IDENTIFY THE PROBLEM FIRST

THEN ATTACK IT

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Things you should do every year to help with the maintenance of your greens.

1. You should have your soil sampled every year and sent to a lab for analysis. This will let you know what your soil is doing. In other words what you need to give it or not give it.

2. In the growing season you can also send clippings into have an analysis done for what the plant is getting or not getting. With this information you can adjust your fertilization program.

3. In early spring the greens should be aerified with 1/4" solid tines. This lets the air down into the root system. With the ¼" holes no top dressing is needed. The holes will not disrupt play. At this time you should also start your fertilization program. I recommend what is called a greens grade fertilizer 10-4-16. This will help top growth as well as help build a strong root system. With a solid root system this will help with the wear and tear that a green gets due to a lot of play.

4. In late May or the first part of June the greens need to be hollow cored. It is best to use ½" x 6½" hollow core tines, if your core machines can handle this size. We use a Toro Aercore which handles 24 tines. We then use a core harvester to pick up the cores. If one is not able to have the use of a core harvester then you must shovel them of. The greens must then be top dressed with a greens grade sand that most of your golf courses use. This sand then must be drug in by using a sports screen. After you have drug the sand in as not to leave an excess of sand on the green you would fertilize with 10-4-16 and water in. In some cases some people just drag the old cores back into the holes. I personally do not like this method since I want to bring new life to the green not put back the old.

1 Do Not do until

3 days @ 65° Soil In AM

Only use the same sand as the green is built on test Sand if green is not sure greens grade USGA Sand

5. Every year you should do a soil profile. This will show you if you have a thatch problem.

Also gained will be how your root growth is going. You will also see if any other soils have somehow invaded your soil causing possible black layer. This will not allow water to leach down through the soil. It will also limit your nutrients to get down to the root sources.

IAS Laboratories

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SOIL ANALYSIS REPORT

VL = Very Low
L = Low
M = Medium
H = High
VH = Very High

Today's Date: 10/17/2002
Grower: Recreation Center of Sun City
Submitted By: Scott
Send Report To: Recreation Center of Sun City
Report Number: 6618673
Crop: Turf
Date Received: 10/10/2002

Sender Sample Id	Depth	Lab #	pH	Calcium (Ca) PPM	Magnesium (Mg) PPM	Sodium (Na) PPM	Potash (K) PPM	Iron (Fe) PPM	Zinc (Zn) PPM	Manganese (Mn) PPM	Copper (Cu) PPM	Salinity (EC x K) dS/m	Nitrate Nitrogen (NO3-N) PPM	Phosphorus (Bicarb - Soluble P) PPM	Computed % Sodium (ESP)	Sulfur (SO4-S) PPM	Boron (B) PPM	Free Lime Level
LKWEST		117	7.4	1300 VH	320 VH	63 L	140 M					.6 L	5.0 VL	11.0 M	2.8			Low
LKEAST		118	8.4	1600 VH	370 VH	75 L	170 H					.7 L	6.3 L	8.8 L	2.8			Medium
BNORTH		119	7.6	1200 VH	300 VH	79 L	120 M					.5 VL	6.6 L	7.0 L	3.8			Medium
BSOUTH		120	7.5	1500 VH	390 VH	100 L	130 M					.8 L	5.2 VL	8.8 L	3.8			Low
FRWY		121	7.1	1500 VH	400 VH	86 L	150 M					.8 L	5.7 VL	12.0 M	3.2			Low
MNTVIEW		122	7.7	700 H	220 H	41 L	97 M					.4 VL	3.2 VL	8.4 L	3.1			Low
OAKMONT		123	7.5	1500 VH	290 VH	68 L	120 M					.8 L	6.3 L	9.6 L	2.8			Low

AL — THIS IS THE IMPORTANT THING.

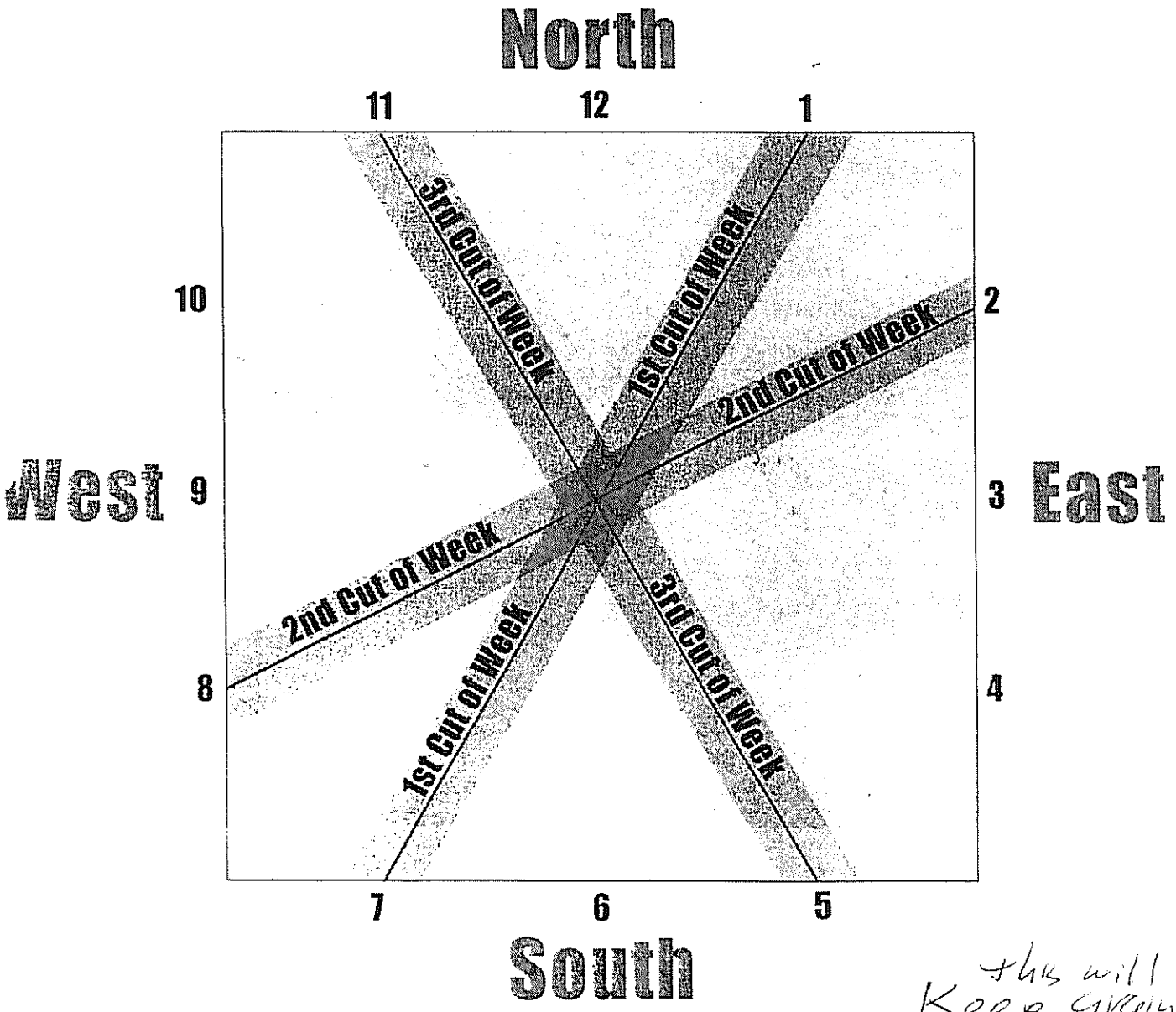
Mowing—

It is essential that mowing directions be altered as much as possible to reduce graininess, to reduce wear and to develop a uniform playing surface. In Sun City we maintain the same cutting height 5/32" or .156 all year long. In the summer or our best growing season we mow three times a week. We do the mowing on the day of a scheduled bowling day. Some of our clubs only bowl twice during the week so we cut on those days. When ever we mow we change directions (please see attached angles). We mow two passes wide around the perimeter from the plinth board in. Then we go into our angle we have selected for that day. When we finish we then do two clean up passes around the perimeter. Make sure the height of the mower is correct before mowing and that the reel is sharp and the bed knife is faced. Both have to be sharp or you do not get a clean cut. Dull blades or bed knife cause a pulling instead of a clean cut. To help save your equipment one should walk the green to look for stones or other debris.

Mow Once a week in the winter

AL — THIS IS THE BIG DEAL

Mowing Lawnbowl Areas



this will Keep green from growing the same way

Soil Compaction

Of course aerifying will help this problem. But if water is not going down through the soil several things could be the problem. One the ground maybe gone hydro-phobic. This means the sub soil is hard. Some folks try using gypsum to help loosen the soil. This may help but does not have relative neutralizing value. I use a product called aqua duct. This has been very successful in opening the ground to let water enter the soil.

Watering

You must realize that greens that have a Tif 328 Bermuda grass or several of the other Tif types do not require a lot of water. With Bermuda grass you want to give it enough water to keep it alive but not over water it. Two of our greens have been connected to the irrigation systems of golf courses by the lawn bowl greens. The computers that run those courses are tied into each courses weather station. The computer tells the station on how much water is needed to replace the ET. Now most everyone might say "what is ET"? ET is short for evapotranspiration.

water
2-3 times a week
you can find daily local ET online

Evapotranspiration

From Wikipedia, the free encyclopedia

Evapotranspiration (ET) is the sum of evaporation and plant transpiration. Evaporation accounts for the movement of water to the air from sources such as the soil, canopy interception, and waterbodies. Transpiration accounts for the movement of water within a plant and the subsequent loss of water as vapour through stomata in its leaves. Evapotranspiration is an important part of the water cycle.

Potential evapotranspiration (PET) is a representation of the environmental demand for evapotranspiration and represents the evapotranspiration rate of a short green crop, completely shading the ground, of uniform height and with adequate water status in the soil profile. It is a reflection of the energy available to evaporate water, and of the wind available to transport the water vapour from the ground up into the lower atmosphere. Evapotranspiration is said to equal potential evapotranspiration when there is ample water.

Contents

Evapotranspiration and the water cycle

Evapotranspiration is a significant water loss from a watershed. Types of vegetation and land use significantly affect evapotranspiration, and therefore the amount of water leaving a watershed. Because water transpired through leaves comes from the roots, plants with deep reaching roots can more constantly transpire water. Thus herbaceous plants transpire less than woody plants because herbaceous plants usually lack a deep taproot. Also, woody plants keep their structure over long winters while herbaceous plants must grow up from seed in the spring in seasonal climates, and will contribute almost nothing to evapotranspiration in the spring. Conifer forests tend to have much higher rates of evapotranspiration than deciduous forests. This is because their needles give them superior surface area, resulting in more pores for transpiration, and allowing for more droplets of rain to be suspended in and around the needles and branches, where some of the droplets can then be evaporated. Factors that affect evapotranspiration include the plant's growth stage or level of maturity, percentage of soil cover, solar radiation, humidity, temperature, and wind.

Through evapotranspiration, forests reduce water yield, except for in unique ecosystems called cloud forests. Trees in cloud forests condense fog or low clouds into liquid water on their surface, which drips down to the ground. These trees still contribute to evapotranspiration, but often condense more water than they evaporate or transpire.

In areas that are not irrigated, actual evapotranspiration is usually no greater than precipitation, with some buffer in time depending on the soil's ability to hold water. It will usually be less because some water will be lost due to percolation or surface runoff. An exception is areas with high water tables, where capillary action can cause water from the groundwater to rise through the soil matrix to the surface. If potential evapotranspiration is greater than actual precipitation, then soil will dry out, unless irrigation is used.

Evapotranspiration can never be greater than PET, but can be lower if there is not enough water to be evaporated or plants are unable to readily transpire.

Estimating evapotranspiration

Rolling greens

Bowling greens are typically rolled prior to play most days. Normal rolling is proceeded by mowing.
You should roll using the angle/straight method, which will ensure a double roll. It is not necessary to iron the green in the opposite direction to the play. It is important, however, to roll east-west one day then north-south the next time the green is rolled.
Rolling of the last six feet on an established green is considered unnecessary for most conditions, as increased compaction is caused by players at the ends of the green and the green will quicken naturally during the game.

In Sun City we do not roll our greens. If we are having a tournament we double and triple cut the greens to help produce the speed. The rear roller on our Scott Bonnar mower is the key to this.

2-3 times a year

PLAINING

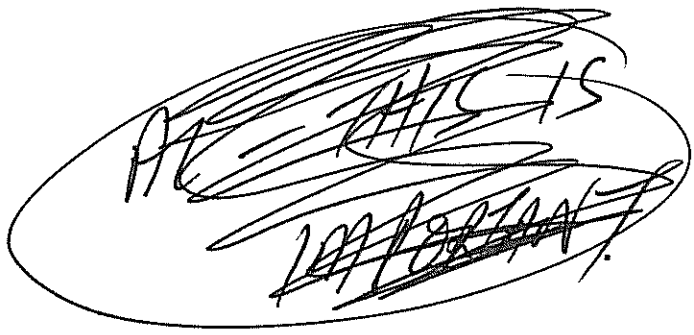
end of 1st May June

2nd 1st Aug

First plaining of the year. From the plinth board out go 8 ft. to 10 ft. once a year. Then go into the angles for verticutting (see attached form). We set our blades as to penetrate the ground 1/8". We some time have to adjust height as to wear on the blades may warrant it. We go two ways to help with thatch but mostly to create an even playing surface. Take excess materials off the surface. Mow green with a mower that it won't hurt the reel or bed knife. Then follow this with a mowing using a good mower. Top dress the green lightly and drag in. This will help maintain an even surface until the green has filled in. Fertilize with 10-4-16 and water in.

3rd m.d Sept

fill in with sand

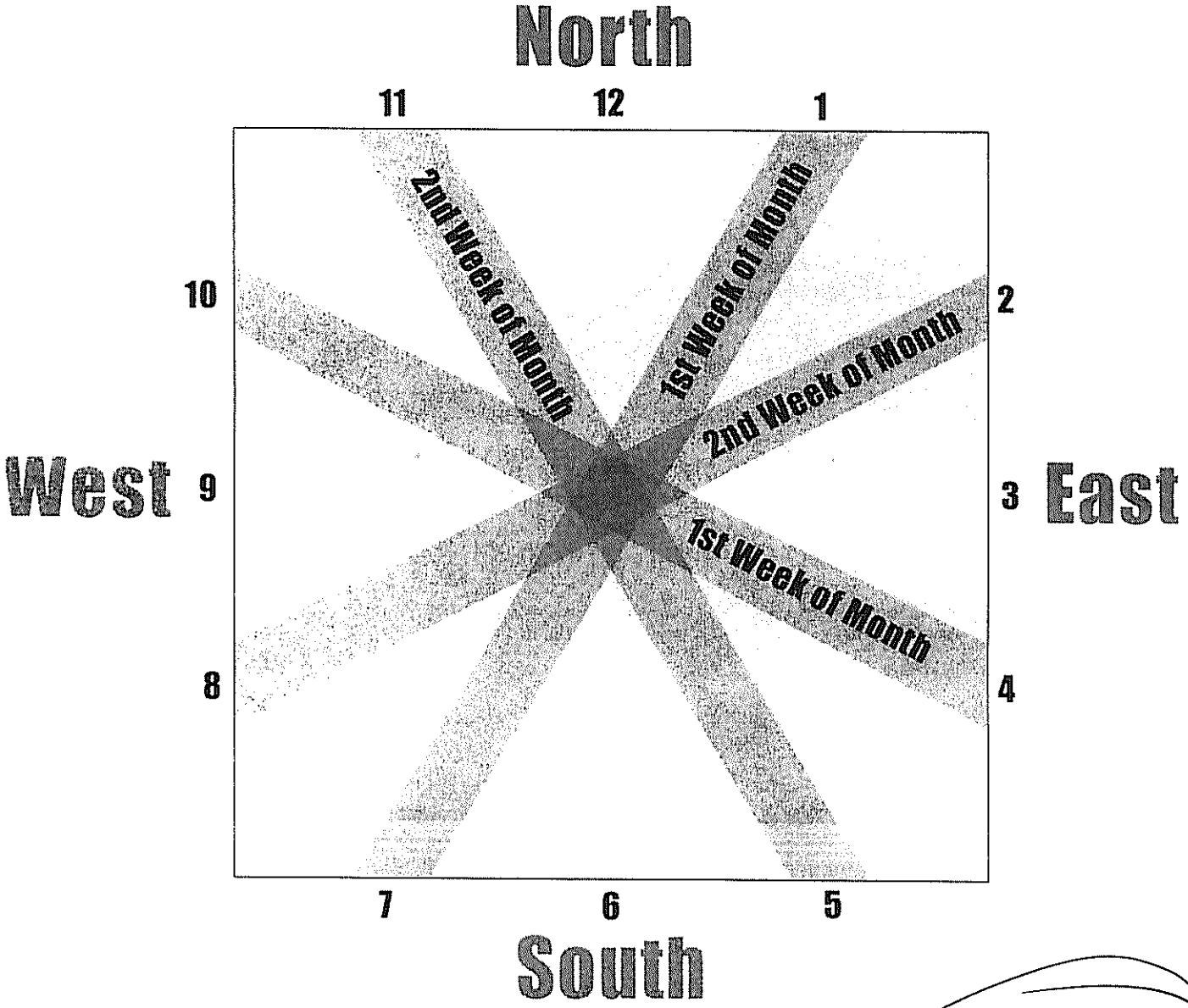


Verticutting or grooming greens

In Sun City we plain 3 or possibly 4 times each year during the growing season. After we complete the last plaining in September we finish by grooming the greens until the start of dormancy or hopefully just prior to it so the green has time to heal by dormancy time. We use the same pattern as listed on our verticutting diagram. After we have finished the grooming we then mow the green with our regular mower to help bring the green back into good playing conditions. We also continue our fertilization program with one exception. We do an application of 0-0-50 fertilizer also known as pot ash. We do this for the root system. Being when the plant goes into dormancy it lives of the carbohydrates that are built up in the roots. The 0-0-50 creates these carbohydrates. We set our blades at 1/16".

AL – THIS IS IMPORTANT. SEE OVER AS WELL

Verticut for Lawnbowl Areas



IMPORTANT

EQUIPMENT

MOWERS - - - - RECOMMEND THE SCOTT BONNAR 30" QUEEN MOWER. HEAVIER

VERTICUTTERS - - THE 30" SCOTT BONNAR WITH A VERTI-CUTTING REEL ON IT.

AERIFYER - - - RECOMMEND TORO AERCORE WILL HOLD 24 TINES.

ROLLER - - - GREENS IRON 5000

DITCH RAKES - - ONE THAT WILL FIT YOUR DITCHES

HAND AERIFIER WITH AT LEAST 4 TINES TO WORK ON SMALL AREAS.

DEW ROLLER OR DEW WHIP COULD BE MADE OUT OFF ½ OR 3/8 PVC. THIS IS USED TO GET MORNING DEW OF GREENS,

HAND BLOWERS - - ECHO BRAND IS GOOD. 2 CYCLE ENGINE

GAS WEED EATER TO EDGE THE GREEN.

BROOMS TO CLEAN UP DEBRIS AFTER DONE MOWING.

SOIL CORERS FOR PULLING SAMPLES.

MAINTENANCE SCHEDULE

DAILY MAINTENANCE OF GREENS STARTS BY WALKING THE GREEN TO MAKE SURE THERE IS NO DEBRIS ON THE GREEN THAT WILL HURT THE REEL AND BED KNIFE. IT IS ALSO A GOOD TIME TO LOOK AT YOUR GREEN TO SEE IF YOU HAVE ANY VISABLE PROBLEMS.

MAKE SURE THAT THE MOWER IS FULL OF GAS. NEVER FILL YOUR MOWER ON THE GREEN. IF GAS IS SPILLED ON THE TURF IT WILL KILL IT.

CHECK YOUR MOWING SCHEDULE FOR THE DAY AND FOLLOW IT. MAKE SURE YOU CLEAN THE DITCHES AND LEVEL OUT FOR PLAY. I HAVE MY GREENS WORKERS WHEN THEY WALK OFF THE GREEN TO TAKE A FINAL LOOK TO MAKE SURE THE GREEN LOOKS GOOD.

IF YOU ARE NOT GETTING A GOOD CUT, IN OTHER WORDS STRIPING OR AN UNEVEN CUT YOU ARE BETTER TO STOP AND CORRECT THE PROBLEM.

THE MOWER IS ALWAYS WASHED AFTER YOU ARE DONE. THE OIL SHOULD BE CHECKED BEFORE YOU START THE MOWER. WE HAVE OUR MECHCANICS CHECK THE MOWER AT LEAST TWICE A WEEK MORE IF THE OPERATOR REPORTS A PROBLEM.

Pests—Weeds—and Fungi

The very first thing you do is to identify the pest weed or fungus. Trust Mother Nature she does give off some tips to possible problems. For example if the birds are pecking holes in your green that is an indication that there are some type of subsoil pest down there that they are after. It could be grubs or possibly chinch bugs. Again you must first identify the invader. The best way to help you find out what they are is to put a hole in the green in that area or simply use the hole the birds have made. Then use a dish soap (we use dial liquid) pour into the hole then add water to the area. The pests do not like the soap and will come to the surface. When they do collect them and then identify them. The two afore mentioned pests I use Merit 5g granular. I apply at 31/2 lbs. per 1000 sq. ft. then water in. Choose a non playing day to do this. It might help to set up a system be flagging the green or some kind of sign to let members know something chemically has been done to the green. Say someone comes to practice on that off day. Or the head greens keeper can post it for members on such a day chemicals will be applied to their green.

I think lemon in it

Irrigation for a fungus problem
You should water in the predawn hours. If you start your irrigation at 4 or 5 am this will help. This is a good time in Calf. or others coasts. This allows them to dry quicker. When the sun comes up you should dew roll or dew whip the water off the green. It is bad to allow the water to remain on the green in hopes the sun will take it off. In Arizona we water late at night because fungus is not a major problem. This does not mean we do have it.

Fungi

There are two types of fungi

1. Saprophtes - - Fungi that feed on dead organic matter such as thatch.
2. Parasites - - fungi that fees directly on plants to obtain some or all their food.

It is a fairly accepted fact that fungi are a secondary problem caused by some other problem that has weakened the turf area. The fungi which is classed as a Saprophtes is more prevalent on greens. So make sure that you keep the thatch off of your greens. By plaining or verticutting or grooming regularly will help control your thatch. Also a program of light topdressing during the growing season will help. You can keep track of your thatch by using a soil probe to look at your make-up of your green you can either replace the core or fill the hole with sand. This should not and in our case does not interrupt play. Be sure and pull several samples from various places on the green.

Fungicides

Always check labels for rates, types of grasses can be used on and if it can be used in your area. States vary on what you can use and where.

Types to use to help prevent fungi
Banner Maxx
Bayleton
Daconil
Rubigan
Sentinel

In some cases if the fungi can not be controlled you may have to take out the sod fume the soil and re-sod.

PREEMERGENTS

MAKE SURE THE HERBICIDE ACCORDING TO THE LABEL CAN BE USED ON GREENS AS WELL AS SPORTS FIELDS. ALWAYS CHECK THE LABELS FOR RATES AND REENTRY TO THE AREA.PREEMERGENTS MUST BE PUT DOWN SO AS TO BE IN THE SOIL SO THAT WHEN THE PLANT GOES INTO CELL DIVISION IT WILL BE THERE TO STOP THEM.
IF YOU ARE TRYING TO CONTROL COOL SEASON WEEDS YOU SHOULD HAVE YOUR PREEMERGANTS DOWN IN LATE OCT. OR NOV. IF YOU ARE TRYING TO CONTROL SUMMER WEEDS DO NOT PUT DOWN UNTIL LATE JAN.

SOME OF THE PREEMERGENTS WE USE ARE.
BARRICADE
PENDULUM 5G
RUBIGAN ALSO OTHERS THAT HAVE BEEN USED ARE KERB AND PRINCEP.

POST EMERGENTS

IF YOU DO NOT GET THE PREEMERGENTS DOWN AND THE WEEDS COME UP THEN YOU WILL HAVE TO BE CONTROLLED BY POST EMERGENTS. NOTE IF YOUR GREENS WORKERS SPOT A PROBLEM STARTING HAVE THEM REMOVE THE WEEDS BY HAND HOPEFULLY GETTING THE ROOT OUT.

SOME OF THE POST EMERGENTS THAT CAN BE USED FOR BROADLEAF WEEDS ARE.

ROUND UP PRO AT A SMALL PERCENTAGE 1% OR LESS
MANAGE
MANOR
LONTREL
SPEED ZONE
THREEWAY

ALWAYS MAKE SURE THAT THESE AND OTHER PRODUCTS I HAVE MENTIONED CAN BE USED IN CALF.