VERMONT
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Neonicotinoid use in Vermont

Presented to the Agricultural Innovation Board by the Agency of Agriculture, Food and Markets
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Vermont neonicotinoid use over the last five years

There are a total of 366 products containing neonicotinoid active ingredients registered in Vermont, including agricultural, commercial pest control, and animal health products. In Vermont, all outdoor-use neonicotinoid containing products are classified as restricted use and can only be purchased and used by certified pesticide applicators. Pesticide use is reported annually to the Agency of Agriculture, Food and Markets (the Agency) by certain certified applicators, including commercial, non-commercial, and government certified applicators.

Neonicotinoid usage data reported for the last five years is summarized below (Table 1). Note that these data do not include usage by certified private applicators, who may apply pesticides (including those classified as restricted use) on their own property and are not required to report their individual usage data, or usage from seeds treated with neonicotinoids, which is discussed separately below.

Vermont neonicotinoid use by commercial, non-commercial, and government certified applicators

Use of neonicotinoids began in Vermont when imidacloprid was first registered in 1994. Neonicotinoid use data presented in this section doesn't reflect homeowner use, seed treatment applications or applications by private applicators. From 2017 to 2021 the most neonicotinoid products are used in the landscaping industry and on golf courses and for structural pest control (Table 1).

Table 1. Total pounds of neonicotinoids reported by commercial applicators, 2017-2021.

Pounds of Neonicotinoids Used Commercially in VT (2017-2021)					
CLOTHIANIDIN					
Treatment Use Type	**2017**	**2018**	**2019**	**2020**	**2021**
Lawn Care & Ornamentals	1.4	1.6	1.2	1.2	1.7
Golf Courses	7.1	5.3	20.4	9.7	18.4
General Pest Control	0.3	2.2	3.9	8.5	25.4
Greenhouse / Nursery	*NR*	*NR*	*NR*	*NR*	*NR*
Produce Production	*NR*	*NR*	*NR*	*NR*	*NR*
Corn, Field & Forage	*NR*	*NR*	*NR*	*NR*	*NR*
Highway & Railway	*NR*	*NR*	*NR*	*NR*	*NR*
Forestry	*NR*	*NR*	*NR*	*NR*	*NR*
THIAMETHOXAM					
Treatment Use Type	**2017**	**2018**	**2019**	**2020**	**2021**
Lawn Care & Ornamentals	*NR*	*NR*	*NR*	*NR*	*NR*
Golf Courses	4.0	5.6	3.7	7.7	0.7
General Pest Control	3.0	2.5	2.5	0.2	3.7
Greenhouse / Nursery	0.0002	0.0006	*NR*	0.003	*NR*
Produce Production	*NR*	*NR*	0.2	*NR*	*NR*
Corn, Field & Forage	*NR*	*NR*	*NR*	2.1	*NR*
Highway & Railway	*NR*	*NR*	*NR*	*NR*	*NR*
Forestry	*NR*	*NR*	*NR*	*NR*	*NR*
IMIDACLOPRID					
Treatment Use Type	**2017**	**2018**	**2019**	**2020**	**2021**
Lawn Care & Ornamentals	676.0	646.3	662.0	574.1	646.5
Golf Courses	185.3	152.6	218.7	146.5	168.5
General Pest Control	269.2	183.3	91.1	307.5	96.6
Greenhouse / Nursery	0.06	0.05	0.02	0.03	0.02
Produce Production	*NR*	0.2	*NR*	*NR*	4.0
Corn, Field & Forage	*NR*	*NR*	*NR*	*NR*	*NR*
Highway & Railway	*NR*	*NR*	0.07	*NR*	*NR*
Forestry	*NR*	0.01	*NR*	*NR*	*NR*
DINOTEFURAN					
Treatment Use Type	**2017**	**2018**	**2019**	**2020**	**2021**
Lawn Care & Ornamentals	11.5	10.8	33.7	17.7	14.2
Golf Courses	*NR*	*NR*	*NR*	*NR*	0.6
General Pest Control	2.0	2.6	2.8	9.4	7.5
Greenhouse / Nursery	24.1	0.05	0.06	0.03	*NR*
Produce Production	*NR*	*NR*	*NR*	*NR*	*NR*
Corn, Field & Forage	*NR*	*NR*	*NR*	*NR*	*NR*
Highway & Railway	*NR*	*NR*	*NR*	*NR*	*NR*
Forestry	*NR*	*NR*	0.08	*NR*	*NR*
ACETAMIPRID					
Treatment Use Type	**2017**	**2018**	**2019**	**2020**	**2021**
Lawn Care & Ornamentals	*NR*	0.4	2.0	1.7	1.7
Golf Courses	*NR*	*NR*	*NR*	*NR*	*NR*
General Pest Control	6.3	36.6	9.2	26.9	0.9
Greenhouse / Nursery	*NR*	*NR*	*NR*	*NR*	*NR*
Produce Production	1.0	7.6	1.7	1.5	4.8
Corn, Field & Forage	*NR*	*NR*	*NR*	*NR*	*NR*
Highway & Railway	*NR*	*NR*	*NR*	*NR*	*NR*
Forestry	*NR*	*NR*	*NR*	*NR*	*NR*

NR = none reported

Although there are products registered in the state containing at least five different neonicotinoid active ingredients, imidacloprid is the most common neonicotinoid applied commercially not including treated seed (Figure 1). Imidacloprid has remained the most common neonicotinoid used by commercial applicators over the past five years. When the commercial use of imidacloprid is classified by treatment type for 2021, use as lawn and ornamental plant treatments account for 71% of imidacloprid use, followed by 18% used on golf courses and 11% in the structural pest control industry (Figure 2).

Figure 1. Total pounds of neonicotinoids reported by commercial applicators, 2021.

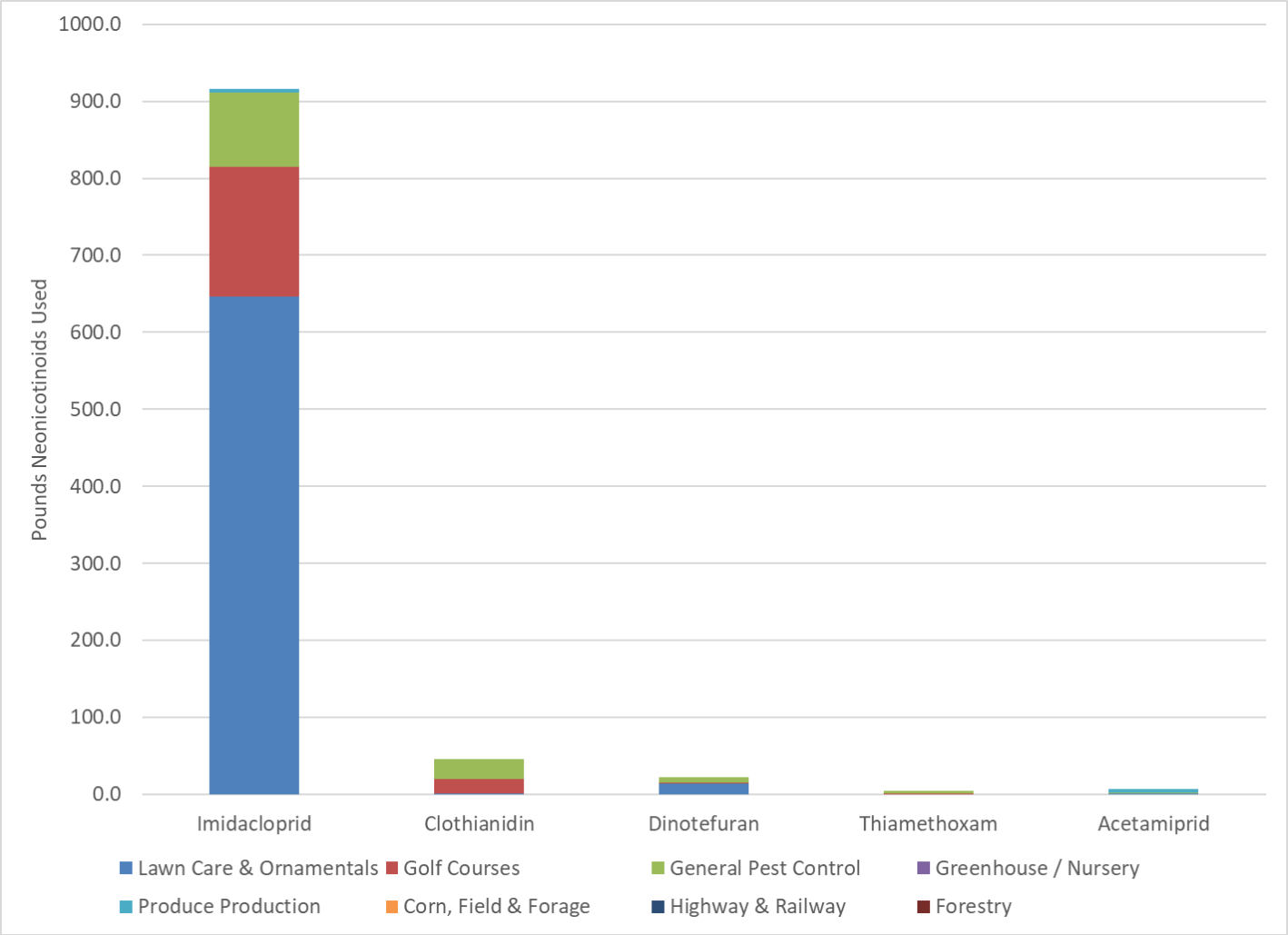
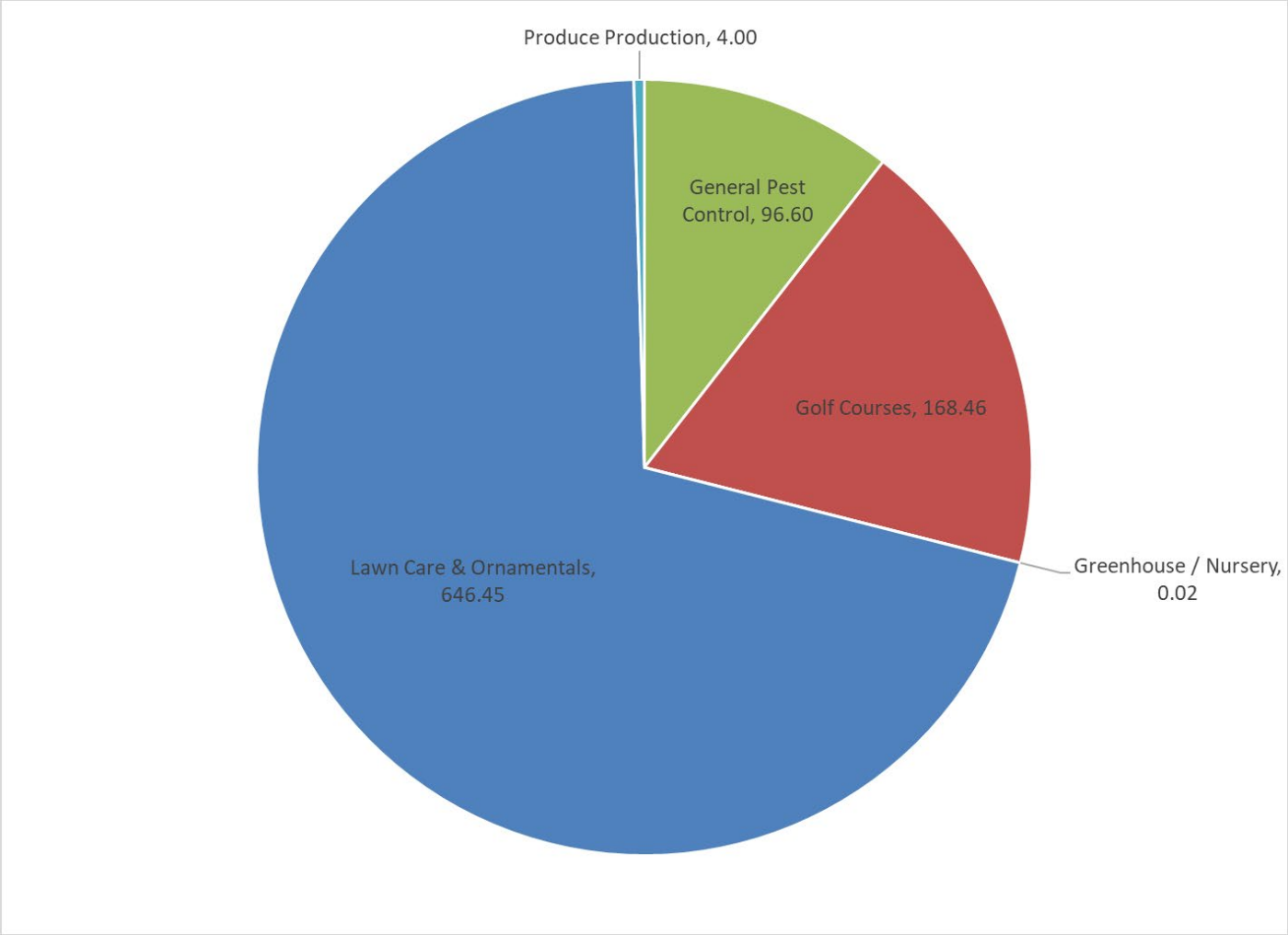


Figure 2. Total pounds imidacloprid commercial use in Vermont by treatment type, 2021.



Estimated neonicotinoid use on treated seeds

A significant quantity of neonicotinoid insecticide is used in Vermont on treated seed. All field corn is treated out of state by the seed manufacturer with a neonicotinoid and/or a diamide insecticide and a fungicide to protect the seeds and young seedlings from pests. The treated seeds are sold into Vermont either directly to a crop producer or to a Vermont-based registered seed distributor. These treated seeds are considered "treated articles".

The Agency requires reporting on the quantity of treated article seed and the quantity of untreated seed sold in Vermont. According to seed sales reported to the Agency in 2022, approximately 99.6% of corn planted is treated with neonicotinoids with 87% of the treated corn using clothianidin as an active ingredient. The remaining 13% is treated with thiamethoxam. Based on this information, the reported acreage planted in corn, and average seeding rates, the Agency makes the following estimate of neonicotinoid use attributed to treated seeds: 0.25 - 1.25 mg active ingredient per seed * 30,000 seeds per acre * 99.6% of 90,000 acres ≈ 1,482 – 7,410 pounds of neonicotinoid active ingredient per year in Vermont (or 1,289 – 6,447 pounds of clothianidin and 193 – 963 pounds of thiamethoxam per year). This is a result of an application rate of approximately 0.02-0.08 pounds active ingredient per acre over the large number of acres planted in corn. According to soybean seed sales reported to the Agency in 2022, approximately 34% of the soybeans planted are treated with neonicotinoids. Based on the 2022 USDA CroplandCROS estimated acreage of soybeans in Vermont, average seeding rates per acre, and the range of seed treatment application rates, the Agency estimates: 0.075 – 0.23 mg active ingredient per seed * 160,000 soybean seeds per acre * 34% of 7,000 acres planted in soybean ≈ 63 – 193 pounds of neonicotinoid active ingredient per year in Vermont.

Including the use of neonicotinoids on treated seed significantly increases the total pounds of neonicotinoids used, with treated seed use contributing more than any other treatment type. However, when evaluating pesticide use, the most useful metric is the rate of application per acre, not the total amount used in a geographic area. Application rates are prescribed by the label, after a review of exposure and environmental fate studies, and set to result in no unreasonable adverse effects at those rates. When comparing the data on a rate per acre basis, the lawn care and ornamental industry apply imidacloprid (the most commonly used neonicotinoid) at a maximum rate of 0.4 lb active ingredient per acre per year and planting of treated seed (as estimated above) applies a maximum rate of 0.08 lb active ingredient per acre per year.