

Budgeting Nitrogen for Cool-Season Turf

by Jim Williams

Heavy applications of nitrogen (N) to cool-season turfgrasses can produce an attractive turf in the spring. Unfortunately, this outward beauty comes at the expense of the roots, and a fragile turf results.

While shoots may flourish under the influence of extra N in the spring, roots remain underdeveloped. Frequent irrigation becomes necessary during summer to keep the turf from deteriorating.

If you want to produce tough, economical turf, go easy on the N in the spring. Save most of the turf's yearly allotment of N for fall, when it will encourage maximum root development. The following chart gives an example of a productive budget allotment:

Timing	% of Annual N
March-April	12.5%
May-June	12.5%
July	-0-
August	25.0%
September	25.0%
October	-0-
November	25.0%

The actual amount of N the turf receives in a year will vary, depending on such factors as:

- **Turf species:** More N is needed for shorter-root species like Kentucky bluegrass, and less is needed for longer-root species like tall fescue.

- **Soil type:** More N is needed for sandy soils, less is needed for heavier soils with higher organic matter.

- **Water resources:** The more water the turf receives, the more N it needs.

Some turf managers may want to vary the percentages a bit. One option is to apply 30 percent of the yearly allotment of N between March and June, 40 percent from August to September, and 30 percent around November. Whatever the schedule, it's important to apply the bulk of the N following summer stress to ensure maximum root development.

Budget agronomics

The suggested budget represents a complete reversal of the practices turf managers used 20 to 30 years ago. N was often applied heavily in the spring and lightly in the fall.

That regimen worked well for a while, but over the years, the turf showed deterioration in late summer. Too much of the turf's carbohydrates were being expended in spring for shoot growth. Reviewing

the ways in which turf uses carbohydrates throughout the year will demonstrate why a budget favoring fall fertilization works best.

Turf breaks dormancy in the spring, consuming carbohydrates as it grows. The roots develop first; they are capable of growing at slightly lower temperatures than shoots. When temperatures rise and shoots appear, the turf consumes large amounts of carbohydrates.

Turf produces as much green tissue as possible for photosynthesis. Proper photosynthesis, can replace consumed carbohydrates and store enough to nourish the turf for future months.

A light application of N in spring stimulates a balanced production of shoots and stored carbohydrates. If too little or too much N is applied, problems arise.

With too little N available, plants become chlorotic and incapable of achieving maximum photosynthesis. On the other hand, too much N exaggerates the plants' spring tendency toward shoot production. Too many carbohydrates are consumed during this growth, and not enough are stored. This produces a fine-looking turf, but it leaves carbohydrate reserves dangerously low.

In summer, cool-season turf growth

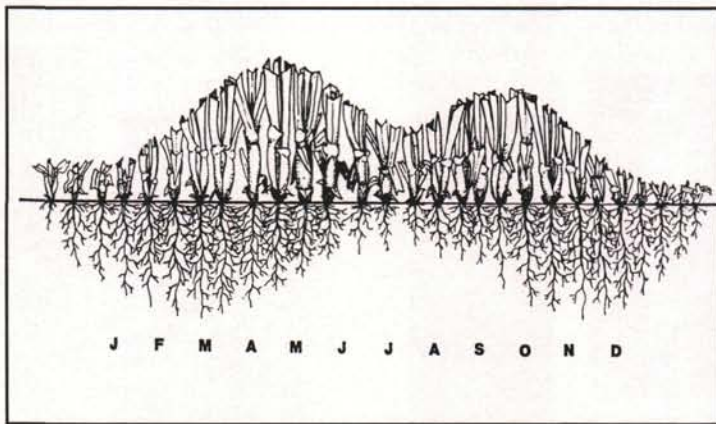
slows as the turf diverts its carbohydrate consumption to help it survive the stress of heat. If carbohydrate reserves are low at the beginning of summer, plants can totally deplete them before the heat abates, especially during severe years.

During most summers, frequent irrigation will relieve moisture stress, and quality loss can be averted. But in the long run, the turf is likely to encounter problems due to frail roots.

To help turf survive the stress of July, it's generally best to avoid using N applications, as they force plants to consume carbohydrates for growth. A light application of N in July is usually beneficial only if the turf shows signs of chlorosis.

As temperatures cool in late summer and early fall, turf emerges from its summer swoon. It begins consuming carbohydrates in a surge of growth that is similar to the development that takes place in the spring.

However, it doesn't grow quite as high at this time of the year. The emphasis shifts away from expending carbohydrates for shoot growth, and plants begin storing the nutrients for the upcoming dormancy.



Between January and December, cool-season turf experiences two surges of growth—one in spring, and the other in late summer/fall.

Now is the best time to fertilize low-budget sites that receive only one application of N per year. On most

other sites, you'll want to continue to maximize storage of carbohydrates into late fall. A growing trend among turf managers calls for moderate applications of N between the last mowing of the season and the time when soil temperatures drop below the level required to sustain roots.

If you fertilize heavily in fall and lightly in spring, you'll help your turf build more massive roots. They'll come in handy throughout the year, and will better equip the turf to survive heat, traffic, drought, and other stresses. □

Jim Williams is the former editor of sportsTURF. He would like to thank Dr. Nick Christians of Iowa State University for inspiring this article.

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