Diuron + Paraquat	8
*	*	*			*			S-metolachlor + Metribuzin + Paraquat	12
*	*	*			*			Metolachlor + Metribuzin + Paraquat	12
*	*	*			*			S-metolachlor + Ametryn + MCPA	9
*	*	*			*			Metolachlor + Ametryn + MCPA	9
*	*	*			*			S-metolachlor + Ametryn + Paraquat	9
*	*	*			*			Metolachlor + Ametryn + Paraquat	9
*	*	*			*			S-metolachlor + Ametryn	9
*	*	*			*			Metolachlor + Ametryn	9
*	*				*			Sulcotrione + Atrazine	8
*	*	*			*		PLANT CROP ONLY	Metazachlor + Diuron + Paraquat	9
*	*	*			*			Metazachlor + Ametryn + Paraquat	9
*	*	*			*			Mesotrione + S-metolachlor + Terbuthylazine + Paraquat	10
*	*				*			Mesotrione + S-metolachlor + Diuron	4-8
*	*	*			*			Metribuzin + Diuron + Paraquat	12
*	*	*			*			Metribuzin + Ametryn + Paraquat	12
*	*				*			Tebuthiuron + Acetochlor	12
*	*	*						Tebuthiuron + Diuron	12
*	*	*						Tebuthiuron + Ametryn	12
*	*	*			*		RATOON CROP ONLY	Hexazinone + Diuron	12
*	*	*			*		RATOON CROP ONLY	Hexazinone	12
*	*	*			*		RATOON CROP ONLY	Hexazinone + Ametryn	12
*	*	*					RATOON CROP ONLY	Isoxaflutole + Paraquat	14
*	*	*			*		RATOON CROP ONLY	Amicarbazone + Hexazinone + Paraquat	14

POST-EMERGENCE

BL	GRASS	UBABE	ROT	SOR	YWG	PWG	CROP RESTRICTION	TREATMENT	WEEKS CONTROL
*	*	*			*			Ametryn + Metribuzin	12
*	*	*						Glufosinate ammonium + Diuron + Metribuzin	12
*	*	*					RATOON CROP ONLY	Glufosinate ammonium + Diuron + Hexazinone	12
*					*		RATOON CROP ONLY	Amicarbazone + MCPA	12
*	*	*			*		RATOON CROP ONLY	Amicarbazone + Ametryn	12
*	*				*		RATOON CROP ONLY	Amicarbazone + MCPA + Ametryn	12
*	*	*						Isoxadifen-ethyl + Tembotrione + Atrazine	6
*					*			Diuron + MCPA	6
*					*	*		Mesotrione + Halosulfuron	6
					*	*		Halosulfuron	6
*	*							Ametryn	6
*	*				*			Ametryn + MCPA	6
*	*							Ametryn + Paraquat	6
*								MCPA	5
	*	*			*	*		MSMA	6
*	*	*			*	*		Diuron + Paraquat	5
*	*				*	*		Paraquat	4
*	*	*			*	*		Glufosinate ammonium	no info

LATE POST-EMERGENCE

BL	GRASS	UBABE	ROT	SOR	YWG	PWG	CROP RESTRICTION	TREATMENT	WEEKS CONTROL
*	*				*			Diuron + Paraquat	5
*	*	*	*	*	*	*		Diuron + MSMA	5
					*	*		Halosulfuron	6
*	*				*	*		Paraquat	4
	*	*			*	*		MSMA	4
*	*	*	*	*	*	*		Ametryn + MSMA	5
*	*	*			*	*		Glufosinate ammonium	no info

CANE STOOL ERADICATION & FALLOW FIELD CLEAN-UP

BL	GRASS	UBABE	ROT	SOR	YWG	PWG	CROP RESTRICTION	TREATMENT	WEEKS CONTROL
*	*	*		*	*	*		Glyphosate	no info
	*							Fluazifop-butyl	no info
*	*	*		*	*			Arsenal Gen 2	no info

LIST OF ACTIVE INGREDIENTS AND CORRESPONDING PRODUCT TRADE NAMES

ACTIVE INGREDIENT	TRADE NAME	AI STRENGTH	UNIT	FORMULATION	LABEL BAND	HRAC GROUP
ACETOCHLOR	Acetochlor 700 EC	700	g/litre	(EC)	Blue	K3
ACETOCHLOR	Wenner	700	g/litre	(EC)	Blue	K3
ACETOCHLOR	Guardian S	840	g/litre	(EC)	Blue	K3
ACETOCHLOR	Leap 840 EC	840	g/litre	(EC)	Blue	K3
ACETOCHLOR	Premium 840 EC	840	g/litre	(EC)	Blue	K3
ACETOCHLOR	Acetak EC	900	g/litre	(EC)	Blue	K3
ACETOCHLOR	Acetochlor 900 EC	900	g/litre	(EC)	Blue	K3
ACETOCHLOR	Arysta Acetochlor	900	g/litre	(EC)	Blue	K3
ACETOCHLOR	GAP Acetochlor 900	900	g/litre	(EC)	Blue	K3
ACETOCHLOR	Premium 900 EC	900	g/litre	(EC)	Blue	K3
ACETOCHLOR	Relay Super	900	g/litre	(EC)	Blue	K3
ACETOCHLOR	Kestrel	960	g/litre	(EC)	Blue	K3
ALACHLOR	Alachlor	384	g/litre	(EC)	Yellow	K3
ALACHLOR	Lasso EC	384	g/litre	(EC)	Yellow	K3
ALACHLOR	Arysta Alachlor	384	g/litre	(EC)	Yellow	K3
ALACHLOR	GAP Alachlor	384	g/litre	(EC)	Yellow	K3
ALACHLOR	Alachlor EC	384	g/litre	(EC)	Yellow	K3
ALACHLOR	Villa-klor 480 CS	480	g/litre	(CS)	Yellow	K3
ACETOCHLOR + AMETRYN	Squash EC	350+200	g/litre	(EC)	Yellow	K3 + C1
ACETOCHLOR + AMETRYN	Acetamet 700 SC	450+250	g/litre	(SC)	Yellow	K3 + C1
ACETOCHLOR + AMETRYN	Assault 700 SC	450+250	g/litre	(SC)	Yellow	K3 + C1
AMETRYN	Ametryn 500 SC	500	g/litre	(SC)	Yellow	C1
AMETRYN	GAP Ametryn	500	g/litre	(SC)	Yellow	C1
AMETRYN	Anaconda	500	g/litre	(SC)	Yellow	C1
AMETRYN	Arysta Ametryn	500	g/litre	(SC)	Yellow	C1
AMETRYN	Ametrex 500 SC	500	g/litre	(SC)	Yellow	C1
AMICARBAZONE	Dinamic 700 WG	700	g/kg	(WDG)	Blue	C1
AMICARBAZONE	Farmazone 700 WG	700	g/kg	(WDG)	Blue	C1
AMICARBAZONE	Direction 700 WDG	700	g/kg	(WDG)	Blue	C1
AMICARBAZONE	Discipline 700 WDG	700	g/kg	(WDG)	Blue	C1
ATRAZINE	Atrazine 900 WG	900	g/kg	(WDG)	Yellow	C1
ATRAZINE	Arysta Atrazine 900	900	g/kg	(WDG)	Yellow	C1
ATRAZINE	Agrizine 500 SC	500	g/litre	(SC)	Yellow	C1
ATRAZINE	GAP Atrazine	500	g/litre	(SC)	Yellow	C1
ATRAZINE	Atrazine SC	500	g/litre	(SC)	Yellow	C1
ATRAZINE	Atraflo 500 SC	500	g/litre	(SC)	Yellow	C1
ATRAZINE	Arysta Atrazine 500	500	g/litre	(SC)	Yellow	C1

ACTIVE INGREDIENT	TRADE NAME	AI STRENGTH	UNIT	FORMULATION	LABEL BAND	HRAC GROUP
CHLORIMURON-ETHYL	Elegance Super 750 WDG	750	g/kg	(WDG)	Blue	B
CHLORIMURON-ETHYL	Style 750 WDG	750	g/kg	(WDG)	Blue	B
DIURON	Aventis Diuron Flo	800	g/litre	(SC)	Green	C2
DIURON	Diuron 800 SC	800	g/litre	(SC)	Green	C2
DIURON	Arysta Diuron	800	g/litre	(SC)	Green	C2
DIURON	GAP Diuron	800	g/litre	(SC)	Green	C2
DIURON	Diablo	800	g/litre	(SC)	Green	C2
DIURON	Cention	800	g/litre	(SC)	Green	C2
DIURON	Diurex 800 SC	800	g/litre	(SC)	Green	C2
DIURON	Farmag Diuron 800	800	g/kg	(WDG)	Green	C2
DIURON	Diron 800 WG	800	g/kg	(WDG)	Green	C2
DIURON	Develop 800 WDG	800	g/kg	(WDG)	Green	C2
DIURON	Extend 800 WDG	800	g/kg	(WDG)	Green	C2
DIURON	Diuron 80 WG	800	g/kg	(WDG)	Green	C2
DIURON	Karmex	800	g/kg	(WDG)	Green	C2
EPTC	Eptam Super	720	g/litre	(EC)	Yellow	N
EPTC	EPTC Plus	720	g/litre	(EC)	Yellow	N
EPTC	Eptam Plus	720	g/litre	(EC)	Yellow	N
EPTC	EPTC Super 720 EC	720	g/litre	(EC)	Yellow	N
EPTC	Esculentus 720 EC	720	g/litre	(EC)	Yellow	N
EPTC	EPTC S EC	720	g/litre	(EC)	Yellow	N
FLUAZIFOP-BUTYL	Volley 125	125	g/litre	(EC)	Yellow	A
FLUAZIFOP-BUTYL	Fluzie	125	g/litre	(EC)	Yellow	A
FLUAZIFOP-BUTYL	Orca 125 EC	125	g/litre	(EC)	Yellow	A
FLUAZIFOP-BUTYL	Fusilade Forte	150	g/litre	(EC)	Yellow	A

ACTIVE INGREDIENT	TRADE NAME	AI STRENGTH	UNIT	FORMULATION	LABEL BAND	HRAC GROUP
GLUFOSINATE AMMONIUM	Basta	200	g/litre	(SL)	Yellow	H
GLUFOSINATE AMMONIUM	Bound	200	g/litre	(SL)	Yellow	H
GLUFOSINATE AMMONIUM	Brass	200	g/litre	(SL)	Yellow	H
GLUFOSINATE AMMONIUM	Nirvana	200	g/litre	(SL)	Yellow	H
GLYPHOSATE	Slash 710 SG	710	g/kg	(WSG)	Green-Blue	G
GLYPHOSATE	Glygran 710 SG	710	g/kg	(WSG)	Green-Blue	G
GLYPHOSATE	Kalach 700	700	g/kg	(WSG)	Green-Blue	G
GLYPHOSATE	Piranha Dry	686	g/kg	(WSG)	Green-Blue	G
GLYPHOSATE	Erase Super 540 SL	540	g/kg	(SL)	Green-Blue	G
GLYPHOSATE	Piranha 510 SL	510	g/kg	(SL)	Green-Blue	G
GLYPHOSATE	Kalach 510 SL	510	g/kg	(SL)	Green-Blue	G
GLYPHOSATE	Clearout 500	500	g/kg	(WSG)	Green-Blue	G
GLYPHOSATE	Erase 500	500	g/kg	(WSG)	Green-Blue	G
GLYPHOSATE	Touchdown Forte Hitech	500	g/litre	(SC)	Green-Blue	G
GLYPHOSATE	Mamba DMA	480	g/litre	(SL)	Green-Blue	G
GLYPHOSATE	Mamba Max	480	g/litre	(SL)	Green-Blue	G
GLYPHOSATE	Slash Turbo	450	g/litre	(SL)	Green-Blue	G
GLYPHOSATE	Roundup Turbo	450	g/litre	(SL)	Green-Blue	G
GLYPHOSATE	Muscle-up 360 SL	360	g/litre	(SL)	Green-Blue	G
GLYPHOSATE	Bounty SL	360	g/litre	(SL)	Green-Blue	G
GLYPHOSATE	Slash 360	360	g/litre	(SL)	Green-Blue	G
GLYPHOSATE	Scat 360	360	g/litre	(SL)	Green-Blue	G
GLYPHOSATE	Panga 360	360	g/litre	(SL)	Green-Blue	G
GLYPHOSATE	Piranha 360	360	g/litre	(SL)	Green-Blue	G
GLYPHOSATE	Annihilate	360	g/litre	(SL)	Green-Blue	G
GLYPHOSATE	Persuador	360	g/litre	(SL)	Green-Blue	G
GLYPHOSATE	Erase 360	360	g/litre	(SL)	Green-Blue	G
GLYPHOSATE	Clearout 360	360	g/litre	(SL)	Green-Blue	G
GLYPHOSATE	Clearout 180	180	g/litre	(SL)	Green-Blue	G
GLYPHOSATE	Mamba	360	g/litre	(SL)	Green-Blue	G
GLYPHOSATE	Roundup 360	360	g/litre	(SL)	Green-Blue	G
GLYPHOSATE	Senator Xtra	360	g/litre	(SL)	Green-Blue	G
GLYPHOSATE	Springbok	360	g/litre	(SL)	Green-Blue	G

ACTIVE INGREDIENT	TRADE NAME	AI STRENGTH	UNIT	FORMULATION	LABEL BAND	HRAC GROUP
HALOSULFURON	Servian	750	g/kg	(WDG)	Green	B
HALOSULFURON	Cyprex	750	g/kg	(WDG)	Green	B
HALOSULFURON	Brigadier 750 WG	750	g/kg	(WDG)	Green	B
HALOSULFURON	Crown	750	g/kg	(WDG)	Green	B
HALOSULFURON	Halo	750	g/kg	(WDG)	Green	B
HEXAZINONE	Hexazinone 75 DF	750	g/kg	(WDG)	Yellow	C1
HEXAZINONE	Unizone 750 WDG	750	g/kg	(WDG)	Yellow	C1
HEXAZINONE	V-Zone 750 DF	750	g/kg	(WDG)	Yellow	C1
HEXAZINONE	Villex 750 WDG	750	g/kg	(WDG)	Yellow	C1
HEXAZINONE	Zinon WG	750	g/kg	(WSG)	Yellow	C1
HEXAZINONE	Hexazinone 480 SL	480	g/litre	(SL)	Yellow	C1
HEXAZINONE	Hexsan 240	240	g/litre	(SL)	Yellow	C1
HEXAZINONE	HexaziMax	240	g/litre	(SL)	Yellow	C1
HEXAZINONE	Ransom 240 SL	240	g/litre	(SL)	Yellow	C1
HEXAZINONE	UAP Hexazinone	240	g/litre	(SL)	Yellow	C1
HEXAZINONE	Arysta Hexazinone	240	g/litre	(SL)	Yellow	C1
HEXAZINONE	FarmAg Hexazinone 750 WG	750	g/kg	(WDG)	Yellow	C1
HEXAZINONE	Velpar DF	750	g/kg	(WSG)	Yellow	C1
HEXAZINONE + CLOMAZONE	Dropzone 500 WP	400+100	g/kg	(WP)	Blue	C1 + F3
HEXAZINONE + DIURON	Bobcat Combi 600 WG	132+468	g/kg	(WDG)	Yellow	C1 + C2
HEXAZINONE + DIURON	Velpar K2.4	250+533	g/kg	(WDG)	Yellow	C1 + C2
HEXAZINONE + DIURON	Velpar K3.0	250+533	g/kg	(WDG)	Yellow	C1 + C2
HEXAZINONE + DIURON	Velpar K2.0	375+400	g/kg	(WDG)	Yellow	C1 + C2
IMAZAPYR	Arsenal GEN 2	240	g/litre	(EC)	Blue	B
ISOXADIFEN-ETHYL + TEMBOTRIONE	Laudis	630	g/litre	(SC)	Yellow	F2
ISOXAFLUTOLE	Merlin	750	g/kg	(WDG)	Green	F2
ISOXAFLUTOLE	Guillotine 750 WG	750	g/kg	(WDG)	Green	F2
ISOXAFLUTOLE	Silencer	750	g/kg	(WDG)	Green	F2
ISOXAFLUTOLE	Manter	750	g/kg	(WDG)	Green	F2
ISOXAFLUTOLE	Palmero 750 WG	750	g/kg	(WDG)	Green	F2
ISOXAFLUTOLE + INDAZIFLAM	Alion Total	450+150	g/litre	(SC)	?	L29 + F2

ACTIVE INGREDIENT	TRADE NAME	AI STRENGTH	UNIT	FORMULATION	LABEL BAND	HRAC GROUP
MCPA	Tornado 400 SL	400	g/litre	(SL)	Yellow	O
MCPA	Rescue 400 SL	400	g/litre	(SL)	Yellow	O
MCPA	MCPA 400 SL	400	g/litre	(SL)	Yellow	O
MCPA	Universal MCPA	400	g/litre	(SL)	Yellow	O
MCPA	GAP MCPA	400	g/litre	(SL)	Yellow	O
MESOTRIONE	Astron 480 SC	480	g/litre	(SC)	Yellow	C1
MESOTRIONE	Amazing	480	g/litre	(SC)	Yellow	C1
MESOTRIONE	Galago S	480	g/litre	(SC)	Yellow	C1
MESOTRIONE + S-METOLACHLOR + TERBUTHYLAZINE	Lumax	37.5+375+125	g/litre	(SE)	Yellow	C1+F2+K3
MESOTRIONE + S-METOLACHLOR + TERBUTHYLAZINE	Locate 538 SC	37.5+375+125	g/litre	(SE)	Yellow	C1+F2+K3
MESOTRIONE + S-METOLACHLOR + TERBUTHYLAZINE	Local 538 SC	37.5+375+125	g/litre	(SE)	Yellow	C1+F2+K3
METAZACHLOR	Claw 500 SC	500	g/litre	(SC)	Blue	K3
METAZACHLOR	Sultan 50 SC	500	g/litre	(SC)	Blue	K3
METOLACHLOR	Metolachlor 960 EC	960	g/litre	(EC)	Yellow	K3
METOLACHLOR	Tolla 960	960	g/litre	(EC)	Yellow	K3
METOLACHLOR	Platinum	960	g/litre	(EC)	Yellow	K3
METOLACHLOR	Buccaneer 960	960	g/litre	(EC)	Yellow	K3
METOLACHLOR	Unimoc EC	960	g/litre	(EC)	Yellow	K3
S-METOLACHLOR	Falcon Gold	960	g/litre	(EC)	Yellow	K3
S-METOLACHLOR	Palladium 960	960	g/litre	(EC)	Yellow	K3
S-METOLACHLOR	Tolla Super 960 EC	960	g/litre	(EC)	Yellow	K3
METRIBUZIN	Sentak	480	g/litre	(SC)	Yellow	C1
METRIBUZIN	Metribuzin 480 SC	480	g/litre	(SC)	Yellow	C1
METRIBUZIN	GAP Metribuzin	480	g/litre	(SC)	Yellow	C1
METRIBUZIN	Arysta Metribuzin 480	480	g/litre	(SC)	Yellow	C1
METRIBUZIN	Metricane 700 WDG	700	g/kg	(WGD)	Yellow	C1
METRIBUZIN	Amazon 480 SC	480	g/litre	(SC)	Yellow	C1
METRIBUZIN	Mistral 700 WG	700	g/kg	(WGD)	Yellow	C1
METRIBUZIN	Ag-Metribuzin	480	g/litre	(SC)	Yellow	C1
METRIBUZIN	Metribuzin 75 WG	750	g/kg	(WGD)	Yellow	C1
METRIBUZIN + CHLORIMURON-ETHYL	Extreme Plus	643+107	g/kg	(WGD)	Yellow	C1 + B
METRIBUZIN + CHLORIMURON-ETHYL	Imposter	643+107	g/kg	(WGD)	Yellow	C1 + B
METRIBUZIN + DIURON	Metrad	360+400	g/kg	(WGD)	Yellow	C1 + C2
MSMA	GAP MSMA	720	g/litre	(SL)	Yellow	Z
MSMA	MSMA	720	g/litre	(SL)	Yellow	Z
MSMA	MSMA SL	720	g/litre	(SL)	Yellow	Z
MSMA	Arysta MSMA	720	g/litre	(SL)	Yellow	Z
MSMA	Agromate	720	g/litre	(SL)	Yellow	Z

ACTIVE INGREDIENT	TRADE NAME	AI STRENGTH	UNIT	FORMULATION	LABEL BAND	HRAC GROUP
PARAQUAT	Makhro Paraquat	200	g/litre	(SL)	Yellow-Red	D
PARAQUAT	Agroquat 200	200	g/litre	(SL)	Yellow-Red	D
PARAQUAT	Paraquat 200 SL	200	g/litre	(SL)	Yellow-Red	D
PARAQUAT	Harpoon 200 SL	200	g/litre	(SL)	Yellow-Red	D
PARAQUAT	Paragone SL	200	g/litre	(SL)	Yellow-Red	D
PARAQUAT	GAP Paraquat	200	g/litre	(SL)	Yellow-Red	D
PARAQUAT	Skoffle 145 SL	145	g/litre	(SL)	Yellow-Red	D
PARAQUAT	Gramoxone	200	g/litre	(SL)	Yellow-Red	D
PARAQUAT	Paraquat SL	200	g/litre	(SL)	Yellow-Red	D
PARAQUAT	Skoffle 200 Super	200	g/litre	(SL)	Yellow-Red	D
PARAQUAT	Arysta Paraquat	200	g/litre	(SL)	Yellow-Red	D
PARAQUAT + DIURON	X-Tinct	450+50	g/litre	(SC)	Yellow-Red	D + C2
PARAQUAT + DIURON	Farmuron	100+300	g/litre	(SL)	Yellow-Red	D + C2
PARAQUAT + DIURON	Gramuron	100+300	g/litre	(SL)	Yellow-Red	D + C2
PARAQUAT + DIURON	Volmuron	100+300	g/litre	(SL)	Yellow-Red	D + C2
PENDIMETHALIN	Prowl	455	g/litre	(CS)	Yellow	K1
PENDIMETHALIN	Pendimethalin 500 EC	500	g/litre	(EC)	Yellow	K1
PENDIMETHALIN	Parabat 500 EC	500	g/litre	(EC)	Yellow	K1
PENDIMETHALIN	Alligator 500 EC	500	g/litre	(EC)	Yellow	K1
SAFLUFENACIL + DIMETHENAMID-P	Intelex	68	g/litre	(EC)	Blue	E + K3
SULCOTRIONE + ATRAZINE	Armadillo	125+300	g/litre	(SC)	Yellow	F2 + C1
SULCOTRIONE + ATRAZINE	Shuttle 425 SC	125+300	g/litre	(SC)	Yellow	F2 + C1
SULFENTRAZONE	Preelect 750 WDG	750	g/kg	(WDG)	Blue	E
SULFENTRAZONE	Avon 750 WDG	750	g/kg	(WDG)	Blue	E
TEBUTHIURON	Tarantula 500 SC	500	g/litre	(SC)	Yellow	C2
TEBUTHIURON	Teburox	500	g/litre	(SC)	Yellow	C2
TEBUTHIURON	Tebusan 500 SC	500	g/litre	(SC)	Yellow	C2
TEBUTHIURON	Arysta Lava 500 SC	500	g/litre	(SC)	Yellow	C2
TEBUTHIURON	Lava 800 WDG	800	g/kg	(WDG)	Yellow	C2

ADDITIONAL INFORMATION PER ACTIVE INGREDIENT

ACETOCHLOR	
HRAC Group = K3	Inhibits protein or fat synthesis and cell division and hence growth and development
Weeds controlled	Controls grasses and a few broadleaf weeds when applied before germination of the weeds.
Variable control	Yellow watergrass
Site of absorption	Germinating grass seeds. No post-emergence activity
Climatic requirements	You need at least 15 mm rain within 5-10 days after application. Best results are obtained when rainfall moves the herbicide into the root zone after application.
Maximum cane size before applying as a directed spray	Apply at planting or immediately following planting, but not later than 3 days after planting. Acetochlor has no post-emergence activity and can be applied post-emergence to the crop after cultivation, when no weeds are present.
Level of management required	Medium
Leaching	Low leaching
Label band colour of worst ingredient	Blue. Toxic with caution required.
Toxicity to rats	Low (ORAL LD50 2000-8000 mg/kg)
Toxicity to birds	Medium (LD50 900-2000 mg/kg)
Toxicity to bees	Low or no toxicity (LD50 1000 ug/BEE - non toxic)
Toxicity to fish	High (LC50 1-20 mg/L)
Spray rate of water	200-300 litres per hectare
Increase herbicide application rate according to	Clay content.
Comments	Apply the higher acetochlor dosage rate on soils with more than 30% clay, or where longer residual action, or better control of yellow watergrass is required. Use the lower dosage rate on lighter soils.
Precautions	Do not apply acetochlor to poorly drained soils, or soils with a compaction layer as the herbicide may cause crop injury in cases of waterlogging. Do not apply acetochlor to sandy soils susceptible to wind erosion. Ensure continuous agitation of the spray mixture during mixing and application.

ALACHLOR	
HRAC Group = K3	Inhibits protein or fat synthesis and cell division and hence growth and development
Weeds controlled	Annual grasses, *Panicum maximum* , some broadleaf
Variable control	Yellow watergrass
Site of absorption	Germinating grass seeds and roots of broadleaf
Climatic requirements	You need 10-15 mm rain within 5-10 days after application.
Maximum cane size before applying as a directed spray	Apply alachlor preferably with or directly after planting but not later than three days after planting. 0-5 unfurled leaves. Safe in plant and ratoon cane.
Level of management required	High (leaching risk)
Leaching	Very high leaching risk
Label band colour of worst ingredient	Yellow. Toxic and described as harmful
Toxicity to rats	Low toxicity to mammals (ORAL LD50 2000-8000 mg/kg)
Toxicity to birds	Low toxicity to birds (LD50 2000-20000 mg/kg)
Toxicity to bees	Medium - high toxicity to bees (LD50 70-1000 ug/BEE)
Toxicity to fish	Medium toxicity to fish (LC50 50-300 mg/L)
	Some formulations can be toxic to fish.

Spray rate of water	100-300 litres per hectare
Increase herbicide application rate according to	Clay content.
Comments	If you expect heavy *Panicum maximum* (barbi grass) pressure from seed, apply highest rate of alachlor in the mixes.
Precautions	Do not use alachlor on poorly drained soils or soils with a compaction layer. Under these conditions waterlogging can occur and the herbicide may cause crop injury. Do not use alachlor on sandy soils which are susceptible to soil erosion. Ensure thorough agitation of the mixture in the tank throughout mixing and spraying. The mixture must not stand overnight. When mixed with diuron, the diuron rate is very high so do not use this treatment on sensitive fields (e.g. sandy soils with sensitive varieties).

ACETOCHLOR + AMETRYN	
HRAC Group = K3 + C1	Inhibits photosynthesis (conversion of light to chemical energy), cell division and protein or fat synthesis and hence growth and development
Weeds controlled	Annual grasses, *Panicum maximum* , some broadleaf
Variable control	Yellow watergrass
Site of absorption	Germinating grass seeds
Climatic requirements	You need at least 15 mm rain within 5-10 days after application.
Maximum cane size before applying as a directed spray	Preferably apply before emergence of the weeds. 0-2 unfurled leaves.
Level of management required	Medium
Leaching	Low-medium
Label band colour of worst ingredient	Yellow. Toxic and described as harmful
Toxicity to rats	Low (ORAL LD50 2000-8000 mg/kg)
Toxicity to birds	Medium (LD50 900-2000 mg/kg)
Toxicity to bees	Medium-high (LD50 70-1000 ug/BEE)
Toxicity to fish	Very high (LC50 0.023-1.0 mg/L).
	WARNING: Toxic to fish and aquatic organisms.
Spray rate of water	200-300 litres per hectare
Increase herbicide application rate according to	Clay content.
Comments	For early post-emergence application, add 1.5 litres per hectare paraquat to kill weeds that have germinated. This will create a pre-emergence situation for weed control with ametryn. Add a non-ionic surfactant to the final spray mixture, to enhance the efficacy of post-emergence treatment.
Precautions	Ensure continuous agitation of the spray mixture during mixing and application

AMETRYN	
HRAC Group = C1	Inhibits photosynthesis (conversion of light to chemical energy)
Weeds controlled	Annual grasses, some broadleaf
Variable control	Yellow watergrass
Site of absorption	Roots and foliage
Climatic requirements	Effective post-emergence weed control can be obtained under relatively dry conditions. For pre-emergence control, soil must be moist and conditions must favour rapid growth.
Maximum cane size before applying as a directed spray	0-5 unfurled leaves. Wherever possible preference should be given to a directed spray treatment.
Level of management required	Medium

Leaching	Low-medium adsorption. Adsorption increases with clay and OM content. It has more adsorption than other triazines.
Label band colour of worst ingredient	Yellow. Toxic and described as harmful
Toxicity to rats	Low (ORAL LD50 2000-8000 mg/kg)
Toxicity to birds	Low (LD50 2000-20000 mg/kg)
Toxicity to bees	Medium-high (LD50 70-1000 ug/BEE)
Toxicity to fish	Very high (LC50 0.023-1.0 mg/L).
	Toxic to fish and aquatic organisms.
Spray rate of water	200-500 litres per hectare, depending on density and size of weeds.
Increase herbicide application rate according to	Clay content.
Comments	Pre-Emergence: Combine ametryn with metolachlor or acetochlor to control annual broadleaf weeds and grasses. Use lower rates on light-medium clay soils and higher rates on medium-heavy clay soils. Post-emergence: Ametryn may be applied at any growth stage of cane, but weeds must be small and actively growing. Add a non-ionic surfactant to the final spray mixture to increase efficacy. Broadleaf less than 10 cm: Ametryn + MCPA + paraquat + surfactant. Mainly broadleaf and annual grasses: Apply 8L/ha ametryn to broadleaf weeds less than 7.5 cm and grasses less than 4 cm. Mainly *Cyperus esculentus* : Apply ametryn + MCPA + surfactant when *C. esculentus* is in the early flowering stage. Only fully emerged plants will be controlled for a period of 3 to 6 weeks. Broadleaf weeds smaller than 4cm will also be controlled. Broadleaf, annual grasses and *C. esculentus* : Apply ametryn + metribuzin + surfactant when *C. esculentus* is in the early flowering stage. This will control only fully emerged *C. esculentus* under favourable climatic conditions. Broadleaf weeds and grasses less than 4cm will also be controlled. Use the higher ametryn rate for heavy grass pressure lands. Mainly emerged small grasses: Ametryn + MSMA (no surfactant). Rottboellia which germinates after application will not be effectively controlled. Proper wetting is essential for good control. *Panicum maximum* below other weeds will not be controlled.
Precautions	Do not apply near roots of desirable plants. Do not mix, load or apply within at least 15 metres of boreholes, streams, rivers and dams or at least 60 metres from dams. Agitate spray mixture thoroughly before and during spraying.

AMICARBAZONE	
HRAC Group = C1	Inhibits photosynthesis (conversion of light to chemical energy)
Weeds controlled	Broadleaf weeds (including creepers) and certain grasses
Variable control	Yellow watergrass
Site of absorption	Foliage and roots
Climatic requirements	Certain combination treatments can be applied under both dry or moist soil conditions
Maximum cane size before applying as a directed spray	Apply pre-emergence soon after harvesting before the weeds have germinated and the first cane leaves are 10 cm high. Apply post-emergence directed away from cane foliage. Amicarbazone can cause **temporary** leaf chlorosis and plant stunting, especially on tillered cane grown in a low clay soil. Symptoms can be severe if the spray mixture comes into direct contact with developed leaves.
Level of management required	High
Leaching	Very high. Avoid soils with less than 0.5 % organic matter, greater than 60 % sand, and a water table that is less than 2m below the surface.
Label band colour of worst ingredient	Blue band. Toxic described as caution required.
Toxicity to rats	Medium (ORAL LD50 1000-2000 mg/kg)
Toxicity to birds	Low (LD50 2000-20000 mg/kg)

Toxicity to bees	Medium-high (LD50 70-1000 ug/BEE)
Toxicity to fish	Medium (LC50 50-300 mg/L)
Spray rate of water	200-300 litres per hectare
Increase herbicide application rate according to	DO NOT INCREASE RATE. Carefully follow label directions.
Comments	**Pre-emergence:** Apply amicarbazone after harvesting and before the weeds have germinated and the first cane leaves are 10 cm high. Amicarbazone MUST be combined with a) acetochlor to **moist** soil, or b) with hexazinone **to a dry or moist soil**. To suppress e.g. C*yperus esculentus* and/or control *Panicum maximum* , apply the highest permitted hexazinone rate (see label for clay% and time of season). Better *Cyperus esculentus* suppression depends on early application and follow-up moisture. Add paraquat at 1 ℓ/ha if small weeds are present. **Post-emergence:** Direct spray between rows and avoid contact with cane foliage. *Cyperus esculentus* and broadleaf weeds: Apply amicarbazone + MCPA + approved surfactant when *C. esculentus* is more than 20% flowering at spraying for optimum control. Grass seedlings: Apply amicarbazone + ametryn + approved surfactant. Grasses should not be beyond the tillered stage. *Cyperus esculentus* is also controlled. Cyperus esculentus, broadleaf and grass weeds: Apply amicarbazone + ametryn + MCPA + approved surfactant.
Precautions	ONLY in fields with more than 10% clay. Avoid soils with less than 0.5 % organic matter, greater than 60 % sand, and a water table that is less than 2 m below the surface. You get better weed control in soil free of extraneous matter (e.g. thick trash blanket). Avoid double application in one season and overlapping spray swaths. Do not use on cane fields that have been treated with e.g. **lime, gypsum, filter press, chicken litter** that may raise soil pH in the last 12 months. Do not use if soil pH is > 7.4. Contact your supplier for more details.

ATRAZINE	
HRAC Group = C1	Inhibits photosynthesis (conversion of light to chemical energy)
Weeds controlled	Annual broadleaf weeds and some grasses
Variable control	Yellow watergrass
Site of absorption	Mainly roots
Climatic requirements	You need 10-15mm rain within 7-10 days after application. For best results, apply shortly irrigation or before rain is expected
Maximum cane size before applying as a directed spray	0-5 unfurled leaves. Safe in plant and ratoon cane.
Level of management required	High (leaching risk)
Leaching	Very high leaching risk
Label band colour of worst ingredient	Yellow. Toxic and described as harmful
Toxicity to rats	Medium (ORAL LD50 1000-2000 mg/kg)
Toxicity to birds	Medium (LD50 900-2000 mg/kg)
Toxicity to bees	Low or no toxicity (LD50 1000 ug/BEE - NON TOXIC)
Toxicity to fish	High (LC50 1-20 mg/L)
Spray rate of water	200-300 litres per hectare
Increase herbicide application rate according to	Clay content.
Comments	**Pre-emergence:** Annual grasses and broadleaf weeds: Combine atrazine with a registered grasskiller, e.g. acetochlor or metolachor. Apply immediately after planting and before weed emergence. **Post-emergence application:**

	Annual grasses and broadleaf weeds: Where application is post-emergence to the cane and weeds, broad-leaf weeds should be less than the 2-leaf seedling stage. Grasses should not have germinated.
Precautions	Not recommended by SASRI due to leaching risk and bio-accumulation. There are alternative products with lower environmental risk. Repeated or prolonged use can lead to bio-accumulation in water courses. Do not mix or load within at least 15 metres of boreholes, streams and rivers or at least 60 metres from dams. Do not apply near the roots of desirable plants. Constant agitation throughout the spray operation is essential. Contact your local agro-chemical supplier for correct use.

CHLORIMURON-ETHYL	
HRAC Group = B	Inhibits protein or fat synthesis and hence growth and development
Weeds controlled	Yellow (*Cyperus esculentus*) and Purple (*Cyperus rotundus*) watergrass. Broadleaf weeds and some grasses
Variable control	
Site of absorption	Roots and foliage
Climatic requirements	Ideally, apply onto moist soil. Rainfall or irrigation within 1-3 days after application will also improve weed control. Cool, dry conditions after spraying will reduce weed control. If dry weather conditions prevail after application, use an appropriate post-emergence herbicide.
Maximum cane size before applying as a directed spray	0 unfurled leaves. Apply as a directed inter-row spray, avoid foliar contact.
Level of management required	High (leaching risk)
Leaching	Very high leaching risk
Label band colour of worst ingredient	Blue. Toxic and described as requiring caution
Toxicity to rats	Low (ORAL LD50 2000-8000 mg/kg)
Toxicity to birds	Low (LD50 2000-20000 mg/kg)
Toxicity to bees	Very high (LD50 11-50 ug/BEE)
Toxicity to fish	Toxic to fish and other aquatic organisms. Considered a Marine Pollutant.
Spray rate of water	100-400 litres per hectare
Increase herbicide application rate according to	Clay content. Do not exceed the label recommendations.
Comments	**Pre-emergence and early post emergence:** *Cyperus esculentus* , grasses and broadleaf weeds: Apply chlorimuron-ethyl + metribuzin **pre-emergence** as soon as possible after planting, or harvesting. Apply **early post emergence** to actively growing weeds, not later than the 4-leaf stage of broadleaf weeds or the 3-leaf stage of grasses and *Cyperus esculentus* . *Cyperus rotundus:* Apply before germination begins, whether visible or not. Application after germination, or a post-emergence application, will only result in suppression (± 60 % control). Weed control is improved if soil has been disked or rotavated immediately before planting and spraying. In ratoon cane a similar inter row cultivation should precede spraying. Poor weed control plus chlorosis and stunting may occur when cane is stressed by drought, waterlogging, cold temperatures, nutrient deficiencies (especially nitrogen and zinc), insect damage, disease, wind or hail damage or earlier herbicide damage.
Precautions	Avoid soils with exceptional high clay content, high cation exchange capacities and exceptionally high organic matter. Apply as soon as possible after planting or harvesting. Avoid excessive overlapping of swathes. Never exceed the recommended dosage rate. Do not apply when weeds are covered with rain or dew or if rain is expected within 2 hours. Do not spray when wind speed exceeds 15 km per hour or under gusty wind conditions.

Precautions	Do not use water containing high levels of chlorine. Insufficient soil moisture, high soil temperatures, low soil pH and weed species may negatively affect the residual control of weeds germinating after application of the product. Water pH should be between 6.7 and 7.5. Residual activity may be extended when soils have a water pH above 7.0 or soils contain free lime or if you apply more than once in the same season. Maintain proper agitation. Do not spray on or near desirable trees or plants or where their roots may extend or could come in contact with the herbicide.

DIURON	
HRAC Group = C2	Inhibits photosynthesis (conversion of light to chemical energy)
Weeds controlled	Mainly annual broadleaf weeds and grasses
Variable control	Yellow watergrass
Site of absorption	Mainly through roots, but also through foliage
Climatic requirements	Apply to moist soil and with at least 15 mm rain within 1 week after application.
Maximum cane size before applying as a directed spray	0-5 unfurled leaves. High rates can affect cane growth of most varieties.
Level of management required	Medium
Leaching	Medium-high leaching risk
Label band colour of worst ingredient	Blue. Toxic and described as requiring caution
Toxicity to rats	Low (ORAL LD50 2000-8000 mg/kg)
Toxicity to birds	Medium (LD50 900-2000 mg/kg)
Toxicity to bees	Low or no toxicity (LD50 1000 ug/BEE - NON TOXIC)
Toxicity to fish	Moderate-highly toxic to fish (LC50 1-20 mg/L)
	Highly toxic to aquatic organisms.
Spray rate of water	200-400 litres per hectare
Increase herbicide application rate according to	Clay content.
Comments	Ideal for use with a variety of other chemicals as it controls a range of weeds. More water dependent than ametryn. **Pre-emergence:** Diuron is combined with e.g. acetochlor, metribuzin, isoxaflutole or pendimethalin. **Pre-early post-emergence:** For early post and post-emergence applications, add a recommended adjuvant if the label recommends it. Weeds should be actively growing and in the correct growth stage for optimum results. Diuron can be combined with one of the following hexazinone, or metribuzin or MCPA or MSMA *Panicum maximum*: is normally controlled with diuron+ hexazinone or diuron+MSMA before 4 cm tall and before tillering. *Cyperus esculentus*: Can be controlled if sprayed by diuron + MCPA just before flowering. Variable results may be obtained if sprayed earlier or during cold or dry weather conditions. *Cyperus rotundus Rottboellia, Cynodon dactylon* and *Paspalum* species are not controlled. Control of *Sorghum verticilliflorum* is usually inadequate.
Precautions	Avoid leaching on soils with low clay and organic matter content. Do not apply near desirable plants or trees. Do not mix, load or apply within 20 meters of any water source. Prevent overlapping spray swaths and double spraying. Maintain proper agitation.

EPTC	
HRAC Group = N	Inhibits protein/ fat synthesis and hence growth and development
Weeds controlled	Mainly grasses, and yellow and purple watergrass
Variable control	
Site of absorption	Roots
Climatic requirements	Soil should be moist for activation of the chemical
Maximum cane size before applying as a directed spray	0-5 unfurled leaves
Level of management required	High
Leaching	Adsorbed into particles of dry soil. Adsorption increases as clay and organic matter contents increase
Label band colour of worst ingredient	Yellow. Toxic and described as harmful
Toxicity to rats	Medium (ORAL LD50 1000-2000 mg/kg)
Toxicity to birds	Low (LD50 2000-20000 mg/kg)
Toxicity to bees	Very high (LD50 11-50 ug/BEE)
Toxicity to fish	High (LC50 1-20 mg/L)
Spray rate of water	250-450 litres per hectare
Increase herbicide application rate according to	Clay content
Comments	ONLY use EPTC in plant cane fields. Provides good control of *Cyperus rotundus* and *C. esculentus* if adequately incorporated into the soil, and if furrows are not drawn deeper than the depth of incorporation (200 mm). Only use EPTC if soil conditions are suitable for fast germination of the crop.
Precautions	EPTC MUST BE incorporated into the soil within two minutes after application and preferably in one operation, especially if the soil surface is moist, because the product is very volatile. It must be thoroughly mixed with the uppermost 10 -15 cm soil layer, before planting takes place, or it should be injected into the soil at planting time with a suitable implement. Read label instructions.

FLUAZIFOP-BUTYL	
HRAC Group = A	Inhibits protein or fat synthesis and hence growth and development
Weeds controlled	Post-emergence control of grasses, including sugarcane
Expected period of control	Kills existing grasses but has some residual action
Site of absorption	Foliage then translocated
Climatic requirements	Warm, humid conditions when weeds are vigorously growing. Drought conditions will result in poor or no weed control.
	Rain within one hour will necessitate re-spraying.
Maximum cane size before applying as a directed spray	The product stunts or kills young, uncurled leaves and may also kill the growing points of cane.
Level of management required	Medium
Leaching	Low. Only slightly mobile in soil
Label band colour of worst ingredient	Yellow. Toxic and described as harmful
Toxicity to rats	Low (ORAL LD50 2000-8000 mg/kg)
Toxicity to birds	Low (ORAL LD50 2000-20000 mg/kg)
Toxicity to bees	Medium high (LD50 70-1000 ug/BEE)
Toxicity to fish	High (LC50 1-20 mg/L)
Spray rate of water	200-300 litres per hectare

Increase herbicide application rate according to	Weed species
Comments	WARNING: kills cane. Wait until most of the grass weeds have germinated before spraying. It will control grass seedlings with up to six leaves but before tillering. For creeping erennial grasses, apply ONLY to broken rhizomes. Re-growth may occur on well established *Cynodon dactylon* and *Paspalum paspalodes* . Repeated applications might result in multiplication of broadleaf weeds because competition with grasses is reduced..
Precautions	Avoid spray drift onto other crops or sugarcane not ready for harvesting, grazing, rivers or dams. Do not add a wetting agent, or mix with any other chemicals

GLUFOSINATE AMMONIUM	
HRAC Group = H	Results in accumulation of ammonia and this destroys cells
Weeds controlled	Broadleaf weeds, certain annual grasses, sedges, common reed.
Multiple sprays	*Cynodon dactylon* (Cynodon), *Panicum maximum* (grass), and watergrass require multiple sprays when grass is actively growing. Refer to the label for required re-spray rates.
Site of absorption	Foliage
Climatic requirements	You get optimum control if spray within 3 days after good rainfall and there are conditions promoting active growth of weed leaf area e.g. humid, warm, after rain.
	Do not apply if you expect rainfall within 6 hours.
Maximum cane size before applying as a directed spray	0 leaf. **WARNING: KILLS CANE.** Ensure spray does not touch cane foliage as the crop will be damaged. Direct post-emergence application between the rows in plant and ratoon cane.
Level of management required	Medium
Leaching	Normally stays in the top 15 cm of soil.
Label band colour of worst ingredient	Yellow. Toxic and described as harmful
Toxicity to rats	Medium (ORAL LD50 1000-2000 mg/kg)
Toxicity to birds	Low (LD50 2000-20000 mg/kg)
Toxicity to bees	Low or no toxicity (LD50 1000 ug/BEE - NON TOXIC)
Toxicity to fish	Medium (LC50 50-300 mg/L)
Spray rate of water	300 to 800 litres per hectare. Ensure thorough wetting of foliage.
Increase herbicide application rate according to	Weed type. If you need multiple sprays, these are at the higher rate (except for *Panicum maximum*). Refer to label directions.
Comments	**Post-emergence application:** Weed growth: Apply to actively growing weeds. Refer to the label for optimum weed growth stages. DO NOT spray stressed weeds or dormant or senescing weeds or weeds with wet foliage or weeds covered with a heavy layer of dust. For tall weeds, increase the volume of water to 800 litres per hectare and use the higher application rate (follow label directions). Grasses: spray before seed sets. Spray when adequate leaf area is present for uptake but before grass stems lie along he ground. If re-growth occurs, re-spray at the lower rate when there is 50 to 60 % re-growth. *Cynodon dactylon:* Multiple applications. Apply when adequate leaf surface area is available for uptake but before the grass becomes a recumbent mat. Cyperus: Good suppression occurs under normal growing conditions with 7.5 litres per hectare at 5 % flowering, where plants are shaded. Re-spray when sufficient leaf surface area has developed to absorb the herbicide. Length of control: This varies - suppression or complete control is achieved 2-6 weeks after spraying, depending on weed type, growth stage, vigour, climate, etc.
	Where the herbicide has been in contact with water, do not use for domestic purposes for at least 24 hours after spraying.

Precautions	Avoid spray drift onto other crops, grazing, rivers, dams or areas not under treatment or to nearby water sources. Ensure that direct spray or drift does not come into contact with green leaves, active buds and fruit of desirable plants.

GLYPHOSATE	
HRAC Group = G	Inhibits protein or fat synthesis and hence growth and development
Weeds controlled	Sugarcane and most annual and perennial weeds - non-selective.
Expected period of control	Only kills existing weeds.
	Variable control can occur e.g. with drought, cold or heat stress, plants with waxy layers, natural or acquired resistance to glyphosate (e.g. *Commelina, Ipomoea* and *Conyza*), poor coverage and penetration of exposed leaves, plants with bulbs and tubers e.g. *Cyperus,* inconsistent relationship between above soil parts and below soil parts e.g. *Conyza bonariensis* after dry periods or growth during the winter, and **poor water quality**.
Site of absorption	Foliage (green plant material)
Climatic requirements	You need good growing conditions for cane eradication. No rain for 6-8 hours after application. This is less for some glyphosate products, depending on product formulation. Target plants should not be suffering from moisture stress (drought or waterlogging).
Maximum cane size before applying as a directed spray	0 leaf. **WARNING: KILLS CANE.** Ensure spray does not touch cane foliage as the crop will be damaged or killed.
	NOT FOR USE in field with live plant or ratoon cane.
Level of management required	Medium - high
Leaching	Strongly adsorbed in soil.
Label band colour of worst ingredient	Green-blue. Toxic and described as requiring caution
Toxicity to rats	Low (ORAL LD50 2000-8000 mg/kg)
Toxicity to birds	Low (LD50 2000-20000 mg/kg)
Toxicity to bees	Low (LD50 1000 ug/BEE - NON TOXIC)
Toxicity to fish	High (LC50 1-20 mg/L)
Spray rate of water	200-600 litres per hectare. Depends on weed size and density. Ensure good coverage of every shoot.
Increase herbicide application rate according to	Weed type, weed size and weed density. Higher rates are needed for cane eradication.
Comments	Weeds: **Only apply** to actively growing weeds. Ensure that target weeds are fully exposed to spray. Dosage: Apply the dosage rate according to the weed growth stage and species. Follow label recommendations. Growing cane: **Not recommended** for use in fields with growing cane. You can use it in fallow cane fields with problem weeds. Weed control: Glyphosate is useful to control *Cyperus rotundus*, *Cyperus esculentus* and grasses such as *Paspalum urvillei* and *Cynodon dactylon*. Repeat spot sprays are usually necessary for complete control. Sugarcane eradication: Apply to actively growing cane. Cane should have all buds emerged and tillered at time of spray. Only apply in summer (October to April).
Precautions	**WARNING: KILLS CANE.** Drift: Avoid drift to all adjacent crops, plants with foliage and/or green bark, grazing, rivers, dams and areas not under treatment. Use low spray pressure (100-200 kPa) and correct nozzles and shields to avoid spray drift. Dirt: Remove sediments, rust or dust from spray tanks. Use only clean spray-water with no suspended soil particles. Do not spray on weed foliage covered with a layer of dust or with dew, or dormant or stressed. Ammonium sulphate: **must be added** to treat poor quality spray-water containing salts. Add 0,5 - 2,0% ammonium sulphate in tank mixtures at all times. Always add first to the spray-tank (follow the label directions).

	Surfactant: may be needed for some glyphosate products (follow label directions). The mixing order is important for these products.

HALOSULFURON	
HRAC Group = B	Inhibits protein or fat synthesis and hence growth and development
Weeds controlled	*Cyperus rotundus* (purple watergrass) and *Cyperus esculentus* (yellow watergrass)
Variable control	
Site of absorption	Shoot uptake which improves with penetrator
Climatic requirements	Need moist soil and conditions for active weed growth
Maximum cane size before applying as a directed spray	Relatively safe on cane. Cane leaves can be 0 -1m high
Level of management required	Medium
Leaching	High leaching index
Label band colour of worst ingredient	Blue. Toxic and described as requiring caution.
Toxicity to rats	Low (ORAL LD50 2000-8000 mg/kg)
Toxicity to birds	Low (ORAL LD50 2000-20000 mg/kg)
Toxicity to bees	Medium high (LD50 70-1000 ug/BEE)
Toxicity to fish	Medium (LC50 50-300 mg/L)
Spray rate of water	200-400 litres per hectare
Increase herbicide application rate according to	Only one application rate of 50g per hectare
Comments	**Post-emergence:** Ensure weeds are not overshadowed to avoid poor coverage. Add a recommended adjuvant (e.g. surfactant) for all post-emergence applications. *Cyperus* species: There is no pre-emergence control. For best results apply after most plants have germinated but before flowering. New germination may occur if application was done too early. Late germinating tubers require a second application before the crop canopy closes. Inferior results occur with later applications when in flower. If applications are followed by a dry period and then a wet period later in the season, regrowth of plants may occur. Broadleaf weeds: Restricted activity on broadleaf weeds. Broadleaf weeds should be less than 4 - leaf or 100 mm in height. Grasses: No activity on grasses.
Precautions	Do not apply on cane stressed by e.g. drought, flooding, disease or insect damage. Do not use on soils with a water pH of 7 or higher, and/or on soils containing free lime. Ammonium sulphate: **must be added** to treat poor quality spray-water containing salts. Adding 0,5 - 2% ammonium sulphate improves weed control. Always add first to the spray-tank (follow the label directions). Rainfall: Rain within 6 hours reduces weed control. Cultivation: Delay any cultivation until 2 - 7 days after application.

HEXAZINONE	
HRAC Group = C1	Inhibits photosynthesis (conversion of light to chemical energy)
Weeds controlled	Grasses and broadleaf weeds
Variable control	Yellow watergrass. There is adequate control only when applied post-emergence.
Site of absorption	Foliage and roots-absorbed with long residual action.
Climatic requirements	Best results with warm humid conditions for active weed growth and when rainfall within a few weeks after application moves herbicide into root zone.
Maximum cane size before applying as a directed spray	0-1 unfurled leaves. Do not apply directly over the ratoon foliage but direct the sprays across the inter-row to avoid, as far as possible, wetting the foliage.

Level of management required	Medium
Leaching	Moderately adsorbed by clay. Avoid soils with less than 0.5 % organic matter, greater than 60 % sand, and a water table that is less than 2 m below the surface the surface and annual rainfall greater than 1000 mm.
Label band colour of worst ingredient	Yellow. Toxic and described as harmful
Toxicity to rats	High (ORAL LD50 280-1000 mg/kg)
Toxicity to birds	Low (LD50 2000-20000 mg/kg)
Toxicity to bees	Low or no toxicity (LD50 1000 ug/BEE - NON TOXIC)
Toxicity to fish	Medium (LC50 50-300 mg/L)
Spray rate of water	200-400 litres per hectare
Increase herbicide application rate according to	Clay content and season. Adhere carefully to label directions.
	With mid and late season you must reduce application rates.
Comments	**Pre-very early post-emergence:** Apply before or during the period of active growth of weeds. Hexazinone controls a broad spectrum of grasses and broadleaf weeds. Broad leaf weeds: should not be taller than 8-10cm. Grasses: Apply at 0-4 leaf, pre-tillering stage or before the grass develops a strong root system. *Panicum maximum*: If Panicum has emerged at application, add either diuron or ametryn. Ametryn is preferred for use under more cooler and drier conditions of spring. Diuron is preferred for use under warm, wet, active growing conditions.
Precautions	Application rates: Adhere to label recommendations. Use correct rates, according to the season and soil type. Use lower application rates for light less absorptive soils having a low cation exchange capacity. For extremely heavy soils (usually a high cation exchange capacity) confirm actual rate with Technical Advisor. Avoid excessive overlapping of spray swaths and double spraying. Do not apply more than one in a growing season, to avoid possible accumulation. Rainfall: Rain within a few weeks after application enhances the herbicidal action. **Ratoon cane ONLY. Do not use on plant cane.** Do not mix, apply or clean equipment within 20 metres of a water source or where drift or run-off could contaminate a water source. Do not apply near desirable plants or trees or on areas where their roots may extend, or in locations where the chemical may be washed or moved into contact with their roots.

HEXAZINONE + CLOMAZONE	
HRAC Group = F3 + C1	Inhibits photosynthesis (conversion of light to chemical energy) and development of pigments.
Weeds controlled	Annual grasses and some broadleaf weeds
Variable control	Yellow watergrass
Site of absorption	Foliage and root absorbed herbicide with a long residual action.
Climatic requirements	You can apply this product under both dry or moist soil conditions.
Maximum cane size before applying as a directed spray	For good grass control, apply **as soon as possible** after harvesting, before weeds have germinated and at the latest, before first cane leaves are 10cm high.
Level of management required	Medium
Leaching	Avoid soils with less than 0.5 % organic matter, greater than 60 % sand, and a water table that is less than 2 m below the surface the surface and annual rainfall greater than 1000 mm.
Label band colour of worst ingredient	Blue. Toxic and described as requiring caution
Toxicity to rats	Low (ORAL LD50 2000-8000 mg/kg)
Toxicity to birds	Low (LD50 2000-20000 mg/kg)
Toxicity to bees	
Toxicity to fish	Medium (LC50 50-300 mg/L). Toxic to aquatic organisms

Spray rate of water	Minimum 200 litres per hectare
Increase herbicide application rate according to	Only apply to soils with more than 10% clay.
	Only apply 2 litres per hectare. DO NOT over-apply.
Comments	**Pre-emergence:** Apply before weeds and crop emerge. For good control of *Rottboellia, Sorghum* and *Panicum maximum*, apply **as soon as possible** after harvesting, before weeds have germinated and at the latest, before first cane leaves are 10cm high. Apply **DROPZONE™ 500 WP** with **DINAMIC® 700 WG** to improve broadleaf spectrum and increase suppression of *Cyperus esculentus* **.**
Precautions	**Ratoon cane only.** Avoid double application in one season and overlapping spray swaths. **NOTE:** Take extra precautions to ensure uniform spray application particularly on field edges where knapsack operators and tractor booms tend to slow down and over-apply. Do not apply more than one in a growing season, to avoid possible accumulation. Allow 400 days between the last application and harvest. Consult your supplier.

HEXAZINONE + DIURON	
HRAC Group = C1 + C2	Inhibits photosynthesis (conversion of light to chemical energy)
Weeds controlled	Grasses and broadleaf weeds
Variable control	Yellow watergrass. There is adequate control only when applied post-emergence.
Site of absorption	Foliage and root absorbed herbicide with a long residual action.
Climatic requirements	Best results with warm humid conditions for active weed growth and when rainfall within 2-3 weeks after application moves herbicide into root zone.
Maximum cane size before applying as a directed spray	0-1 unfurled leaves. Apply as a directed spray across the inter-row and avoid, as far as possible, wetting the foliage. Do not apply directly over the ratoon foliage
Level of management required	Medium
Leaching	Moderately adsorbed by clay. Avoid soils with less than 0.5 % organic matter, greater than 60 % sand, and a water table that is less than 2 m below the surface the surface and annual rainfall greater than 1000 mm.
Label band colour of worst ingredient	Blue. Toxic with caution required.
Toxicity to rats	High (ORAL LD50 280-1000 mg/kg)
Toxicity to birds	Medium (LD50 900-2000 mg/kg)
Toxicity to bees	Low or no toxicity (LD50 1000 ug/BEE - NON TOXIC)
Toxicity to fish	High (LC50 1-20 mg/L)
Spray rate of water	150-400 litres per hectare
Increase herbicide application rate according to	Clay content and season. For the formulations combining both herbicides, make sure you use one bag/hectare of the correct product for your soil clay content. Adhere carefully to label directions.
Comments	**Pre-emergence or early post-emergence:** Apply just prior to or during the period of active weed growth. Do not exceed the recommendations given on the label. Apply the entire contents in this bag to 1,0 hectare. Broad leaf weeds: should not be taller than 8-10cm. Grasses: Apply at 0-4 leaf, pre-tillering stage or before the grass develops a strong root system. Weeds not normally controlled: *Cyperus rotundus, Cynodon dactylon, Sorghum verticilliflorum,* established (tillered) *Panicum maximum*.
	Ratoon cane only. Avoid excessive overlapping of spray swaths and double spraying. Do not apply more than one in a growing season, to avoid possible accumulation.

Precautions	**Water bodies:** Do not allow the product to be applied directly to or drift onto water or wetlands. Do not apply within 10 m of permanent water. Do not apply where run-off from treated areas will contaminate water sources. Do not mix or load within 20 m of any water body. **Rain:** Rainfall within 2 - 3 weeks after application will enhance the herbicidal activity. **Spray-water:** Avoid water with a high conductivity and high pH. Avoid dirty water. Do not apply near desirable plants or trees or on areas where their roots may extend, or in locations where the chemical may be washed or moved into contact with their roots.

IMAZAPYR	
HRAC Group = B	Inhibits protein or fat synthesis and hence growth and development
Weeds controlled	Broad–spectrum, non–selective herbicide to control grasses, broadleaf and sedges. It also kills volunteer or last ratoon cane.
Variable control	
Site of absorption	Foliage and root absorbed herbicide with a long residual action.
Climatic requirements	Need moist soil and conditions for active weed growth
Maximum cane size before applying as a directed spray	0 leaf. **WARNING: KILLS CANE.** Ensure spray does not touch cane foliage as the crop will be damaged or killed.
	NOT FOR USE in field with live plant or ratoon cane.
Level of management required	High (persistence)
Leaching	High leaching.
Label band colour of worst ingredient	Blue. Toxic with caution required.
Toxicity to rats	Low (ORAL LD50 2000-8000 mg/kg)
Toxicity to birds	Low (ORAL LD50 2000-20000 mg/kg)
Toxicity to bees	Medium high (LD50 70-1000 ug/BEE)
Toxicity to fish	Medium (LC50 50-300 mg/L). Toxic to aquatic plants.
Spray rate of water	A minimum of 300 litres per hectare
Increase herbicide application rate according to	Do not increase recommended dosage. Ensure correct registration.
Comments	**Fallow fields:** Apply imazapyr after harvesting the final ratoon and once re–growth of the sugarcane and weeds has occurred. Apply when cane is 30 – 45 cm tall, fully emerged and actively growing. **Reduced efficacy:** Caused by A) Application to stressed plants. Both sugarcane and weeds should be actively growing at the time of application and not wilted or stressed. B) Weeds should not be shielded by tall weeds or the sugarcane canopy. Ensure proper coverage of the target with the spray solution. C) Any mechanical soil operation **before** application that results in clods on the soil surface (e.g. ripping). D) Any mechanical operation resulting in soil disturbance **after** application. E) Frequent and /or heavy rainfall incidences, especially on sandy soils. **Replanting:** After the application of imazapyr, sugarcane can **ONLY** be replanted after a minimum waiting period of at least four months **AND** after the occurrence of at least 600 mm precipitation (preferably rain) during the warmer months of the year. **Persistence:** Do not apply imazapyr more than once in a normal replant cycle. **ONLY** re-spray with spot treatment(s) of glyphosate at the registered rate (refer to the applicable label), after applying imazapyr. **DO NOT** spot-spray with imazapyr. Soil degradation is mainly due to naturally occurring soil micro–organisms. The rate of degradation increases as soil pH increases. Persistence is greater on low pH (acid) soils (pH < 6.0). Liming increases pH and can release additional imazapyr from clay colloids. This will temporarily elevate the available concentration in the soil until degradation by the soil micro–organisms occurs. Planting too soon after liming may damage the newly planted crop. Allow at least 12 weeks between liming and replant. A test planting with single–eye setts is always advisable. Once cane is planted, normal irrigation accelerates degradation of remaining residues.

Precautions	Do not apply imazapyr to the root zone of desirable vegetation or within twice the drip line of a tree canopy. Avoid spray drift onto non-target areas and plants, other crops, grazing, rivers and dams. Rain, two hours after application, will not reduce efficacy. Use suitably shielded nozzles. Avoid overlapping spray swaths.

ISOXADIFEN-ETHYL + TEMBOTRIONE	
HRAC Group = F2	Inhibits development of pigments
Weeds controlled	Post-emergence control of certain broadleaf and grass weeds
Variable control	
Site of absorption	Foliage of small weed seedlings
Climatic requirements	Need moist soil and conditions for active weed growth
Maximum cane size before applying as a directed spray	May cause chlorosis and stunting of cane plants. This is transitory and yield will not be affected, provided that label directions are followed carefully.
Level of management required	High (atrazine leaching)
Leaching	High leaching in sandy and wet soils
Label band colour of worst ingredient	
Toxicity to rats	
Toxicity to birds	
Toxicity to bees	
Toxicity to fish	Very toxic to aquatic life with long-lasting effects.
Spray rate of water	200-300 litres per hectare
Increase herbicide application rate according to	Do not increase application rate. Follow label recommendations
Comments	**Post-emergence:** Apply when weeds are between 4-6 leaf growth stage and are actively growing. Requires a recommended surfactant.
Precautions	**Do not allow to get into surface water, drains and ground water.** The mixing partner, atrazine is not generally recommended by SASRI due to leaching risk and bio-accumulation. Atrazine is particularly mobile in irrigated areas. Consider using alternative products with lower environmental risk. Repeated or prolonged use can lead to bio-accumulation in the water course environment. Do not mix or load within at least 15 metres of boreholes, streams and rivers or at least 60 metres from dams. Do not apply near the roots of desirable plants. Constant agitation throughout the spray operation is essential. Contact your local agro-chemical supplier for correct use. Add required amount of the salt adjuvant ammonium sulphate. Add a recommended surfactant. Ensure even coverage of weeds. Do not use plants as fodder from treated cane within 235 days of last application. Avoid spray drift onto other crops, grazing, rivers and dams Avoid excessive overlapping of spray swathes and double spraying.

ISOXAFLUTOLE	
HRAC Group = F2	Inhibits development of pigments
Weeds controlled	Grasses and broadleaf weeds
Variable control	

Site of absorption	Seeds, roots and shoots
Climatic requirements	Application should preferably be performed onto moist soil and rain or irrigation is required within one week after application.
	Can be applied to dry soil when temperatures become suitable for weed germination. It is stable under dry conditions (no photo-degradation) and is activated by rainfall.
Maximum cane size before applying as a directed spray	0-4 unfurled leaves. Apply pre-emergence of the weeds, at spiking, but no later than the 4-leaf stage of the cane.
Level of management required	High
Leaching	Low – Medium, less than most acetanilides
Label band colour of worst ingredient	Blue. Toxic and described as requiring caution
Toxicity to rats	Low (ORAL LD50 2000-8000 mg/kg)
Toxicity to birds	Low (LD50 2000-20000 mg/kg)
Toxicity to bees	Medium-high toxicity (LD50 70-1000 ug/BEE)
Toxicity to fish	Medium (LC50 50-300 mg/L)
Spray rate of water	100-400 litres per hectare
Increase herbicide application rate according to	Clay content.
Comments	Can be combined with diuron, ametryn, hexazinone or paraquat. Does not control *Cyperus* species or perennial weeds with established root systems.
Precautions	**Not for use on plant cane.** Can be used on dryland cane and on cane under scheduled irrigation. Not for use on soils of less than 10% clay. Not for use on dry crop residue (trash) that may be blown by wind. Ensure application of correct dosage. Avoid double application, e.g., overlapping spray swaths. Do not use on stony soil. Do not use on soils that contain less than 10 % clay. Use on newly limed soil can cause crop chlorosis. Efficacy may be reduced when spray-water contains high levels of chlorine. Do not add any adjuvants to the spray mixture. Prevent spray drift onto other crops, grazing, rivers, dams or other areas not under treatment. Isoxaflutole may remain active for much longer in soils which expand when wetted and crack or crumble upon drying. See also label precautions.

ISOXAFLUTOLE + INDAZIFLAM	
HRAC Group = L29 & F2	Isoxaflutole inhibits development of pigments. Indaziflam is a cellulose biosynthesis inhibitor. It severely affects cell wall formation as well as cell elongation and cell division in seeds.
Weeds controlled	Certain broadleaf and grass weeds.
Variable control	
Site of absorption	Pre-emergence application for uptake by seeds. Germinating weed seeds die before emerging.
Climatic requirements	
Maximum cane size before applying as a directed spray	0-unfurled leaves. Apply pre-emergence.
Level of management required	Medium
Leaching	Moderately mobile in soils. Not rapidly biodegradable.
	Does not bioaccumulate
Label band colour of worst ingredient	
Toxicity to rats	Very high (ORAL LD50 48-160 mg/kg)
Toxicity to birds	Low (LD50 2000-20000 mg/kg)

Toxicity to bees	Low or no toxicity (LD50 1000 ug/BEE - NON TOXIC)
Toxicity to fish	High (LC50 1-20 mg/L).
	Very toxic to aquatic life with long lasting effects.
Spray rate of water	200-300 litres per hectare
Increase herbicide application rate according to	Do not increase dosage rate. Apply at 333 ml per hectare.
Comments	**Pre-emergence:** **ONLY** on ratoon cane. Do not use on plant cane. Apply pre-emergence of the weeds. It controls certain broadleaf species and grass weeds such *as Panicum maximum* and *Rottboellia* . Do not apply to sugarcane under any form of stress, as it is likely to display chlorosis. Do not use plants from treated sugarcane within **250 days** after application. **A 12 month waiting period** is required between application and planting sugarcane.
Precautions	Avoid double application, e.g., overlapping spray swaths. Do not use on stony soil or soils that contain less than 10 % clay. Application on newly limed soil can cause crop chlorosis. Do not use spray-water containing high levels of chlorine. Do not mix the product with any other products. Use the spray mixture within 6 hours after mixing. Continue agitation to keep the product in continuous suspension. After each spray, flush the tank out thoroughly with water. Accurately calibrate spray equipment prior to application. Where application is to soils which expand when wetted and crack or crumble upon drying, the product may remain active in the soil for much longer than the above waiting periods might indicate. Prevent spray drift onto other crops, grazing, rivers, dams or other areas not under treatment. Do not apply where the roots of desirable plants might absorb the chemical.

MCPA	
HRAC Group = O	Inhibits cell division and development through other pathways
Weeds controlled	Broadleaf
Variable control	
Site of absorption	Foliage and roots
Climatic requirements	You need moist soil and conditions for active weed growth
Maximum cane size before applying as a directed spray	0-5 unfurled leaves. The treatment can cause sugarcane damage. If the sugarcane exceeds a height of 40 cm or has unfurled more than 5 leaves/shoot, directed spraying must be carried out or else the growth may be retarded.
Level of management required	Medium
Leaching	Medium - high leaching in sandy and wet soils
Label band colour of worst ingredient	Yellow. Toxic and described as harmful
Toxicity to rats	High (ORAL LD50 280-1000 mg/kg)
Toxicity to birds	High (ORAL LD50 280-1000 mg/kg)
Toxicity to bees	Low or no toxicity (LD50 1000 ug/BEE - NON TOXIC)
Toxicity to fish	Medium-high (LC50 1-20 mg/L)
Spray rate of water	300-400 litres per hectare
Increase herbicide application rate according to	Clay content
	Pre-emergence: Apply to damp seedbed free of emerged weeds, immediately after the crop has been planted.

Comments	Annual grasses: Apply before emergence of the grass seedlings. Apply MCPA in combination alachlor or with metolachlor + ametryn to improve control of grasses. **Post-emergence:** The weeds should still be young. Use the lower dosage if the weeds have not progressed beyond the 4-leaf stage. Broadleaf, grasses and *Cyperus* species: Apply MCPA in combination with diuron or ametryn to control a wider spectrum of broad-leaved weeds, young grasses and *Cyperus s* pecies. *Cyperus esculentus* will be controlled if sprayed just before flowering. Variable results may be obtained if sprayed earlier or during cold or dry weather conditions Salt adjuvant: MCPA benefits from treatment of dissolved cation salts with ammonium sulphate. **Note:** ammonium sulphate is not registered to be used with MCPA in South Africa. Surfactant: Add a recommended surfactant if stated on the label.
Precautions	Do not use near other crops such as bananas, tomatoes and grains. Prevent drift by adhering to spray procedures.

MESOTRIONE	
HRAC Group = F2	Inhibits development of pigments
Weeds controlled	Annual grasses and some broadleaf weeds
Variable control	Certain larger weeds. Refer to the labels
Site of absorption	Mainly through germinating shoots of grasses and roots of broadleaf weeds
Climatic requirements	For best results, 10-15mm of rain is required within 7-10 days of application to activate the herbicide in the soil. Avoid stress conditions such as drought, heavy rain and water logging.
Maximum cane size before applying as a directed spray	0-3 unfurled leaves.
Level of management required	Medium
Leaching	Medium-very high leaching potential. Adsorbed in soils with high clay and organic matter contents. Higher pH levels increase rate of adsorption.
Label band colour of worst ingredient	Blue. Toxic and described as requiring caution
Toxicity to rats	Low (ORAL LD50 2000-8000 mg/kg)
Toxicity to birds	Low (LD50 2000-20000 mg/kg) (technical)
Toxicity to bees	Medium-high toxicity (LD50 70-1000 ug/BEE)
Toxicity to fish	Medium (LC50 50-300 mg/L) (technical)
Spray rate of water	Minimum 200-300 litres per hectare
Increase herbicide application rate according to	The dosage rate is not affected by the clay content of the soil.
Comments	**Pre- and early post-emergence:** Broadleaf weeds and grasses: Apply mesotrione in combination with diuron and S-metolachlor. Add a recommended surfactant for post-emergence application. *Cyperus esculentus* , *Panicum maximum* and other grasses: Apply mesotrione in combination with diuron and S-metolachlor. Add paraquat for post-emergence control. **Post-emergence:** Apply to the true leaves of weeds, not cotyledons (seed leaves not true leaves). Apply on actively growing weeds. Apply the product during the late spring and summer season when the chance of rain is high. Do not apply during seasons when no or little rain is expected. *Cyperus esculentus* and *Cyperus rotundus* : Apply mesotrione in combination with halosulfuron and a recommended surfactant. For best results apply after most *Cyperus* plants have germinated but before flowering.
Precautions	Avoid overlapping swaths. Follow instructions on label. Prevent drift to adjacent crops. Avoid smaller droplet sizes that are prone to drift. Soil disturbance after both pre- and/or post-emergence applications can result in re-germination of weeds resulting in reduced weed control. Prolonged dry soil conditions after application may result in reduced control of germinating weeds.

MESOTRIONE + S-METOLACHLOR + TERBUTHYLAZINE	
HRAC Group = C1 + F2 + K3	Inhibits photosynthesis (conversion of light to chemical energy), development of pigments, and protein or fat synthesis and hence growth and development
Weeds controlled	Annual grasses and some broadleaf weeds
Variable control	Yellow watergrass
Site of absorption	Mainly through germinating shoots of grasses and roots of broadleaf weeds
Climatic requirements	Rain or overhead irrigation 15-20 mm within 1-2 weeks after application is required to leach the chemical into the germinating zone to obtain optimal weed control. If this does not happen, reduced efficacy can be expected.
Maximum cane size before applying as a directed spray	Post-emergence applications when combined with paraquat may cause foliar scorch and stunting if the cane has more than 2-3 leaves per shoot.
Level of management required	Medium
Leaching	Adsorbed in soils with high clay and organic matter contents. Extent of leaching depends on organic matter.
Label band colour of worst ingredient	Yellow. Toxic and described as harmful
Toxicity to rats	Low (ORAL LD50 2000-8000 mg/kg)
Toxicity to birds	Low (ORAL LD50 2000-20000 mg/kg)
Toxicity to bees	Medium high (LD50 70-1000 ug/BEE)
Toxicity to fish	Medium (LC50 50-300 mg/L).
	Toxic to fish and other aquatic organisms
Spray rate of water	Minimum 200-300 litres per hectare.
Increase herbicide application rate according to	The clay content of soil does not affect the dosage rate.
Comments	The product has no post-emergence activity **Pre-emergence:** Apply product preferably at planting or immediately after planting. The product will control broadleaf weeds and grasses. For *Cyperus esculentus* , apply to soil before tubers begin to germinate. **Pre- and very early post emergence application:** In all early post-emergence applications use a recommended adjuvant as surfactant. Weeds must not be larger than 1 to 2 leaf stage at time of application. Grasses and *Cyperus* species: A recommended paraquat **must** be added for post-emergence control, especially where there is *Panicum maximum* and *Cyperus esculentus.* Apply the product in combination with S-metolachlor plus paraquat to increase the residual grass control.
	Avoid overlapping swaths. Product requires continuous agitation. Do not apply product to high organic matter soils (>3 %) or on to soils with excessive trash or burnt sugarcane rubble, as reduced residual action can be expected. Prevent drift onto other crops, grazing, rivers, dams and areas not under treatment or to nearby water sources. Apply product during the late spring and summer season when chances of rain is high. Do not use the product with other HPPD inhibitors/ F2 group (e.g. products containing isoxaflutole, mesotrione or sulcotrione within the same growing season.

METAZACHLOR	
HRAC Group = K3	Inhibits protein or fat synthesis and hence growth and development
Weeds controlled	Annual grasses and a range of broadleaf weeds;
Variable control	Yellow watergrass
Site of absorption	Mainly germinating seeds of grasses.

Climatic requirements	You need about 15 mm rain or sprinkler irrigation as soon as possible after application and before any weeds emerge.
Maximum cane size before applying as a directed spray	0-5 unfurled leaves. Pre-emergence (of sugarcane) applications are unlikely to have any effects on sugarcane. Where paraquat is added, take care to adhere to instructions relating to directed / inter-row spraying as this product combination can cause severe scorching or damage to emerging sugar cane.
Level of management required	Medium
Leaching	Very high leaching potential.
Label band colour of worst ingredient	Blue. Toxic and described as requiring caution
Toxicity to rats	Low (ORAL LD50 2000-8000 mg/kg)
Toxicity to birds	Low (LD50 2000-20000 mg/kg)
Toxicity to bees	Low or no toxicity (LD50 1000 ug/BEE - NON TOXIC)
Toxicity to fish	High (LC50 1-20 mg/L). Toxic to fish and aquatic organisms.
Spray rate of water	More than 200 litres per hectare
Increase herbicide application rate according to	Due to high leaching risk, follow label directions. Do not over-apply
Comments	**Pre and early post-emergence:** Metazachlor controls grasses and some broadleaf weeds when applied before germination of those weeds. Weeds that have already emerged at the time of application will not be controlled and must be removed either by hand or mechanically. For pre-emergence control, combine the product with diuron or ametryn. The dosage rate of ametryn depends on the growth stage and intensity of weeds. For early post-emergence control, combine the product with diuron or ametryn PLUS paraquat. A suitable wetter / sticker should be added to all post emergence treatments.
Precautions	Prevent leaching in soils. Avoid drift of spray onto other crops, grazing, rivers, dams and areas not under treatment. Do not apply to poorly drained soils or soils with a compaction layer since the product may cause damage to the crops under waterlogged or supersaturated conditions. A functional agitator is an essential requirement.

METOLACHLOR AND S-METOLACHLOR	
HRAC Group = K3	Inhibits protein or fat synthesis and hence growth and development
Weeds controlled	Pre-emergence control of annual grasses and, under certain conditions, also yellow watergrass.
Variable control	Yellow watergrass
Site of absorption	Mainly through germinating shoots of grasses and roots of broadleaf weeds
Climatic requirements	You need 10-20 mm rain within 7-10 days after spray
Maximum cane size before applying as a directed spray	Metolachlor is safe to use before cane emerges. Direct spray between cane rows after the 3 leaf stage if combined with paraquat and the 5-leaf stage if there is no paraquat.
Level of management required	Medium
Leaching	Adsorbed in soils with high clay and organic matter content.
	The extent of leaching depends on organic matter.
Label band colour of worst ingredient	Yellow. Toxic and described as harmful
Toxicity to rats	Low (ORAL LD50 2000-8000 mg/kg)
Toxicity to birds	Low (LD50 2000-20000 mg/kg)
Toxicity to bees	Medium-high toxicity (LD50 70-1000 ug/BEE)
Toxicity to fish	High toxicity to fish (LC50 1-20 mg/L). Toxic to fish
Spray rate of water	Minimum 200 litres per hectare

Increase herbicide application rate according to	Increase metolachlor application rate on soils with more than 35 % clay and on all soil types where *P. maximum* is a problem and/or for improved control of *C. esculentus* and/or for longer residual control. Apply highest rate if the soil organic matter content exceeds 1 %, and the clay content exceeds 35 %.
Comments	S-Metolachlor has more biological activity than metolachlor, resulting in lower application rates. The registered rate of S-metolachlor is 35% lower than the registered rate of metolachlor (based on the active ingredient). **Pre-emergence:** Apply preferably at planting or immediately after planting, but not later than three days after planting. For good broadleaf control, combine metolachlor with ametryn or hexazinone. The latter treatment can only be applied in ratoon cane and only when good rain occurs before weeds emerge. To control yellow watergrass, chemical should be in the soil before tubers begin to germinate. **Post-emergence:** Metolachlor has no post-emergence activity. Metolachlor can be combined with MCPA plus ametryn plus a recommended surfactant for control of emerged broadleaf weeds. For emerged *Panicum maximum* and other grasses, combine with ametryn or diuron (plus paraquat or with metribuzin plus paraquat.
Precautions	Do not apply to poorly drained soils or soils with a compaction layer, as herbicide injury may occur. Heavy rain (25 mm per day or 50 mm over a 3- to 7-day period) on very sandy soils (< 15 % clay) low in organic matter (< 1 %) can reduce weed control. Use an efficient agitation mechanism. Add metolachlor last in tank mixtures and mix thoroughly.

METRIBUZIN	
HRAC Group = C1	Inhibits photosynthesis (conversion of light to chemical energy)
Weeds controlled	Annual grasses and broadleaf weeds
Variable control	Yellow watergrass
Site of absorption	Mainly through roots but also through foliage
Climatic requirements	You need 10-15 mm rain within 5-10 days after spray. Ideally conditions should be warm and optimal for plant growth.
Maximum cane size before applying as a directed spray	0-5 unfurled leaves. Generally, metribuzin has little effect on plant or ratoon cane growth, and the mixture with diuron is also safe.
Level of management required	Medium
Leaching	Very high leaching in sandy soils with low organic matter. Moderately adsorbed in soils with high clay and organic matter contents. Adsorption decreases as pH increases.
Label band colour of worst ingredient	Blue. Toxic and described as requiring caution
Toxicity to rats	Medium (ORAL LD50 1000-2000 mg/kg)
Toxicity to birds	High (LD50 200-900 mg/kg)
Toxicity to bees	Medium-high toxicity (LD50 70-1000 ug/BEE)
Toxicity to fish	Medium (LC50 50-300 mg/L)
Spray rate of water	200-300 litres per hectare
Increase herbicide application rate according to	Clay content.
Comments	**Pre-emergence:** Metribuzin plus diuron will suppress *Cyperus esculentus* . For control of grasses and especially *Panicum maximum* , application should be done pre emergence. *Cyperus rotundus* and *Solanum nigrum* are normally not controlled. **Post-emergence:** Spray grass weeds (especially *Panicum maximum*) before the 2–3 leaf stage and broadleaf weeds before the 4–6 leaf stage. Add paraquat at the recommended rate to metribuzin plus diuron or to metribuzin plus ametryn to enhance efficacy, particularly where *Panicum maximum* is a problem.
Precautions	Heavy rains following application will cause leaching of the product and a decrease in the efficacy. Plant residues or stubble (mulch) covering the soil, may adversely affect efficacy.

Precautions	Do not apply on soils with less than 6% clay, because it is likely that nematicides will be used and interactions can occur

METRIBUZIN + CHLORIMURON-ETHYL	
HRAC Group = C1 + B	Inhibits photosynthesis (conversion of light to chemical energy), cell division and protein or fat synthesis and hence growth and development
Weeds controlled	Sedges, broadleaf weeds and some grasses
Variable control	
Site of absorption	Foliage and roots
Climatic requirements	You need moist soil then >20 mm rain within 1-3 days after spray.
Maximum cane size before applying as a directed spray	0 unfurled leaves. It can be phytotoxic to sugarcane and therefore should be applied as soon after planting or harvesting as possible. Apply as a directed inter-row spray, avoid foliar contact and excessive overlapping
Level of management required	Medium
Leaching	Very high leaching. Moderately adsorbed in soils with high clay and organic matter contents.
Label band colour of worst ingredient	Blue. Toxic and described as requiring caution
Toxicity to rats	Medium (ORAL LD50 1000-2000 mg/kg)
Toxicity to birds	High (LD50 200-900 mg/kg)
Toxicity to bees	Very high (LC50 0.023-1.0 mg/L)
Toxicity to fish	Medium (LC50 50-300 mg/L). Toxic to fish and other aquatic organisms.
Spray rate of water	200-400 litres per hectare
Increase herbicide application rate according to	Clay content. Do not exceed label recommendations.
Comments	**Pre-emergence:** Only a few grasses are controlled by this product. For purple watergrass, apply before any signs of emergence, immediately after planting or after harvesting. Soil disturbance before spraying, e.g. discing before planting or cultivating ratoon interrows breaks up tuber chains and results in uniform growth more susceptible to control. However, it also spreads tubers in the field. **Post-emergence:** Use a recommended surfactant. Failure to include a surfactant may significantly reduce efficacy. Broad leaf weeds: Apply pre-emergence to early post emergence but not later than the 4-leaf stage of development. Application after the 4-leaf stage may be too late for effective control. Grasses and yellow watergrass: Apply pre-emergence to early post emergence but not later than the 3 leaf stage of development. Application to tillered grasses will be too late for effective control. Purple watergrass: Applications made post-emergence will result in partial control (60 %) only.
Precautions	Do not spray in stressed cane. Crop damage may occur if the recommended dosage rates are exceeded. Lengthy wet or cold conditions soon after application may result in leaf chlorosis. Cool, dry conditions prevailing after treatment may reduce efficacy. Avoid soils with poor drainage or compacted conditions. Avoid soils with exceptional high clay content, high cation exchange capacities and exceptionally high organic matter. Avoid leaching, especially in sandy soils with low organic matter. Extended residual activity may result when applied to soils with a water pH above 7.0 and/or soils containing free lime or if more than one application is made in the same season. The product usually works better in sandy soil, but interaction may occur with nematicides. Rainfall within 2 hours reduces efficacy on emerged weeds. Always keep the spray mixture agitated. Do not spray on or near desirable trees or plants or where their roots may extend or could come in contact with the herbicide.

METRIBUZIN + DIURON	
HRAC Group = C1 + C2	Inhibits photosynthesis (conversion of light to chemical energy)
Weeds controlled	Annual grasses and broadleaf weeds
Variable control	Yellow watergrass
Site of absorption	Mainly through roots but also through foliage
Climatic requirements	You need moist soil then 15-20 mm rain within 7 days after spray
Maximum cane size before applying as a directed spray	0-5 unfurled leaves. Relatively safe but recommended that the product be applied as a directed spray in the inter-row area.
	High rates can affect cane growth of most varieties.
Level of management required	Medium
Leaching	Very high leaching in sandy soils with low organic matter. Moderately adsorbed in soils with high clay and organic matter contents. Adsorption decreases as pH increases.
Label band colour of worst ingredient	Blue. Toxic and described as requiring caution
Toxicity to rats	Medium (ORAL LD50 1000-2000 mg/kg)
Toxicity to birds	High (LD50 200-900 mg/kg)
Toxicity to bees	Medium high toxicity (LD50 70-1000 ug/BEE)
Toxicity to fish	High (LC50 1-20 mg/L)
Spray rate of water	200-300 litres per hectare
Increase herbicide application rate according to	Clay content.
Comments	Preferably apply pre-emergence or at the latest, very early post-emergence of the weeds. Broadleaf weeds must not be taller than 3-5 cm at time of application. If grasses are present, apply before tillering and preferably before plants are beyond the 2-leaf stage. Where these weeds have developed further, add paraquat to the spray mixture at the recommended rate.
Precaustions	Avoid excessive overlapping of spray swaths and double spraying. Do not apply near desirable plants or trees. Prevent application directly to or drift onto water or wetlands. Do not apply within 10 m of permanent water. Do not apply where run-off from treated areas will contaminate water sources. Do not mix or load within 20 m of any water body. Heavy rains following application can cause leaching of the product. Plant residues or stubble (trash) covering the soil may adversely affect efficacy. Metribuzin mixtures are not recommended on soils with less than 5% clay, because it is likely that nematicides will be used and interactions can occur

MSMA	
HRAC Group = Z	Unknown mode of action
Weeds controlled	Grasses (including *Panicum maximum* and *Rottboellia conchinchinensis)*
Variable control	
Site of absorption	Foliage. Kills existing weeds only - no residual control.
Climatic requirements	Hot and humid conditions
Maximum cane size before applying as a directed spray	MSMA scorches contacted cane foliage severely and retards cane growth. Severe cases may result in some yield loss, but if growing conditions are favourable the crop will recover before harvest. Always direct spray away from cane foliage.
Level of management required	Medium
Leaching	Almost completely inactivated by adsorption in the soil

Label band colour of worst ingredient	Yellow. Toxic and described as harmful
Toxicity to rats	High (ORAL LD50 280-1000 mg/kg).
	Can be highly toxic to wildlife and grazing stock.
Toxicity to birds	Medium (LD50 900-2000 mg/kg)
Toxicity to bees	Medium-high toxicity (LD50 70-1000 ug/BEE).
	Can be toxic to bees.
Toxicity to fish	Low (LC50 1800 mg/L - NON TOXIC)
Spray rate of water	300-500 litres per hectare
Increase herbicide application rate according to	
Comments	MSMA controls large tillered grasses at the following heights: *Rottboellia conchinchinensis* (10-50 cm), *Panicum* and *Digitaria* spp., *Sorghum verticilliflorum* (10-30 cm), Urochloa panicoides: less than 3 cm. *Sorghum bicolor* and *Eleusine indica* (10-30 cm) are severely suppressed. Perennial stools of *Panicum* species may not be completely killed and may require follow-up spray on regrowth. Mixtures with diuron or ametryn improve control of grasses. Cyperus spp.: pre-flowering to flowering is severely suppressed. A repeat application may be necessary when chlorotic watergrass plants show signs of greening up after the first application.
	Some MSMA formulations contain a surfactant in a concentration that provides best results. It is not necessary to add additional surfactants to the spray tank. Follow the label. Prevent pollution of water sources that are utilized for drinking. **Do not spray** on overcast or cloudy days. Apply during warm, sunny weather when weeds are in an active stage of growth. (Best results are obtained at air temperatures above 21 °C). Do not apply if the weeds are wet or if rain is expected within 24 hours after application as this may reduce efficacy. Avoid spray drift onto other crops, grazing rivers or dams.

PARAQUAT	
HRAC Group = D	Inhibits transfer of chemical energy to sugar
Weeds controlled	Annual grasses and broadleaf weeds
Variable control	Yellow and purple watergrass. Suppression only.
Site of absorption	No persistence in soil. Only kills existing weeds. Only acts on foliage. A contact chemical, not systemic so translocation into weeds is limited.
Climatic requirements	No rain during spraying.
Maximum cane size before applying as a directed spray	Paraquat causes severe scorching to cane foliage.
	Application over cane with more than three unfurled leaves per shoot will set it back.
	Ratoon cane: Direct paraquat and mixtures containing paraquat away from cane foliage.
	Plant cane: Apply paraquat and mixtures containing paraquat preferably no later than the spike stage of growth. Read the label.
	Spot-spraying: Paraquat can be used for spot-spraying, preferably with shields to protect the cane.
Level of management required	High (health and safety)
Leaching	Inactivated by soil binding
Label band colour of worst ingredient	Yellow-Red. Highly toxic and described as requiring extreme caution
Toxicity to rats	Very high (ORAL LD50 48-160 mg/kg). Toxic in contact with skin and if swallowed. Very toxic by inhalation.
Toxicity to birds	High (ORAL LD50 280-1000 mg/kg)
Toxicity to bees	Low or no toxicity (LD50 1000 ug/BEE - NON TOXIC)

Toxicity to fish	High toxicity to fish (LC50 1-20 mg/L). Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
Spray rate of water	Spray water rate depends on weed size and density
Increase herbicide application rate according to	For example, size and density of weeds.
Comments	Paraquat is a non-selective contact chemical and will kill most young annual grasses and broadleaf weeds. It will knock down yellow or purple watergrass but control is short-lived. Adding diuron improves its effect, particularly on grasses and the mixture is useful for weeds which are too big for other chemical treatments, i.e. grasses beyond the 2-4 leaf stage and after tillering, and for broadleaf weeds taller than 10 cm.
Precautions	Paraquat is very poisonous (Group 2) and produces very small droplets when sprayed. **Do not inhale or spill concentrate on skin.** **Only use clean water.** Do not use muddy water. Avoid spray drift onto other crops, grazing rivers or dams. Inconsistent and variable control of weeds is due to e.g. • Stress conditions (drought, cold or heat), • Plants with foliage with pronounced waxy layers (e.g. *Portulaca),* • Inconsistent relationship between above soil and subsoil plant tissue (*Conyza bonariensis* after dry periods or growth during the winter). • Plants with natural or acquired resistance to paraquat based products (e.g. *Commelina, Ipomoea, Conyza),* • Poor coverage and penetration of exposed leaves, • Regrowth by plants with bulbs and tubers e.g. *Cyperus* spp, • Growth tips protected by leaf sheaths covering growth points, • Periods or growth during the winter, • Poor water quality.

PARAQUAT + DIURON	
HRAC Group = D + C	Inhibits photosynthesis (conversion of light to chemical energy) and transfer of chemical energy to sugar
Weeds controlled	Annual grasses and broadleaf weeds
Variable control	Yellow and purple watergrass
Site of absorption	Foliage and roots. Early – late post-emergence
Climatic requirements	No rain during spraying. Active growing conditions. Best results are obtained in moist soil when rainfall moves the herbicide into the soil soon after application.
Maximum cane size before applying as a directed spray	Paraquat causes severe scorching to cane foliage. When cane has more than three unfurled leaves per shoot at the time of spraying, growth will be set back by applications over the cane. Spray should be directed away from foliage in ratoon cane and should preferably be applied no later than the spike stage of growth in plant cane.
Level of management required	High (health and safety)
Leaching	Adsorbed by soils with high clay and organic matter content.
Label band colour of worst ingredient	Yellow-Red. Highly toxic and described as requiring extreme caution. **These products can kill if swallowed – never repack from the container.**
Toxicity to rats	Very high (ORAL LD50 48-160 mg/kg). Toxic in contact with skin and if swallowed. Very toxic by inhalation.
Toxicity to birds	High (ORAL LD50 280-1000 mg/kg)
Toxicity to bees	Can be toxic.
Toxicity to fish	High toxicity to fish (LC50 1-20 mg/L). Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
Spray rate of water	200-400 litres per ha. Use the higher rate where severe weed infestations are anticipated or where longer residual activity is required on heavier soils.
Increase herbicide application rate according to	Depends on the formulation. Follow label recommendations.

Comments	A non-selective chemical that will kill most young annual grasses and broadleaf weeds. It can control *Panicum maximum* before 4 cm and before tillering. Apply when the weeds are in the early post-emergence stage just prior to or at spiking stage in plant cane. It can be used as a directed pre-canopy spray in both plant and ratoon cane or for spot spraying. Use a high water volume for spraying dense weed growth. Resistance against the following species has been reported: *Bidens* spp, *Plantago* spp, *Lolium* spp.
Precautions	Paraquat is very poisonous (Group 2) and produces very small droplets when sprayed. **Do not inhale spray mist! Do not spill concentrate on skin** **These products can kill if swallowed – never repack from the container.** Use clean water only.

PENDIMETHALIN	
HRAC Group = K1	Inhibits cell division and development through other pathways
Weeds controlled	Seeding grasses and annual broadleaf weeds
Variable control	Yellow watergrass
Site of absorption	Roots
Climatic requirements	For good control of Rottboellia, it is **critical** to leach herbicide into soil with 20 to 50 mm sprinkler irrigation within 0-3 days of application.
	In rainfed conditions soils **must** be moist with rainfall occurring within three days of spraying to ensure that the herbicides move into the soil profile and reach the root zone of germinating weeds.
Maximum cane size before applying as a directed spray	Plant cane: Apply within two days of planting.
	Ratoon cane: Apply not later than seven days after cutting.
Level of management required	Medium
Leaching	Adsorbed by clay and organic matter.
Label band colour of worst ingredient	Yellow. Toxic and described as harmful
Toxicity to rats	Medium (ORAL LD50 1000-2000 mg/kg)
Toxicity to birds	Medium (LD50 900-2000 mg/kg)
Toxicity to bees	Medium-high toxicity (LD50 70-1000 ug/BEE)
Toxicity to fish	High (LC50 1-20 mg/L).
	Toxic to fish and other aquatic organisms.
Spray rate of water	150-250 litres per hectare
Increase herbicide application rate according to	Clay content
Comments	**Pre-emergence:** Very good pre-emergence control of difficult seeding grasses like *Rottboellia* and *Panicum maximum* . For good control of Rottboellia, it is **critical** to leach herbicide into soil with 20 to 50 mm sprinkler irrigation within 0-3 days of application. Mixtures with diuron increase the spectrum of weeds that can be controlled. The formulation Parabat is registered in combination with with Extreme Plus and this improves control of *Cyperus* species
Precautions	Avoid inhalation. The mixture with diuron should be continually agitated. If the specified application timing is not adhered to, or if dry conditions are allowed to prevail, **only** partial weed control may be achieved.

SAFLUFENACIL + DIMETHENAMID-P	
HRAC Group = E + K3	Inhibits development of pigments and also protein or fat synthesis and hence groth and development.

Weeds controlled	Pre-emergent control of annual grasses, and annual broadleaf weeds and suppression of yellow watergrass
Variable control	Yellow watergrass
Site of absorption	Uptake occurs between germination of the seed and emergence of the seedling from the soil.
Climatic requirements	Application must be followed by 10-15 mm of rain, or sprinkler irrigation, before the weeds emerge.
Maximum cane size before applying as a directed spray	Do not apply after emergence of the crop as this will result in crop damage.
Level of management required	Medium
Leaching	
Label band colour of worst ingredient	Blue. Toxic and described as requiring caution.
Toxicity to rats	Low (ORAL LD50 2000-8000 mg/kg)
Toxicity to birds	
Toxicity to bees	
Toxicity to fish	Very high (LC50 18 mg/L). Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
Spray rate of water	Minimum of 200 litres per hectare
Increase herbicide application rate according to	Apply at recommended dosage of 1,5 litres per Hecate.
Comments	The product must be applied as an overall application at planting of the crop, or within three days thereof, and pre-emergence of the weeds. Weeds that have emerged at time of application will not be controlled.
Precautions	Avoid overlapping spray swaths. Weed control may be reduced if: • Heavy rains erode or wash away the soil surface containing product. • Heavy rainfall, or irrigation, shortly after application may reduce residual activity. • There is surface trash. Application to loose trash that may be displaced by wind can result in reduced efficacy. Do not apply the product in the following situations as crop damage may occur: • On poorly drained soils. • Soils with a compaction layer. • Soils with nutrient deficiencies. • Where soil capping occurs, prior to the emergence of the seedlings, or if seedling germination is retarded. Avoid spray drift onto desirable vegetation. Prevent contamination of grazing, rivers, dams and areas not under treatment.

SULCOTRIONE + ATRAZINE	
HRAC Group = F2 + C1	Inhibits photosynthesis (conversion of light to chemical energy) and also development of pigments
Weeds controlled	Annual grasses and broadleaf weeds
Variable control	Suppression only of yellow watergrass
Site of absorption	Mainly foliage, some root uptake
Climatic requirements	Moist soil with actively growing weeds. Continuous wet, rainy conditions after a post-emergence application may reduce efficacy of the product.
Maximum cane size before applying as a directed spray	Cane leaves can be up to 1m high
Level of management required	High (high leaching potential)
Leaching	High potential. Adsorbed by clay and organic matter
Label band colour of worst ingredient	Yellow. Toxic and described as harmful
Toxicity to rats	Low (ORAL LD50 2000-8000 mg/kg)
Toxicity to birds	Low (LD50 2000-20000 mg/kg)
Toxicity to bees	Low or no toxicity (LD50 1000 ug/BEE - NON TOXIC)

Toxicity to fish	High (LC50 1-20 mg/L). Toxic to fish and aquatic organisms.
Spray rate of water	200-300 litres per hectare
Increase herbicide application rate according to	Dosage rate is not influenced by the clay content of the soil.
Comments	It will control some annual grasses and many broadleaf weeds, e.g. pigweed, commelina, and at higher rates, e.g. morning glory. The product can be applied pre- or post-emergence of either crop or weeds. **Do not** add a surfactant for post-emergence application. When applying post-emergence the weeds must be at the correct growth stage (see label). Refer to label before planting cover crops.
Precautions	Avoid leaching, especially in sandy soils. Do not add additional Atrazine Use only water of a high quality and low soluble salt content. Use a recommended buffer as required. Ensure thorough agitation is maintained at all times. Do not mix, load or apply within at least 15 metre from bore holes, streams or rivers. Do not apply within at least 60 metre from dams. Do not spray near desirable trees or plants or where their roots may extend. Avoid drift onto other crops, grazing, rivers, dams or nearby water sources. Efficacy is reduced with: • Dry soil conditions after pre-emergence application • Continual overcast and rainy conditions after a post-emergence application • In areas with a high soil organic matter content the period of weed control may be shorter For post-emergence application, avoid: • Stress conditions of weeds caused by drought, cold weather conditions, disease, insect damage, mineral element deficiencies and waterlogging. • Application to weeds beyond the optimum growth stage. • Application to weeds that are not actively growing.

SULFENTRAZONE	
HRAC Group = E	Inhibits development of pigments
Weeds controlled	Range of broadleaf weeds, grasses and *Cyperus esculentus*
Variable control	
Site of absorption	Absorbed by roots and shoots of germinating seeds and seedlings
Climatic requirements	Apply onto moist soil, rain or irrigation is required within one week after application to obtain best results.
Maximum cane size before applying as a directed spray	Sulfentrazone can cause a temporary red scorch to leaves that have been sprayed.
Level of management required	Medium
Leaching	Sulfentrazone is not strongly adsorbed by clay or organic matter. This chemical is moderately mobile in the soil.
Label band colour of worst ingredient	Blue. Toxic and described as requiring caution
Toxicity to rats	Low (ORAL LD50 2000-8000 mg/kg)
Toxicity to birds	Low (LD50 2000-20000 mg/kg)
Toxicity to bees	
Toxicity to fish	Medium (LC50 50-300 mg/L). Toxic to fish and other aquatic organisms.
Spray rate of water	200-400 litres per hectare
Increase herbicide application rate according to	Only one application rate is given for soils above 20% clay content.
Comments	Lands infested with Cyperus rotundus are likely to have a dense and extensive system of rhizomes and tubers which produce hardy plants. To achieve maximum benefit plan three sprays, the first at planting and then directly after the cane is cut in the following two cycles.

Precautions	Plant cane: Prepare soil using good agricultural practices. Ratoon cane: remove debris from soil surface before spraying. Apply pre-emergence to soils with a clay content >15 %. High rainfall (> 450 mm) will cause movement of the product in coarse soils which can result in poor weed and residual control. As soil pH increases, sulfentrazone availability increases. Irrigation with highly alkaline water (pH of 7.5 and above) following soil application can also significantly increase the availability of sulfentrazone in soil solution. The total amount of sulfentrazone available in solution, in any given soil, is determined by the interaction of soil type (clay content), OM content and pH. Avoid spray drift onto other crops, grazing, rivers and dams. Prevent drift by adhering to spray procedures.

TEBUTHIURON	
HRAC Group = C2	Inhibits photosynthesis (conversion of light to chemical energy)
Weeds controlled	Grasses and broadleaf weeds
Variable control	
Site of absorption	Mainly roots, but also foliage
Climatic requirements	Rain or a moderate irrigation is required to leach tebuthiuron into the top layer of soil where seeds germinate. Apply when conditions favour active growth.
Maximum cane size before applying as a directed spray	0-5 unfurled leaves
Level of management required	Medium
Leaching	Little leaching can be expected, as this product is bound to clay and organic matter.
Label band colour of worst ingredient	Yellow. Toxic and described as harmful
Toxicity to rats	High (ORAL LD50 280-1000 mg/kg)
Toxicity to birds	Medium (LD50 900-2000 mg/kg)
Toxicity to bees	Low or no toxicity (LD50 1000 ug/BEE - NON TOXIC)
Toxicity to fish	Medium (LC50 50-300 mg/L)
Spray rate of water	200-300 litres per hectare
Increase herbicide application rate according to	Clay content
Comments	Effective on grasses, broadleaf and woody weeds. Can be applied as a pre- or an early post-emergence herbicide to both plant and ratoon sugarcane. **Pre-emergence:** Combine tebuthiuron with ametryn or diuron to a soil surface that is free of cane trash, clods and established weeds. Do not apply to soil that is excessively dry or wet. **Post-emergence:** Combine tebuthiuron with ametryn or diuron plus a recommended surfactant. Ensure that broadleaf weeds and grasses have not developed beyond the four leaf stage at the time of treatment.
Precautions	Do not apply near trees or other desirable plants as the product may leach into the root zone. Do not apply to cane trash or to soils of over 10 % organic material content, nor to soils of under 8 % clay content. Do not plant any crop other than sugarcane within two years of application. The spray mixture should be agitated continuously before and during application.