

March 31, 2017

Introduction

Phenology- definition-important ecosystem structuring process

For temperate trees, spring phenology is trade off, optimized between frost damage risk and extending growing season.

Spring climate patterns are unstable, so optimum timing is maintained through plasticity.

Plasticity is only adaptive with reliable environmental cues

Climate change is already causing organisms to shift their phenology.

Signature of climate change is not just warming trend, but increasing variability in shoulder seasons, more frequent extreme events.

Environmental cues might become less reliable.

Memory effects, produced by gene x environment interactions, may be an important mechanism that shapes the plastic response of phenology, allowing trees to extract more reliable "information" about their environment and fine tune their phenological response in the face of the stochastic climate early spring". These effects are documented in other plant and animal systems but we will restrict our conversation to temperate trees.

The following paper will further explore these memory effects, and how they may be adaptive for forest trees in the anthropocene.

In part 1, I will briefly discuss the environmental cues influencing the phenology of temperate species and review evidence for how trees perceive these cues.

In part 2, I broadly introduce the topic of memory effects, and partition memory effects into two categories, intergenerational effects, and seasonal carryover. I will discuss the evidence for each category of effects in the literature and explore the adaptive significance of each response in light of climate change.

In part 3, I will discuss directions for further research, with a particular focus of seasonal carryover effects, which has been understudied in the evolutionary ecology field.

1 Phenologic Cues

forcing

chilling

photoperiod

perception

2 Intergenerational Parental Effects

General: Maternal or Paternal, little evidence for paternal so I will primarily discuss maternal.

Adaptive significance. Less responsive to variation

3 Carryover Effects

3.1 Between phenophases

3.2 Between seasons

4 Future Directions