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**Orchids can be planted in tree crevices to help create lush landscapes.**

do a little bit of everything in the plant and landscape realm for the 40-plus homes under contract. Susan says the business expanded in 1987 from primarily installation/maintenance to about 50 percent design/build, 50 percent maintenance and installation. "We're finding that people are wanting a one-stop shop," she says. "It makes life a lot easier for them."

Much of the design/build includes nightscaping. Lighting is a popular

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*Turf is a scarce commodity on the island. Those who can afford to own property have very little turf.*

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landscape addition on the island, since people spend most of their time outside around their pools.

#### **A different terrain**

Working the Hawaiian landscape takes skill. "There's one inch of rainfall every block up to about two miles toward the mountains from Waikiki beach. It's dramatic going from desert to mountains," Mulkern says. "There are a lot of soil types, like sandy soils along the coastline. There's very alka-

line to very acidic, such as volcanic ash."

Turf is a scarce commodity on the island. Those who can afford to own property have very little turf.

Bermudagrass and zoysiagrass are the common home lawn turfs, while St. Augustinegrass grows in low-

maintenance areas.

Sprigs from the mainland must be quarantined for up to two years, since turf carries the same viruses as sugar cane. Then, it's expensive to install, a flat (1.39 square feet) of zoysiagrass sells for \$6 to \$7; centipedegrass is \$4 to \$5; and Bermudagrass is about \$3.25 a flat.

Mulkern uses mostly walk-behind equipment because of the small area of most lawns and narrow gates leading to yards. The rotaries include Lawn Boy, Snapper and Sensation. Reel mowers, which he uses on hybrid Bermudagrass lawns, are Pro Master and Trimmer.

The best tool, he says, is his Ryan verticutter. "Verticutting pulls out stems, rhizomes and stolens," Mulkern explains. It's especially important in zoysia lawns which develop thatch quickly. The process includes thinning the lawn, then aerating. Next, the crew top dresses with a light coat of sand or soil, depending on the site. "For clay soils we use a heavier soil so you don't get that ice cream sandwich effect," Mulkern says. Within two weeks, at any time during the year, the lawn begins to fill in.

But Mulkern found out through one lawn renovation that it's important to have good communication with customers. One of Mulkern's clients is a wealthy real estate investor who's home overlooks the ocean and who's spotless garage holds Andy Warhol prints. The man decided to throw an important party just days



**Susan and Kevin Mulkern: landscaping paradise.**

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chads in tree crevices. "Trees bloom throughout the year based on how much water you give them," he says. I don't really notice a difference in seasons."

### **Uniformity**

Despite the naturalness of the Hawaiian "tropical look," competition on the island is intense. "In the old days, I used to tell people it's a great business to get into, but there's too many now," he says.

One thing some of his competitors don't do is to require uniforms. "We

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*Each employee has 11 sets of shirts and pants. Each week they turn in five sets to be cleaned by the uniform supplier.*

---

do a lot of work inside people's houses and it's awkward not to have people easily identifiable," he explains. "It's also convenient for them to have uniforms."

Each employee has 11 sets of shirts and pants. Each week they turn in five sets to be cleaned by the uniform supplier. The supplier also does alterations. That way Mulkern guarantees his employees show up in clean uniforms.

Another competitive aspect to the job is getting the projects. "Bids on a project can vary 40 to 50 percent," Mulkern says. "The most frustrating part of dealing with customers is that they don't understand what you're selling or what they need. Our higher price reflects that they're getting personal service."

Hawaii businesses also face laws which don't govern other states and which run up the cost of doing business. For example, it's mandatory for employers to carry medical insurance for employees. Companies are able to deduct 50 percent of the cost. The Mulkerns provide 95 percent of the cost of insurance. Employees contribute \$5 monthly toward the medical plan.

Business insurance is getting better. "Three years ago it was 17 percent," Mulkern says. "Now it's down to eight percent."

But the benefits outweigh the price according to Susan and Kevin. They plan to expand to the nursery side of the landscape business in the future.

One thing's for sure. They won't leave the island. Even residents know when they're in paradise. **LM**

**To get a competitive edge in the market, Mulkern's employees will go all-out to maintain ocean-front homes.**

after Mulkern's crew had heavily renovated the lawn.

"We used dye..green dye," Mulkern reminisces. "He had tables set up on the lawn, and even received compliments on his lawn."

Almost all landscapes are irrigated in Hawaii. Mulkern recommends his clients use automatic Rain Bird systems. "I haven't had a lot of success giving homeowners irrigation sched-

ules," he says.

Since turf is scarce, much of the landscape maintenance is done on plant material, like flowering jacobinia, plumeria trees or the state flower, hibiscus. In fact, Mulkern designed his own version of the hibiscus for his company logo.

"Most people want a lush tropical look," Mulkern says. To add flowers to trees, Mulkern's crew will plant or-

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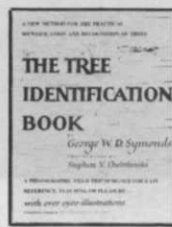
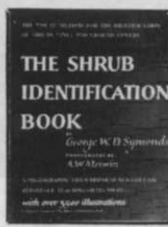
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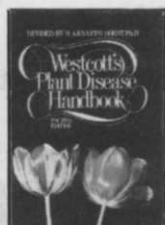
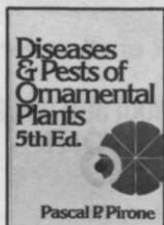
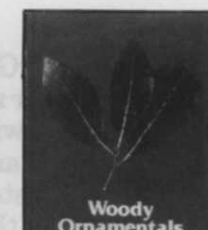
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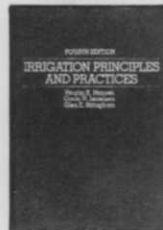
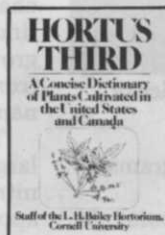


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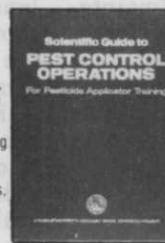


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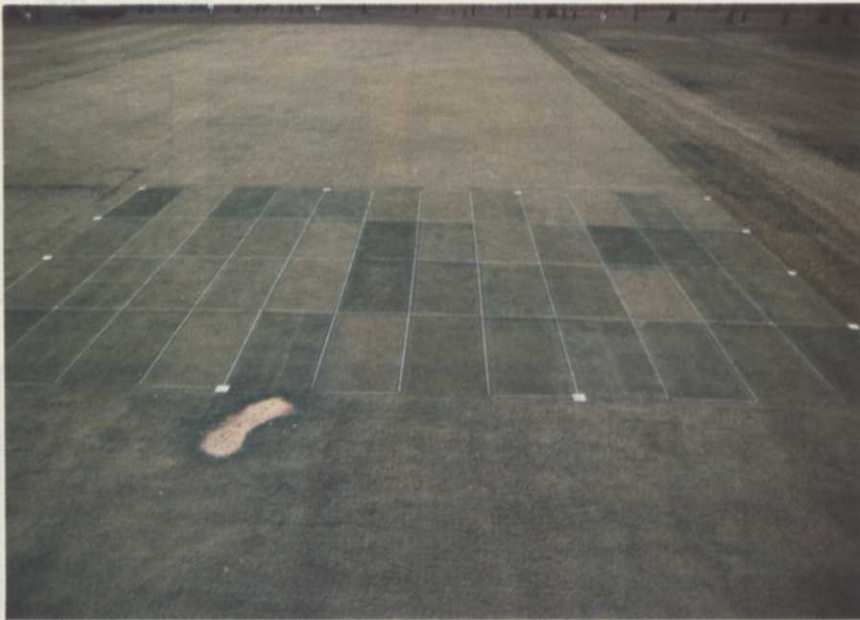
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# NEW CONCEPTS IN TURF FERTILIZATION

Nitrogen is the most important element in a successful fertilization program. New concepts demonstrate when it is the best time to apply nitrogen, and how much is needed.

by John R. Street, Ph.D., Ohio State University



Late-season fertilization will extend the greening period and aesthetics of turf in fall and spring.

**T**urfgrass growth depends on an adequate supply of all essential plant nutrients, plus many other cultural and edaphic (soil-related) factors. Research in plant nutrition has shown that at least 16 elements are essential for plant growth and development (Table 1).

Those essential elements used in greatest quantities by the plant are referred to as macronutrients: nitrogen, phosphorus and potassium. Micronutrients, seldom deficient in most soils, are needed in relatively small quantities by the plant.

## Nitrogen fertilization

Nitrogen receives the most attention

in turfgrass fertilization programs for several reasons.

First, nitrogen is the essential element to which turfgrass is most responsive (Table 2). A key concept in turfgrass fertilization is that nitrogen is the "growth-control element." Supplies of other elements are maintained at adequate levels (maintenance fertilization). The turfgrass manager regulates growth and color by adding or withholding nitrogen.

Second, nitrogen plays a major role in turfgrass heat, drought and cold stress tolerances by its effect on rooting, plant carbohydrate levels and plant hydration.

Third, the turfgrass plant con-

tains more nitrogen than any other element.

Fourth, nitrogen is a very dynamic element in the soil system. Its concentration is constantly changing, usually decreasing. The other essential elements are significantly more stable in soils. Nitrogen, therefore, must be routinely added to turfgrass to maintain a soil level sufficient for turfgrass growth.

An ideal nitrogen fertilization maintenance program on established turfgrass should provide for very slow to moderate uniform topgrowth throughout the growing season (Figure 1). The ideal program should supply enough nitrogen to stimulate some growth and green color to maintain turf quality and recuperative potential, where necessary. Rapid changes or surges in topgrowth, sometimes referred to as peak and valley growth or feeding, are undesirable from both an agronomic and maintenance standpoint.

Turfgrass shoot growth can be largely managed by the (1) amount of nitrogen applied; (2) type of nitrogen applied and (3) timing of the nitrogen application. Fast-release sources (e.g. urea) are readily available for the plant's use. They stimulate a relatively rapid plant/growth response.

Slow-release sources (e.g. methylene urea, sulfur-coated urea, IBDU) provide a time release of nitrogen to the plant. This results in a more uniform or controlled growth.

Fast-release/slow-release nitrogen combinations are typically used to control turfgrass growth and provide safety. Higher nitrogen rates generally stimulate greater turfgrass shoot growth.

*continued on page 40*



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Nitrogen rates are usually limited to 1/2 to 1 pound per 1,000 sq. ft., especially with fast-release nitrogen sources. This avoids undesirable shoot growth surges during periods favorable for shoot growth (i.e. spring on cool-season grasses).

Recent nitrogen fertilization philosophy has been to limit nitrogen levels. This helps to avoid excessive topgrowth and adhere to a slow-to-moderate shoot growth concept.

This philosophy stems in part from the impact that nitrogen has on rooting and plant carbohydrate levels. Carbohydrates (sugars) support growth of plant parts (e.g. shoots and roots) and assist in recovery from injury. Carbohydrates are also the key source or energy for maintaining all the plant's growth and physiological processes.

Nitrogen applications favor turfgrass growth. As nitrogen rates are increased, more topgrowth is usually produced. More topgrowth results in more carbohydrate use to support this growth. A key physiological principle is that under rapid growth, shoots take priority over roots, rhizomes and stolons for available carbohydrate. Shoot growth will continue to respond to higher nitrogen levels, distinctly suppressing root growth and other growth processes.

These effects are well illustrated in a fertilization study evaluating the response of a Merion Kentucky bluegrass sod to incremental rates of nitrogen (topgrowth) and nitrogen content of clippings.

In contrast, sod strength, a reflection of root and rhizome growth, and rhizome weight decreased at higher

**Table 1:**  
**Essential Plant Nutrients Required for Turfgrass Growth and Development**

Macronutrients	Typical Percentage in Turfgrass Tissue <sup>a</sup>	Remarks
Nitrogen Phosphorus Potassium	3-6 0.2-0.5 2-3	Commonly used in maintenance fertilization at ratios of 3-1-2 to 5-1-2. Additional P and K (corrective) may be necessary where inherent soil levels are low.
Sulfur	0.2-0.3	Usually only applied where a specific deficiency has been diagnosed. Used in ratios similar to P.
Calcium Magnesium	0.4-0.6 0.2-0.4	Usually only applied where a soil pH adjustment is required or on alkali soils.
Micronutrients	Typical Parts per million (ppm) in Turfgrass Tissue	Remarks
Iron Zinc Molybdenum Manganese Copper Boron Chlorine	40-200 40-120 0.1-0.2 20-150 15-20 5-20 —	Iron is usually used to provide short term green color enhancement. Micronutrients primarily deficient on alkaline soils and/or soils with high phosphorus and/or high micronutrient levels (Mn, Zn, and Cu). Seldom deficient on fine-textured soils.

<sup>a</sup> Elemental percentages will vary to some extent depending on turfgrass species and cultivars, environmental conditions and other variables.

nitrogen levels. Thus, when most of the plant's carbohydrate was directed toward shoot growth, root and rhizome growth suffered accordingly. Agronomists well recognize that a plant's stress tolerance is directly related to the depth and mass of the

plant's root system.

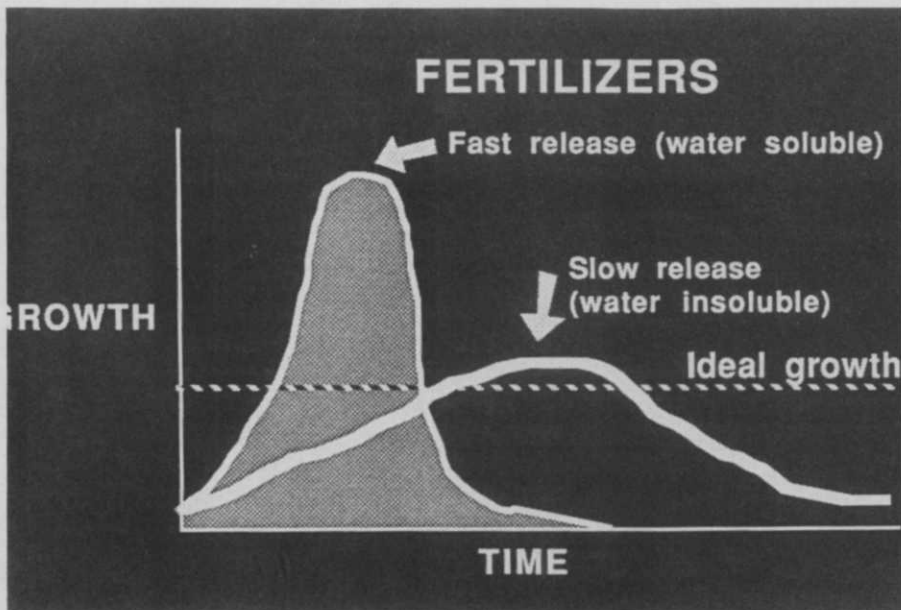
Research at Ohio State University has shown that root initiation and root growth of cool-season grasses occurs in the spring and again in the fall (Figure 2). Liberal nitrogen fertilization in the spring will have a tendency to restrict root growth in favor of shoot growth. The turfgrass plant will go into the summer with a shorter root system than when low-to-moderate rates of nitrogen fertilizer are used.

Furthermore, high rates of nitrogen will increase topgrowth and increase the need for spring mowing. Rapid topgrowth may result in the removal of large amounts of clippings at each mowing. The removal of more than a third of the foliage at any one mowing retards both root and tiller development.

A reduction in root growth at this time is extremely critical since spring is an optimum time for root growth. A lot of "good root growth growing time" can be lost in the spring by heavy nitrogen applications.

Thus, mismanagement of nitrogen during the spring can have a dramatic effect on the root system under the turfgrass going into the summer. This, in turn, means a significant influence on stress tolerance.

continued on page 42



**Figure 1.** A slow to moderate, uniform growth is most desirable in turfgrass fertilization programs. Nitrogen is the "growth control" element.