Interpreting Chemical Structures

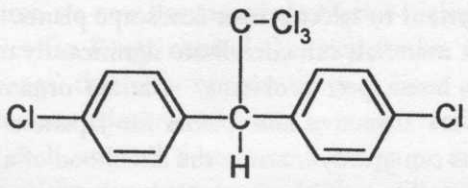
Chemists use a kind of shorthand to sketch the shape of molecules, which are made up of two or more atoms.

Abbreviations:

C = carbon
Cl = chlorine
H = hydrogen
O = oxygen
P = phosphorus
S = sulfur

Bonds:

Many atoms are connected to their neighbors by "single bonds," which are usually relatively stable and are represented by a single dash between the atoms. Sometimes atoms are connected by double bonds, which tend to be less stable and are represented by two dashes between the atoms.



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The center of the molecule is a carbon atom, which is attached to two hexagonal rings. These are rings of carbon connected by alternating single and double bonds (actually it is not quite that simple!). The central carbon also has another carbon atom attached to it (at the top of the sketch), which in turn has three chlorine atoms attached to it. Finally, there is a chlorine atom attached at the "far" end of each of the hexagonal rings.

Chemical Characteristics:

The molecular structure of an insecticide will determine its persistence, solubility in water, acute toxicity (to people or to insects), and other characteristics.

Genetic Resistance to Mole Crickets in Turf Bermudagrass

by Wayne Hanna, U.S. Department of Agriculture
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Mole crickets can quickly ruin beautiful turf if a plan to manage and/or control them is not in place. It seems that this pest is becoming more serious each year. Insect management procedures are usually continuous and must be repeated. Genetic resistance to pests is usually permanent and can greatly reduce and simplify (and possibly eliminate) some management procedures.

Development of turf cultivars with genetically controlled pest resistance is an important objective in the U.S. Department of Agriculture-ARS turf bermudagrass breeding program at the University of Georgia Coastal Plain Experiment Station in Tifton, GA. Pesticides (including insecticides) are rarely applied to the plots with experimental cultivars so that insects will infest the research area and new plant types with resistance to insects can be identified. 1996 has been an exceptionally good year to screen for genetic resistance to the tawny mole cricket (Scapteriscus vicinus) in our research plots.

In 1996, we rated mole cricket activity in 497 experimental turf bermudagrass hybrids growing in 4 x 4 meter plots replicated twice. These were selected for close mowing tolerance from over 27,000 hybrids produced in 1993. Ratings ranged from 1 (no mole cricket activity) to 9 (severe mole cricket activity) indicating at least that the mole crickets preferred some cultivars more than others. Differential feeding by the mole crickets on the experimental hybrids was dramatic. Where the lowest and highest rated plots were adjacent to each other, the crickets would not invade the non-preferred plots. Tift 94, a fine-textured cultivar introduced at Midiron at Tifton, GA, which should be

available to certified growers in 1997, continues to show the almost no mole cricket activity, as originally reported in 1993. In addition to mole cricket non-preference, Tift 94 has excellent color, quality, and cold resistance and should be an excellent grass for golf course fairways, sports fields, parks, lawns and landscaping. TW72, a potential new dwarf bermudagrass for golf greens in the future, also continued to show significantly less mole cricket damage than Tifdwarf.

The turf breeding research at Tifton, GA, shows that mole crickets prefer to avoid certain cultivars where a choice of cultivars exists. What would happen if the cultivars showing non-preference were the only ones available? Experiments will be conducted in 1997 in cooperation with Kristine Braman, entomologist at the UGA Georgia Station in Griffin, GA, to determine the level of genetic resistance associated with the non-preference.

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Planning Ahead to Minimize Insecticide Impacts on Golf Courses

by Rick L. Brandenburg
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The use of insecticides on golf courses has been documented to have the potential for adverse, off-target effects on the environment. The key word is "potential." Insecticide use can and should be directed in such a fashion so as to keep the potential risk to a minimal level. This, of course, involves the use of properly selected pesticides chosen specifically for the pest and site to be treated. It also requires that insecticides are properly applied in an appropriate manner and timed in accordance with the insect's life stage. However, minimizing the potential for adverse risk from insecticide use starts long before the actual pest outbreak.

In theory, environmentally sound pest management should start during golf course design and construction. The installation of catch basins to capture insecticide contaminated runoff has proven effective for several years on many courses. More common considerations for avoiding runoff from areas that may require insecticide use include utilizing the slope of the land to direct runoff into buffer areas and appropriate landscaping. It is important to select proper landscape plants. Some plant materials can contribute significantly to turfgrass insect pest problems. Certain ornamentals that are attractive host plants for Japanese beetle adults can greatly increase the likelihood of a white grub problem. Since Japanese beetles prefer to lay their eggs in moist soil under healthy turf, any plants that attract the adults into the vicinity of the turf are likely to increase the chances of having such a problem.

Other more subtle problems can occur with insects like the two-lined spittlebug. The adults prefer to feed on hollies while the nymphs favor certain grasses. If hollies are used in plantings around buildings, they will attract adults and soon increase the number of nymphs feeding on the turfgrass. The same is true for grubs of the green June beetle and several other common turfgrass pests. Adjustments in landscaping can help avoid insect problems and thus reduce the need for insecticide use.

Areas of special concern over insecticide use (i.e. those immediately adjacent to water) can still provide the aesthetics and challenging ball play desired without the use of highly maintained turf-