

Dec 9 2013 MN Environment, natural resources, agriculture, finance committee meeting
Protecting bees by understanding systemic insecticides
 Vera Krischik, Department of Entomology, University of Minnesota



Bees feed on pollen and nectar to pollinate flowers to produce fruits and seeds.



Honey bees are the buzz at U of M, Capitol - ABC Newspapers, Tim Budig, June 4, 2013 at 4:45 pm

Systemic neonicotinyl insecticides (imidacloprid or clothianidin) are widely used due to low toxicity to humans, but they are very toxic to bees and birds as addressed in 2 new review papers by the Xerces Society (2012) and American Bird Conservancy (2013). See the 2010 LCCMR pollinator website for research and outreach products and review papers at www.entomology.umn.edu/cues/pollinators/index.html.



Systemic insecticides move from the soil to the leaves and pollen and nectar of the plant, as shown in the drawing. Imidacloprid accumulates in pollen, nectar, and seeds from soil treatments and tree injections



To understand how little kills a bee or reduces foraging, let us think of a heart healthy aspirin that is 80 milligrams = 80,000 micrograms= 80,000,000 nanograms or ng. A bee is killed when it feeds on 4-40 ng of imidacloprid. That would be 40-400 ppb imidacloprid in pollen or nectar.

Seed treatments on canola use 0.11 mg of imidacloprid on the seed that results in 2 ppb in nectar and up to 10 ppb in pollen. These residue levels in pollen and nectar do not kill bees, but reduce foraging.

Much higher amounts of imidacloprid are used in field crops and landscape plants. In agriculture 4mg of imidacloprid/sgft can be applied which results in 14 ppb in squash and 122 ppb in pumpkin nectar. It is common for imidacloprid to be applied to basswood trees and native plants

in gardens to kill insects. Under a basswood trees, 67g is applied or 270 mg is applied to flowering plants. We do not know how much imidacloprid accumulates in pollen and nectar and if there is enough to kill bees. Few studies exist, but 550 ppb were found in Eucalyptus nectar and that amount would kill a bee.



Neonicotinyl insecticide use in US

	Imidacloprid lbs (ai)	Clothianidin lbs (ai)	Thiamethoxam lbs (ai)
MN	52,048	43,663	68,876
CA	348,247	3,182	30,687
US	700,000	1,200,000	990,000
US	In 2009 143/442 million acres use a neonicotinyl insecticide 83 million acres of corn have seed treatments of neonicotinyls and honeybees rely on corn for pollen		

Estimated Agricultural Use for Imidacloprid , 2009

