

POLLUTION MAIN PROBLEM ON GOLF COURSES — 1970 MILESTONE IN TURF MANAGEMENT

by V. J. Zolman

"The 1970's absolutely must be the years when America pays its debt to the past by reclaiming the purity of its air, its waters and our living environment. It is literally now or never."

President Nixon

The consequences of pollution to our general environment have now been widely recognized. The nation's scientific resources are being marshalled to deal with the wide-ranging dangers that have been created by it. Golf course management, that has been so profoundly affected by the problems directly or indirectly arising from pollution, must follow this trend toward scientific solution.

Experts in golf course management developed through many years of practical experience new methods of dealing with our changing natural environment. New and better balanced fertilizers, for example, have been developed to deal with the problems arising from depletion of soil. In many instances, however, increasing pollution of our air and waters brought new problems—particularly for golf courses in industrial areas—that defy conventional, time tested approaches. Superintendents find that diseases, fungi and weeds spread despite careful maintenance. They find that application of standard fertilizers and of chemicals recommended against diseases and fungi no longer guarantee top quality turf. Almost invariably, the pollution has been the culprit.

Today, the soil environment for monoculture grass plants on golf courses is being changed rapidly by pollution from several sources: 1) Pollution of air, whose harmful effects for people have been well established, is equally harmful for turf grasses. The major pollutant is Sulphur dioxide (SO₂) a product of combustion of coal with high sulphur content, and of liquid fuels. Hydrogen fluoride (HF) an industrial pollutant, is very poisonous to plants causing damage to susceptible crops at concentrations as low as a few parts of HF per billion parts of air. Different intensity of damages to gladioli, tulips, apples and pears have been reported in Holland.¹ Harmful effects of acute toxic or chronic toxicity depend on time exposure and the quantities of SO₂ and HF in the air. Photochemical air pollutants such as ozone and peroxyacetyl nitrate (PAN) can be found in certain "smog" areas. In many cases industrial smoke stacks emit solid particles of various types of pollutants e.g., Zinc (Zn) is directly deleterious to plants. Boron (B) in areas with heavy industry is harmful to turf grasses from toxic soil.

2) Irrigation waters from lakes, rivers, brooks and wells are often heavily polluted, and are toxic to turf grasses due to high content of Epsom Salt, (MgSO₄—Magnesium Sulfate). Total Sulfates (SO₄), Total Chlorides (Cl) Common Salt (NaCl), Total Salt. Concentration is especially high during dry periods—at the very time when irrigation requirements are high. Thus irrigation during summer months, often contributes to pollution of the soils.²

3) Pollution of soil of greens, tees and fairways comes through application of heavy calibration or of "dirty" fertilizers, through application of mixture of trace minerals without proper analyses of soil, and through

spray of chemicals such as fungicides, herbicides and insecticides. In polluted "tired," "poisonous" toxic soil environment chemically and biologically ruined, turf grasses cannot grow properly, and diseases, fungi and weeds are widespread.³

Resulting Problem — Low Restitance of Grasses to Disease

It has been conclusively established by scientists that a particular combination of environmental and climatic conditions—such as high temperature, excessive soil moisture, poor aeration and high humidity—are conducive to growth of diseases and fungi. Germs are constantly present and may become actively parasitic on grass plants if the plants lose their growth vigor. If soil environment contains factors or group of factors which are toxic or deficient even to a minor degree to green plants, the plants may be weakened to the point that they lose disease resistance and thus become susceptible to attack by the constantly present disease germs and fungi. Once the balance between plant resistance and susceptibility is tilted in favor of the fungus, disease conditions can reach critical proportions.⁴

Dealing With the Pollution Problem

Superintendents cannot successfully manage turf on polluted and toxic soils with contaminated irrigation water. Unfortunately, many superintendents are not fully aware of the problem that remains usually undetected through conventional soil testing programs that are not geared to today's environmental problems.

There are essentially two ways for dealing with the effects of pollution. One consists of a gradual rebuilding of golf courses. Unbalanced soil environment, chemically and biologically defective greens and tees, are usually ready for rebuilding after 5 but almost always after 20 years, presently at a cost of \$3,000 to \$8,000 for each green.

An alternative, far less expensive and more effective approach is through scientifically designed programs of treatment of soil. Such an approach is based on individual research conducted directly on golf courses with treatment program designed to restore the balance of soil environment according to requirements of monoculture sensitive turf grasses. In general, complete research program is based on a scientific testing designed specifically for golf courses by properly selected series of qualitative analyses in laboratories with modern equipment and well trained personnel. The testing is carried out for Major, Secondary and Micro-elements which have been recently found to influence directly or indirectly the vigor, health, growth and resistance of turf grasses. Research reports are then interpreted by experts evaluating analytical findings. They diagnose the problem, suggest treatment program, including calibration for 2-4 years and design main ideas for turf management which must be based strictly on scientific principles.

Detail results of such tests conducted on golf courses in the Chicago area⁵ have revealed wide variations in standard range of factors (nutrients) within greens, tees and fairways on a golf course. Standard range of factors (nutrients) has been found narrow for monoculture of fine turf grasses, compared with farm crops; especially in trace minerals the differences between deficiency — standard range — toxicity, expressed in p.p.m. have been extremely narrow. Harmful effects by deficiency or toxicity to turf grasses (to a point whereby they lose resistance) is by single factors or group of factors. Usually a group of factors is taking part (deficient — excess — toxic) combined with group

of harmful climatic factors such as high humidity and temperature during summer months. All these factors—mostly the results of soil pollution could then be successfully treated and corrected with good results.

Conclusion

It has been in the mainstream of American tradition that specialized industries, in order to obtain a top quality product or service utilize industrial research as a solid scientific and economical base for prosperous business in the future. The American Academy of Science recommended research as a first step toward elimination of harmful effects of pollution in the air and water. Soil scientists in the U. S. look for new philosophy and policy in soil testing for higher yields of crops on unbalanced and polluted soils. The medical science recommends periodical check-ups in clinics for young and old and prescribe individual treatment. Superintendents must follow a similar path for turf improvement on "sick," contaminated and unbalanced soil environment. Individual research on each golf course and appropriate treatment, based on scientific principles, represent a new way for balanced soil environment. Year 1970 will be a milestone in common practice of turf management on golf courses in America.

REFERENCES

- ¹Houten, J. G.: "Aspects of Air Pollution in Agriculture" Landbouwkundig Tijdschrift 78 — 1, July 2, 1965, Netherlands.
- ²Zolman, V. J., "The Problem of Contaminated Water." *Turf-grass Times*, April, 1968. U.S.
- ³Zolman, V. J., "Atomic Turf Maintenance," *The Golf Superintendent*, March, 1967. U.S.
- ⁴Holmes, J. L., "Factors Influence Irrigation," *USGA Green Section Record*, March, 1966. U.S.
- ⁵Unpublished data of Brookside Research Laboratory, New Knoxville Ohio. U.S.

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REPORT ON DDT

by Stanley Rachesky
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Recently in Illinois DDT has been restricted in its use for public health emergencies as designated by the Illinois Department of Public Health effective January 1, 1970.

Dr. H. B. Petty, Professor of Agricultural Entomology, University of Illinois College of Agriculture at Champaign-Urbana and the Illinois Natural History Survey just completed a comprehensive middle-of-the-road look at DDT. Following is a very short synopsis of his paper and a few added thoughts of my own.

In Illinois, DDT has been steadily phased out since the late 1940's. The last time DDT was agriculturally recommended was in 1964 on sweet corn for ear-worm and corn borer control. Since 1964 it has been recommended for use in Dutch elm disease spray and mosquito abatement and in a few isolated instances for the control of the bronze birch borer, iris borer and certain pine moths.

The World Health Organization has used more than half the total world production of DDT in recent years. For example, in India the annual loss of income because of malaria after World War II was near 1 billion dollars. By 1965 this was cut by 99.9 per cent. Deaths from malaria per year dropped from 750,000 to 1,500. The number of cases dropped from 7,500,000 to 150,000 per year. DDT, by prolonging human life, has without a question of a doubt contributed greatly to world overpopulation.

More research has been conducted on DDT and its fate on the environment than on any other pesticide. No human can possibly read and retain every written word. Confusion ensued. Data from research done was interpreted differently. Driven by public opinion to get to the bottom of whether DDT is bad or not we could have completely overlooked other possible pollutants, such as plasticizers, not to mention lead, zinc, carbon monoxide, etc.

How toxic is the pesticide you use around your home? Do you know the definition of pesticide? How about chemical cleaners like drain cleaners and soaps? Are they biodegradable? If you don't know, why are you using them?

The Federal Drug Administration continually checks our food supply by using "market basket" samples. Sampling is accomplished by purchasing food a 19 year old boy would consume. It was and continually has been concluded that the dietary intake of the DDT compounds remained constant and very well below the levels established by the Federal Drug Administration.

DDT is stored in the fat of humans. In the U.S.A. the average has dropped from 15.8 ppm in 1954 to

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