

When Times Are  
*Tough*...





## Foliar fertilizers are the stuff. So say researchers and manufacturers alike who praise the benefits of foliar nutrition. by Jason Stahl

**Y**ou may not think of turf as ground-cover, but it is. Every square inch of the ground where it exists is covered with canopies, leaves, etc. This is precisely what makes it ideal for foliar fertilization.

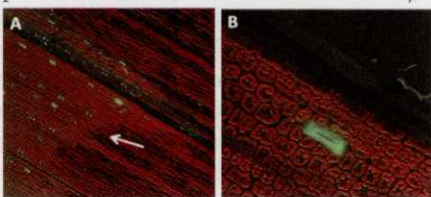
“Because it covers everything, anything we apply on the turf surface should be received on the surface or canopy,” says Haibo Liu, professor in the School of Agricultural, Forest and Environmental Sciences at Clemson University. “We have the resilience of the leaves, where the plants are not designed for some nutrient uptake due to having a barrier to protect against losing water or any penetration, but the plant can still get those nutrients, including all chemicals and pesticides.”

This is what a lot of Liu’s research has been focused on: penetration of the plant’s cuticle. If they could understand how different nutrients perform based on their penetration of the cuticle layer, they could determine which nutrients are the best to apply via foliar fertilization. After comparing nitrates, ammonia and urea, Liu’s research affirmed what others studies had: urea is a better form for foliar fertilizers.

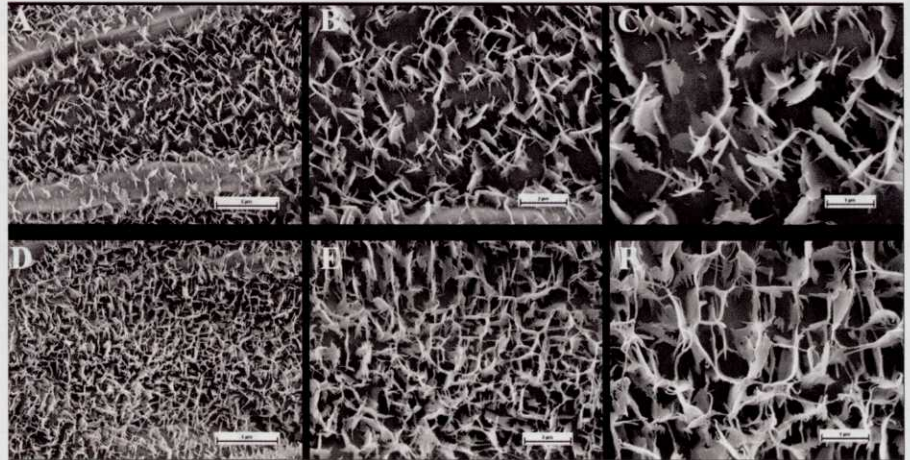
“You cannot rely heavily on ammonia or nitrates for foliar,” he says. “When we compared nitrogen, phosphorus and potassium, we found nitrogen penetrated the plant much more easily while phosphorus and potassium were more difficult – even though you could still apply it.”

Given this finding, Liu said courses that use more potassium than nitrogen on greens cannot rely on foliar applications and instead would have to do granular fertilizing.

“The reason is because the high rate of potassium would burn the turf,” Liu says.



Bentgrass at 10X mag. (A) Fluoresce in the solution collecting around the stomates on half of the leaf. At 60X (B) fluorescent solution accumulated at a stomata and the guard cells.



Scanning electron micrographs of creeping bentgrass cuticle layer under 100 percent ET and 50 percent ET irrigation regimes.

“Phosphorus is comprised of larger molecules, so it doesn’t penetrate the cuticle layer like urea. Therefore, the efficiency of phosphorus is not as great as other elements. There are 14 elements for plant nutrition, and we are just beginning our studies into all of them.”

But foliar fertilization offers more benefits than just direct-to-leaf contact. It also allows you to reduce the total amount of fertilizer applied. According to Liu, granular’s efficiency is not even close to foliar’s.

“If you apply granular fertilizer, it must get into the soil, dissolve and then the plant will get it,” says Liu. “With any type of fertilizer, you typically don’t get more than 50 percent efficiency, and a lot of times you get lower. With granular, you can get leach out or runoff, but with foliar you avoid these things.”

Foliar also cannot be applied heavily or they could burn and kill the turf, Liu says. This restriction is a good thing, though, as it prevents you from “overdoing” it and promotes a strong feeding strategy beneficial to plants.

Finally, because foliar are liquid, you can mix them with other things easily to expand their use. For example, it’s common to mix them with plant growth regulators. You can even mix them with pesticides, although most researchers do not recommend that.

While foliar have many benefits, it’s not to say that granulars don’t. For instance, Liu says there are tremendous labor savings when you

can apply 1 lb. or even ½ lb. of slow-release nitrogen per 1,000 square feet and have it work over the next few weeks. You can’t do that with foliar because the plant will use them as soon as you apply them.

“But we recommend a spoon-feeding strategy, which is nice for turfgrass because we’re not shooting for yields but performance and color, which is beneficial,” Liu says.

The fact that the plant uses foliar as soon as they’re applied plays into when superintendents should apply them. According to Liu, foliar must be applied when the plant is able to use them, particularly in stressful times during the growing season.

“Right now, though, it’s getting a little colder, and you still need to do some late fertilization, but foliar are not as good for this as controlled release,” he says. “You would rather have that fertilizer stay in the soil and have more control time and release to the plants when they need it.”

Courses with bentgrass greens will use 100 percent foliar in summer because granulars would burn the turf under the summer stress no matter how little you apply. On the opposite end of the spectrum is wet conditions where there is a lot of water and washout, leaching and runoff. Under these conditions, turfgrass will have a weak root system and therefore uptake will not be great, so the best way to correct that is through foliar.



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"So either in dry situations or wet situations, foliar fertilization is the best way to improve the turf," says Liu. Foliars benefit the Transition Zone most because it has both warm- and cool-season turf. Warm-season turf, he admits, is a little tougher and thus can handle granular better. And, when the air turns cold, it's best to put slow release on cool-season turf.

"But it doesn't matter where you are because even Minnesota in summer can get very hot and stress the turf, so foliars could help there too," says Liu.

Jake Straub of Performance Nutrition echoes Liu's observations when he says the upside to foliars is the fact that they're taken up very quickly by the leaf.

"Whenever you have the ability to put foliar out, you're going to take some of the highs and lows of granular fertilization applications out of play," he says. "It helps give you a nice even keel from the nutri-

tional side."

Supers looking to get nitrogen to their turfgrass can spoon-feed foliars in small doses, Straub says, so the plant doesn't get a big slug, grow like crazy and slow down greens or make fairways and tees out of control. Then, staff is running around trying to get everything mowed.

"That's where foliar nutrition is really important," says Straub. "You can tweak your program so you get nice, consistent growth and color out of all your turf."

Straub emphasizes the importance of understanding what you're trying to get out of the foliar product.

"Sometimes guys put out a product and think they will see one thing and, in fact, they don't," he says. "You have to understand why you're putting it down, so you need to know if it will go directly in the plant and will I see a response in a day or two or is this something that will take a little longer to act?"

The program Straub sees, at least



## Foliars: Not Just For Fertilization

From a post-emergent perspective, foliar herbicides do a great job of controlling weeds.

"Foliar products give better coverage and efficacy because you get more of the active ingredient to the intended target," says Brian Thompson, strategic account manager with BASF.

Fall, Thompson says, is an ideal time for applications of post-emergent herbicides because many weed plants are metabolizing and storing carbohydrates in preparation for winter. Thus, the active ingredients in these herbicides get easily translocated, resulting in higher rates of efficacy.

Spring is also a good time to apply, says Thompson, but superintendents should be mindful of the products they're using, the active ingredients and the biology of the weed species they're going after.

"Since crabgrass is a summer annual weed, those applications are most effective from a post-emergent standpoint at a juvenile state, which could be anywhere from May through July depending on geography," Thompson says. "But many applications targeting perennial weeds, whether dandelion or broadleaf clover, are best made in the fall because the herbicide gets more readily translocated in the plant. The key thing here is understanding the weed species you're going after, its biology and growth cycle, and the chemistry that best fits that growth cycle."

When it comes down to technique, it pays to consider the product you're using. For example, Drive XLR8 for post-emergent control of crabgrass is best used with a methylated seed oil.

"This additive in the spray tank helps quinclorac, the active ingredient in Drive, become more readily available to the plant and hastens its uptake," says Thompson, adding that other herbicides' efficacy can also be improved with the addition of methylated seed oil, non-ionic surfactants or fertilizers.

A new product, Pylex, has a unique mode of action that controls warm-season grasses in a cool season turf environment. Launched last summer, Thompson says it has performed well in a research setting as well as with customers in taking Bermuda out of cool-season turf and providing post-emergent control of goosegrass.

on warm-season grasses in the North Mid-Atlantic region, is applications of granular in spring and fall and foliar in the summer. When it comes to spraying greens, crews are doing every seven days or every 10 to 14 days, whether it be a micronutrient or end source.

"They'll do granular fertilizer till it gets hot out and sometimes the release can get away from them, and that's when foliar nutrition becomes more of a pinpoint method," Straub says.

The most important thing is

understanding the foliar product you're applying and the desired effect you're trying to achieve.

"What technologies are being used to deliver a particular nutrient into the plant in the most effective way possible? That's something everyone in the industry needs to educate themselves on. In the long run, it benefits everybody," Straub says. **GCI**

*Jason Stahl is a Cleveland-based writer and frequent GCI contributor.*



### For more info

Seeking out some more information on foliar feeding and turfgrass? Enter the following links into your web browser and access recent USGA Green Section research on this topic.

#### Foliar Nutrient Uptake by Cool-Season and Warm-Season Turfgrasses:

University of Arkansas research lends insight into understanding turfgrass foliar feeding. [bit.ly/1a2Ris0](http://bit.ly/1a2Ris0)

**Soil Fertility And Turfgrass Nutrition 101:** Some important concepts you might have missed in or outside of the classroom. [bit.ly/1bQ3Wbo](http://bit.ly/1bQ3Wbo)

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## ALUMNI UPDATE

The presentations were condensed and to the point. We had a short period of time, so it had to be specific. They did such a good job putting it all together; all the Wake Forest University professors were great.

The sessions on negotiation and conflict management were interesting and insightful, particularly the information about staff development. I've been implementing some of the learning tools for my staff and myself; particularly the four-step process: directing, coaching, supporting and delegating.

I've talked to friends and colleagues in the industry and urged them to participate. You get so much out of it beside the curriculum; the staff and other superintendents you meet give you a terrific networking opportunity.



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