EDITORIAL

Surfing the Internet - An educational experience *or* a waste of time

While interviewing Dr. Ken Carey for the article on world wide web at the Guelph Turfgrass Institute I was impressed with the amount of turfgrass information that is available to anyone who wishes to surf the Internet. Certainly much of the information that I saw, as Dr. Cagey deftly hit the right icons, was not new. But it is only in its infancy - less than two years!

Will this new format for information transfer replace the written word? This is a matter which the Sports Turf Association must seriously debate. Will the Sports Turf Manager become redundant? Should it be placed on the Internet? What are the financial implications? And many more questions should be asked.

It occurred to me that a major problem with information obtained from the Internet is its authenticity. Scientific publications have a review procedure which prevents the publication of information not supported by appropriate scientific procedures. Most reputable magazines have an editor who establishes the reliability of what the magazine contains. Who edits the Internet? At the moment, nobody.

This means each user of the Internet must be able to separate the wheat from the chaff. Thus the reputation of the organization originating a "home page" must be know to the surfer. Certainly GTI, Cornell, Ohio, Michigan have that reputation.

A waste of time? Certainly letters to Ann Landers suggest surfing the Internet may disrupt ones family life. But I have spent many enjoyable hours browsing among books in the shelves of the many libraries and have enjoyed every minute. If this computer were connected to the Internet I would be doing what is essentially the same - surfing, not browsing; on the screen, not in the shelves; on home pages, not in books - and still be within hollering distance of my wife. Oh for the quiet of the library shelves!

New Members

Mark Fluhrer, Kingston Parks and Recreation

Rusty Warkman, City of Toronto

Clayton Brant, Town of Port Hope

Duane Boutang, Manitoba Baseball Association

Paul Beswetherick, Whistler, B.C.

Doug Bowen, City of Nepean

Alan Dungey, Ottawa Links Baseball Club

Erratum (March 1996 Issue):

Iain Souter, Aldershot Landscape Contractors

World Wide Web at Guelph Turfgrass Institute

In November, 1995, Dr. Ken Carey established a home page on the world wide web for the Guelph Turfgrass Institute. At that time the were three pages on the internet, today there are over ten major sites. The Guelph site is averaging ~1500 "hits" per week, with people from around the world signing their guest book.

The Guelph pages are designed to deliver timely and useful text and graphical information about turf management and the turf industry via the internet. The address of the Guelph page is

http://www.uoguelph.ca/GTI/gtihome.htm.

The site offers a collection of turfgrass links, that is, the URL's (addresses) of other turf related sites on the internet, a popular part of the Guelph page.

In addition they have the GTI Annual reports on file as well as OMAFRA fact sheets on turf. A bulletin board is available where turf managers and researchers can "pin" announcements, turf management questions and answers, equipment buy and sell notices, jobs available/wanted postings and general graffiti.

Information about the history, mandate, research and educational programs offered by the GTI are listed.

The site also offers a home page for the turf industry organizations using the G.M. Frost Research and Information Centre. This includes a home page for the Sports Turf Association.

Species Identification

The 20th in a series by
R.W. Sheard, P.Ag.

The management of turf often requires we know what species of grass we are working with. The manager may wish to know whether his sports field is bluegrass, ryegrass or tall fescue. His records may be misplaced as to what was seeded originally and with time a mixture of species may have become dominated by one species. So what is it?

The answer is obtained through identifying certain vegetative plant parts; then according to their characteristics decide what species you are working with. The plant parts are the root system, the leaf blade, the bud-shoot, the sheath, the collar, the auricle and the ligule.

The root system identification characteristic is based on the presence or absence of stolons or rhizomes. An ability to identify stolons from rhizomes is critical for this step. Stolons are stems which grow along the soil surface or within the thatch layer. New roots and shoots emerge from the nodes on these stems. The stolons may branch at the nodes forming a network of stolons. Rhizomes are also stems, but they grow horizontally below the soil surface. When the stem approaches the soil surface light response stimulates the formation of shoots and roots at a node on the stem and a new plant results from which one or more new rhizomes may emerge.

Generally stolons and rhizomes are much larger in diameter than the fibrous root system, therefore they should not be confused with roots.

The bud shoot or bud leaf is the manner in which the newly emerging leaf emerges. The arrangement of the bud shoot is the basic point from which all identification of grasses commences. The bud shoot may be folded with the margins of the leaves meeting but not overlapping or it may be rolled with the margins of the leaves overlapping (Fig. 1).

The leaf blade may be used in identifying species on the basis of the shape of the leaf tip. The differentiating characteristic is whether the leaf tip is boat shaped or pointed apex (Fig. 2).

The leaf sheath is that tubular part of the leaf, arising at the node and closely clasping the stem or younger growing leaves upward to where the blade begins. The leaf sheath may be classified as split from the node to emergence of the blade, split at the top but tube-like near the node, or closed the entire distance from the node to where the blade emerges (Fig 3).

The collar is a meristematic band or growth zone which marks the division between the blade and the sheath. The collar may be broad and prominent or narrow, continuous from one margin of the leaf to the other, or divided by a conspicuous midrib. In some species it may be higher on one side of the leaf than the other (Fig 4).

The auricles are appendages projecting from the collar, one from either side. They may be absent or vary in length and shape from long and claw-like to small and rounded or rudimentary (Fig. 5)

The ligule is a tongue-like outgrowth at the junction of the blade and the sheath clasping the culm or bud shoot. It may appear as a fringe of hair or as membranous tissue, or may be pubescent [covered with soft hairs] on the back (Fig. 6).

There are over 7,500 species which belong to the family of plants called *Gramineae*. As turf grass managers in the cool temperate region, however, we need to be concerned with only 16 of these species. They have been discussed in recent articles in this series and for review are listed again.

Kentucky bluegrass (*Poa pratensis L.*)
Canada bluegrass (*Poa compressa L.*)
Rough bluegrass (*Poa trivialis L.*)
Annual bluegrass (*Poa annua L.*)
Supina bluegrass (*Poa supina* Schreb.)

Italian ryegrass (*Lolium multiflorum* Lam.)
Perennial ryegrass (*Lolium perenne* L.)

Tall fescue (*Festuca arundinaceae* Schreb.)
Meadow fescue (*Festuca elatior* L.)
Creeping red fescue (*Festuca rubra* L.)
Sheeps fescue (*Festuca ovina* L.)
Hard fescue (*Festuca ovina* L. subsp. *duriuscula*)

Creeping bentgrass (*Agrostis stolonifera* Huds.)
Colonial bentgrass (*Agrostis tenuis* Sibth.)
Velvet bentgrass (*Agrostis canina* L.)
Redtop (*Agrostis alba* L.)

To this list we must add three forage grasses which may invade a turf area and two weed grasses which create control problems. They are:

Brome grass (*Bromus inermis* L.)
Timothy (*Phleum pratense* L.)
Orchard grass (*Dactylis glomerata* L.)
Twitch (quack) grass (*Agropyron repens* L.)
Crabgrass (*Digitaria ischaemum* Schreb.)

To aid in separating the identifying characteristics of each species and deciding on which species you are dealing with botanists have developed an identification key. With the aid of a sharp knife and a small hand lens the plant is systematically examined for the several characteristics listed above until a the name of the species is arrived at.

AN IDENTIFICATION KEY FOR TURF SPECIES

1.0. - Folded in the bud shoot.	
1.1. - Auricle present.	
1.1.1. - Lower leaf sheath reddish, back of leaf shiny.	Perennial ryegrass
1.2. - Auricle absent.	
1.2.1. - Ligule membranous.	
1.2.1.1. - Blade narrow, prominently ridged on upper surface.	
1.2.1.1.1. - Ligule less than 0.5 mm or absent, sheath split, leaves waxy, plant tufted.	Sheep fescue
1.2.1.1.2. - Ligule over 0.5 mm, sheath closed, leaves not waxy, plant not tufted.	Red fescue
1.2.2. - Ligule absent to very short.	
1.2.2.1. Without rhizomes.	
1.2.2.1.1. - Sheath keeled or with prominent ridge like a boat keel running down base of leaf which gradually tapers to apex.	Canada bluegrass
1.2.2.2. - With rhizomes.	
1.2.2.2.1. - Sheath not keeled,leaf parallel sided, with abruptly pointed and boat shaped tip.	Kentucky bluegrass
1.2.3. - Ligule rounded or pointed, more than 1.0 mm long.	
1.2.3.1. - With stolons.	
1.2.3.1.1. - Tapered and boat shaped leaf tip, sheath rough, blade glossy under surface.	Rough bluegrass
1.2.3.2. - Without stolons.	
1.2.3.2.1. - Parallel side leaf with tip abruptly pointed and boat shaped.	Annual bluegrass
1.2.3.2.2. - Leaf blade wide and taper pointed, stem base flattened.	Orchardgrass
2.0. - Rolled in the bud shoot.	
2.1. - Auricles present.	
2.1.1. - Auricle blunt to claw like and with minute marginal hairs, very shiny underside, strongly ribbed upper side of leaf.	Tall fescue
2.1.2. - Auricles without marginal hairs, leaf soft and less shiny, margin of leaf harsh or slightly rough or jagged to finger when slid lengthwise down edge near leaf base.	Meadow fescue
2.1.3. - Margin of leaf smooth, auricle small, rarely reaching 1/4 distance around stem, ligule over 1 mm.	Italian ryegrass
2.1.4. - Sheath, collar, and blade with short soft hairs, rhizomes prominent which are white and pointed.	Quack grass
2.2. - Auricles absent.	
2.2.1. - Ligule membranous.	
2.2.1.1. - Leaf sheath closed, its margins united except for a small V-shaped notch near the collar, leaf sheath and blade hairless, "W" marking of wrinkled tissue near middle of leaf, rhizomes present.	Bromegrass
2.2.1.2. - Leaf sheath split, hairless and compressed with ridge or keel down the back.	Crabgrass
2.2.2. - Ligule 1.5 mm or longer with prominent notch on either side, enlarged or bulbous base to stem.	Timothy
2.2.2.1. - Ligule without notch, rhizomes present.	Redtop
2.2.2.2. - Ligule shorter than 1.5 mm, rhizomes slender and short.	Colonial bentgrass
2.2.2.3. - Stolons present.	Creeping bentgrass
2.2.2.4. - Stolons present, ligule tends to be pointed.	Velvet bentgrass

It is important to remember that the key is based on contrasting pairs of statements. If the first statement is not true then you move on to the next statement at the same level in the key.

Let us take an example. The first characteristic listed in the key is the bud shoot. As there are only two possibilities the first step is to determine whether the sample is folded in the bud shoot or rolled in the bud shoot. Let us assume that it is folded (1.0). The alternative statement is rolled in the bud shoot (2.0.). The second step is to determine whether the sample has auricles. Let us assume that it does not (1.2.). The third step is to examine the shape of the ligule. Let us assume that ligule are hard to see or absent (1.2.2). Further examination reveals the plants have very prominent rhizomes (1.2.2.2.) and for confirmation that the leaves are not tapered but parallel sided and boat shaped at the tip. Following these observations through the key reveals that the plant you have examined is Kentucky bluegrass.

Practice is necessary to develop skills in using the key. Some initial short cuts can often save time, such as to examine the plant for rhizomes or stolons. Broad leaf species will often turn out to be quack grass or forage grasses. Crab grass in August can easily be identified by its particular seed head, even under two inch mowing.

ILLUSTRATIONS OF VEGETATIVE CHARACTERISTICS USED FOR GRASS IDENTIFICATION

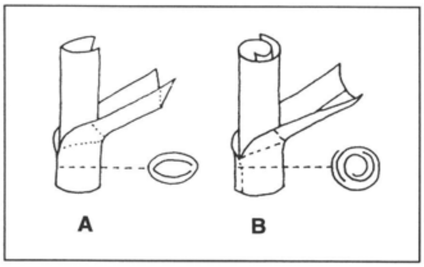

FIGURE 1: The Bud Shoot (A = folded, B = rolled)

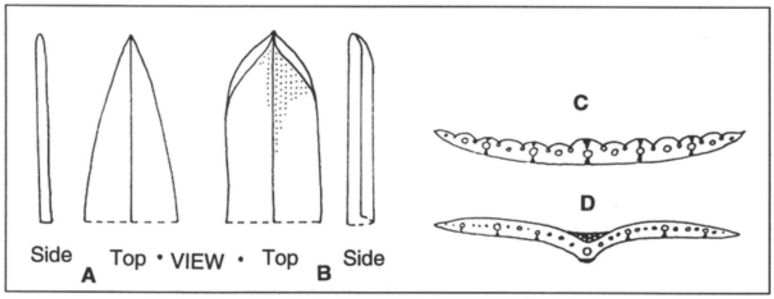

FIGURE 2: The Leaf Tip and Surface
(A = tapered, B = boat-shaped, C= ridged but not keeled, D = not ridged and keeled)

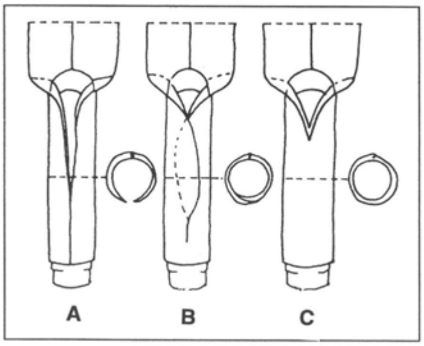

FIGURE 3: The Leaf Sheath (A = split, B = split with margins overlapping, C = closed)

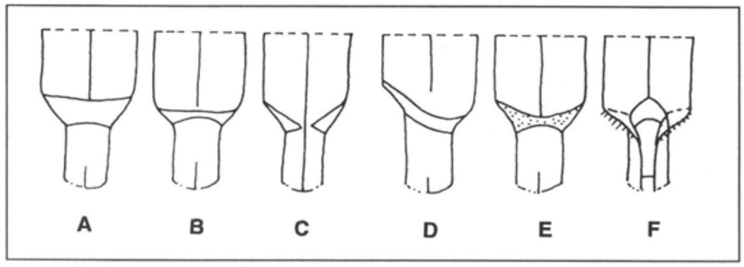

FIGURE 4: The Collar (A = broad band, B = narrow band, C = divided by midrib, D = Oblique, E = Pubescent, F = ciliate, note: A - E are back views, F is a front view)

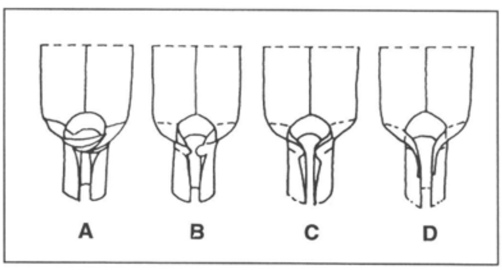

FIGURE 5: The Auricle (A = claw like, B = rounded, C = rudimentary, D = absent)

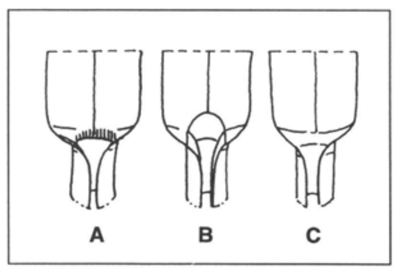

FIGURE 6a: The Ligule Types, (A = fringe of hair, B = membranous, C = absent

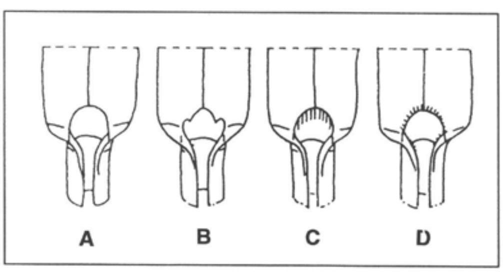

FIGURE 6b: The Ligule Margin (A = entire, B = notched, C = lacerate, D = ciliate)

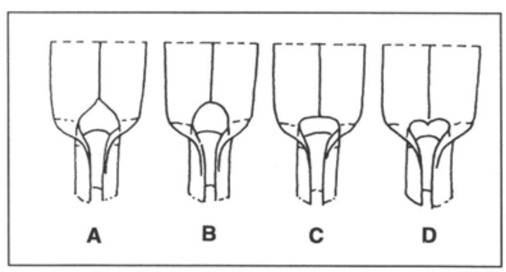

FIGURE 6c: The Ligule Shapes (A = acute, B = rounded, C = truncate, D = marginate)

GTI HILITES

For a number of years the Guelph Turfgrass Institute has published the results of variety trials. Recently they have included data from the Kemptville and Ridgetown testing programs. A hugh amount of data is presented; the most recent issue, the 1995 GTI Research Report has 20 pages of numbers. To the layman these numbers have little meaning. The selection of the best variety of a species might take hours of careful study.

Recently, Prof. Steve Bowley of the Crop Science Dept. at the University of Guelph has developed a rating system by which the vanities can be compared within a station and between stations. The system is called the superiority index.

Once a month Prof. Bowley examines the quality of the test plots of a species and identifies what he considers to be the best variety in the test. He assigns a number to this "best" variety for that month and all other vanities in the test are rated relative to it. Each month the difference between the "best" variety and any other variety in the test is calculated. At the end of the season the values are summed and the necessary statistical analysis applied.

Thus if the "best" variety remains the best at each evaluation date throughout the season its difference from the "best" would be zero and its superiority index would be zero. In contrast any variety which differs significantly or inconsistently from the "best" will have a high superiority index.

Table 1: The Superiority Index for Kentucky Bluegrass Varieties at Guelph and Kemptville in 1995.

	SUPERIORITY INDEX	
Variety	**Guelph**	**Kemptville**
Asset	0.38*	0.36*
Cynthia	0.38*	0.26*
Touchdown	0.48*	0.74*
Welcome	0.52*	0.46*
Nublue	0.79	0.86*
Alpine	0.81	0.18*
Opal	0.83	0.41*
Lofts 1757	0.88	0.88*
Shamrock	0.88	2.00
Aspen	0.98	2.12
Liberty	1.02	0.22*
Chateau	1.06	2.06
Eclipse	1.08	0.85*
Limousine	1.08	0.72*
Midnight	1.13	3.05
Adelphi	1.17	0.53*
America	1.31	0.72*
Glade	1.31	0.18*
SR2100	1.33	2.16*

*Superiority Index cut-off at a statistical probability level of P = 0.05. Varieties with values not stared are statistically inferior to those "best" performing varieties which are stared.

This type of analysis has been put into use both at Guelph and Kemptville, thus permitting a comparison of varieties at Guelph and between Guelph and Kemptville. Superior varieties at both locations may be considered suitable for the areas represented by the two stations. Table 1 lists the quality ratings for bluegrass at Guelph and Kemptville during 1995.

Based on Prof. Bowley's analysis the varieties which are superior at both sites may be considered to be true STARS. The varieties which are inferior at both sites may be considered to be true DOGS. Those in between will require the individual turf manager's decision on whether to use them or not.

Assessment of other species such as tall fescue and bentgrass are available in the 1995 Research report of the GTI. Additional years of data and data from trials at Ridgetown will improve the shake down of the large number of varieties available today to the turf manager.

GTI Turf Research Field Day

August 19, 1996 is the date of the second Turf Research Field Day to be held at the Guelph Turfgrass Institute in Guelph. The experimental plots will be in their second year of operation.

The day offers an excellent opportunity to see first hand the results of work being conducted on the use of chemicals for pest control, IPM systems, variety trials, chemical movement from the rooting zone and many other items of interest to the turf manager. GTI researchers will be available to answer your many questions.

For further information, call (519) 767-5009.

"EVERY CHILD DESERVES A PLACE TO PLAY"

Tony Brett Young
Communications Officer
United Kingdom Playing Field Association

In a land of 57 million people (more than a quarter of the population of the USA), that would fit nearly forty times into the USA, competition for space is keen. The United Kingdom faces a major dilemma: the need for constant building and development and the need to protect its playing fields - and in the United Kingdom that generally means turfgrass. With constant demand for new housing, roads, supermarkets and car parks, the easy option has too often been a sacrifice of the nations recreational land. But, as the humorist Mark twain once observed: " The trouble with land is, they are not making it any more!"

However, as is so often the way of the British, the people are fighting back. Leading the crusade against the continuing loss of playing fields is an independent charity, the National Playing Fields Association (NPFA), which was established in 1922 to protect and improve recreational land. Involved in the organization are such world-renown notables as Prince Philip, the Duke of Edinburgh, who serves as President and NPFA Vice-President Michael Caine. Roger Moore of James Bond fame, also lends his active support to the organization.

To the NPFA, the value of physical activity among children is paramount. It believes it is essential that a habit of keeping fit should be formed at school age. Once children leave school, many of their games, sports, recreations and other pastimes are forgotten, and there is little likelihood that the fitness habit will be developed in adulthood.

However, surveys have lead to a growing concern about fitness of British children. One study revealed that 90 percent of children in a major provincial city were not fit as they should be. Part of the problem comes from the fact that many of them are being denied the facilities they need to play freely and safely at school and outside of school hours.

The NPFA believes that generally, children are still keen to play games and sports, and particularly on natural surfaces provided by turfgrass. However, if society makes it increasingly difficult for them to do so, they will inevitably drift more and more to passive pastimes, thus becoming less physically fit.

To counter the loss of playing fields, the NPFA carries out its protection role in a number of ways, including constant lobbying of central and local government bodies. It has had some success in persuading them of the value of one of its major planks of policy - the NPFA Six Acre Standard. Broadly, this recommends that a minimum of six acres (2.43 hectares) of recreational land should be provide for every 1,000 in the population. The NPFA also acquires land for sport, recreation and play and at present owns 111 playing fields or open space sites. These holdings make it the largest owner of formal recreational land in the country.

The charity also promotes improvement of playing fields by providing an independent advisory service on all technical aspects of outdoor recreational facilities. This includes design, layout, installation, construction, management, and maintenance and can range from advice on soil, drainage and irrigation to floodlighting, fencing and line marking.

The NPFA also recognizes the value of turfgrass playing and sports fields because of their increased margins of safety, cleanliness and diversity. While not all play and sports areas can appropriately be turf covered, the vast majority in the United Kingdom are. The reduction of injuries, both major and minor, to active participants on well maintained turf has been well documented by numerous scientific studies. The NPFA accordingly encourages not only the use of high quality turf playing areas, but also its proper management and maintenance to ensure that the quality is ongoing.

The NPFA has proven what common sense tells us and that is, if children are given a reasonable opportunity to play out of doors on a well maintained area, they will gladly do so. Also, a community which provides a mix of activities including safe and adventurous play, sport and recreation will benefit from healthier, more intellectually developed, imaginative children. They will also grow into adults who will contribute much more to that community.

The need, not only in the United Kingdom, but around the world is urgent and underlines the relevance of the National Playing Fields Association's slogan, "Every child deserves a place to play."

[Reproduced from *The Journal of Environmental Turfgrass*, Vol. 5. pp. 5, 1993]

Yes! It was a Hard Winter

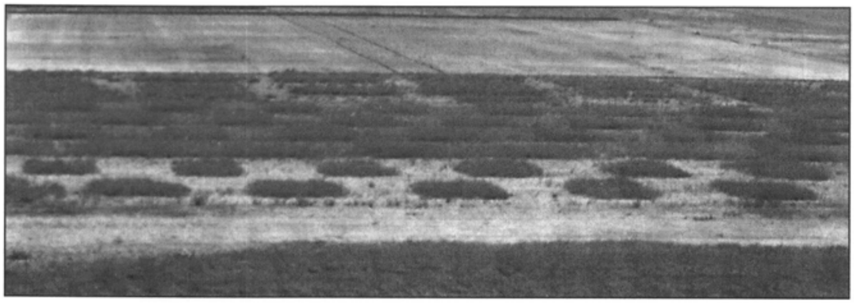

Figure 1: Loss of perennial ryegrass (top) and tall fescue (foreground) following hard winter of 1995-96.

When the snows finally receded this spring the effects of the long, cold winter became apparent to many turf managers. None were more aware of the effects than the researchers and station manager at the Guelph Turfgrass Institute. All the perennial ryegrass and tall fescue variety trials were dead as well as the three-year-old roadways through the plot area which were seeded to pure ryegrass (Figure 1). The fine fescues and bluegrass were not effected.

Snow cover was minimal and long periods of low temperatures were a feature of the winter. The uniform pattern was not related to any ice sheet damage and internal drainage of the site was ideal.

Prof. Bowley of the Crop Science Dept. considers Ontario to be on the northern fringe of the adaptation for tall fescue. Researchers at the Kemptville station have repeatedly had winter kill problems with ryegrass. It appears the weather factors during the past winter all came together to do a number on both species.

What are the implication for sports field mangers? **Beware of pure stands of either species.** A mixture with bluegrass may have resulted in partial survival which could be corrected with an overseeding program. Unfortunately mixtures of the two species with bluegrass were not available in the test plots to evaluate this effect.

KEEPING COOL

As I look out the window on this May 1st morning there are snow flakes in the air, thus it is hard to think about hot temperatures. But hopefully in a few days, or weeks at the most, we will be turning on the central air.

The turfgrass environment is one of natures greatest air conditioning systems. The cause of the cooling effect of turf is the evaporation of water from the leaf and soil surface - a process often called evapotranspiration.

The cooling effect of evaporation of water is very apparent as you walk barefoot at the beach on a hot, sunny day in August. The relief you feel as you move from the dry sand to the wet sand at the waters edge is due to the use of the radiant heat from the sun in evaporating water from the wet surface. On the wet sand as much as 80% of the radiant heat may be used for evaporating water, however, on the dry sand, the radiation from the sun is primarily going into heating the sand grains and the air at the sand surface.

While it will take one calorie of energy to raise one gram of water one degree centigrade, the evaporation of water from a surface, whether it is soil or grass surface, requires approximately 590 calories of energy for every gram of water. Thus less radiant energy remains to heat the sand and/or air.

Dr. Jim Beard made measurements at and above turf surfaces in August at Texas A. & M. University. His data clearly show the living system is a tremendous natural air conditioner, not only lowering the surface temperature, but also the air temperature and the night temperature. Systems without the cooling effect of water evaporation have more radiation used in heating the surface; sinks from which heat is lost back to the atmosphere at night keeping the night temperatures higher.

The data clearly illustrate the undesirable high temperatures associated with artificial turf. Even at night the artificial turf does not lose its higher temperature by radiation back to the atmosphere as fast as natural grass.

Note that non-living, brown turf also has a higher surface temperature than green turf, a clear illustration of the heat energy consumed in evaporating water from the living plant.

Table 1: A comparison of surface and air temperatures of turf surfaces in August.

Type of Surface	Max. Day Temperature Surface	Max. Day Temperature 3 in. above	Min. Night Temperature Surface
	°F	°F	°F
Irrigated Green Turf	88	89	76
Dormant Brown Turf	126	95	79
Bare Soil	102	91	78
Artificial Turf	158	96	84

Pregermination vs Seed Priming

Pregermination of grass seed and grass seed priming are not synonymous terms. Pregermination of seed involves the soaking of the seed until the physical process of germination - the actual penetration of the root through the seed coat has occurred, followed by planting the wet seed. Priming grass seed, on the other hand refers to soaking the seed in a limited amount of water until the physiological process of germination has commenced, drying the seed and planting in the conventional manner.

The basic difference, therefore, is the control of the amount of water that is fed to the seed. Limiting the amount of water during priming allows the germinating juices to course through the seed but does not allow for full germination. As a result the primed seed can be stored for a period of time without harm. In contrast pregerminated seed must be planted within three to five days because if the seed is dried it is killed and the seed is wasted. Thus delay in seeding pregerminated seed due to weather can result in the loss of a seed lot. On the other hand primed seed can be stored for a period of time without harm. Unplanted seed merely reverts to its unprimed state and may be stored for several months.

Pregermination of turfgrass seed is accomplished by adding 50 pounds of seed to a 45 gallon drum and covering the seed with enough water to thoroughly wet the seed. The mix is stirred on and off until tiny roots are visible on the seeds, then is drip dried in a burlap bag suspended in the air. The seed must not be allowed to dry before seeding or after placing on the soil surface because the little seedling will be killed as the germination process has progressed too far.

The hazards associated with pregerminated seed, therefore, are the method of seeding and the influence of weather on the timing of the operation. The wet pregerminated seed with its small roots - probably only a few millimetres in length - will not flow easily in a conventional seeder. Physical damage to the emerging root tips is an additional hazard. Thus hydro seeding is the most satisfactory seeding method.

Pregermination generally cuts one day off the germination period for every day of soaking. For example, if a species that would normally germinate in 7 days is soaked for two days, it will germinate in the field in 5 days. Emergence of the root tip on the majority of the seed is the test of when to drain the seed and plant.

Freshly primed seed is quite dramatic in the early stages of field germination. As a rule of thumb, priming — at best — cuts the germination period in half. Thus if a crop normally germinates in 14 days, i.e., bluegrass, it will germinate in 7 days if primed. As the priming effect wears off, however, through degradation during storage, such that the 7 days become 8 days, and so on. In a study at Oklahoma State prime seed of Kentucky bluegrass emerged three days sooner than untreated seed and has as much as 27% greater field survival.

After 6 weeks under optimal growing conditions in the field, it is nearly impossible to tell a primed bluegrass field from an unprimed one. The benefits of priming come when temperatures are adverse or when the bluegrass is mixed with a fast growing species such as ryegress that normally tends to overwhelm the slow germinating bluegrass. Another priming benefit is under athletic field conditions, where only a short period is allocated between games for reseeding.

Certain conditions are required for a successful priming operation. The first is the control of the amount of water added. Control may be accomplished by adding a salt-water [225 g table salt per 19 litres of water] or a water-polyethylene glycol mix which limits the water penetration of the seed by osmotic effects. Some water passes into the seed, but not enough to complete germination.

A more simplified approach is to dampen the seed with a limited amount of water. Add 8 pounds of water to 10 pounds of seed with stirring, followed by periodic mixing to redistributed any surface water. The process may be carried out in woven poly bags that the seed is shipped in. Air flow may be achieved by a short piece of plastic hose inserted to the centre of the bag and attached to a small squirrel-cage fan. The air flow helps to cool the seed which tends to heat when wetted. Perennial regress will be primed at room temperature in 2 days whereas bluegrass will require 5 days. An "eyeball" method of gauging the priming time is to stop priming when the very first root tips can be seen on a few seeds.

Temperature in the priming process is of major importance. The ideal temperature for priming is 15 C. Ideally the seed should remain at 15 C during the drying process. Use of higher temperature during drying will effectively remove the priming effect. The seed should be dried to 15% moisture if seeding is to occur in five days. Dropping the moisture content to 12% will drastically reduced the priming effect.

Light may also be beneficial in the priming process. Bluegrass will prime without light, however, the germination index of bluegrass seed primed with light will be higher than seed primed without light. Only a brief exposure of one hour or less per day is require and red light is most beneficial. Fluorescent light is least beneficial.

Oxygen during the priming process is perhaps the key ingredient for bluegrass. Priming while submerged in water totally inhibits the priming process. There seems to be a natural dormancy mechanism in the bluegrass seed that prevents it from germinating in wet conditions.

As bluegrass seed germinates it gives off inhibitors. In nature, the inhibitors probably aid the plant by reducing competition around the young seedling. However, when priming in bulk the inhibitors can build up, actually inhibiting the priming process.

The shelf life of primed seed decreases with time and temperature. When stored at 15 C the priming effect can be detected for up to one year but the amount of the priming effect would be insignificant in the field. As a rule of thumb the priming effect can be expected to remain at a beneficial level for one to two months when the seed is stored under cool conditions.

Priming for too long a period - until the root tip breaks the seed coat will effectively ruin a lot of seed. On the other hand priming for too short a period will provide little or no priming advantage. If time is important or if germination conditions are less than optimal, pregermination or priming of the seed might be considered by a turf manager. Be aware it is a tricky process and can be expensive if your seed supply is destroyed in the process. Remember the seed companies have not adopted the priming process, partly due to the logistics of the operation and partly due to the limited shelf life of the prime seed.

(This article was compiled from a series of articles written by Dr. Douglas Bede of the Jacklin Seed Company)