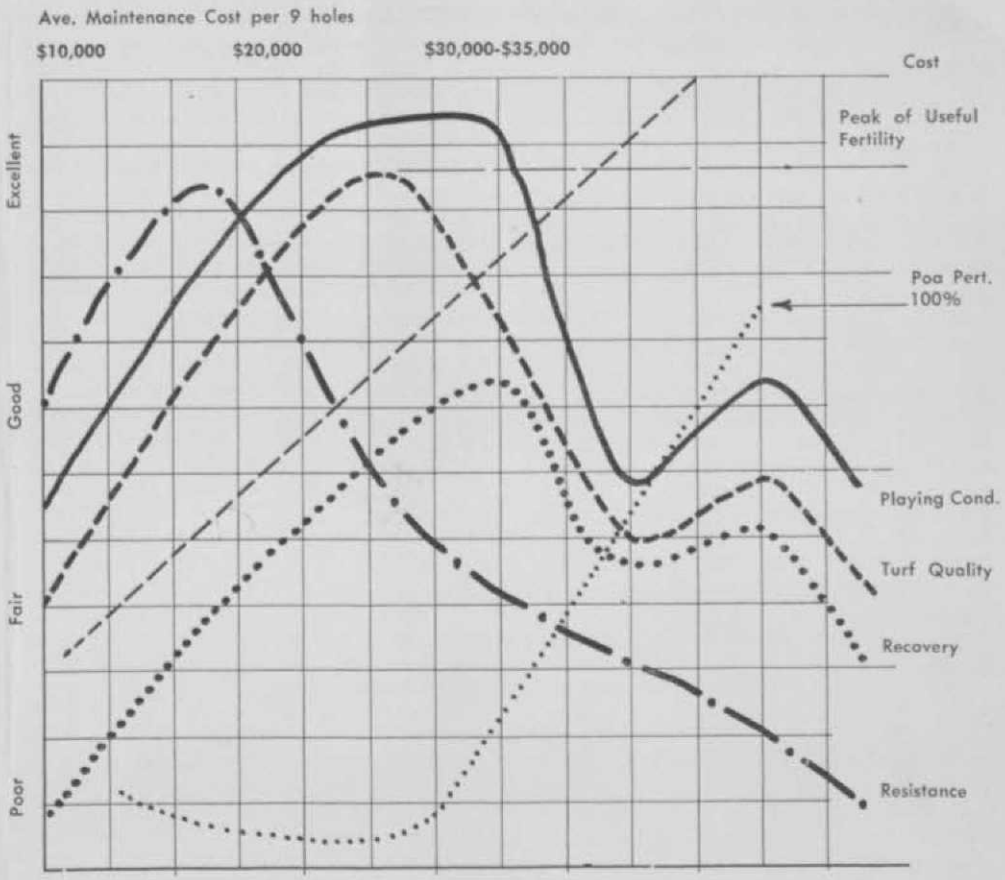

	Poor	Fair	Good	Excell.	Super	Lush	
N	.25	.50	1.	1.4	1.8	2.4	lbs. per mo./1000 sq. ft.
H_2O	.25	.50	1.	1.4	1.8	2.4	.10 ins. per day
Fert.	.50	1.00	2.	2.8	3.6	4.8	

Useful Fertility

A 34-Year Study of A Wide Variety of Grasses Shows That There Should Be A Limit to the Peak of Quality

By HENRY C. MITCHELL
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BACK IN the late twenties I read a book called "The A B C's of Turf Culture" which was written by O. J. Noer. The book corroborated many basic principles of turf culture which had already been drummed into my head by my father, an agronomist of the old school. Later I attended Professor Dickinson's school at the University of Massachusetts. He used the same principles to explain what he called the limits of tolerance of grass.

The depression, followed by the war, made it impossible for even the larger clubs to continue accepted standards of maintenance. The post-war era brought back prosperity as well as a flood of new chemicals, machines and new varieties of grass. In their efforts to be spectacular,

turfmen forgot that turf has a limit of tolerance, not only to traffic but to fertility as well.

Traffic and Treatments

I have been studying the results of traffic and treatments on various turf areas in an attempt to determine just how far off the track we have wandered. I have depicted in the graph on this page my interpretation of observations made over a period of 34 years. It shows the peak of useful fertility under heavy traffic. It is fairly accurate for most varieties and species of turf grass grown in the sun in all climates from Maine to Louisiana. This is provided, of course, that the variety is tolerant to temperature ranges and the height of cut. (See graph.)

Henry C. Mitchell's article does not necessarily present the views and opinions of GOLFDOM but is presented as a thought-provoking treatment of the subject of fertility.

In the graph, fertility equals nitrogen in lbs. per 1,000 sq. ft. per month (including clippings, top dressing, etc.) plus water figured in tenths of an inch per day (including rainfall but excluding run-off). Lack or excess of some other element is, of course, often the cause of turf failure. The resistance factor is resistance to disease, weeds, traffic and machines. The recovery factor is speed of healing. The figures used for these two factors, (resistance and recovery) include weekly observations of the effects of traffic and disease and yearly observations of change of population of grass, weeds and poa annua. Allowances are made for the areas of tees and green and amount of traffic. The poa annua line is based on results from 20,000 rounds per year where the area of greens is 5,000 sq. ft., tees, 3,000 sq. ft. and on well drained fairways where traffic is not concentrated for any reason.

Extra traffic, poor drainage and shade make fertility more harmful. Recovery varies with the variety, the temperature and the season of year. Fertilizer for increased recovery is futile in hot weather. Northern grasses like to recover in May and June and September and October. Some southern grasses are more resistant to traffic but reach the peak of useful fertility at the same time as northern grass.

Resistance plus recovery gives turf quality. It varies with species but is controlled by fertility and follows the trend of the graph regardless of variety.

Color also varies with different varieties and should not be used as a yardstick for quality. Playing conditions often are rated higher than turf quality. Turf which requires extra expensive maintenance is lower in quality than it appears.

The cost line shows the average cost of total maintenance on courses where the observations were made, (compared to 1957 cost in New York Metropolitan area). However, many low budget clubs are often guilty of over-fertilizing in some areas.

Cool weather reduces fertility and probability of disease. The reverse is true in hot, muggy weather, making proper control of the fertility more important.

Acidity reduces fertility and often produces organic residue which helps resist traffic. My father used to say, "Lime makes rich fathers and poor sons". He liked to leave some organic matter in the bank. A pH reading of 5.5 is not necessarily harmful. Chemical weed treatment is often a failure if weeds are not somehow replaced with good turf. The resulting large increase in poa annua often improves playing conditions but can hardly be called improved turf quality.

We dream of varieties of grass that will exist on low fertility. But what we need are grasses that will withstand the lush conditions found on most of our courses today. When the peak of quality is reached with a given budget and set conditions, an attempted improvement with extra nitrogen and water can only lead to disaster. We will bust our bugles if we don't stop trying to blow a note that ain't in the horn.

In conclusion, I find that the peak of useful fertility is reached when available nitrogen averages 1 lb. per month and available water equals 1/10 inch per day. If less of one is applied, more of the other can be used without harm. Poa is increased by prosperity as well as traffic. Even though bent is stronger under normal conditions, the poa recovery curve reaches its peak at a much higher point of fertility than bent, especially in cold weather.

To improve our courses today, we must consider limiting membership to a reasonable number; build larger greens and tees to reduce the traffic per sq. ft. **We must have better control of fertilizer, lime and water**; better control and timing of our chemicals and machines; and continued selection and use of better grasses. The area turfed with improved varieties in our county is pitiful.