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inexpensive compared to sophisticated "slow release" products that are widely used and accepted. However, fertigation allows you to mimic the effects of expensive slow-release materials.

You can feed small amounts of liquid fertilizer during each irrigation cycle, or develop feeding regimens that routinely provide a cumulative balanced agronomic program. Being able to apply only enough fertilizer to feed the turfgrass for a few days gives you the ability to control color and growth very evenly and predictably.

Fertigation offers unique opportunities to meet the needs of turfgrass managers in the 1990s and beyond. Sound agronomic planning, a sufficient irrigation system, the proper choice of fertilizers, and a good injection system provide the right combination for optimum turfgrass performance.



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'Micro-fertigation' opens application windows

■ The concept of "micro-fertigation" is a staple of the fertilization program of Don Parsons, superintendent at Old Ranch Country Club in Seal Beach, Calif.

"Micro-fertigation" is *not* the application of micro-nutrients through the irrigation system. It *is*, however, the ability to apply nitrogen fertilizer any time and in small amounts through the irrigation system.

"Most of us would not consider making an application of 16 bags of ammonium sulfate on a 120-acre golf course. It is not practical to run a tractor and spreader over the golf course to apply 16 bags of fertilizer." Fertigation, however, is uniquely suited to this task.

The advantage of fertigation to apply tiny amounts of nutrient is that the superintendent can "dial in" the growth and color that he or she needs. The reduced application rates also reduce the possibility of excessive growth, thatch and disease. And it reduces the potential for nitrate leaching.

Parsons suggests a total rate of about

0.07 lbs. of actual nitrogen per 1000 sq. ft. as a good rule of thumb when fertigating. "Let the plant use up this nitrogen before making another application," he says. "This technique should promote a strong plant with a deep root system."

Parsons fertigated 170 times in 1992 but just 140 times in 1993, due to changes in weather patterns.

If there is a drawback to fertigation, Parsons says, it is that grass and weeds grow in places that they were not growing before. "Many areas in the rough that were never fertilized regularly now grow very vigorously. Our tree growth is also significantly better," he says.

"Many people feel they cannot use fertigation because of poor sprinkler distribution," Parsons further notes. "Fertigation will not make a poor sprinkler system better, but don't back away from it just because of poor sprinkler distribution. Fix the problem and carry on."

Parsons firmly believes, however, that minute and frequent amounts of nitrogen on turf have great potential.

Seashore paspalum gets around water restrictions

Great for its salt tolerance, this sub-tropical grass does, however, have a problem resisting some major weeds.

■ Because of municipal restrictions on water for irrigation, many golf courses and recreational areas that are located near the ocean have turned to seashore paspalum grass.

Seashore paspalum is a very salt-tolerant grass that can be irrigated with water containing high salt levels. In fact, many turf managers irrigate the grass with brackish water, which is part seawater and part freshwater from ponds or pumped from wells located near the shore.

Seashore paspalum is a warm-season perennial grass native to tropical and sub-

tropical regions of North and South America. Because of its salt tolerance, it is often found on seacoasts and around brackish ponds and estuaries. Seashore paspalum spreads by rhizomes and stolons, and the stolons and leaves of the grass are slightly more coarse than those of common bermudagrass.

Paspalum is blue-green in color, and has a texture that is similar to common Kentucky bluegrass.

The salt tolerance of seashore paspalum is superior to even bermudagrass. In fact, on golf courses in south Texas and southern California, salinity levels are above 25 mmhos/cm, and seashore paspalum grows quite well, unlike bermudagrass, which dies out.

Seashore paspalum can also be found growing in brackish water with salinity levels above 4,000 ppm total salts.

As a turfgrass, seashore paspalum shows good tolerance to close mowing,

good wear tolerance and moderate shade and drought tolerance.

The cold tolerance of the grass is between that of bermudagrass and St. Augustinegrass, but it does not tolerate prolonged sub-freezing temperatures.

As a turfgrass, seashore paspalum shows good tolerance to close mowing, good wear tolerance and moderate shade and drought tolerance.

It is well suited to turf areas mowed at two inches or less, and can also be used in golf course roughs. Its quality improves as the mowing height is reduced and mowing frequency increased. Even at putting green heights of 1/4-inch, the grass is very dense. Seashore paspalum must be propagated from sprigs of sod. When sprigged at a rate of 200 bushels per acre, a complete cover could be expected in two to three months.

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Applications of nitrogen of at least 1 lb./1000 sq.ft. per month are needed during establishment.

After establishment, seashore paspalum needs 1/2 lb. N/1000 sq.ft. during the growing season to maintain good quality. However, high nitrogen fertilization during summer months produces excess growth and leads to scalping problems. Rooting characteristics of seashore paspalum are similar to those of bermudagrass.

The turf appears to have few disease problems, although it is susceptible to brown patch and leaf spot. However, weed control can be a problem (see sidebar).

Rooting characteristics of seashore paspalum are similar to those of bermudagrass.

Two weeds of primary concern to turf managers trying to establish seashore paspalum are crabgrass and goosegrass. Both noxious weeds are difficult to control and are prevalent in warm-season turf.

Crabgrass, a bunch grass, is the most common weed in lawns and professional turf areas. Goosegrass, which is often confused with crabgrass, is the single most prevalent weed in the southern U.S. It thrives on putting greens, compacted soil and areas with heavy foot traffic. To help control outbreaks of both types of weeds, deep, infrequent irrigation should be used.



Dr. Joe DeFrank of the University of Hawaii thinks herbicides labeled for seashore paspalum should be applied 12 days after applying stolons.

Controlling weeds in seashore paspalum

■ Dr. Joe DeFrank of the University of Hawaii has been searching for ways to control problem weeds in newly-established seashore paspalum turf.

"Until recently, there wasn't a pre-emergence herbicide labeled for newly-established seashore paspalum," he says. "So turf managers had to wait until the weeds came up and then try to mow the weeds down, take them out manually, or spot-treat them with a post-emergent. But all of these options are undesirable because of the high cost of labor input."

Through his research, DeFrank now recommends Ronstar (oxadiazon), which can be used soon after sprigging.

One of DeFrank's experiments looked at applying pre-emergents during a seashore paspalum hydro-sprigging operation. One part of the experiment featured a

herbicide application to the soil before putting stolons down, followed by a hydro-mulch cap. Another part featured the stolons being put down first, followed by incorporating the herbicides into a wood-fiber cap.

Since seashore paspalum is extremely sensitive to herbicides, the at-planting applications did not yield acceptable results. However, Ronstar was very effective when applied 12 days after planting with little or no injury to the turf. DeFrank believes that a one-pound rate would be a better choice than a two-pound rate because of seashore paspalum's unique sensitivity to herbicides.

Ronstar also has low water solubility with low likelihood of leaching into groundwater.

These trees can take what cities dish out

■ City trees have it rough.

Conditions in urban environments are hard on plant life, what with high pH, compacted sidewalk planters, carbon monoxide from vehicle traffic.

Here are some city-tough trees, courtesy of Dr. Nina Bassuk, of Cornell University, writing in "Shade Tree Notes."

Acer platanoides, Norway maple: good for Zone 4. Tolerant of salt and a wide range of soil conditions, including moderately high pH. It tends to heave sidewalks so adequate rooting space is recommended.

Acer rubrum, red maple: use in Zone 3. Acid, moist soils are required. Sensitive to salt and drought. Good fall color. Use with caution only in sites with little environmental stress.

Betula nigra, heritage river birch: use in Zone 4. Best on acid, moist soils, but adaptable to city conditions. Resistant to bronze birch borer.

Acer pseudoplatanus, sycamore maple: for Zone 5. Tolerant of wide soil pH. Very tolerant of soil or air-borne salt. Take care when planting next to parks or natural areas as the species naturalizes freely.

Fraxinus americana, white ash: Zone 4. Full sun, tolerates high pH soils, but needs well-drained soil. Ash decline or some insect problems may be a serious hazard. This tree has good fall color.