Understanding Pesticide Risk

In 1993 enrollment began for the largest health study of the US farming community, the Agricultural Health Study (AHS). Twelve years later, data from the 99,658 enrollees in Iowa and North Carolina are beginning to generate the most comprehensive assessments of the link between individual pesticides and cancer risk ever published. The risk of various cancers is just one set of health endpoints monitored in this ground-breaking study; other health problems addressed include diseases of the nervous system, as well as respiratory and reproductive health.

There have been various epidemiological attempts to better understand the relationship between pesticide exposure and cancer risk. These, together with laboratory work, have presented a patchwork of data linking some pesticides with increased risk of some cancers. The large scale and comprehensive design of the AHS are meant to specifically address the weaknesses and gaps in prior research.

Enlisting the long-term support of a large portion of the farming communities in two states, Iowa and North Carolina—both with strong agricultural sectors with diverse agricultural methods and products—enables researchers to employ the strengths of prospective cohort studies. The chemical exposure and lifestyle information that is collected from these participants is the most detailed ever: participants responded to about 250 questions in the initial survey.

Fifty pesticides were selected based on their widespread use or if previous studies indicated their potential association with health risks, and 30 more were added based on participant “write-ins.” Follow-up surveys every five years provide scientists with updated information. Including spouses in the research is an important aspect that is providing data on women and pesticide use and exposure never before collected. There is also a small percentage of female certified (North Carolina) and licensed (Iowa) pesticide applicators included in the study. Overall, two-thirds of participants are applicators and one-third are spouses. With children also registered, the understanding of the health of farm families is being greatly enhanced by the AHS.

Cancer Findings

Previous research indicates that farmers experience some cancers to a lesser extent than the general population and some cancers to a greater extent. Fewer farmers die from lung, esophagus, bladder, and colon cancers, possibly the result of smoking less, eating a healthier diet and getting more physical exercise than the average American. But studies also suggest that farmers as a group experience higher rates of Hodgkin’s disease, leukemia, multiple myeloma, non-Hodgkin’s lymphoma, and cancers of the lip, stomach, prostate, skin, brain, and connective tissue.

This project provides information from the fourth year of a study assessing the feasibility and performance of golf course turf management with an IPM approach utilizing population-based pest management to a system that utilizes biologically-based controls and reduced risk chemistry. The work was initiated on the Green Course at the Bethpage State Park, Long Island, New York in 2001. The Green Course is one of five public courses at the park and accommodates approximately 50,000 rounds of golf annually. The greens are push-up native soil greens that have been heavily sand top-dressed for the last six years, and are typical of a high-use public course in a northern metropolitan community. A more detailed discussion of methodology and results from 2001 through 2003 can be found at http://usgatorcs.msu.edu/

Experiment Design

The experiment was designed as a 3 x 2 factorial, with three pest-management and two cultural-management regimes.

Pest Management: 1) Unrestricted: All legal and currently available chemical pesticides in New York State may be used. 2) IPM: Cultural and biological approaches to prevent and minimize pest problems were emphasized, but reduced risk chemical pesticides were used occasionally to prevent turf loss.

Cultural Management: 1) Current Standard: Cultural practices currently being employed at the golf courses of the Bethpage State Park. 2) Alternative: Modified cultural practices selected to reflect the most progressive practices that maximize turfgrass performance and minimize stress to the grass. The experimental design resulted in six management systems. Each green served as a replicate, with all 18 greens of the Bethpage Green Course used to accommodate 3 replicates.