Using Hardiness Zones to Determine Phenological Variation

ABSTRACT

Phenology is nature's calendar; it describes the seasonal timing of organisms that synchronize their lives to cyclical climatic changes throughout the year and across years. Phenology varies with latitude and other drivers of temperature and climate. Hardiness zones were established by the USDA as a basis for comparing phenology across North America. Hardiness zones are defined by the average annual minimum winter temperatures for any given location. We set out to evaluate similarities and differences in the first bloom date of common lilac (*Syringa vulgaris* L.) and red maple (*Acer rubrum* L.) across various locations within the same plant hardiness zones. We used the US National Phenology Network (US-NPN), a citizen-scientist observational database, which dates back to 1951 and the Pan European Phenology Database (PEP) which dates back to 1868. With the help of ArcMap, we were able to separate each data point according to its location within its respective hardiness zone. Results showed there is a significant difference between the zones in the long-term US-NPN data for common lilac. Evaluating the first bloom dates of common lilac and red maple will help us understand if hardiness zones are an accurate representation of phenological changes and the degree to which they can help us understand future plant phenology work.

KEY WORDS: *Acer rubrum*, Hardiness zones, Phenology, *Syringa vulgaris*, US-NPN, PEP