Photoperiod sensitivity in Ivyleaf morning glory, *Ipomoea hederacea*

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Introduction

Background

- *Ipomoea hederacea* is an annual weedy vine with a wide range that spans from the southern United States up into the Great Lakes
- Annual lifecycle starts in late spring and continues until a frost ends the season
- Evidence of photoperiodic response in flowering[1,2]
- Previous studies have shown photoperiod is the most important factor for the initiation of flowering[1,2]
- Observation: Southern populations are more difficult to induce flowering
- Climate change is predicted to promote species' range shifts; photoperiodism may limit these shifts

Aims

- What are the importance of light cues for flowering?
- How do life history traits affect responses to changes in daylength?
- How will global change affect responses to novel photoperiodic cues?

Methods

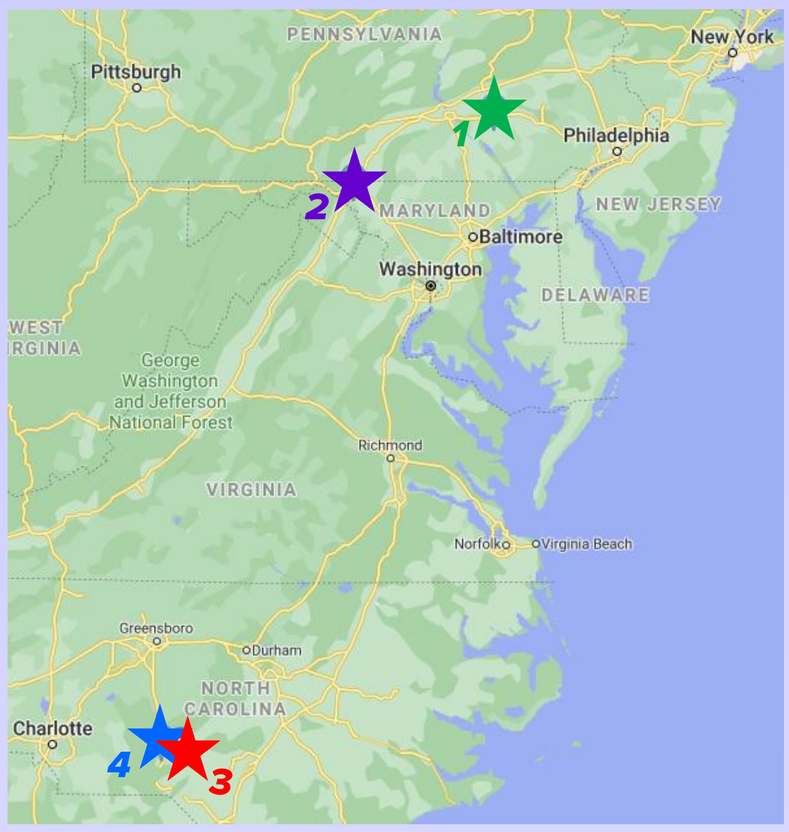


Figure 1 – Distribution of sampled populations. Map depicting origins of populations 1, 2, 3, and 4.

- 4 populations, 43 families from each
  - Pop 1 = Pennsylvania
  - Pop 2 = Maryland
  - Pop 3 = Hoffman, NC
  - Pop 4 = Ellerby, NC
- 4 chambers, 2 of each type
  - Chamber 54, 55 = PGR15
  - Chambers 70, 74 = E15
- 5 racks in each chamber
- n = 688

- ***Factors:***
  i. Light treatment (slow/fast)
  ii. Population (1/2/3/4)
- ***Measured:*** leaf growth rate, leaf size, *date of first flower*, size at first flower, daylength at first flower
- Grow for 18 weeks at constant temperature of 25 °C
  - First 2 weeks at 16h daylength
  - Slow light treatment: decrease daylength by 1h every 2 weeks
  - Fast light treatment: decrease daylength by 1h every week

Results

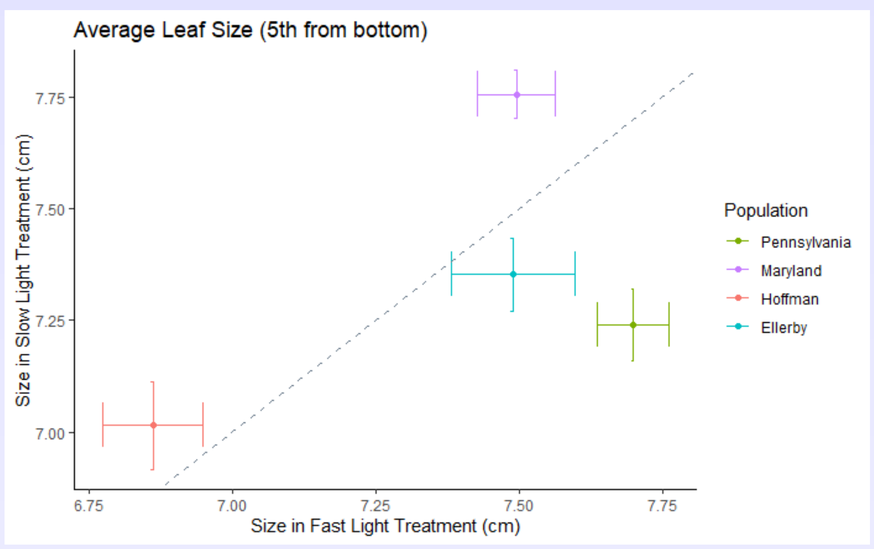


Figure 2 – Average leaf size (bottom leaves). Leaf size was measured 38 days after planting. Leaves that were the 5th from the base of each plant were measured using a ruler.

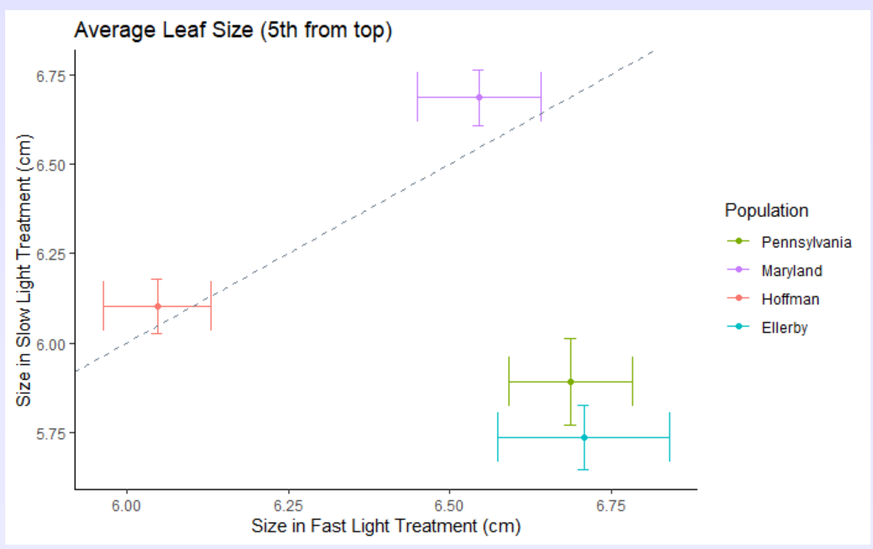


Figure 3 – Average leaf size (top leaves). Leaf size was measured 38 days after planting. Leaves that were the 5th from the top of each plant were measured using a ruler.

- Leaf size significantly varies between populations in both bottom ($p < 2.2e^{-16}$) and top leaves ($p = 0.002$)
- Light treatment did not significantly affect leaf size ($p = 0.910$)
- There were significant interactions between the effects of the light treatments and populations on leaf size in both bottom ($p = 0.021$) and top leaves ($p = 0.002$)

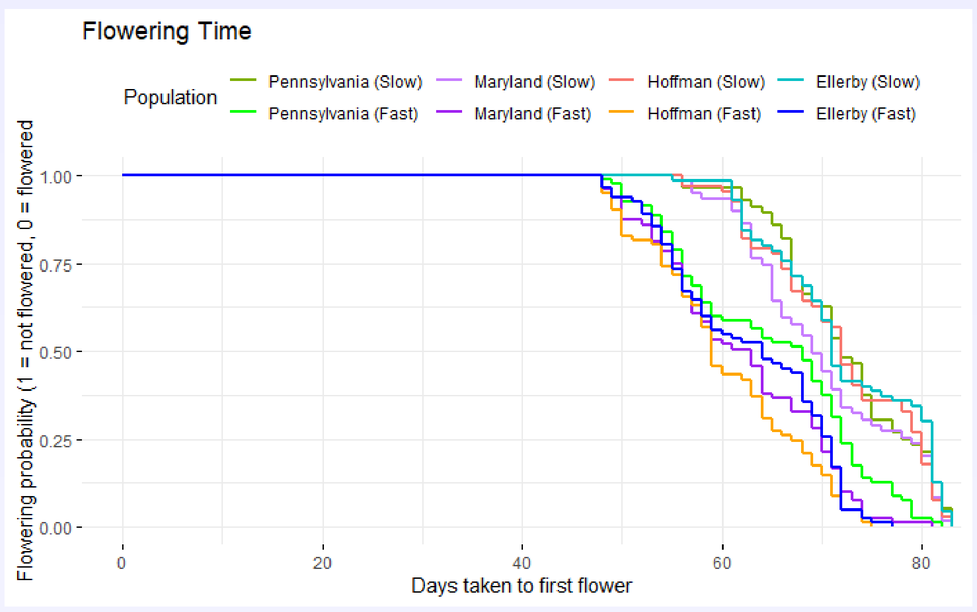
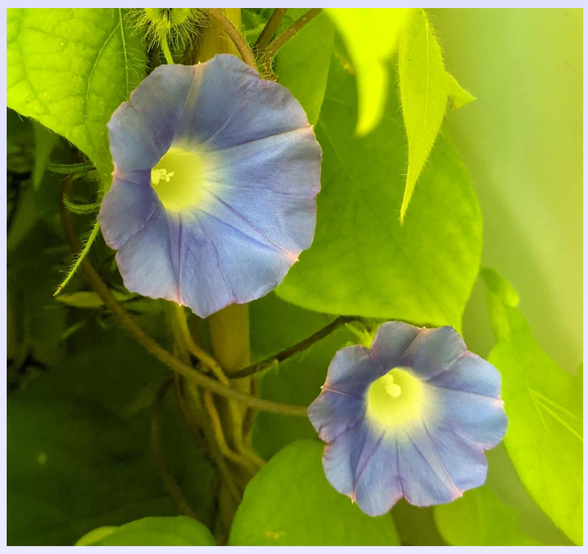


Figure 4 – Onset of flowering across populations and light treatment. Data was collected on day of first flower for each individual.

- Flowering significantly varied between populations ($p = 0.002$)
- Light treatment also significantly affected flowering ($p < 2.2e^{-16}$)
- Plants in the fast light treatment flowered earlier than those in the slow light treatment
- There was a marginally non-significant interaction between population and light treatment ($p = 0.081$)



Discussion

- Populations vary in response to light cues, affecting leaf size
  - Despite being far apart, Pennsylvania and Ellerby display similar trends in leaf size
- Flowering time varies between populations and in response to the light treatments
- At this time, data on size at flowering, fruit number, and biomass has not been fully collected
- This additional data can be analyzed to further examine photoperiodic effects and how they vary between populations

References

1. Senseman SA, Oliver LR. 1993. Flowering Patterns, Seed Production, and Somatic Polymorphism of Three Weed Species. Weed Science 41: 418–425.
2. Klingaman TE, Oliver LR. 1996. Existence of Ecotypes Among Populations of Entireleaf Morningglory (*Ipomoea hederacea* var. *integriuscula*). Weed Science 44: 540–544.

Acknowledgements

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