Morphological and physiological features allow alfalfa (*Medicago sativa* L.) to adapt to a wide range of soil moisture conditions. In the humid regions of the USA, rainfall is usually sufficient for economic production; however, irrigation is often required for maximum production. In semi-arid and arid regions, irrigation is essential. Under moisture-limiting environments, alfalfa persists by extracting water from deep within the soil profile and by becoming semidormant. Despite its survival capabilities, growth is sensitive to water deficits in the upper soil profile.

Alfalfa water use is often considered extravagant, since seasonal evapotranspiration is large compared to other crops, primarily because of long periods of transpiration. Water requirements for production vary considerably depending mainly on climate and soil water supply and to a lesser extent on cultivar selection and management practices. Daily evapotranspiration rates approximate those of other crops with full ground cover. We will discuss the pathway of water movement, physiological and morphological effects of soil moisture deficits, water requirements for seed and forage production, and irrigation scheduling criteria.

11 PHYSIOLOGICAL EFFECTS OF WATER DEFICITS

11.1 Water Potential

The water status of plants, organs, and tissues is described either by the water potential ($\psi_w$) or less often by the relative water content (water content relative to that at full turgor). The components of the $\psi_w$ include...