

# TURFGRASS TRENDS

Volume 8, Issue 11 • November 1999

## WEED CONTROL

### Weeds Shedding Light on an Old Foe

*Karl Danneberger, Ph.D., Department of Horticulture and Crop Science, The Ohio State University*

**W**eeds are opportunistic plant species that possess the ability to colonize open or thinned areas of turf quickly. Human activities and disturbances are the major means for introducing weeds. It should be no secret then, that the great majority of the 2,000 plant species considered weeds are not native to the United States.

Weeds are often grouped into broad groups according to life cycle (winter or summer annual, biennial or perennial), and morphological characteristics (monocot, dicot). Recognizing other ways of grouping weeds can help turfgrass managers devise effective management control programs.

#### Classification based on Carbon Fixation

Classification of weeds can also be based on their photosynthetic pathway. All plants carry on photosynthesis, the process whereby a plant captures radiant energy (light) from the sun and converts it into a usable form.

Photosynthesis is comprised of two main steps. The first is the light-dependent reaction where radiant energy is converted into biologically useful energy called ATP (adenosine triphosphate). The second, or dark (light independent), step is the storage of this energy into the chemical bonds of sugars and carbohydrates. Central to the light-independent reaction is the fixation of carbon dioxide (CO<sub>2</sub>) known as the Calvin cycle. The cycle is a series of reactions where CO<sub>2</sub> is fixed. The initial step is the attachment of CO<sub>2</sub> to a 5-carbon compound, ribulose biphosphate (RuBP) that quickly divides into two 3-carbon compounds. The term C3 cycle comes from the catalyzation of the 3-carbon compounds. Cool-season turfgrasses are often referred to as C3 plants.

Some plants however fix CO<sub>2</sub> differently. In many tropical plants, CO<sub>2</sub> is initially fixed to phosphoenolpyruvate (PEP) prior to entering the Calvin cycle. This additional reaction step is known as the C4 Dicarboxylic Acid Pathway. Most C4 plants are warm-season grasses. Generally speaking, C4 plants capture CO<sub>2</sub> more efficiently under increasing light and temperature conditions. Conversely, C3 plants capture CO<sub>2</sub> more efficiently under more moderate light and temperature conditions.

In 1969, Black proposed that plant-weed competition could be based on photosynthetic efficiency. Based on the efficiency of capturing CO<sub>2</sub>, the competitive outcome between a C3 and a C4 plant is predictable. Under increasing temperature and light intensity, the more efficient capture of CO<sub>2</sub> (C4) would provide a competitive advantage over

## IN THIS ISSUE

■ **Weeds, Shedding Light on a Old Foe . . . . . 1**

- Carbon Fixation
- Common Monocot Weeds
- Common Dicot Weeds

■ **Not All Microbes Are Created Equal, Identifying Beneficial Ones . . . . . 4**

- DNA Fingerprinting
- Protein Fingerprinting
- Fast Enzyme Analysis

■ **Documenting Irrigation Systems Accurately With Global Positioning . . . 7**

- Base Map Development
- Irrigation Audits
- Accurate Record Drawing
- Central Control Systems

■ **Imported Pest Defoliates Redgum Eucalyptus in West . . . 11**

Visit us at  
[www.landscapegroup.com](http://www.landscapegroup.com)