TURFDISEASES
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SPRAY PESTICIDES? TIME TO LEARN ABOUT ENDOCRINE DISRUPTION.

Posted by Paul Koch on 05 Feb 2014 / 0 Comment

‘THE DOSE MAKES THE POISON.’

It is arguably the central tenet of toxicology, and one I heard hundreds of times during my classes as a Toxicology minor at the University of Wisconsin. Attributed to Paracelsus (the ‘Father of Toxicology’) in the early 1500’s, it basically means that any substance can be poisonous if the dose is high enough and any substance can be non-poisonous if the dose is small enough. This principle has shaped toxicology for centuries and remains the prime force behind pesticide regulation today. When registering a particular pesticide, the U.S. Environmental Protection Agency (EPA) determines the maximum exposure (dose!) a person can encounter in their daily lives without experiencing detrimental effects both in the near and long term. Then they determine how much the average person would be exposed to the pesticide in all potential uses (i.e. from putting greens, lawns, eating apples, etc.) and will allow certain uses and maximum application rates to make sure the average exposure remains under the maximum

exposure. As you can imagine, more toxic substances require lower exposures to reduce the risk to the general population and the environment while higher exposures are allowed for less toxic substances.

Notable Turfgrass Pesticides on the Endocrine Disruptor Screening List*

- Fungicides
  - Chlorothalonil
  - Fosetyl-Al
  - Iprodione
  - Propiconazole
  - Tebuconazole
- Herbicides
  - 2-4, D
  - Glyphosate
  - Quinclorac
- Plant Growth Regulators
  - Paclobutrazol
  - Trinexapac-ethyl
- Insecticides
  - Carbaryl
  - Chlorpyrifos
  - Imidacloprid

*The entire list of chemicals to be screened for endocrine disruption can be found at epa.gov/endo

But what if tiny amounts of a substance could have harmful effects that were not picked up by traditional toxicology tests and weren't immediately noticeable. This was the primary concern with endocrine disrupting chemicals, which have been studied to varying degrees for decades. The endocrine system is too complex to discuss in depth here, but it can be thought of as the hormone system (i.e. estrogen and testosterone). One hallmark of hormones is that they operate at very low concentrations, and hence very small disruptions can cause huge alterations to the body. An altered hormone system has been implicated in everything from increased rates of breast and prostate cancer to increased rates of attention deficit disorder in teens.

Beginning in 1996, the Food Quality Protection Act (FQPA) mandated that the EPA test all pesticides for their endocrine disrupting abilities. Because this is a sensitive and relatively poorly understood topic, it took the EPA a REALLY long time to actually implement the testing. The Endocrine Disruptor Screening Program (EDSP) was created in 1998 and it wasn't until April 15th, 2009 that the initial list of chemicals to be screened was released. Another list was released in November of 2010, and both lists contain a lot of pesticides you should be very familiar with (see figure).

So how might this affect you? In the next few years the EPA will release the results of their initial screening and will identify any chemicals that are of concern regarding endocrine disruption. Those chemicals will then undergo further testing to determine what types of endocrine disruption they cause and the degree to which they disrupt. Since significant alterations can be caused by very low exposure levels, however, it seems unlikely that the exposure level of any potent endocrine disruptor can be reduced to a level that is considered acceptable to the environment and the general population. Expect the turf registration of any potent endocrine disruptors to be severely curtailed or removed entirely.

This is a really complex topic, and I have only given the very basics, but the fact that the dose might not necessarily make the poison has the potential to significantly alter the pesticide landscape. As more information is released by the EPA we'll do our best to relay it to you. Much more information can be found at the EPA's Endocrine Disruptor Screening Program website (www.epa.gov/endo).