

pounds of nitrogen, 60 pounds of phosphorous, and 80 pounds of K₂O equivalent per acre. The combinations we use usually depend upon what is available at the best price.

Herbicide Program

Our weed eradication program begins in early March with an application of pre-emergence chemical on those fairways that are heavily infested with weeds the year before. Usually we find weeds in the compacted and shady areas, and our greatest problem is with goosegrass. This year we treated approximately 15 acres with pre-emergence chemical. I would say we were 75 per cent effective.

I think it is significant to state at this point that in no case did we get complete control, and consequently we have had to follow up with post emergence treatment. Our post emergence consists of three to four pounds of DSMA or MSMA per acre of actual material, plus one-half pound of 2, 4-D in 50 gallons of water. Treatments are about 10 days apart and three to four treatments keep our fairways fairly clean of most obnoxious weeds during the year.

Poa Annua Control in Bermudagrass

In general we have found that the above program has produced satisfactory results for

us. We still are faced with the problem of **Poa annua**. While it affords us some winter color until the bermudagrass emerges, it hinders this emergence to some degree and, of course, we never know how many seeds are tracked onto the green with the resulting problem.

This past year in two fairways, we used one quart of Paraquat in 30 gallons of water per acre and eliminated **Poa annua** that was growing. The bermudagrass must be dormant to spray this chemical and it is best to treat after two or three hard frosts. The reason for treating in December or January is that the **Poa** has not stooled out and will not leave unsightly areas as when sprayed in March.

These two fairways filled in much faster with the **Poa annua** eliminated than they did in the past. Reduced rates have been used with satisfactory results. Do not spray overseeded greens or cool-season grasses with this chemical or they will be eliminated.

We have found that with the many different types of bermudagrass that we have in our fairways, a "close knit" strain of common bermuda is easier to maintain than the hybrids. However, on stress fairways where shade or other factors, such as root encroachment from trees, are a problem, the hybrids, such as 419 and 328, are much more vigorous and weed free.

Damage To the Golf Course

by JAMES L. HOLMES

This is the time of year when the golfing public should be made aware of the damage that golf courses and golf course turf suffers both because of their activities and the activities necessary for maintenance.

If "damage" is brought to their attention, it is hoped that most of this damage will remain as potential, rather than becoming actual. Perhaps the best way to approach this problem is to divide and discuss damage under the following headings: traffic, golf carts, vandalism, snowmobiles, flooding, desiccation, and ice sheet cover.

Traffic

Even though one type of damage to a golf course could be included under the broad heading of "traffic," it is broken down in order to expand upon various types. First, player traffic

causes most extensive injury. Constant and heavy play on a given area frequently destroys turf. Teeing turf is most severely damaged, followed by turf on greens, and then fairways.

The one single factor of extracting divots, especially on tees and fairways, is an example. The United States Golf Association has steadfastly maintained that all divots die or are displaced by mowing equipment and many bare spots are left throughout the course. Even though divots may be replaced it is necessary to plug many divot scars or topdress such scars with soil and seed. That is done at the best maintained golf courses where the membership insists upon a complete turf at all times.

Foot traffic can be severely damaging to turf on putting surface and collars, especially when soil is overwet, or frost and ice is leaving the ground in spring.



The most important time to close the course to all play is when soil in greens is thawing and the upper one to three inches has melted with solid ice beneath. This will happen only on a few days in spring, but invariably occurs on a nice, sunny, warm weekend when the golfer, who has played very little during the winter, is ready to go.

Other serious foot traffic damage occurs in funnel areas such as between greens and trees and on collars between the putting surface and greenside bunkers. Any design or redesigning attempts take into consideration the necessity of dispersing foot traffic as much as possible.

Equipment necessary to maintain the golf course can be and often is excessively damaging to turf. Much of this results from the fact that mechanization is absolutely essential in order to effectively and economically operate and maintain a modern golf course. Much of this equipment is quite heavy, and even though wide flotation tires are regularly used, rutting and other heavy equipment-type damage occurs.

Even though heavy maintenance equipment is known to be damaging to turf it simply must be used. This type damage, along with player damage, simply must be lived with.

In the broadest sense, the other type traffic damage we must consider is temperamental or intentional—putters being driven into the putting surface, and litter, such as cigarette and cigar butts, bottles, cigarette packages, golf ball boxes, and various assorted discarded paraphernalia which is strewn over the golf course. Nonetheless, this is a serious problem and it is costing the golfing public dearly.

At some clubs, interested members pick up litter during a round. Golf carts, used by men of this type are frequently loaded down with litter and refuse at the end of 18 holes. If all members were as careful, or took as much pride in their own golf course, litter would be no problem. In any event, it appears that we must live with a certain amount of careless individuals who believe that the rest of the world must clean up their garbage. The litter bug must be included along with the temperamental or intentional damager of his golf course.

Snowmobiles

The use of snowmobiles on golf courses is relatively new. However, last winter numerous calls were received from interested club members requesting information on possible "snowmobile damage." A study over the past couple of years leads to the conclusion that improper use of snowmobiles can be damaging to turf on tees and greens, and to *Poa annua* grass no matter where it exists. As a result of our observations, we have arrived at the following conclusion:

1. Do not allow snowmobiles to pass over greens or tees at any time.
2. Anywhere *Poa annua* is the predominant turf, restrict use of snowmobiles as much as possible.
3. Do not allow use under any circumstances in less than six inches of snow.

4. Never allow snowmobiles if snow is melting, or following a rain regardless of depth of snow.
5. Prohibit use completely when snow is melting in spring.

It seems obvious that restrictions must be placed on the use of snowmobiles on golf courses: that is, if you wish to eliminate serious damage which can occur in trail areas or at given times throughout the winter.

Golf Carts

A great deal has been said and published regarding turf damage resulting from the use of golf carts. It is recognized that golf carts can be excessively damaging to turf. Much has been done to reduce this damage, such as restricting cart use when courses are overwet or golf turf is wilting. At most courses cart paths have been installed in heavy funnel areas or where it is simply impossible to maintain turf because of "funnel" cart use. Further, it is becoming common to install cart paths throughout the playing areas. The trend actually is toward extending paths from the first tee to the 18th green.

Vandalism

Vandalism can be placed under two general headings: occasional or planned.

Occasional vandalism occurs where courses are not fenced in or otherwise protected. The unknowing public strolls over the golf course

and occasionally takes a flag and flag stick, or a "pretty tee marker" simply because they are not aware of their place or value. This type of vandalism results from what you might consider the ignorant public and by people who have no desire to damage the golf course.

On the other hand, planned vandalism is of a vindictive nature and the persons responsible have a definite purpose. Regardless of precautions taken against this type of vandalism, such as installation of fencing or use of private policemen, such vandalism is relatively difficult to stop. Fencing and the use of private policemen or "night watchmen" is a deterrent, and an increasing number of clubs, especially in urban areas, are resorting to this practice. Night watchmen and trained dogs are being tried in the East.

It would take the rest of the magazine to list all the types of destructive acts committed on golf courses, and no doubt every reader will have seen some vandalism and will be aware that this problem is real and increasing. It is advisable for those courses in areas where vandalism is a problem to include a reasonable amount in their budget to cope with this problem.

Desiccation

Desiccation is the one single factor which kills the most grass, especially on putting surfaces, in the northern part of the country. Death to turf through drying or desiccation occurs in late February or early March, shortly before watering systems are placed in operation. Desic-

Flooding can damage turf as well as limit maintenance work.



cation follows three to five days of high temperature, occasionally in the 80s and high velocity southwest winds. Frequently wind gusts may exceed 60 miles per hour.

Most golf course superintendents have become aware of this problem and either have access to a large spray tank and water-down greens with at least 500 gallons of water per green, or will turn on watering systems, water all greens, then immediately drain back the system. Even if some breakage to the system results, in their opinion it is simpler to repair limited water system breakage than to re-establish anywhere from one to 18 putting surfaces. Desiccation must be closely watched for at times when it is known to occur, and every effort should be made to compete with this serious problem.

Flooding

A suitable golf course simply cannot be maintained in an area which regularly floods. If it has not been possible to control flooding, the club should be moved to a location which does not flood. If an area completely floods, turf will suffer and playing conditions will be poor, or else play will be impossible for a number of days during the season. There is nothing which more grossly damages turf or which places greater limitations on maintenance than flooding. Flooding does not refer to casual standing water or the flooding of a couple fairways because a creek overflows occasionally, but the regular overflow of any water contributory resulting in water or ice covering an extensive golf turf area for an extended period of time.

Ice Sheet Cover

The next greatest "kill" to golf putting turf results from a solid ice sheet cover. Just what happens, or the physiology of turf kill has yet to be determined. In order to be deadly this ice sheet cover must be solid from the soil surface up to and encompassing the entire grass blade. If the ice is rotten or has holes throughout, or there is loose snow beneath the ice, it appears that little or no damage occurs. Those who have lived with this problem limit an ice sheet cover to 25 days. Or, after it has been in place for 25 days it is removed. Removal is accomplished through topdressing with a dark material such as a natural organic fertilizer or a soil mix. This is the most widespread practice and is quite effective. Also, mechanical devices such as front end loaders or iron bars are used to break up ice or punch holes through the ice.

There is a definite trend by golf course superintendents to either topdress heavily or apply a natural organic fertilizer at high rates in late fall before ice formation starts. Application of either of these materials tends to reduce the formation of a continuous ice sheet. It may be effective in that a "layer" which might be considered similar to snow under ice is present. In any event, this practice of heavy topdressing or use of a natural organic fertilizer in late fall is increasing. It suffices to say that if a solid ice sheet is in place for longer than 25 days, it should be removed or extensive damage to turf will most likely result.

General

A number of things can cause damage to the golf course: such as diseases, insects, nematodes, etc. But, by and large, these are of biological nature and each individual one would take a report of this size for comment. When one is aware of the many things which can be damaging to the golf course and the turf thereon, it is quite amazing that golf courses have been and are maintained at the high standards and levels currently existing. Indeed, this is a testament to the golf course superintendents or the men who are responsible for the superb playing conditions that golfers expect today.

Conclusion

Most damage to the golf course results from players and player traffic. Obviously, without golfers there would be no golf courses. But courses would be much easier to maintain without them. Most money is spent on and most effort is put into competing with or overcoming damage done to playing turf by the player. Considerably less damage would result if players were more conscientious and made an effort to take better care of their course. Actually, every single golfer pays for the damage he does to the golf course through increase in daily fees or dues. Damage from use of mechanical equipment is an occupational hazard because economy of operation dictates that such equipment must be used.

Damage not directly related to traffic, such as flooding, desiccation, and ice cover as discussed, are problems more pertinent to the golf course superintendent. He must make himself familiar with them and take efforts to overcome or circumvent them. It is a testament to the turf-keeping profession that golf course superintendents have been able to compete effectively with the golfer as well as with nature.