



# A common garden experiment assessing the physiological impacts of roadside runoff on common jewelweed (*Impatiens capensis*)

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**Overview:** In Pennsylvania, salt is used to treat roads during adverse weather conditions. The resulting runoff has the potential to contaminate waterways and substrates that support plant communities. In recent years, the conservation of plant communities in potentially contaminated roadside ditches has received increased attention. This study will observe impacts of roadside runoff on jewelweed, *Impatiens capensis*. Research on this topic is relevant and timely as many of these roadsides function as wetlands; wetland ecosystems are particularly vulnerable to degradation while roadsides are well-known corridors for invasive species. By answering how roadside runoff impacts a common wetland species (jewelweed) in these ditches, we can better assess the health of these ecosystems and their resilience to anthropogenic stressors. We will attempt to answer how roadside runoff impacts jewelweed phenology and physiology across various treatments. Jewelweed seeds will be collected from various populations and grown in a common-garden experiment. Seedlings will be raised and then watered with a solution containing contaminants, including road-salts, in a randomized complete block design. This work will result in a better understanding of human impacts on ubiquitous but understudied roadside habitats and their associated plant communities.

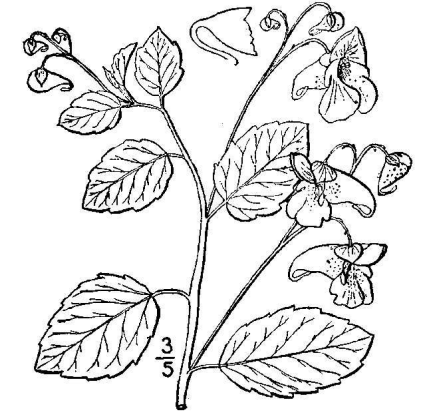


https://www.jaxshells.org/imeson.htm  
https://sustainabletechnologies.ca/home/urban-runoff-green-infrastructure/pollution-prevention/road-salt-management/

## Hypotheses:

We hypothesize that:

1. increases in simulated runoff salinity will adversely impact jewelweed germination, reproduction, and development
2. Different populations of jewelweed will respond differently to increases in salinity following germination (maternal effect)



https://plants.usda.gov/home/plantProfile?symbol=IMCA

## Common Garden Design

- Experimental unit: Petri Dish
- Treatment: Salt levels
- Factor: Population

## Methodology:

1. Seeds will be sown into Petri dishes by population
2. Each dish will be assigned a salt level
  1. No salt
  2. Salt concentration to conductivity level of 25  $\mu\text{S}/\text{cm}$  (observed runoff levels)
  3. 10x observed runoff (250  $\mu\text{S}/\text{cm}$ )

## Response variables

1. Germination time (2 mm radicle present)
2. Emergence time (appearance of hypocotyl/stem)

## Deliverables:

1. Better understanding of impact of salts on common roadside plant
2. Pilot data for further investigations into roadside vegetation dynamics

## Materials and Methods

### Seed collection

Seeds collection will occur in August/September 2022 and will be stratified across two distinct population groups (Figure 1)

1. Roadside populations (n=4)
2. Non-roadside populations (n=4)

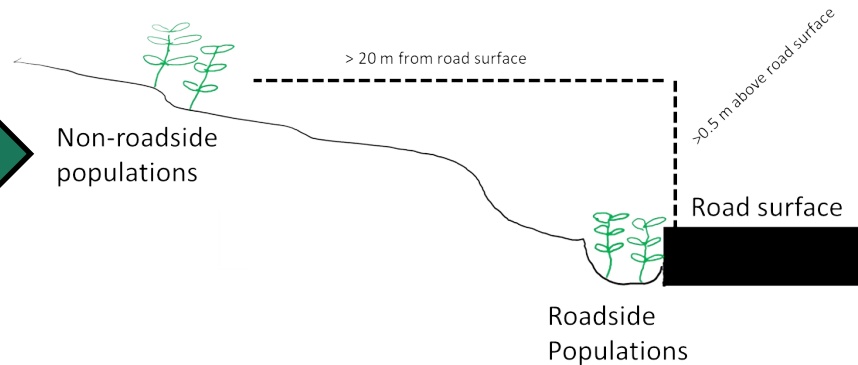
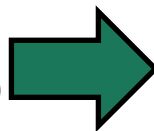


Figure 1: Schematic diagram of jewelweed sampling

### Germination tests

1. 10% of collected seeds will be randomly chosen to test germination methods (fall/winter 22/23)
2. Remaining 90% will be cold-stored for common garden tests