

Variation in Japanese Knotweed Populations

Ashley Behringer & Dr. Stacy B. Endriss

UNC Chapel Hill & UNC Wilmington



Background:

Japanese Knotweed (comprised of both Japanese Knotweed and the hybrid, Bohemian Knotweed) are globally invasive plants that cause diverse negative impacts, including harm to native species and damage to pavement, building foundations, and retaining walls.

Here, we aim to investigate whether Japanese Knotweed expresses predictable variation along environmental gradients (i.e., local adaptation) and across ploidy levels by measuring resistance to herbivory across two scales of environmental variation: climate and soil type. Understanding its variation will help with management strategies.

We predict that Japanese Knotweed populations have **locally adapted** to their introduced range and that both ploidy and abiotic environmental gradients are major drivers of variation. We propose two **hypotheses**:

1. Leaves will be plumper the colder and drier the origin of the Japanese Knotweed population.
2. Populations from areas with more clay will experience more leaf consumption by insects.

Conclusions:

- Some leaf traits, but not others, provide support for local adaptation of Japanese Knotweeds in their introduced range.
- Determining the ploidy of the population is key to understanding leaf morphology (and perhaps what measures to take when managing).
- Japanese Knotweed leaf morphology and herbivory can be impacted by soil sediment.

Future Direction:

- What nutrients might we expose Japanese Knotweeds to that may make them more susceptible to insect feeding?

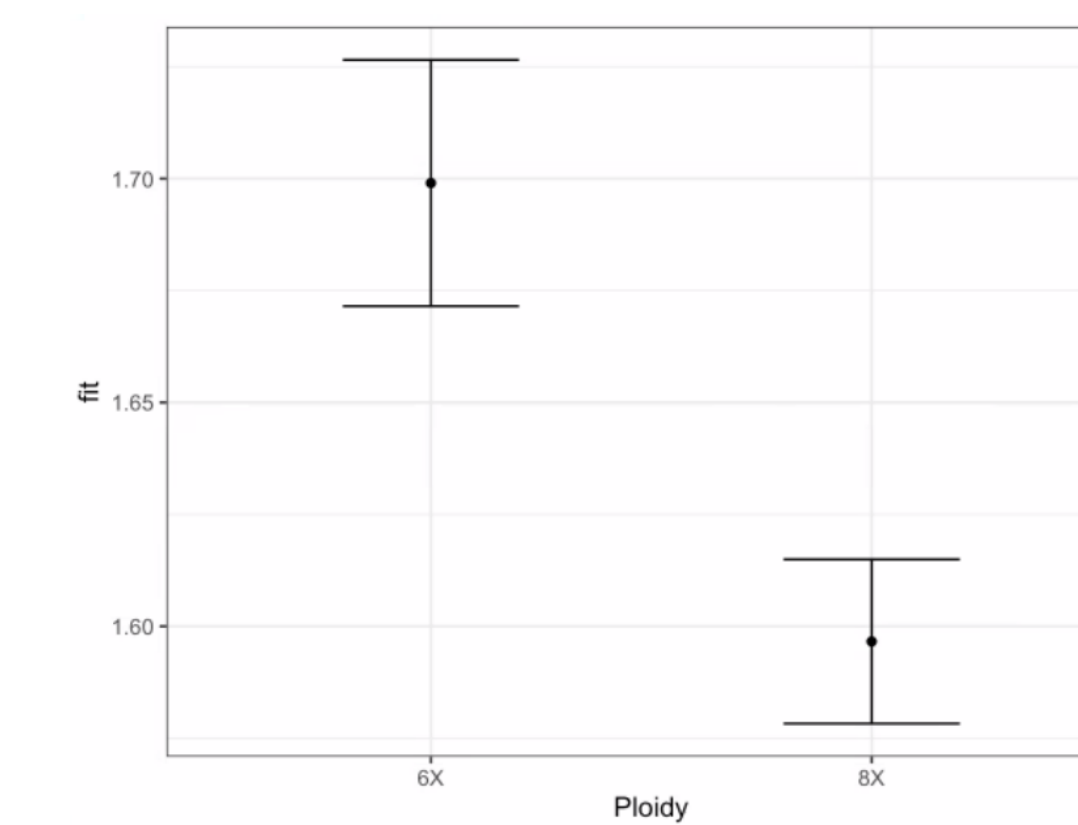
Methods:



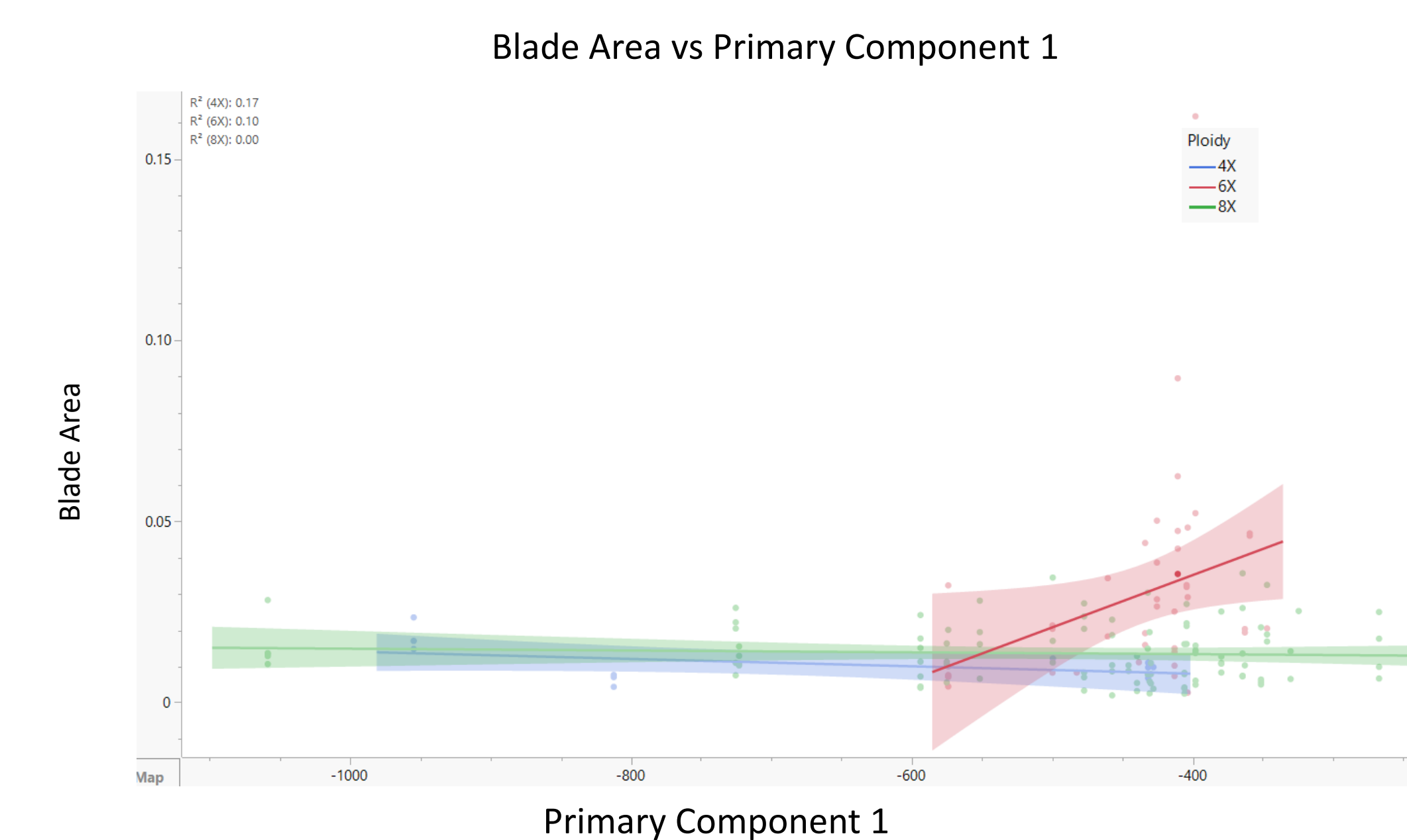
In 2018 we propagated plants from 5 rhizomes collected from each of 50 Japanese Knotweed populations along the eastern US. After plants were established in pots for 4 years, we photographed 3 young leaves in the late summer. Each leaf photo was processed through ImageJ.

Results:

- Ploidy was a strong driver in variation of leaf size ($P < 0.001$) and shape ($P < 0.01$)



- Leaf blade area (but not the plumpness) increased with latitude, showing local adaptation.



- Soil composition does not impact insect herbivory, but does influence the plumpness and blade area of the leaf.

