

**Public Release Summary**

**TRIBENURON METHYL  
IN THE PRODUCT  
DU PONT EXPRESS HERBICIDE**

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Agricultural and Veterinary Chemicals.  
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## **EXECUTIVE SUMMARY**

### **Introduction**

The purpose of this document is to provide a summary of the data reviewed and an outline of regulatory considerations for the proposed clearance and registration of the chemical tribenuron methyl in the product Du Pont Express Herbicide as a pre-emergence herbicide for control of certain broadleaf weeds in fallow and pre-crop situations. Use in NSW and Qld only is proposed.

The National Registration Authority for Agricultural and Veterinary Chemicals (NRA) invites public comment before deciding whether to proceed to approve this product for use in Australia.

The NRA has completed an assessment of the data submitted by the applicant in support of this use of tribenuron methyl and has provided the following information for public comment:

### **Agricultural Aspects**

Du Pont Express Herbicide is a new non-selective herbicide containing 750 g/kg tribenuron methyl. The product has been shown to give good control of broadleaf weeds in winter and summer fallow at rates of between 20 and 30 g/ha. Registration of the product is sought in NSW and Qld only.

Efficacy trials carried out by qualified personnel in a range of conditions indicated that Du Pont Express Herbicide provides good control of all the weeds listed on the label. The product has the potential to replace the more toxic product Goal CT in tank mixes with glyphosate.

Results of a number of phytotoxicity trials were submitted and indicated that phytotoxicity would not be a problem when the product is used according to label directions.

The label identifies the herbicide as an acetolactate synthase inhibitor and recommends management strategies to minimise the development of resistance.

The use of Du Pont Express Herbicide is not expected to have any adverse trade implications for Australia as no detectable residues are expected in any produce.

### **Environmental Aspects**

Tribenuron methyl shares the general properties of sulfonylureas. That is: degradation is by hydrolysis of the sulfonylurea bridge; it is more stable in alkaline conditions; and mobility generally increases with increasing soil pH and decreasing organic matter.



Tribenuron methyl degraded very rapidly in aqueous acidic conditions (half-life less than 1 day), but was much slower in aqueous alkaline conditions with more than 87% of the parent compound remaining after 32 days. The same kind of trends were observed in the various soil studies. It was not degraded initially by microbial action.

The adsorption coefficient based on organic carbon content is very low which suggests that tribenuron methyl could be mobile. In field dissipation studies, however, there was little leaching of the parent compound, or its degradates, from the top 13 cm of a neutral and alkaline soil. Tribenuron methyl is not expected to accumulate in fish because of its low octanol/water partition co-efficient.

The ecotoxicity profile of tribenuron methyl suggests that the area of concern is non-target broadleaf terrestrial and aquatic plants. For non-target broadleaf plants, it is expected to be phytotoxic to various degrees. Animals in general, including aquatic, soil and beneficial invertebrates, were noted to be less sensitive to tribenuron methyl.

## **Public Health Aspects**

### **Toxicology**

Tribenuron methyl, the active ingredient of Du Pont Express Herbicide, has low acute oral, dermal and inhalation toxicity potential, is not a skin irritant or sensitiser, but is a moderate eye irritant. The formulated product, Du Pont Express Herbicide, also has low acute toxicity, is not a skin irritant or sensitiser, but is a moderate eye irritant.

Both short-term and long-term administration of tribenuron methyl in animals showed that growth retardation and slight liver effects were the main manifestations of toxicity at high doses. Long-term dosing to rats also resulted in an increase in mammary gland tumours in females at high doses. Like other structurally related compounds, tribenuron methyl has been shown to mimic the natural hormone oestrogen in the rat. The resultant endocrine imbalance is believed to hasten the onset of tumours. This phenomenon has only been seen in the Sprague-Dawley strain of rat, and is therefore unlikely to be of significance in other species including humans. Irrespective of whether the effects are specific to the rat, the doses needed to produce these effects in the rat greatly exceed any anticipated human dietary intake associated with the use of Du Pont Express Herbicide. There was no evidence of a potential to cause birth defects or damage to genetic material (DNA).

### **Residues**

Australian residue trials were submitted which allowed appropriate MRLs to be set for tribenuron methyl in cereal crops, primary animal feed commodities and animal products.

Du Pont Express Herbicide is used in fallow and pre-planting situations. No residues were detected in plant and grain matter at the time of harvest; there is therefore no need for a withholding period in relation to harvest. Detectable residues of tribenuron methyl were found in cereal crop plants shortly after application. Crops at this growth stage

and earlier were considered inappropriate for animal consumption due to the limited amount of green matter available for forage. Therefore no withholding period was set for grazing or forage.

Tribenuron is readily metabolised in plants and animals and it is thus highly unlikely that residues would accumulate in either plants or animals.

The pre-emergence use pattern and the nature of the chemical make it unlikely that residues of tribenuron methyl would appear in food commodities.

In summary, based on an assessment of the toxicology and the potential dietary intake of residues, it was considered that there should be no adverse effects on human health from the proposed use of Du Pont Express Herbicide.

### **Occupational health and safety aspects**

Worksafe Australia has conducted a risk assessment on Du Pont Express Herbicide containing tribenuron methyl at 750 g/kg dry flowable formulation for use on certain broadleaf weeds in fallow and precrop situations and concludes that it can be safely used by workers.

Tribenuron methyl and Du Pont Express Herbicide are considered to be hazardous substances. Tribenuron methyl and Du Pont Express Herbicide are of low acute toxicity but may cause eye irritation because of dust associated with the granular form of both substances.

Du Pont Express Herbicide will be imported fully formulated and re-packaged in Australia.

Safety directions are established to enable end users to minimise contamination with the product. They include the use of elbow-length PVC gloves and a face shield or goggles when preparing the spray. Specific protective clothing is not considered necessary for workers applying the spray. All workers should adopt good occupational hygiene practices.

No re-entry period is necessary for workers re-entering treated areas.

Du Pont Express Herbicide can be used safely if handled in accordance with the control measures indicated on the label. Additional information is provided on the material safety data sheet for the product.



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## **INTRODUCTION**

The purpose of this document is to provide the public with a summary of the data reviewed and an outline of the regulatory considerations for the proposed application of the chemical tribenuron methyl as a pre-emergence herbicide for control of certain broadleaf weeds in fallow and pre-crop situations, and to seek public comment prior to the chemical product being approved for use in Australia.

Comments should be received by 29 August 1995 and sent to:



### **Applicant**

Du Pont (Australia) Limited has applied for registration of a pre-emergence herbicide product containing a new active constituent, tribenuron methyl, a sulphonylurea which inhibits acetolactate synthase.

### **Product Details**

Tribenuron methyl will be marketed under the trade name Du Pont Express Herbicide as a dry flowable formulation containing 750 g/kg of active constituent.

Du Pont Express Herbicide will be imported fully formulated, requiring repacking only in Australia.

Du Pont (Australia) Limited intends to market Du Pont Express Herbicide in NSW and Qld only for the control of broadleaf weeds in fallow and pre-crop situations.

### **Overseas Registration Status and Trade Implications**

Products containing tribenuron methyl are registered in more than 30 countries, including New Zealand, the United States and the European Community.

Tribenuron methyl MRLs for cereal grains have been set in a number of Australia's grain export destinations including the US, NZ, Canada and European countries.

Du Pont Express Herbicide is applied to fallow and no significant residues would be expected. This was confirmed by residue studies with tribenuron methyl which failed to detect residues on any commodities grown or grazed on treated land.

Australian MRLs for grain commodities were all set at the limit of analytical determination (0.01 or 0.05 mg/kg depending on the crop) and are at the same level or lower than many of the comparable overseas MRLs.

MRLs for animal feed commodities were set at the higher level of 0.1 mg/kg as there was no potential for the accumulation of tribenuron methyl residues in animal commodities. The chemical is rapidly metabolised in both plants and animals and shows no potential for accumulation in animal commodities due to rapid elimination from the animal after ingestion.

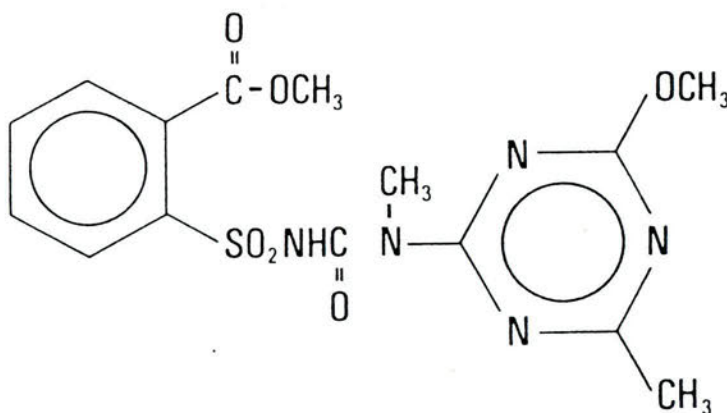
In summary, Australian produce is not expected to have detectable levels of tribenuron methyl when Du Pont Express Herbicide is used as recommended on the label. If residues were detected, they would not be expected to violate overseas MRLs. Thus the use of Du Pont Express Herbicide is not expected to have any adverse trade implications for Australia.

## PROPERTIES OF THE CHEMICAL ACTIVE INGREDIENT

The chemical active ingredient tribenuron methyl is manufactured in the US and has the following properties:

Common name:	tribenuron methyl
Chemical name:	2-[4-methoxy-6-methyl-1,3,5-triazin-2-yl(methyl)carbomoylsulfamoyl]benzoic acid
Product name:	DuPont Express Herbicide
CAS Registry Number:	101200-48-0
Empirical formula:	C <sub>15</sub> H <sub>17</sub> N <sub>5</sub> O <sub>6</sub> S
Molecular Weight:	395.39
Physical form:	Powder at 20°C
Colour:	White
Odour:	None
Melting point:	141°C
Density:	1.54 g/cc
Octanol/water partition coefficient (K <sub>OW</sub> )	0.36 at pH 7
Vapour pressure:	2.7 x 10 <sup>-7</sup> mm Hg at 25°C

Structural Formula:





## **AGRICULTURAL ASSESSMENT**

### **Justification for Use**

Du Pont Express Herbicide provides control of problem broadleaf weeds in winter and summer fallow. The main geographical area for its use will be in Northern New South Wales and Southern Queensland; the product will thus be registered in NSW and Qld only.

The product is targeted to replace the more toxic Goal CT (oxyfluorfen) in broadacre fallow situations, usually in a tank mix with glyphosate. Du Pont Express Herbicide, scheduled as an S5 poison, should provide a safer alternative to Goal CT (an S7 poison).

Tribenuron methyl has a short half life in soil and it is applied as a fallow and pre-crop herbicide which is not expected to leave residues in subsequent crops.

### **Proposed Use Pattern**

DuPont Express Herbicide is applied in fallow and pre-crop situations. A table on the label indicates the minimum interval between treatment with the product and sowing of subsequent crops. A minimum of 3 days is recommended for barley, oats and wheat and 7 days for cotton, maize, mungbeans, sorghum, soybeans and sunflowers.

The product Du Pont Express Herbicide is applied at rates of between 20 and 30 g/ha (15-22.5 g/ha active constituent) when used alone, depending on the weed species. It can also be used in a tank mix with 450 g/L glyphosate at rates between 15 and 25 g/ha, again depending on the weed species. Appropriate compatibility with glyphosate herbicide has been demonstrated.

The label specifies the weed growth stage at which spraying should be carried out and recommends that the product is applied to small, actively growing weeds as larger weeds are more difficult to control.

The product should be applied in a minimum volume of 50 L/ha for ground application and 20 L/ha for aerial application.

### **Evaluation of Efficacy**

Results of 29 separate efficacy trials covering all the weeds listed on the label for the product were submitted. The reviewers noted that trials were well planned, well documented and designs were suitable for the purpose of testing efficacy and phytotoxicity. Data was systematically recorded and analysis carried out by recognised statistical methods. Significance of results was adequately noted.

The applicant was asked to supply further data to support the claim for control of common thorn apple by Du Pont Express Herbicide alone. This claim was subsequently removed from the label. All other claims were supported and minor label amendments requested. These have been carried out by the applicant.

### **Phytotoxicity**

Results of 22 phytotoxicity trials were submitted and indicated that phytotoxicity would not be a problem when the product is used according to label directions. As the herbicide is non selective it is not applied to the crop itself.

### **Resistance management**

Tribenuron methyl is a member of the sulfonylurea group of herbicides and has the acetolactate synthase inhibitor (ALS) mode of action. It is thus identified on the front of the label as a Group B Herbicide. To prevent resistance development the label recommends that other ALS inhibitors should not be used in the crop following the use of DuPont Express Herbicide alone as a preceding fallow or pre-crop treatment. The recommendation to use Express with glyphosate also helps minimise the risk of resistant weeds occurring.

### **Conclusion**

Du Pont Express Herbicide has been shown to be efficacious in the control of broadleaf weeds in fallow situations in northern New South Wales and Queensland. Tribenuron methyl has a short half life in soil and is not expected to leave residues in subsequent crops. The label provides adequate instructions for the safe use of the product.



## ENVIRONMENTAL ASSESSMENT

### Environmental fate

Du Pont Express Herbicide containing the technical grade active constituent, tribenuron methyl (750g/kg), will be imported into Australia formulated as dry flowable solid granules, and only require repacking. It will be used alone, or in conjunction with a commercially available glyphosate to control broadleaf weeds in winter and summer fallows. Tribenuron methyl is a sulfonylurea which inhibits acetolactate synthase.

#### Hydrolysis

Tribenuron methyl was not stable in solutions of sterile aqueous buffers. The decay in acidic solutions was rapid with a half-life less than 1 day. In neutral solutions, the half-life was determined to be 3-6 days, while in alkaline solutions, more than 87% of the parent compound (relative to Day 0 levels) remained after 32 days.

Tribenuron methyl degraded to sulfonamide or saccharin, and triazine amine. These breakdown products were typical of all fate studies.

#### Photolysis

Tribenuron methyl in neutral distilled water had a half-life of 15.9 days and 13.0 days when kept in the dark or exposed to summer sunlight, respectively. In acidic solutions, degradation was very rapid in both dark and light-exposed treatments, while degradation was very slow in alkaline solutions (half-life less than 1 day and greater than 137 days, respectively). The results, therefore, give no indication that photodegradation occurred.

A photolysis study for tribenuron methyl in soil was not provided. This is acceptable since the aqueous photolysis study showed little, if any, photodegradation.

### Degradation in soils and water

#### Degradation in soils

Tribenuron methyl labelled in the triazine amine ring was applied to two silt loam soils to assess the degree of aerobic degradation in a 220-260 day study. The half-lives were calculated to be about 3 and 12 days for each (non-sterile) soils. For sterilised soils, the half-lives were shorter, probably reflecting the decrease in pH of the soils when sterilised and emphasising the role of abiotic hydrolysis. One of the degradation products, triazine amine, was persistent, irrespective of soil source. Studies of the other degradation products, such as saccharin, showed they ultimately degraded to CO<sub>2</sub> and/or soil-bound degradates.

Another study in which treated soils were aerobically incubated for 64 days, indicated that despite the variability in soil characteristics of 5 soil types, half lives were rapid with most of the tribenuron methyl degraded within about 30 days.



### Anaerobic studies

Tribenuron methyl is degraded in anaerobic aquatic sediments through abiotic hydrolysis and microbial action, controlled by the pH of the system and the adaptability of the micro-organisms to Tribenuron methyl.

### Mobility in Soils

The adsorption/desorption characteristics of tribenuron methyl were assessed in water-soil suspension systems and soil thin layer chromatography.

### Flask adsorption/desorption and soil TLC studies

Four types of soil with different physico-chemical properties were used. Both processes were described by Freundlich isotherms in the flask studies. The adsorption and desorption coefficients based on organic carbon content of soils suggest that it is likely to be weakly bound and highly mobile in soils.

Mobility of tribenuron methyl was further assessed with soil thin layer chromatography. The plate mobility values were inversely correlated with the soils' organic matter levels, indicating soil organics could be a major factor in controlling the mobility of tribenuron methyl.

### Leaching potential

The possible extent of leaching was investigated in three studies using a soil column method; in each study, a silt loam (Keyport soil) was also left to age, allowing a comparison of the effect of ageing of the compound on leaching. Results indicated that tribenuron methyl was very mobile in a sand, only slightly retained by a silty clay and a silt loam (not Keyport), but with less than 10% of the applied compound/products eluted in Keyport soil. Results when tribenuron methyl was aged on Keyport soil were very similar.

In another study with three soil types, results indicated organic carbon might cause a greater percentage of the tribenuron methyl to be retained in the soil.

### Field Dissipation Studies

Three soil types (silt loam, pH 8.3; silty clay loam, pH 7.1; and silt loam, pH 5.1) were studied for the dissipation of Tribenuron methyl under field conditions. Tribenuron methyl was radiolabelled in one of two ring structures: the phenyl ring or triazine ring.

Tribenuron methyl degraded rapidly in soil with half-lives of 9, 5 and 2 days for an alkaline, neutral, and acidic loam, respectively. The two labels behaved very similarly with respect to degradation and mobility in the soil profile. There is little leaching of the parent compound or its degradation products from the top 13 cm of either soil throughout the 17 month study; the labelled parent compound and degradates never

leached greater than 23 cm. The large losses of label in the phenyl ring was attributed to CO<sub>2</sub> evolution.

#### Bioaccumulation in aquatic organisms and accumulation potential in soils

No studies were submitted for bioaccumulation in aquatic organisms. However, tribenuron methyl is not expected to bioaccumulate in fish because of its low octanol/water partition co-efficient and high water solubility.

No studies were submitted for accumulation in soils. Its high water solubility, rapid biodegradation, low rate and frequency of application (once per season), however, all indicate its low potential for accumulation. There is some potential for one of its major metabolites, triazine amine to persist, while saccharin, another major metabolite, is less likely to persist since it can be degraded to CO<sub>2</sub>.

#### Environmental Effects

##### Birds

Five-day oral (acute) tests with Bobwhite quails gave an LC<sub>50</sub> greater than 2250 ppm. Five-day oral and dietary (acute) tests with Bobwhite quails and Mallard ducks gave LC<sub>50</sub>'s greater than 5620 ppm. This data suggests that tribenuron methyl is practically nontoxic to birds.

##### Aquatic organisms

The aquatic toxicity of tribenuron methyl was tested with rainbow trout, bluegill sunfish, water flea, green algae, and duckweed. The results are given in Table 1.

**Table 1. Summary of ecotoxicological data of tribenuron methyl**

Species	Test	Purity	Results <sup>a, b, c</sup> (purity)
Bluegill sunfish	acute static	96-98%	LC <sub>50</sub> (96h) >1000
Rainbow trout	acute static	96-98%	LC <sub>50</sub> (96h) >1000 (96-98% ) *LC <sub>50</sub> (96h) = 160 (80% )
	21 d flow-through	96%	LC <sub>50</sub> (96h) >455 (96% ) *LC <sub>50</sub> = 150 (80% )
Water flea	static acute	96%	EC <sub>50</sub> (48h) = 720 (96%) *EC <sub>50</sub> (48h) >520 (80% )
	chronic 21 d static-renewal	96%	EC <sub>50</sub> (reproduction) >900
Water flea	chronic 21 d static-renewal	80%	*EC <sub>50</sub> (reproduction) = 230
Algae	static 120 h	96%	EbC <sub>50</sub> (growth inhibition) 120 h = 4.5
Duckweed	14 d static-renewal	96%	EC <sub>50</sub> = 9.9 µg.L <sup>-1</sup>

a. results marked with \* are measured concentrations; b. where a test had multiple endpoints, on the most sensitive result is given; c. units are mg.L<sup>-1</sup> unless otherwise stated.



The aquatic toxicity profile of tribenuron methyl suggests that the area of concern is non-target macrophytes, with it expected to be phytotoxic, while for fish and aquatic invertebrates it is expected to be practically non-toxic.

#### Non-target Invertebrates

A honey bee test determined the LD<sub>50</sub> of tribenuron methyl as greater than 100 µg.L<sup>-1</sup>, and could be considered relatively non-toxic to the honey bee.

An LD<sub>50</sub> of 1299 mg.kg<sup>-1</sup> (dry weight) was determined for tribenuron methyl of 98% purity with earthworms in an artificial soil system.

There were no significant effects of tribenuron methyl on microbial process (nitrogen transformation, respiration and asymbiotic nitrogen fixation) in laboratory studies where tribenuron methyl was applied at twice the maximum label rate.

#### Phytotoxicity

The herbicide is expected to have typical herbicidal activity against broad-leaf plants with inhibition of acetolactate synthase.

#### Environmental Hazard

Tribenuron methyl is for use in summer and winter fallows to control a range of broadleaf weeds. The main hazard of tribenuron methyl is from exposure to non-target broadleaf plants. Exposure of tribenuron methyl or triazine amine, its metabolite, may occur through:

- Lateral transport of the chemical in subsurface/groundwater flow;
- Contaminated rising water tables and/or irrigation water associated with accumulation of tribenuron methyl in confined aquifers;
- Spray drift to non-target areas; and
- Surface run-off to non-target areas.

The latter two points have the greater potential, although the first two points should not be ignored if tribenuron methyl is able to remain uncharged at a high pH.

Worst case: direct overspray onto water & spray drift onto pond

The Q (ratio of Estimated Environmental Concentration (EEC) to most sensitive, relevant, toxicity value) for the worst case situation of direct overspray onto shallow water is 1.7. The high Q reflects the very high toxicity to the aquatic macrophyte, *Lemna*. With appropriate labelling, and following of label directions by operators of spray equipment, this situation should not arise. For 10% spray drift onto a shallow pond, Q is 0.17 and is still of concern. However, in Australian conditions, water is likely to be acidic or neutral, thus ensuring degradation will occur.



The EEC and Q for the worst case situation of direct spray onto soil is  $50 \mu\text{g.L}^{-1}$  and  $38 \times 10^{-6}$ , respectively. The Q in this case is well below the level of concern.

#### Tribenuron methyl mobility

The major factor that will influence tribenuron methyl mobility once applied to target areas will be soil pH, since under acidic conditions (soil or water) there will be very rapid hydrolysis. In this respect, alkaline sodic soils are the most vulnerable soil types. These soils comprise 40% of the Australian wheat cropping area, which extends into northern New South Wales and southern Queensland (Du Pont Express Herbicide will be registered in these States). Sodic soils also tend to disperse leading to surface sealing, poor water infiltration and highly compacted soil with low microbial activity. This property might promote surface run-off in fallow situations for which Du Pont Express Herbicide will be used.

The data presented in a field dissipation study indicated that for an alkaline soil, degradation was rapid with a half-life of 9 d, and little mobility of Tribenuron methyl. However, this study had very low rainfall. Estimations from the laboratory studies indicated that a significant proportion of the tribenuron methyl might persist in alkaline soils, with 10% remaining after 200-400 d. This potential for tribenuron methyl to persist is of concern in alkaline soils in Australia, especially where the subsoil is often very alkaline, and given the high phytotoxicity. Further, lower temperatures would decrease the rates of chemical and microbial degradation, and surplus rainfall over evaporation would provide a driving mechanism for leaching.

#### Conclusions and Recommendations

Tribenuron methyl shares the general properties of sulfonylureas:

- Degradation is by hydrolysis of the sulfonylurea bridge producing the sulfonamide and heterocyclic group (triazine amine from tribenuron methyl);
- It is more stable (and therefore much less easily degraded) in its anionic form that predominates in alkaline conditions; and
- It does not photodegrade (which is dependent on the UV-visible absorption spectrum of the sulfonylurea and the emission spectrum of the light source), and mobility generally increases with increasing soil pH and decreasing organic matter.

Tribenuron methyl has the advantage of being a low use rate, short-residual sulfonylurea that can be used prior to cropping in fallows. Further, it is designed to replace Goal CT (containing oxyfluorene) which is scheduled as a S7 poison.

Any extension proposed by the company where use of tribenuron methyl is likely to be on very alkaline soils (pH greater than 8), should provide the appropriate field dissipation data.

### Proposed use

When used as proposed to directly control weeds in summer and winter fallows prior to cropping, noting its low use rate and with good agricultural practice, the use of tribenuron methyl should not lead to significant environmental contamination or effects on non-target species.

In view of the toxicity to aquatic plants, the company has agreed to amend an existing warning on the label, to prevent injury to vegetation, *including aquatic plants*, and our assessment is now complete. Also, the company has agreed to inform the EPA of any incident where deleterious effects on non-target systems were observed (overseas or Australia) in the use of Du Pont Express Herbicide.



## **PUBLIC HEALTH AND SAFETY ASSESSMENT**

### **Evaluation of Toxicology**

The toxicological database for tribenuron methyl which consists primarily of toxicity tests conducted using animals, is quite extensive. In interpreting the data, it should be noted that toxicity tests generally use doses which are high compared to likely human exposures. The use of high doses increases the likelihood that potentially significant toxic effects will be identified. Toxicity tests should also indicate dose levels at which the specific toxic effects are unlikely to occur. Such dose levels as the No-Observable-Effect-Level (NOEL) are used to develop acceptable limits for dietary or other intakes at which no adverse health effects in humans would be expected.

### **Toxicokinetics and Metabolism**

Radiolabelled tribenuron methyl was well absorbed after a single oral administration to rats, and metabolism and excretion was rapid and extensive. Excretion mainly occurred via the urine. The amount of residues remaining in the tissues after 96 hours was extremely low.

### **Acute Studies**

The acute oral toxicity of tribenuron methyl was low in both rats ( $LD_{50} > 5000$  mg/kg) and rabbits ( $LD_{50} = 3400$  mg/kg). Tribenuron methyl also exhibited low acute dermal toxicity in rabbits ( $LD_{50} > 2000$  mg/kg) and low acute inhalational toxicity in rats ( $LC_{50} > 5000$  mg/m<sup>3</sup>). Eye irritation was moderate in rabbits, but there was no skin irritation in rabbits or sensitisation in guinea pigs.

Du Pont Express Herbicide, the formulated product, also has low acute toxicity potential in rats and rabbits. The product did not produce skin irritation in rabbits or sensitisation in guinea pigs, but was a moderate eye irritant in rabbits.

### **Short-Term Studies**

Short-term (up to 90 days) dietary administration of tribenuron methyl to mice and rats at doses of up to 476 and 386 mg/kg/day respectively demonstrated mild liver toxicity, retarded growth rates and increased liver weight at 476 mg/kg/day in mice and from 135 mg/kg/day in rats. In rats, there were also reductions in the levels of serum glucose, protein and globulins, and increases in cholesterol levels, these effects occurring at high doses (from 118 mg/kg/d) were also indicative of slight liver toxicity.

Short-term dietary administration of tribenuron methyl to dogs at up to 78 mg/kg/day, produced slight increases in numbers of circulating platelets and white blood cells, as well as an increase in the weights of the thyroid/parathyroid glands, these effects occurring at the highest dose only.



## **Long-Term Studies**

Long-term dietary administration of tribenuron methyl to mice (18 months) and dogs (12 months) at up to 247 and 52 mg/kg/day respectively only resulted in non-specific toxicity consisting of growth retardation and organ weight enlargements at the highest doses.

Long-term (2 years) dietary administration of tribenuron methyl in rats at up to 76 mg/kg/day produced non-specific toxicity consisting of growth retardation and organ weight changes from 10 mg/kg/day. An increase in mammary gland tumours was seen in females at the highest dose, but are thought to be due to endocrine changes as tribenuron methyl has been shown to mimic the effects of the natural hormone oestrogen. The resultant endocrine imbalance is believed to hasten the onset of tumours. This phenomenon has only been seen in the Sprague-Dawley strain of rat, and is therefore unlikely to be of significance in other species including humans. Irrespective of whether the effects are specific to the rat, the doses needed to produce these effects in the rat greatly exceed any anticipated human dietary intake associated with the use of the formulated product, Du Pont Express Herbicide.

## **Reproduction and Developmental Studies**

In two studies, rats were fed tribenuron methyl for one and two generations of breeding. At doses of 24 mg/kg/day and above, the weights of the offspring were retarded, however there were no effects on reproductive performance of the rats.

Pregnant rats and rabbits that were administered tribenuron methyl continuously throughout the embryonic development period showed growth retardation from 125 and 80 mg/kg/day respectively, but no major effects were produced on the young. Foetuses had slightly lower body weight compared to normal, and in rats, there was a delay in bone deposition in some of the young. These effects on the young may be associated with the maternal toxicity which was present at these doses.

## **Genotoxicity**

A number of tests established that tribenuron methyl does not damage genetic material (DNA). Studies presented consisted of tests for mutagenicity in *Salmonella* strains and Chinese hamster ovary cells, chromosomal aberrations in cultured human lymphocytes, micronuclei formation in the bone marrow of rats, and unscheduled DNA synthesis in cultured rat hepatocytes.

## **Other Studies**

When Sprague-Dawley rats were administered tribenuron methyl in the diet at 125 mg/kg/day for 90 days, an increase in the duration, and decrease in number of oestrous cycles were produced. Under culture conditions, tribenuron methyl and its metabolites were shown to bind with the oestrogen receptor in the uterus. These results indicated that tribenuron methyl can mimic the natural hormone oestrogen in the rat.

## **PUBLIC HEALTH STANDARDS**

### **Poisons Scheduling**

The National Drugs and Poisons Schedule Committee (NDPSC) considered the toxicity of the product and its active ingredients and assessed the necessary controls to be implemented under States' poisons regulations to prevent the occurrence of poisoning.

The NDPSC recommended that tribenuron methyl be listed in Schedule 5 of the Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP). There are provisions for appropriate warning statements and first-aid directions on the product label.

### **NOEL/ADI**

The most sensitive species tested was the rat, with a NOEL of 0.95 mg/kg body weight/day in a 2-year study. In order to calculate the acceptable daily intake (ADI) for humans, a safety factor is applied to the NOEL in the most sensitive species. The magnitude of the safety factor is selected to account for uncertainties in extrapolation of animal data to humans; variation within the human population; the quality of the experimental data; and the nature of the potential hazards. Using a safety factor of 100, an ADI of 0.01 mg/kg body weight/day for tribenuron methyl was established.

### **Potential for Chemical Residues in Food**

#### **Trial Data**

Australian residue trials as well as appropriate plant and animal metabolism studies have been provided in support of the applicant's request for the establishment of maximum residue limits for tribenuron methyl.

Residue trial data was specifically supplied to support consideration of the presence of tribenuron methyl in the following commodities: barley, maize, oats, sorghum, wheat, chick peas, mung beans, soya beans, rape seed, cottonseed and sunflower seed. Studies were conducted exclusively in Australia and at one and two times the recommended label rates (30 and 60 grams of product per hectare; or 22.5 and 45 grams of tribenuron methyl per hectare). No residues were detected in plant and grain matter from any of the trials at the time of harvesting these commodities. Consequently there is no need for a withholding period in relation to harvesting these commodities.

Residues of tribenuron methyl were found (generally at less than 0.02 but in all cases, less than 0.05 mg/kg) shortly after application. Crops at this growth stage and earlier were considered inappropriate for animal consumption due to the limited amount of green matter available for forage. Therefore no withholding period was set for this use pattern.

In the case of wheat, barley and oats, finite residues were found at less than 0.1 mg/kg at day 14 after treatment for post-emergent use of tribenuron methyl. It was therefore



considered appropriate to set a primary animal feed MRL of 0.1 mg/kg (see Table below) to allow for the cutting of stock feed. However it should be noted that post emergent use is not recommended on the label.

### **Metabolism Studies**

Animal metabolism studies were provided for the rat and lactating goat. In the lactating goat metabolism study, the animals were effectively fed at a rate of 6.7 mg/kg tribenuron methyl (radiolabelled in either the triazine or the phenyl moiety of the molecule) for five days during which milk was collected on a daily basis. Urine was the main route of elimination and equivalent residue levels (of tribenuron methyl extrapolated from radioactivity measurements) in milk were found to be between 0.006 and 0.09 mg/kg; despite the presence of this radioactivity in this case, the parent molecule could not be specifically detected. It is concluded that tribenuron-methyl was readily metabolised in goats fed at 6.7 mg/kg. Detailed studies in the rat indicated that greater than 95% of the radiolabel was excreted when the equivalent of 10 mg/kg of tribenuron methyl was present in the feed. As a consequence, it is highly unlikely that this compound has the potential to bioaccumulate in mammals; nor is it fat soluble.

Plant metabolism studies were conducted in wheat and indicated that tribenuron methyl is translocated in wheat plants but that only a small amount of this active is translocated as the parent molecule. Furthermore, studies with whole plants showed that tribenuron methyl is readily metabolised in wheat following application to growing plants.

### **Analytical Methodology**

The analytical method is based upon high performance liquid chromatography. The limit of determination was 0.01 mg/kg for grain and green forage and 0.02 mg/kg for straw. Satisfactory recoveries were demonstrated for these commodities. The applicant clearly demonstrated the stability of stored residue samples for at least six months at -20°C. The residue definition is based upon the parent molecule, tribenuron methyl.

### **Crop Rotational Studies**

Crop rotational studies indicated that tribenuron methyl is not present in soil 30 days after application when applied at 1.5 times the label rate. Of the material taken up by beets, cabbage, wheat soybean and sorghum planted at either 30 or 120 days after application, less than 0.015 mg/kg of material could be considered consistent with the presence of the parent molecule. This observation is consistent with the molecule being readily metabolised in both soil and plants.

### **Primary Food Commodities of Animal Origin**

Based upon the animal metabolism studies and the likely residues found in animal feedstuffs, MRL's have been recommended for animal commodities.



### **Proposed Residue Limits**

The residue and metabolism data show that when the tribenuron methyl is used according to the approved label, the proposed MRLs should not be exceeded. The following consequential amendments have been recommended for the MRL Standard:

**TABLE 1**

<b>Compound</b>	<b>Food</b>	<b>MRL, mg/kg</b>
<b>ADD: Tribenuron methyl</b>		
	<b>Barley</b>	<b>*0.01</b>
	<b>Maize</b>	<b>*0.05</b>
	<b>Oats</b>	<b>*0.01</b>
	<b>Sorghum</b>	<b>*0.01</b>
	<b>Wheat</b>	<b>*0.01</b>
	<b>Chick-pea (dry)</b>	<b>*0.01</b>
	<b>Mung bean (dry)</b>	<b>*0.01</b>
	<b>Soya bean (dry)</b>	<b>*0.01</b>
	<b>Rape seed</b>	<b>*0.01</b>
	<b>Cottonseed</b>	<b>*0.05</b>
	<b>Sunflower seed</b>	<b>*0.01</b>
	<b>Meat (mammalian)</b>	<b>*0.01</b>
	<b>Edible offal (mammalian)</b>	<b>*0.01</b>
	<b>Milks</b>	<b>*0.01</b>

**TABLE 3**

**ADD: Tribenuron methyl**      **Measured as tribenuron methyl**

**TABLE 4**

**ADD: Tribenuron methyl**    **Primary Animal Feed**  
   **Commodities (fresh weight)**      **0.1**

## OCCUPATIONAL HEALTH AND SAFETY ASSESSMENT

Tribenuron methyl is considered a hazardous substance for humans according to National Occupational Health and Safety Commission (NOHSC) Approved Criteria for Classifying Hazardous Substances, because it is a potential eye irritant in granular form.

The product, Du Pont Express Herbicide exists as light brown solid granules with a slight pungent odour. It is also considered a hazardous substance for humans according to NOHSC Criteria, because it is a potential eye irritant in granular form.

Du Pont Express Herbicide will be imported fully formulated and re-packaged in Australia.

Tribenuron methyl and Du Pont Express Herbicide are not classified as dangerous goods under the Australian Code for the Transport of Dangerous Goods by Road and Rail.

### **Re-packaging, transport and sale**

Australian workers involved in the re-packaging process should be protected by safe work practices and training commensurate with risks identified in the workplace assessment. These workers should wear overalls, gloves, boots, safety glasses and respirators. They should use automatic filling devices and exhaust ventilation. Australian workers involved in transport, storage and handling of the product are unlikely to be exposed to the product unless accidental spillage occurs.

Advice on the safe handling of the product during routine transport and storage is provided on the Material Safety Data Sheet (MSDS) for DuPont Express Herbicide.

### **End use**

Du Pont Express Herbicide may be applied by ground or aerial spray, for weed control in fallow and pre-crop situations. The concentration of tribenuron methyl in the spray will be < 0.06% for ground application and < 0.15% for aerial application.

End users may become contaminated with Du Pont Express Herbicide when preparing the working strength solution, loading spray tanks and applying the spray. Workers will also need to clean up spills and maintain and clean spray equipment.

The product is expected to be of low acute toxicity but an eye irritant due to its dusty nature. It is important for users to protect the eyes when pouring out the concentrated product. Safety directions on the label caution workers to avoid getting the product in their eyes. Safety directions include the use of elbow-length PVC gloves and a face shield or goggles when preparing the spray.

The assessment of a field worker exposure study using a similar product containing tribenuron methyl (Du Pont Project No: AMR-1256-88) suggests that workers should not suffer any health effects from using tribenuron methyl under normal conditions.



Contamination with the working strength solution on the skin or by inhalation of spray mist is not expected to result in substantial contamination or health effects in end users. Specific protective clothing is not considered necessary for workers using the working strength solution. All workers should adopt good occupational hygiene practices.

End users should follow the directions on the Du Pont Express Herbicide label and refer to the MSDS for additional information.

### **Entry into treated areas**

Entry into treated fields does not pose any occupational health and safety concern.

### **Recommendations for safe use - all workers**

Workers involved in re-packaging should be protected by engineering controls such as exhaust ventilation, safe work practices and training. They should also wear long sleeved overalls (AS 3765-1990 Clothing for protection against hazardous chemicals), approved safety boots (AS 2210 Occupational protective footwear), fully enclosed goggles (AS 1337-1984 Eye protectors for industrial applications), PVC or nitrile rubber gloves (AS 2162-1978 Industrial safety gloves and mittens) and respirators (AS 1716-1991 Respiratory Protective Devices).

End users should follow the safety directions on the Du Pont Express Herbicide label. Safety directions include the use of elbow-length PVC; gloves and a face shield or goggles when preparing the spray.

On the basis of the risk assessment, Worksafe Australia does not consider that occupational health and safety regulatory standards, such as Health Surveillance or Exposure Standards, are necessary for tribenuron methyl.

### **Conclusion**

Du Pont Express Herbicide can be used safely if handled in accordance with the control measures described above. Additional information is available on the label and in the MSDS.

## **SUGGESTED FURTHER READING**

*Interim Requirements for Clearance of Agricultural and Veterinary Chemical Products* (available from the NRA)

*Code of Practice for Labelling Agricultural Chemical Products* (available from the NRA)

*Code of Practice for Labelling Veterinary Chemical Products* (available from the NRA)

*MRL Standard - Maximum residue limits in food and animal feedstuffs* (NHMRC)

"Main panel"

**WARNING**

KEEP OUT OF REACH OF CHILDREN  
READ SAFETY DIRECTIONS BEFORE OPENING



# Express®

## herbicide

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ACTIVE CONSTITUENT : 750 g/kg TRIBENURON METHYL

GROUP

**B**

HERBICIDE

For the control of certain broadleaf weeds in fallow and pre-crop situations as per Directions for Use Table.  
READ THE ATTACHED BOOKLET BEFORE USING THIS PRODUCT.

NET 500 g

Du Pont (Australia) Limited  
A.C.N. 000 716 469  
168 Walker Street, North Sydney NSW 2060

NRA Approval No: 46440/2467

® DuPont Registered Trademark



*"Main panel"*

**Storage and Disposal**

Store in the closed, original container in a dry, well ventilated area, as cool as possible out of direct sunlight. Keep from contact with fertilisers, insecticides, fungicides and seeds. **DO NOT** re-use container. Triple or (preferably) pressure rinse containers before disposal. Add rinsings to spray tank. **DO NOT** dispose of undiluted chemical on site. Break, crush, puncture and bury empty containers in a local authority landfill. If not available bury the containers below 500 mm in a disposal pit specifically marked and set up for this purpose clear of waterways, vegetation and roots. Empty containers and product should not be burnt.

**SAFETY DIRECTIONS**

Will irritate the eyes. Avoid contact with eyes. When preparing spray wear elbow-length PVC gloves and face shield or goggles. If product in eyes, wash out immediately with water. After use and before eating, drinking or smoking, wash hands, arms and face thoroughly with soap and water. After each day's use, wash gloves and face shield or goggles.

**FIRST AID**

If poisoning occurs, contact a doctor or Poisons Information Centre.

For further information refer to the material Safety Data Sheet.

**NOTICE TO BUYER**

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"Booklet"

**WARNING**

KEEP OUT OF REACH OF CHILDREN  
READ SAFETY DIRECTIONS BEFORE OPENING



# Express®

## herbicide

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ACTIVE CONSTITUENT : 750 g/kg TRIBENURON METHYL



COMPLETE DIRECTIONS FOR USE

This booklet is part of the label attached to the 500 g pack.

NRA Approval No: 46440/2467

® DuPont Registered Trademark



**DIRECTIONS FOR USE****RESTRAINTS**

**DO NOT** apply to weeds that are not actively growing or stressed by any cause such as adverse weather conditions, drought, waterlogging. Broadleaf weeds under stress frequently become less susceptible to herbicide activity. This may result in an incomplete kill or only growth suppression. If heavy grazing has occurred allow regrowth before spraying.

Minimum volumes of prepared spray to be applied:

- ground application - 50 L/ha
- aerial application - 20 L/ha.

Use prepared spray suspensions within two days of preparation, otherwise significant breakdown may occur.

**DO NOT** apply if rainfall is expected within 2 hours.

**Express® alone- NSW & Qld ONLY**

SITUATION	WEEDS CONTROLLED	RATE g/ha	WEED GROWTH STAGE AT APPLICATION	CRITICAL COMMENTS	
FALLOW and PRE-CROP  (Refer to Crop options section for minimum intervals between application and sowing)	Amaranthus / Boggabri weed ( <i>Amaranthus mitchellii</i> )	25	Apply up to the 10 leaf stage.		As a herbicide resistance countering measure, <b>DO NOT</b> use an ALS inhibitor herbicide in the crop following the use of crop following the use of Express alone as a preceding fallow or pre- crop treatment.
	Caltrop/Yellowvine ( <i>Tribulus terrestris</i> )	25			
	Common Sowthistle / Milk thistle ( <i>Sonchus oleraceus</i> )	25			
	Deadnettle ( <i>Lamium amplexicaule</i> )	25	Apply up to the 6 leaf stage.	If weeds are at a more advanced growth stage and/or are present in high numbers(greater than 50 per m <sup>2</sup> ) use a Glyphosate mixture as specified in Express + Glyphosate Tank mix table	
	Medics (Native) ( <i>Medicago spp.</i> )	30	Apply up to 5 cm diameter.		
	New Zealand Spinach ( <i>Tetragonia tetragonioides</i> )	20	Apply up to the 10 leaf stage.		
	Prickly Lettuce ( <i>Lactuca serriola</i> )	30	Apply up to the 4 leaf stage.	If weeds are at a more advanced growth stage and/or are present in high numbers (greater than 50 per m <sup>2</sup> ) use a Glyphosate mixture as specified in Express + Glyphosate Tank mix table.	
	Turnip weed ( <i>Rapistrum rugosum</i> )	20	Apply up to flowering.		
Always add non-ionic surfactant (1000 g/L - non buffering type) at 100 mL/100 L (0.1% v/v) of final spray volume. When applying DuPont Express herbicide alone by air in addition to a non-ionic surfactant add a mineral spray oil at 1 L/100 L (1% v/v) of final spray volume.					



**Express® + Glyphosate Tank mixes - NSW & Qld Only**

For the control of these weeds in addition to those in the Express Alone table.

SITUATION	WEEDS CONTROLLED	RATE g/ha	WEED GROWTH STAGE AT APPLICATION	CRITICAL COMMENTS
FALLOW and PRE-CROP (Refer to Crop Options section for minimum intervals between application and sowing)	Black bindweed ( <i>Polygonum convolvulus</i> )	25 + Glyphosate (450 g/L) 600 mL/ha	Apply up to the 10 leaf stage.	For best control, apply to small actively growing weeds. Larger weeds are more difficult to control.
	Common Thornapple ( <i>Datura stramonium</i> )	20 + Glyphosate (450 g/L) 400 mL/ha	Apply up to the 8 leaf stage.	
	Deadnettle ( <i>Lamium amplexicaule</i> )	25 + Glyphosate (450 g/L) 400 mL/ha	Apply up to the 10 leaf stage.	
	Mintweed ( <i>Salvia reflexa</i> )	15 + Glyphosate (450 g/L) 600 mL/ha		
	Pigweed/Portulaca ( <i>Portulaca oleracea</i> )	20 + Glyphosate (450 g/L) 600 mL/ha		
	Prickly Lettuce ( <i>Lactuca serriola</i> )	20 + Glyphosate (450 g/L) 600 mL/ha	Apply up to the 6 leaf stage.	
Always add non-ionic surfactant (1000 g/L - non buffering type) at 100 mL/100 L (0.1% v/v) of final spray volume. When applying DuPont Express herbicide alone by air in addition to a non-ionic surfactant add a mineral spray oil at 1 L/100 L (1% v/v) of final spray volume.				

NOT TO BE USED FOR ANY PURPOSE, OR IN ANY MANNER, CONTRARY TO THIS LABEL UNLESS  
AUTHORISED UNDER APPROPRIATE LEGISLATION.**WITHHOLDING PERIOD**

Not required.

## GENERAL INSTRUCTIONS

Best results are obtained when DuPont Express herbicide is applied to young actively growing weeds. The rate will depend on weed spectrum at time of application. The degree of control and duration of effect are dependent on rate used, sensitivity and size of target weeds and environmental conditions at the time of and following application.

DuPont Express herbicide stops growth of susceptible weeds rapidly. However, typical symptoms of dying weeds (discolouration) may not be noticeable for 1 to 3 weeks after application depending on the environmental conditions and susceptibility. Warm, moist conditions following treatment promote the activity of DuPont Express herbicide, while cold, dry conditions delay activity. Weeds hardened-off by cold weather and/or drought stress will be less susceptible.

Where recommended the addition of Glyphosate will enhance knockdown and control of weeds. It also helps minimise the risk of resistant weeds occurring.

### Crop Safety

**DO NOT** apply DuPont Glean<sup>®</sup> cereal herbicide, DuPont Ally<sup>®</sup> herbicide or Logran<sup>1</sup> in a tank mix with DuPont Express<sup>®</sup> herbicide as a fallow or pre-crop treatment.

### Spray Preparation

DuPont Express herbicide is a dry flowable formulation to be mixed with water and applied as a spray. Partially fill the spray tank with water. Using the Express measuring cone provided, measure the amount of DuPont Express herbicide required for the area to be sprayed. Add the correct amount of DuPont Express herbicide to the spray tank with the agitation system engaged. Top up to the correct volume with water. **THE MATERIAL MUST BE KEPT IN SUSPENSION AT ALL TIMES BY CONTINUOUS AGITATION.**

In tank mixes, DuPont Express herbicide must be in suspension before adding the companion herbicide or surfactant/wetting agent.

### Compatibility

DuPont Express herbicide is compatible with glyphosate herbicides eg Nufarm Glyphosate CT and Roundup<sup>2</sup> CT.

### Use of Surfactant/Wetting Agent

Always add non-ionic surfactant (1000 g/L - non buffering type) at 100 mL/100 L (0.1% v/v) of final spray volume. When applying DuPont Express herbicide alone by air in addition to a non-ionic surfactant add a mineral spray oil at 1 L/100 L (1% v/v) of final spray volume.

### Ground Spraying

Use a boom spray properly calibrated to a constant speed and rate of delivery to ensure thorough coverage and a uniform spray pattern. Avoid overlapping and shut off spray booms while starting, turning, slowing or stopping. Apply a minimum of 50 L prepared spray/ha.

### Aerial Spraying

Apply in a minimum of 20 L/ha water. Application in 30 L/ha will improve performance reliability. Avoid spraying in still conditions and in winds likely to cause drift onto adjacent sensitive crops or fallow areas likely to be planted to these crops - see Crop Options section. Turn off spray boom whilst passing over creeks and dams.

**DO NOT** apply when a temperature air inversion is likely to occur.

### Sprayer Cleanup

To avoid subsequent injury to crops immediately after spraying thoroughly remove all traces of DuPont Express herbicide from mixing and spray equipment as follows:

1. Drain tank, then flush tank, boom and hoses with clean water for a minimum of 10 minutes.
2. Fill the tank with clean water then add 300 mL household chlorine bleach (containing 4% chlorine) per 100 L of water. Flush through boom and hoses then allow to stand for 15 minutes with agitation engaged, then drain.
3. Repeat step 2.
4. Nozzles and screens should be removed and cleaned separately. To remove traces of chlorine bleach, rinse the tank thoroughly with clean water and flush through hoses and boom.



**CAUTION: DO NOT** use chlorine bleach with ammonia. All traces of liquid fertiliser containing ammonia, ammonium nitrate or ammonium sulphate must be rinsed with water from the mixing and application equipment before adding chlorine bleach solution. Failure to do so will release a gas with a musty chlorine odour which can cause eye, nose and lung irritation. **DO NOT** clean equipment in an enclosed area.

### Resistant Weeds Warning

GROUP

**B**

HERBICIDE

DuPont Express® herbicide is a member of the Sulfonylurea group of herbicides. DuPont Express herbicide has the Inhibitor of Acetolactate Synthase (ALS) mode of action. For weed resistance management DuPont Express herbicide is a Group B herbicide.

Some naturally-occurring weed biotypes resistant to DuPont Express herbicide and other ALS herbicides may exist through normal genetic variability in any weed population. The resistant individuals can eventually dominate the weed population if these herbicides are used repeatedly. These resistant weeds will not be controlled by DuPont Express herbicide or other ALS herbicides.

Since the occurrence of resistant weeds is difficult to detect prior to use, DuPont accepts no liability for any losses that may result from failure of DuPont Express herbicides to control resistant weeds.

Large numbers of healthy surviving weeds can be an indication that resistance is developing. Efforts should be taken to prevent seed set of these survivors.

**DO NOT** use an ALS inhibitor herbicide against the same weed in the crop following the use of DuPont Express herbicide alone either as a fallow or pre-crop treatment. This does **NOT** apply if the fallow or pre-crop use of DuPont Express herbicide was tank mixed with glyphosate.

Avoid the prolonged use of ALS inhibitor herbicides on the same weed population.

If the user suspects that an ALS inhibitor resistant weed is present, DuPont Express herbicide or other ALS inhibitors herbicides recommended for the control of that weed should not be used.

Strategies to minimise the risk of herbicide resistance are available. Consult your farm chemical supplier, consultant, local Department of Agriculture or Primary Industries, or local DuPont Representative.

### Crop Options

Land previously treated with DuPont Express herbicide may be sown to any of the specified crops after the interval indicated in the following table:

Minimum interval	Crops **
3 days	Barley Oats Wheat
7 days	Cotton Maize Mungbeans Sorghum Soybeans Sunflowers

\*\* As a herbicide resistance countering measure, **DO NOT** use an ALS inhibitor herbicide in any of these crops following the use of Express alone as a preceding fallow or pre-crop treatment

### Protection of Crops, Native and Other Non-Target Plants

Injury to or loss of desirable trees, vegetation including aquatic plants may result from failure to observe the following:

**DO NOT** apply or drain or flush equipment on or near desirable trees or other plants or on areas where their roots may extend or in locations where the chemical may be washed or moved into contact with their roots.

**DO NOT** apply or allow spray to drift onto adjacent crops and non-target desirable plants as injury to the crop may occur.



**Protection of Wildlife, Fish, Crustacea and Environment**

DO NOT contaminate any body of water by spraying, cleaning of equipment of disposal of waste.

**Protection of Livestock**

The use pattern is such that a withholding period for harvest or grazing is not required. It is recommended however, not to graze treated areas for 2 to 3 days to ensure adequate control is achieved.

**Storage and Disposal**

Store in the closed, original container in a dry, well ventilated area, as cool as possible out of direct sunlight. Keep from contact with fertilisers, insecticides, fungicides and seeds. **DO NOT** re-use container. Triple or (preferably) pressure rinse containers before disposal. Add rinsings to spray tank. **DO NOT** dispose of undiluted chemical on site. Break, crush, puncture and bury empty containers in a local authority landfill. If not available bury the containers below 500 mm in a disposal pit specifically marked and set up for this purpose clear of waterways, vegetation and roots. Empty containers and product should not be burnt.

**SAFETY DIRECTIONS**

Will irritate the eyes. Avoid contact with eyes. When preparing spray wear elbow-length PVC gloves and face shield or goggles. If product in eyes, wash out immediately with water. After use and before eating, drinking or smoking, wash hands, arms and face thoroughly with soap and water. After each day's use, wash gloves and face shield or goggles.

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