sand that has been brought to the site. The irrigation system is being designed so that each of the 36 plots can be irrigated individually. The irrigation will be controlled electronically; scheduling will be determined based on the evapotranspiration requirements of the turfgrass. All turfgrass-soil type combinations will be subjected to two irrigation regimes: 100 percent crop evapotranspiration (ET_C) and 130 percent ET_C.

Fertilizer (urea and sulfur-coated urea) and pesticide treatments will begin early 1992. The volatilization and leaching of the products applied will be characterized for the putting green and fairway plots.

Dr. Marylynn Yates

University of Nebraska
Iowa State University

Pesticide and Fertilizer Fate in Turfgrasses Managed Under Golf Course Conditions in the Midwestern Region

Research addressing movement and fate of fertilizer and pesticides in turfgrasses managed under golf course conditions was initiated at the University of Nebraska and Iowa State University during 1991. The objective of the research is to determine the influence of pesticide, fertilizer and irrigation management practices on the persistence and mobility of nitrogen and selected pesticides in turfgrass systems. Intact, undisturbed soil columns were used to reliably monitor pesticide and nitrogen movement in the field, and effectively simulate the turf-soil environment in controlled greenhouse studies. The columns in controlled greenhouse studies will allow measurement of nitrogen and pesticide residue in column leachate for a balance-sheet of their fate in the turfgrass system.

Research sites with established stands of Kentucky bluegrass were selected at the John Seaton Anderson Turfgrass Research Facility at the Agricultural Research and Development Center near Mead, Nebraska, and at the Iowa State University Horticulture Farm, Ames, Iowa. The experimental areas were treated with recommended rates of urea fertilizer; Trimec® (2,4-D, mecoprop and dicamba) and pendimethalin herbicides; isazofos and chlorpyrifos insecticides; and the fungicide metalaxyl.

Eight-inch turf-soil cores were excavated to a depth of 24 inches from local field environments and transported to the laboratory one week prior to application and approximately 1, 14, 30, 60 and 120 days after application. Four cores were removed on each sampling date at each location. The cores were sectioned into verdure, thatch, mat and multiple soil depths, and then prepared for residue analysis. Additional untreated soil columns were encased in cement before being moved to the greenhouse for controlled experiments.

Experiments addressing the fate of nitrogen and phosphorus were initiated at Iowa State University. Fourteen soil columns were encased in cement, extracted from the field, and transported to the greenhouse. Nitrogen and phosphorus were applied to the columns and two watering regimes (1 inch immediately following nutrient application and four 0.25-inch applications during a one-week period) were used to determine the effects of irrigation rates. Nitrogen volatilization was greater from columns receiving the lower irrigation rate. Nitrogen moved to greater depths in the profile under the higher irrigation rate.

Protocols developed at Iowa State for soil column preparation and greenhouse research were modified for pesticide and fertilizer studies at the University of Nebraska. A concern regarding the effect of cement encasement on soil pH was addressed. The pH of a Sharpsburg soil increased from 6.0 to 6.7 after 10 days of contact with the cement, but declined and remained between 6.2 and 6.5 at 15 to 45 days after encasement. The pH fluctuation would not be expected to have a significant effect on the fate of the pesticides included in the study. In addition, a porous plate assembly was designed and constructed such that soil water tension found in the field could be simulated in the greenhouse.

An analytical procedure for simultaneous extraction and quantification of residues of isazofos, metalaxyl, chlorpyrifos and pendimethalin has been developed, and analysis of turf/soil cores removed from the Nebraska and Iowa field sites is in progress. Additional methodology development will be required for analysis of 2,4-D, dicamba and mecoprop in the samples.

Dr. Garald Horst
Dr. Nick Christians