

**APPENDIX 1**  
**USE OF SELECTED HERBICIDES IN VERMONT COUNTIES 2011**  
**based on**  
**Commercial Applicator Pesticide Usage Host Group Summary**  
**Pounds of Active Ingredient 2011**

(data supplied by Vermont Agency of Agriculture, Food & Markets through FOIA)

**Use codes:** C=corn; F=forestry; G=golf courses; H=highway; L=lawncare; O=ornamental, shade trees; P=plant propagation; Q=aquatic; R=railroads; S=general pest control, structural, food processing; U=electric utility, substations, pipeline; V=small fruits, vegetables; X=field & forage. No entry = no use data available.

<b>County, herbicides</b>	<b>USES in pounds (lbs.) active ingredient</b>	<b>total</b>
<b>ADDISON</b>		
2,4-D	L 7.57 + L.26 =	7.83d
acetochlor		
alachlor		
atrazine	C 11,773.81 + V 2.67 =	<b>11,776.48</b>
glyphosate	C 37.03 + F 43.04 + L 5.20 + H 61.65 + O 127.63 + P 10 + R 154.00 + U 18.35 + V 3.33 =	460.23
metolachlor	C 7,363.95 + C 650.91 + V 3.33 =	<b>8018.19</b>
simazine	C 1,947.20 =	1947.20
<b>BENNINGTON</b>		
2,4-D	C 230.34 + G 73.46 + L32.27 + L3,042.29 =	3378.36
acetochlor		
alachlor		
atrazine	C 608.49 =	608.49r
glyphosate	C 608.82 + G 1 + F 57.68 + L1,121.61 + H 51.73 + 17.12 + P6.16 + R188 +U389.70 =	2441.82
metolachlor	C 162.90 + C 82.02 =	244.92
simazine		
<b>CALEDONIA</b>		
2,4-D	C 68.40 + G 18.93 +L 16.80 =	104.13
acetochlor	C 3,891.50 =	3891.50
alachlor		
atrazine	C 7,554.92 =	<b>7554.92</b>
glyphosate	C 639.00 + F 5.74 + H 51.15 + R 262.00 + U 4.90 =	916.79

metolachlor	C 4,591.88 + 1,143.66 =	<b>5735.54</b>
simazine	C 300.90 =	300.90

### CHITTENDEN

2,4-D	G 50.55 + L 202.78 + 3.88 + O 3.41 = 260.62	260.62
acetochlor		
alachlor		
atrazine	C 5,476.55 =	<b>5476.55</b>
glyphosate	C 341.13 + F 77.64 + H36.80 +L184.41 + O394.79 +P28.00 + <b>R 358.00</b> + T12.80 + <b>U2,118.65</b> =	3552.22
metolachlor	C 6,438.56 + 45.72	<b>6484.28</b>
simazine	C 22.50 =	22.50

Notes: Imidacloprid use = 4139.15 lbs.

### ESSEX

2,4-D		
acetochlor		
alachlor		
atrazine	C 443.70 =	443.70
glyphosate	C 4,932.73 + F 2.22 + H 9.80 + Q 9.80 + R 116.00 + U 125.15 = 5185.90	<b>5185.90</b>
metolachlor	C 4,869.49 + 668.70 =	<b>5538.19</b>
Simazine	C 143.10 =	143.10

### FRANKLIN

2,4-D	G 6.13 + L 5.86 =	11.99
acetochlor		
alachlor		
atrazine	C 18,130.43 + X 1,264.73 =	<b>19,395.16</b>
glyphosate	C 5,459.25 + F 23.50 + H 52.15 + R 280.00 + <b>U 1,630.35</b> + <b>X 30,997.00</b> =	<b>36,978.25</b>
metolachlor	C 13,240.91 + 208.59 =	<b>13,449.50</b>
simazine	C 623.70 =	623.70

### GRAND ISLE

2,4-D	G 82.08 + L 0.48 +H 9.35 + R 226.00 = 317.91	317.91
acetochlor		
Alachlor		

atrazine	C 3,128.35 =	3138.35
glyphosate	C 308.00 + F 7.20 + U 63.85 =	379.05
metolachlor	C 2,678.15 =	2678.15
simazine	C 90.00 =	90.00

### LAMOILLE

2,4-D	G 6.13 =	6.13
acetochlor		
alachlor		
atrazine	C 1,088.04 =	1088.04
glyphosate	C 277.75 + G 4 + F 1.50 +H 17.50 + L 1.70 +O 2.20 + U 37.00 =	341.45
metolachlor	C 582.75 =	582.75
simazine	C 26.10 =	26.10

### ORANGE

2,4-D	C 10.25 + G 24.06 + L 576.17 + X 2 =	612.48
acetochlor		
alachlor		
atrazine	C 1,735.98 =	1735.98
glyphosate	C 92.60 + F 48.68 + H 22.40 + R 136.00 + U 69.10 =	368.78
metolachlor	C 752.35 + 582.75 =	1409.35
simazine	C 26.10 =	26.10

NOTE: Imidacloprid use = O 1,374.61 lbs.

### ORLEANS

2,4-D	C 7.60 + G 62.94 + G 13.90 + L 29.49 =	113.93
acetochlor	C 4,097.90 =	4,097.90
alachlor		
atrazine	C 15,033.17 =	15,033.17
glyphosate	C7,122.62 + G1.32 + H21.50+ O 40+R 268+ U81.70 =	7537.14
metolachlor	C 12,870.23 + 3,687.35 =	16, 557.58
simazine	C 186.30 =	186.30

### RUTLAND

2,4-D	C 53 + G 2.93 + L 292.04 + 2,849.22 =	3197.19
acetochlor		
alachlor		
atrazine	C 1,873.08	1873.08
glyphosate	C 429.84 + G 2 + F38.31 + L 116.88 + R 394 + U 102.86 =	1083.89
metolachlor	C 234.80 + 859.41 =	1094.21

simazine

NOTE: TFM use = 1,823.20 lbs.

#### UNKNOWN

glyphosate	S 51.81 =	51.81
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#### WASHINGTON

2,4-D	C 180.50 + G 51.30 + L 6.83 + Q 6.48 + U 0.95 =	246.06
acetochlor		
alachlor		
atrazine	C 1,503.23 =	1503.23
glyphosate	C 3,366.00 + F 103.73 + O 254.83 + R 368.00 + U 72.40 =	4164.96
metolachlor	C 1,625.31 + 481.87 =	2107.18
simazine	C 306.90 =	306.90

NOTE: Imidacloprid use = O 1,372.89 pounds

#### WINDHAM

2,4-D	C 0 + G 8.9 + L 6.48 + 12.29 =	27.67
acetochlor		
alachlor		
atrazine	C 1,008.98 =	1008.98
glyphosate	C 26.06 + F 12.91 + L 172.32 + O 90.00 + P 121.88 + U 587.15 =	1010.32
metolachlor	C 275.28 + 2.43 =	277.71 mt
simazine		

#### WINDSOR

2,4-D	G 20.95 + L 4,716.94 =	4737.89
acetochlor		

alachlor		
atrazine	C 725.73 =	725.73
glyphosate	C 124.00 + G 168.00 + F 277.52 + L 338.56 + P 2.20 + R 382.00 + U 217.25 =	1509.51
metolachlor	C 4.76 + 490.80 =	494.76
simazine		

NOTE: Imidacloprid use = O 6,872.86 lbs.

### OTHER NOTES FOR 2011 (References at end of Appendices)

1. Note huge use (more than 10,000 lbs each) of atrazine, glyphosate and metolachlor in Franklin County; high use (>5,000 lbs) of metolachlor in Addison, Caledonia, Chittenden, Franklin and Orleans Counties. Atrazine is recognized by EPA to target the endocrine system in humans and animals (US EPA 2007). Components of Roundup have been found by researchers to act as EDCs (Richard S et al 2005; ). Metolachlor can affect reproductive endocrinology of rats (Mathias FT et al 2012).

2. Note following **high uses of glyphosate** (in pounds):

Chittenden County: railroad, 358.00; utilities 2,118.65

Franklin County: railroad, 280.00; utilities, 1,630.35; field and forage, **30,997.00**

Railroads and utilities use glyphosate in areas closest to water. Glyphosate is being studied as a viable source of phosphorous for algae and cyanobacteria in water bodies (Cummings et al 2009; Perez et al 2009; I believe this source has not yet been considered in the TMDL calculations for phosphorus in Lake Champlain.

3. 2,4-Dichlorophenoxyacetic Acid and 2,4-D are listed sometimes listed separately but are the same compound. C.Giguere explains (email, 9/30/13) that different people have been responsible for this database, and that once an active ingredient is assigned to an EPA Number every time that EPA number is reported, the sum total of pounds for the reported active ingredient (A.I.) is added to the tally of pounds used and reported out for that particular A.I. Both A.I.'s are listed separately but are in fact the same and can be added for a total used.

4. CGA-77102 or s-metolachlor is an isomer of metolachlor listed separately from metolachlor in pesticide data. They are added together here for purposes of understanding total uses.

5. Imidacloprid is a neonicotinoid insecticide noted in Appendices 1 and 2 above because of its large use in Bennington, Chittenden, Lamoille, Orleans and Windsor Counties and its relationship to bee colony collapse (Laycock I et al 2012). Research indicates that imidacloprid reduces beneficial arthropod populations (Szczepaniec A et al 2011), and causes immuno-toxicity to mice (Badgular PC et al 2013) and chickens (Kammon AM et al 2012). What implications might these findings have for endangered bats?

## APPENDIX 2

### USE OF SELECTED HERBICIDES IN VERMONT COUNTIES 2012

based on

#### Commercial Applicator Pesticide Usage Host Group Summary 2012 Pounds of Active Ingredient

(data supplied by Vermont Agency of Agriculture, Food & Markets)

**Use codes:** C=corn; F= forestry; G=golf courses; H=highway; L=lawn care; O=ornamental, shade trees; P =plant propagation; Q=aquatic; R=railroads; S=general pest control, structural, food processing; U=electric utility,substations, pipeline; V=small fruits, vegetables; X=field & forage. No entry = no use data available.

<u>County, herbicides</u>	<u>USES in pounds (lbs.) active ingredient</u>	<u>total</u>
<b>ADDISON</b>		
2,4-D	C 8.20 + G 30.60 + L 35.92 + 7.05 + U 2.85 + X 4.10 =	88.72
acetochlor		
alachlor		
atrazine	C 751.04 + X 11,412.92 =	<b>12,163.96</b>
glyphosate	C 2,838.01 + F 64.54 + L 37.22 +H 85.85 + O 88.39 + P 16.00 + R 71.00 + U 50.66 =	3251.67
metolachlor	C 994.82 + C 2,867.98 + X 575.36 + 6,446.88 =	<b>10,885.04</b>
simazine	C 1,251.27 + X 4,476.00 =	<b>5727.24</b>

#### **BENNINGTON**

2,4-D	G 34.79 + L 314.17 + 1,078.06 + U 1.66 =	1428.68
acetochlor		
alachlor		
atrazine		
glyphosate	G 1.88 + F 4.06 + L 1,235.96 + H 126.00 +O 382.68 + P 30.00 + R 168.00 + U 158.02 =	2079.60
metolachlor		
simazine		

Note: Total reported pesticides (not indicated above) for this county = 28,927.47 lbs, of which 28,177 were used in golf, lawn care and ornamental. Imidacloprid use included O=1600 lbs.

#### **CALEDONIA**

2,4-D	G 15.80 + L 10.38 =	26.18
acetochlor		
alachlor		
atrazine	C 3,613.87 =	3613.87
glyphosate	C 852.00 + H 105.40 +R 180.00 =	1137.40
metolachlor	C 674.73 + C 2,850.48 =	3525.21
simazine	C 103.50 =	103.50

### CHITTENDEN

2,4-D	G 58.29 + L 119.42 + 266.51 + U 2.85 =	447.07
acetochlor		
alachlor		
atrazine	C 1,820.51 + X 651.05 =	2471.56
glyphosate	C 900.34 + G2.05 + F 255.39 + L579.43 + H227.70 + O 26.60 +Q 522.94 +RR 325 + U181.36 =	3020.81
metolachlor	C 126.96 + C 948.96 + X 121.22 =	1197.14
simazine	C 126.00 =	346.00

Notes: Imidacloprid used on golf courses = 49.10 lbs and ornamental, 664.83 lbs = ; TFM use = 32,400 lbs.

### ESSEX

2,4-D	C 114.00=	114.00
acetochlor		
alachlor		
atrazine	C 401.88 =	401.88
glyphosate	C 196.00 + F 2.39 + H28.95 +Q13.40 +R 137.84 +U36.25 =	388.83
metolachlor	C 869.65 =	869.65
simazine		

### FRANKLIN

2,4-D	C 76.00 + G 54.61 +L 7.32 + 31.74 =	169.67
acetochlor		
alachlor		
atrazine	C 21,469.77 =	21,469.77
glyphosate	C 8,427.49 + F 16.53 + L7.91+ H77.50+R 372.00 +U 54.15 =	8955.58
metolachlor	C 950.76 + 13,582.76 =	14,533.52

simazine	C 1,351.80 + L 2.00 =	1353.80
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ALSO: 36,720.00 lbs of TFM used.

**GRAND ISLE**

2,4-D	G38.00 + L 4.88 + 3.53 =	46.41
acetochlor		
alachlor		
atrazine	X 2.41 =	2.41
glyphosate	F 8.56 +H 3.65+ R 28.00 + X2.00 =	42.21
metolachlor		
simazine		

**LAMOILLE**

2,4-D	G 49.80 + L 4.88 +10.58 =	65.26
acetochlor		
alachlor		
atrazine	C 1,868.79 =	1868.79
glyphosate	C 580.25 + G 4.00 + F 1.25 +L 6.86 + H30.10 + U 66.75=	689.21
metolachlor	C 900.74 +676.82 =	1577.56
simazine	C 123.30 =	123.30

**ORANGE**

2,4-D	G 3.83 + L 203.06 + 1.07 + X 6 =	213.96
acetochlor		
alachlor		
atrazine	C 2,082.64 =	2082.64
glyphosate	C 1,364.61 + F 39.84 + H 163.45 +R 78.00 + U 55.55 =	1701.45
metolachlor	C 2,617.18 + 1,790.05 =	4407.23
simazine	C 811.23 =	811.23

NOTE: Imidacloprid use= 483.54 lbs; triclopyr aquatic use = 1,545.60 lbs.

**ORLEANS**

2,4-D	C 19 + G 31.29=	50.29
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acetochlor	C 11,163.10 =	<b>11,163.10</b>
alachlor		
atrazine	C 19,071.59 =	<b>19,071.59</b>
glyphosate	C 5,262.06 + L 2.00 + H 94.60 + O 40.00 + R 210.00 + U 49.90 =	<b>5658.56</b>
metolachlor	C 4,213.61 +5,789.66=	<b>10,003.27</b>
simazine	C 989.10 + L 1.00 =	990.10

#### **RUTLAND**

2,4-D	C 11.79 + G 27.06 + L 231.47 +U 8.55 =	278.87
acetochlor		
alachlor		
atrazine	C 3,858.24 =	3858.24
glyphosate	C 1,363.95 + G 2 + F 2.08 + L 174.45 + H 217.25 + R 286.00 + U 21,578.47 =	<b>23,624.20</b>
metolachlor	C 101.34 + C 2,961.86 =	3063.20
simazine	C 476.06 =	476.06

#### **WASHINGTON**

2,4-D	G 38.78 + L 67.37 + 38.79=	144.94
acetochlor	C 16,795.80 =	<b>16,795.80</b>
alachlor		
atrazine	C 15,966.05 =	<b>15,966.05</b>
glyphosate	C 3,539.05 + G 1+ F 67.37 + L 4.00 + H 175.55 + Q 7.20 + R 140.00 +U 10.00 =	3944.17
metolachlor	C 415.72 +1,229.57 =	1645.29
simazine	C 267.08 =	267.08

#### **WINDHAM**

2,4-D	G 17.75 + L 32.39 =	50.14
acetochlor		
alachlor		
atrazine	C 218.61 + X 703.19 =	221.80
glyphosate	C 75.06 + F 16.32 + L 201.33 + H 195.00 + O 88.00 + R 216.00 + U 234.30 =	1026.01
metolachlor	C 12.59 + 165.60 +X 86.13 =	263.72

simazine

**WINDSOR**

2,4-D	C 1.80 + G 37.92 +L 1,799.30 =	1839.02
acetochlor		
alachlor		
atrazine	C 1,115.63 =	1115.63
glyphosate	C 474.48 + G 50.00 + F 212.99 + G 148.04 + H 349.35 + O 36.38 + R 396.00 + U 475.94 +X 2.00 =	1785.18
metolachlor	C 824.88 =	824.88
simazine	C 10.00 =	10.00

NOTE: **Imidacloprid** use: **54,221.47 lbs.**

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**APPENDIX 3**

**YEARLY GRAND TOTAL REPORTED USE OF PESTICIDES (in pounds) SINCE 2000:**

2000:	973,219.32
2001	1,149,295.78
2002	840,572.89
2003	439,384.03
2004	424,507.68
2005	388,905.28
2006	502,209.48
2007	442,465.20
2008	225,441.95
2009	404,104.96
2010	410,241.81
2011	574,899.72
2012	634,407.04

([http://agriculture.vermont.gov/pesticide\\_regulation/pesticide\\_usage\\_reported](http://agriculture.vermont.gov/pesticide_regulation/pesticide_usage_reported))

## REFERENCES FOR APPENDIX 1

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