

**GCS**



**&**

**Stick to greens**

**MAI**

Jan, 2014

# Stick to Greens

A beautiful year is waiting for you, walk with aims,  
run with confidence, fly with achievements.  
GCS&MAI wishes you a healthy & prosperous 2014

**Golf Course Superintendents & Managers Association of India**

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# FROM THE CHIEF EDITOR'S DESK

They say ,age is only a number , a cipher for the records. A man can't retire his experience, although he may have retired himself. He must use that experience. Experience achieves more with less energy and time.

Unfortunately , in our country, especially within the Golfing fraternity we don't seem to appreciate the age old axiom. " We want fresh blood" they say.. Well, then they have to pay the price. The condition of Golf courses around us have a tale to tell. There's no fool like an old fool, you can't beat experience.

The world is round and the place which may seem the end may also be only the beginning. This appointment of the General Secretary is the new beginning for me. It seems AK and myself are playing musical chairs and we are chasing each other at the General Secretaries chair. Not that I have any regrets. The previous Committee have done a great job. Amongst their achievements, the most important has been the Registration of the Association. Under the stewardship of Col Bhattacharya, his team have achieved many a milestones and we look forward to their continued support as we go by.

We at the GCS & MAI, not only believe in caring and sharing but to also use the experience that we all have gained over a period of time.

Use that experience to help people. For we are given, this God sent gift not to advance out our own purposes nor to make a great show in the world , nor a name. There is but one just use of this experience and it is to serve people.

There's a period of life when we swallow a knowledge of ourselves and it becomes either good or sour inside. We have a golden opportunity to showcase our knowledge in the forthcoming Asia Golf Industry show in March 2014. Knowledge is not simply another commodity. On the contrary, knowledge is never used up, it increase by diffusion and grows by dispersion. Almost all the know names , who matter in bringing up Golf courses will be there to care and share. The essence of knowledge is having to apply it, not having to confess your ignorance. And as they say 'Ignorance is a bliss". Come one come all, this year we have the CII hosting the occasion and believe you me, they intend making this a grand show and one of the greatest in the History of Golf shows in the country. For those who matter , right from the Sports Ministry to the apex body of Golf ,IGU, the real estate people, the Golf tourism, will be there amongst the top Golf Course designers, Golf machinery experts and you name them, they will be there for consultation and interaction. The Golf seminar spread over two days will project the best of speakers and experts in the Golf industry.

Making a success of the Show and the job at hand is the best step toward the kind that we want. So, lets all get together and make this a GRANDSUCCESS.

Happy Golfing



Col Pravin Uberoi, VSM (Retd)  
Arjuna Awardee  
Secretary General

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## FROM THE PRESIDENT'S DESK

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Friends,

At the out set, I wish to thank you all for reposing faith in your committee through "e" ballot. I must say, it was revolutionary idea to ensure that maximum number of members exercised their vote. It couldn't have been possible without the genius idea of Col Vinay Khanna and support from Wg Cdr A K Singh and Wg Cdr Patel, Secretary, Air Force Golf Course, New Delhi. It is a fact that in sprawling country as ours and the ever rising cost of air travel, one thinks twice to spend time and money to travel long distances just to cast vote. The idea has created reverberations in other clubs also to capture the out station votes. Coinciding with us, The IGU has also elected a new committee with a very positive outlook. The IGU has started on the right foot and conducted a training capsule at Mysore for managers and are learnt to be in the process of negotiating to start a full fledged correspondence course for course Superintendents. Although we have had no direct communication with them but we can assure you that your committee would keep you abreast with all the developments in the field.

You all must have already received our first mailer and as promised we have made an attempt to revitalize our "Stick to Greens" magazine and hope that you all find the material useful. The articles have been contributed by some of you, which I found very enlightening and useful. I also hope that this attempt would trigger our other friends to sit and jot down their experiences and talent on the greens for our next issue, which we hope to bring out by end of March 2014.

As I see it there are two golf exhibitions in the offing in 2014 at Delhi and Pune respectively of course, ideal would be to attend both the exhibitions and your committee is striving to get some concessions for our members for entry and accommodation, we shall keep you informed regularly of the developments.

I would also like to remind you all about our resolve to print the Directory of Golf Courses in India. May I request you once again to forward information on your and the neighboring courses as per the format attached to this issue. Our target date is end February to enable us to put it on the sale counter s in the two forthcoming golf exhibitions in the first week of March.

*Wishing you all and your families , a very happy New Year and good golfing.*



*Wg Cdr S S Dhankhar (Retd)  
President*



**A**s most of us have experienced, a truly exciting golf course design on a great piece of property can be ruined by poor turfgrass selection and or management resulting in less than ideal playing conditions. However, on the other hand, every golf course can be enhanced by superior turfgrass conditions resulting in a memorable golfing experience. The golf green is obviously the most important part of the golf course. Golfers will tolerate greater variation and less quality anywhere on the golf course other than the greens. Dr. James B. Beard stated in his book "Turf Management for Golf Courses" that greens represent only 1.75% of the golf course area, but play a role in 75% of all golf strokes. Appropriately then, while the greens encompass a small percentage of the golf course area, they receive the most attention, intensive management and resources.

Parts of following article were originally composed by Dr. Earl Elsner of the Georgia Seed Development Commission for Quality Golf's Turf Times Newsletter and are reproduced here with his permission. Guided by Dr. Elsner's expertise, I will examine the differences between the most important warm seasons grass species used for golf course greens and assess the key factors that should be considered in making the turfgrass selection for your golf greens in tropical climates within the Indian Subcontinent.

The factors that must be taken into consideration range from playability and aesthetics to environmental and resource considerations including technical, financial and management resources:

✍ There are no perfect grasses. Some species perform better in

specific environments and under certain management regimes than others;

✍ Stresses that will be placed on the turfgrass are particular to each golf course and will influence turfgrass performance. It is essential to know how specific grasses respond to stressful and non-stressful situations;

✍ Understand the expectations of the golfers, i.e. whether the "WOW" factor or playability is more important;

✍ Does the technical expertise exist and will existing management and funding be sufficient to maintain the golf course at desired levels once the turfgrass has been selected.

### CLIMATE

The climate of India resolves into six major climatic subtypes; these give rise to desert in the west, alpine tundra and glaciers in the north, humid tropical regions supporting rain forests in the southwest, and island territories flanking the Indian subcontinent. Regions have starkly different—yet tightly clustered—micro-climates. The nation is largely subject to four seasons: winter (January and February), summer (March to May), a monsoon (rainy) season (June to September), and a post-monsoon period (October to December). India's climate varies from dry with low humidity to high elevations with snow and cold, to tropical rainy and humid subtropical. Wet and dry seasons are common. Cold tolerance, over seeding requirement, tolerance to salt soils and saline water are also relevant factors to consider in species and variety selection. However, in Central to South India where the majority of warm season golf courses are located these issues are replaced



TifEagle at Santiburi Samui Country Club, Thailand

by periods of dense cloud cover (i.e. low sunlight), high temperature / humidity (i.e. intense disease pressure) and year-round play (i.e. high traffic).

The high temperatures and high humidity usually preclude the use of *Agrostis* (bentgrass) in most areas except for higher elevations, so we will emphasize only *Cynodon* (bermudagrass) and *Paspalum* (seashore paspalum).

**BERMUDAGRASS:** Within the *Cynodon Dactylon* genus, there are numerous varieties available. All of the improved varieties adapted to golf greens trace their heritage to interspecies crosses between *C. dactylon* and *C. transvaalensis*. A significant majority of the current varieties are thought to be selections from old Tif-green or Tif-dwarf golf greens originating in Tifton Georgia, USA, hence the prefix "Tif". Within these varieties there are two primary groupings; namely ecotypes similar to Tif-dwarf and ecotypes with much more of a dwarf morphology (ultra-dwarf) such as MiniVerde and Champion. TifEagle is in the ultra-dwarf category, but differs from other ultra-dwarf varieties and Tif-dwarf ecotypes in that rather than being selected from golf greens, it was intentionally bred, developed and released by the US Department of Agriculture and the University of Georgia. These state of the art Bermudagrass greens turfgrasses are now in India as there are currently 3 Tifeagle greens planted and under observation at the historic Royal Calcutta Golf Club and a new Nicklaus golf course in Ahmedabad, India which has planted their greens with MiniVerde.



### **SEASHORE PASPALUM** (*Paspalum vaginatum*)

All of the current seashore paspalum varieties were selected from golf courses or coastal areas. Although, there are several varieties of seashore paspalum that have been released by the university breeding programs, none to date have been developed by conventional plant breeding methods. Seashore paspalum varieties have significant differences in salt tolerance, disease susceptibilities/ tolerance, growth habit and rate, but little difference in golf green performance. A recent study at Florence, South Carolina, did not find

significant differences among 6 commercially available varieties in regard to green speed. There were differences in disease reaction, but no variety significantly outperformed the others in both Dollar Spot and Rhizoctonia disease tolerance. Unfortunately, there is little objective data available to document other varietal characteristics. Consequently, seashore paspalum variety selection is usually based on marketing programs and golf course experience.

### **THE BEST CHOICE**

Which then, Bermudagrass or Seashore Paspalum, is the best choice for golf greens in tropical climates?

From my experience the best Bermudagrass variety will have superior putting quality when compared to the best seashore paspalum variety. However, neither species is consistently the "best" choice. Under normal conditions in India and South Asia, either species can be managed to produce a superior golf green. For example, Bangkok Golf Club changed their greens to TifEagle in 1999 and the golf course Superintendent has achieved superior putting surfaces during the entire year even with an average of 9,000-10,000 rounds per month. Similarly the Superintendent at Amata Spring Country

C l u b , Thailand, has produced excellent putting surfaces with SeaIsle 2000 P a s p a l u m getting it to speeds well in excess of 10' f o r international tournaments. It is very

important to note that on most golf courses, management has a greater influence on greens surface quality than grass species. However, species adaptation to environmental stress determines the management difficulties or obstacles that must be overcome to produce consistently high quality putting surfaces.

Conditions where Bermudagrass has an advantage over seashore paspalum:

- putting surface smoothness
- tolerance to scalping
- low insect preference

- putting uniformity during the day
- mower up-keep
- chemicals available for weed control

Conditions where seashore paspalum has an advantage over Bermudagrass:

- high rainfall environment
- poor to moderate drainage
- long periods of cloud cover
- low quality, high saline water
- low fertility
- striping

Situations where Bermudagrass and seashore paspalum are considered relatively equal:

- disease pressure (varies with specific diseases & fertilization)
- thatch management
- need for growth regulator (e.g. Primo)
- quantity of water use
- budget
- management expertise
- tree shade tolerance
- traffic tolerance

The majority of golf courses in India and South Asia can have successful greens planted with either Bermudagrass or seashore paspalum varieties. Both can provide a high quality putting experience. However, when a species is selected that is less adapted to the golf course environment or golfing expectations, there will be a lower margin of error for management. For example, if the decision is to use Bermudagrass because of its putting quality and the golf course has extended days of cloud cover, turf health will be a critical issue and must be a management priority. If, on the other hand, Seashore Paspalum is selected because of extended periods of cloud cover, but golfing expectations are for the greens to be in Ultra-dwarf Bermudagrass tournament condition throughout the day, every day, then surface smoothness and greens speed will be the critical issue and thus the management priority. Bermudagrass and seashore paspalum each have unique advantages and disadvantages. The majority of their disadvantage can be overcome, or significantly improved, by skillful Golf Course Superintendents.

Three final considerations to take into account in maintaining these grasses are: 1) knowledge, 2) control

and 3) responsibility. Do you as a Superintendent or Manager have the knowledge or can you acquire the knowledge it takes to grow ultra modern greens turfgrasses? Can you control all the factors involved, including proper greens construction standards, irrigation systems, equipment, budgets from your owners and/or committees and training systems for your employees? Finally are you able to take responsibility in the end for the final product based on the decision you have made. With that being said I hope the above data will help move us all forward to proper selection of turfgrasses for your golf course greens. ●



## CONGRATULATIONS HARSHADA

*Our colleague Ms. Harshda Abhyankar, Course Superintendent of KARNATAKA GOLF ASSOCIATION - KGA got another feather in her cap.*

*Seen with the award which KGA have received after 40 years history and have been adjudged "Asia Best Golf Course -In top 10) in ASIA PACIFIC GOLF SUMMIT (APGS-2013) November 5-7, 2013, Jakarta-Indonesia.*

*Beside the above she has also received the award for 18 Hole Golf Course - Amby Valley City Ltd, Pune - Lonavala for "Rolex's 1000 Best Courses" in year 2010-2011 as course taker.*

*We wish her all the best and hope to keep the flag flying high.*

*When we think of turf grass wilt the first thought that occur to us is water draught in the soil. We commonly visualize that wilting would occur in water deficient soils but ironically turf grass sometimes do wilt due to excess water! This phenomenon of turf grass wilting in excess water is known (or less known?) as Wet Wilt.*

## **TURF GRASS WILT**

Plant wilt is described as a phenomenon of loss of rigidity of non-woody parts of plant. The morphological stability of plants and their parts is basically ascribed to the plant cell walls and the turgor pressure exerted on it by the living cell within it, which keeps the cell-cell wall complex rigid.

Turf grasses are primarily non woody and so retain their morphological and structural stability owing to the turgor pressure maintained in their tissue cells. The resilience and hence the functional feature of sport surface playability is also an indirect outcome of turgor pressure in turf grass plant cells.

Like all other plants the basic structural and functional unit of turf grass plants is cell. Turf grass plant cells are bounded by outer plant cell wall which is mainly composed of carbohydrate polysaccharides. The pressure exerted by the cell membrane on to the outer cell wall is called Turgor Pressure. This turgor develops when the turf grass plant cells take up water from the soil. So if there is no water uptake by the grass plant root cells, there will be no hydraulic turgor pressure and no rigidity in plant which is called Turf grass wilt.

There may be several factors that may impede absorption of water by turf grass plants and result in wilt. When the soils are dry and deficient in water then the turf grass plant wilt due to water deficit in plant cells caused by excess loss of water by transpiration. Prolonged drought conditions result in permanent wilting and eventual desiccation and death of turf grass. Very low temperatures may cause dysfunction of plant vascular tissues and result in wilt. High soil salinity in soil can be the other cause that impedes water absorption by plant roots. Bacteria & fungi may also hinder water absorption and most interestingly water logging or prolonged saturated soil conditions also cause turf grass wilt.

## **TURF GRASS WET WILT**

Turf grass plants remain healthy in favourable growing

environment that includes optimum availability and uptake of growth factors like sunlight, nutrients and water. Considering the availability of sunlight and nutrients optimum the excess water availability and poor drainage to turf grass roots has significant impact on turf grass growth and quality.

As the availability of water does not necessarily mean uptake as well. There may be water stress and deficit of water within plant when water is available to roots in excess but no uptake is happening in the roots. Such a situation also results in wilting of the turf grass plant although there is no desiccation. The wilting of turf grass despite abundant water availability in soil is called Wet Wilt.

**WHY THE UPTAKE OF WATER CEASES IN WATER LOGGED CONDITIONS?** Transpiration is the process of loss of water from plant leaves which is responsible for regulating the surface tissue temperatures and accounts for 99% of total water absorbed by plants. Turf grass absorbs water from soil to make up the deficit caused by the transpiration. However in turf grass plant roots the uptake of water is subject to optimum soil temperature, oxygen availability and optimum solute concentration in soil media. In water logged condition soil oxygen is depleted which stops root cell respiration and the roots suffocate in anaerobic soil environment. The heated water in root zone and on the turf surface further accentuates root cell damage by shear heat. All this impedes the water uptake by turf grass plants causing wilt.

## **SYMPTOMS OF WET WILT**

Turf grass wet wilt is characterised by flaccid, dropping leaves and weaker turf surfaces. Wilted turf grass surface losses its ability to sustain physical wear and traffic stress and so foot or tyre marks becomes obvious quickly on such surfaces. The functional feature of such sport turf surfaces becomes aberrant and they cannot be utilized effectively for their prime purpose for which they are grown.

Such weak turf surfaces turn susceptible to other

environmental stresses & pathogens and may eventually contract diseases. Many a time a bacterial or fungal agent is diagnosed from such suffering surfaces and is held responsible for the plight of turf grass surface. But they are the secondary cause while the real reason remains obscured in the oblivion.

### **ENVIRONMENTAL FACTORS FAVOURING WET WILT**

High day and night temperatures, bright sunshine and intermittent heavy down pours, high humidity and strong winds push the turf grass towards wet wilt condition. Standing water on turf surfaces in presence of bright sunshine like after a spurt of rains coupled with high temperatures causes wet wilt. Because in such saturated soil conditions aeration declines also higher surface air temperatures and bright sunshine heat up the water film on turf canopy and the water in the root zone also remain relatively hot for long because water has significantly higher specific heat and so do not cool as quickly as surrounding air or soil. These set of soil-water conditions stresses the turf roots and shoots by damaging it due to heated water and the roots also suffocate due to lack of aeration or oxygen. This shuts the roots respiration resulting in decline and death of roots while the plant loses its water to lethal limit due to transpiration. All this in turn translates into withering away of turf grass resulting in turf less patches.

Scald is another abiotic injury to turf grasses that occur to turf grass in almost similar sort of situation when the high temperatures and sunshine heat up the standing waters on saturated turf to such an extent that it physically 'cooks' the turf grass or the hot waters inflicts the 'wet burn' to the turf canopy and roots due to which it turns brown and declines in patches.

### **WET WILT MANAGEMENT**

To ameliorate wet wilt condition the strategy should involve:

**DRAINING OUT:** As water stagnation and logging is the primary cause of root asphyxiation one should first focus on draining out the water. Water may be pumped out from the low lying areas, temporary drain channels may be dug out to clear the standing water. One needs to be extra careful while getting rid of water from golf putting greens so as to avoid any further mechanical injury to weak grass.

**AERATION OF ROOTZONE:** Second step should be to think of means to facilitate root aeration so that the suffocating turf grass roots may resume respiration and the dying tissue cells get invigorated to life again. This can be attained with slicing, spiking manual coring etc.

**SECONDARY STRESS MANAGEMENT:** One should be watchful to avoid any secondary mechanical injury due to machinery, equipment, traffic or tyres of golf carts. The probability of fungal or bacterial attack also increases in such situations so one should be prepared with a stock of all strategic fungicides and pesticides to deal with any infection in the initial stage.

**HANDLING OF HEAT:** Management of high soil and air temperatures if existing also becomes crucial in containing the wet wilt. Light syringing to keep the turf surface cooler can be considered but the surface should be made draining so that water does not stagnate.

#### References:

1. Bevard, D.S. 2006. Lessons Learned on Putting Greens During the Summer of 2005. USGA Green Section Record. March/April. 44(2):p.13-16.
2. Dernoeden, P.H. 2006. Understanding Wet Wilt: Shedding Some Light on an Unfamiliar Subject. USGA Green Section Record. March/April. 44(2):p.7-9.

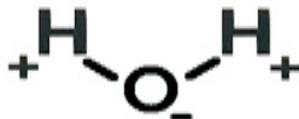
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In turf industry wetting agents are used for relieving localized dry spots, managing water, improving drainage and pesticide movement into the soil and reducing dew and frost formation. Wetting agent fits into a class of chemical compounds called surfactants, which are chemicals that cause a physical change at the surface of liquids, increasing their spreading and penetrating properties by lowering the surface tension. Because they cause changes at the surface, they are known as “SURFace ACTive ageNTs.” In order to understand the science behind how the wetting agents work, let us first get familiarized with some terms:



1. Gravity, a constant force that pulls the water downward.



2. Cohesion, attraction of water molecules for each other.

3. Adhesion, attraction of water molecules to soil particles. Surface tension, tendency of the surface molecules of a liquid to be attracted toward the center of the liquid body.

4. Surface tension, tendency of the surface molecules of a liquid to be attracted toward the center of the liquid body.

5. Polarity of Water: Water is a dipolar substance having both negative and positive polar ends (consisting of two hydrogen atoms and one oxygen atom), which allows water to have a unique property of forming bond with a variety of polar molecules.

Water droplet behaves differently in various media as per the degree of forces among gravity, cohesion and adhesion. On a newspaper, force of adhesion among water and paper molecules is greater than the force of cohesion and hence water droplet spreads out and soaks into the paper. When adhesive forces between water molecules and an object are weaker than the cohesive forces between water molecules, the surface repels water and is said to be hydrophobic.

Action of wetting agents:

Soil water repulsion is a common phenomenon in highly managed golf course soils and may severely impact turf grass quality and playability. The phenomenon is most pronounced in coarse sands and sandy soils and is

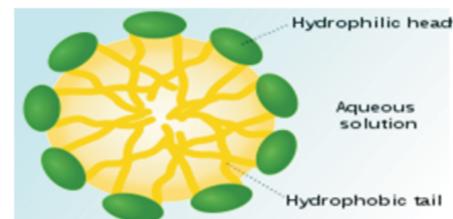
attributed to the accumulation of hydrophobic organic compounds as coatings on soil particles and aggregates. Sources of these hydrophobic materials may include accumulated plant-derived organic matter (thatch, decomposing roots

& plant tissues, root exudates and fungal hyphae). The water applied wets the turf but does not adequately penetrate the soil surface to reach the root zone, as a result availability of moisture to plants is reduced which reduces the availability of essential nutrients to plants, limiting growth and productivity. Despite frequent irrigation, the soil in these spots resists wetting, resulting in patches of dead or severely wilted turf.

All surfactants possess the common feature of a water-soluble group attached to a long, oil-soluble hydrocarbon chain. A typical wetting agent molecule has a hydrophilic water-attracting group and a long oil-soluble (lipophilic) hydrocarbon chain.

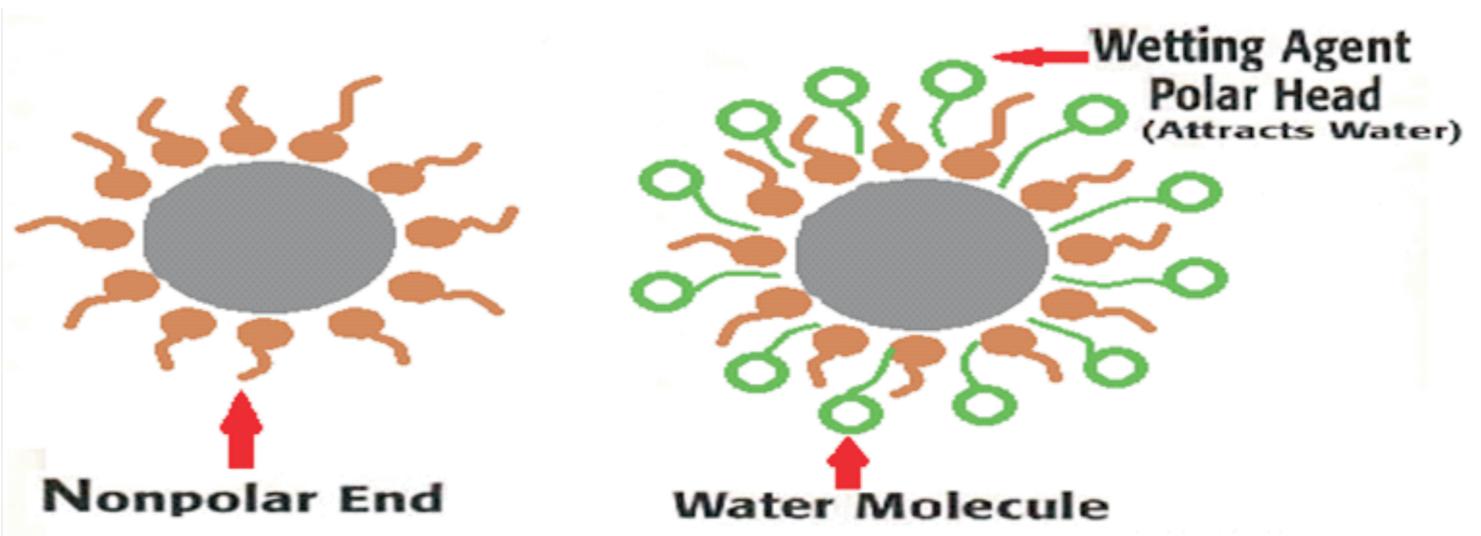
All surfactants possess the common feature of a water-soluble group attached to a long, oil-soluble

hydrocarbon chain. A typical wetting agent molecule has a hydrophilic water-attracting group and a long oil-soluble (lipophilic) hydrocarbon chain.



Depending on their ionization or charge, surfactants are separated into anionic, cationic, nonionic and amphoteric. First two groups of surfactants ionize when mixed with water but they have the disadvantage of reacting with other ions in the solution, causing a precipitate to form. Nonionic surfactants do not ionize in aqueous or water solutions and are unaffected by hard water. The amphoteric surfactants can be either anionic or cationic depending on the acidity of the solution.

Most of the wetting agents used are nonionic surfactants which reduce the surface tension of water allowing the water molecules to spread out. They impart a “film” to all of the



particle surfaces within the medium, improving the ability of the water to penetrate the soil surface resulting in increased infiltration rate. The polar portion of the wetting agent bonds with the water while the nonpolar portion bonds with the nonpolar organic coating, thus allowing the soil or sand particle to wet. This allows the medium to retain its ability to uniformly wet out for several days to several weeks. The extent of improvement in infiltration rate is affected by the type of wetting agent used, its dilution, previous use of wetting agents on the soil, and the water content of the soil at the time water is applied. Wetting agents will improve infiltration rates only in soils that have water-repellent properties, regardless of their texture, tilth and aggregation. Uniform wetting aids in the distribution and utilisation of dissolved fertilizers, pesticides and other water soluble chemicals.

Water management is the most important aspect of greenkeeping, therefore a good wetting agent program using quality, well-tested wetting agents should be followed throughout the year. Less stress for the grass will always result in greener, healthier and more consistent turf. ●

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I am Rishi Pal Singh, a highly motivated ambitious Turf manager. I completed International Turf manager's course from University of Massachusetts Amherst US in 2010-11

I guess we all need a push out of our comfort zones every now and then to actually go for something new and in my case that push was provided by Mr. Trevor Savior (Agronomist, GNGCD). I remember it was in 2008, during the planning stages of our new Unitech project in Noida, when I got an opportunity to meet him. He was visiting as an expert to take into account the soil type along with sources of water and agricultural material. In one of our animated conversations, he told me that for someone working strictly as a horticulturist in planning and landscaping of golf courses like me, it would do a great deal of good to both my reputation and future prospects, to do a course in Turf management and thankfully several leading universities abroad offered that. I did ponder upon the thought and with few of my friends chipping in; I decided to give it a shot and started looking for possible universities. I got a mail from Kelly Blake Moran (Golf Architect, Penn State US) about International Turf manager's intensive full time course for working professionals.

My company approved my application to join the course for Turf manager's with Department of Natural Sciences U Mass Amherst US and I was all good to go.

**About Course:**

The goal is to teach concepts essential to maintain high quality turf, with emphasis on environmental stewardship and fiscal responsibility. This comprehensive, dynamic program is especially suited for experienced professionals associated with the management of golf courses, athletic fields, fine lawns and landscapes.

Through a combination of classroom, laboratory and discussion activities, students can expect to gain an understanding and working knowledge of the items described for each course.

**How I applied for Admission and Visa:**

I applied online to U Mass Amherst with 2 reference letters, education qualification certificates, and employer approval letter, letter stating why I wanted to join the course, and then filled in all the details with attachment of all credentials sent to admission in-charge. Post analysis of all documents, Program head mailed me the admission approval letter. Next step was to deposit fee online through internet banking / credit card. Then university sent me J-1 form for visa application.

If I talk about approximate costs, then course tuition fee is \$2150, house rent (3month) \$ 2100, books & Stationary \$ 900, daily expenses (3month) around- \$1500, air fare-\$1000, home security -\$100, visa fee-180, health insurance-\$150, miscellaneous-\$500 so total would be around \$ 8580. Better keep your credit cards always with you as did I, for I know your most dependable friend in foreign land is money.

I reached my destination on 27 December only to find myself being greeted with heavy snowfall and strong winds on an extremely chilly night. A perfect glimpse of what I were to expect climate wise. The temperature dipped upto 15 C on the negative scale during nights. But we had in place very sophisticated and modern systems in all class rooms, houses, ensuring fully automatic temperature control around 20-25 degree C

I was kept pretty busy with classes starting as early as 8 in the morning and lasting till 5-30PM five days a week. Even on weekends I had my hands full with projects and assignments to complete.

Health insurance is of utmost importance there as the medical facilities are very expensive. Many insurance companies provide cash less facility, and I went for one such provided by ICICI Lombard. In US one cannot buy medicines from chemist shop without the doctor's prescription, so just for the sake of saving me one probable visit, I had brought some medicines from India for cold and fever but thanks to my habit of taking proper precautions and super clean environment, I never had to look at them.

I was glad to see a good crowd of Indian students in varied departments, for they were always very keen to help, be it arranging accommodation, going to local market, telling about perks of bus service and conveying other DO's and DON'T's. So I registered myself with ISA (Indian Student Association U Mass, Amherst) to enter in Indian student's society and owe a great deal to them. I am sincerely grateful to Mr. Om Prakash, Associate Professor Bio-technology in same department of Natural Sciences for his unceasing cooperation and assistance.

I would be pleased to help out anyone who wants to upgrade or divert his/her technical qualification in Turf management.

<p><b>Plant Science</b></p> <ul style="list-style-type: none"> <li>✍ Principles of Turf Management</li> <li>✍ Advanced Topics in Turf Physiology &amp; Morphology</li> <li>✍ Soil Science - Study of the nature and properties of soils, Soil test analysis and recommendations.</li> <li>✍ Turf Management Calculations</li> <li>✍ Arboriculture</li> </ul> <p><b>Construction &amp; Engineering</b></p> <ul style="list-style-type: none"> <li>✍ Irrigation of Fine Turf</li> <li>✍ Golf Course Design &amp; Construction</li> <li>✍ Quality control &amp; sample test analyses</li> <li>✍ Man power management</li> <li>✍ Tools &amp; Machinery</li> </ul>	<p><b>Business Management</b></p> <ul style="list-style-type: none"> <li>✍ <b>Personnel Supervision</b> - Principles of effective communications and employee supervision for supervisors &amp; managers, with emphasis upon "real-world" applications.</li> <li>✍ Financial Management - Development of operating &amp; capital budgets breakeven analysis, and other budgetary topics.</li> <li>✍ Special Topics – Case studies &amp; various topics, including grooming greens &amp; other fine turf areas, athletic field, and effective personal &amp; organizational interaction.</li> </ul> <p><b>Turf Protection Management</b></p> <ul style="list-style-type: none"> <li>✍ Turf grass Diseases-Identify &amp; Control through lab test.</li> <li>✍ Turf grass Insects –Identify &amp; Control</li> <li>✍ Weed Management in Turf , Turf Management &amp; the Environment</li> </ul>
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