

GOLF COURSE PESTICIDE USE AND MONITORING

1998

This fact sheet summarizes survey results of pesticide use at Alberta golf courses and data gathered from monitoring its impacts on local surface and groundwater. The survey and monitoring program was initiated in response to several major golf course development proposals in Alberta during the late 1980s and early 1990s. The survey was conducted during 1990/91 and monitoring took place from 1991 to 1993.

SURVEY RESULTS

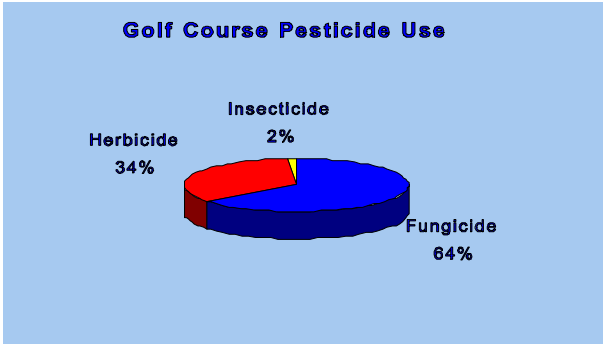
Survey forms were sent to 91 golf courses. Thirty-three forms were completed and returned.

Pest Problems

The most frequently reported insect pests were yellow-headed spruce sawfly, forest tent caterpillars, birch leaf miner, mites, and spruce budworm. Dandelion and clover were the most frequently listed weed problems (97 per cent and 85 per cent respectively). The most frequently reported disease problems were pink snow mold (85 per cent) and gray snow mold (85 per cent). Others sited include brown patch, melting out and dollar spot.

Pesticide Use

Pesticide use reported in the survey ranged from 13.5 to 166.5 kg of active ingredient per golf course, with an average of 76.9 kg. The following chart compares the use of fungicides, herbicides and insecticides on Alberta golf courses. Percentages are based on the volume (kg) of active pesticide ingredients applied.



GOLF COURSE PESTICIDE USE AND MONITORING

(a) Fungicides

Thiram and quintozone were the most commonly used fungicides (77 per cent and 61 per cent respectively). Five other fungicides (phenyl mercuric acetate, mercurous/mercuric chloride, carbathiin, oxycarboxin and chloroneb) were used at up to 55 per cent of the courses surveyed. The products chlorothalonil, iprodione, benomyl, thiophanate-methyl and maneb were used at up to 22 per cent of courses.

Golf courses are replacing mercurial fungicides with fungicides such as chlorothalonil, iprodione and propiconazole.

(b) Herbicides

Turf herbicides 2,4-D and mecoprop were used at 84 per cent of courses responding to the survey, while dicamba and glyphosate were used at 74 per cent and 61 per cent of courses, respectively. MCPA, paraquat, napropamide and chlorsulfuron were used less frequently. Copper triethanolamine, diquat, copper sulphate, and chelated copper citrate/gluconate were used for algae and aquatic weed control according to survey responses.

(c) Insecticides

Malathion was the most commonly used insecticide (at 33 per cent of courses surveyed). One or more of diazinon, insecticidal soap, carbaryl, dimethoate, methoxychlor, *Bacillus thuringiensis* var. *israelensis*, propoxur, and pyrethrins) were used at 12 per cent of the courses.

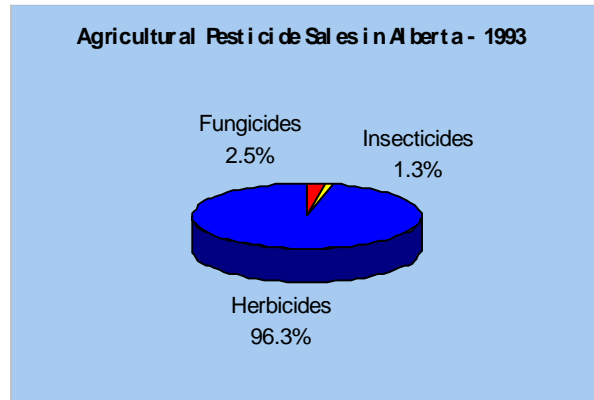
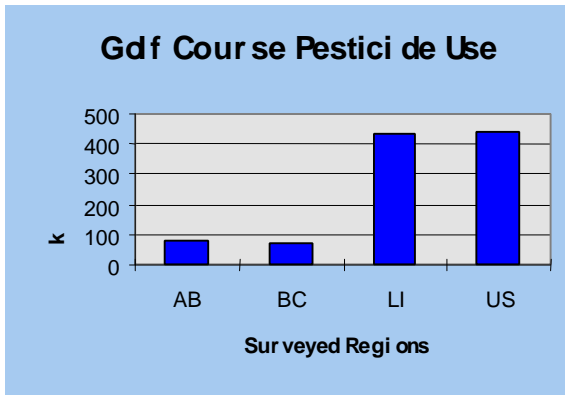
PESTICIDE USE COMPARISONS

(a) Other Regions

Alberta (AB) golf course pesticide use has been compared to pesticide use by courses in British Columbia (BC), Long Island, New York (LI) and the U.S. as a whole, based on similar surveys.

Alberta and B.C. have fewer golf course pest problems, especially those related to disease and insects, than the other areas surveyed. In eastern North America, disease frequency is greater because of high summer humidity, while Alberta's lower humidity and cold winters has the opposite effect.

GOLF COURSE PESTICIDE USE AND MONITORING



(b) Agriculture

Alberta golf course and agriculture pesticide use can be compared by converting average golf course pesticide use figures to kg of active ingredient per hectare (kg/ha). Golf courses surveyed use approximately 1.2 kg/ha while overall agricultural application rates are 0.8 kg/ha. This difference is attributed primarily to the greater use of fungicides for turf protection. Fungicides are used for disease control in cereal crops at a rate of 0.125 kg/ha for propiconazole and 0.744 kg/ha for iprodione. The same active ingredients are used for turf snow mold control at rates of 3.22 and 9 kg/ha respectively.

For agriculture, fungicides account for approximately three per cent of all pesticides used in Alberta, herbicides make up over 96 per cent and insecticides account for the balance.

On golf courses, fungicides account for over 64 per cent of pesticides used, herbicides make up almost 34 per cent, and insecticides and rodenticides make up the balance.

Golf course applications account for approximately 0.17 per cent of pesticide use in Alberta and one per cent of pesticide use in the U.S. The use of pesticides per hectare is also significantly higher in the U.S. than in Canada.

PESTICIDE MONITORING

In 1991 and 1992, surface water and sediment were sampled from rivers adjacent to the Kananaskis Country Golf Course, the Glencoe Golf and Country Club (near Calgary), Banff Springs Golf Course, the Calgary Golf and Country Club, and from on-course streams. (Surface water sampling continues indirectly through Environmental Protection's surface water monitoring networks.) From among the 89 surface water samples collected, four pesticides were detected: 2,4-D (seven times, or eight per cent of total samples); mecoprop (three times, or three per cent); quintozone (three times or 3 per cent); and dicamba (once or one per cent). Eight of the 14 detections did not appear related to golf course pesticide applications. All detections were below Canadian Drinking Water and Protection of Aquatic Life guidelines.

GOLF COURSE PESTICIDE USE AND MONITORING

Over 200 sediment samples were also collected from adjacent rivers and on-course streams. No pesticides were detected other than mercury which was found at ambient levels in the rivers, and at elevated levels in on-course stream sediments. Sediment sampling for mercury residue analysis is continuing at selected sites to assess long-term trends in relation to recently-released sediment quality guidelines for mercury.

From the spring of 1992 to the fall of 1993, water was also sampled from twenty-two stainless steel shallow (less than 35 feet) groundwater monitoring wells that were installed at the Canmore Golf and Curling Club, Kananaskis Country Golf Course, Glencoe Golf and Country Club, D'Arcy Ranch Golf Club (near Okotoks), and the Turner Valley Golf and Country Club.

A total of 182 groundwater samples were analyzed for non-mercurial pesticides (16 different fungicides, herbicides and insecticides), and 240 samples analyzed for mercury. Of the non-mercurial pesticides, only 2,4-D (six times), mecoprop (twice), dicamba (once) and carbathiin (three times) were found in the groundwater. Mercury was detected at trace levels on four occasions. All detections were below Canadian Drinking Water guidelines.

Results of surface and groundwater sampling and analysis at these Alberta golf courses indicate that the impact of Alberta golf courses on surface and groundwater quality is limited. Mercurial fungicides are no longer registered for use on golf courses, although the federal Pest Management Regulatory Agency (Health Canada) has allowed existing supplies to be used until December 31, 2000. Mercury levels on golf course greens are being assessed and remediation plans will be developed as required.

Several studies are underway that may lead to reduced fungicide dependency for golf greens. For example, The Prairie Turfgrass Research Centre in Olds is studying the use of compost and management practices to reduce the incidence and severity of pythium root rot, and The Guelph Turfgrass Institute is evaluating the use of antagonistic fungi for the control of grey snow mould.

FURTHER INFORMATION

For information about pesticide management in Alberta, please contact a pesticide specialist at the nearest Alberta Environmental Protection office:

Grande Prairie (780) 538-5460, Fax (780) 538-5336, Room 1701, Provincial Building
10320 - 99 Street, Grande Prairie, Alberta T8V 6J4

Stony Plain (780) 963-6131 Fax (780) 963-4651, Westerra Building, 52322 - Golf Course Road,
Stony Plain, Alberta T7Z 2K9

Edmonton (780) 427-2700 Fax (780) 422-4192, 4th Floor, Oxbridge Place
9820-106 Street, Edmonton, Alberta T5K 2J6

GOLF COURSE PESTICIDE USE AND MONITORING

Red Deer (403) 340-7052 Fax: (403) 340-5022, 3rd Floor, Provincial Building
4920 - 51 Street, Red Deer, Alberta T4N 6K8

Calgary (403) 297-7602 Fax: (403) 297-8232, 2nd Floor, Deerfoot Square
2938 - 11 Street N.E., Calgary, Alberta T2E 7L7

Lethbridge (403) 381-5511 Fax: (403) 382-4008, 2nd Floor, Provincial Building
200 - 5th Avenue South, Lethbridge, Alberta T1J 4C7

For further information regarding golf course pest management, please contact:

Alberta Golf Superintendents Association (403) 912-0130

Canadian Golf Superintendents Association (416) 602-8873 (1-800-387-1056)

Golf Course Superintendents Association of America (1-800-472-7878, Internet:
<http://www.gcsaa.org>).