



STATE OF MAINE  
DEPARTMENT OF AGRICULTURE, FOOD AND RURAL RESOURCES  
BOARD OF PESTICIDES CONTROL  
28 STATE HOUSE STATION  
AUGUSTA, MAINE 04333-0028

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TO: Board Members  
FROM: Lebelle Hicks PhD DABT and John Jemison PhD BPC and Cooperative Extension  
RE: Environmental Fate of Tribenuron Methyl (DuPont DPX-L5300)

September 4, 2008

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Tribenuron is the active ingredient in Express Herbicide (EPA# 352-632). There is a proposed 24c label for control of Bunchberries in lowbush Blueberry culture currently under consideration. At the August 1<sup>st</sup> Board meeting concerns regarding the potential of this compound to leach under Maine soil conditions were raised. To address these concerns DuPont submitted five studies regarding the soil metabolic pathways and the field leaching profile under three sets of field conditions. One of the studies, (DuPont 1985) was a column leaching study and the other addressed the nature of the metabolites (DuPont 1990a). These studies utilized radio-labeled [<sup>14</sup>C] tracers either in the phenyl ring and/or at the N-2 position of the triazine moiety and analysis using a liquid scintillation assay. In addition, chromatography was used to identify the metabolites. The field study application rates ranged from 30 to 35 g/ha (0.43 oz/A to 0.5 oz/A). These are within the label rates 0.25 to 0.5 oz per acre for use on grains (Express Label 2007). The lab study evaluating leaching in a column had a rate of 0.72 oz/A (DuPont 1985). The use rates for the proposed 24c label to control bunchberry is higher at 0.8 to 1 oz per acre. The soil parameters from the leaching studies done with the triazine labeled compound are summarized in Table 1.

The first step in the soil metabolism of this compound is cleavage of the sulfonylurea bond resulting in a benzene sulfonamide group and a multi-methylated triazine group (Roberts 1998). The former is metabolized to saccharin and CO<sub>2</sub> (DuPont 1990a) and the latter is metabolized to one of three de-methylated compounds.

Under laboratory conditions, no leaching was observed in the Keyport Silt soil column study using either fresh or aged soil (DuPont 1985).

In the Madera California study, radioactivity was not detected after 18 months below the top 9 inches of soil. The calculated dissipation half life (DT<sub>50</sub>) of tribenuron methyl was 19 days for the <sup>14</sup>C phenyl labeled compound was 19 days and that for the N-2- <sup>14</sup>C triazine labeled compound was 23 days. The principal degradate in the phenyl labeled study was saccharine. The principal degradates in the triazine labeled study were triazine amine and O-demethyl triazine amine (DuPont 1990b).

In the German study, other than 0.003% of applied radioactivity in the leachate, thought to be result of mineralization, radioactivity was not identified at depths greater than 30 cm (12 inches). The DT<sub>50</sub> for tribenuron methyl was calculated as 5.5 days and the DT<sub>50</sub> for the triazine amine was 38.1 days (DuPont 2001a).

The third study was performed in Denmark. Two plots were treated with tribenuron methyl and samples taken at regular intervals until day 502 after treatment. The calculated DT<sub>50</sub>s were 9 days and 5 days in the two plots. The triazine amine metabolite was the only one found in the 5 to 15 cm (2 to 6 inches).

Comparison of the soil conditions from the DuPont studies leaves us trying to compare conditions of untilled, extremely acid, variable carbon content soils to situations with plowed soils, finer textured soils, or laboratory conditions. Given what we know about how the chemical is applied, the application rate and past history of use with this product under different conditions, it is not likely that this chemical will end up in groundwater.

However, if heavy rains followed application of this material, particularly within a week of application, there is a chance of finding the chemical at low concentrations in wells or surface water.

This leaves the Board with the options of:

- a) not approving the Express 24c;
- b) approval with a groundwater monitoring component to assess movement; or
- c) approval with a groundwater monitoring component to assess movement with an education program.

<b>Table 1. Summary of Leaching Studies Performed with [Triazine -2-C<sup>14</sup>] Tribenuron Methyl and Comparison with Maine Conditions</b>							
Soil Source	Percent				pH	CEC <sup>(a)</sup>	Reference
	Sand	Silt	Clay	Organic Matter			
New Jersey, Key Point Loam; Lab	4	83	13	1.5	4.5	1.9	DuPont 1985
California, Field	61	26	13	1.6	7.3	15.4	DuPont 1990b
Germany, Clayey Silt, Lysimeter Field	6.4	78.2	15.4	1.1	6.9	11.4	DuPont 2001a
Denmark, Field	42	41.2	16.8	1.6	5.8	8.5	DuPont 2001b
Maine Downeast	Soils data: generally blueberry fields are in a pH range of 4 - 4.5, CEC are 4 - 12, and soil carbon is 6 - 20 percent based on how thick the organic pad and management (Jemison, 2008. e-mail).						

a = **Cation Exchange Capacity (me/100gm)**

<b>References Cited</b>	
DuPont 1985	Soil Column Leaching Study with [triazine C-2- <sup>14</sup> ] DPX-L5300
DuPont 1990a	Field Soil Dissipation Study of [Phenyl (U) C <sup>14</sup> ] DPX-L5300 and [Triazine -2-C <sup>14</sup> ] DPX-L5300 at Madera California, February 8, 1990
DuPont 1990b	Field Soil Dissipation Study of [Phenyl (U) C <sup>14</sup> ] DPX-L5300 and [Triazine -2-C <sup>14</sup> ] DPX-L5300 at Madera California, February 14, 1990
DuPont 2001a	Dissipation of [C <sup>14</sup> ]Tribenuron Methyl in Field Soil Lysimeters in Germany
DuPont 2001b	Field Dissipation of [C <sup>14</sup> ]Tribenuron Methyl Herbicide in Northern Europe
24c Label	Express Herbicide Proposed 24c label for control of Bunchberries in lowbush Blueberry culture DuPont 2008
Express Label 2007	Express Herbicide Section 3 label (EPA# 352-632) (DuPont 2007)
Roberts 1998	Roberts, T.R. (1998) <i>editor</i> Metabolic Pathways of Agrochemicals, The Royal Society of Chemistry