Neonicotoinoid facts for the Greenhouse Industry

Cliff Sadof
Purdue University
Department of Entomology
765-494-5983
csadof@purdue.edu

For the past decade neonicotinoid insecticides, such imidacloprid and dinotefuran, have been an essential part of greenhouse pest management programs that target whiteflies, mealybugs, and aphids. These products have been widely adopted due to their ease of use and relatively low price. Unfortunately, use of these products in the agricultural sector as seed treatments has caused concern about their impact on the health of pollinators. Several unfortunate and widely publicized events, including the death of bumble bees foraging on linden trees have placed neonicotinoid use at the forefront in newspaper articles about the causes of pollinator decline. This along, with a report in June 2014 that found residues of these pesticides in flowers purchased at box stores such as Home Depot, Lowes at levels that could be toxic to bees has made the use of neonicotinoids unpopular among consumers. Home Depot has already announced that in 2015 it will require a label on each plant that has been treated with a neonicotinoid insecticide. Other stores are likely to follow suite, or even ban the sale of plants treated with these products.

On Oct 1, 2014, I was in North Carolina at a meeting of ornamental pest management researchers who were discussing the neonicotinoid issue. During this meeting several things became quite clear.

1. Neonicotinoid insecticides are toxic to bees at low doses and have the capacity to kill them outright, or make them disoriented and unable to return to the hive. When worker bees fail to return, colonies die from lack of food.
2. Although bee researchers agree that neonicotinoid use can contribute to bee decline, Varroa mites, and other maladies are more important contributors to what has been commonly called colony collapse disorder (CCD). Evidence for this largely comes from observations that suggest that CCD started before the widespread use of neonicotinoid insecticides.
3. Not nearly enough research has been be conducted to show that the use of neonicotinoids in greenhouses produces plants that are safe, or toxic to bees because it is quite expensive, costing over $100,000 to evaluate an individual plant and growing practice. The few rigorous studies (Krischik 2011) that have been conducted suggest that use of products like Marathon at the labeled rate (300 mg/ 3 gal pot) result in toxic levels of imidacloprid in the nectar of Agastache, Asclepias, and Esperanza, as well as in the pollen of roses. The impact of these levels on pollinator health depend on the

proportion of floral resources available to pollinators in the landscapes in which these plants are planted.

4. In the absence of hard data, and in the presence of a media storm that continues to connect the use of neonicotinoids to CCC, it is very likely that regulatory changes and customer demands will reduce your ability to sell plants treated with neoniconitoids in the future.

As growers you can choose to continue to use neonicotinoids in accordance with the label and do your best to comply with requirements that your commercial clients will set. But, this puts you at risk to restrictions that are out of your control. Now is the time for you to have some frank discussions with your biggest customers to be sure that you have plants that you can sell next spring.

Fortunately, it is still possible to make changes in your growing practices so that you can produce high quality plants for next spring's market without neonicotinoids. The attached table prepared by Dave Smitley at Michigan State University and Eric Rebek of Oklahoma State University can be used to help you find alternatives. If Michigan growers are following these guidelines, you can bet that there will be plenty of neonicotinoid free plants available for sale in the spring of 2015.

Background Reading

Gardeners Beware 2014: Bee-toxic pesticides found in "Bee-Friendly" plants sold at garden centers across the US and Canada. Although this study does not demonstrate that plants in the landscape are the cause of CCD it raises many questions. It also has a very good bibliography of much of the research that has been published in scientific journals.
http://libcloud.s3.amazonaws.com/93/88/f/3354/Gardeners-Beware-Report-11.pdf

Table 1. Alternative chemistries to neonicotinoids and pyrethroids for key arthropod pests of greenhouse crops.

Trade Name	Active Ingredient(s)	Insecticide Class	Thrips	Aphids	Whiteflies	Scales	Mealybugs	Spider Mites	BroadMites Cyclamen Mites
Aria	Flonicamid	Pyridinecarboxamide	X	X	X		X		
Azatin/Ornazin	Azadirachtin	IGR	X	X	X	X	X		
Botanigard/Mycotrol	*Beauveria bassiana*	Parasitic fungus	X	X	X		X	X	
Avid	Abamectin	Avermectin	X	X	X			X	X
Orthene/Precise	Acephate	Organophosphate	X	X	X	X	X		
Mesurol	Methiocarb	Carbamate	X	X					
Preferal/NoFly	***Isaria fumosorosea***	**Parasitic fungus**	**X**	**X**	**X**		**X**		
Enstar	Kinoprene	IGR	X	X	X	X	X		
Endeavor	Pymetrozine	Pyridine azomethine		X	X				
Distance	Pyriproxyfen	IGR		X	X	X			
Kontos	**Spirotetramat**	**Keto-enol**		**X**	**X**		**X**	**X**	
Ultra-Pure Oil/SuffOil-X	Petroleum oil	Horticulture oil		X	X	X	X	X	
Sunspray UFO	Paraffinic oil	Horticulture oil	X	X	X	X	X	X	
Triact Oil	Neem oil	IGR		X	X	X	X	X	
M-Pede	Insecticidal soap	Soap		X	X	X	X	X	
Hachi-Hachi	Tolfenpyrad	Pyrazole	X	X	X	X			
Pedestal	Novaluron	IGR	X		X				
Mainspring	**Cyantraniliprole**	**Ryanidine inhibitor**	**X**		**X**				
Overture	**Pyridalyl**	**N/A**	**X**						
Conserve	Spinosad	Bacterium extract	X						
Pylon	**Chlorfenapyr**	**Pyrroles**	**X**					X	X
Adept	Diflubenzuron	Benzamide			X				
Preclude	Fenoxycarb	IGR	X	X	X	X			
Talus	Buprofezin	IGR			X	X	X		
Floramite	Bifenazate	Carbazate						X	
Shuttle	Acequinocyl	Quinoline						X	
Ovation	Clofentezine	Tetrazine						X	
TetraSan	Etoxazole	Diphenyl oxazoline						X	
Magus	Fenazaquin	Quinazoline			X			X	
Akari	Fenpyroximate	Pyrazole						X	X
Hexygon	Hexythiazox	Carboxamide						X	
Met52	*Metarhizium anisopliae*	Parasitic fungus	X		X			X	X
Sanmite	Pyridaben	Pyridine			X			X	X
Judo	**Spiromesifen**	**Keto-enol**			**X**			**X**	**X**
Sultan	**Cyflumetofen**	**Meti-inhibitor**						**X**	
Rycar	**Pyrifluquinazon**	**Unknown**		**X**	**X**		**X**		