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New Generics in Crop Protection 2022

Active ingredients coming off-patent 2020-2027

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Crop Science | **Report**

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About the Author

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Executive Summary

Chapter 1: Introduction

IHS Markit Crop Science's New Generics 2022 is a guide to important herbicide, fungicide, insecticide and nematicide active ingredients coming off patent (key patents covering the active ingredient *per se*, *i.e.* composition of matter) over the period from 2020 to 2027. Active ingredients included are registered either in the European Union or in the US or both.

The report comprises profiles covering 12 herbicides, 17 fungicides, 8 insecticides and 2 nematicides.

A brief background to patents and data protection is given.

The information to be found in the active ingredient profiles is described.

Chapter 2: Herbicides

Herbicides covered are aminocyclopyrachlor, aminopyralid, bicyclopyrone, florpyrauxifen-benzyl, halauxifen-methyl, indaziflam, methiozolin, pyrasulfotole, pyroxasulfone, pyroxsulam, saflufenacil, and thiencarbazone-methyl.

Chapter 3: Fungicides

Fungicides covered are ametroctadin, amisulbrom, benzovindiflupyr, bixafen, fluopicolide, fluopyram, flutianil, fluxapyroxad, isofetamid, isopyrazam, mandestrobin, mandipropamid, oxathiapiprolin, penflufen, picarbutrazox, pyriofenone, and sedaxane.

Chapter 4: Insecticides

Insecticides covered are afidopyropen, chlorantraniliprole, cyantraniliprole, cyflumetofen, flupyradifurone, pyrifluquinazon, spinetoram, and sulfoxaflor.

Chapter 5: Nematicides

Nematicides covered are fluensulfone and tioxazafen. NB. Fluopyram, profiled as a fungicide, is also marketed as a nematicide.

Important aspects of the use of the active ingredient are then described. The main features of the activity and application that underpin its use are summarized. This section covers crops and targets on which products may be used. The mode of action as officially classified by HRAC is given along with comments on resistance issues.

Registration status under the EU and US authorities is noted with links to the sources of regulatory review data available for use once all data protection has expired.

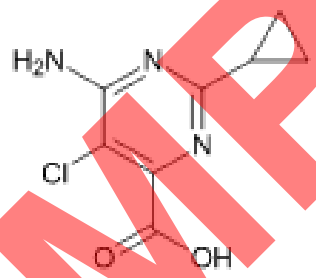
Major markets for key products based on the active ingredient are listed: country, product trade names, key crops and approval or commercial launch dates to give an overview of the global use of each active ingredient.

2.3. Aminocyclopyrachlor

Aminocyclopyrachlor is a pyrimidine carboxylic acid (synthetic auxin) herbicide for post-emergence control of tough BLW with a long residual action invented by DuPont (now Corteva) and acquired by Bayer CropScience.

EU registration: Not registered.

US registration: Approval for turf herbicide *Imprelis* revoked in 2011; new approval for aminocyclopyrachlor + trichlopyr in February 2020.



CAS: 6-amino-5-chloro-2-cyclopropyl-4 pyrimidine carboxylic acid

IUPAC: 6-amino-5-chloro-2-cyclopropylpyrimidine-4-carboxylic acid

2.3.1. Formulation

Aminocyclopyrachlor's main commercialized formulations are shown in Table 2. *Perspective* and *Streamline* were approved in the US in early 2011. Applications for the approval of mixtures with imazapyr and sulfometuron were also submitted. *Invora*, which contains the triethylamine salt, was approved in early 2020.

Table 2: Aminocyclopyrachlor key product formulations

Brand	Formulation
Invora	Aminocyclopyrachlor triethylamine 10.8%+ triclopyr triethylamine 20.4% SL
Perspective	Aminocyclopyrachlor 39.5% + chlorsulfuron 15.8% WG
Streamline	Aminocyclopyrachlor 39.5% + metsulfuron-methyl 12.6% WG

Source: Company websites, IHS Markit © 2022 IHS Markit

Key physico-chemical properties related to formulation are noted in Table 3.

Table 8: Aminopyralid key product introductions

Country	Brand name	Mixture partners	Main crops/markets	Date introduced
US, Canada	*Milestone*	None	Grassland, non-crop	2005
US	*CleanWave* (+fluroxypyr)	None	Cereals	2005
UK	*Forefront*	Fluroxypyr	Grassland	2006
UK	*AstroKerb*	Propyzamide	Oilseed rape	2014
Australia	*ForageMax Arylex*	Halauxifen-methyl	Grassland	2015
US	*TerraVue*)	Forpyrauxifen-benzyl	Grassland, non-crop	2020

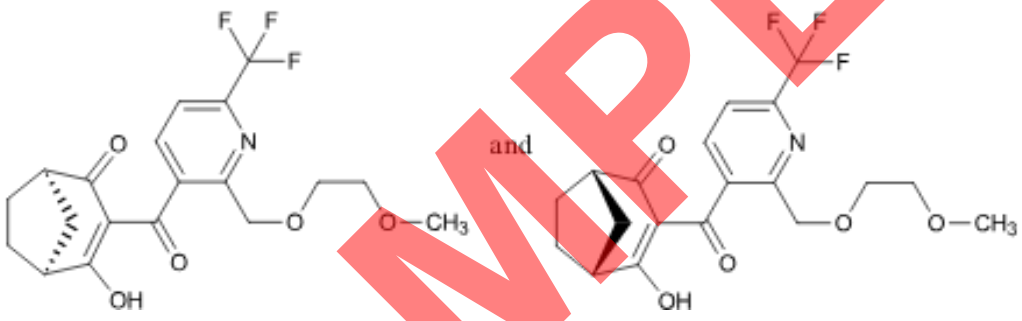
Source: Company websites, IHS Markit

2.5. Bicyclopyrone

Bicyclopyrone is a triketone HPPD inhibitor herbicide invented and developed by Syngenta with activity against BLW and some grasses, used mainly in mixtures on maize, wheat and barley.

EU registration: Not registered.

US registration: Registered 24 April 2015.



CAS: 4-hydroxy-3-[[2-[(2-methoxyethoxy)methyl]-6-(trifluoromethyl)-3-pyridinyl]carbonyl] bicyclo[3.2.1]oct-3-en-2-one

IUPAC: (1*RS*,5*SR*)-4-hydroxy-3-{2-[(2-methoxyethoxy)methyl]-6-(trifluoromethyl)-3-pyridylcarbonyl}bicyclo[3.2.1]oct-3-en-2-one

2.5.1. Formulation

Bicyclopyrone's main commercial formulations are shown in Table 9. The initial strategy was to develop mixtures with partner herbicides to give broad spectrum pre- and post-emergence activity. A solo formulation was introduced later.

Table 9: Bicyclopyrone key product formulations

Brand	Formulation
Acuron (US)	Bicyclopyrone 7.1 g/L + mesotrione 28.5 g/L + atrazine 120 g/L + S-metolachlor 257 g/L + benoxacor safener
Acuron Flexi (US)	Bicyclopyrone 0.87%+ mesotrione 3.47% + S-metolachlor 31.2% + benoxacor safener
Talinor (Australia)	Bicyclopyrone 37.5 g/L + bromoxynil 175 g/L + cloquintocet-mexyl safener 9.4 g/L EC
Acuron Uno (LATAM)	Bicyclopyrone 200 g/L SC

Source: Company websites, IHS Markit

Table 12: Bicyclopyrone key product introductions

Country	Brand name	Mixture partners	Main crops/markets	Date introduced
US, Canada	*Acuron (GT)*	Mesotrione + atrazine + S-metolachlor+ benoxacor safener	Maize	2015
US, Canada	*Acuron Flexi*	Mesotrione + S-metolachlor + benoxacor safener	Maize	2016
Argentina, Uruquay	*Acuron Uno*	None	Maize	2016
US, Canada	*Talinor*	Bromoxynil	Wheat, barley	2017
Australia	*Talinor*	Bromoxynil	Wheat, barley	2018

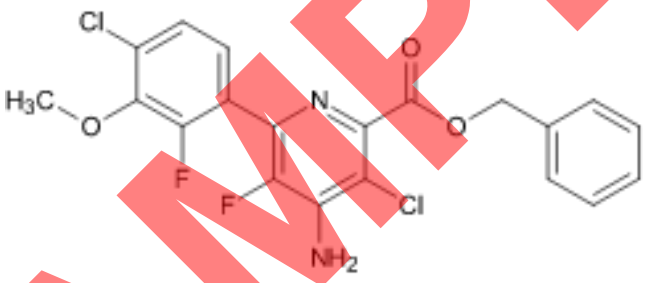
Source: Company websites, IHS Markit

2.6. Florpyrauxifen-benzyl

Florpyrauxifen-benzyl (trademarked as *Rinskor*) is an arylpicolinate chemistry herbicide invented by Corteva legacy company Dow AgroSciences for the post-emergence control of broadleaf, grass and sedge weeds in paddy rice, range, pasture and non-crop sectors.

EU registration: Expires 24 July 2029.

US registration: Registered 15 September 2017.



CAS: phenylmethyl 4-amino-3-chloro-6-(4-chloro-2-fluoro-3-methoxyphenyl)-5-fluoro-2-pyridinecarboxylate

IUPAC: benzyl 4-amino-3-chloro-6-(4-chloro-2-fluoro-3-methoxyphenyl)-5-fluoropyridine-2-carboxylate

2.6.1. Formulation

Florpyrauxifen-benzyl's main commercial formulations are shown in Table 13. These include EC, SC and WG formulations; single a.i. products at high and low concentrations and several mixtures. Mixture partners include penoxulam, cyhalofop-butyl and aminopyralid.

Table 13: Florpyrauxifen-benzyl key product formulations

Brand	Formulation
Ubeniq	Florpyrauxifen-benzyl 300 g/L SC
Loyant	Florpyrauxifen-benzyl 25.2 g/L EC
Novixid	Florpyrauxifen-benzyl 12 g/L + penoxsulam 20.4 g/L
Agixa	florpyrauxifen-benzyl 12 g/L + cyhalofop-butyl 160 g/L EC
DuraCor	Florpyrauxifen-benzyl 0.76% + aminopyralid K 8.95% SC
TerraVue	florpyrauxifen-benzyl 6.0% + aminopyralid K 71.01% WG

Source: Company websites, IHS Markit

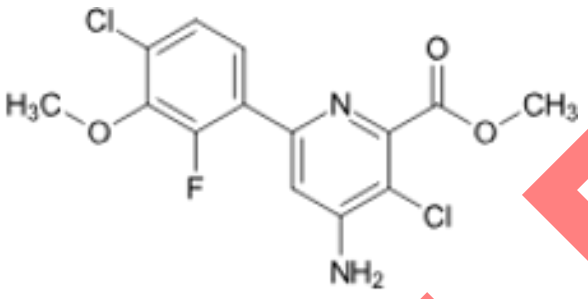
Key physico-chemical properties related to formulation are noted in Table 14.

2.7. Halauxifen-methyl

Halauxifen-methyl (trademarked as *Arylex*) is an arylpicolinate chemistry herbicide invented by Corteva legacy company Dow AgroSciences for the post-emergence control of broadleaf weeds in paddy rice, range, pasture and non-crop sectors.

EU registration: Expires 5 August 2025.

US Registration: Registered 29 July 2016.



CAS: methyl 4-amino-3-chloro-6-(4-chloro-2-fluoro-3-methoxyphenyl)-2-pyridinecarboxylate

IUPAC: methyl 4-amino-3-chloro-6-(4-chloro-2-fluoro-3-methoxyphenyl)picolinate

2.7.1. Formulation

Halauxifen-methyl's main commercial formulations are shown in Table 17. These include EC, SC, WG and OD formulations; single a.i. products; two-way mixtures and some three-way mixtures. Some formulations include the safener cloquintocet-mexyl. Mixture partners include aminopyralid, florasulam, fluroxypyr, diclosulam, picloram and pinoxaden. Corteva call the formulation of *Belkar* a NeoEC, which provides a favorable toxicological profile along with EC features of long shelf life, effective dispersion in water, consistent performance and efficacy.

Table 17: Halauxifen-methyl key product formulations

Brand	Formulation
Elevore	Halauxifen-methyl 69 g/L
Paradigm Arylex	Halauxifen-methyl 20% + florasulam 20% WG
ForageMax Arylex	Halauxifen-methyl 100 g/L+ aminopyralid 50 g/L SC
Rexade	Pyroxsulam 15% + halauxifen-methyl 5% + cloquintocet-mexyl safener 31.9%
Zypar	Halauxifen-methyl 6 g/L + florasalum 5 g /L, OD
Quelex	Halauxifen-methyl 10.4% + florasulam 10%
Pixxaro	Halauxifen-methyl + fluroxypyr + cloquintocet-mexyl safener EC
Pazeo	Halauxifen-methyl + dliclosulam
Rezuvant	Halauxifen-methyl + pinoxaden + fluroxypyr
Belkar	Halauxifen-methyl + picloram, NeoEC[1]

Source: Company websites, IHS Markit

Key physico-chemical properties related to formulation are noted in Table 18.

Table 18: Halauxifen-methyl key physico-chemical properties

Melting point	145.5°C	**Log P (log K_{ow})**	3.76 at pH 7, 20°C
Water solubility	1830 mg/L, 20°C	**Vapor pressure**	$1.5x10^{-5}$ mPa, 20°C

Source: University of Hertfordshire Pesticide Properties Database, IHS Markit

Safety data sheet: An example (*Elevore*, US) can be found here.

CAS: N^2-[(1R,2S)-2,3-dihydro-2,6-dimethyl-1H-inden-1-yl]-6-(1-fluoroethyl)-1,3,5-triazine-2,4-diamine

IUPAC: N^2-[(1R,2S)-2,3-dihydro-2,6-dimethyl-1H-inden-1-yl]-6-[(1RS)-1-fluoroethyl]-1,3,5-triazine-2,4-diamine

2.8.1. Formulation

Indaziflam's main commercial formulations are shown in Table 21. Some mixtures with post-emergence herbicides have been developed.

Table 21: Indaziflam key product formulations

Brand	Formulation
Esplanade SC	Indaziflam 200 g/L SC
Specticle	Indaziflam 200 g/L SC
Alion	Indaziflam 500 g/L SC
Specticle Total	Indaziflam 1 g/L + diquat 10 g/L + glyphosate-ipa 224 g/L SC
Merlin Total, Provence Total	Indaziflam 150 g/L + isoxaflutole 450 g/L SC

Source: Company websites, IHS Markit

Key physico-chemical properties related to formulation are noted in Table 22.

Table 22: Indaziflam key physico-chemical properties

Melting point	183ºC	**Log P (log K_{ow})**	2.8 at pH 7, 20ºC
Water solubility	2.8 mg/L at 20ºC	**Vapor pressure**	2.5 x 10^{-05} mPa at 20ºC

Source: University of Hertfordshire Pesticide Properties Database, IHS Markit

Safety data sheet: An example (*Alion*, US) can be found here.

2.8.2. Patents

Important intellectual property around indaziflam *per se* is described in Table 23.

Table 23: Indaziflam key intellectual property

Patent type	Patent claims	PCT patent	US patent
Composition of matter and method of use	Amino 1, 3, 5-triazines N-substituted with chiral bicyclic radicals as herbicides and plant growth regulators	WO2004069814 Filed 23 January 2004	US20040157739 Filed 3 February 2004

Source: European Patent Office, IHS Markit

2.8.3. Use

Activity and application: Indaziflam is a fluoroalkyltrazine chemistry residual herbicide applied pre-emergence or early post-emergence. Application rates of 25-100 g/ha are recommended as a single or split treatment in spring, summer or autumn.

More details can be found on the product label of which an example (*Alion, US*) can be found here.

Specticle (indaziflam 200 g/L SC) controls summer grass (*Digitaria* spp.), crowsfoot grass (*Eleusine indica*) and winter grass (*Poa annua*) in turf on golf course fairways at 50 g ai/ha.

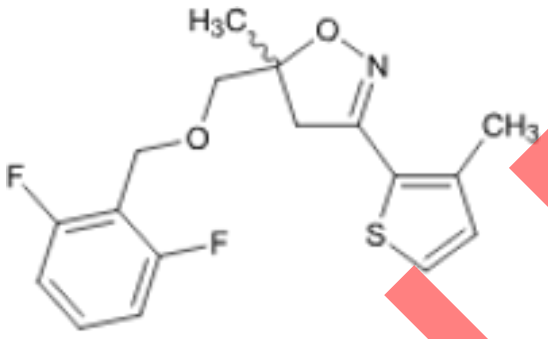
Bayer introduced *Provence Total* SC (indaziflam 150 g/L + isoxaflutole 450 g/L) in Brazil and other LATAM countries for use in sugar cane to control of blackjack (*Bidens pilosa*), fireplant (*Euphorbia heterophylla*), Alexander grass (*Brachiaria plantaginea*) and Guinea grass (*Panicum maximum*). It provides 200 days residual action. Application rates range from 200-250 ml/ha.

2.9. Methiozolin

Methiozolin is an oxazole chemistry herbicide discovered at Moghu Research Centre in S. Korea and licensed to SDS Biotech. It controls annual bluegrass (*Poa annua*) in various cool and warm season turfgrasses post-emergence with some residual activity.

EU registration: Not registered.

US registration: Registered 9 December 2019.



CAS: 5-[[(2,6-difluorophenyl)methoxy]methyl]-4,5-dihydro-5-methyl-3-(3-methyl-2-thienyl)isoxazole

IUPAC: (5*RS*)-5-[(2,6-difluorobenzyloxy)methyl]-4,5-dihydro-5-methyl-3-(3-methyl-2-thienyl)isoxazole

2.9.1. Formulation

PoaCure is a suspension concentrate formulation containing 275 g/L methiozolin.

Key physico-chemical properties related to formulation are noted in Table 25.

Table 25: Methiozolin key physico-chemical properties

Melting point	50.2°C	**Log P (log K_{ow})**	N/A
Water solubility	3.4 mg/L	**Vapor pressure**	N/A

Source: University of Hertfordshire Pesticide Properties Database, IHS Markit

Safety data sheet: An example (*PoaCure*, US) can be found here.

2.9.2. Patents

Details of key patent information for methiozolin *per se* are shown in Table 26. A more recent patent protects its use in turf.

Table 26: Methiozolin key intellectual property

Patent type	Patent claims	PCT patent	US patent
Composition of matter	Preparation of herbicidal 5-benzyloxymethyl-1,2-isoxazoline derivatives for weed control in rice.	WO200219825 Filed 5 Sept 2001	US838416 Filed 5 Sept 2001
Use	Use of 5-benzyloxymethyl-1,2-isoxazoline derivatives as turf herbicide		US2008318784 Filed 16 May 2008

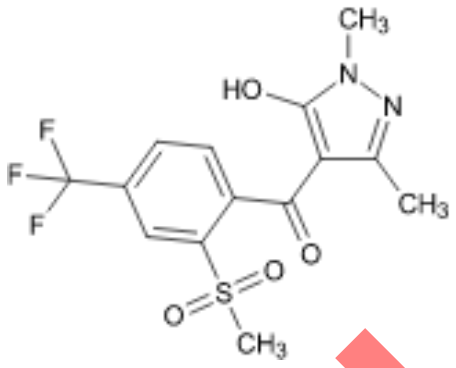
Source: European Patent Office, IHS Markit

2.10. Pyrasulfotole

Pyrasulfotole is a benzoylpyrazole chemistry herbicide invented by Aventis and now sold by Bayer CropScience for the control of BLW in cereals, generally used in pre-mixtures.

EU Registration: Not registered.

US Registration: Registered 9 August 2007.



CAS: (5-hydroxy-1,3-dimethyl-1*H*-pyrazol-4-yl)[2-(methylsulfonyl)-4-(trifluoromethyl) phenyl] methanone

IUPAC: 5-hydroxy-1,3-dimethyl-1H-pyrazol-4-yl 2-(methylsulfonyl)-4-(trifluoromethyl) phenyl ketone

2.10.1. Formulation

Bayer CropScience use pyrasulfotole in pre-mix formulations., especially with bromoxynil. In addition, thiencarbazone-methyl, fenoxaprop-P-ethyl and fluroxypyr are included in three-way mixtures (Table 27). The safener mefenpyr diethyl is included to improve crop safety in most formulations.

Table 27: Pyrasulfotole key product formulations

Brand	Formulation
Huskie, US; *Infinity*, Canada	Pyrasulfotole (3.3%) + bromoxynil octanoate (13.4%) + bromoxynil heptanoate (12.9%), EC
Huskie Complete, US	Pyrasulfotole (2.82%) bromoxynil phenol/octanoate/heptanoate (22.56%) + thiencarbazone-methyl (0.45%), EC
Precept, Australia	Pyrasulfotole (3.3%) + (13.4%) + bromoxynil (12.9%), EC
Wolverine, US; *Tundra*, Canada	Pyrasulfotole (1.94%) + bromoxynil octanoate (4.95%) + bromoxynil heptanoate (4.79%) + fenoxaprop-P-ethyl (4.47%), EC (no safener)
Huskie FX, USA	Pyrasulfotole (2.7%) + bromoxynil octanoate (11.02%) + bromoxynil heptanoate (10.66%) + fluroxypyr (9.02%), EC

Source: Company websites, IHS Markit

Key physico-chemical properties related to formulation are noted in Table 28.

Table 28: Pyrasulfotole key physico-chemical properties

Melting point	201ºC	**Log P (log K_{ow})**	-1.36 at pH 7, 20ºC
Water solubility	69.1 g/L at 20ºC, pH7	**Vapor pressure**	2.7 x 10^{-07} mPa at 20ºC

Source: University of Hertfordshire Pesticide Properties Database, IHS Markit

Safety data sheet: An example (*Huskie,* US) can be found here.

IUPAC: N-(5,7-dimethoxy[1,2,4]triazolo[1,5-a]pyrimidin-2-yl)-2-methoxy-4-(trifluoromethyl) pyridine-3-sulfonamide

2.12.1. Formulation

Pyroxsulam formulations include ODs and WGs using the safener cloquintocet-mexyl. Mixtures with other active ingredients have been developed, including those with clodinafop-propargyl, florasulam, fluroxypyr, flupyrsulfuron-methyl-sodium, halauxifen-methyl and pendimethalin. Representative formulations are shown in Table 33.

Table 33: Pyroxsulam key product formulations

Company	Brand	Formulation
Corteva	*Crusader* (*e.g.,* Australia)	Pyroxsulam 30 g/L + cloquintocet-mexyl 90 g/L, OD
Corteva	*PowerFlex* (*e.g.,* US)	Pyroxsulam 13.3% + cloquintocet-mexyl 13.3% WG
Corteva	*Broadway Star* (UK)	Pyroxsulam 7.1% + florasulam 1.42% + cloquintocet-mexyl 6.7%, WG
Corteva	*Broadway Sunrise* (UK)	Pyroxsulam 5.4 g/L + pendimethalin 314 g/L + cloquintocet-mexyl 0.5%, OD
Corteva	*Unite* (UK)	Pyroxsulam 6.9% + flupyrsulfuron-methyl-sodium 3.7% + cloquintocet-mexyl 6.9%, WG
Corteva	*Palio* (UK)	Pyroxsulam 7.08% + florasulam 1.42% + cloquintocet-mexyl 7.08%, WG
Corteva	*GoldSky* (USA)	Pyroxsulam 12.0 g/L + florasulam 2.0 g/L + fluroxypyr 115.7 g/L), cloquintocet-mexyl 3.7%
Corteva	*Rexade* (Australia)	Pyroxsulam 15% + halauxifen-methyl 5% + cloquintocet-mexyl 31.9%
Syngenta	*Serrate* (Spain)	Pyroxsulam 7.5%+ clodinafop-propargyl 20% + cloquintocet-mexyl 2.5%, WG
Sicam	*Palio* (Italy)	Pyroxsulam 75 g/L + cloquintocet-mexyl 75 g/L, WG

Source: IHS Markit, Company websites

Key physico-chemical properties related to formulation are noted in Table 34.

Table 34: Pyroxsulam key physico-chemical properties

Melting point	208ºC	**Log P (log K_{ow})**	-1.01 at pH 7, 20ºC
Water solubility	3200 mg/L at 20ºC	**Vapor pressure**	1.0 x 10^{-04} mPa at 20ºC

Source: University of Hertfordshire Pesticide Properties Database, IHS Markit

Safety data sheet: An example (*Simplicity GoDri*, Canada) can be found here.

2.12.2. Patents

Important patents covering the intellectual property around pyroxsulam *per se* are listed in Table 35.

Table 35: Pyroxsulam key intellectual property

Patent type	Patent claims	PCT patent	US patent
Composition of matter and use	N-(5,7-dimethoxy[1,2,4]triazolo[1,5-a]pyrimidin-2-yl) arylsulfonamide compounds and their use as herbicides	WO0236595 Filed 2 November 2001	US6559101 Filed 2 November 2001

Source: European Patent Office, IHS Markit

2.12.3. Use

Activity and application: Pyroxsulam is a compound with similar chemistry to other Corteva compounds including metosulam, cloransulam-methyl, diclosulam and penoxsulam. It controls a range of important BLW and grasses such as bromes (*Bromus* spp.) and wild oats (*Avena fatua*), providing an alternative mode of action to ACC-ase inhibitors.

be rotated with wheat treated with the product. A condition of its UK registration is that is used as part of graminicide programme including residual herbicides and follow-up herbicides with different modes of action to slow the development of resistance to the product.

In 2016, Syngenta launched *Serrate* (clodinafop-propargyl + pyroxsulam + safener), in Spain. It is water-dispersible granule formulation for the control of great brome (*Bromus diandrus*) in cereals. It also controls other grasses such as ryegrass and wild oats in wheat, oats and triticale.

In 2017, *Crusader GoDRI* (pyroxsulam 21.5% + cloquintocet acid safener 45.2%), for use on wheat and triticale, and *Rexade* (pyroxsulam 15% + halauxifen-methyl 5% + cloquintocet safener 31.9%) were approved in Australia. They are for the control of grasses and BLW in triticale and wheat (excluding durum).

In 2018, Corteva received US approval for *OpenSky* (pyroxsulam + fluroxypyr) for use on provides wheat and durum wheat. The two active ingredients with different modes of action reduce the likelihood of weed resistance and target wild oats (*Avena fatua*), yellow foxtail (*Setaria pumila*), cheatgrass (*Bromus secalinus*), kochia (*Kochia* spp), mustards and wild buckwheat (*Polygonum convolvulus*).

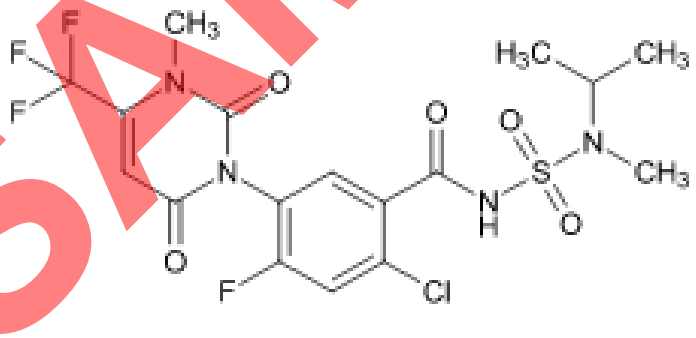
In 2021, Sipcam launched *Palio* (pyroxsulam + cloquintocet-mexyl safener) in Italy as part of a distribution deal with Corteva. *Palio* is a water dispersible granule formulation for post-emergence application control of broadleaf weeds on cereals.

2.13. Saflufenacil

Saflufenacil (trademarked as *Kixor*) is a uracil chemistry PPO inhibitor herbicide invented and developed by BASF. It has contact and soil residual activity on BLW.

EU registration: Not registered.

US registration: Registered 3 September 2009.



CAS: 2-chloro-5-[3,6-dihydro-3-methyl-2,6-dioxo-4-(trifluoromethyl)-1(2*H*)-pyrimidinyl]-4-fluoro-*N*-[[methyl(1-methylethyl)amino]sulfonyl]benzamide

IUPAC: 2-chloro-4-fluoro-N-[isopropyl(methyl)sulfamoyl]-5-[3-methyl-2,6-dioxo-4-(trifluoromethyl)-3,6-dihydropyrimidin-1(2H)-yl]benzamide

2.13.1. Formulation

Saflufenacil has been formulated alone and in mixture with a number of other active ingredients including dimethenamid-P, imazethapyr and pyroxasulfone. Formulation types have included WG, SC and EC. Representative ones are listed in Table 36.

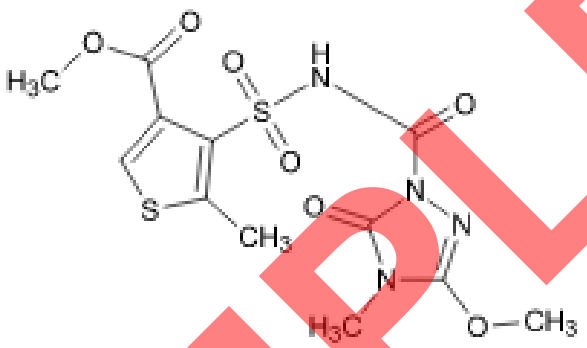
Tirexor). Trifludimoxazin is a 1,3,5-triazine compound that PPO inhibitor, like saflufenacil. *Voraxor* is an SC formulation for burndown and selective pre-emergence residual control of a range of BLW and the suppression of key grass weeds prior to planting cereals. It will also be approved for burndown prior to the establishment of forestry plantations and fallow; and other non-crop total vegetation control.

2.14. Thiencarbazone-methyl

Thiencarbazone-methyl is a sulfonyl-amino-carbonyl-triazolinone chemistry ALS inhibitor herbicide developed by Bayer CropScience for pre- and post-emergence control of grasses and BLW in maize and other major crops.

EU registration: Expires 30 June 2024.

US registration: Registered 30 October 2008.



CAS: methyl 4-[[[(4,5-dihydro-3-methoxy-4-methyl-5-oxo-1H-1,2,4-triazol-1-yl)carbonyl]amino]sulfonyl]-5-methyl-3-thiophenecarboxylate

IUPAC: methyl 4-{[(4,5-dihydro-3-methoxy-4-methyl-5-oxo-1H-1,2,4-triazol-1-yl)carbonyl] sulfamoyl}-5-methylthiophene-3-carboxylate

2.14.1. Formulation

Thiencarbazone-methyl's main commercial formulations are shown in Table 39, most of which are mixtures. Common mixture partners are other ALS inhibitors, especially foramsulfuron and HPPD inhibitors such as isoxaflutole. The safeners cyprosulfamide, mefenpyr-diethyl or isoxadifen-ethyl are often included. A range of formulation types have been commercialized, including SC, EC, WG and OD.

Table 39: Thiencarbazone-methyl key product formulations

Brand	Formulation
Velocity	Thiencarbazone-methyl 10 g/L SC
Adengo 465 SC	Thiencarbazone-methyl 90 g/L + isofluxatole 225 g/L+ cyprosulfamide 150 g/L SC
Adengo	Thiencarbazone-methyl 20 g/L + isoxaflutole 50 g/L + cyprosulfamide 33 g/L SC
Corvus	Thiencarbazone-methyl 90 g/L+ isoxaflutole 226 g/L + cyprosulfamide 150 g/L SC
Capreno	Thiencarbazone-methyl 68 g/L + tembotrione 346 g/L+ isoxadifen-ethyl 134 g/L SC
Huskie Complete	Thiencarbazone-methyl 0.45% + pyrasulfotole 2.82% + bromoxynil 15.77% + mefenpyr-diethyl 2.7% EC
Tribute Total	Thiencarbazone-methyl 9.9% + foramsulfuron 19.8% + halosulfuron-methyl 30.8% WG
Monsoon Active	Thiencarbazone-methyl 10 g/L+ foramsulfuron 30 g/L + cyprosulfamide, OD
Conviso One	Thiencarbazone-methyl 30 g/L+ foramsulfuron 50 g/L OD
Percutor	Thiencarbazone-methyl 45% + iodosufuron-methyl-sodium 6% WG

Source: IHS Markit, Company websites webswebsiteites

To find out more about this report please contact us at:
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