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A PATCH of GREEN

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Official Publication of the
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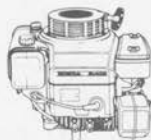
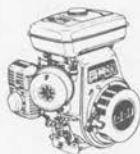
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	G150	Q	AF	X		2 7/16 x 3/4 DIA. TAPPED 5/16 24 UNF		X		4000	X	X		OB	2.64	29.8	
	G150	PE	AF	X		2 7/16 x 5/8 THREADED		X		4000	X	X		OB	2.64	29.8	
	G150	HQ	AF	X		2 3/4 x 3/4 DIA.	X	X		4000	X	X		OB	2.64	37.1	
5	GV200	(1)	N40		X	3 5/32 x 1 DIA. TAPPED 3/8 24 UNF		X		3200	X		X	DE	2.01	37.5	
	GV200	(2)	N50		X	1 13/16 x 1 DIA. TAPPED 7/16 20 UNF		X		3200	X		X	DE	2.01	37.5	
	GV200	(3)	N4C		X	3 5/32 x 1 DIA. TAPPED 3/8 24 UNF		X		3700	X	X		DE	OPT.	35.3	
	G200	Q	AF	X		2 7/16 x 3/4 DIA. TAPPED 5/16 24 UNF		X		4000	X	X		OB	3.68	33.1	
	G200	V	A5	X		2 53/64 x 0.755 DIA. TAPER 2 1/4 PER FT.		X		4000	X	X		OB	3.68	33.1	
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	G300	HQ	B6	X		3 7/32 x 1 DIA. TAPPED 7/16 20 UNF	X	X		4000	X		X	DE	6.36	59.0	
	G300	Q	J0	X		3 31/64 x 1 DIA. TAPPED 7/16 20 UNF		X		4000	OPT.	X	X	DE	6.36	59.0	
10	G400	Q	B6	X		3 31/64 x 1 DIA. TAPPED 7/16 20 UNF		X		4000	X		X	DE	6.36	66.1	
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	G400	Q	J0	X		3 31/64 x 1 DIA. TAPPED 7/16 20 UNF		X		4000	OPT.	X	X	DE	6.36	76.0	
11	GV400	(4)	AA		X	3 5/32 x 1.0 DIA. TAPPED 7/16 20 UNF		X		3550	X	X		DE	2.44	61.7	
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SEA PLANTS AND THEIR USES IN TURFGRASS MAINTENANCE

By William D. Middleton

Sea plants are unique and useful living systems. They are able to extract inorganic substances from the ocean, assimilate them, and convert them into organic compounds. Sea plants contain every element known or theorized to be active or useful in forming tissues in plants: as much Nitrogen, half the Phosphorus and twice the Potassium of farmyard manures; more Calcium, Magnesium and Sulphur than fish fertilizers and emulsions; and all essential trace elements in chelated form. They also contain naturally-occurring hormones (Auxins, Gibborellins, Cytokinins) and antibiotics that act as fungal inhibitors and thereby increase plant resistance to disease.

Because of their wide variety of beneficial constituents, raw sea plants have been used for centuries by coastal growers throughout the world. Since they contain very little cellulose, they decompose rapidly, and were therefore not available to inland growers until this century.

In the early 1900's, techniques were developed to process sea plants into meal. Since World War I, granulated meal has been used by farmers not only as a soil conditioner and fertilizer, but also as a nutritional supplement for livestock, particularly dairy cattle. The Jersey and Guernsey breeds developed on pastures which had been fertilized with seaweed for countless generations.

During World War II, techniques were developed to extract the beneficial constituents from sea plants. The most effective of these concentrates the nutrients, soil conditioners, natural hormones and antibiotics into a liquified extract. Some processors offer their product in this form. Others dehydrate the extract into a powdered concentrate that can be reconstituted.

Sea plant products—both granular meals and liquified extracts—are now used extensively by sporting turf professionals throughout Europe and Great Britain. They are applied reg-

ularly on golf courses, athletic fields, and even steeplechase courses.

One of the professionals who pioneered the use of these products for turfgrass maintenance was L.C. Chilcott, Parks Manager of Wembley in the London Borough of Brent. Wembley has 1,200 acres of sports grounds. In addition to a golf course and several grass tennis courts, it includes 28 soccer fields, 26 cricket tables, 7 bowling greens, 6 rugby pitches and assorted lawns and gardens. Here, in part, is what Mr. Chilcott says about his experience with sea plant products:

"In the ordinary way, *Poa annua* is thought to be one of the worst grasses for turf. It is coarse and turffy, and for this reason is the ruination of bowling greens; but in spite of this, it's not generally regarded as a strong-wearing grass. But under seaweed treatment, *Poa annua* seems to become tougher, wears much better, and comes through the sinter well, so that when combined with perennial ryegrass mixtures, it helps to produce quite a thick turf. Indeed, we now have football pitches in use from the first days of August which contain large areas of *Poa annua* in combination with other grasses. If, as seems possible, *Poa annua* has become a good servant, instead of a bad master as a result of using seaweed, then I won't mind how much of it we have in our sports turf."

The use of sea plants for golf course maintenance is as old as the game itself. Long before artificial fertilizers were developed, the traditional method of conditioning tees and greens in the British Isles was sand and seaweed compost. Not every golf course, even those along the coasts has access to sea plants, but in recent years, their benefits have become more widely available in the form of extracts. In the last five years, their use in turf management has increased dramatically.

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Wetting Agents - The Preventive Application Approach

Wetting agents are nothing new and were probably in existence before I was even born. Today however, wetting agents are often an overlooked management tool on quality turfgrass stands--especially in areas with poor underlying soil structure.

I'm sure you've all experienced seasons with infrequent precipitation and even in some cases actual severe drought conditions. Well, try as we may to use our irrigation systems to compensate for a lack of rain, we find that irrigation water can only supplement natural rainfall and not take the place of it. Before too long, localized dry spots begin to appear and the rotation pattern of the sprinklers becomes highly evident.

When localized dry spots appear on our greens or tees, it would be a standard practice to:

1. Aerate each individual dry spot.
2. Apply a wetting agent.
3. Hand water.

This is strictly a curative measure, however through the scheduled application of wetting agents on a preventive basis (rather than curative) localized dry spots can be minimized.

Let us look for a moment at the function of wetting agents. Wetting agents are special chemicals that lower the tensions of water. They are in the same class as surfactants.

Wetting agents change water, yet have no visible effect on the soil structure. However, since the wetting agent stays in the soil, the treated soil will accept water more rapidly and excess

water will drain freely, resulting in optimum growing conditions.

At Bob O' Link I make a primary application on greens and tees in mid-May and then repeat the procedure in late June or early July. One and one half quarts of Aqua-gro in 100 gallons of water (per 6,000 square foot greens) has proven to give the best results. Such a high volume of water necessitates the use of a rose nozzle as the most efficient means of application. It is important to water the application in immediately and thoroughly. Experience shows that permitting a wetting agent to remain on the turf blade will cause a yellowing, so it is important to water thoroughly after any application.

The preventive use of wetting agents on greens and tees provides a tremendously uniform distribution of moisture in the soil.

During the past two summers I have attempted to take my successful results with wetting agents on greens and tees another step further and incorporate preventive applications on 35 acres of fairways. Through trial and error, the following rates have provided optimum results.

The primary fairway application is made in mid-June and a second application follows in mid-July. A third application may be necessary in August, but due to the heavy precipitation last August, 2 applications proved to be sufficient. Two gallons of Aqua-gro in 200 gallons of water covering once

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acre at a ground speed of two miles per hour is the recommended rate. With the use of test plots with varying volumes of water, different rates and various brands of wetting agents as well as check plots, the following general observations should be noted:

1. Aqua-gro at the above mentioned rate was the most effective wetting agent.
2. Good results were shown in test plots with All-wet and Hydro-wet.
3. Wetting agents not watered in are potentially phytotoxic.
4. All wetting agents were applied alone and not in combination with any other pesticide.

In a comparison of wetting agent treated fairways and untreated check plots, the difference was like night and day. Treated fairways had the following qualities:

1. Dew is eliminated for a 6-7 day period following the application.
2. Localized dry spots in the wedge shaped areas adjacent to our single row irrigation system, required hand watering only once during the 1979 season. Prior years have shown 80-100 man-hours to accomplish this task. Less hand watering means a lower labor cost

and freedom to use your staff on other projects. Less hand watering means minimizing or eliminating interference to golfers. Less hand watering means conservation of water and power.

3. Fairways had fewer dry spots and also fewer wet spots.

4. Overall, soil moisture continuity was increased.

5. Soils were able to absorb moisture more rapidly during the heavy precipitation we had during the month of August.

6. Less stress was evident on treated fairways and wilting was not severe.

7. Prior to fairway applications, it was often difficult for irrigation water to penetrate a one inch thatch layer unless fairways had been sliced or aerated in the Spring.

The fairway applications have proven as successful as the wetting agent program on my greens and tees. The approximate cost of materials for one application to 18 greens is \$150. 35 acres of fairways would be covered with \$700 worth of wetting agent. Given the aforementioned results, I feel that this is a cost which is offset by a savings in water and manpower, pro-

Continued on Page 14

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TURFGRASS CLIPPINGS - DUMP EM? OR LEAVE EM?

*Dr. A. Martin Petrovic and Robert
O'Knefski with Ann Reilly*

What are turfgrass clippings? Basically, they are leaf blades and are 75-85% water. What isn't water is 3-6% nitrogen, 0.5-1% phosphorus and 1-3% potassium (a 4-1-3 Fertilizer) along with calcium and a few other nutrients. There is little or no lignin or cellulose in turfgrass clippings, and because of this along with their being most water, they do not lead to thatch accumulation. Thatch is composed of mainly stems, crown tissue, leaf sheathes, roots and rhizomes, but not leaf blades.

LEAVE 'EM

Putting greens and other specialty surfaces aside where clippings have to be removed, one solution to the "what to do with clippings" problem is to leave them there. Collecting clippings is more of a waste of precious energy for you, it is also a waste of energy for the plant. As clippings break down, the "recycled" 4-1-3 fertilizer is returned to the turf. You have eliminated the dumping cost, and have saved the time of emptying catchers of bags and hauling the clippings to the dump by returning clippings to the turf.

Research at Michigan State University has shown that turf requires up to 2 extra pounds of nitrogen per 1000 sq. ft. where clippings are removed. These studies also indicated that turf needs 20-30% more fertilizer if clippings are removed to match the quality of turf plots where clippings are not removed.

Thus, fertilizer costs can be cut by returning clippings to the turf, and the need to supply additional fertilizer which may end up in the ground water is eliminated.

Research at the Connecticut Agricultural Experiment Station showed comparable results. Turf specialists there found that 1.8 pounds of nitrogen per 1000 sq. ft. were removed when grass clippings were cleaned up. In some cases, researchers found that clippings could return over 50% of the nitrogen that was added as fertilizer. The turf was greener and growth was more vigorous where the clippings remained. Ten years ago, similar studies at Cornell University and at Eisenhower Park in Nassau County showed that turf was greener, more vigorous and more disease tolerant when clippings were left (dollar spot in particular was reduced).

When clippings are short, they fall down between blades and decompose quite quickly. Tests at Michigan State and Connecticut showed that the clippings are recycled and the nutrient elements are utilized within 7 to 14 days. This was determined by visual observation and at Connecticut by tracing the heavily isotopes of a form of nitrogen.

If the clippings are very long, wet or heavy, they should be removed. An alternate to raking is to re-mow the area after the clippings are dry, or to



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use a mulching mower. A few things should be remembered when using a mulching mower: 1) The turf must be relatively dry before mowing to help prevent machine cloggings and the formation of large clumps of clippings; 2) You will need to mow more often in the spring and fall because of the faster growth rate. If more frequent mowing is not possible during these periods, you may need to switch to conventional mowers; 3) Mulching mowers produce up to 30% finer clippings than conventional rotary mowers which means faster clippings breakdown, deeper and faster penetration of the clippings into the turfgrass canopy and clippings that are less noticeable.

MULCH 'EM?

Turfgrass clippings can be used as a mulch around ornamentals, reducing weed competition, conserving soil moisture, supplying nutrients as they break down and helping to improve soil conditions especially in fine textured soils. Clippings can be used as straight mulch, but are better if they are allowed to air-dry first. They can be composed with or without leaves, but either way should be applied at least 1" thick and should be turned under in the fall to help supply nutrients for the next year. As with any mulching material, when using clippings as mulch: Avoid clippings from areas with stolons such as creeping bentgrass as clippings of this type can form into new plants and infest the ornamental beds, and do not use the first several batches of clippings after applying broad-leaf herbicides to the turf to prevent injury to ornamental plants.

FEED 'EM?

You must answer NO to this question before considering turfgrass clippings as animal feed: "Have any pesticides been applied to the turf? If you answered YES, strongly consider other alternatives for clipping utilization. Dried, pelletized clippings have been shown to be an excellent poultry feed; however, large acreages are needed to produce enough clippings for this process. Sod farmers, with limited pesticide usage have been able to do this to a limited degree.

So, what are you going to do with your clippings? You leave 'em, dump 'em or use 'em. Remember, though, this point if you remember nothing else: clippings DO NOT create or add to the thatch layer of the turf.

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Sea Plants, Cont.

Today, according to Mr. J.H. Arthur (consultant to many world class courses, including Portmarnock, Ballybunion, Muirfield and others), "Sea plant extracts are used on most of the championship courses-links and inland in the British Isles." In general, these materials are used:

- to stimulate, strengthen and expand root systems.

- to condition soil, stimulate microbiological activity, and assist in thatch decomposition.

- to protect plant life-support systems against a variety of fungal diseases and insect pests.

- to increase resistance to various types of stress.

- to accelerate speed and yield of seed germination.

LIQUIFIED SEA PLANT EXTRACT...A GRASS ROOTS SOLUTION.

One of the particular benefits of sea plant extract, at least from the turf professionals' point of view, is to stimulate root development. In the August,

1979 issue of Patch of Green, Dr. W.H. Daniel of Purdue University wrote:

"The highest priority of the turf professional is keeping root tips alive and active. If you want healthy turf, you want all the roots possible or practical."

Dr. Daniel offered some practical advice for strengthening and expanding root systems. Among other things, he emphasized the need for ample Potassium and micro-nutrients.

POTASSIUM

Potassium is essential for plant growth; second only to nitrogen in the amount required. Yet, it is usually the most neglected when it comes to fertilization. In reviewing soil tests, it is evident that most turf areas are low in Potassium-due probably to the continuous use of descending ratio fertilizers like 10-6-4 or 6-4-0.

Potassium is the most active of the essential plant nutrients, easily leached from soil and probably even from plant leaves during rain or irrigation. Potassium deficiency weakens turf grass root systems. A Potassium deficient plant has lower disease resistance,

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FIGURE A

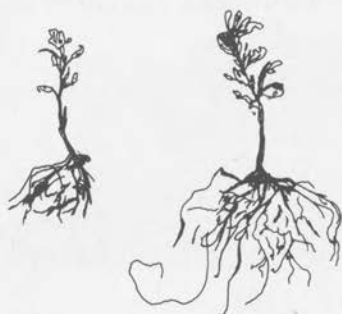
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SWEET PEA SEEDLINGS



Root systems of the two seedlings.

FIGURE B

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Root systems of the two seedlings.

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NATIONAL CLUB ASSOCIATION FIGHTS PETITION TO RESTRICT PESTICIDE USE

WASHINGTON, D.C.- The National Club Association (NCA) has contacted both the Environmental Protection Agency (EPA) and the Federal Aviation Administration (FAA) opposing a petition from an environmentalist group, Friends of the Earth (FOE), that would tremendously impede the commercial use of pesticides for golf course maintenance. Both agencies have requested public comment on the proposal, which they will consider along with other available data to determine whether they should initiate rule-making or other proceedings based on the FOE request.

The petition calls for mandatory "buffer zones" of 250 feet and 1,000 feet bordering land sprayed by pesticides; 250 feet for ground applications and 1,000 feet for aerial spraying. Pesticides would be banned from the buffer area unless written consent is

obtained from all residents within the zone. Violations would occur if written permission was not obtained from all residents and if any pesticide were to drift within the zone. Such violations would subject ground applicators to EPA sanctions and aerial applicators to violation of FAA licensing.

"Because golf courses are dependent on efficient pesticide applications for essential maintenance," the NCA submission said, "implementation of this petition would significantly and adversely affect all courses from coast to coast."

NCA urged denial of the petition because: (1) It did not show present regulations to be inadequate; (2) it is so broad and vague as to be unenforceable; (3) it would not reduce pesticide use, but only make it more costly; and (4) as presently proposed, it would be extremely damaging to the golf in-

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dustry in the United States.

NCA has been working with the Golf Course Superintendents Association, the United States Golf Association, the American Hotel & Motel Association and other concerned agricultural groups in an effort to generate opposition to the FOE plan. Research by these groups has determined that current pesticide control procedures are working well to protect against the dangers of improper pesticide use.

Federal, state and local governments now work closely together in the compliance area. The Federal Insecticide, Fungicide and Rodenticide Act has already established effective pesticide certification systems in the states. And existing notification systems are adequate to warn neighbors of pesticide applications.

NCA will be carefully monitoring EPA and FAA, and will take further action should rulemaking in this area be initiated.

The National Club Association, headquartered in Washington, D.C., represents the common legislative, legal,

fiscal and policy interests of private golf, city, yacht and tennis clubs.

For further details, contact the National Club Association, 1625 Eye Street, N.W., Washington, D.C., 20006 (202) 466-8424.

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To endure success,
To profit by mistakes,
To forgive and forget,
To think and then act,
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To subdue an unruly temper,
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Wetting Agents, Cont.

viding a better playing surface.

Each year the golf course superintendent sweats out that period from June to September known to try men's souls, bring on ulcers and cause sleepless nights. During this stress period we carry on a day to day battle in an effort to provide pleasurable playing conditions for our memberships. In these modern times of turfgrass management, any loss of turf on our greens and tees is intolerable and a loss of fairway turf is undesirable. More and more the trend in the Chicago area has shown that players who once compared golf courses by their fast and true greens are now using the condition of fairways as criteria for judgement. With this increased demand for fairway perfection, loss of turf on our fairways, even though minimal, is no longer tolerable.

With the incorporation of wetting agents into my fairway management program, maintenance of summer time Poa annua has certainly become more enjoyable. I'm thankful for something that has made my job a little bit easier.

Bruce Williams
Supt., Bob O'Link G.C.
Credit: Bull Sheet

Nov. 30-Dec. 5, 1980 ... 72nd Annual
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Conference, Detroit, Michigan
Jan. 13-14, 1981
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Michigan State University
Jan. 25-30, 1981
52nd International
Turfgrass Conference and Show,
Anaheim Convention Center,
Anaheim, California

Something to Think About . . .

A Failure Is Not Always A Failure

One of the skeptics talking to Thomas E. Edison asked him. "Now that you have tried 16 times to make a light bulb and have failed, what have you gained?"

And he replied, "I know 16 ways it cannot be made."

This brings to me this thought. It matters little if you try and fail, and try and fail again. But what matters most if you try and fail, but fail to try again.

John S. Goodrich, via Chert Chatter,
Springfield, MO.

PLAN AHEAD AND SAVE SOME MONEY

As everyone knows inflation has affected the total economy. But there are ways to curb costs. If you are planning on attending GCSAA's Annual International Turfgrass Conference and Show next year in Anaheim plan now and purchase a super-saver flight. The cost of this type of airline ticket is considerably less than a regular coach fare. Any major airline or travel agent can give you specific information on this.

John C. Argue, president of the Southern California Golf Association and a leader in the campaign to bring the 1984 Summer Olympic Games to Los Angeles, will deliver the keynote address in Anaheim.

At a banquet too much food was served and far too many long speeches were made. When the last speaker's turn came, the hour was late and he was weary. "I have been asked," he said, "to give an address and I shall beg the privilege of giving my own. It is 1440 Garden, and with your kind permission, I will go there at once."

Sunshine Magazine



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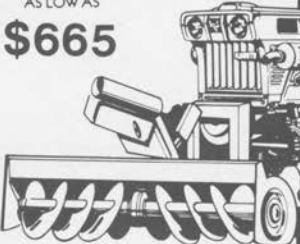
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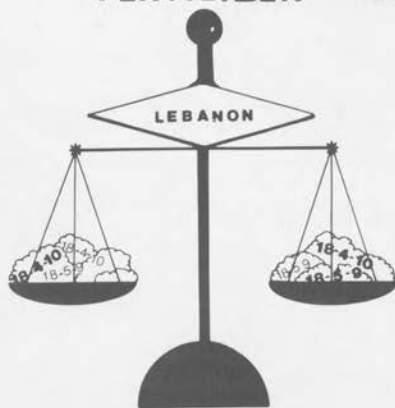
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Sea Plants, Cont.

is more susceptible to winter-kill and may be more vulnerable to insect damage. Potassium deficient plants also have higher water losses. Sea plants are high in Potassium and they are the richest single source of the micro-nutrients.

MICRO-NUTRIENTS

Micro-nutrients are critical in plant biochemistry. They are essential in forming enzymes. Enzymes function like catalysts: they initiate and control most of the major life processes in plants. For example, an enzyme makes oxidation (the burning of carbohydrates to produce energy to produce protein) without combustion possible in plants.

Enzyme molecules generally contain atoms of inorganic mineral elements, without which they would be unable to function. For example, Nitrate Reductase (which "reduces" Nitrogen to a state in which it can be absorbed by a plant's roots) requires Molybdenum.

Although chlorophyll is not an enzyme, the structure of its molecule illustrates just how critical the micro-nutrients are to growing plants. In the center of the chlorophyll molecule among 136 other atoms is a single essential atom of Magnesium.

Micro-nutrients may also be involved in plant protoplasm as unconnected molecules. Researchers don't yet know all the ways in which micro-nutrients function in plants. All they can do with any certainty is relate the presence or absence of micro-nutrients to observable effects. Chemical analysis reveals that plant tissues contain almost all known elements. It is not clear what functions are performed by gold, silver, lead, bismuth, strontium, gallium, ruthenium, and so on, all of which are found in living tissue.

"It may be, that as life evolved from that which was not living, it took into its tissues and mechanisms the metallic components of both earth and sea, so that each of these metallic components has its own essential job to do for plants."

Sea plant extract is an outstanding source of Potassium and the micro-nutrients, both of which are essential for healthy root systems in turf grasses. Additionally, it contains a number of

natural hormones which directly stimulate root development and growth. Figures A and B illustrate the effects of sea plant extract on root systems of developing seedlings. This is particularly important for the turfgrass professional because:

"The working part of any root is the soft, absorptive root tip and the root hairs near it. This is where the payload of water and elements are absorbed for transfer to the crown, stems and the leaves...When individual root tips die, the older parts seldom initiate new tips; instead, the plants response is to start a new root."

These materials offer considerable promise as natural controls for certain insect pests. Researchers at the University of Maryland found that 200 pounds of granular seaweed meal per acre per year appeared to control turf nematodes in blue grass. In one study, nematode population was reduced to 68%. Tests at the University of Florida suggest that sea plant extract, applied as both a foliar spray and watered into the soil, helps to control citrus nematodes.

In general, a variety of sucking and chewing insects can be controlled with applications of sea plant extract and/or granulated meal. Extensive research, carried out at Rutgers, Cornell, Clemson, Oregon State and Cambridge has established that sea plant extract is effective against sap-sucking insects like mites and aphids. In his book *Seaweed in Agriculture and Horticulture*, W.A. Stevenson says,

"...The resistance which seaweed seems to give plants against mites and aphides cannot be explained easily. I can only point out that aphides have a well-developed sense of taste. Perhaps they dislike the taste and smell of leaves which have been sprayed with extract. Seaweed also produces a thicker cuticle, so a sap-sucking insect must work harder. It also tends to make sap more 'syrupy'. The trace elements in seaweed may also be a factor in discouraging mites and aphides..."

Our experience with foliar sprays based on seaweed, together with the experiences and observations of oth-

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ers, lead to two general conclusions: the resistance to pests and diseases given by these foliar sprays becomes more and more noticeable after two or three years' use; and, within limits, the weaker the solution, the stronger the effect...Seaweed doubtless increases the disease-resisting qualities of the plants by helping them to become healthy and vigorous. I would go further and say that the hormones it contains discourage fungus and virus diseases..."

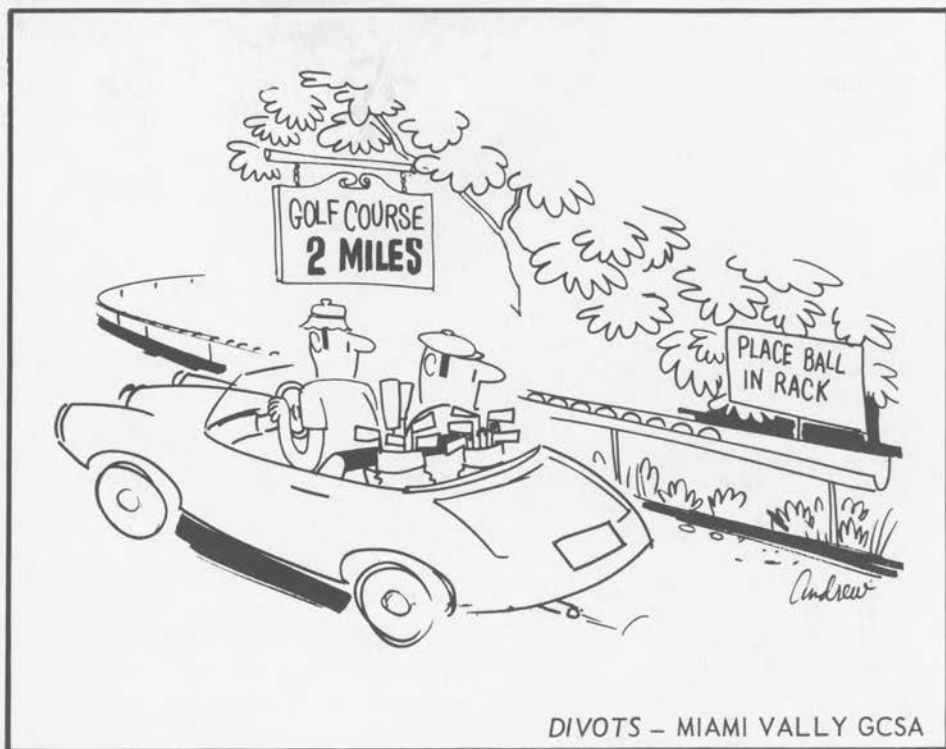
Tests conducted at Michigan State University in 1978 clearly suggest that sea plant extract has fungal inhibiting properties. In high dosages, it effectively controlled "common dollar spot" fungus. Fusarium Wilt, which seems to be correlated with nematode infestation also abates with the application of sea plant extract. There are indications of systemic action since there appears to be a lag-time between application and effect.

Sea plants are extremely rich in alginic and humic acids, both of which act as soil conditioners...flocculating soil particules and producing an open-

textured "crumb" structure.

The alginates in extracts also accelerate the rate and yield of seed germination. For this reason, they are used extensively in contravator seeding or overseeding. They are applied as foliar feeds on fairways, tees and greens; and as constituents of compost dressings on tees, greens and surrounding areas. Such application in Spring, Summer and Autumn seems to produce denser, stronger turf with greater resilience to wear, weather and disease. They also reduce to a minimum, the need for inorganic fertilizers. These extracts appear to extend the life of grasses and by increasing root development, permit plants to begin vigorous growth at the first possible opportunity in the spring.

Liquified sea plant extract and granulated seaweed meal offer significant benefits to today's turf grass professional when included in his maintenance program. Sea plant products are completely safe, act as nutritional supplements, soil conditioners and help turfgrass resist disease, pests and stress. They are truly multiple-benefit products.



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