Since Dr. Youngner (1969) reviewed the subject of growth and development in the original monograph on turfgrass science, several reviews have appeared (Beard, 1973; Madison, 1971; Turgeon, 1985). While another analysis could be prepared based upon the advances that have occurred since the last review, it may be better to concentrate on energy relations and carbohydrate partitioning rather than turfgrass growth and development in general. These aspects of turfgrass biology have never been reviewed even though they have become a major focus of much contemporary research in crop physiology.

In some respects, closely mowed turf is a simple biological system. Apart from the period of establishment, which is a short time in the life of a turf, turfgrasses do little more than capture energy and use it to maintain and replace tillers and roots. Unlike most plant populations, which undergo profound ontogenetic changes during their seasonal growth cycle, properly managed turfgrasses mostly process energy for leaf production and maintenance. In an established turf, there is little seed germination, almost no flower induction, anthesis, fertilization, or seed production, and limited seasonal dormancy. The more complex aspects of turfgrass biology involve responses to environmental and biological stresses, interactions between plants and microorganisms comprising the turf community, and acquisition and cycling of water and nutrients for maintenance of the turf ecosystem. These subjects have been assigned to other chapters in this monograph.

For these reasons, this chapter emphasizes the energy relations that support the growth and development of a turfgrass stand. Even though energy flow is a primary activity in turfgrass growth and development, reports that address this subject area in turfgrasses are limited. Beard (1985) highlighted this fact in his review of turfgrass physiological research reported between 1981 and 1985, in which only 6 out of 61 papers were viewed as addressing turfgrass energy dynamics. Consequently, it will be necessary to draw from the broader physiological literature to develop the subject. Hopefully, this exercise will identify gaps and serve to stimulate research aimed at improving our understanding of this important subject.

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