

**FOOD AND ENVIRONMENT PROTECTION ACT, 1985, PART III**

**Plant Protection Products Regulations 2005**

Evaluation of Provisionally Approved Products

Evaluation on: **Aminopyralid (Agricultural Uses)**

**October 2009**

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**ADVISORY COMMITTEE ON PESTICIDES**

**DISCLOSURE DOCUMENT**

**EVALUATION ON AMINOPYRALID**

## EXECUTIVE SUMMARY

Products containing the active substance aminopyralid were first approved for weed control in grassland in 2006. Aminopyralid is a very effective herbicide that works by disrupting the plant hormones necessary for plant growth. Some plants are particularly sensitive to its effects. Following reports of crop damage in allotments attributed to residues of aminopyralid in farmyard manure, all approvals for use of these products were suspended on 23 July 2008.

Careful examination of the reports of crop damage identified that one likely cause of the damage was farmyard manure resulting from livestock fed silage or hay that had been harvested from grassland previously treated with aminopyralid. The properties of aminopyralid that result in this effect were known when approval was granted and standard warnings were included in the product labels. Some feedstuff had entered the general supply chain and as a result the end users were unaware that it contained residues of aminopyralid that would reach the manure resulting from the animals feed on these feedstuffs. It was also possible that some manure from animals that had grazed treated land had also moved into the general supply chain.

This evaluation considers applications for approvals of products containing aminopyralid for more restricted uses in weed control in grassland for grazing cattle and sheep only, or for grassland in areas that are neither grazed nor harvested, e.g. railway embankments and roadside verges. Aminopyralid breaks down in the soil with half-lives of 26-147 days in the laboratory or 8-35 days in the field. It does not breakdown in anaerobic situations, e.g. manure heaps. The proposed product label provides advice about subsequent cropping of the treated land and management of the livestock and manure to prevent residues occurring in manure that is subsequently used to fertilise farm land. It also gives instructions to prevent manure that potentially contains aminopyralid residues from leaving the farm and hence reaching allotments and home gardens that could be used to grow plants susceptible to damage by aminopyralid. The applicant proposes to support these approvals with a detailed product stewardship plan, building on the work they have already undertaken following the suspension of previous approvals, some details of which are also given in this evaluation document.

This evaluation document presents a number of risk assessments, summarised as follows:

- It is very unlikely that individuals handling contaminated manure would be exposed to levels of aminopyralid which would cause concern for human health.
- If crops grow in soil treated with manure containing residues of aminopyralid at the highest level measured, aminopyralid residues in those crops would be well below levels that would be of any concern and any effect on human health is therefore unlikely.
- Application of manure containing residues of aminopyralid to grassland previously treated with aminopyralid products will result in an increased dose of the herbicide being applied to some areas of land. Small quantities of the

herbicide will move through the soil into groundwater, but levels are not expected to exceed the maximum legal level of 0.1 µg/l, even where these higher doses are applied. The Environment Agency will add aminopyralid to its monitoring programme.

- It is possible that groundwater might be used to irrigate crops. Some crops can be damaged by very low doses of aminopyralid, but at the levels predicted to occur in groundwater there is no risk to even sensitive crops grown outdoors irrigated post-emergence. Levels of aminopyralid in groundwater might in worst case situations reach levels where very sensitive glasshouse crops grown using specialised techniques such as hydroponics might be damaged. Most commercial crops of this nature are grown in different areas of the country to grassland areas so in practice this very slight risk is considered acceptable. The studies used to estimate the no effect level of aminopyralid on these sensitive crops actually used products that contained aminopyralid and other related herbicides. All of the effects seen were assumed to be due to aminopyralid in the calculations presented, although in practice they are likely to be the combined result of all of the herbicides in the mixture so they can be considered 'worst case' in this respect.
- Finally there is a possible risk that livestock grazing aminopyralid treated grassland might be moved to graze grassland containing important sensitive plants such as rare wildflowers. Keeping livestock away from grassland treated with aminopyralid for 3 days means that their dung and urine will no longer contain any residue of aminopyralid and thus they should be kept on untreated grassland for 3 days before moving to graze grassland containing important sensitive plants.

Based on these risk assessments and the other information included in this evaluation document the Advisory Committee on Pesticides advised Ministers that the more restrictive approvals could be granted.

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## GLOSSARY OF TERMS

µg	Microgram
µg/cm <sup>2</sup>	Micrograms per centimetre squared
<	Less than
>	Greater than
~	Approximately
ACP	Advisory Committee on Pesticides
a.e.	Acid equivalent
AOEL	Acceptable Operator Exposure Level
a.s.	Active substance
a.s./ha	Active substance per hectare
a.s./litre	Active substance per litre
bw	Body weight
bw/d	Body weight per day
BASIS	Formerly British Agrochemicals Standards Inspection Scheme, now known as BASIS (Registration) Limited, - An independent Registration Standards and Certification Scheme Serving Pesticides, Fertilisers and Allied Organisations and Interests
CHIP	Chemicals (Hazard Information and Packaging for Supply) Regulations
COPR	Control of Pesticide Regulations 1986
cm <sup>2</sup> /hour	Centimetres squared per hour
doc	Document
DAR	Draft Assessment Report – produced for assessments of active substances at European level
DARNI	Department of Agriculture in Northern Ireland
DETR	Department of the Environment, Transport and the Regions
DEFRA	Department for Environment, Food and Rural Affairs
DFR	Dislodgable foliar residue
CRD	Chemicals Regulation Directorate
EADE	Estimated Actual Dermal Exposure
EC	Emulsifiable Concentrate



EC50	The theoretical median effective concentration for 50% of a group of organisms
EEC	European Economic Community
EUROPOEM	European Predictive Operator Exposure Model
FOCUSgw	A model for predicting movement of active substances and metabolites through soil systems into groundwater [Forum for the Co-ordination of pesticide models and their use]
FOCUSsw	A model for predicting movement of active substances and metabolites to surface water.
ftWA	Time Weighted Average factor
g	Gram
g/l	Grams per litre
GPS	Global Positioning Systems
ha	Hectare
IUPAC	International Union of Pure and Applied Chemistry
kg	Kilogram
LD50	The theoretical lethal dose for 50% of a group of organisms
l	Litre
l/ha	Litres per hectare
m	Metre
m <sup>3</sup>	Cubic metre
m <sup>2</sup>	Square metre
mg	Milligram
mg/kg	Milligrams per Kilogram
ml	Millilitre
ml/hour	Millilitres per hour
MS	Member State
MSDS	Material Safety Data Sheet
NFU	National Farmers Union
NOAEL	No observed adverse effect level
NRoSO	National Register of Spray Operators
PD	Fraction of food type in diet; dimensionless (between 0 and 1)
PDE	Potential Dermal Exposure Value
POEM	Predictive Operator Exposure Model
PPE	Personal Protective Equipment
PSD	Pesticides Safety Directorate
PUSG	Pesticide Usage Survey Group
SFU	Scottish Farmers Union
sq	Square
TBA	To be assigned
TER	Toxicity / Exposure Ratio
UFU	Ulster Farmers Union
UK	United Kingdom
WFU	Welsh Farmers Union
WiGRAMP	Working Group on Risk Assessment of Mixtures of Pesticides
w/w	Weight for weight

## 1. THE APPLICATIONS

The products for which reinstatement is requested are:

Product	MAPP No	Formulation
Forefront	12765	A water in oil emulsion containing 30 g/litre (3.5% w/w) aminopyralid (present as 36 g/litre aminopyralid potassium) + 100 g/litre (14.14% w/w) fluroxypyr (present as 144 g/litre fluroxypyr-methyl heptyl ester).
Halcyon	12749	
Mileway*	TBA	
Synero	14059	
Pharaoh	13631	An oil in water emulsion containing 30 g/L (3.13% w/w) aminopyralid (present as 36 g/L aminopyralid potassium) + 240 g/L (29.44% w/w) triclopyr (present as 334 g/L triclopyr-butotyl).
Pro-Banish	13767	A soluble concentrate containing 30 g ae/L (2.95% w/w) aminopyralid (present as 36 g/L aminopyralid potassium salt)

\*formerly known as 'Runway' MAPP 14017

Approval for reinstatement of 'Banish' (MAPP 13766), an amateur product previously approved for use on grassland, but never launched, is not being sought.

'Forefront' had provisional approval for use on grassland at a rate of 2 litres product/ha, once a year (NANUM 3308/2007, COP 2007/01056), as did the identical product 'Halcyon'. Grassland is defined as "Land grown for grass production, includes short and long-term grass leys and permanent pasture, which may be grazed and /or cut for subsequent animal consumption."

'Runway' (to be known as 'Mileway' in future) had provisional approval for use in amenity grassland, at a rate of 2 litres product/ha, once a year (NANUM 1032/2008, COP 2007/01666) and is an identical formulation to 'Forefront', just for a different use i.e. amenity grassland. Amenity grassland is defined as "Areas of semi-natural or planted grassland subject to minimal or non-intensive management. Includes areas that may be accessed by the public, such as golf roughs. May include airfields and predominantly grassed railway embankments and roadside verges. May be floristically rich and irregularly managed so that plants may flower and set seed."

The remainder of the products in the table are either identical or similar to 'Forefront'. Consideration of these products will follow the outcome of 'Forefront'.

The main consideration in this document will be in relation to 'Forefront', but with some reference to 'Mileway'. The supporting information, (Appendices 3 to 9 as submitted by the applicant) relates to the stewardship programme that the approval holder intends to implement for all their aminopyralid containing products if approval is re-instated. The evaluation of that information is presented in sections 2 to 7 and Annexes 1 and 2.

## **2. REASON FOR TECHNICAL CONSULTATION**

In spring and summer 2008, allotment holders and gardeners started to complain about poor and distorted foliar growth on a range of plants. The quality of fruit and yields, if any, were low of potato, tomato, pea and bean crops. There are claims that similar foliar symptoms were seen on ornamental plants such as delphinium, phlox and roses.

The main input was manure and initial enquiries raised suspicions that the herbicide aminopyralid was involved. The applicant was already aware of similar issues in 2007 with farmers having problems with potato crops that had been planted into manured soil. Investigations showed that farmers were ignoring the label warnings not to use manure from aminopyralid-treated grass on a range of sensitive crops including potato until all plant residues had completely decayed.

Following discussions with PSD, the applicant requested the suspension of their approvals pending further investigations and a consideration of how to address this issue. These applications request the lifting of the suspensions, changes to the labels to amend the warnings and the details of a product stewardship programme to take steps to minimise the likelihood of this problem occurring in the future. This paper considers the scope and scale of the risks involved and assesses the suitability of the proposals.

## **3. BACKGROUND**

### **3.1 Grassland management**

The applicant has produced a brief summary of the grassland sector and how herbicides are used (Appendix 3, note that the figures are broadly the same as other figures presented in Appendix 4 but do differ to some extent). The key points from this summary are as follows:

- There are more than 10,000,000 ha of grassland in the U.K. of which approximately 6,000,000 hectares is described as managed grassland.
- Annually 650,000 hectares receive a herbicide treatment. 70% of this treated area (450,000 hectares) is permanent grassland, i.e. grass over 5 years old.
- The applicant has estimated from their 2008 sales data that the area of land treated with aminopyralid was equivalent to 13% of the total grassland on the farm.
- Dairy farmers typically manage grassland more intensively, using herbicides on a greater percentage of their grassland than other farm types.

Weeds in grassland reduce productivity of the sward, reduce palatability and nutritional quality of the forage and fodder and, in some cases, can present a hazard to animals (e.g. ragwort and horses). Removing weeds lengthens the productivity of the sward and delays reseeding which is an expensive process.

### 3.2 Herbicide label warnings

Many herbicides have warnings about safety to following crops. These often take the form of warnings about residues in the soil remaining after failure of the crop to establish or after harvest. The labels of products containing such active substances will either include a list of insensitive crops or sensitive crops, sometimes both. With residues in soil, clearly there is not the same potential for distribution of the problems as there is with residues in plant material that can be moved away from the treated field. Below are some examples of label warnings that appear on agricultural products to address this particular issue. N.B. this is not an exhaustive list.

*Clopyralid: 'Chop or incorporate all treated plant remains in the early autumn (or as soon as possible after harvest) to release any residues into the soil, where they are more quickly broken down. Following good agronomic practice ensures that stubble and straw (including farmyard manure) and other treated plant remains have completely decayed before planting susceptible crops.'*

*Diflufenican, all product labels contain the following: 'Where diflufenican containing products are applied to successive cereal crops, levels of diflufenican will build up in the soil. Even with ploughing to 150mm and thorough mixing of the soil, there may still be a risk of damage to following crops of onions, leeks, other allium crops and clover. As a precaution, users who rent out their land to growers of these crops should not use diflufenican containing products in successive years before renting out that land.'*

*Fluroxypyr, all product labels contain the following or similar: 'Straw disposal: straw must be removed from the field after harvest; it may be used only for fuel or livestock bedding with the manure produced being spread on land to be cropped with cereals or grass for the next 12 months.'*

*Chlormequat: 'DO NOT use straw from treated cereals as a horticultural growth medium or as a mulch.'*

Similar label warnings were included on the agricultural products containing aminopyralid when originally approved: *'Do not use animal waste (e.g. manure, slurry) from animals fed on grass treated with FOREFRONT, or fodder resulting from grass treated with FOREFRONT, on susceptible crops e.g. peas, beans and other legumes, sugar beet, carrots and umbelliferae, potatoes and tomatoes, lettuce and other compositae, or land intended for growing such crops, until all plant tissues have completely decayed.'*

*'Do not use any plant material treated with FOREFRONT for composting or mulching.'*

To the knowledge of CRD (formerly PSD), these warnings have proved effective and have never previously caused significant problems in the industry. The first sulphonylurea herbicides used on cereals left residues in soil which were shown to affect following crops of sugar beet and oilseed rape. Similarly, and more in line with aminopyralid, the use of clopyralid, a related active substance, on grassland led to residues in manure which, when incorporated at the same time as field beans led to crop failures. Once farmers became aware of these issues and adapted their

farming practices to accommodate these restrictions, these issues have been overcome.

In the home garden, lawn weedkillers often include hormone herbicides that remain in the treated plant material. The labels of such products all contain the warning that the first three or four clippings following treatment must be thoroughly composted before being used as a mulch or incorporated into the soil. CRD is unaware of any problems with the use of such products.

### **3.3 Background to farmyard manure (FYM)**

The applicant has presented information on the generation of farmyard manure (FYM) in the UK (see Appendix 4) and quantified the potential scale of the problem in 2008.

This presents the following estimates:

- Of a total UK grassland area of 11.7 million hectares, around 6.1% or 714,000 hectares is sprayed with herbicides to kill weeds.
- Around 7% of grassland that is used for forage and fodder is treated with herbicides annually.
- Assuming aminopyralid products accounted for one third market share, at most around 2.3% of silage and hay and thus FYM, could contain residues of aminopyralid.
- Around 34 million tonnes of FYM is produced from housed cattle each year. Of this, 98.2% is used on the farm of origin with the remainder of some 600,000 tonnes exported from the farm of origin.
- Combining these estimates and assumptions for herbicide use and manure production provide the estimate that a maximum of 13,800 tonnes of FYM leaving farms where aminopyralid was used to treat the grass. This represents 0.04% of the total FYM produced.
- The destination of this manure is unknown, but information is provided that around 1.4 million tonnes of FYM is imported on to farms. The difference between exports and imports is made up of pig and poultry manure.

Similar work has examined the production of hay used for fodder in relation to herbicide use. This estimates that around 0.015% of horse manure available to allotment holders and gardeners could come from grassland treated with aminopyralid.

The above discussion starts with treated grassland to produce estimates of manure. To test these estimates, it is worth estimating the amount of FYM used by those other than farmers. To do this we have made the following assumptions:

- All 300,000 UK allotment holders use FYM to represent the total usage of FYM by all those other than farmers.
- FYM is applied at a rate of 25 tonnes/ha to an average plot size of 30m x 10m.

This provides an estimate of total usage of 225,000 tonnes/year. While allotment holders are fewer than gardeners, their usage of FYM is likely to be higher, but it is

very unlikely that all allotment holders would apply FYM at the rate used. Thus, this estimate is a maximum figure and does not seem unreasonable when compared with the 600,000 tonnes of FYM estimated to be exported from farms each year, much of which will be used on other farms. Using the applicant's estimates, if 2.3% could come from grass treated with aminopyralid, this equates to 5,175 tonnes which may contain residues of aminopyralid assuming as a worst case that none of the farmers followed the label warnings.

These estimates assume the problems in 2008 were caused by application in 2007. However, if farmers sell aged rather than fresh manure, it is possible that the problems have arisen from application in 2006 when the market share was lower. This leads to lower estimates for potentially contaminated FYM leaving farms. Of those few responses where affected individuals provided dates for application of aminopyralid, some mentioned treatment in 2006 (see 3.7 below and Appendix 6.1).

Many factors may affect whether grass treated with aminopyralid results in contaminated manure including dilution of residues through grass growth and mixture with silage from untreated grass. Once contaminated manure is incorporated into soil there will be degradation of the residues. These factors will tend to ameliorate any problems with residues. However, farmers often supply FYM to allotment sites which usually have tens of allotment holders all obtaining their manure from the single source. Moreover, if one farmer has contaminated FYM, the problem can affect a number of allotment sites and many individuals (see section 3.7 Allotment Complaints Review).

### **3.4 Other routes of environmental exposure**

FYM is also used for compost manufacture e.g. potting compost although no information is available on the scale of use.

A good proportion of FYM is applied to grassland. While there are no issues with regards to agricultural grassland in relation to aminopyralid residues, there is a concern with use on species-rich hay meadows which represent a rare type of semi-natural grassland in the UK with only a few thousand hectares remaining. They have suffered a steep decline in extent since World War Two primarily due to agricultural intensification. They comprise a varied mix of herbaceous flowering plants/herbs (mostly dicotyledons) and a variety of grasses and the most species-rich examples can support over 30 different species in a square metre. Such meadows are maintained by low-intensity management comprising a July hay cut followed by grazing in the late summer/autumn and, in upland hay meadows, spring grazing prior to shut up for hay in early May. The management also involves light dressing of straw-based farmyard manure (but not slurry or inorganic fertilisers) up to an absolute maximum of 12 tonnes/ha/year (to ensure a modicum of productivity is maintained to allow for an annual sustainable hay crop) plus occasional dressings of lime.

Usual practice is to apply FYM in spring or early autumn. Application is normally by rotary or rear discharge manure spreaders and represents a surface deposition to the grassland sward. Manure is thus not physically incorporated into the surface soil

as this practice would firstly not be practical and secondly may be damaging to the botanical interest of the meadows. Thus, if FYM containing aminopyralid residues were to be used, there is the potential that this would have an adverse impact on such grassland. Similarly, animals moved from treated grassland directly onto species-rich grassland also pose a risk while they excrete aminopyralid over the first few days, although this is likely to be far less a risk than an even coverage of contaminated FYM.

### **3.5 Description of symptoms and problems**

Aminopyralid is in the pyridine carboxylic acid group of auxinic herbicides. Pyridine carboxylic acid herbicides are mobile in the phloem and xylem. They are rapidly absorbed by the foliage and roots. The herbicide translocates to meristematic tissue, where it binds to protein receptor sites that regulate plant processes. The herbicide binds to protein receptor sites and disrupts plant metabolic pathways causing deregulated plant growth, resulting in suppression or death of susceptible plant species. Symptoms are typical for the auxinic mode of action and include thickened, curved and twisted shoots, stems and leaves, cupping and crinkling of leaves, stem cracking, and narrow leaves with callus tissue.

Symptoms of damage include distorted foliage, with cupping of leaves and fern-like growth. There are no remedies once damage has occurred, though some crops may show no symptoms and others may show signs of recovery. Where there is a harvestable crop, the fruits and tubers are often small and distorted.



The first sales of aminopyralid were in spring 2006. Farmers reported problems in 2007 (see section 3.6 Agricultural Complaints) but gardeners or allotment holders did not report any issues to the applicant or PSD until 2008. It is possible that farmers sell older, more well-rotted manure into this market or perhaps similar problems did arise but other explanations, rightly or wrongly, were found for them.

### **3.6 Agricultural complaints**

First used in 2006, a number of complaints were received about effectiveness and crop safety, all of which related to warnings on the label. The applicant claims the level of complaints was normal following the launch of a new product.

A proportion of the grass that was treated in spring 2006 was cut for silage and fed through the winter 2006/7 and the resulting manure used in 2007. Subsequently, the applicant received seven complaints relating to use of 'Forefront', all from agricultural use. In all cases, the conclusion was that in complete contradiction to the label warnings, farmers had applied manure from grass treated with aminopyralid less than three months before planting potato, a known sensitive crop specifically included in the label warning. The full details of the complaints are presented in Appendices 5 and 5.1.

The applicant responded to this by conducting an awareness campaign and agronomist training sessions were held throughout the winter period and into the spring. This included targeting advisors and farmers using articles, training and communication. During 2008, the number of complaints in the UK arable sector relating to use of manure and aminopyralid had decreased to two which the applicant claims was due to the extensive communications.

### **3.7 Allotment complaints review**

During 2008 the applicant received a number of e-mails and calls from a range of people including allotment growers with specific concerns, those with general interest, journalists and others.

In the allotment and garden sector, the applicant identified approximately 135 individuals who appear to be genuinely affected i.e. from the information they initially supplied they had crop phytotoxicity symptoms consistent with those caused by a hormone herbicide and a range of crops affected consistent with the selectivity pattern of aminopyralid. The 135 individuals were contacted by the applicant using an e-mail questionnaire to gain further details. Of the 55 who had replied by the time the application was submitted:

- 26 cases relate to cattle manure, 22 to horse manure, 5 to manufactured compost and 2 people did not know what they used.
- All growers have made the assumption that their crop symptoms are linked to aminopyralid. When asked whether they have they been able to trace back to an actual application, 19 people say they can.
- Most people have not given details of the manure-producing farm. 3 farms have been named twice. There are 5 cases of compost – all from the same manufacturer.
- 3 people say they have had samples positively analysed for aminopyralid.
- 33 people say they still have manure.
- Amounts of manure vary from "one barrow full" to several tonnes.
- Approximately 100 tonnes of manure is still stacked.
- Of the 100 tonnes 72 tonnes are in 3 sites
- Geographically the respondents are spread throughout England with a cluster in the West Midlands and one in London. (Of the 55 replies received 10 did not provide details of their location).

See Appendix 6.1 for full details of the questions and replies.



The applicant has dealt with these issues as follows:

All 135 individuals were contacted again to:

1. Obtain details from those that did not reply the first time.
2. Explain that manure in manure heaps is not safe to use.
3. Explain that aminopyralid must be incorporated into soil to breakdown.
4. Offer to collect and dispose of the FYM.

Where individuals requested removal of their FYM, the applicant has arranged for this to be undertaken, with disposal via collection by local farmers and spreading on grassland or land intended for grass, cereals or maize. An update on progress is at Appendix 6.2.

#### **4. RESIDUES OF AMINOPYRALID IN PLANTS, ANIMALS AND ANIMAL WASTE (MANURE/SLURRY)**

An overview was presented of relevant residue data already available in the DAR for aminopyralid (see Appendix 7). This indicates that aminopyralid is not metabolised by plants but is in majority bound to cellulose chains. Residue decline would primarily occur through growth dilution, for the use practice under consideration (spring/early summer application to grass) this is not consistently appreciable.

##### **4.1 Animals**

Aminopyralid is essentially not metabolised by animals and is eliminated almost quantitatively in the excreta. Label recommendations are therefore in place to avoid the use of manure containing aminopyralid on sensitive crops.

Analysis of manure from the cattle feeding study indicated that aminopyralid clears rapidly from the animal once the herbicide is removed from the diet. That is, if cattle were to be grazed on grass not treated with aminopyralid for three days, any subsequent manure should not be of concern.

##### **4.2 Fate in manure**

A study has been submitted to examine the degradation of aminopyralid in manure. This concluded that aminopyralid residues did not decline appreciably during the thermophilic or mesophilic phases of the composting process. Based on these results, composting is not likely to be a useful technique to mitigate aminopyralid residues present in animal wastes.

Therefore, label statements are in place advising against the use of manure containing aminopyralid for composting or mulching.

##### **4.3 Residues in slurry and manure - farm trials**

The applicant has provided additional information on potential residues in manure/slurry but note that samples of known provenance, analyses and results of their effects were all difficult to obtain reliably. The data were based on original uses

of aminopyralid containing products (i.e. including use on grass for production of hay or silage).

Using slurry from a dairy herd known to have been fed silage from grass treated with 'Forefront', residues in the slurry were variable and, following incorporation, there were no effects on the growth of potato or bean crops when damage would have been expected. The second study monitored residues in grass, silage and manure or slurry on seven farms where full details were available of treatment and subsequent feeding regimes. The residues of aminopyralid measured in solid manure collected at two farms ranged from 0.08 mg/kg (8 ppb) to 0.48 mg/kg (480 ppb). The highest residue of aminopyralid of 0.48 mg/kg (480 ppb) was measured where 75% of the 1<sup>st</sup> cut silage had been treated with 'Forefront' and where the animals were exclusively fed on treated silage with no other feedstuff provided.

Residues of aminopyralid determined in slurry of 5 farms ranged from < 0.01 mg/kg (<10 ppb) (LOQ) up to 0.19 mg/kg (190 ppb).

Residues of aminopyralid in grass treated with 'Forefront' at 1.9-2.0 L/ha on six farms ranged from 0.41–2.01 mg/kg (410 – 2010 ppb). The samples were taken 3-8 weeks after treatment.

Residues of aminopyralid in 1<sup>st</sup> cut silage treated with 'Forefront' at 1.9-2.0 L/ha on five farms ranged from 0.35 to 1.21 mg/kg (350 – 1210 ppb), on 2 farms no residues of aminopyralid were detected. The silage from the corresponding 2<sup>nd</sup> cuts showed 0.06 mg/kg (60 ppb) on one farm and no detectable residues of aminopyralid on two farms.

#### **4.4 Consumer risk assessment**

There are no concerns with regards to consumption of crops grown either in contaminated manure or from the consumption of animal products from the livestock fed on grass treated with aminopyralid or haylage product containing residues of aminopyralid as detailed in the risk assessment in Annex 1, section 3.

#### **4.5 Handling contaminated manure**

There are no concerns relating to aminopyralid when handling the manure as the detailed risk assessment in Annex 1, section 2 demonstrates. Usual good handling practice should be followed.

#### **4.6. Fate of aminopyralid in soil**

In the detailed assessment at Annex 1, section 4 it was concluded that it is not currently possible to exclude the potential for some increased environmental exposure arising from application of contaminated manure or slurry under certain circumstances. This secondary route of exposure would be expected to be highly variable and dependent on many factors including the proportion of aminopyralid treated material in the animal diet, application rates of contaminated manure or slurry as well as specific application methods, the characteristics of the receiving soil and the prevailing environmental conditions after application.

The assessment at Annex I, section 4 was based on the originally proposed uses of the aminopyralid containing products (i.e. including use on grass for production of hay or silage). The applicant has addressed the concern in the current application by asking for approval for use on grassland to be restricted to grazing only. The applicant has not provided any further information to support their submission in this area. However this restriction will clearly reduce the risks posed by this secondary route of exposure by reducing the quantities of contaminated FYM and slurry produced on farm. For example the removal of uses on land used to produce hay or silage will significantly reduce the volumes of contaminated manure produced during periods of winter housing. However, the proposed restriction to use on grassland for grazing only does not completely eliminate all the risks. For example, this does not take into account dairy cows which may be moved off treated fields to be milked twice daily and have their waste products collected during the daily housing period. In accordance with the label, this type of animal waste (i.e. FYM and, more likely, slurry) should only be spread onto agricultural grassland and must stay on the farm of origin. This restriction is to eliminate the risks of contaminated material entering waste streams off farm where risks to susceptible crops cannot be controlled.

By contrast with relatively intensively managed dairy cattle, some beef cattle and certainly sheep, could be left out at pasture all year round where the underlying soil conditions are suitable. Whilst these sheep and cattle may play a role in increasing the risks to groundwater by effectively reapplying aminopyralid in manure *in situ* it should be noted that the volumes applied will be much lower and will be applied over a much longer time period than considered in Annex I, section 4. These factors may effectively reduce the risks posed by this specific route of exposure. Overall the risks posed by sheep and cattle naturally applying contaminated manure *in situ* are likely to be much lower than would arise via semi-even coverage of large quantities of manure applied by farmers and considered in Annex I, section 4.

The risks to groundwater resources via contaminated manure identified in Annex I are most likely to arise from cattle housed for long winter periods and fed a diet high in hay or silage from aminopyralid treated fields. The manure analysis data available indicates that in such situations relatively high aminopyralid residues can be detected in FYM and slurry. In the case of dairy or beef cattle outlined above such high aminopyralid residues over long periods would not be expected as the natural growth dilution occurring in treated fields would reduce subsequent residues in manure over time. This is partially supported by the analysis of residues in silage cuts, with residues in the corresponding 2<sup>nd</sup> cuts much lower than initial levels. The volumes of FYM and slurry collected from dairy cattle would also only arise during housing during milking times and would be clearly much lower than would be collected during winter from permanently housed livestock.

The potential risks to groundwater via application of contaminated FYM and slurry have not previously been considered for any other compound. There is therefore no previous precedent upon which to base the current assessment. The current uncertainties surrounding the release of residues from animal waste make it difficult to assess this via a formal exposure assessment using the standard FOCUS groundwater models. The assessment outlined above, along with the detailed consideration at Annex I, section 4, is therefore based on expert judgement based

on the information available. Although the restriction to grassland for grazing only does not completely eliminate the risks posed by contaminated FYM identified in Annex I, overall the risks posed by this secondary route of exposure are considered to be small.

#### **4.7 Effect on wildlife**

There are no direct concerns but there are concerns about contamination and damage to plant species in botanically valuable grassland. These are discussed in detail in Annex 1, section 5. Warnings have been added to the draft label to alert users not to apply potentially contaminated FYM to such grassland and to ensure a three day interval between animals moving from treated grassland to such habitats (see 7.2.4 below). The Environment Agency will add aminopyralid to its monitoring programme.

#### **4.8 Summary of non-target plants affected**

In terms of visual injury the most sensitive crops to aminopyralid, in studies examining the soil NOEL when applied pre-planting of the crops, were the legumes, with a NOEL of 0.0135 g a.e./ha (pea, alfalfa, pinto bean, red clover and horse bean) and 0.0405 g a.e./ha (lentil and soybean). Sugar beet, sunflower, potato, cotton, cucumber, oilseed rape and tomatoes were also shown to be very sensitive with NOELs of 0.0135 (sugar beet and sunflower), 0.0405 g (potato), 0.123 g (cotton), 0.375 g a.e./ha (cucumber, oilseed rape and tomato).

The most tolerant species were the grasses, with rice having a NOEL of 13.95 g, wheat and maize a NOEL of 42 g and barley and perennial ryegrass a NOEL of 124.5 g a.e./ha.

Symptoms seen were severe epinasty and twisting of the foliage causing thickening of emerging stem tissue.

### **5. THE APPLICANT'S STEWARDSHIP PLAN**

This consists of six areas:

- 5.1 Managing manure already in the system
- 5.2 Proposed label changes
- 5.3 2009 Issues prevention plan
- 5.4 Communication plan
- 5.5 Stewardship plan to govern future sales of aminopyralid products
- 5.6 Managing concerns

#### **5.1 Managing product and manure already in the system (Appendix 8.1)**

Any product already in the distribution chain has been recovered, including on-farm cans that are unopened (see Appendix 8.1). This anticipates future label changes and prevents use until further notice. The occasional, opened and part-used can in pesticide stores on-farm poses no risks and farmers have been instructed not to use it. Hence, no further grass crops should be treated in 2009.

The applicant is working through distributors to communicate to their customers the restrictions on use of manure and slurry. They will additionally be reminded of the need to inform anyone they have supplied with manure or grass products of the restrictions. See section 5.4 Communication Plan.

The gardeners and allotment holders who have notified the applicant of a possible issue have all been contacted and any unwanted FYM removed in all cases with one exception.

## **5.2 Proposed product label**

A revised draft label for 'Forefront' appears as Appendix 2. This has changed completely since that first approved. The key risk in relation to residues remaining in animal wastes affecting following crops is prominent as the first paragraph on the label followed by a clear reference to requiring training before use of the product. Only farmers with cattle and sheep will be allowed to purchase the product and the container size will not be less than 5 litres, again to help ensure the product is used on large, professional farms. Thereafter, a series of warnings make it explicit that the product is for use on grassland for grazing only and no fodder is to be taken until the following calendar year.

Any FYM or slurry produced, either while dairy animals are being milked or from fodder harvested in the following year and subsequently fed to housed animals, is to be kept on the farm of origin and applied to grassland. There were concerns that some farmers may not have sufficient grassland on which to dispose of any accumulated manure, possibly due to restrictions on nitrate levels. The applicant has confirmed that their training will cover this issue and they can be contacted for support by farmers to help find a neighbour willing to spread their manure. Specific warnings are proposed to avoid any potentially contaminated FYM being spread on grassland with botanical value to avoid any adverse impact on biodiversity. Similarly, advice is included to avoid animals fed on aminopyralid-treated grass being allowed to graze grassland of botanical value within three days until any trace of aminopyralid has been excreted.

These proposed changes will be communicated via the applicant's stewardship program (Appendix 8.2) subject to regulatory audit.

Finally, 'Banish' for the amateur market will not be approved.

## **5.3 2009 Issue Prevention Plan**

With the increased awareness of this issue as a result of the communication plan through the winter and into the spring of 2009, there will be many people who belatedly question the provenance of their FYM. In response, the applicant is proposing to address three areas (see Appendix 8.3). Firstly, managing the FYM that is already on horticultural sites (see 3.6 above). Secondly, through a media

campaign concerning appropriate manure use (see 5.4 below). Lastly, the applicant is to provide support for enquirers next season. This involves the following:

- The creation of a micro-site within the Dow AgroSciences website called 'Manure Matters'. This site contains information on best practices, bio-test methodology, images, contact details, FAQs.
- Learning from the experience of 2008, many enquirers welcomed the opportunity to actually speak with someone. Thus, the applicant has employed a consultant with previous experience of agrochemical stewardship campaigns, who is dedicated to working on this issue to deal with in-season enquiries, providing advice and reassurance.
- Provision of a test methodology (and materials if required) to help callers determine the presence of a residual herbicide in their FYM.

#### **5.4 Communication Plan 2009**

The applicant has implemented a communication plan (Appendix 8.2) to deliver the key messages to all those potentially involved. The primary target for communication has been the distributors, agronomists and farmers who have recommended and/or used aminopyralid in 2008. Additionally, in order to ensure that aminopyralid containing plant material which is potentially already further downstream is not used inappropriately, an additional '2009 issues prevention' plan is being implemented.

A substantial part of achieving the above is with effective and regular communication to wide range of audiences, all of which have a role to play:

- Distributors
- Agronomists
- Farmers
- Contractors
- Equine units and small-holders
- Hay and straw merchants
- Compost manufacturers
- Allotment holders and gardeners

Each of these diverse groups has required a set of specific messages to ensure clarity and relevance to their interests. However, consistency of messages across audiences is important. Communication has been made via letters and media campaigns. Full details are presented in Appendix 8.2. This has been in addition to the "Manure Matters" micro site [www.manurematters.co.uk](http://www.manurematters.co.uk) set up within the Dow AgroSciences website which is easily accessible via Google searching and linked to via Gardening associations such as the RHS.

This campaign was started in September 2008 and will continue through 2009.

## **5.5 Stewardship Plan to Govern Future Sales of Aminopyralid Products (Appendix 8.4)**

The applicant will change the business terms, essentially making aminopyralid an agency product with conditions placed on the training of staff, the supply of product, the conditions of sale, stewardship of after-sales, and the auditing of records.

The applicant will limit the number of businesses that can supply aminopyralid product restricting any sales to trade-ons and contractors. Any contractors must be BASIS and NRoSO (National Register of Spray Operators) qualified, and a member of a trade body. Any traders who wish to purchase from a distributor will be subject to the same agency terms as above and must be trained by the applicant's staff. A dedicated Stewardship co-ordinator will be put in place to assist in training and overall stewardship.

The applicant will require the name of each and every purchaser of aminopyralid as a condition of sale and will audit a proportion of farmers.

Any farmer wishing to purchase must be in receipt of a recommendation sheet from a BASIS qualified, registered agronomist. Where the farmer does not have this, he can only be supplied once he has had a discussion with a BASIS registered agronomist and is supplied with a recommendation sheet.

Every purchase must be accompanied with a technical information leaflet.

## **5.6 Managing Concerns (Appendix 8.5)**

Gardeners and allotment holders may have heard of the aminopyralid issue and wish to be reassured that their manure is unaffected. The applicant has proposed this will be achieved through communication on best practice for manure and a simple pot test (bioassay). The applicant also has a dedicated Stewardship co-ordinator to deal with questions.

The bioassay method has been tested and proven to detect aminopyralid. It has been ring tested and published on the Manure Matters website to enable the testing of soil/FYM of concern.

In addition, the applicant now has analytical methods available for soil and manure with LOQs to be in line with concentrations affecting the most sensitive crops. These are in the form of final drafts, which have been independently validated, but have not been signed off by the applicant's QA system yet. Final signed off versions will be forwarded when they become available.

## **6. AMINOPYRALID IN NON CROP SITUATIONS (Appendix 9)**

Two other products containing aminopyralid, 'Mileway' [formerly 'Runway'] and 'Synero' were approved with identical label claims (see Appendix 1 for draft approval and Appendix 2 for draft label) for use in amenity grassland but have not been launched in the UK to date.

The application of plant production products to non-crop land has seen proactive developments to ensure a consistent standard of performance with reliability of

results and minimisation of risk. 'Mileway' will be used on predominantly grassed railway embankments only through one specialist spray contractor. 'Synero' will be used on other amenity grassland areas through two specialist distributors. A similar stewardship programme will be put in place for this market to that of the grassland market.

The agency agreement system will be used to ensure that these products are used in the sectors specified above.

Use of these products is for the control of unwanted vegetation, including the noxious weed ragwort, bramble and the invasive species Japanese knotweed along with docks, nettles and other species. Such treated vegetation is not fed to animals and thus, there is no route of exposure from the use that gives rise to any concerns.

A label restriction also emphasises that treated vegetation should not be cut.

It is considered very unlikely that any herbicide is used in other non-crop situations where vegetation management is required. For example, a number of authorities are mowing road-side verges to reduce competition from tufted grasses to encourage broad-leaved species. Herbicides, particular those as effective as aminopyralid, would not be used in such situations. The label includes warnings not to allow grazing of or remove grass from the treated site, or to use it for animal feed or bedding, nor for composting or mulching.

In conclusion the applicant has requested the removal of the current suspension notice for the following aminopyralid approvals in the UK:

Product	MAPP No	Formulation
Forefront	12765	A water in oil emulsion containing 30 g/litre (3.5% w/w) aminopyralid (present as 36 g/litre aminopyralid potassium) + 100 g/litre (14.14% w/w) fluroxypyr (present as 144 g/litre fluroxypyr-methyl heptyl ester).
Halcyon	12749	
Mileway *	TBA	
Synero	14059	
Pharaoh	13631	An oil in water emulsion containing 30 g/L (3.13% w/w) aminopyralid (present as 36 g/L aminopyralid potassium) + 240 g/L (29.44% w/w) triclopyr (present as 334 g/L triclopyr-butotyl).
Pro-Banish	13766	A soluble concentrate containing 30 g ae/L (2.95% w/w) aminopyralid (present as 36 g/L aminopyralid potassium salt)

\* formerly known as 'Runway' MAPP 14017

## 7. DISCUSSION

The amount of FYM potentially contaminated with aminopyralid is estimated to be a very small amount of the total produced each year in the UK. Of that quantity, a tiny amount is sold to gardeners and allotment holders. While the overall scale of the problem is extremely small, for individuals who suffered failures of many of their crops in 2008, this is a very upsetting event. For those who revere the properties of FYM and use it as a key input for organic growing, the discovery that pesticide



residues have contaminated both your crops and soil is extremely distressing. All involved are keen to ensure that there is no repeat of this situation.

The first issue to address is human health. The risk assessments for both handling contaminated manure or eating produce, whether from insensitive crops or sensitive crops that do manage to produce a harvestable yield, predict a very large margin of safety.

The remaining two issues to consider are firstly, how to deal with silage and manure that maybe contaminated and secondly, the future of products containing aminopyralid.

## **7.1 Existing silage and manure**

### **7.1.1 FYM currently on gardens and allotment sites**

The applicant has taken active steps to communicate with those gardeners and allotment holders who believe they have a problem with contaminated FYM. While it is unlikely that everyone affected will have contacted the applicant, every effort has been made to communicate to the public the issues and how they may be resolved.

All but one of those individuals in contact with the applicant who have FYM that they either know or suspect to be contaminated have had any residual material removed from their site. Some may have taken action into their own hands and either persuaded their supplier to remove the affected FYM or incorporated it thoroughly in their soil to allow nature to take its course.

Those who incorporated FYM in late 2007 or early 2008 and have had problems have been given the advice to thoroughly incorporate any remaining plant material to encourage breakdown and release any last residues. Given the length of time since first worked into the soil, it is very unlikely that any problems will arise from this source in 2009.

The applicant's helpdesk and Manure Matters micro-site [[www.manurematters.co.uk](http://www.manurematters.co.uk)] will continue to provide advice through next year. Any significant developments will also be the subject of Regulatory Updates on the CRD website which may be read by certain sectors of the public.

If for whatever reason individuals still have concerns, the bioassay method is published on the Manure Matters micro-site. Using readily available materials, this enables a very simple, cheap and reliable check to be made that no harmful residues remain.

Despite these efforts it is very probable that complaints will still be received in 2009. Aminopyralid does not breakdown when FYM is composted so any brought as late as spring 2008 but as yet not used, is a potential source of concern. There will be individual members of the public who have had affected crops and put this down to other factors (e.g. an unusually cold May experienced in 2008). They will be unaware of the publicity and advice now available and, if they incorporate their by

now well rotted FYM and their crops fail for a second year, they may only then take action to find out what is happening.

It is most likely that there will be some who in 2009 will allege aminopyralid is responsible for many of the ills that gardeners and allotment holders regularly face. With the helpdesk and micro-site together with the bioassay, along with the experience of 2008, both the applicant and CRD are in a much better position to provide the correct and timely advice and support to any genuine enquirers and complainants.

By May this year, 25 enquiries had been received by the applicant. To the same date, CRD had received 23 enquiries of which 13 were information related and 10 concerned crop damage and in a couple of cases, several of the enquiries came from a single individual and are linked. From both sets of information the main point is that stable manure is a source of concern. The application to lift the suspension specifically addresses this point and sales are not permitted into this market in future.

In liaison with the approval holder, CRD produced 5000 postcards with the key messages to advise growers. These have been distributed as follows: 2,850 to garden centres (Wyvale, Notcutts, Dobbies and Hilliers), 750 to the Royal Horticultural Society for distribution at the Chelsea Flower Show, 500 to the National Society of Allotment and Leisure Gardeners with approximately 650 to individuals, mostly those who contacted CRD in 2008. The remaining 230 planned for any future enquirers. For details of the text in this postcard see Annex 3.

CRD and the applicant are currently discussing the possibility of sharing copies of all enquiries and replies.

### **Requirement for continuing approval**

Summary reports of any complaints relating to manure on farms, gardens and allotments are required to be submitted to CRD on a 3 month basis.

#### **7.1.2 FYM currently on farms**

By spring 2009, there is a potential situation on farms of contaminated FYM from three seasons of use. This material must not be released for non-agricultural uses or a repeat of the 2008 problems may occur. The applicant through their distributors and from the responses to a competition on the products in spring 2008 has the contact details of the majority of those who have used products containing aminopyralid. Those individuals and all distributors have been contacted, made aware of the issues, reminded of the label warnings and given directions not to release this FYM other than for agricultural uses on insensitive crops. Contact has also been made with all sectors of the industry involved with manure to make them aware of the issues and how to avoid problems in the future. Together with the other aspects of the stewardship campaign, particularly the use of the media to alert the various interest groups to the issues, and the awareness of those who trade in manure and amongst many gardeners and allotment holders, the chances of any slurry or FYM from treated grass entering the market is far lower than in spring 2008.

Compared with the volumes of FYM used on farms, the amount released into the allotment and garden market is minute. Thus, if this route of disposal is denied to those who have used aminopyralid previously, this should pose no great difficulties as the FYM can be safely used on grassland or land intended for grass, cereal and maize crops.

### **7.1.3 Silage, haylage and hay currently on farms**

There will be some bagged silage cut in 2008 and a much smaller amount from 2007 that will contain aminopyralid residues currently on farms. It is probable that many farmers will be unable to differentiate such silage from that taken from untreated grass. Thus, all of this silage needs to be treated with caution and warnings given to farmers if they are intending to sell this silage to others. This is addressed in the correspondence to farmers (see Appendix 8.2). Again, any resulting slurry and FYM can be safely disposed of on grassland or land intended for grass, cereal and maize crops.

### **7.1.4 Other uses of FYM**

Given the comprehensive coverage of the communication plan of all areas of the industry that are involved with manure, including compost manufacturers, the issues around aminopyralid should be well known. Seeking an assurance from a supplier that manure and slurry is from sources that have not used grass from aminopyralid-treated grassland should be standard practice, not too onerous on either party and should prevent any reoccurrence of such problems.

### **7.1.5 Recommendations on existing contaminated silage, haylage, hay and FYM**

With those gardeners and allotment holders who have identified themselves to the applicant, direct action has been taken to remove contaminated FYM in a timely manner and to provide further information and support. Similarly, working in partnership with the distributors, attempts have been made to contact all farmers who have used the products. The other sectors of the industry involved with manure have also been contacted and given a full explanation of the issues and how to resolve them. There is also the ongoing commitment to continue to raise the awareness in the industry via the media through 2009.

With the problem being tackled with the suppliers of fodder from treated grassland and manure, both FYM and horse manure, and all those buying these, the awareness of the issues will have been raised. Compared with 2008, these efforts should reduce the chances that sensitive crops are exposed to manure containing aminopyralid residues. While it is considered that all reasonable steps are being taken to prevent a repetition of the 2008 problems, it is not possible to say that these will be eliminated totally. The support and advice will be provided by the applicant throughout next year for those who believe they have been affected. The requirements outlined are considered necessary to ensure that the actions proposed by the applicant are delivered and, should any new developments arise, action can be taken at the earliest opportunity.

## 7.2 The future of the products

There are those who would argue that by not lifting the suspension or banning all products containing aminopyralid, the problems of 2008 would be solved. However, the regulation of pesticides has always been on the basis of a scientific consideration of the risk posed by use of the product, not on the basis of hazard or the consequences of mis-use or abuse. If the label instructions had been carefully followed, there would not have been the problems of 2007 and 2008.

The key target weeds in permanent grassland are perennial weeds such as docks, nettles, thistles along with creeping buttercup, dandelion and common chickweed. These weeds have been proven to have a direct effect on grass productivity.

Aminopyralid products are effective herbicides, used at one rate for all weeds and achieve extremely high levels of control in the season of use with results often seen into the following year, reducing the need for regular or repeat applications. They also have a short grazing interval of 7 days.

Launched in 2006, products containing aminopyralid accounted for around one third of the grassland herbicide market in 2008. This success will have been achieved through various factors including effective marketing by the applicant and the desire for farmers to try something new. However, there is also the fact that the product is needed and delivers what it promises. Furthermore, there are many favourable aspects of the human safety and environmental profiles of aminopyralid.

When considering the original applications to lift the suspensions, a risk assessment was conducted on the manure resulting from treated grassland. This evaluation highlighted a potential concern over contamination of groundwater (see Annex 1, section 4). Not enough is known about the release of aminopyralid from decaying plant material to accurately consider the risks. However, for any future application for use of this active substance on grassland for fodder, this risk needs to be considered carefully.

### 7.2.1 The use of label warnings

Following the launch of clopyralid as a grassland herbicide in the 1980s, there were problems with field beans failing to germinate or showing distorted growth after coming into contact with manure containing clopyralid residues. The following warning was developed and has been effective to CRD's knowledge:

*“Do not use animal waste (e.g. manure, slurry) from animals fed on grass treated with [clopyralid-containing products], or fodder resulting from grass treated with [clopyralid-containing products],, on susceptible crops e.g. peas, beans and other legumes, sugar beet, carrots and umbelliferae, potatoes and tomatoes, lettuce and other compositae, or land intended for growing such crops, until all plant tissues have completely decayed.”*

In view of the similarities between these two active substances and the risk to following sensitive crops, the same warning was included in labels of products containing aminopyralid.

The label attached to the pesticide container is the key means to communicate all the risks of use to the user. In the event, it is clear that this warning alone was not sufficient and the label instructions were not followed despite the familiarity of the industry with this type of warning.

The new draft label, supplied by the applicant, (see Appendix 2) now has a series of warnings and restrictions. The aim is to ensure the product is used only on grassland for grazing so that the vast majority of manure falls back onto the treated field. Any accumulations of manure or slurry, as will occur with dairy herds, must not be moved off the farm of origin and can be safely applied to grassland. The risks posed from any residues in the soil or manure to sensitive crop species are dealt with by a series of following crop restrictions.

The problems in 2007 and 2008 arose due to the label warnings not being followed. The new label has new restrictions and thus, it can be argued that the chances of these being followed will be less than before. However, there is now the stewardship programme which includes each user receiving training on how to use the product correctly and responsibilities for distributors and contractors.

Evidence that the proposed stewardship campaign will work is provided by the response to the problems with commercial potato crops in 2007. The applicant undertook a relatively limited stewardship campaign and, on the basis of only two complaints in 2008 despite much greater usage of the products, it would appear this has been very effective, even where manure is not used on the farm of origin but transported to another farm.

In conclusion, it is considered that the product will be used as recommended on the label and thus the risks of the previous situation arising again are minimised.

### **7.2.2 Stewardship campaign**

The stewardship campaign is comprehensive in communicating with all parties involved in grassland management and those using the resulting manure. The various requirements that have to be undertaken before a distributor can sell the product or a farmer can apply a product containing aminopyralid will ensure that they are fully aware of the issues. The applicant will have control of the selected distributors through the Agency contracts. Furthermore, the applicant will have contact details for all who buy the products and thus, can contact them very easily to provide reminders and any further information. No farmer will have any excuse for not following the label instructions correctly.

The applicant has confirmed that regular reports on progress with this campaign will be made available to CRD.

### **7.2.3 Animals grazing treated land**

As part of the evaluation for provisional approval consumer intakes due to the consumption of animal products from livestock fed grass treated with aminopyralid were calculated. All intakes were below the relevant ADI or ARfD for all consumer groups. An effect on health is therefore unlikely.

## **7.2.4 Botanically valuable grassland**

When first approved, the standard ecotoxicology risk assessment raised no concerns from the proposed use of 'Forefront' and 'Mileway' with all areas showing an acceptable risk at the first tier. As a standard precaution a warning was added to the label to avoid drift onto non-target plants.

The subsequent issues over residues in animal wastes and the possibility of transfer of aminopyralid in FYM or directly by animals having recently grazed treated grassland have raised concerns in relation to botanically valuable grassland. These issues are summarised at Appendix 10 and discussed in detail in section 5 of Annex 1.

To address these potential risks the label (Appendix 2) includes specific warnings to minimise this potential problem.

### **Data requirement**

To remove these warnings, data will be required to demonstrate that the application of farmyard manure from animals fed on treated grassland, or the transfer of animals from treated grassland, do not have a significant adverse effect on botanically valuable grassland.

## **7.3 Other issues**

### **7.3.1 European responsibilities**

Aminopyralid is approved for use in grassland in many other European countries. However, while the first season of use in the UK was 2006, in Germany it was first used in 2007 and for other countries, 2008 was the first season of use.

In Germany, 30 incidents of crop damage have been reported. These followed incorporation of contaminated manure immediately prior to planting potato crops.

No other incidents have been reported to CRD. In some countries (e.g. Belgium) approval is restricted to grassland for grazing only.

It has been confirmed by the applicant that of the four other European countries where aminopyralid is approved for use on grassland, problems with non-agricultural growers have occurred only in Germany where eight complaints have been received.

### **7.3.2 Ragwort warning**

Labels for products containing aminopyralid include the standard warning about excluding animals from treated grassland until poisonous weeds including ragwort become unpalatable. Questions have been raised by Committee members about the wording which has been in common use unchanged for the past 20 years. This is a generic issue and will be taken forward separately by the CRD herbicide specialist in consultation with the industry.

## **ANNEX 1: DETAILED RISK ASSESSMENT**

### **1. TOXICOLOGICAL ASSESSMENT**

Aminopyralid was considered at the ACP meeting of 22 September 2005 and November 2005 and it was decided that it is of low acute toxicity via the oral, dermal and inhalation routes. It is not classified as irritating to skin but is extremely irritating to the eye and should be classified as a severe eye irritant (R41). It is not considered to be a contact sensitiser.

The formulation is of low acute toxicity via the oral, dermal and inhalation routes. It is classifiable as irritating to skin (R38) and a severe eye irritant (R41). Although the product showed some evidence of sensitisation but not enough for classification purposes this was not of concern for operator protection because the product is classified as a skin irritant and a severe eye irritant. Based on these irritant properties, and in line with UK risk management strategy, operators would have to wear gloves and a face shield when handling the concentrate which would also provide protection from any slight skin sensitisation potential.

A dermal absorption default value of 50% was agreed for aminopyralid (as potassium salt, acid or anion) from the formulation (concentrate and in-use dilution).

An Acute Reference Dose (ARfD), Acceptable Daily Intake (ADI) and short-term systemic Acceptable Operator Exposure Level (AOEL) of 0.26 mg/kg bw/day were agreed based on applying a 100-fold assessment factor to the No Observable Effect Level (NOEL) (for in-coordination in pregnant rabbits) of 26 mg aminopyralid acid equivalents/kg bw.

### **2. OPERATOR EXPOSURE ASSESSMENT**

Under normal circumstances, it is unlikely that growers or gardeners will come into close contact with manure containing residues of aminopyralid. However, the following assessments illustrate the low risk involved.

The AOEL set for aminopyralid is 0.26 mg/kg bw/day. For an adult of 60 kg bodyweight, the tolerable dose would be  $60 \text{ kg} \times 0.26 \text{ mg/kg bw/d} = 15.6 \text{ mg/d}$ . It is assumed that exposure from handling manure would be predominantly via the dermal route. As the dermal absorption of aminopyralid is 50% agreed for both concentrated and diluted formulations), the dermal dose needed to reach the AOEL would be  $2 \times 15.6 \text{ mg} = 31.2 \text{ mg}$ . The highest reported concentration of aminopyralid found in manure is 0.48 mg/kg. To achieve the tolerable dose, therefore, an individual would need to be exposed to all of the aminopyralid in  $31.2 \text{ mg}/0.48 \text{ mg/kg} = 65 \text{ kg}$  of manure – an unlikely scenario.

Exposure calculations have previously been carried out for workers handling compost treated with pesticides. Assuming, as a worst case, that manure is handled in the same way further illustrates the low risk.

Field studies investigating dermal exposure to soil by direct gravimetric measurements (Kissel *et al*, 1996) suggest that an appropriate hand soil loading for

a worker handling growing media would be 0.44 mg/cm<sup>2</sup> (geometric mean peak value for farmers involved in hand weeding).

Assuming a surface area of the hands of 820 cm<sup>2</sup> (OECD OCDE/GD(97)148) and a retention value of 0.44 mg/cm<sup>2</sup>, the appropriate daily peak manure hand loading would be 361 mg (0.000361kg). At 0.48 mg aminopyralid/kg manure, the dermal dose of aminopyralid would be 0.000361 x 0.48 = 0.000173 mg. Assuming a dermal absorption of 50% and a 60kg bodyweight, the systemic dose would be 0.0000014 mg/kg bw/d, or <<1% of the AOEL for aminopyralid.

In conclusion, it is very unlikely that individuals handling contaminated manure will be exposed to levels of aminopyralid which would cause concern.

Reference

Kissel J.C., Richter K.Y. and Fenske R.A. (1996) Field measurement of dermal soil loading attributable to various activities: Implications for exposure assessment. Risk Analysis 16(1): 115-125.

**3. CONSUMER EXPOSURE ASSESSMENT**

**Estimate of residue concentrations of aminopyralid that would give intakes at the ARfD**

An assessment has been conducted for aminopyralid for each commodity for which consumption data is available to identify the residue levels that would lead to intakes at the proposed acute reference dose of 0.26 mg/kg bw/day. Several worst case (in terms of highest intake) crops are presented in Table 1 along with the residue levels that would be required in the crop to give an intake at the proposed ARfD. The full list of commodities is provided at the end of this section.

Table 1: Lowest residue values to give short term intakes at the ARfD for UK consumers

<b>Crop</b>	<b>Critical consumer group</b>	<b>Lowest residue level required to give an intake at the ARfD</b>
Potato	Infants	1.69 mg/kg
Oranges	Infants	1.96 mg/kg
Apples	Infants	2.65 mg/kg
Carrots	Infants	4.10 mg/kg
Tomatoes	Infants	5.39 mg/kg
Cabbage	Infants	6.04 mg/kg
Cucumber	toddler	8.81 mg/kg
Onion	infant	11.54 mg/kg
Lettuce	4- 6 year old	14.60 mg/kg
Peas	infant	31.73 mg/kg
Beans	7-10 year olds	35.25 mg/kg
Strawberries	4- 6 year old	37.51 mg/kg

From this it can be seen that residues would need to be at least 1.6 mg/kg in any crop before intakes would be close to the ARfD of 0.26 mg/kg bw/day.



## Estimate of potential residues in manure and crops.

Manure samples from farms, that have treated grassland with aminopyralid and fed the resulting treated grass to animals were analysed as part of the monitoring study submitted. On analysing the manure, the highest residue of aminopyralid found was 0.48 mg/kg.

Based on the assumption that the manure was spread onto land in which crops are grown at a rate of 50 tonnes/ha (50000 kg/ha), this would result in a concentration equivalent to 24 g aminopyralid/ha being applied to soil. This figure is 2.5 times lower than the previously approved label rate of 60 g aminopyralid/ha.

The applicant has provided information and residues data relating to uses of aminopyralid on edible crops for countries outside the UK. The application rate of aminopyralid is 10 - 70 g/ha for cereal crops & 30-60 g/ha for fodder brassica crops i.e. similar to or higher than the level estimated to be present based on residues in manure. The highest residues in these crops at harvest were as follows:

Crop	Number of trials (locations)	Residue levels at harvest (mg/kg)	Highest residue (mg/kg)
Wheat (grain)	22 ( North & South EU, USA)	0.01, 6 x <0.01,0.023, 0.012, 0.010,0.014,0.01, 0.011, 0.013, 5 x <0.01, 0.01, 0.01, 0.01	0.023
Barley (grain)	11 (North EU)	0.01, 2 x <0.01, 0.02, 0.04, 0.08, 0.02, 0.04, 0.05, 0.03, 0.03	0.08
OSR (Seed)	10 (North EU)	10 x <0.01	<0.01
Maize (grain)	40 (USA)	0.038, 0.014, 0.066, 0.029, 0.057, 0.045, 0.054, 0.023, 0.065, 0.052, 0.099, 0.031, 0.088, 0.035, 0.034, 0.029, 0.023, 0.015, 0.139, 0.041, 0.209, 0.155, 0.024, 0.022, 0.017, 0.042, 0.018, <0.01, 0.045, 0.037, 0.04, 0.02, 0.018, 0.012, 0.01 <0.01, 0.069, 0.033, 0.074, 0.054	0.209
Turnip (bulb)	2 (New Zealand)	0.01, 0.01	0.01
Turnip (tops)	2 (New Zealand)	0.12, 0.06	0.12
Swedes (bulb)	2 (New Zealand)	0.07,0.01	0.07
Swedes (tops)	2 (New Zealand)	0.27, 0.15	0.27
Kale	2 (New Zealand)	0.18, 0.08	0.18
Fodder rape	2 (New Zealand)	0.15, 0.15	0.15

The highest residue level found in supervised residue trials where crops were treated directly with aminopyralid was 0.27 mg/kg in swede tops. This residue was found in

a trial where aminopyralid was applied at a rate of 30 g a.s. /ha i.e. slightly higher than the level estimated to be present based on residues in manure.

Given that as a worst case residues in crops would need to be at least 6 times higher before intakes were at the ARfD for all consumer groups it is not expected that intakes will exceed the ARfD and an effect on human health from the consumption of crops is unlikely.

### **Estimates of potential and actual dietary exposure through consumption of animal products from livestock fed grass treated with aminopyralid**

A consideration of intakes by domestic animal of residues of aminopyralid from treated grassland was made as part of the original assessment for provisional approval considered by the ACP at the meeting of 22 September 2005.

Based on this consideration and information from livestock feeding studies it was considered that residues of aminopyralid in products of animal origin are unlikely to exceed the levels given below:

milk:	0.014 mg/kg
meat:	0.01 mg/kg
fat:	0.01 mg/kg
liver:	0.014 mg/kg
kidney:	0.202 mg/kg

As part of the evaluation for provisional approval consumer intakes due to the consumption of animal products from livestock fed treated aminopyralid were calculated. All intakes were below the relevant ADI or ARfD for all consumer groups. An effect on health is therefore unlikely.

### Lowest residue values to give short term intakes at the ARfD for UK consumers

<b>Crop</b>	<b>Critical consumer group</b>	<b>Lowest residue level required to give an intake at the ARfD (mg/kg)</b>
Almonds	infant	129.3
Apples	infant	2.7
Apricots	4-6 year old	11.1
Asparagus	toddler	57.3
Aubergines	4-6 year old	10.4
Avocados	infant	8.7
Bamboo shoots	11-14 year old	154.1
Bananas	infant	3.1
Barley	7-10 year old	46.3
Beans	infant	14.2
Beans with pods	infant	51.9
Beans without pods	7-10 year old	35.3
Beansprouts	7-10 year old	65.6

Beetroot	toddler	12.4
Blackberries	toddler	24.3
Blackcurrants	4-6 year old	54.5
boiled potatoes	infant	1.8
Brazil nuts	4-6 year old	299.4
Broccoli	4-6 year old	10.5
Brussels sprouts	infant	35.6
Cabbage (head)	infant	6.0
Carrots	infant	4.1
Cashew nuts	toddler	150.8
Cauliflower	infant	4.5
Celeriac	adult	21.9
Celery	vegetarian	31.4
Cherries	4-6 year old	48.0
Chestnuts	4-6 year old	62.0
Chicory	15-18 year old	18.8
Chilli pepper	4-6 year old	152.3
Chinese cabbage	15-18 year old	10.3
Coconuts	vegetarian	151.3
Courgettes	toddler	5.6
Cress	vegetarian	688.2
Cucumbers	toddler	8.8
Dates	4-6 year old	83.0
Dried Peas	11-14 year old	39.6
Eggs	infant	20.9
Fennel	vegetarian	14.0
Figs	infant	26.7
Garlic	vegetarian	403.3
ginger	4-6 year old	362.6
Globe artichokes	adult	30.4
Gooseberries	infant	80.2
Gourd	adult	17.9
Grapefruit	toddler	3.3
Grapes (table)	toddler	4.3
Hazelnuts	toddler	428.4
Horseradish	adult	542.9
Jerusalem artichoke	vegetarian	45.7
Kidney	toddler	69.1
Kiwi fruit	toddler	7.2
Kohl Rabi	11-14 year old	19.3
Leeks	toddler	20.0
Lemons	infant	13.5
Lentils	11-14 year old	38.8
Lettuce	4-6 year old	14.6
Limes	toddler	12.9
Liver	infant	32.2
Loganberries	toddler	147.8
Lychees	15-18 year old	180.3
Maize	infant	38.6
Mandarins	toddler	4.7
Mangoes	4-6 year old	4.0
Marrows	toddler	12.2
Meat excl.poultry &	infant	22.0

offal		
Meat fat	infant	125.0
Melons	4-6 year old	3.1
Milk	infant	2.1
mushrooms	toddler	88.9
Oats	infant	82.3
Oils	4-6 year old	83.5
Olives	4-6 year old	77.7
Onions	infant	11.5
Oranges	infant	2.0
Other types of offal	infant	35.7
Parsley	vegetarian	217.1
Parsnips	infant	7.2
Passion fruit	7-10 year old	84.2
Peaches	toddler	4.7
Peanuts	toddler	89.3
Pears	toddler	3.1
Peas with pods	4-6 year old	75.3
Peas without pods	infant	31.7
Pecan nuts	vegetarian	114.1
Peppers	7-10 year old	15.8
Pineapples	4-6 year old	2.6
Pistachios	adult	97.1
Plums	toddler	8.8
Pomegranates	7-10 year old	14.9
<b>Potatoes</b>	infant	1.7
Poultry	vegetarian	22.1
Radishes	toddler	83.0
Raspberries	7-10 year old	53.3
Red currants	toddler	128.7
Rhubarb	toddler	7.0
Rice	toddler	20.6
Runner Beans	toddler	62.8
Rye	infant	41.1
Salsify	vegetarian	24.2
Spinach	4-6 year old	45.8
Spring onions	4-6 year old	56.9
Strawberries	4-6 year old	37.5
Sugar Beet	toddler	3.3
Swedes	infant	5.0
Sweet corn	toddler	6.0
Tomatoes	infant	5.4
Turnips	4-6 year old	7.2
Walnuts	toddler	172.2
Watercress	vegetarian	242.2
Wheat	4-6 year old	18.0
Yam	toddler	6.0

## 4 ENVIRONMENTAL FATE AND BEHAVIOUR ASSESSMENT

When aminopyralid was first considered by the ACP the environmental exposure assessments were based on the assumption of single annual applications of a maximum of 60 g a.s. /ha to permanent and rotational grassland. The environmental fate of secondary exposure resulting from spreading of animal manure containing aminopyralid residues back onto agricultural land was not evaluated. Assessments of the environmental fate of residues in animal manure would not normally be considered to be within the scope of Directive 91/414/EEC. However in light of the potential problems that have arisen from the use of aminopyralid it is considered appropriate to consider this secondary route of exposure in more detail here. The assessments below are based on the assumption that aminopyralid would be used on grassland used to produce hay or silage. In the current application the applicant has requested that uses be restricted to use on grassland for grazing only. However since the assessment below identifies the possibility of an increased risk to groundwater arising from application of contaminated manure to land this section is still considered to be of relevance to the current application. Taking a worst case risk assessment assuming that manure containing the highest residues from the previous use which allowed use on both grazing and fodder grassland.

In order to assess the potential scale of such a secondary exposure route in the environment reference has been made to the information supplied by the applicant relating to residues detected in manure or slurry. On the basis of the information supplied, the highest residue of aminopyralid that was detected in solid manure was measured to be 0.48 mg/kg. Although these results represented analysis of only two UK farms where manure was collected, the highest residues were measured in a farm where 75% of the first cut silage had been treated with 'Forefront' and where the animals were exclusively fed on treated silage with no other feedstuff provided. They are therefore likely to represent a reasonable worst case in terms of aminopyralid residues in manure since in many farms a lower proportion of the diet would be expected to be made up of treated silage. Residues of aminopyralid determined in slurry of five UK farms ranged from < 0.01 mg/kg (LOQ) up to 0.19 mg/kg.

The highest residues of aminopyralid detected in manure of 0.48mg/kg will be used as a worst case for the purposes of a first tier assessment. Assuming a maximum manure application rate of 50 tonnes/ha, assuming all manure contained aminopyralid residues at the highest concentration detected, this would result in an equivalent effective application rate of 24 g a.s./ha. The maximum residue level detected in slurry (i.e. 0.19mg/kg) would result in an effective application rate of 9.5 g a.s. /ha based on the same assumptions of a maximum application rate of 50 tonnes/ha. The assumption of a maximum manure or slurry application rate of 50 tonnes/ha is based on advice taken from the Defra Codes of Good Agricultural Practice for the Protection of Water, Air and Soil which recommends avoiding applying higher rates to reduce the risk of run-off and odours. Manure application rates would also be limited by the need to ensure that nitrogen application rates comply with the maximum of 250 kg N/year in accordance with the EU Nitrates Directive 91/676/EEC.

The potential secondary exposure route via spreading of contaminated manure would therefore result in a worst case effective application rate of 24 g a.s. /ha. The revised label has been developed to ensure that applications of manure are only made to agricultural grassland, and therefore the secondary exposure route should not result in any additional land being exposed that could not already be treated through the normal use of aminopyralid containing products. The secondary exposure route is therefore noted to result in an effective application rate that is within the current application rate of 60 g a.s. /ha that was considered acceptable during the original considerations of the active substance.

At the simplest level of assessment it could therefore be concluded that the existing assessment based on application rates of up to 60 g a.s. /ha is sufficient to cover the potential for secondary exposures at up to only 24 g a.s. /ha. However, two further issues would need to be considered before it could be concluded that a satisfactory assessment has already been performed.

Firstly, some consideration needs to be given to the potential increased exposure resulting from spreading of contaminated manure onto agricultural grassland that has either previously been treated with, or could be subsequently treated with aminopyralid containing products in the same year. If both a manure and a spray application were made to the same land in the same year, effective application rates could exceed the rates that have been currently assessed. Of the estimated 34 million tonnes of farm yard manure that is produced from housed cattle each year, approximately 98.2% is proposed to be used on the farm of origin. Therefore for those farms that do use aminopyralid containing products it is not unreasonable to assume that treated land could also be exposed via contaminated manure within the same year. Hence the secondary exposure route would not necessarily be addressed by the existing environmental assessments.

Secondly, it should be noted that when the use of aminopyralid was first assessed in the UK, the environmental exposure assessments assumed that up to 90% of the active substance would be intercepted by the grassland crop. This is a standard assumption based on guidance from the FOCUS groundwater group report and is considered appropriate for spray applications to well established grassland. Therefore although a total application rate of 60 g a.s./ha was assessed, for the purposes of assessing the potential for exposure in soil and subsequently exposure to groundwater, an effective soil loading rate of only 6 g a.s./ha was assumed. Such high levels of crop interception may not be appropriate for manure or slurry dependent on the method of application (e.g. broadcast compared with direct soil injection of slurry). It is therefore, possible that the secondary exposure route could actually result in greater effective soil loadings compared with the traditional spray application of the aminopyralid products.

Some consideration should also be given to the form of aminopyralid present in animal manure or slurry and the impact this has on its fate and behaviour. From the available ruminant animal metabolism studies aminopyralid was found to be excreted approximately equally in faeces and urine. Analysis of manure from a cattle feeding study indicated that aminopyralid was cleared rapidly from the animal once feeding on treated material was terminated. Bench scale manure and straw composting systems indicated that aminopyralid residues did not decline appreciably during

composting processes. In terms of bioavailability of aminopyralid residues in manure, those residues associated with digested plant material can be assumed to be most readily bioavailable. However the proportion of residues associated with undigested plant material may not be bioavailable as it is present in a form that is bound to cellulosic fractions. The applicant considered the possibility of modelling the predicted release of bound aminopyralid residues assuming simple first order reactions for the breakdown of cellulosic material and subsequent degradation of aminopyralid in soil. However a brief review of the available literature indicated that the breakdown rates of undigested plant material in manure would be highly variable and influenced by a relatively large number of parameters such as the biochemical composition of the faeces, the soil type and prevailing environmental conditions.

In the absence of any further data to elucidate the fate and behaviour of aminopyralid in manure, it is reasonable to assume that a portion of the total residue will remain bound to the plant cellulosic material for some time after spreading on agricultural land and that this portion will only be released to the environment when the plant material itself is degraded. This would be expected to reduce the immediately bioavailable fraction of the aminopyralid residues to some extent. However it cannot be excluded that a significant proportion of the residues in the manure would be available either immediately or over time and thus increase the effective environmental exposure above the level that has been previously assessed based on the spray applications alone.

From an environmental exposure point of view, the most critical area of the assessment for aminopyralid was considered to be the potential to contaminate groundwater. The concentrations predicted to occur in groundwater were very close to the 0.1 µg/l limit and only very small increases in soil exposure would be needed to result in breaches of the trigger value under the vulnerable conditions simulated by the standard FOCUS models. In the other areas of the environmental assessment larger margins of safety were encountered and any increases in soil exposure would be expected to be less critical compared with the groundwater issue. Figures provided by the applicant suggest that in 2008 aminopyralid based products were used on approximately 130,000 ha of permanent grassland (approximately 30% of all herbicide applications made to permanent grassland). Assuming that aminopyralid based products were used on approximately a third of grassland. On the basis of this scale of use it seems difficult to simply argue that the increased risk of groundwater contamination arising from the secondary exposure would not be potentially significant. It should also be noted that the potential for the groundwater leaching risk could be increased by the fact that the greatest exposure may occur in localised areas of high density of dairy, cattle or sheep farming in the UK.

Although it is not possible to exclude the potential for some increased environmental exposure arising from application of contaminated manure or slurry under certain circumstances. This secondary route of exposure would be expected to be highly variable and dependent on many factors including the proportion of aminopyralid treated material in the animal diet, application rates of contaminated manure or slurry as well as specific application methods, the characteristics of the receiving soil and the prevailing environmental conditions after application.

In the case of dairy or beef cattle grazing fields, such high aminopyralid residues over long periods would not be expected as the natural growth dilution occurring in treated fields would reduce over time. This is partially supported by the analysis of residue levels in silage cuts, with residues in the corresponding 2<sup>nd</sup> cuts much lower than initial levels. The volumes of FYM and slurry collected from dairy cattle would also only arise during housing during milking times and would clearly be much lower than would be collected during winter from permanently housed livestock.

These factors may effectively reduce the risks posed by this specific route of exposure. Overall the risks posed by sheep and cattle naturally applying contaminated manure *in situ* are likely to be much lower than would arise via semi-even coverage of large quantities of manure applied by farmers and considered in the original risk assessment

Given the specific worst case assumptions that had been made, ACP Members considered that the risks were acceptable.

Due to the theoretical risk of leaching to groundwater at concentrations approaching 0.1 µg/l, the Environment Agency confirmed that future monitoring will include analysis for aminopyralid. The applicant has confirmed that they will support this in any way possible.

The ACP raised a concern over irrigation water potentially being contaminated and causing crop damage. This is explored in more detail in Annex 2. In summary, using the sensitivity data for a wide range of crops and assuming a worst case concentration of aminopyralid of 0.1 µg/l (0.1ppb) in water, there is a 20 fold margin of safety when applied post-emergence of the most sensitive field crop (soybean). Potato crops are extensively irrigated but are half as sensitive to aminopyralid residues as soybean and thus, no problems are anticipated. Rarely, if ever, are field crops irrigated pre-emergence due to concerns over soil capping and subsequent poor development of root systems. Hence, no risks are envisaged via field irrigation.

In the specific area of glasshouse edible crops (especially grown by hydroponics as used extensively for tomato, cucumber and pepper crops) and ornamentals (especially in 'ebb & flood' systems), the use of contaminated groundwater poses a potential risk. Water for such systems can be obtained from rainwater, mains supply or groundwater, but there were no specific data on the proportion of growers that use the different water sources. Given the high costs of mains water and the large volumes required (in the region of 625,000 to 1,400,000 litres/0.1 ha of crop), growers are likely to use alternative supplies including bore holes if they have abstraction licences. Particularly sensitive crops to hormone-type herbicides in general (e.g. MCPA, dicamba and picloram) include tomato, Dahlia, Isotoma and Bidens. These are affected at levels as low as 5-10 µg/l (< 5-10ppb) of herbicide.

Aminopyralid does photolyse under aqueous conditions and the applicant claims that UV light, used to sterilise the circulating water, would remove any traces. However, relatively few nurseries and glasshouse units disinfect water via UV systems. The extent, efficacy and frequency of UV disinfection will depend on the equipment installed, the risk (disease) considerations from the water being used and the likely cost-benefit analysis.



Specific data are not available for the sensitivity of tomato to aminopyralid in hydroponics, but when seed was planted in soil containing aminopyralid, the NOEL was 0.246 ppb when assessed 21-28 days after planting. At higher concentrations the symptoms of visual injury consisted of epinasty and twisting of foliage. Aminopyralid is only weakly adsorbed to soil and thus, most would be predicted to be available in the soil water. Thus, it is possible to argue that the soil water concentration to which the roots were exposed would be much higher than 0.246 ppb which represents the total soil concentration. Conversely, the half-life is similar to the length of the experiment and this would act to reduce the concentration. The seedling stage is likely to be more sensitive than the mature plant. In conclusion, using groundwater with 0.1 µg/l aminopyralid for hydroponically-grown tomatoes presents, at best, a five-fold margin of safety and, at worst, a theoretical potential to damage tomato plants. Further details of this assessment can be found in Annex 2.

Aminopyralid has a relatively low vapour pressure ( $9.25 \times 10^{-9}$  Pa at 20°C). In wind tunnel experiments volatilisation from soil surfaces was not significant. Overall it is concluded that aminopyralid would not be expected to be present in air in significant quantities and risk via vapour in the glasshouse environment is also considered negligible.

The UK has less than 20 major tomato growers mostly in the east and south of England, well away from the major grassland areas where aminopyralid would be most used. There are also many more smaller but nonetheless significant production units around the country. No problems have been reported by these growers following agricultural use over three years, although the volume of aminopyralid sales has been building-up over this period. Treatment of non-crop land (e.g. railways, industrial sites) would occur throughout the country, but these products have yet to be launched and the area treated is likely to be much smaller than that for grassland.

It is important to note that the most vulnerable nurseries would be specialist propagators and most use mains water for this part of the crop production phase. Tomato crops post-planting are assumed to be less sensitive to the same dose of aminopyralid or other hormone type products, so this mitigates the risk to some extent.

In addition there are numerous ornamental nurseries including retail outlets such as garden centres using groundwater sources via bore-hole supplies. Whilst most of these crops are grown in proprietary compost rather than inert substrates such as rockwool, there is a possible risk they are vulnerable to damage but there are no data to assess this risk.

While there is uncertainty over the sensitivities of different plant species to aminopyralid, there is also an uncertainty around the predicted concentrations in groundwater. The FOCUSgw models and scenarios were developed for the purposes of enabling a first tier groundwater exposure assessment at EU level. Collectively the models are intended to represent an overall 90<sup>th</sup> percentile vulnerability with respect to leaching losses across the EU. However additional research has shown that the 4 UK relevant FOCUS scenarios are representative of

up to 97.8% of vulnerable groundwater situations in England and Wales. Outputs from the models represent predictions of concentrations leaving the top 1m soil layer directly under a treated crop and are not therefore intended to represent actual concentrations in any real aquifer. The whole approach can therefore be considered conservative.

Although it is not possible to exclude the possibility of individual aquifer concentrations temporarily exceeding the concentrations predicted by the FOCUSgw models, overall the FOCUS approach is considered sufficiently conservative for the purposes of UK decision-making. This is generally supported by UK groundwater monitoring data that typically shows very low incidences of exceedence of the 0.1 µg/l limit across a wide range of active substances.

To be taken into consideration is the fact that the predicted levels in groundwater are at most half that used in this 'worst case' assessment. On the other hand, there is the possibility of trace residues of other hormone herbicides in the same water. Assessment of mixtures is very complex and not performed routinely as methodology is yet to be developed and agreed. WIGRAMP has considered this issue in some detail.

## **5 ECOTOXICOLOGICAL ASSESSMENT**

In a standard ecotoxicology risk assessment there were no concerns from the proposed use of 'Forefront' and 'Mileway' with all areas showing an acceptable risk at the first tier. As a precaution a standard warning was added to the label to avoid drift onto non target plants.

The subsequent issues over residues in animal wastes have raised concerns about the risk to grassland of importance to biodiversity (Appendix 10). There is the potential for transfer of herbicide residues either in FYM or from grazing animals directly onto botanically valuable habitats which may reduce the biodiversity. Nothing is known of the quantity and rate of release of aminopyralid from cow pats or FYM applied to the grass or onto the surface of grassland. Aminopyralid is water soluble and thus, there is the possibility of lateral transfer from a cow pat. How this is affected by or compares with the activities of insects and fungi in degrading cow pats is unknown. Similarly, the impact on biodiversity of any aminopyralid residues in comparison with the effects of nutrient transfer and physical exclusion of light with a cow pat are unknown.

There is a potential risk although there are many uncertainties around the scale and nature of the risk. Two specific label warnings to minimise any risks have been agreed. One relates to the spread of potentially contaminated FYM, a risk that will be somewhat reduced in future as FYM is only to be used on the farm of origin and not transferred, either as fodder or FYM, between farms. The second relates to a three day restriction on the movement of animals from treated grassland to botanically valuable habitats to allow any aminopyralid residues to be excreted. Both will be backed up by the training required before the sale of the product and, where possible, in the management agreements of such land.

The applicant is planning to conduct tests with seed provided by Natural England to determine the sensitivity of these to a number of herbicides used on grassland. In addition, development of label recommendations for spot treatment and application via a weed wiper to reduce exposure are ongoing.

The ACP considered that aminopyralid is most likely to be used on farms with high output dairy herds where there was little chance of grazing on unimproved grassland. Where such unimproved grassland was grazed, the lower stocking densities were believed not to pose a significant risk. However, the members were keen that further work is conducted in discussions with nature conservation bodies to provide more information to better assess the risks posed.

### **Data requirement**

To remove these warnings, data will be required to demonstrate that the application of farmyard manure from animals fed on treated grassland, or the transfer of animals from treated grassland, do not have a significant adverse effect on botanically valuable grassland.

## **6 EFFICACY ASSESSMENT**

### **6.1 Forefront**

No new efficacy data were submitted to support the applicant's revised draft label (see Appendix 2). The General Information section clearly sets out the issue of aminopyralid having the potential to pass through the animal and remain in the waste potentially posing a problem for following sensitive species which are listed in the standard following crop warnings. Mention is made of the need for specific training before the product is used.

Thereafter, the warnings are designed to keep animal waste on the farm of origin, applied to grassland only and delaying any taking of fodder from treated land until the year after treatment. A specific warning is included not to supply any animal FYM to gardeners or allotment holders.

Concerns over the risks of FYM from treated grass being applied to botanically valuable habitats have also been addressed in label amendments.

The redrafted label, supported by the planned training programme, now addresses all the identified risks.

### **6.2 Mileway**

This product is for use on non-crop land against a range of weed species including Japanese knotweed and bramble. Most aspects of the efficacy of this product have been fully considered previously and do not need to be addressed here.

A series of warnings are included to avoid the removal of treated vegetation that could result in exposure of any remaining aminopyralid residues to sensitive crops (see draft label at Appendix 2). These are considered acceptable in view of the very limited risks posed by the product and the situation of use.

## Annex 2: Predicted risk from contaminated groundwater

The ACP sought further clarification on risks to plants from irrigation water. Assessing potential risks via irrigation with contaminated groundwater is not common practice for most pesticide evaluations as few actives have activity at such low doses or concentrations. In trying to assess this quantitatively a number of simple assumptions have been made below.

The simplest way to do a comparison at the first tier is probably to assume as a worst case a maximum concentration in groundwater of 0.1 µg/l. Although in practice it is expected levels will be much lower than this (PEC<sub>gw</sub> 0.004 – 0.005 µg/l) Assuming a 25mm irrigation event, this equates to 250,000 l/ha. If this contained aminopyralid at the maximum permissible level of 0.1 µg/l, this would equate to an effective application rate of 0.025g a.s. /ha. This is therefore likely to represent a reasonable worst case assessment. However it should be noted that the standard PEC<sub>gw</sub> outputs from the FOCUS<sub>gw</sub> models are intended to represent an overall 90<sup>th</sup> percentile level as an annual average concentration and individual daily peak events could temporarily exceed this annual average value.

The greatest risk to irrigated field crops is likely to come from irrigation applications made post-emergence, as irrigation pre-emergence is less common due to concerns over soil capping and subsequent poor development of root systems. Post-emergent effects studies were performed in accordance with OECD 208 and to GLP and were fully evaluated in previously in the original application for approval. The study design involved applying a formulated product containing 30g/l aminopyralid and 99g/l fluroxypyr as a spray to various species at early growth stages (typically GS 13 or 3 true leaves). The most sensitive species was soybean, with an EC<sub>50</sub> based on effects on fresh weight of 0.34 litres product/ha (equivalent to 10.2 g aminopyralid/ha). The NOEL for this most sensitive species was 0.016 litres product/ha (equivalent to 0.48 g aminopyralid/ha). Although soybeans are not a major UK crop the effect data are considered appropriate as an indicator of effects on sensitive species in the UK. In addition these effect concentrations are likely to be conservative because all effects are assumed to be due to the aminopyralid component alone and ignores any contribution from the fluroxypyr component. The exposure regime in the phytotoxicity study is likely to be comparable to exposure via irrigation in arable cropping systems. Most arable crop irrigation systems involve mobile sprinklers or raingun type systems. These would deliver the irrigation water to the crop canopy and the effects should therefore be covered by the phytotoxicity study design. These effect concentrations compare favourably with our simple worst case irrigation exposure concentration of 0.025 g aminopyralid/ha derived above and overall there appears to a margin of safety of around 20x when comparing the lowest NOEL for the most sensitive species tested (i.e. 0.48g a.s. /ha) versus the likely worst case application rate via irrigation water (i.e. 0.025g a.s. /ha). On this basis there appears to be sufficient evidence to conclude that post emergent applications of potentially contaminated irrigation water is unlikely to have an effect on UK field crops.

With regard to making a comparison between potential exposure via contaminated groundwater in glasshouse, including hydroponic, cropping systems the situation is less clear. The most relevant effect data is likely to be from the available pre-

emergence phytotoxicity tests where exposure is predominantly via root uptake during sensitive life stages. Although these appear to be performed broadly in line with OECD 208, it should be noted that they are non-GLP studies. The study design involved mixing aminopyralid into soil to ensure it was fully incorporated prior to planting seeds of various sensitive species. The lowest NOEL for damage in this study was for sugar beet and was from a soil concentration of 0.009ppb. The damage symptoms seen in the most sensitive crops included epinasty and twisted foliage. Exposure in this study is obviously not directly comparable to the hydroponic situation, since the effect study ensured even mixing in soil, whilst exposure in hydroponic systems will be via direct uptake from the irrigation water. However due to the relatively low soil sorption of aminopyralid it is reasonable to assume that the majority of residues in soil in the phytotoxicity tests will be available for uptake via the soil pore water (the aminopyralid K<sub>f</sub> values vary from 0.73 down to 0.01 indicating a strong tendency for concentrations in the soil aqueous phase to exceed the concentration sorbed to soil). Therefore in the absence of further information, it has to be assumed that exposure via soil incorporated residues is broadly comparable to exposure via hydroponic irrigation water. However it should be noted that there is a degree of uncertainty over the sensitivity of species exposed by contrasting exposure regimes such as via soil or hydroponic solutions. In addition the effect concentrations are expressed as total soil concentrations and this may not reflect the effective concentrations being taken up by plants via the soil pore water.

As a worst case assuming all water were taken from a contaminated groundwater source containing aminopyralid at the maximum acceptable concentration the concentration in irrigation water would be 0.1µg/l (or 0.1ppb). This concentration is significantly higher than the equivalent NOEL for the most sensitive species of 0.009ppb based on a total soil concentration and may therefore indicate cause for concern. However it should be re-iterated that there is uncertainty over the comparison of effects between a soil dosing phytotoxicity study versus exposure via hydroponic irrigation systems.

Since the main concern in the UK over use of groundwater in hydroponic systems appears to come from use in tomato cropping systems it is also appropriate to consider the soil NOEL available for this crop. Although tomatoes were also sensitive to aminopyralid in soil they were significantly less sensitive than the most sensitive species such as sugar beet considered above. The lowest NOEL for damage in this study for tomatoes was from a soil concentration of 0.25ppb. On the basis of the tomato effect data there appears to be a very small margin of safety between the effect concentration based on total soil loading of 0.25ppb and the worst case hydroponic irrigation solution concentration of 0.1ppb. If the highest PEC<sub>gw</sub> that was actually modelled for UK relevant groundwater scenarios (i.e. 0.054µg/l rather than 0.1µg/l) is used the margin of safety increases slightly to approximately 5. However the same uncertainties over the comparison of effects from a soil dosing study remain. On the basis of the available information we cannot fully conclude there would be no effects following irrigation with contaminated groundwater when applied via hydroponic systems.

The above assessment has considered risks posed by irrigation with potentially contaminated groundwater. Irrigation could also be made with water abstracted from surface waters, where the first tier exposure estimates indicated that concentrations

would be higher than predicted to occur in groundwater (e.g. the first tier UK spray drift calculation resulted in a PEC<sub>sw</sub> of 0.55µg/l and the first tier UK drainflow calculation resulted in a PEC<sub>sw</sub> of 0.88µg/l). However these concentrations represent the levels expected in small surface water bodies adjacent to a treated field. Such water bodies would not be expected to be routinely used for the purposes of abstraction and the dilution upon entering larger water bodies where abstraction may be made would be expected to bring concentrations in line with those assessed above based on groundwater concentrations.

### **Annex 3: Text from CRD Postcard distributed to enquirers, garden centres, the Chelsea Flower Show and allotment societies**

#### **Using Manure in your Garden or Allotment?**

It is important to check before using farmyard or stable manure that it does not contain the agricultural weedkiller aminopyralid.

Aminopyralid has been used on farms to control weeds in grassland. Where treated grass was eaten by livestock their manure may contain residues of the weedkiller.

There may still be some affected manure and, while there are no concerns for human health, its use can cause poor or distorted growth in many crops including beans, peas, potatoes and tomatoes, which will reduce harvests.

Therefore, ask the supplier to confirm that the manure does not contain aminopyralid. Stable owners may not be able to offer this assurance so be very cautious about using stable manure.

If you have already used manure and you now suspect that it might have contained aminopyralid...

If it has been used on empty beds in preparation for planting, dig or rotavate it thoroughly into the soil and leave it for several months to allow soil bacteria to break down the aminopyralid.

If it has been spread around plants, remove as much as you can as plants may be affected by any remaining manure.

Unused and removed manure is best disposed of - ask if the supplier or a local farmer will take it, or contact your local council to ask if you can dispose of it as household waste. In all cases, you must explain that it may contain residues of aminopyralid.

For more information, visit [www.pesticides.gov.uk](http://www.pesticides.gov.uk) or telephone our information team on 01904 455775 between 9:00am and 1:00pm (Mon – Fri). More advice and guidance is available from Dow AgroSciences at [www.manurematters.co.uk](http://www.manurematters.co.uk).

**Appendix 1 Draft notice of approval for 'Forefront'**

**Notice of Approval Number: 0 of 2009**

**APPROVAL AND CONSENT FOR A PLANT PROTECTION PRODUCT**

**FOOD AND ENVIRONMENT PROTECTION ACT 1985: PART III  
PLANT PROTECTION PRODUCTS REGULATIONS 2005  
PLANT PROTECTION PRODUCTS (SCOTLAND) REGULATIONS 2005  
PLANT PROTECTION PRODUCTS (BASIC CONDITIONS) REGULATIONS 1997**

Product name: Forefront

Formulation: an emulsion, oil in water formulation containing 30 g / l aminopyralid and 100 g / l fluroxypyr details of which are specified in the 'Confidential Conditions' section (Appendix 3) of this approval.

MAPP number: 14701

Approval holder: Dow AgroSciences Limited, Latchmore Court, Brand Street, Hitchin, Hertfordshire, SG5 1NH. (Registered company number: 2381612)

This approval ends: (a) 29 July 2011 for the advertisement, sale and supply by any persons  
(b) 29 July 2011 for the storage and use by any persons

Extent of Approval: Great Britain

CRD Digital Signature

(This and the attached Appendices 1 to 3 are signed by HSE for and on behalf of the Secretary of State, the Welsh and the Scottish Ministers)

Date of issue.



## **EXPLANATORY NOTES**

1. This Notice of Approval Number is ..... of 2009.
2. Ministers will publish this Notice on the website of the Chemicals Regulation Directorate of the HSE.
3. Application reference number COP 2009/00182.

## APPENDIX 1: CONDITIONS OF APPROVAL AND CONSENT

Failure to comply with the following conditions may result in revocation or suspension of approval or other enforcement action, including prosecution.

### Sale and supply:

**Packaging:** The approval holder must only place this product on the market in 5 litre polyethylene terephthalate container.

**Label:** The approval holder must only sell and supply the product with the agreed label (Co. ref.: LABEL Forefront (grazing only) 21Apr09), which is the label submitted on 21 April 2009 (HSE ref: w001266807) and label amendments as specified in Annex A to HSE's letter dated.....

### Use:

**Field of use:** **ONLY AS AN AGRICULTURAL HERBICIDE**

**User:** Professional

Crops/situations:	Maximum individual dose: (l product / ha)	Maximum total dose:	Maximum number of treatments: (per year)	Latest time of application:
Grassland (for grazing only)	2	-	1	7 days before grazing

### Operator protection:

- (1) Engineering control of operator exposure must be used where reasonably practicable in addition to the following personal protective equipment:

Operators must wear suitable protective gloves and face protection (faceshield) when handling the concentrate.

- (2) However, engineering controls may replace personal protective equipment if a COSHH assessment shows that they provide an equal or higher standard of protection.

Other specific restrictions:

- (1) Livestock must be kept out of treated areas for at least 1 week following treatment and until poisonous weeds such as ragwort have died and become unpalatable.
- (2) This product must be used with an antifoaming agent.
- (3) This product must not be applied by hand-held equipment
- (4) To protect groundwater do not apply to leys less than 1 year old.
- (5) This product must not be used on grassland grazed by animals other than cattle and sheep.
- (6) This product must not be used on grassland that will be cut for animal feed, fodder or bedding nor for composting or mulching within one year of treatment.
- (7) Users must have received adequate instruction, training and guidance in the safe and efficient use of the product and must take all reasonable precautions to protect the health of human beings, creatures and plants and safeguard the environment.

## **APPROVAL AND CONSENT FOR A PLANT PROTECTION PRODUCT**

### **FOOD AND ENVIRONMENT PROTECTION ACT 1985: PART III**

### **PLANT PROTECTION PRODUCTS REGULATIONS 2005**

### **PLANT PROTECTION PRODUCTS (SCOTLAND) REGULATIONS 2005**

### **PLANT PROTECTION PRODUCTS (BASIC CONDITIONS) REGULATIONS 1997**

Product name:	Mileway
Formulation:	an emulsion, oil in water formulation containing 30 g / l aminopyralid and 100 g / l fluroxypyr details of which are specified in the 'Confidential Conditions' section (Appendix 3) of this approval.
MAPP number:	14702
Approval holder:	Dow AgroSciences Limited, Latchmore Court, Brand Street, Hitchin, Hertfordshire, SG5 1NH. (Registered company number: 2381612)
This approval ends:	(a) 29 July 2011 for the advertisement, sale and supply by any persons  (b) 29 July 2011 for the storage and use by any persons
Extent of Approval:	Great Britain

CRD Digital Signature

(This and the attached Appendices 1 to 3 are signed by HSE for and on behalf of the Secretary of State, the Welsh and the Scottish Ministers)

Date of issue....

## **EXPLANATORY NOTES**

1. This Notice of Approval Number is ..... of 2009.
2. Ministers will publish this Notice on the website of the Chemicals Regulation Directorate of the HSE.
3. Application reference number COP 2009/00290.

## APPENDIX 1: CONDITIONS OF APPROVAL AND CONSENT

Failure to comply with the following conditions may result in revocation or suspension of approval or other enforcement action, including prosecution.

### Sale and supply:

**Packaging:** The approval holder must only place this product on the market in 5 litre polyethylene terephthalate container.

**Label:** The approval holder must only sell and supply the product with the agreed label (Co. ref.: appendix 6.1: Runway proposed label), which is the label submitted with the application on 7 November 2008 (HSE ref: w001237777) and label amendments as specified in Annex A to HSE's letter dated.....

### Use:

**Field of use:** **ONLY AS AN AGRICULTURAL HERBICIDE**

**User:** Professional

Crops/situations:	Maximum individual dose: (l product / ha)	Maximum total dose:	Maximum number of treatments: (per year)	Latest time of application:
Amenity grassland	2	-	1	-

**Operator protection:**

- (1) Engineering control of operator exposure must be used where reasonably practicable in addition to the following personal protective equipment:

Operators must wear suitable protective gloves and face protection (faceshield) when handling the concentrate.

Operators must wear suitable face protection (faceshield) and suitable protective gloves when applying by hand-held equipment.

- (2) However, engineering controls may replace personal protective equipment if a COSHH

assessment shows that they provide an equal or higher standard of protection.

Other specific restrictions:

- (1) This product must not be used on land that will be grazed by livestock.
- (2) This product must be used with an antifoaming agent.
- (3) To protect groundwater do not apply to grassland within one year of sowing from seed.
- (4) The product must not be used on airfields.
- (5) The product must not be used land where vegetation will be cut for animal feed, fodder or bedding nor for composting or mulching within one year of treatment.
- (6) Users must have received adequate instruction, training and guidance in the safe and efficient use of the product and must take all reasonable precautions to protect the health of human beings, creatures and plants and safeguard the environment.



# **FOREFRONT\***



*HERBICID*

Product Registration Number: MAPP 12765.

A water in oil emulsion containing  
30 g /litre (3.5% w/w) aminopyralid (present as 36 g/litre aminopyralid potassium)  
+  
100 g /litre (14.14% w/w) fluroxypyr (present as 144 g/litre fluroxypyr-methyl  
heptyl ester).

A foliar acting herbicide for the long term control of annual and perennial  
broad-leaved weeds in established grassland intended for grazing.

The (COSHH) Control of Substances Hazardous to Health Regulations may apply  
to the use of this product at work.

**READ DIRECTIONS FOR USE ON ATTACHED LEAFLET.**

**PROTECT FROM FROST.**

2.0/5.0 litre(s)

Dow Agrosciences Limited  
Latchmore Court, Brand Street, Hitchin, Hertfordshire. SG5 1NH.  
Telephone: Hitchin (01462) 457272 Fax: (01462) 426605  
24 Hour Emergency Telephone Number: +44 (0) 1553 761 251  
\*Trademark of Dow Agrosciences LLC.

This label is compliant with the CPA Voluntary  
Initiative Guidance.





## **SAFETY PRECAUTIONS**

### **Operator protection:**

Engineering control of operator exposure must be used where reasonably practicable in addition to the following personal protective equipment:

**WEAR SUITABLE PROTECTIVE GLOVES AND FACE PROTECTION (FACESHIELD)** when handling the concentrate.

However, engineering controls may replace personal protective equipment if a COSHH assessment shows they provide an equal or higher standard of protection.

Use of an antifoam is compulsory with this product.

**DO NOT APPLY** by hand-held equipment.

**WHEN USING DO NOT EAT, DRINK OR SMOKE.**

**WASH CONCENTRATE** from skin or eyes immediately.

### **Consumer protection:**

**DO NOT USE ON FOOD CROPS.**

### **Environmental protection:**

To protect groundwater do not apply to leys less than 1 year old.

**DO NOT CONTAMINATE WATER** with the product or its container. Do not clean application equipment near surface water. Avoid contamination via drains from farmyards and roads.

**KEEP LIVESTOCK** out of treated areas for at least 7 days or until foliage of any poisonous weeds such as ragwort has died and become unpalatable.

### **Storage and disposal:**

**KEEP AWAY FROM FOOD, DRINK AND ANIMAL FEEDING STUFFS.**

**KEEP IN ORIGINAL CONTAINER**, tightly closed, in a safe place.

**WASH OUT CONTAINER THOROUGHLY**, empty washings into spray tank, and dispose of safely.



## **IRRITANT**



## **DANGEROUS FOR THE ENVIRONMENT**

**IRRITATING TO SKIN.  
RISK OF SERIOUS DAMAGE TO EYES.  
VAPOURS MAY CAUSE DROWSINESS OR DIZZINESS.  
TOXIC TO AQUATIC ORGANISMS, MAY CAUSE LONG-TERM ADVERSE EFFECTS IN THE AQUATIC ENVIRONMENT.  
WEAR SUITABLE GLOVES AND EYE/FACE PROTECTION.  
AVOID CONTACT WITH SKIN.  
KEEP OUT OF REACH OF CHILDREN.  
IN CASE OF CONTACT WITH EYES, RINSE IMMEDIATELY WITH PLENTY OF WATER AND SEEK MEDICAL ADVICE.  
THIS MATERIAL AND ITS CONTAINER MUST BE DISPOSED OF IN A SAFE WAY.  
USE APPROPRIATE CONTAINMENT TO AVOID ENVIRONMENTAL CONTAMINATION.  
To avoid risks to man and the environment, comply with the instructions for use.**

### **IMPORTANT INFORMATION**

#### **FOR USE ONLY AS AN AGRICULTURAL HERBICIDE**

**Crops/Situations:** Established grassland intended for grazing

**Maximum Individual Dose:** 2.0 litres product per hectare

**Maximum Number of Treatments:** One per year

**READ THE LABEL BEFORE USE. USING THIS PRODUCT IN A MANNER THAT IS INCONSISTENT WITH THE LABEL MAY BE AN OFFENCE. FOLLOW THE CODE OF PRACTICE FOR USING PLANT PROTECTIONS PRODUCTS.**

## **DIRECTIONS FOR USE**

**IMPORTANT:** This information is approved as part of the Product Label. All instructions within this section must be read carefully in order to obtain safe and successful use of this product.

### **GENERAL INFORMATION**

One of the active ingredients in FOREFRONT\* is aminopyralid. In common with some other herbicides, it has the ability to pass through the digestive system and be found at trace levels in animal waste. These trace levels could be sufficient to have an impact on sensitive crops such as peas, beans and other legumes, sugar beet, fodder beet, carrots and umbelliferae, potatoes and tomatoes, lettuce and other compositae.

Ensure you have received specific training on the use of FOREFRONT before application.

Consult the manufacturer for specific advice.

### **WARNINGS**

Use of an antifoam is compulsory with this product.

FOREFRONT must only be applied to established grassland which will be grazed by cattle or sheep.

FOREFRONT must only be applied to established grassland intended for grazing in the calendar year of application. Where silage, hay or haylage is produced from this area in the following calendar year, any manure subsequently produced from animals fed on this must stay on the farm. This manure should only be spread onto agricultural grassland.

Grass treated with FOREFRONT should not be cut for hay, haylage or silage in the calendar year of treatment.

#### **Following Crops**

FOREFRONT residues in plant tissues which have not completely decayed may affect succeeding susceptible crops eg peas, beans and other legumes, sugar beet, fodder beet, carrots and umbelliferae, potatoes and tomatoes, lettuce and other compositae.

Do not plant potatoes, sugar beet, fodder beet, vegetables, beans or other leguminous crops in the next calendar year following an application of FOREFRONT.

Do not plant potatoes, sugar beet, fodder beet, vegetables, beans or other leguminous crops in the next calendar year following an application of manure from animals fed on grass treated with FOREFRONT or fodder resulting from grass treated with FOREFRONT.

Following good agricultural practice ensure that plant remains have completely decayed before planting susceptible crops.

### **Neighbouring Crops/Plants**

Avoid damage by drift onto susceptible crops, non-target plants or waterways. Do not apply directly to, or allow spray drift to come into contact with agricultural or horticultural crops, amenity plantings, gardens, ponds, lakes or watercourses.

### **Farmyard Manure/Slurry/Compost/Mulch/Dung Management**

Any accumulations of manure or slurry following grazing on treated grassland, for example from dairy herds, must stay on the farm of origin and be spread onto grassland. Under no circumstances should this manure be supplied to gardeners or allotment holders.

Aminopyralid may be present in manures derived from yards or livestock sheds where livestock have previously grazed areas treated with Forefront. Thus, do not spread such manure onto SSSI land or land in an agri-environment agreement before consulting with your adviser.

Aminopyralid in animal dung may damage botanically valuable wildlife habitats including species-rich and low-input grassland, rough grazing and wetlands. This includes land in ELS agreement where the objective is the protection or promotion of botanical diversity. Ensure that animals grazing on grassland treated with Forefront do not have access to such land unless they have spent a minimum of three days grazing on other land that has not been treated with an aminopyralid containing product.

Do not use any plant material treated with FOREFRONT for composting, mulching or any other non-agricultural purpose.

Do not use animal waste (eg manure, slurry) from animals fed on grass treated with FOREFRONT for composting or mulching susceptible crops.

### **NOTES**

Grass and weeds must be actively growing to ensure good weed control and minimal check to the grass. Therefore do not spray in drought, very hot or very cold weather conditions.

Do not roll or harrow grass for 10 days before or 7 days after application.

Do not use on crops grown for seed.

Late applications of FOREFRONT may lead to a slight leaning of the grass but this is transient and does not affect the yield of the grass.

FOREFRONT is safe to grass. Very occasionally some yellowing of the sward may occur; this is transient and quickly outgrown.

If the grass has been cut for hay or silage or grazed leave 2-3 weeks to allow sufficient regrowth to occur before spraying.

Where there is a high reservoir of weed seed in the soil and/or a historically high weed population, a programmed weed control approach may be needed involving a second application the following year.

Control may be reduced if rain falls within 1 hour of application.

Wash equipment thoroughly with water and liquid detergent immediately after use.

Finally wash out twice with water and drain.

## CLOVER MANAGEMENT

Clover will be killed by application of FOREFRONT.

Do not drill clover within 4 months of applying FOREFRONT.

Once control of target weeds has been achieved, and you have ensured that plant remains have completely decayed, clover can be re-introduced 4 months after application

## WEED CONTROL

### WEEDS CONTROLLED, RATES OF USE AND TIMING OF APPLICATION

Weeds	Rates of use litres/ha	Optimum timing of application
Broad-leaved dock	2.0	Treat when the docks are actively growing, in the rosette stage up to 25 cm high or wide
Curled dock	2.0	Treat when the docks are actively growing, in the rosette stage up to 25 cm high or wide
Creeping thistle	2.0	Treat when the thistles are actively growing, in the rosette stage up to 25 cm high
Spear thistle	2.0	Treat when the thistles are actively growing, in the rosette stage up to 25 cm high
Common nettle	2.0	Treat when the nettles are actively growing, up to 30 cm high
Creeping buttercup	2.0	Treat when the buttercups are actively growing, before flowering
Dandelion	2.0	Treat when the dandelions are actively growing, before flower bud
Common chickweed	1.0	Treat when the chickweed is actively growing, up to 30 cm wide

## OVERALL APPLICATION

The timing of application of FOREFRONT is crucial. For good results the product must be applied to actively growing weeds at the correct growth stage as detailed in the WEED CONTROL section of this label.

### Application

FOREFRONT should be applied through a tractor-mounted hydraulic sprayer provided it is in good working order and has been calibrated according to the manufacturers' recommendations.

### Mixing

Fill the spray tank half full with water and add required amount of FOREFRONT mixing well. Top up with water and continue agitation until the spray tank is full. Maintain agitation while spraying. Use the spray immediately.

**Spray Volume**

For overall application FOREFRONT should be used in a spray volume of 200 litres of water per hectare to give good coverage of the weeds.

A higher water volume of 250-300 litres of water per hectare may be required where the weed population is high and where the grass is dense at the time of application

**Spray Quality**

Apply as a MEDIUM quality spray as defined by the BCPC system.

**Dow AgroSciences Conditions of Supply**

All goods supplied by us are of high grade and we believe them to be suitable but, as we cannot exercise control over their storage, handling, mixing or use, or the weather conditions before, during or after application which may affect the performance of the goods, all conditions and warranties, statutory or otherwise, as to the quality or fitness for any purpose of our goods are excluded. No responsibility will be accepted by us or re-sellers for any failure in performance, damage or injury whatsoever arising from their storage, handling, application or use. These conditions cannot be varied by our staff or agents whether or not they supervise or assist in the use of such goods.

'Mileway' (formerly known as Runway) label



# **RUNWAY\***



*HERBICIDE*

Product Registration Number: 14017

A water in oil emulsion containing  
30 g /litre (3.5% w/w) aminopyralid (present as 36 g/litre aminopyralid potassium) +  
100 g /litre (14.14% w/w) fluroxypyr (present as 144 g/litre fluroxypyr-methyl heptyl  
ester).

For the control of a wide range of deep-rooted PERENNIAL and HERBACEOUS  
WEEDS  
on NON-CROP LAND such as motorway and railway embankments, roadsides,  
grassland of no agricultural interest, and industrial areas (but excluding airfields).

The (COSHH) Control of Substances Hazardous to Health Regulations may apply to  
the use of this product at work.

**READ DIRECTIONS FOR USE ON ATTACHED LEAFLET.**

**PROTECT FROM FROST.**

1.0/2.0/3.0 Litre(s)

**Dow AgroSciences Limited**

Latchmore Court, Brand Street, Hitchin, Hertfordshire. SG5 1NH.  
Telephone: Hitchin (01462) 457272 Fax: (01462) 426605  
24 Hour Emergency Telephone Number: +44 (0) 1553 761 251

\*Trademark of Dow AgroSciences LLC.

This label is compliant with the CPA Voluntary Initiative  
Guidance.



## **SAFETY PRECAUTIONS**

### **Operator protection:**

Engineering control of operator exposure must be used where reasonably practicable in addition to the following personal protective equipment:

WEAR SUITABLE PROTECTIVE GLOVES AND FACE PROTECTION (FACESHIELD) when handling the concentrate.

WEAR SUITABLE PROTECTIVE GLOVES AND FACE PROTECTION (FACESHIELD) when applying by hand-held equipment.

However, engineering controls may replace personal protective equipment if a COSHH assessment shows they provide an equal or higher standard of protection.

Use of an antifoam is compulsory with this product.

WHEN USING DO NOT EAT, DRINK OR SMOKE.

WASH CONCENTRATE from skin or eyes immediately.

### **Consumer protection:**

DO NOT USE ON FOOD CROPS.

### **Environmental protection:**

To protect groundwater do not apply to grassland within one year of sowing from seed.

DO NOT CONTAMINATE WATER with the product or its container. Do not clean application equipment near surface water. Avoid contamination via drains from farmyards and roads.

KEEP LIVESTOCK out of treated areas for at least 7 days or until foliage of any poisonous weeds such as ragwort has died and become unpalatable.

### **Storage and disposal:**

KEEP AWAY FROM FOOD, DRINK AND ANIMAL FEEDING STUFFS.

KEEP IN ORIGINAL CONTAINER, tightly closed, in a safe place.

WASH OUT CONTAINER THOROUGHLY, empty washings into spray tank, and dispose of safely.





## **IRRITANT**



## **DANGEROUS FOR THE ENVIRONMENT**

**IRRITATING TO SKIN.  
RISK OF SERIOUS DAMAGE TO EYES.  
VAPOURS MAY CAUSE DROWSINESS OR DIZZINESS.  
TOXIC TO AQUATIC ORGANISMS, MAY CAUSE LONG-TERM ADVERSE EFFECTS IN THE AQUATIC ENVIRONMENT.  
WEAR SUITABLE GLOVES AND EYE/FACE PROTECTION.  
AVOID CONTACT WITH SKIN.  
KEEP OUT OF REACH OF CHILDREN.  
IN CASE OF CONTACT WITH EYES, RINSE IMMEDIATELY WITH PLENTY OF WATER AND SEEK MEDICAL ADVICE.  
THIS MATERIAL AND ITS CONTAINER MUST BE DISPOSED OF IN A SAFE WAY.  
USE APPROPRIATE CONTAINMENT TO AVOID ENVIRONMENTAL CONTAMINATION.  
To avoid risks to man and the environment, comply with the instructions for use.**

### **IMPORTANT INFORMATION.**

**FOR USE ONLY AS A HORTICULTURAL/INDUSTRIAL HERBICIDE**

<b>Crops/Situations:</b>	Amenity grassland
<b>Maximum Individual Dose:</b>	2.0 litres product per hectare
<b>Maximum Number of Treatments:</b>	One per year
<b>Other Specific Restrictions:</b>	Do not use RUNWAY on airfields.

**READ THE LABEL BEFORE USE. USING THIS PRODUCT IN A MANNER THAT IS INCONSISTENT WITH THE LABEL MAY BE AN OFFENCE. FOLLOW THE CODE OF PRACTICE FOR USING PLANT PROTECTION PRODUCTS.**

## **DIRECTIONS FOR USE**

**IMPORTANT:** This information is approved as part of the Product Label. All instructions within this section must be read carefully in order to obtain safe and successful use of this product.

### **WARNINGS**

Use of an antifoam is compulsory with this product.

Avoid damage by drift onto susceptible crops, non-target plants or waterways. Do not apply directly to, or allow spray drift to come into contact with agricultural or horticultural crops, amenity plantings, gardens, ponds, lakes or watercourses.

**SENSITIVE PLANTS** may be harmed by residues of RUNWAY\* in soil and treated vegetation. Do not apply RUNWAY on or adjacent to soil which may be used as garden top-soil, potting soil, etc. or to grass which may be cut and used as mulch or for compost for horticultural or garden crops. Do not use cuttings from treated grass for mulching or composting.

Cut treated grass should not be removed from site, or used for animal feed, animal bedding, composting or mulching.

Treated grass must not be used for grazing.

On level ground there is negligible lateral movement but do not apply RUNWAY around desirable trees or shrubs or where their roots may take up a lethal dose, care should be taken on slopes to prevent leaching into areas where desirable shrubs, etc are present.

### **NOTES**

Grass and weeds must be actively growing to ensure good weed control and minimal check to the grass. Therefore do not spray in drought, very hot or very cold weather conditions.

Where a broadcast application is made to a high cover of Japanese knotweed and bramble, in season control may be variable. Control will be improved if a spot treatment is used for these target weeds. Where there is a high reservoir of weed seed in the soils and/or a historically high weed population, a programmed approach may be needed involving a further application in the following year.

Do not use on grass less than one year old.

Do not use on crops grown for seed.

Applications of RUNWAY may lead to a slight leaning of the grass but this is transient.

RUNWAY is safe to grass. Very occasionally some yellowing of the sward may occur; this is transient and quickly outgrown.

To allow maximum translocation of RUNWAY to the roots do not cut grass for 7 days after application.

Clover will be killed by application of RUNWAY.

Control may be reduced if rain falls within 1 hour of application.

Wash equipment thoroughly with water and detergent immediately after use.

### **WEED CONTROL**

### **WEEDS CONTROLLED, RATES OF USE AND TIMING OF APPLICATION**

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\* Trademark of Dow AgroSciences LLC

<b>Weeds</b>	<b>Rates of use litres/ha</b>	<b>Optimum timing of application</b>
Broad-leaved dock	2.0	Treat when the docks are actively growing, in the rosette stage up to 25 cm high or wide
Curled dock	2.0	Treat when the docks are actively growing, in the rosette stage up to 25 cm high or wide
Creeping thistle	2.0	Treat when the thistles are actively growing, in the rosette stage up to 25 cm high
Spear thistle	2.0	Treat when the thistles are actively growing, in the rosette stage up to 25 cm high
Common nettle	2.0	Treat when the nettles are actively growing, up to 30 cm high
Creeping buttercup	2.0	Treat when the buttercups are actively growing, before flowering
Dandelion	2.0	Treat when the dandelions are actively growing, before flower bud
Mugwort	2.0	Treat when the mugwort is actively growing, before flowering
Japanese knotweed	2.0	Treat when the Japanese knotweed is actively growing
Ragwort	2.0	Treat when the ragwort is actively growing, in the rosette stage up to 20 cm high
Bramble	2.0	Treat when the bramble is actively growing,

## **TIMING OF APPLICATION**

The timing of application of RUNWAY is crucial. For good results the product must be applied to actively growing weeds at the correct growth stage as detailed in the WEED CONTROL section of this label.

## **APPLICATION**

### **Broadcast Treatment**

RUNWAY should be applied through a hydraulic sprayer provided it is in good working order and has been calibrated according to the manufacturers' recommendations.

### **Mixing**

Use of an antifoam is compulsory with this product.

Fill the spray tank half full with water and add required amount of RUNWAY mixing well.

Top up with water and continue agitation until the spray tank is full. Maintain agitation while spraying. Use the spray immediately.

### **Spray Volume**

For overall application RUNWAY should be used in a spray volume of 200 litres of water per hectare to give good coverage of the weeds.

A higher water volume of 250 - 400 litres of water per hectare may be required where the weed population is high and where the grass is dense at the time of application

### **Spray Quality**

Apply as a MEDIUM quality spray as defined by the BCPC system.

### **Spot Treatment**

For localised treatment using a suitable lance from a knapsack or tractor mounted sprayer use a solution of 100 ml RUNWAY per 10 litres of water. The weeds should be thoroughly wetted with the spray solution but spraying until "run-off" will decrease activity. The use of flood jets is recommended to prevent drift. Care should be taken to avoid local overdosing.

### **Dow AgroSciences Conditions of Supply**

All goods supplied by us are of high grade and we believe them to be suitable but, as we cannot exercise control over their storage, handling, mixing or use, or the weather conditions before, during or after application which may affect the performance of the goods, all conditions and warranties, statutory or otherwise, as to the quality or fitness for any purpose of our goods are excluded. No responsibility will be accepted by us or re-sellers for any failure in performance, damage or injury whatsoever arising from their storage, handling, application or use. These conditions cannot be varied by our staff or agents whether or not they supervise or assist in the use of such goods.

## **APPENDIX 3: THE GRASSLAND SECTOR**

### **OVERVIEW**

There are more than 10,000,000 ha of grassland in the U.K. of which approximately 6,000,000 hectares is described as managed grassland.

Annually 650,000 hectares receive a herbicide treatment. 70% of this treated area (450,000 hectares) is permanent grassland, i.e. grass over 5 years old.

The key target weeds in permanent grassland are perennial weeds such as docks, nettles, thistles. These weeds have been proven to have a direct effect on grass productivity, and in the case of thistles there are anecdotal associations of links with the orf (a disease predominantly of sheep).

### **AMINOPYRALID USE IN PERMANENT GRASSLAND**

Forefront and Halcyon (aminopyralid + fluroxypyr), Pharaoh (aminopyralid + triclopyr) and Pro-Banish (aminopyralid) were approved for professional use in permanent grassland. Banish (aminopyralid) was approved for use in the amateur market in grassland areas such as paddocks, grazed fields or fields intended for cutting. To date, only Forefront, Pharaoh and Pro-Banish have been commercialised.

Aminopyralid products were developed to meet the key needs of grassland farmers. They are effective products, used at one rate for all weeds, which offer extremely high levels of control in the season of use with results often seen into the following year, reducing the need for regular or repeat applications. They also have a short cutting/grazing interval of 7 days.

In 2008 aminopyralid products were used on approximately 130,000 hectares of permanent grassland, which accounts for approximately 30% of all herbicide applications made to permanent grassland.

Dairy farmers typically manage grassland more intensively, and use herbicides on a greater percentage of their grassland, than other farm types.

## Appendix 4

### **MANURE IN PERSPECTIVE**

#### **Manure Production**

Census data for 2008 shows a grassland area of 11.7 million hectares. According to the 2005 PUSG Grassland pesticides usage surveys, 6.3% of this area is sprayed with herbicides. Included in this area are 22,529 hectares sprayed with glyphosate. If this area is removed then 713,631 hectares are sprayed which is 6.1% of all grassland:

Grass type	2008 UK census data	2005 estimates of area treated with herbicides CSL & DARDNI	% of crop sprayed with pesticides
permanent grassland	5,977,000	502,423	8.4%
rough grazing	4,333,000	34,793	2.7%
temporary grassland	1,412,000		
New leys <1 yr	124,600	90,000	72.2%
Temporary grassland > 1 yr old	1,287,400	108,944	8.5%
<b>Total Area of grassland</b>	<b>11,722,000</b>	<b>736,160</b>	<b>6.3%</b>

Notes: DARDNI data based on grazing ground - added to permanent pasture above and silage / hay ground - added to temporary grassland

The total amount of manure that is generated and collected can be calculated as follows:

Head of cattle > 1 yr in UK	8,590,000
Amount of manure (kg / day) created per day from a typical beef / dairy animal > 1 yr (average 500kg weight)	44
No of days of housing period (assumes 6 months)	180
Total manure production (tonnes) during housing period	68,032,800

The amount of manure from housed systems that is either slurry or FYM (higher DM component) has been estimated as follows:

Manure type	Volume - tonnes	Volume - %
Amount that is slurry	34,016,400	50%
amount that is FYM	34,016,400	50%

Further studies of manure corroborate these figures. The quantity of manure generated as defined in the British Survey of fertiliser practice is as follows:

Manure type	All Volume - tonnes	Exported volume - tonnes used elsewhere	Exported volume - % used elsewhere
Cattle FYM	33,800,000	600,000	1.8%
Cattle slurry	34,300,000	200,000	0.6%
Manure type		Imported volume - tonne bought on to farm	Imported volume -% bought on to farm
Cattle FYM		1,400,000	4.1%
Cattle slurry		100,000	0.3%

The analysis indicates that just 1.8% of all farm yard manure (FYM) leaves the farm from which it is generated i.e. a sum of 600,000 tonnes.

DAS assume that only the more productive grassland i.e. permanent grassland and temporary grassland older than 1 year but less than 5 years old would be used to generate forage for housed animals and taking into account that one third of this area is used for forage and fodder, then there are approximately 2,421,000 hectares of grassland used to generate forage and fodder. CSL statistics indicate that of the productive grassland 513,864 hectares are sprayed with herbicides. This is 7% of the available total. So it can be concluded that 7% of the manure that is subsequently generated comes from grassland that is sprayed with herbicides.

Assuming that one third of the grassland area sprayed with herbicides containing aminopyralid, then at most 2.3% of manure might contain aminopyralid residues

Cattle FYM is the most obvious route by which manure can leave the farm and end up on gardens or allotments. The data above indicated that only 1.8% of cattle FYM leaves the farm (600,000 tonnes). So if 2.3% of that quantity might contain aminopyralid, then the total potential amount of FYM leaving farm that might contain aminopyralid is 13,800 tonnes. As a percent of all manure generated from a 6 month housing period this is 0.02%.

The other interesting point is that the import data suggests that 1,400,000 tonnes of manure arrive on a farm that is different to where it was produced.

The amount then that actually goes into allotments and gardens is thus expected to be very small.

### Additional Information

Application of manure to crop and grassland management type:

% area of crop receiving an organic manure application		% area of grass management type receiving an organic manure application	
All Tillage	18%	All cut for hay	27%
Forage Maize	87%	All cut for silage	55%
Grassland < 5yrs	45%	All cut for grazing	36%
Grassland 5yrs and older	39%		

### References:

Area needed to apply max 250kgs N / ha

[http://www.defra.gov.uk/corporate/regulat/forms/agri\\_env/nvz/manureplan.pdf](http://www.defra.gov.uk/corporate/regulat/forms/agri_env/nvz/manureplan.pdf)

Amount of excreta / day:

<http://www.crosscompliance.org.uk/cms/assets/Uploads/PDFs/Making-Better-Use-of-Livestock-Manures-2001.pdf>

<http://www.defra.gov.uk/farm/environment/land-manage/nutrient/pdf/bsfp2007.pdf>

Pesticide Usage statistics:

<http://www.csl.gov.uk/newsAndResources/resourceLibrary/articles/puskm/grassland2005.pdf>

<http://www.afbini.gov.uk/pusg-pesticide-usage-on-grassland-and-fodder-crops-ni-2005.pdf>

Equine statistics:

<http://www.beta-uk.org/>

## **APPENDIX 5: COMPLAINT HISTORY**

In 2005 (prior to the launch of aminopyralid in 2006) Dow AgroSciences (DAS) received 24 complaints relating to its grassland product range. Of these, 23 related to efficacy and one was a perceived problem with a formulation quality. This represents a typical level of complaints, and nature of complaint, which would be expected in a year.

In 2006 when Forefront was launched, a total of 26 complaints were received of which 16 related to Forefront; 14 related to efficacy and 2 to leaning and yellowing which are transient symptoms that may occur and are identified on the label.

In 2007, 37 complaints were received of which 22 related to Forefront. Fifteen of these related to efficacy and 7 reported injury to potatoes, all in the arable sector. Six of the injury reports related to use of manure/slurry and one related to following crop injury. In all 7 cases it was established that label advice and restrictions had not been followed.

As a result of the crop injury complaints DAS instigated an extensive awareness campaign through the autumn and winter of 2007 and into the spring of 2008. This involved activities such as press articles, advisor training and communications at farmer and advisor level. Updated technical literature and bottleneck-collar cards were produced for the 2008 season and market research in the form of a post-Forefront Use survey was undertaken.

In 2008 the number of arable complaints has reduced considerably as a result of the awareness campaign undertaken in 2007. To date (September 2008) 13 Forefront related complaints have been received from the agricultural sector:

- 9 cases relate to efficacy
- 4 cases are associated with damage to potato crops:
  - 1 multiple herbicides implicated e.g. SU reddening
  - 1 from farm that neither uses herbicides at all or imports grass
  - 2 relating to prior manure use. Investigations on-going

In addition to these, one farmer requested support from DAS in anticipation that he may receive complaints following his supply of manure to allotment holders.

A summary of the investigations into the potato complaints can be found in Appendix 5.1.



## **APPENDIX 5.1: OVERVIEW OF POTATO COMPLAINT INVESTIGATIONS UNDERTAKEN IN 2007**

During spring/summer 2007 Dow AgroSciences (DAS) investigated ten situations where damage had been recorded in potato crops and there was a potential association with aminopyralid.

Of these ten complaints, seven were associated with Forefront (aminopyralid + fluroxypyr).

Of the seven associated with Forefront all involved the application of manure or slurry applied to ground intend for growing potatoes.

One situation involved manure and following crop, i.e. the potato ground had previously been grass that had been treated with Forefront, and the manure applied had been derived from the silage obtained from the treated grass.

Five of the investigations are more detailed and of these three were Farm Yard Manure, one slurry of high Dry Matter and one liquid slurry.

Overall damage in potatoes was recorded when the time between ploughing in the FYM/slurry and planting potatoes was very short - from one day prior to planting to 3-4 weeks prior to planting, thus not leaving sufficient time for plant remains to completely decay before planting, or sufficient time between ploughing in and planting as specified by label warnings. See Table 1.

It was apparent from DAS investigations that practices around potatoes are “short”: Short time between applying slurry and planting, very short time (days) between ploughing and planting. There are unusual practices of keeping cattle on field over winter, not ploughing, then planting potatoes, potato grower and manure spreader not always the grass farmer, potato grower and manure spreader do not read label and often have never seen it.

It was evident that a communication was needed direct to the potato growers and Manure movers as well as Grassland Farmers and this was undertaken in 2007-2008 communication plan.

**Table 1: Warnings on the 2006 Forefront label**

<p><i>FOREFRONT residues in plant tissues (including manure) which have not completely decayed may affect succeeding susceptible crops eg peas, beans and other legumes, carrots and umbelliferae, potatoes and tomatoes, lettuce and other compositae. Therefore do not plant susceptible crops within 3 months of ploughing up or destroying grassland previously treated with FOREFRONT.</i></p> <p><i>Do not use any plant material treated with FOREFRONT for composting or mulching.</i></p> <p><i>Do not use manure from animals fed on crops treated with FOREFRONT for composting.</i></p> <p><i>Following good agricultural practice ensure that plant remains have completely decayed before planting susceptible crops</i></p>
--

### **Individual Complaint Summaries**

#### **No. 1**

Planted potatoes within 3 months of destroying previous crop in contravention of label warnings.

#### **No. 2**

Manure from animals fed on aminopyralid treated silage was still present i.e. had not decayed when the potato crop was planted in contravention of the label warnings.

**No. 3**

Analysis of soil, foliage and tubers shows aminopyralid in tubers only at <0.01 ppm. Not detected in good areas.

Analysis details:

Specimen Reference Number (CSR)	Originators Reference			Result mg/kg	
3674-001	Potato Plant Material	Untreated		ND	
3674-002	Soil	Good		ND	
3674-003	Potato Plant Material	Treated		<0.01	
3674-004	Soil	Bad		<0.01	
3674-005	Plot A	Potato Foliage	28 Jun 07	ND	
3674-006	Plot A	Potato Tubers	28 Jun 07	ND	
3674-007	Plot A	Top 25 cm	Soil	28 Jun 07	ND
3674-008	Plot A	25 cm to 50 cm	Soil	28 Jun 07	ND
3674-009	Plot A	50 cm to 75 cm	Soil	28 Jun 07	ND
3674-010	Plot B		Potato Foliage	28 Jun 07	ND
3674-011	Plot B		Potato Tubers	28 Jun 07	<0.01
3674-012	Plot B	Top 25 cm	Soil	28 Jun 07	ND
3674-013	Plot B	25 cm to 50 cm	Soil	28 Jun 07	ND
3674-014	Plot B	50 cm to 75 cm	Soil	28 Jun 07	ND

Manure from animals fed on aminopyralid treated silage was still present i.e. had not decayed when the potato crop was planted in contravention of the label statement

**No. 4**

Samples taken soil plant tuber - analysed <0.01mg/kg tuber and plant:

Specimen Reference Number (CSR)	Originators Reference	Result mg/kg
Samples that arrived at laboratory on 25 July 2007		
3674-015	Healthy Potato Plants	ND
3674-016	Healthy Potato Tubers	ND
3674-017	Healthy Top 25cm soil	ND
3674-018	Healthy 25cm - 50cm soil	ND
3674-019	Healthy 50cm - 75cm soil	ND
3674-020	Affected Potato Plants	<0.01
3674-021	Affected Potato Tubers	<0.01
3674-022	Affected Top 25cm soil	ND
3674-023	Affected 25cm - 50cm soil	ND
3674-024	Affected 50cm-75cm soil	ND
Samples that arrived at laboratory on 23 August 2007		
3674-025	22/08/07 complaint Field Broster 1 (affected) - Potato Tubers	<0.01

Manure from animals fed on aminopyralid treated silage was still present i.e. had not decayed when the potato crop was planted in contravention of the label statement

**No. 5**

Not enough detail to be certain but probably caused by manure that had not decayed before the potatoes were planted patches could coincide with area where the manure was heaped before spreading.

**No. 6**

Not a formal complaint –more a request for information.

**No. 7**

Information limited as not a formal investigation just a query.

**No. 8**

Symptoms presented were more likely to be SU (sulphonyl urea) – recommended he obtain record of spraying for the spray tank.

## **APPENDIX 6: ALLOTMENT COMPLAINT REVIEW**

### **CHRONOLOGY**

In the second week of May 2008 Dow AgroSciences (DAS) received the first enquiry from an allotment holder, with the second case being reported from the same site in the last week of May.

During early June there was a sharp increase in the number of enquiries, which levelled out in early July and reduced considerably following revised website information. There were brief resurgences shortly following articles in publications, or radio programmes.

### **GEOGRAPHY**

Enquiries have been received from people across the country, with crop-effect hotspots being the Birmingham M5/M6 corridor, Cheltenham/Gloucester, West London and Yorkshire.

A small number have been received from Scotland and the Channel Islands, but none from Northern Ireland.

### **ENQUIRY ANALYSIS**

A breakdown of enquiries as of September 2008 was as follows:

- 20 crop-effects enquiries from identified use of Forefront
- 100 enquiries from people with appropriate crops and symptoms, but no identified use of Forefront
- 100 e-mails where no claims of crop effects have been made, but authors expressed their concern about this situation, company ethics, regulatory system, etc
- 80 general enquiries from non-affected people such as journalists, advisors, compost manufacturers, laboratories
- The majority of people contacted DAS on only one occasion. However some people contacted DAS a number of times. Much information was posted on internet chatrooms which led to the perception of an escalating problem. A number of e-mails were copied to Members of Parliament and agencies such as the FSA.
- Of the 120 possible cases approximately 50 are related to agricultural manure, 65 to equine/small holdings and 5 to compost bought from garden centres
- Where a direct link can be made to an application of aminopyralid, half of these cases relate to one or two farmers
- Where testing occurred, no, or trace levels, of aminopyralid were found

The following information is the situation to-date (November 2008).

DAS has received approximately 425 individual e-mails and 250 telephone enquiries relating to aminopyralid in manure and crop symptoms.

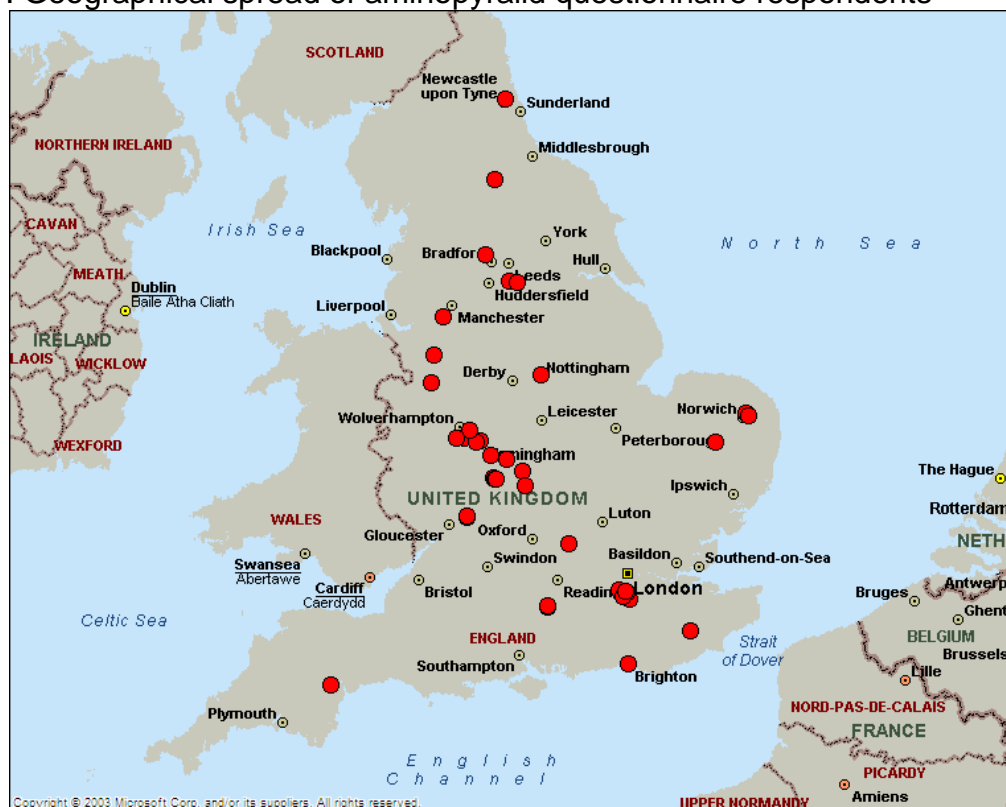
In the allotment and garden sector, there are approximately 135 individuals who appear to be genuinely affected i.e. from the information they initially supplied they had crop phytotoxicity symptoms consistent with those caused by a hormone herbicide and a range of crops affected consistent with the selectivity pattern of aminopyralid.

The 135 individuals were contacted by DAS via an e-mail questionnaire to gain further details. To-date 55 replies have been received and these are detailed in Appendix 6.1.

Data in Appendix 6.1 was supplied by the individuals involved and as such DAS cannot guarantee its accuracy. A summary of the data is as follows:

- 26 cases relate to cattle manure, 22 to horse manure, 5 to manufactured compost and 2 people did not know what they used.
- All growers have made the assumption that their crop symptoms are linked to aminopyralid. When asked whether they have they been able to trace back to an actual application, 19 people say they can.
- Most people have not given details of the manure-producing farm. 3 farms have been named twice. There are 5 cases of compost – all from the same manufacturer.
- 3 people say they have had samples positively analysed for aminopyralid.
- 33 people say they still have manure.
- Amounts of manure vary from “one barrow full” to several tonnes.
- Approximately 100 tonnes of manure is still stacked.
- Of the 100 tonnes 72 tonnes are in 3 sites
- Several respondents are under the impression that aminopyralid will degrade in the manure heap. DAS is ensuring that these people understand the need to incorporate into the soil for breakdown to occur.
- Geographically the respondents are spread throughout England with a cluster in the West Midlands and one in London (see Figure 1 below). (Of the 55 replies received 10 did not provide details of their location).

Figure 1: Geographical spread of aminopyralid questionnaire respondents



## **ACTION PLAN**

All 135 individuals will be contacted again. The objective of this further communication will be to:

1. Obtain details from those that did not reply the first time.
2. Explain that manure in manure heaps is not safe to use.
3. Explain that aminopyralid must be incorporated into soil to breakdown.
4. Offer to collect and dispose of the manure.

This e-mail will be sent on or before 20 November 2008.

Where individuals would like their manure removed DAS will either collect it using a trailer for small amounts (<1.5 tonnes) or in the case of larger amounts provide a skip. In both cases the manure will be disposed of in landfill using the same arrangements used for crop destruct trials.

The objective is to remove the manure from those people who request this option before the end of 2008.

## **APPENDIX 6.1 ALLOTMENT QUESTIONNAIRE RESPONSE SUMMARY**

	Q2	Q3	Q4	Q10
Number	What is your situation, e.g. allotment, garden or other?	Which crops have been affected?	What type of manure did you have - was it cattle muck, or from horses?	If you still have manure, how much do you have?
1	Allotment	Veg	-	-
2	Polytunnel in garden.	Veg	Cattle	4 tons.
3	Allotment	Veg	Cattle	n/a
4	Allotment		Horse	
5	Allotments	Veg	Cattle.	Only about a barrowful.
6	Allotment	Veg	Horse	
7	Garden	Veg	Horse	approx 3 cubic meter
8	Farm	Veg	Cattle	None stacked but plenty covering approximately 0.1 hectare.
9	Garden	Veg	Cattle	n/a
10	Allotment	Veg	Cattle	Approx 4 barrow loads
11	Allotment	Veg	Cattle	Almost none
12	Garden and vegetable parch	Veg	Cattle	Only small amounts remaining
13	Allotment	Veg	Horse	half the load of manure - 12 cubic feet
14	Garden	Veg	Horses	15 bags or so
15	Allotment	Veg	Cattle	Unsure
16	Garden	Veg	Horse	We still have several cubic metres
17	Allotment	Veg	Cattle	
18	Allotment	Veg	Cattle	15 barrow loads approx
19	Allotment	Veg	Horse	Eight square yards.
20	Small holding	Veg	Horse	tons and tons
21	Allotment	Veg	Horse/cattle	Only a small amount.
22	Garden	Veg	Cattle	Approx. 3 cubic yards
23	Allotment	Veg	Horse/cattle	
24	Allotment	Veg	Cattle	Approximately 1 ton, the adjoining plot has 3 tons
25	Garden	Veg	Cow manure.	Manure
26	Garden (Greenhouse)	Veg	Horse	n/a
27	Allotment	Veg	horses	Difficult to say how much we have left, possibly as much as a couple of tons.
28	Allotment	Veg	Horse	still producing manure
29	Allotment	Veg	Horse	Approximately five large skip loads.
30	Garden	Veg	Not known	None
31	Allotment	Veg	Cattle	A few clumps
32	Allotments	Veg	Cattle	about 30 cubic yards
33	Allotment	Veg	horse	n/a
34	Allotment	Veg	Manure - cattle muck	Still have 80% of £25 load
35			Compost	
36			Compost	
37			Horse	
38			Horse	5 bags
39	Allotment	Veg	Horse	relates to 2007
40	Allotment	Veg	Cattle	Pile 4'x 4'x3'
41	Allotment	Veg	Cattle	
42	Small holding	Veg	Alpaca	Some
43	Garden	Veg	Horses	about 6 bags
44	Allotment and glasshouse bed.	Veg	Farmyard muck.	Between us about 1.5 tons
45	Garden	Veg	Horse	n/a
46	Allotment	Veg	Cattle	5 or 6 barrow loads
47	Allotment	Veg	Cattle	4 or 5 wheelbarrow loads
48	Allotment	Veg	Cattle	About half the load originally bough
49	Home vegetable plot	Veg	Horse	A cubic metre or two, in two separate heaps
50	Allotment	Veg	Cattle	1 ton stacked and approximately another 2 tons on site
51	Allotment	Veg	Cattle	About half the load originally bought
52	Garden	Veg	Horse	Have about a cubic metre left.
53	Field	Veg	Horse	10 barrow loads
54	allotment	Veg	Horse	None
55	Allotment.	Veg	Horse	

## **Appendix 6.2: Stewardship report**

Report of AP consultancy November 08 to March 09

A company was approached by Dow AgroSciences in November 2008 to assist in the stewardship of aminopyralid. An initial meeting on the 14<sup>th</sup> November discussed the issues and agreed that the removal of manure from allotments was the first priority.

### **Manure Removal**

It was Dow's wish that the manure should be removed from the agricultural system; the company contacted a number of waste removal companies capable of removing large quantities of manure and disposing to registered landfill sites. Sita, a national waste disposal company agreed that they could lift and dispose of skip sized quantities of manure but stated that landfill sites would not accept ad-hoc disposal by small contractors.

Dow AgroSciences received some 400 complaints from gardeners and allotment growers via e-mail and telephone. In only 130 could aminopyralid implication be substantiated. All 130 people were contacted by Dow and asked what quantity of manure did they have and whether they wished to have it removed. Only 35 replied positively.

On 12<sup>th</sup> January the company contacted these 35 gardeners via e-mail with specific details for removal of these there were only 11 replies of which only 5 wished to take up Dow's offer for removal. With such a low number, and relatively small amounts of manure (largest estimated at 3 tonnes), it was decided that a national scheme the manure collection was not required and the wishes of the allotment holders was best served by contracting local farmers to collect and apply the manure to their fields within the product recommendation.

Of the 5 sites expressing a wish to have manure collected, the company visited 3.

The first contact was not an allotment holder but a small holder who wished to have grass clippings removed after applying aminopyralid to their own land, this fell outside Dow's remit and would not be collected.

At the second allotment site the secretary decided that there was only a small amount to be removed, that they preferred to use the manure on areas that would not put crops at risk. They decided not to have the manure removed.

The third site did have a small amount of manure that the owner wished to be collected.

The other sites, though not visited were telephoned and they verified that they had manure that they wished to be collected.



To date manure has now been removed from 2 sites.

And presently awaiting contact details for a third site

With the removal of manure from gardens and allotment holders the following actions were taken to minimise the amount of aminopyralid containing manure that could be delivered to gardens and allotments in 2009.

### **Allotment Societies**

There is a vast number of private allotment societies in the UK, but most are affiliated to the National Society of Allotment and Leisure Gardeners. This organisation posted a web based update, provided by the company, on the 12 March. Additionally to NSAG, the Scottish Allotments and Gardens Society have agreed a direct link to manurematters from their website, [www.sags.org.uk](http://www.sags.org.uk).

### **Equestrian Centres**

To reduce the risk of manure containing aminopyralid reaching and or moving from stables to allotments, 30 equestrian supply companies were contacted via e-mail on the 25 January 2009. The aim of the e-mails was to highlight the issue and direct companies to the ManureMatters web site.

### **Composters**

With manure presently on farm that may contain aminopyralid, the major composters, were emailed on 23 January. As a follow-up all were contacted by phone to ensure that they took relevant precautions to source farm yard manure that did not contain aminopyralid. The Association for Organics Recycling, the composters' industry association was contacted by phone which agreed to update their members and make them aware of Manurematters.

### **Blogs**

There are blogs negatively highlighting this issue. The company has sent letters to a number of blog/websites but only on Landscapejuice and Up at the Big House blog were they published (<http://www.landscapejuice.com/2008/08/aminopyralid-su.html>) (<http://the-gardener.blog.co.uk/tags/aminopyralid/>)

### **Gardening Magazines**

To maintain and raise awareness within the wider gardening arena the following magazines were sent e-mails for publication in the letters section.

- Gardener's World
- Amateur Gardening
- Grow Your Own – *letter relating to manure article March issue*
- Kitchen Garden
- Garden Answers
- Small Holder

### **Equine Magazines**

Similar letters were sent to:  
Your Horse  
Horse and Rider

Equine Forums

Article published on Horse and Hound forum (Appendix).

Presently the company is maintaining a watching brief on various allotment/garden/equine blogs or web-sites

Responses to Manurematters web-site are directed to the company, to date there have only been 3 e-mails. One with Equiad, selling advertising space and two with requests for the testing process, and one stating that the numbers of allotments/gardeners involved is greater than Dow's estimation.

Summary

Despite a late start, manure has substantially been removed from allotments, allotment holders/gardeners have been informed of take care in ordering this year's manure, the equine industry and composters are aware of the need to know the provenance of any hay or haylage imported. Blogs do have a more balanced input of comments.

## **APPENDIX 7: RESIDUES OF AMINOPYRALID IN PLANTS, ANIMALS AND ANIMAL WASTE**

Metabolism of aminopyralid in plants (data point IIA 6.1)

The metabolism of aminopyralid has been studied in both grasses (Ref. 1) and wheat (Ref. 2) and the studies are summarized in the DAR.

In the grass study, the fate of 14-C labelled aminopyralid was studied at a rate of 360 g ae/ha in three important pasture grass species: Big Bluestem (*Andropogon gerardii*), Perennial Ryegrass (*Lolium perenne*), and Guinea grass (*Panicum maximum*). The residues found in samples collected 21 days after treatment were extensively characterized. Minimal metabolism was observed, with residues consisting of only parent aminopyralid and conjugated materials. During the characterization process, sequential extraction procedures were used to determine the nature of the conjugated residues. Based on this information, the eventual disposition of the residues as freely available or conjugated with cellulose can be inferred. From neutral and acidic solvent extraction, an average of 97% of the total radioactive residue (TRR) was extracted. Upon chromatographic characterization of the neutral extract, about 25% TRR was found to be unchanged parent material. The non-parent peaks from the neutral extracts were further treated with acid and base which resulted in the release of additional parent aminopyralid. The acid extracts also contained parent material and hydrolysable conjugates (75% TRR). It can be postulated from these results that about 25% of the applied material was contained in soluble cell components and would thus be readily available. Conversely, the acid/base release of residues indicates that 75% of the residues are bound to cellulose chains, as acid/base serve to cleave the conjugates from the cellulose chains.

A similar study was performed with wheat, with applications at rates of 40 and 80 g aminopyralid/ha. Straw was harvested 86 days after treatment and the 40 g rate samples were extensively characterized. Over 80% of the TRR were extracted with sequential aqueous and solvent extractions, yielding unchanged aminopyralid (14% TRR, corrected for recovery) and along with two additional chromatograms peak regions (86% of TRR). These additional peaks were further hydrolysed with acid and base, releasing aminopyralid, again indicating the formation of hydrolysable conjugates in the cellulose phase of the straw. Thus, readily available aminopyralid was found in wheat straw at 14% of the applied material, with cellulose-bound, less immediately available residues present at 86% of applied.

Residues in grass from GLP residue trials (IIA 6.3)

Trials were carried out to determine the residues of aminopyralid in grass treated with a single application of 60 g ae/ha aminopyralid during spring/early summer (Refs: 3, 4, 5). Eight of these trials were designed as “decline” trials, with samples taken 0, 1, 3, 7, 14 and 21 days after treatment (DAT). The values at 7, 14 and 21 days DAT are summarized below as a minimum PHI of 7 days has been authorized. It can be observed that decline of residues in the 7-21 day period is not consistently

appreciable, indicating that significant grass growth and corresponding residue dilution did not occur in all trials. This would be fairly representative of grass fields around the timing of an early summer application. Indeed residue values are not dissimilar to those observed in the 2007 on-farm monitoring (Ref: 6)

Trial ID	Trial Year	Country	Zone	Formulation	Rate of aminopyralid (g a.e/ha)	Spray Vol. (L/ha)	GS at Last Appl.	PHI, days	Portion Analyzed	Residue (mg/Kg)	% Recovery
295/153/7	2002	France	SZ	GF-819	60.6	303	Not determined		7 Grass	0.84	96
									14 Grass	0.55	96
									21 Grass	0.81	96
295/153/8	2002	France	SZ	GF-819	61.2	255	BBCH.24		7 Grass	2.18	96
									15 Grass	1.38	96
									21 Grass	1.1	96
295/153/6	2002	Germany	NZ	GF-819	59.72	299	BBCH.31- BBCH.51		7 Grass	1.81	96
									14 Grass	0.91	96
									21 Grass	0.71	96
295/153/5	2002	U.K.	NZ	GF-819	59.8	299	BBCH.85		7 Grass	1.53	96
									14 Grass	1.46	96
									21 Grass	1.93	96
CEMS-2066B	2003	France	NZ	GF-839	60.4	302	BBCH.32- BBCH.33		7 Grass	2.97	90
									14 Grass	0.79	90
									21 Grass	0.4	90
CEMS-2066A	2003	U.K.	NZ	GF-839	60	300	BBCH.59		7 Grass	1.03	90
									14 Grass	0.63	90
									21 Grass	0.41	90
CEMS-2067A	2003	France	SZ	GF-839	61.2	305	BBCH.32		7 Grass	1.96	89
									14 Grass	2.11	89
									21 Grass	1.37	89
CEMS-2067B	2003	Spain	SZ	GF-839	61.5	306	BBCH.33		7 Grass	1.32	89
									14 Grass	1.07	89
									21 Grass	0.95	89

#### Ruminant metabolism and feeding studies (IIA 6.2 and IIA 6.4)

Aminopyralid does not appreciably metabolize in mammalian systems and is excreted in faeces and urine nearly quantitatively. For ruminant animals, a goat was used as the test species (Ref: 7). In the study, which employed <sup>14</sup>C-labeled test compound, the aminopyralid (in terms of total radioactivity) was found to be excreted approximately equally in faeces and urine; no significant metabolites or conjugates were found. The only tissue where any residue > 0.01 mg/kg was found was the kidney.

The follow-up magnitude of residue (feeding) study (Ref: 8) was performed in lactating dairy cows. Because the metabolism study had shown that elimination in excreta was the primary route of clearance of aminopyralid in the animals, manure was collected from one dose group in the study. This dose group was dosed at a rate of 10 times the anticipated dietary concentration (64.5 mg aminopyralid/kg dietary dry matter) via bolus capsules for 28 days. The equilibrium concentration observed in manure was 21.3 mg/kg (fresh weight basis).

It is proposed to submit one additional non-GLP study (Ref: 9) which was initiated to clarify two aspects of aminopyralid fate in ruminant manure systems:

Analysis of manure from the cattle feeding study indicated that aminopyralid clears rapidly from the animal once the herbicide is removed from the diet.

That is, if cattle were to be grazed on grass not treated with aminopyralid for 3 days prior to housing, manure from the housed cattle should not be of concern.

Bench scale manure/straw composting systems indicated that aminopyralid residues did not decline appreciably during the composting process. Composting is not a useful technique to mitigate aminopyralid residues present in animal waste.

Estimation of aminopyralid residues (available and bound) in ruminant manure.

The residue of aminopyralid in the manure/silage will be proportional to the amount fed in the original forage. Indicative results from one animal feeding study showed this concentration in manure (fresh weight basis) to be lower than the concentration fed (dry weight basis) but clearly it is not desirable to carry out multiple animal feeding studies to obtain a representative residue level for cattle.

Stock are not completely efficient in their digestion of plant material in their diets. For example, Varga and Kover (Ref: 10) state that 20-70% of fed cellulose may not be digested by ruminants. The aminopyralid residue in digested material is more likely to be immediately available, while the undigested material will contain unavailable aminopyralid which is still bound to cellulosic fractions.

In line with other agrochemicals considered under 91/414, it is not proposed to directly evaluate residues of aminopyralid in the manure or slurry. Indeed analysis of samples both from the on-farm monitoring and from the study which was initiated to look at the possibility of evaluating the effects of aminopyralid in the manure/slurry on a range of following crops (Ref: 11) demonstrated the difficulties in determining levels of aminopyralid even with prior knowledge of the cattle feeding regime.

The primary legislation for manure in the EU is the animal by-products Regulation EC 1774/2002. Manure is also considered in secondary directives such as the Waste Framework Directive 75/442 and the EU Nitrate Directive 91/676/EEC. Thus animal waste is highly regulated and covered by multiple directives. In developing action plans to comply with EC 1774/202, EU member states have implemented different guidelines. For example, in some countries transported manure must be accompanied by a transport certification and no private sale of manure is allowed.

Council Directive 91/414/EEC does not regulate manure. Local agricultural practices and country guidelines for regulation of manure need to be adhered to specifically for each country when developing product stewardship strategies. For products containing aminopyralid national labels and stewardship programmes are developed to reflect these local practices.

To meet with the specific agricultural practices in the UK a label recommendation that manure should only be spread back onto agricultural grassland is proposed. This will ensure that no residues of aminopyralid can arise in crops other than grass.

- Any accumulations of manure or slurry following grazing on treated grassland, for example from dairy herds, must stay on the farm of

origin and be spread onto grassland. Under no circumstances should this manure be supplied to gardeners or allotment holders.

FOREFRONT must only be applied to established grassland intended for grazing in the calendar year of application. Where silage, hay or haylage is produced from this area in the following calendar year, any manure subsequently produced from animals fed on this must stay on the farm. This manure should only be spread onto agricultural grassland.

- These replace: Do not use animal waste (eg manure, slurry) from animals fed on grass treated with FOREFRONT, or fodder resulting from grass treated with FOREFRONT, on susceptible crops eg. peas, beans and other legumes, sugar beet, carrots and umbelliferae, potatoes and tomatoes, lettuce and other compositae, or land intended for growing such crops, until all plant tissues have completely decayed.

### **References:**

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6 Bernhard, U.H. and Brinkworth, L. A. (2008): Monitoring of aminopyralid residues in samples of manure, slurry, grass and silage. United Kingdom 2006-2007. Dow AgroSciences, unpublished report No. GHE-P-11844 . 11<sup>th</sup> August 2008.

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9 Havens, P.L. and Wendelburg, B.M. (2008) Depuration and Composting of Aminopyralid in Ruminant Manure Systems. Dow AgroSciences, unpublished report No. 081082. September 2008.

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## **MANAGING MANURE ALREADY IN THE SYSTEM**

### **BACKGROUND**

Dow AgroSciences (DAS) is aware there are a number of allotment holder and gardeners who have stocks of manure that contain low levels of aminopyralid. Many of these people have asked for advice as to how to manage the manure. Some have already found a way to use their manure, but we know many are still uncertain of how to progress.

It is important that these people are contacted and provided with support to ensure that the manure is handled in a responsible manner.

### **ACTIONS TO BE TAKEN**

As detailed in Appendix 6 in the allotment and garden sector, there are approximately 135 individuals who appear to be genuinely affected i.e. from the information they initially supplied they had crop phytotoxicity symptoms consistent with those caused by a hormone herbicide and a range of crops affected consistent with the selectivity pattern of aminopyralid.

These individuals were contacted by DAS via an e-mail questionnaire and to date 55 replies have been received. All individuals will be contacted again with advice on how to manage the manure they have and offering to collect and dispose of the manure should they choose. This e-mail will be sent on or before 20 November 2008.

Where individuals would like their manure removed DAS will either collect it using a trailer for small amounts (<1.5 tonnes) or in the case of larger amounts provide a skip. In both cases the manure will be disposed of in landfill using the same arrangements used for crop destruct trials.

The objective is to remove the manure from those people who request this option before the end of 2008.

### **PREVENTIVE ACTIONS TO BE TAKEN FOR 2008 APPLICATIONS**

DAS will work through distributors to communicate to their customers who have used aminopyralid in 2008 to remind them of the restrictions on use of manure and slurry. They will additionally be reminded of the need to inform anyone they have supplied with manure or grass products of the restrictions.

Further details of communications can be found in Appendix 8.2.



## Appendix 8.2 communication plan

### **COMMUNICATION PLAN - OVERVIEW**

#### **OBJECTIVE**

Ensure aminopyralid-containing material is used in a manner to prevent a replication of 2008 issues in allotments/gardens by ensuring that Dow AgroSciences (DAS) products, containing the active substance aminopyralid for the control of noxious weeds in grassland and are used in strict accordance with their product labels and the Code of Practice for Using Plant Protection Products.

#### **1. Targets**

The primary target for communication must be the distributors, agronomists and farmers who have recommended and/or used aminopyralid in 2008. Additionally in order to ensure that aminopyralid containing plant material which is potentially already further downstream is not used inappropriately an additional 2009 issues prevention plan is proposed.

Many allotment holders/gardeners use the internet for advice. A “Manure Matters” micro-site will be set up within the DAS website which will be easily accessible via Google searching or linked to via Gardening associations such as the RHS.

A substantial part of achieving the above is with effective and regular communication to wide range of audiences, all of which have a role to play:

- Distributors
- Agronomists
- Farmers
- Contractors
- Equine units and small-holders
- Hay and straw merchants
- Compost manufacturers
- Allotment holders and gardeners

Each of these diverse groups will require a set of specific messages to ensure clarity and relevance to their interests. However, consistency of messages across audiences will also be important.

#### **2. Time-lines**

The communication plan started in September, to coincide with the planning of application/disposal of farmyard waste and started with distributors, and also farmers and gardeners beginning their autumn preparation of land for the following spring.

It is September when conserved forage starts to be sold and moved off the farm of production and into the supply chain.

#### **3. Specific Audiences**

##### **3.1 Distributors**

Distributors sell to a variety of customers, such as farmers, smaller retail outlets, contractors, etc. Distributors know their customers, and can communicate to each of these customer types as appropriate, to remind them

of the current suspension of aminopyralid, why, and the need to make all end-users aware of the situation.

Information supplied to end-users of aminopyralid products will encourage them to take appropriate steps to avoid farmyard waste being managed inappropriately – and thus avoid unintentional crop injury.

Dow AgroSciences (DAS) will provide explanatory letters that can be used down the supply chain. The letter will remind each reader of the label statements that can be found on each aminopyralid-containing product, with particular regard to farmyard waste management.

In addition, many distributors produce in-house newsletters – either printed and mailed, or digitally distributed. DAS will provide editorial copy for them to use in such newsletters.

### **3.2 Agronomists**

DAS will regularly e-mail agronomists with technical updates

### **3.3 Farmers**

Supporting the information passed on by DAS distributors, DAS will look to communicate directly with the farming community.

#### **3.3.1 Direct Mail**

DAS databases include many farmers. DAS will issue information letters to this list with tailored messages.

#### **3.3.2 Farming Media**

Agricultural media have already been used to highlight the issues that manure may pose to potatoes.

This autumn the campaign focus will shift to focus on the importance of forage and manure leaving the farm premises. This will be achieved through a blend of editorial and paid-for space.

In addition to dedicated titles, the campaign will also utilise provincial and regional newspapers with effective coverage of farming matters. DAS has identified a number of publications for example Beef Farmer and Farmers Weekly.

### **3.4 Equine Units**

Equine units and small holders share a need to be aware of the risks of what is brought into their holdings. In the case of equine units, it is the need to establish whether bought in feed is likely to have been treated with aminopyralid during production.

#### **3.4.1 Trade Associations**

The British Horse Society (BHS) has a pivotal role in communicating with the equine industries. Opportunities for BHS to convey messages are being explored.

#### **3.4.2 Media**

The equine industries are well-served by media and this audience segment will be targeted through PR and advertising in publications such as Horse and Hound and Equine World UK.

#### **3.4.3 Smallholders**

Smallholders need to be aware of both bought-in forage and any manures acquired which could come into contact with sensitive crops.

Specific communications with this group will utilise PR through dedicated media such as *The Smallholder* to raise awareness of the issues.

### **3.5 Hay and Straw Merchants**

Sale of forage, treated with aminopyralid, to third parties is a particular concern.

Awareness is already being raised by leading compost makers requesting assurances from larger livery units that manures will be aminopyralid-free. In addition, DAS has already entered in to dialogue with both the Hay and Straw Merchants Association and the Central Association of Auctioneers and Valuers – the two organisations responsible for much of the country's forage sales.

The CAAV has already posted material from DAS on the members-only part of its website and its technical committee is meeting in October to consider the issues and how the association can help communicate.

It is believed that the communication programme targeting the farming community will also reach those forage producers who participate in private sales to third parties.

### **3.6 Compost Manufacturers**

The compost business is relatively embryonic and ranges from small-scale, local to large national concerns.

Media coverage will be sought via the main title serving the industry 'Composting News'. A link will be provided to our dedicated "Manure Matters" micro-website

In addition, dialogue will be sought with advisory bodies such as the Waste Resources Action Programme (WRAP) responsible for reaching out to private contractors and to local authorities.

### **3.7 Allotment Holders, Gardeners and Gardening Associations**

This audience has been the most vociferous. Messages need to ensure that gardeners are aware of the potential issues, but not frightened off using manures and composts completely.

The Royal Horticultural Society has already been involved with DAS in delivering information to the gardening public – both via its own website and publications, but also via print and broadcast media.

DAS will continue the dialogue with the RHS and other gardening associations in particular by providing a link to our dedicated website and have dedicated support staff in case of in season queries.

#### **3.7.1 Advertising**

There is an extensive range of media, including national newspaper supplements with gardening coverage that address gardening enthusiasts directly and indirectly. Through media briefings it is planned to encourage a wide range of media to give coverage to the need to approach manure with care.

An initial advertising campaign in late autumn will seek to encourage readers to visit a dedicated microsite (see point 3.7.2) where FAQs will be presented and updated.

### 3.7.2 Dedicated Website

The worldwide web has been instrumental in raising awareness of the aminopyralid issue in 2008. It is proposed to utilise this medium to convey information clearly and concisely.

A dedicated micro-website will be created to provide:

- Answers to frequently asked questions
- Guidance on manure in the amateur garden
- Ways to check manure including the proposed pot test
- Useful sources of information, etc.

This will be promoted through advertising and PR.

## Appendix 8.3

### **2009 ISSUES PREVENTION PLAN**

#### **BACKGROUND**

As the communication plan with regard to awareness of this issue gets underway, and continues through the winter period and into the spring, there will be many people who belatedly question the provenance of their manure.

Once they recognise they may have an issue, or do no more than doubt their manure, Dow AgroSciences (DAS) must be able to provide some form of support to help them find a solution to their problem.

Websites are useful, but are limited in their practicality and we learned from 2008 that many people welcomed the opportunity to actually speak with someone. It was the absence of personal dialogue that led a number of people to contact other individuals or organisations, and that in turn increased 'noise' from a limited number of actual cases.

There are three areas that DAS will address:

- Manage manure that is already on horticultural sites
- Media campaign about appropriate manure use
- Provide support for enquires next season

#### **PROVIDE SUPPORT FOR 2009 SEASON**

##### **'Manure Matters' Micro-Site**

Creation of a micro-site within the DAS website. This site will contain information on best practices, bio-test methodology, images, contact details, FAQs.

##### **Aminopyralid Enquiries**

Dedicated support staff available to deal with in season enquiries. These will be experts providing advice and reassurance.

##### **Bio-Assay or 'Pot test'**

Provision of a test methodology (and materials if required) to help callers determine the presence of a residual herbicide in their manure.

##### **Manure Collection and Disposal Service**

There will be people who will have positive results following a pot test, or people who won't conduct a pot test, for whatever reason. Wherever there is a positive result, we will work with the individual to solve their specific needs

## Appendix 8.4

# **STEWARDSHIP PLAN TO GOVERN FUTURE SALES OF AMINOPYRALID PRODUCTS**

## **IMPROVEMENT OF LABELLING**

Pictograms will be used to enhance label statements and convey the key information to users to lessen the probability of labels not being read in full. The intention is to extend the physical length of the label and incorporate the pictograms thus:

**SAFETY PRECAUTIONS**  
**Operator protection:**  
 Engineering control or separate enclosure must be used where reasonably practicable in addition to the following personal protective equipment: WEAR SUITABLE PROTECTIVE GLOVES AND FACE PROTECTION (FACE SHIELD) when handling the concentrate.  
 However, engineering controls may reduce personal protective equipment if a COSHH assessment shows they provide an equal or higher standard of protection.  
 Use of an enclosure is compulsory with this product.  
 DO NOT APPLY by hand-held equipment.  
 WHEN USING DO NOT EAT, DRINK OR SMOKE.  
 WASH CONCENTRATE from skin or eyes immediately.  
**Consumer protection:**  
 DO NOT USE ON FOOD CROPS.  
**Environmental protection:**  
 To protect groundwater do not apply to legs less than 1 year old.  
 DO NOT CONTAMINATE WATER with the product or its container. Do not clean application equipment near surface water. Avoid contamination via drains from farmyards and roads.  
 KEEP LIVESTOCK out of treated areas for at least 7 days or until foliage of any poisonous weeds such as ragwort has died and become available.  
**Storage and disposal:**  
 KEEP AWAY FROM FOOD, DRINK AND ANIMAL FEEDING STUFFS.  
 KEEP IN ORIGINAL CONTAINER, tightly closed, in a safe place.  
 WASH OUT CONTAINER THOROUGHLY, rinse multiple times into safe tank, and dispose of safely.

**FOREFRONT**  
 HERBICIDE  
 Product Registration Number: MAFF 12765  
 A water in oil emulsion containing 30 g/litre (3.5% w/v) aminopyralid (present as 55 g/litre aminopyralid potassium) + 900 g/litre (14.4% w/v) fluroxypyr (present as 144 g/litre fluroxypyr-sodium heptyl ester).  
 A tiller killing herbicide for the long term control of ANNUAL and PERENNIAL BROAD-LEAVED WEEDS in GRASSLAND.  
 The (COSHH) Control of Substances Hazardous to Health Regulations may apply to the use of this product at work.  
 READ DIRECTIONS FOR USE ON ATTACHED LEAFLET.  
 PROTECT FROM FROST.  
 2 Litres e

**FOREFRONT USE AND MANURE MANAGEMENT**  
 IRRITANT  
 DANGEROUS FOR THE ENVIRONMENT  
 IRRITATING TO SKIN.  
 RISK OF SERIOUS DAMAGE TO EYES.  
 VAPOURS MAY CAUSE DROWNSINGS OR DROWNING.  
 TOXIC TO AQUATIC ORGANISMS. MAY CAUSE LONG-TERM ADVERSE EFFECTS IN THE AQUATIC ENVIRONMENT.  
 WEAR SUITABLE GLOVES AND EYEFACE PROTECTION.  
 AVOID CONTACT WITH SKIN.  
 KEEP OUT OF REACH OF CHILDREN.  
 IN CASE OF CONTACT WITH EYES, RINSE IMMEDIATELY WITH PLENTY OF WATER AND SEEK MEDICAL ADVICE.  
 THIS MATERIAL AND ITS CONTAINER MUST BE DISPOSED OF IN A SAFE WAY.  
 USE APPROPRIATE CONTAMINATION TO AVOID ENVIRONMENTAL CONTAMINATION.  
 To meet obligations to man and the environment, comply with the instructions for use.  
**IMPORTANT INFORMATION**  
 FOR USE ONLY AS AN AGRICULTURAL HERBICIDE  
 Group/Brand Name: Forefront  
 Maximum Individual Dose: 2.0 litres practical per hectare  
 Maximum Number of Treatments: One per year  
 READ THE LABEL BEFORE USE. USING THIS PRODUCT IN A MANNER THAT IS INCONSISTENT WITH THE LABEL, MAY BE AN OFFENCE. FOLLOW THE CODE OF PRACTICE FOR USING PLANT PROTECTION PRODUCTS.  
 QUZK 1107 FOR A

**FOREFRONT USE AND MANURE MANAGEMENT**  
 GRAZING GRASS  
 GRAZING  
 DUNG  
 GRASS CEREALS MAIZE  
 BEETS CARROTS TOMATOES  
 POTATOES PEAS BEANS LETTUCE  
 HAY  
 SLUDGE

If this cannot be achieved because of labelling size or other restrictions then it is proposed to include a neck tie on the containers (Exhibit 18 produced for Ireland).

## **CONDITIONS ON THE SUPPLY OF PRODUCT**

The 'Aminopyralid Sales Stewardship Plan' will be presented to all purchasers. Only those accounts that agree to commit to principles contained within it will be able to source aminopyralid products from Dow AgroSciences (DAS).

## **AMINOPYRALID SALES STEWARDSHIP PLAN - DISTRIBUTION**

The principles herein have been agreed to and will be adhered to by "account" on the understanding that non-compliance will result in the termination of said plan until such time that corrective action is in place.

## **PRINCIPLES**

1. The account agrees to the Aminopyralid Sales Stewardship Plan in full.
2. The account will make available all appropriate staff to undergo re-training on aminopyralid products which will encompass new label directions and manure management guidance.
3. All attendees will be required to undertake a test of knowledge (Aminopyralid Support Plan) that will reflect the training given – test will be available on-line and awarded BASIS points. Proof of training will be recorded and maintained in a database by DAS.
4. Once these requirements have been met, the decision to release product to an account will be approved as appropriate by DAS.

5. Secondary distribution routes that the account wants to sell to must be identified to DAS for training etc.
6. When these secondary distribution routes have signed up to the Aminopyralid Sales Stewardship Plan in full and their staff have undertaken the Aminopyralid Support Plan, DAS will advise the Primary account that sales of aminopyralid products can commence to this route as appropriate.
7. All points of supply commit to only make aminopyralid products available to end users who have completed and agreed to the “Aminopyralid Stewardship Form” prior to release of product. The account agrees to periodic inspection of these forms by DAS to ensure that the necessary checking process is in place.
8. Training of the Aminopyralid Sales Stewardship Plan to be carried out by either DAS or an appointed “Stewardship Co-ordinator”.

### **AMINOPYRALID SALES STEWARDSHIP PLAN – INDEPENDENT AGRONOMISTS**

1. All Independent Agronomists will be contacted and advised to undertake the “Aminopyralid Sales Support Plan”.
2. Training of the Aminopyralid Sales Stewardship Plan to be carried out by either DAS or an appointed “Stewardship Co-ordinator”.

### **CONDITIONS ON THE SALE OF PRODUCT**

Farmers wanting to use aminopyralid containing products on grassland must meet the following criteria before purchase should be allowed:

- Farmer must be applying to designated agricultural pasture land
- Supplier must identify that the farmer has understood the restrictions with respect to use of aminopyralid products
- Aminopyralid products will only be released to the Farmer when he/she has signed the “Aminopyralid Stewardship Form” acknowledging their understanding of how these products must be used
- At the end of the year, all “Aminopyralid Stewardship Forms” must be sent to DAS to assess compliance with the process only.
- Each new year, a new “Aminopyralid Stewardship Form” will be issued
- These arrangements apply to any onward sales.

### **COMMUNICATION INITIATIVES AT POINT OF SALE/USE/RECOMMENDATION**

These initiatives will further prompt user of aminopyralid products on stewardship requirements:

- Point of sale merchandising material to be placed in all designated retail outlets which convey the key stewardship needs emanating from the use of aminopyralid products

- All companies providing agronomy support applications for field recommendations will be contacted and encouraged to build in the updated label warnings and stipulations for aminopyralid stewardship needs.
- Companies that possess retail systems that flag key messages when certain products are rung through will be encouraged to build in messages to ensure “Aminopyralid Stewardship Forms” are completed before sale completes

## **NON COMPLIANCE ACTIONS**

### **CROP INJURY**

- Work with and support individuals to provide information and facilitate solutions where possible.
- Investigate all cases establish cause(s) of the breach. Following actions include
  - Letter/meeting providing details of the breach and corrective action needed
  - Re-training of agronomy staff
  - Suspension or discontinuation of supply
  - Report any incidents or complaint to CRD

### **BREACH OF AMINOPYRALID SALES STEWARDSHIP PLAN**

Where an account fails to comply with the stipulations as laid out in the Aminopyralid Sales Stewardship Plan the following corrective actions will be considered:

- Re-training of staff
- Suspension or discontinuation of supply
- Forfeiture of Rewards
- Minister may revoke approvals

Exhibit 1 – Ireland neck tie





# IMPORTANT INFORMATION

## Additional Guidance from Dow AgroSciences

- To minimise the chance of manure which may contain traces of aminopyralid (the active ingredient in Forefront\*) being used on sensitive crops such as potatoes, peas and beans, **DOW AGROSCIENCES RECOMMENDS THAT FOREFRONT IS ONLY APPLIED TO GRASSLAND USED FOR GRAZING.**
- If manure is subsequently generated from grassland treated with Forefront, it must stay on the farm of origin and can only be applied to grassland, or land destined for grass, cereals or maize.
- Under all circumstances, the “WARNINGS” section of the product label **MUST BE READ IN FULL.**

Forefront contains aminopyralid and fluroxypyr.

\* Trademark of Dow AgroSciences LLC

**PLEASE REFER TO PRODUCT LABEL FOR FULL DIRECTIONS FOR USE**

For further information and support view our website: [www.dowagro.com/ie](http://www.dowagro.com/ie)

Or contact Whelehan Crop Protection

3 Northern Cross Business Park, Finglas, Dublin 11, Ireland

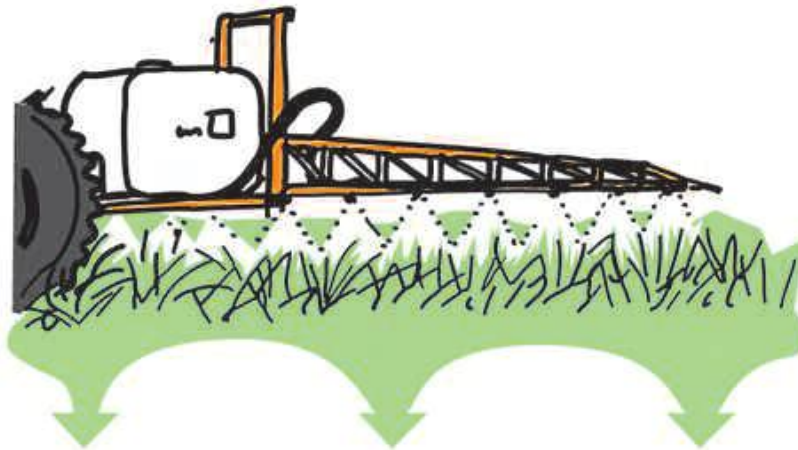
Tel: 01 8068600 Fax: 01 8362271



# FOREFRONT

## USE AND MANURE MANAGEMENT

GRAZING GRASS



GRAZING

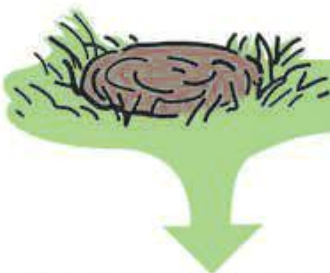


HAY



SILAGE

DUNG



GRASS CEREALS MAIZE



BEETS CARROTS TOMATOES  
POTATOES PEAS BEANS LETTUCE



## **MANAGING CONCERNS**

### **OBJECTIVE**

To develop a method for testing manure and soil for the presence of aminopyralid (or other herbicides).

### **STEP 1: METHOD DEVELOPMENT**

#### **Introduction**

This study was designed to develop a method to test samples of manure for traces of aminopyralid which would prove detrimental to sensitive crops if used as a soil dressing prior to the establishment of those crops. The test was intended to be simple to carry out so that the method could be provided to amateur gardeners and allotment holders. All materials used in the study were readily available on the retail market. For the purpose of this trial 5 manure samples were available 4 from animals which had received aminopyralid treated grass or silage in their diet and one from a source thought to be free from aminopyralid.

#### **Materials**

5 inch flowerpots  
Multi-purpose compost  
Clean buckets  
Labels for pots  
Rubber gloves  
Untreated bean seed (*Vicia faba*)  
Untreated pea seed.  
GF-839 (aminopyralid)  
Measuring cylinders/jugs  
Water

#### **Method**

Samples were collected and sent to the Dow AgroSciences (DAS) facility where they were frozen and stored at -25°C. Twenty-four hours prior to the study being set up they were removed from cold storage and allowed to thaw out at room temperature. Two 5 inch plant pots full of each individual sample were placed in a bucket along with an equal volume of multi-purpose compost and thoroughly mixed by hand. Each separate sample had a clean bucket and clean gloves were used for mixing. The sample presumed to be free of aminopyralid was mixed first.

Once thoroughly mixed 4 pots were filled. Each pot was placed in a separate tray to stop any possible cross contamination when the pots were watered. Manure not needed for this study was refrozen and sent for chemical analysis.

Additional pots containing only multi-purpose compost were also prepared to act as a non-manure control. Additional pots were also prepared and planted with peas

Finally samples of multi-purpose compost were “spiked” with aminopyralid to provide a positive standard.

Once all the pots had been prepared they were watered and left to stand for 24 hours before being planted with 4 beans (or peas) to each pot.

### **Treatments**

1. Sample 1 planted with beans
2. Sample 1 planted with peas
3. Sample 2 planted with beans
4. Sample 3 planted with beans
5. Sample 4 planted with beans
6. Sample 5 (aminopyralid free) planted with beans
7. Sample 5 (aminopyralid free) planted with peas
8. Control multi-purpose compost only. Planted with beans
9. Control multi-purpose compost only. Planted with peas
10. Multi-purpose compost spiked with 0.01mg/kg aminopyralid. Planted with beans
11. Multi-purpose compost spiked with 0.001mg/kg aminopyralid. Planted with beans
12. Multi-purpose compost spiked with 0.0001mg/kg aminopyralid. Planted with beans

Replicates: 4

### **Assessments**

Pots will be assessed at emergence and then weekly until they have 4 pairs of true leaves. Photographs will be taken of any phytotoxic symptoms that are observed.

### **STEP 2: RING TEST**

Based on the results on the research trials the method will be “ring tested” to ensure that the results are repeatable and that the method is robust. Testers will be allocated samples of manure on a random basis. Samples will be known to either contain aminopyralid or be uncontaminated. Testers will be required to carry out the test and then report their results. They will also be required to provide feedback on the ease of use of the test method.

### **STEP 3: POT TEST SUPPLIED TO THE GARDENERS**

Assuming that a reliable and robust bioassay method can be developed the following options could be considered for its deployment:

1. Publish the method and encourage gardeners and allotment holders to carry out their own tests.

2. Publish the method and provide “kits” for gardeners and allotment holders to carry out their own tests. Kits could contain pots, compost, beans and labels.

A DVD will be produced to aid growers on the sampling method.

### **PROGRESS REPORT – NOVEMBER 2008**

The method has been tested by comparing samples thought to be contaminated with aminopyralid (4) and a sample thought to be free from aminopyralid.

The method was able to detect herbicide damage from all those samples thought to be contaminated; these samples have been submitted to a laboratory for aminopyralid determination.



Fig. 1 Beans grown in contaminated manure (left) and beans grown in uncontaminated manure (right)

### **TIMELINES FOR FURTHER ACTIVITY**

#### **RING TESTING**



In mid November manure will be sent to 20 individuals. On a random basis they will be allocated either contaminated or uncontaminated manure. In addition to the manure each individual will receive a kit containing beans, compost, pots and labels. The volunteers will be required to respond as to whether their samples are contaminated or not.

Assuming that the method is robust it will be available by mid December.

### **FEBRUARY UPDATE**

Due to an inability to locate a large enough quantity of contaminated manure the ring test could not take place.

However three further tests have been carried out under “window sill conditions”

A further 3 samples of manure have been tested using the method, two samples were taken from a farm known to be feeding silage that had been made from grass treated with Forefront and one sample was taken from a riding stable thought to be free from aminopyralid.

The test revealed that beans grown in the contaminated manure germinated more slowly and were distorted in appearance, whereas those grown in the horse manure (and the untreated) grew normally.

### **STEP 4: REVISED ANALYTICAL METHOD AVAILABLE**

Current analytical methods for soil, manure and plants establish that residue levels are below that of consumer concern (0.01 mg/kg). DAS is currently revising analytical methods to lower the limit of quantification in soil and manure to correspond with that at which crop injury may be observed in the most sensitive crops. The chemistry in the original methods is quite robust so it is not anticipated that there will be any major problems in extending the method to the lower limits of quantification. In some cases the aminopyralid methods have already been successfully extended to lower LOQs and other crops, depending on the nature of the request. The only anticipated disadvantage of revised methods is that they may take longer to execute, as the lower LOQs will require the use of larger sample extracts and additional sample concentration. This work is targeted for completion in by December 2008.

There are a variety of reasons why manure, mulch or compost may not be in condition to be used for growing vegetables. The pot bio-assay is therefore a more appropriate test to use in most cases, however under certain circumstances (for example commercial compost production) this may not be practical and an analytical method is required. DAS will aim to provide the method to competent, independent laboratories early in 2009.

### **FEBRUARY UPDATE**

DAS has developed analytical methods available for soil and manure in line with most sensitive crops. This method is available within DAS and a laboratory. DAS is developing flexibility to allow this to be used by alternative laboratories.

**PRODUCT STEWARDSHIP FOR USE OF AMINOPYRALID PRODUCTS IN NON-CROP SITUATIONS**

**OBJECTIVE**

To ensure that Dow AgroSciences (DAS) products, containing the active substance aminopyralid for the control of vegetation management on non-crop land, are used in strict accordance with their product labels and the Code of Practice for Using Plant Protection Products.

**BACKGROUND**

**Control of Undesirable Plants**

The use of aminopyralid based products is planned in non-crop situations for the control of undesirable plants. These include noxious and invasive weeds which are a threat to public and animal safety, erosion of biodiversity and environmental quality and which have a serious economic impact. These include:

Japanese Knotweed: Causes serious risk of adverse effects to biodiversity and economic impact e.g. amount spent to date on clearance from the Olympic site in London is estimated at £15 million.

Ragwort: Growing on non-crop land this poisonous plant is a major source of infestation of agricultural land.

Buddleia: A highly invasive weed and the most serious plant problem for Network Rail damaging structures e.g. bridges and affecting sight lines.

**STEWARDSHIP OF PLANT PROTECTION PRODUCTS USED ON NON-CROP LAND**

The application of plant production products to non-crop land has seen proactive developments to ensure a consistent standard of performance with reliability of results and minimisation of risk. These include:

- a) the introduction of the Amenity Assured Accreditation Scheme (AAAS) for contractors, and
- b) the use of GPS in the identification of application sites e.g. on rail embankments to avoid spraying near sensitive areas such as water courses, allotments and gardens.

DAS will work with specialised distributors with established expertise in this sector.

**Aminopyralid Products and Situation of Use**

<b>Products</b>	<b>Active Substances</b>	<b>Situation</b>
Runway Synero	Aminopyralid + fluroxypyr	Non-crop production – amenity grassland e.g. motorway verges and railway embankments

**Mitigation Measures to Avoid Aminopyralid Residues in**

**Manure/Composts/Mulches**

**Label Change**

The use on airfields has been removed from Runway and Synero labels as this has been identified by DAS internal review as an area which could be used for grazing or have grass removed for animal feed/bedding/mulch/compost.

The revised proposed label for Runway is included as Appendix 2. The same changes will be made for Synero.



## **Other Stewardship Comments and Measures**

### **Distribution Chain**

The distribution chain is short for both Runway and Synero:

#### **Distributor**

As part of the product supply agreement the distributor will sign a stewardship agreement agreeing to specific responsibilities:

1. Participate in annual stewardship training run by DAS.
2. Provide annual training of contractors using training materials provided by DAS.
3. Only supply contractors with product who are
  - a) members of the AAAS and
  - b) have successfully completed the DAS stewardship training
4. At the request of DAS provide a complete record of the location of sites treated.
5. Maintain a training register of contractors.

Breach of agreement can result in discontinuation of supply.

#### **Contractor**

The contractor will undertake following as a condition of supply of the product:

1. Participate in annual stewardship run by the distributor.
2. Log and notify the distributor of all sites treated with the product to ensure full traceability.
3. Warning statement given on customer invoice (see Other Measures).

#### **Breach of Stewardship Agreement**

Breach of correct usage of the products can result in discontinuation of supply.

In the event of a breach an investigation will take place to establish the cause(s) of the breach. The following actions could be taken:

- DAS to send a letter providing details of the breach and the corrective action needed. Distributor/contractor to confirm to DAS how and when the corrective action will be undertaken
- Re-training
- Discontinuation of supply

#### **Communication**

To re-emphasise that 'Treated grass must not be used for grazing. Grass should not be cut and removed from site and used for animal feed/bedding or composting/mulching'

1. Warning tag on each bottle.
2. Technical literature/DAS website/articles in specialist magazines.

#### **DAS Stewardship Training Course**

Note: Training will not be undertaken until DAS has an indication on the reinstatement status of aminopyralid approvals.

CRD invited to attend. Programme outline:

1. Duration: 1 day
2. Proposed timing: .....

3. Module 1 - Introduction and overview of the active substances and products
4. Module 2 - The weed problem, integrated weed management, invasive species and biodiversity
5. Module 3 - Operation procedure (to include: operator and public safety, safety to non-target plants - drift, residues in soil, composts, mulches and manure and water quality)
6. Module 4 – Practical workshop
7. Multi-choice exam

## **Appendix 10 –Hay meadows, manure and aminopyralid**

### **1. Use of farmyard manure<sup>1</sup> in nature conservation management**

#### **1.1 SSSI (Sites of Special Scientific Interest) management:**

Semi-natural, species-rich hay meadow SSSIs are maintained by low-intensity management comprising a July hay cut followed by grazing in the late summer/autumn and, in upland hay meadows, spring grazing prior to shut up for hay in early May. The management also involves light dressing of straw-based farmyard manure (FYM) (but not slurry or inorganic fertilisers) up to an absolute maximum of 12 tonnes/ha/year (to ensure a modicum of productivity is maintained to allow for an annual sustainable hay crop) plus occasional dressings of lime.

Usual practice is to apply FYM in spring or early autumn. Application is normally by rotary or rear discharge manure spreaders and represents a surface deposition to the grassland sward. FYM is thus not physically incorporated into the surface soil.

#### **1.2 Management of non-SSSI hay meadows under agri-environment (HLS – Higher Level Stewardship) schemes:**

The Baseline Evaluation of Grassland in HLS options HK6, HK7 and HK8 (which fund the maintenance, creation or restoration of species rich semi-natural grassland) provides some potentially useful data on scale of application, and hence potential scale of risk in these situations. The farmer questionnaire on management practices indicates that for grasslands under options HK6 (maintenance of species rich grassland) and HK7 (restoration) 33% had received manure and/or artificial NPK additions in the last 10 years (24% in HK6 and 39% in HK7), with the proportion much higher in current meadows (60%) than in pastures (26%).

### **2. How does aminopyralid contamination enter the system?**

#### **2.1 Sources of contamination of manure spread to land**

There are two potential routes for contaminants to enter the system:

(a) Livestock may graze treated foliage *in situ* in pastures or the aftermath of meadows/silage fields. Subsequent dung (and urine?) will contain residues which may enter FYM for distribution onto flower rich hay meadows when animals are brought into straw-based housing.

(b) Alternatively, hay/silage harvested from fields where there has been weed treatment is subsequently fed to housed cattle and residues appear in FYM. Contaminated FYM is therefore likely to be an issue when dung (and urine?) is deposited during any temporary housing (e.g. at milking of dairy cattle) or during late autumn/winter when livestock are brought into straw-based winter

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<sup>1</sup> Definition of FYM: a mixture of farm animal dung (usually from cattle) and urine with bedding material, usually straw, in varying quantities and at various stages of decomposition which can be either fresh or stockpiled in a heap to rot down before use.

housing. In autumn and spring there may be days when the cattle are grazing but spend nights in straw-based housing. Although collection of slurry from dairy units at milking times and adding to FYM is not the norm, we do know it takes place on some farms that attempt only to produce FYM.

(c) A possible third route for contamination has been identified by grassland specialists: there are numerous grasslands SSSIs where fields supporting species rich grassland are run as open grazing systems alongside more intensively managed grasslands, typically outside but sometimes within the SSSI boundary. These are usually pastures and many will be associated with dairy herds. In these situations there is a risk of direct contamination from livestock grazing areas of (non-SSSI) improved/semi-improved grassland where the herbicide has been applied; and then dunging on the species rich grasslands.

We know from the results of research that EN (English Nature) and SNH (Scottish National Heritage) commissioned that this type of 'Dual Habitat Grazing' can result in a net transfer nutrients to the unimproved swards. Potentially aminopyralid could be transferred in the same way. Livestock distribute dung heterogeneously at pasture, often with concentrations in camping or 'loafing' areas. If these areas are within the species rich grassland then net transfer of contaminated dung will be higher as presumably will risk of damage to the botanical interest present.

The relevant EN/SNH research report makes recommendations as to how nutrient transfer can be limited, principally by grazing the species rich and improved grassland areas separately. These recommendations may also be relevant from the perspective of limiting the impact of aminopyralid, particularly on sites where the improved grassland lies outside the SSSI and may be outside AE (agri-environment) agreements; hence our ability to have any direct influence on the management of the grassland is limited

## **2.2 Sourcing of FYM from off-farm:**

Although it is likely that the majority of FYM that is used on species-rich hay meadows (SSSIs or those under agri-environment agreements etc) is derived from the same farm, it is possible that there will be situations where FYM is imported from another farm. This might for example occur when a farm has changed away from a cattle-based enterprise and no longer has a source of FYM.

It is possible that in some areas where there are relatively high levels of ownership by non-farmers, FYM may quite often be sourced off site. However indications from a preliminary survey of Natural England field staff suggests that, whilst it does occur, this is generally a rare occurrence – mostly FYM comes from the same holding (due to concerns re weed seeds etc). The suggestion has been made that new NVZ (Nitrate Vulnerable Zone) rules might change the supply of off-site FYM, if farmers have to export manures to another farm.

### **3. Potential controls over application of manure to flower rich hay meadows**

#### **3.1 SSSI (Sites of Special Scientific Interest) consents**

The application of FYM is listed in the operations likely to damage the features of special interest that form part of the SSSI notification documents. Thus, the use of FYM would require a formal written consent from Natural England. Thus, in theory such a consent could be drafted to specify that any FYM applied to an SSSI meadow should be free from contamination (e.g. aminopyralid residues). However, most existing owners of SSSI meadows will already have consents for the application of FYM normally only specifying amount, periodicity and possibly that it should be “well-rotted”. Where such consents were not originally time limited, realistically there is little ready prospect of modification or revocation.

#### **3.2 Agri-environment/HLS/WES/s.15 agreements**

Old style s. 15 and WES (Wildlife Enhancement Scheme) agreements on SSSIs will also have incorporated a similar wording to consents into the agreed management plan that accompanies the legal agreement. These agreements usually have review clauses and are time-limited so there would be scope for changing FYM application practice. Increasingly, HLS agreements will become the norm on SSSIs. For the species-rich HLS options the application of FYM at specific rates/periodicities is a non-mandatory prescription that can be used as stated, amended or deleted.

We have not gathered a comprehensive account for non-SSSI situations, but in the N Pennines ESA (Environmentally Sensitive Area); for example, farmers must seek prior written approval to source FYM off-farm.

Thus, there may be scope for specifying the use of non-contaminated FYM (and enforcing it) in only a limited number of situations. We would probably need to rely on voluntary compliance in situations where existing practice has already been agreed /consented etc. Without a better understanding of the scale of use of aminopyralid in situations of potential risk to nature conservation management, it is difficult to assess whether the need for any restrictions will compromise our ability to source manure for nature conservation management.

Natural England  
23 March 2009

*Additional comments from Natural England to inform Advisory Committee on Pesticides discussion on aminopyralid (supplements paragraph 2.1 c in earlier submission from Natural England: "Hay meadows, manure and aminopyralid", 23 March 2009)*

## **Potential risks to grassland biodiversity through transfer of herbicide within and between grazing parcels via dung**

In England there is more than 0.5 million ha of grassland which is protected partly or mainly for its botanical value. Some is designated as SSSI and some is in agri-environment agreement\*. In addition there are substantial areas of botanically valuable heathland, wetland and other grazed habitats. Generally no herbicide can be used on this land, except spot treatment or weed-wiping to control injurious weeds. However, this land is not protected against transfer of herbicide onto it in the dung of animals grazing contiguous or adjacent land which lies outside the agri-environment agreement/SSSI boundary.

It was recognised by Kirkham (2006) that many sites of botanical value are grazed in conjunction with other land. This other land may be legitimately treated with herbicides known to be persistent in dung/manure and may occur within the same parcel or in a different parcel. Parcels may be grazed simultaneously by leaving gates open, or sequentially. Dung containing herbicide residues will arise from treated parts of the same parcel or from other parcels treated with these herbicides and grazed up to 3 days (approx) previously.

There is therefore a high chance of dung containing herbicide residues being deposited on vegetation containing susceptible plant species due to livestock movement and dung transfer between areas. The scale of this impact is difficult to quantify since we do not know which plants of semi-natural grassland are susceptible to aminopyralid or indeed other herbicides persistent in manure/dung or the concentrations that plants may be exposed to via dung. The area of potentially affected grassland can be estimated. The coverage of cattle dung pats is estimated (pers comm. J Tallowin, North Wyke Research) as: after 3 days 1-2% and over an April to September grazing period up to a max of 20%. In addition the area surrounding dung pats is known to be affected by them, herbage growth being enhanced by uptake of N, P and K. But we have no information on any translocation of herbicide into herbage surrounding dung pats.

Where habitats of botanical value are in the same parcel as grassland treated with herbicide it will often be impractical to fence them off. Where they are in different parcels the problem of transfer via dung could be minimised by grazing them separately. And assuming herbicide residues are all excreted within 3 days, animals could be moved onto pasture with no botanical interest for this period prior to grazing land with susceptible species. However, it should be recognised that implementing such management would necessitate considerable attention to detail and commitment of the land manager.

Whilst the proposed changes to the product label stipulate how potential damage can be avoided on land under agri-environment agreement, at least 18% of known species rich grassland, equating to 41,000ha occurs outside of such agreements/SSSIs and will therefore be largely unprotected from the products potentially damaging effects. We remain concerned, given the persistence of the herbicide aminopyralid in manure, about the absence of data on the impact of dung deposited on botanically valuable grassland and other habitats by cattle, sheep or other livestock grazing treated grassland.

## **Reference**

Kirkham, F.W. 2006 The potential effects of nutrient enrichment in semi-natural lowland grasslands through mixed habitat grazing or supplementary feeding. Scottish Natural Heritage Commissioned Report No. 192, Edinburgh.

## **\*Notes**

### ***Very high value grassland***

The Grassland Inventory in England records 229,000 ha which is of Priority Habitat status in the Biodiversity Action Plan. Of this 41,000 ha (18%) is neither designated SSSI nor in agri-environment agreement.

### ***Grassland under restoration and of some botanical value***

There is a substantial area of land of lower botanical quality which nevertheless has significant current or potential conservation value. This includes 338,000ha of grassland in Entry Level Stewardship (ELS), spread over 21,000 farms, including dairy farms. This ELS grassland attracts payments of over £30 million/ year.

Appendix 11 Data list

<b>Annex point</b>	<b>Author</b>	<b>Year</b>	<b>Title Source (where different from company) Company, Report No. GLP or GEP status (where relevant) Published or Unpublished</b>	<b>DPDB Ref. No.</b>
KIIIA 8.2	BALCER JL LINDER SJ	2007	Title : A NATURE OF THE RESIDUE STUDY WITH 14C LABELED AMINOPYRALID APPLIED TO OILSEED RAPE Sub Company : Owner Company : DOW AGROSCIENCES Report No : 060011 Date : 26/01/2007 GLP Status : yes	158518
KIIIA 8.3.1.1/01	RAWLE NW	2004	Title : RESIDUES OF XDE-750 IN WINTER WHEAT AT INTERVALS AND AT HARVEST FOLLOWING A SINGLE APPLICATION OF GF-1118, ITALY AND SPAIN - 2003 Sub Company : Owner Company : DOW AGROSCIENCES Report No : GHE-P-10575 Date : 09/03/2004 GLP Status : yes	158519
KIIIA 8.3.1.1/02	RAWLE NW	2005	Title : RESIDUES OF XDE-750 IN WINTER WHEAT AT INTERVALS AND AT HARVEST FOLLOWING A SINGLE APPLICATION OF GF-1118, SPAIN - 2004 Sub Company : Owner Company : DOW AGROSCIENCES Report No : GHE-P-10689 Date : 19/01/2005 GLP Status : yes	158520



<b>Annex point</b>	<b>Author</b>	<b>Year</b>	<b>Title Source (where different from company) Company, Report No. GLP or GEP status (where relevant) Published or Unpublished</b>	<b>DPDB Ref. No.</b>
KIIIA 8.3.1.1/03	RAWLE NW	2005	Title : RESIDUES OF FLORASULAM AND AMINOPYRALID (XDE-750) IN DURUM WHEAT AND WINTER BARLEY AT HARVEST FOLLOWING A SINGLE APPLICATION OF GF-1362, SPAIN - 2004 Sub Company : Owner Company : DOW AGROSCIENCES Report No : GHE-P-10968 Date : 02/03/2005 GLP Status : yes	158521
KIIIA 8.3.1.1/04	ROBERTS DW SCHELLE GE KNUTESON JA	2004	Title : MAGNITUDE OF RESIDUES FOR XDE-750 IN WHEAT AGRICULTURAL COMMODITIES Sub Company : Owner Company : DOW AGROSCIENCES Report No : 030042 Date : 17/02/2004 GLP Status : yes	158522
KIIIA 8.3.1.1/05	RAWLE NW	2004	Title : RESIDUES OF XDE-750 IN WINTER WHEAT AT HARVEST FOLLOWING A SINGLE APPLICATION OF GF-1118, HUNGARY AND POLAND - 2003 Sub Company : Owner Company : DOW AGROSCIENCES Report No : GHE-P-10577 Date : 02/03/2004 GLP Status : yes	158523

<b>Annex point</b>	<b>Author</b>	<b>Year</b>	<b>Title Source (where different from company) Company, Report No. GLP or GEP status (where relevant) Published or Unpublished</b>	<b>DPDB Ref. No.</b>
KIIIA 8.3.1.1/06	RAWLE NW	2005	Title : RESIDUES OF XDE-750 IN WINTER WHEAT AT HARVEST FOLLOWING A SINGLE APPLICATION OF GF-1118, GERMANY AND POLAND - 2004 Sub Company : Owner Company : DOW AGROSCIENCES Report No : GHE-P-10691 Date : 01/02/2005 GLP Status : yes	158524
KIIIA 8.3.1.1/07	RAWLE NW	2005	Title : RESIDUES OF FLORASULAM AND AMINOPYRALID (XDE-750) IN WINTER WHEAT AND BARLEY AT HARVEST FOLLOWING A SINGLE APPLICATION OF GF-1362, GERMANY AND POLAND - 2004 Sub Company : Owner Company : DOW AGROSCIENCES Report No : GHE-P-10969 Date : 02/03/2005 GLP Status : yes	158525
KIIIA 8.3.1.1/08	BALLUFF M	2005	Title : RESIDUES OF XDE-742 AND AMINOPYRALID IN WINTER WHEAT AT INTERVAL OR AT HARVEST FOLLOWING A SINGLE SPRING APPLICATION OF GF-1637, NORTHERN EUROPEAN ZONE (GERMANY, FRANCE, POLAND, HUNGARY)-2006 Sub Company : Owner Company : DOW AGROSCIENCES Report No : GHE-P-11642 Date : 02/03/2005 GLP Status : yes	158526

<b>Annex point</b>	<b>Author</b>	<b>Year</b>	<b>Title Source (where different from company) Company, Report No. GLP or GEP status (where relevant) Published or Unpublished</b>	<b>DPDB Ref. No.</b>
KIIIA 8.3.2.1/01	RAWLE NW	2004	Title : RESIDUES OF XDE-750 IN WINTER BARLEY AT HARVEST FOLLOWING A SINGLE APPLICATION OF GF-1118, SPAIN - 2003 Sub Company : Owner Company : DOW AGROSCIENCES Report No : GHE-P-10576 Date : 02/03/2004 GLP Status : yes	158527
KIIIA 8.3.2.1/02	RAWLE NW	2005	Title : RESIDUES OF XDE-750 IN WINTER BARLEY AT HARVEST FOLLOWING A SINGLE APPLICATION OF GF-1118, SPAIN - 2004 Sub Company : Owner Company : DOW AGROSCIENCES Report No : GHE-P-10690 Date : 01/02/2005 GLP Status : yes	158528
KIIIA 8.3.2.1/03	RAWLE NW	2006	Title : RESIDUES OF FLORASULAM AND AMINOPYRALID (XDE-750) IN WINTER BARLEY AT HARVEST FOLLOWING A SINGLE APPLICATION OF GF-1362, SOUTHERN FRANCE - 2005 Sub Company : Owner Company : DOW AGROSCIENCES Report No : GHE-P-11309 Date : 02/05/2006 GLP Status : yes	158529

<b>Annex point</b>	<b>Author</b>	<b>Year</b>	<b>Title Source (where different from company) Company, Report No. GLP or GEP status (where relevant) Published or Unpublished</b>	<b>DPDB Ref. No.</b>
KIIIA 8.3.2.1/04	RAWLE NW	2006	Title : RESIDUES OF FLORASULAM AND AMINOPYRALID (XDE-750) IN WINTER AND SPRING BARLEY AT HARVEST FOLLOWING A SINGLE APPLICATION OF GF-1362, POLAND AND HUNGARY - 2005 Sub Company : Owner Company : DOW AGROSCIENCES Report No : GHE-P-11308 Date : 02/05/2006 GLP Status : yes	158530
KIIIA 8.3.3.1/01	DEVINE HC	2006	Title : RESIDUES OF CLOPYRALID, PICLORAM AND AMINOPYRALID (XDE-750) IN OIL SEED RAPE AT INTERVALS AND AT HARVEST FOLLOWING A SINGLE APPLICATION OF GF-1634, GERMANY, POLAND AND HUNGARY - 2005 Sub Company : Owner Company : DOW AGROSCIENCES Report No : GHE-P-11273 Date : 06/10/2006 GLP Status : yes	158531
KIIIA 8.3.3.1/02	DEVINE HC	2007	Title : RESIDUES OF CLOPYRALID, PICLORAM AND AMINOPYRALID (XDE-750) IN OIL SEED RAPE AT INTERVALS AND AT HARVEST FOLLOWING A SINGLE APPLICATION OF GF-1633 OR GF-871, NORTHERN EUROPE - 2006 Sub Company : Owner Company : DOW AGROSCIENCES Report No : GHE-P-11493 Date : 24/04/2007 GLP Status : yes	158532

<b>Annex point</b>	<b>Author</b>	<b>Year</b>	<b>Title Source (where different from company) Company, Report No. GLP or GEP status (where relevant) Published or Unpublished</b>	<b>DPDB Ref. No.</b>
KIIIA 8.3.4.1	WENDELBURG BM ROSSER SW	2008	Title : RESIDUES OF AMINOPYRALID IN CORN FORAGE, GRAIN, STOVER AND PROCESSED PRODUCTS Sub Company : Owner Company : DOW AGROSCIENCES Report No : 060014 Date : 26/08/2008 GLP Status : yes	158533
KIIIA 8.3.5.1	JAMES RN	2007	Title : AMINOPYRALID RESIDUES IN NEW ZEALAND FORAGE BRASSICAS 2006 Sub Company : Owner Company : DOW AGROSCIENCES Report No : 060112 Date : 27/09/2007 GLP Status : yes	158534
KIIIA 8.3.5.1	CLAY SR	2008	Title : AMINOPYRALID RESIDUES IN FORAGE BRASSICAS AMENDED ANALYTICAL GLP STUDY REPORT - 231 Sub Company : Owner Company : DOW AGROSCIENCES Report No : 231 Date : 01/05/2008 GLP Status : yes	158535
KIIIA 8.3.5.1	ALLEN K	2008	Title : AMINOPYRALID RESIDUES IN FORAGE BRASSICAS NZ FINAL REPORT REVISION 1 Sub Company : Owner Company : DOW AGROSCIENCES Report No : 060112 Date : 08/08/2008 GLP Status : yes	158536

<b>Annex point</b>	<b>Author</b>	<b>Year</b>	<b>Title Source (where different from company) Company, Report No. GLP or GEP status (where relevant) Published or Unpublished</b>	<b>DPDB Ref. No.</b>
	UNKNOWN	0	Title : OVERVIEW OF POTATO COMPLAINT INVESTIGATION UNDERTAKEN IN 2007 Sub Company : Owner Company : DOW AGROSCIENCES LIMITED Report No : N/A Date : GLP Status : no	158274
	BAILEY AD	2008	Title : EVALUATION OF THE EFFECTS OF MANURE CONTAINING AMINOPYRALID TO A RANGE OF ROTATIONAL CROPS UNITED KINGDOM 2008 Sub Company : Owner Company : DOW AGROSCIENCES LIMITED Report No : EA08L1B024 Date : 01/08/2008 GLP Status : no	158275
	BERNHARD UH BRINKWORTH LA	2008	Title : MONITORING OF AMINOPYRALID RESIDUES IN SAMPLES OF MANURE, SLURRY, GRASS AND SILAGE UNITED KINGDOM 2006-2007 Sub Company : Owner Company : DOW AGROSCIENCES LIMITED Report No : GHE-P-11844 Date : 01/08/2008 GLP Status : no	158276

Annex point	Author	Year	Title Source (where different from company) Company, Report No. GLP or GEP status (where relevant) Published or Unpublished	DPDB Ref. No.
	BERNHARD UH MASTERS R PATERSON E	2008	Title : RESPONSE OF GRASS AND BROADLEAF CROP SPECIES TO AMINOPYRALID CONCENTRATIONS IN SOIL Sub Company : Owner Company : DOW AGROSCIENCES LIMITED Report No : N/A Date : 01/11/2008 GLP Status : no	158277
	PATERSON E SHENTON ZL OUSE D	2003	Title : DETERMINING THE SOIL NO OBSERVABLE EFFECT LEVEL (NOEL) AND EFFECTIVE DOSE, ED10 OF XDE-750 ON SEVERAL GRASS AND BROADLEAF CROPS WHEN APPLIED PRE-PLANT INCORPORATED (PPI) Sub Company : Owner Company : DOW AGROSCIENCES LIMITED Report No : GHE-P-10537 Date : 11/11/2003 GLP Status : no	158278