

Cultivar Blends as an Integrated Approach to Sustainable Turfgrass Management

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Over the past four years, my lab at the University of Florida has been investigating the effects of mixing St. Augustinegrass cultivars on insects, turfgrass performance, and resilience to stress. Over this time, we have learned A LOT. And that is an understatement.

The concept of cultivar blends is based on a strong foundation of research from agricultural and natural systems showing that plant monocultures are generally less able to withstand environmental stress events or pest attack than more diverse plantings. In result, we often end up applying more pesticide, water, fertilizer, time, and money into producing and managing monocultures than mixed plantings. If you have been paying any attention to social media, popular press, or environmental activists, you are aware that resource-intensive management is a controversial topic. And there are legitimate environmental concerns related to the over-use of natural resources and pesticides.

Something that always amazes me is that no matter where you are in Florida or many other parts of the U.S., turfgrasses are a component of the landscape. Whether they realize it or not, nearly everyone has some association with turfgrass. What other industry can you say that about? Citrus? Most people may have had orange juice, but they haven't seen an orange tree. I bet they've seen a lawn. There is no denying that the turfgrass industry is an important and relevant player in our economy and the spaces where people live, and because of that, we have an important role to play in protecting the environment and providing value.

My goal with cultivar blends is to provide the industry with an approach that meets the conventional aesthetic and functional turfgrass expectations and values, but also

increases the environmental value of lawns by promoting diversity and reducing maintenance inputs.

Although developing pest resistant or drought tolerant varieties enhances the sustainability of a lawn, it is only one piece of the puzzle. That is because pests can overcome resistance (remember southern chinch bugs and Floratam?), environmental conditions are not uniform across space and time, and even the most advanced cultivars remain susceptible to some variety of pests and stress. The recent challenge with lethal viral necrosis (LVN) of St. Augustinegrass is a great illustration of this. Floratam lawns die when infected but other St. Augustinegrass varieties survive. If a lawn was a blend of Floratam and other St. Augustinegrass cultivars, the lawn as a whole would be less likely to die and need replacement if it became infected. This is hypothetical because we have not tested this concept with LVN, but we have analogous evidence from our field trials.

From 2017 to 2020, we conducted a field experiment at the UF/IFAS Plant Science Research and Education Unit in Citra, FL to evaluate pest pressure and turfgrass quality associated with St. Augustinegrass cultivar blends in the absence of insecticide and fungicide use. We compared single-cultivar plantings (as is standard), mixtures of two cultivars, and mixtures of four cultivars. We evaluated traits like density, color, uniformity, percent turf cover, and quality over this four-year period. Our primary findings are that mixing cultivars had no effect on these traits in our plots during the first two years, but in years 3 and 4 turfgrass quality and cover declined, but only in monoculture plantings. (Fig. 1)

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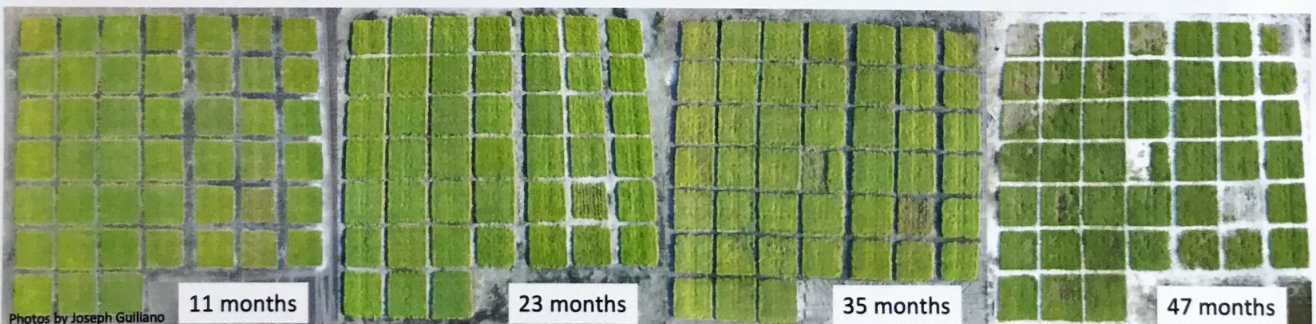


Fig. 1. Field experiments at the UF/IFAS Research Center, Citra, monitored performance and quality of St. Augustinegrasses with no insecticide or fungicide applications. Declines of turf quality and percent coverage were noted in years 3 and 4, but only in monoculture plantings.

The observed decline in turfgrass quality and cover in our monoculture plots was associated with disease pressure and was dependent on the cultivar present. Four years after planting, monoculture plots of Captiva St. Augustinegrass averaged 13% live turf cover, while all other cultivars in monoculture averaged over 75% cover. The value of cultivar blends emerged here because 10 four-cultivar blend plots also contained Captiva, yet none of those plots had less than 85% live turf cover after four years. Therefore, by mixing

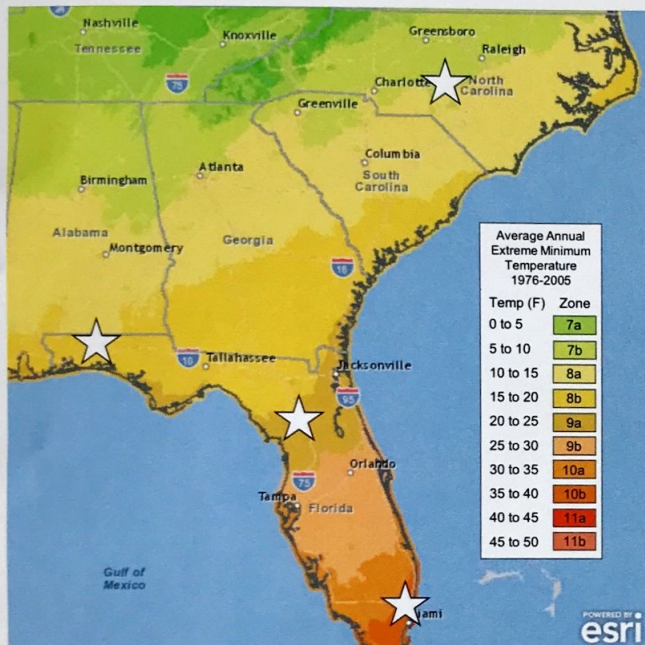


Fig. 2. Collaborative field trials are underway at the University of Florida and North Carolina State University to evaluate cultivar blends and develop regional recommendations.

Captiva with three other cultivars we avoided turfgrass stand death from disease pressure. This is not a blend recommendation, but instead an illustration of the potential value that cultivar blends can provide when faced with disease or other pest pressure and one cultivar is particularly susceptible.

One and three years after planting we also had nearly 200 turfgrass industry professionals walk through and evaluate the quality of our field plots rating them from 1 to 9, where 9 is the best and 6 is minimally acceptable. The results of these surveys reiterated our previous findings and showed that the perceived aesthetic quality of cultivar blends is no different from cultivar monocultures. However, three years after planting people rated mixtures of four cultivars above the minimally acceptable threshold of 6, while monocultures and mixtures of two averaged below the minimal threshold. This suggests that mixing four cultivars also prolongs the perceived quality of turf stands

compared to mixtures of two and monocultures.

Although turfgrass performance may determine industry viability, I am of course very interested in how insect pests respond to cultivar blends. Most of our work to date has evaluated effects on caterpillar pests like fall armyworm and sod webworms. We find that mixing cultivars reduces caterpillar feeding damage, colonization rates, and survival compared to monocultures. We also see that mixing four cultivars is more beneficial than mixing two cultivars from a pest management perspective. For example, four-cultivar blends had 15% less damage than two-cultivar blends. As we see with turfgrass performance, effects on caterpillars can also depend on the cultivar(s) present. For instance, cultivar blends containing Bitterblue reduced caterpillar survival by 20% while blends containing Floratam or Palmetto reduced plant damage by 15%. Again, these are not blend recommendations, simply more evidence that the composition of a cultivar blend matters depending on the focal pest or stress factor. We currently have several experiments underway evaluating similar effects on the southern chinch bug and hope to have those results soon.

Based on what we have found thus far, it is clear there is not a simple St. Augustinegrass cultivar blend solution. However, the evidence is growing that mixing four cultivars has advantages over mixing two or having only one cultivar. In 2019, we began a multi-location field experiment with funding from the USDA to evaluate cultivar blends and develop regional recommendations. (Fig. 2) This project is a collaboration between Dr. Bryan Unruh in Jay, FL, Dr. Marco Schiavon in Ft. Lauderdale, FL, Dr. Susana Milla-Lewis in North Carolina, Dr. Basil Iannone in Gainesville, FL, and my lab group in Gainesville. Our team is collecting tons of data on pests and turfgrass performance associated with different cultivar blends and levels of diversity to identify regional effects and specific blends that perform best. We have another two years of data collection remaining for this project, which will give us a more comprehensive understanding of this approach to turfgrass management.

Although we have learned a lot over the past few years, we still have a lot more to learn. I look forward to sharing those results with the industry and refining them into more targeted recommendations over the next couple of years. I am also always open to hearing industry perspectives and discussing ideas that can improve our work.



Dr. Adam Dale is the turfgrass entomology extension specialist for the state of Florida. Dr. Dale researches economically important pests of turfgrass with the goal of developing more ecologically-oriented and sustainable pest management strategies. He can be reached at 352-273-3976 or by email agdale@ufl.edu.