

Why do agbiotech firms neglect turf grasses?



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Turf. Its mention may conjure up that special project that you successfully hid from your company's bean counters for over a year. Perhaps you envision a particularly nasty political brawl with a colleague. The green, plastic stuff that covers the floor of the Astrodome (Houston, TX) may come to mind. You're getting warm.

For our purposes, turf means turf grasses, a thoroughly neglected opportunity for plant-biotechnology companies and their financial backers. These grasses comprise both warm-season types, like Bermuda grass, and cool-season ones, like bluegrass and ryegrass. Not one of the dozen major annual or perennial species appears on the product menus of leading genetics boutiques or multinationals. I don't understand why if you consider the following.

Huge market

Seed for turf grasses is a marketer's delight. After hybrid seed corn, turf grasses are the largest seed market in the U.S. At retail, the over 350 million pounds of grass seed, planted annually for home and professional landscaping, exceed \$580 million in sales. This is almost three times the market value of seed bought for wheat plantings and almost twice the value of commercial soybean seed. Finally, the turf-market opportunity is concentrated. Seventy-five percent of all turf seed planted is in U.S. soils. France, Germany, Canada, and the U.K. combine to bring this total to 95 percent.

The turf-seed market is already segmented. Consumer lawns around homes and apartment complexes are obvious targets. Seed passes to the homeowner through mass merchandisers, supermarkets, and home-garden stores. Municipalities, too, are large consumers of turf grasses for public sports fields, schools, hospitals, roadsides, and parks. These large quantities of seed usually flow through distributors or direct to landscapers and local procurement officials.

Perhaps the most attractive segment of demand is golf courses. There are now about 14,000 golf courses in the U.S. alone, with over

300 new courses put in annually. Over 1,000 new courses are under construction worldwide, moreover. The tees, greens, and fairways of each new golf course consume as much as 60,000 pounds of turf seed.

Even though a handful of university plant breeders now releases over 80 percent of the new turf varieties, the number of university research programs continues to decline. The turf-breeding group directed by Reed Funk at Rutgers University (New Brunswick, NJ) is acknowledged as the most prolific developer of varieties used around the world. Pennsylvania State University (University Park, PA), Nebraska University (Lincoln, NE), Clemson University (Clemson, SC), and Rhode Island University (Kingston, RI) have made contributions to turf breeding as well.

Juicy targets

Because of the turf industry's reliance on a few public breeders, new products are now largely "look a likes." Results from the U.S. Department of Agriculture's (Washington, DC) turf-grass evaluation trials point out few material differences among the top 30 entries in each turf class. Varieties are distinguished by the slightest differences in blade width, deepness of green color, or growth without shade. Indistinguishable products and the ease of varietal substitution undermine pricing strategies of seed companies. This, in turn, discourages private turf-seed companies from investing in the search for novel seed types.

Even off-the-shelf biotechnologies could revitalize conventional turf breeding. For instance, a restriction fragment linked polymorphism (RFLP) map and probes for over 200 loci, covering a perennial ryegrass genome, could streamline varietal selection. Instead of the usual simple phenotypic selections, recessive or multigenic breeding would be feasible. Whole plants now can be regenerated from callus cultures of many major turf types, thus opening the door for *in vitro* selection and screening.

Many juicy commercial targets

have eluded conventional breeders. The holy grail is low-maintenance turf. Significant reductions of watering, mowing, and chemical usage would revolutionize the turf-care industry. Consumers also want evergreen grasses.

Buffalo grass

Developers of novel turfs have several options for proprietary protection. Individual turf lines may be protected under the Plant Variety Protection Act or general patent law. Frequently, several grasses are mixed in specific proportions to obtain turfs that are hardy and suited to a specific use. Such mixes might constitute unique blends, which could be protected by formulation patents.

For those who are skeptical about application of fancy biotechnologies to lawns, consider taming a wild grass. Buffalo grass, a robust U.S. native grass that covers the Great Plains, is a suitable subject. Using a botanical foray and old-fashioned mass selection, naturally occurring, fine-leaved variants of this grass might be identified in native stands. Desirable features, perfect for the modern turf grass, are already present. Buffalo grass stops growing and greening in drought but regreens rapidly within a day or two after rain. Because it thrives in the wild, it is a formidable competitor against weeds and an efficient scavenger of sparse nutrients.

For the financially inclined, the turf-seed industry is fragmented and ripe for consolidation. Over 80 companies in the U.S. and Canada specialize in these species. Yet even the largest competitor has no more than a seven percent share of the U.S. turf-seed market. All but one company in the turf-seed business, The Scotts Company (Marysville, OH), is privately held. Many companies are wholesale distributors, who simply accumulate seed produced mainly in the Pacific Northwest and ship it to dealers.

So if you really believe that we are fresh out of projects for new, or even old, biotechnology companies, abandon your obsessions with oil-seeds and corn, and consider turf, an idea in the rough.