

# New Philosophy of Approach to Turf Management on Golf Courses

By V. J. Zolman

Turf management on golf courses has progressed through several distinctly identifiable stages of developments. Each stage can be characterized according to the basic principles that constituted the dominating philosophy of the approach of the golf course superintendents in achieving their universal goal—a quality turf.

**Stage I** can be identified by the following relationship:

## Rules = Quality Turf

The origins of this approach date back to the origins of golf—a game played on pasture fields. Initially, and even later as golf course gradually gained its own identity, the approach to golf course turf management evolved paralleled to the evolution of the husbandry of pastures. The main emphasis in achieving satisfactory turf conditions was on following traditional rules concerning frequency and heights of grass cutting, soil aeration, etc. First natural, and then, increasingly, chemical fertilizers were applied mostly in a haphazard fashion, in accordance to rules that had very little or no relationship to the actual soil conditions and requirements of plant grasses.

This stage came gradually to an end as, with the increasing popularity of the sport, the demand for ever better playing condition increased, and the ability of superintendents to meet the demand decreased. Virgin soils that by its natural resiliency withstood the indiscriminate onslaught of chemical fertilizers became unbalanced and depleted by monoculture plant-grasses and the golf course turf became increasingly susceptible to diseases, fungi and weeds invasion. These developments set the stage for the inception of Stage II.

**Stage II** has been characterized by the belief in the success of the following relationship:

## Formulas + Chemicals = Quality Turf

It is the approach most prevalent today. To combat problems encountered increasingly in golf course turf management, the superintendents turned to rigid chemical formulas established for all factors believed to influence the conditions of turf. These were applied to soil structure (1/3 peat, 1/3 soil, 1/3 sand), fertilizers (10-10-10 or 12-3-8), pesticides and herbicides.

To the extent that the development of this trend was based on scientific research, combined with conventional soil-testing techniques, the approach has produced good results. In an increasing number of instances, however, problems gradually reappear. Despite systematic application of "proven" formulas of fertilizers and pesticides, attacks of fungi and weeds are becoming more prevalent.

Scientific evidence is coming to light, identifying the problems. For example, in a paper by researcher F. Nicholson of the University of Illinois at the Eleventh Illinois Turfgrass Conference held last December in Urbana, Illinois, presented evidence that favorable results obtained through application of certain pesticides are only temporary and ultimately self-defeating: Plots of turf, after six years of systematic application of a particular pesticide, were more diseased than plots that were not treated. It appears that in this instance, as well as in others, the resulting con-

tamination of soil proved harmful to turf grass, causing it to lose its natural resistance to diseases. Moreover, as was pointed out by Dr. Couch at the same conference, it appears that the laws of "natural selection" apply to grass diseases and fungi just as they do to other organisms: Under the systematic application of pesticides, they probably developed new, more aggressive and immune strains that defy conventional treatment.

Finally, what may be the "closing chapter" of the Stage II of turf management, is being written by lawmakers in form of laws banning, for health reasons to American people, the use of effective pesticides compounds of arsenic and mercury and DDT. Such bans will make it even more difficult to deal with increasing problems encountered in efforts to contain the disease.

Thus, on one hand, the increasing amount of scientific evidence uncovering the shortcomings of the conventional approach, and on the other hand, the increasing dissatisfaction of turf managers with the results obtained through such an approach, are gradually ushering a dawn of a new era in turf husbandry in the United States—the Stage III.

**Stage III.** The major distinct characteristic of this stage is the emphasis on proper natural soil environment of the turf. In short,

## Balanced Soil Environment = Quality Turf

The approach is based on scientific principles and natural laws, stressing structure and physical properties of soil, and chemical interaction of elements as a basis of proper metabolism and diseases resistance of turf grasses.<sup>1</sup>

In this context, the focus is not only on balanced soil environment in respect to basic elements such as nitrogen, phosphorus, calcium, potash, elements whose role in a healthy soil environment has long been recognized and identified through conventional soil testing programs. In addition to these, the approach embraces a broad array of chemical elements—the trace elements such as iron manganese, copper, zinc, boron and molybdenum—that for many years have been recognized in scientific experiments as essential for proper functioning and interaction of elements in grass metabolism. Through the development of more conclusive scientific evidence concerning their significance in proper soil environment on one hand, and on the other hand, through the development of better, more sophisticated soil-testing techniques that permit their identification, the approach focuses upon balancing of these elements as means of achieving a healthy soil environment that is conducive to the production of quality turf.

Identification and proper balancing of these elements within the framework of scientifically designed soil testing programs is proving to be an effective means of dealing not only with the turf problems arising from soil contamination due to indiscriminate application of commercial chemical fertilizers, pesticides and herbicides, but also with problems arising from sources less commonly recognized but nevertheless of an ever-increasing importance in our changing environment—water and air pollution.<sup>2</sup>

Trace minerals are catalysts, stimulators and inhibitors of biochemical processes as well as sources for production of enzymes. In proper combination, the same trace elements demonstrate systemic ability and protect turf grasses plant tissue against invasion of virus, bacteria and attacks of fungi on chemical and

physiological bases. Chemical balance of soil, completed by trace minerals, leads automatically to biological balance of microflora (bacteria, fungi, anti-mycetes and their strains), and includes small fraction of micro-organism that produces antibiotics. When properly balanced, these elements interact with major and secondary elements, and stimulate and regulate all nutritional system and metabolic processes within plant grasses; when in deficiency, excess or toxicity, they disrupt these processes.

When trace minerals are properly balanced and fit into total chemically balanced soil they can produce almost "miraculous" results in increasing fertility of soil, health and self resistance of turf grasses, eliminating the need for most pesticides.

Balanced Soil Environment approach to turf management is fast gaining broad acceptance not only among turf scientists, but also among enlightened, practicing golf course superintendents. And for good reasons. In many instances the expenses for pesticides and fertilizer have been cut by 30-70 percent, while the quality of turf has been increased spectacularly. Given these results, the new philosophy is gaining new followers among golf course superintendents.

<sup>1</sup> Several scientific papers presented at the Fifth Annual Golf Turf Symposium held in Milwaukee on December 9-10, 1970 strongly reflected the emergence of this new trend. They stressed quantitative evaluating factors: storehouse of nutrients in the soil (Dr. Love), structure and physical properties of soils (Dr. White), chemical interaction (Dr. Reike), soil testing (Dr. Horn), and effect of Pesticides (DDT, chemical compounds of Arsenic and Mercury (Dr. Newman).

<sup>2</sup> See my articles, "Pollution—Main Problem on Golf Courses," *The Bull Sheet*, March 1970; "The Problem of Contaminated Water," *Turf-Grass Times*, April 1968; "Atomic Turf Maintenance," *The Golf Superintendent*, March 1967.

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