Evaluating fine fescues for natural weed suppression in crabgrass

By Dr. Jon Trappe

Many horticulturists or garden hobbyists are aware of the difficulty of growing some plants around black walnut trees. Black walnut trees naturally excrete chemicals into their environment to make themselves more competitive. Similarly, ecologists noticed certain plants turning white when grown adjacent to the bottlebrush plant. Chemists synthesized the chemical produced by the bottlebrush plant eventually led to the creation of the herbicide mesotrione (Tradename = Tenacity). These negative plant-on-plant interactions are referred to as *allelopathy*, and as this area of plant science expands, we are beginning to better understand the extent of this natural plant trait.

Some fine fescue species have been reported to exhibit natural weed suppression. As turfgrass scientists and plant breeders, we could potentially use this natural weed suppression trait and breed for turfgrasses that require fewer pesticides.

Based on work conducted in a controlled environment, we selected 6 accessions and 1 commonly-used cultivar for three fine fescue species - Chewings fescue, hard fescue, and strong creeping red fescue. The seven entries representing each fine fescue species were planted as plugs in fields historically dominated by crabgrass (Digitaria spp.) in St. Paul, MN and West Lafayette, IN in April 2017. To assess the allelopathic potential of the fine fescue genotypes, we evaluated several criteria, including crabgrass emergence, crabgrass seedheads (1-9 visual rating), crabgrass biomass, and fine fescue growth characteristics such as radial expansion and plant height.

Based on 2017 and 2018 results, crabgrass emergence and growth was highly variable in response to the fine fescue accessions, which was observed within and across fine fescue species. Fine fescue accessions differently affected crabgrass emergence, amount of crabgrass seedheads, and overall crabgrass biomass. In some but not all cases, crabgrass suppression was positively related to fine fescue growth rate, meaning that the faster-growing fine fescues often were among the fine fescues that had the highest amount of suppression in crabgrass growth. In a separate controlled environment experiment, we determined that it is not just a matter of higher aboveground growth rates of fine fescues that are resulting in higher levels of crabgrass

suppression. This could indicate that the observations we are making in the field and in controlled environment experiments are at least in part due to some belowground mechanism that is responsible for this crabgrass suppression. In some crop species with confirmed allelopathy, the allelochemicals are released into the soil via root exudates. Based on our field and growth chamber experiments, this is likely what is happening with the fine fescues.

We are currently conducting further field research and controlled environment experiments to better understand the mechanisms by which the fine fescue is affecting the crabgrass. Ultimately, we hope to include this information, as well as data on multiple weed species, into our breeding program with the aim of breeding for turfgrass cultivars that require fewer pesticides.