Mayweed Chamomile
Anthemis cotula

Laura Crawford

2013 REU Intern

Ian Burke

Advisor

WASHINGTON STATE UNIVERSITY

REACCH
Regional Approaches to Climate Change – PACIFIC NORTHWEST AGRICULTURE

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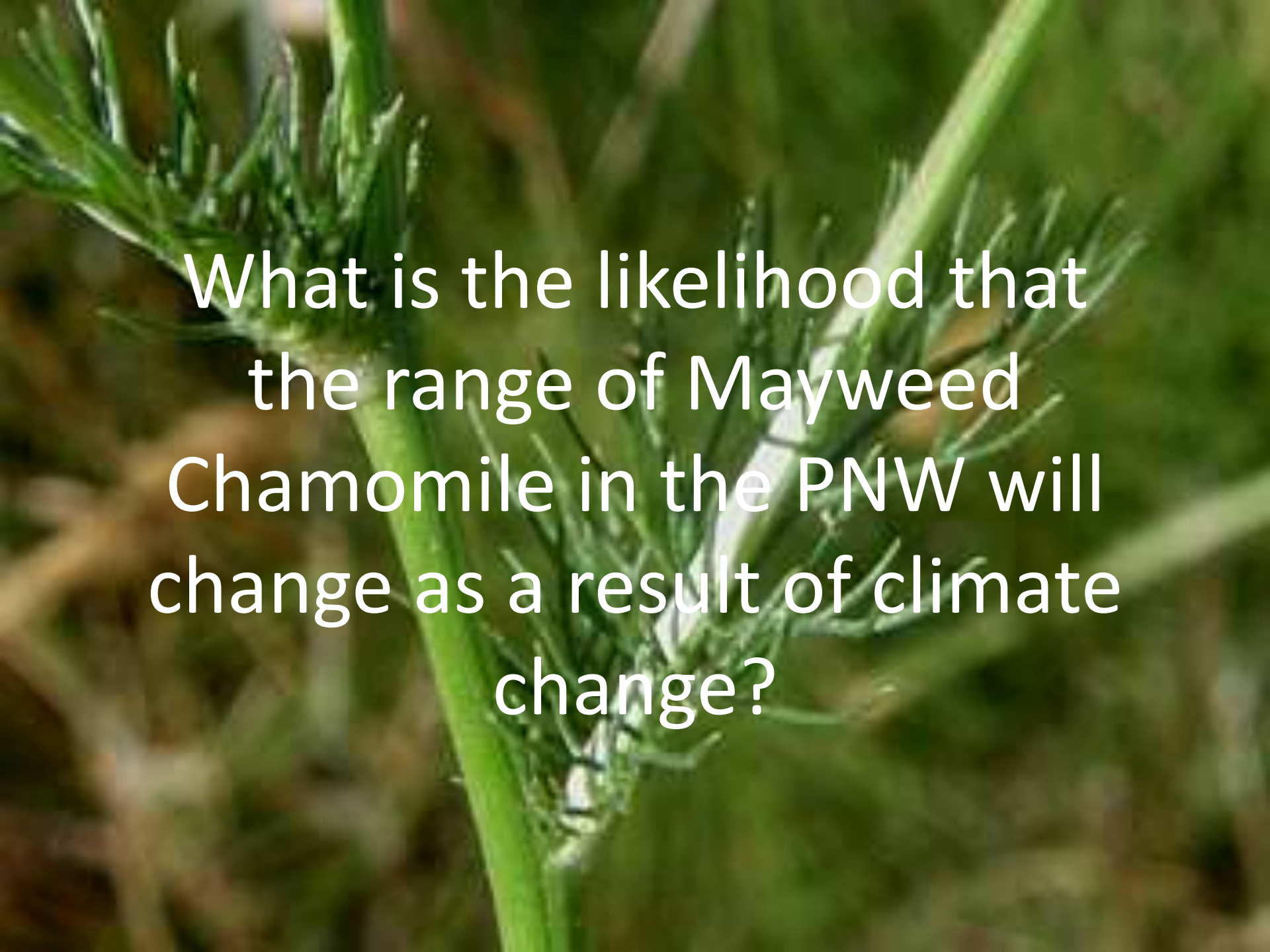

What is the likelihood that the range of Mayweed Chamomile in the PNW will change as a result of climate change?

Mayweed Biology

- Water requirements
  - Can survive moderate drought
  - Relatively high summer evapotranspiration rates
- Soils
- Secondary compounds

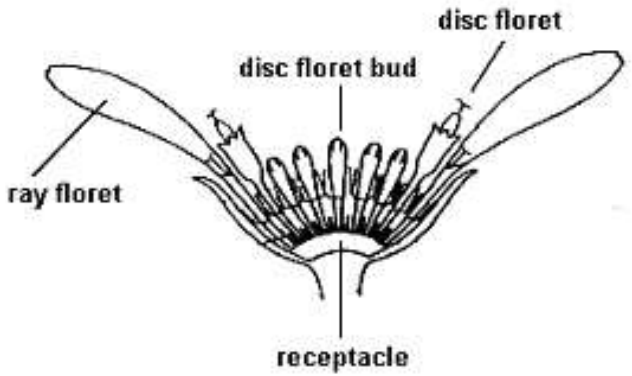
Why Mayweed?

- Allelopathic effects
- Interferes with Pea harvest
- Grazing animals
- Humans: Bullous Dermatitis
- Invasiveness
- Control
  - Fungus
  - Mowing ineffective
  - Herbicides
    - Resistance

Mayweed's Spread

Reproduction

- 50-75 seeds per head, multiple heads per plant
  - 500-30,000
  - Drought
- Viability over time
- Ray and Disc Flowers
- Usually found in large groups
  - Strongly self-incompatible



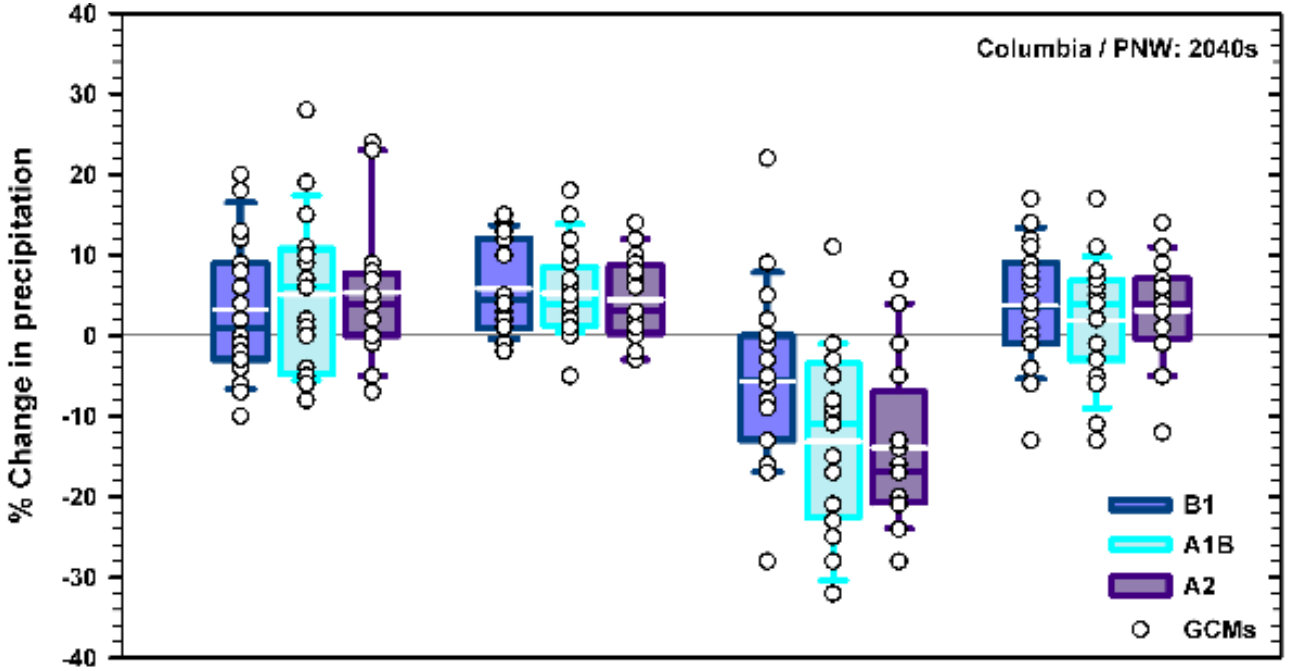
Obligate Outcrossing

- Cannot reproduce asexually
- Logarithmic growth-evolutionary advantage
- Much genetic variation predicted in and between populations, not investigated
- Few control options
- Decreased bottleneck

Expected Range Changes

- Native range
- Introduced
- Easily dispersible

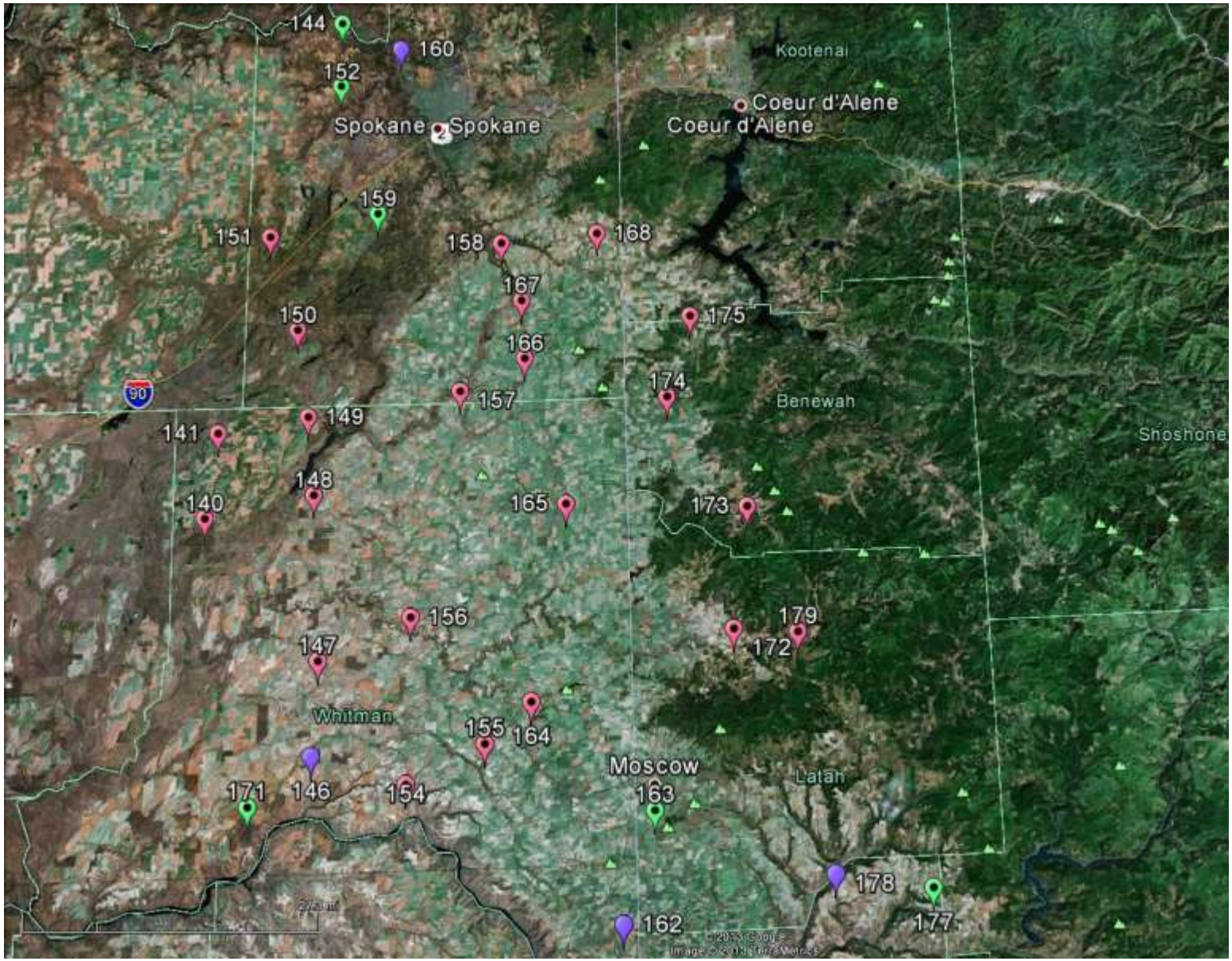
- Phenotypic plasticity
- May have more genetic diversity than a native population



How can we observe the potential for range expansion?

- 18 chromosomes
- Plants tend to shift reproductive strategies
- Flowering time

Collections



Samples

Visible Variation in Plants

What did I do?

PCR

- Amplifies DNA
- Polymorphic EST-SSRs
- 40 Prickly Lettuce Markers
- Different for ABI

Gel Electrophoresis

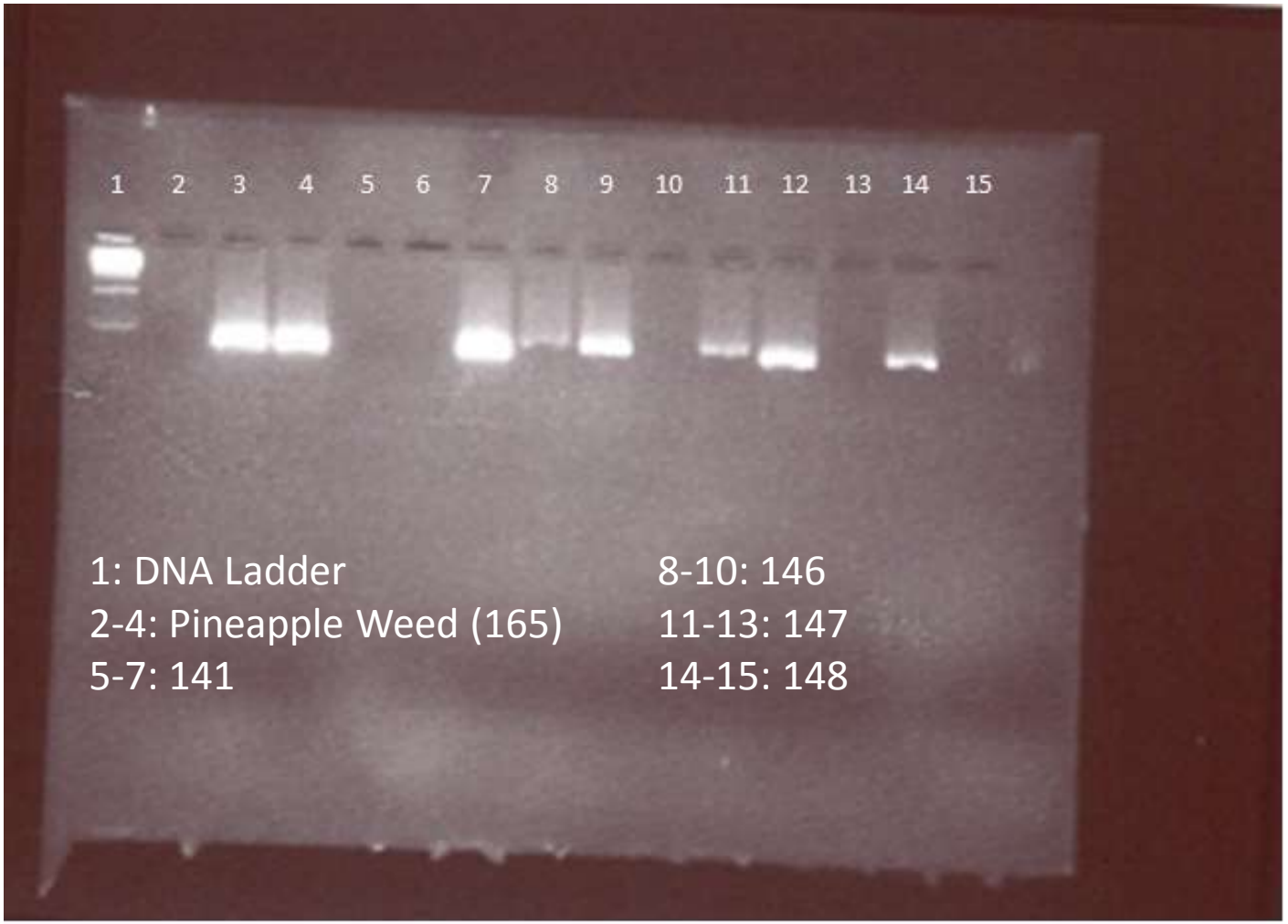
- Measures size and amount of DNA in a sample

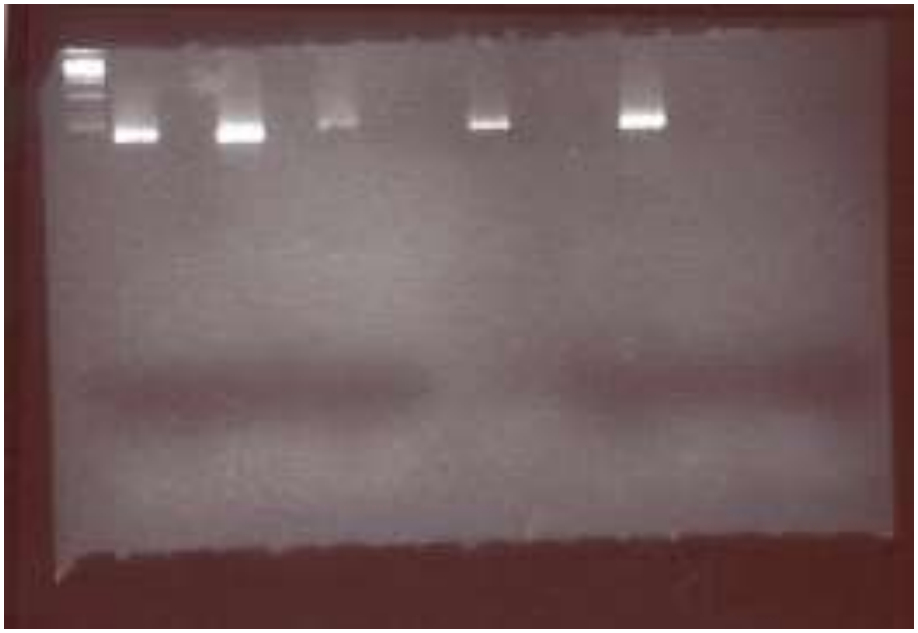
ABI

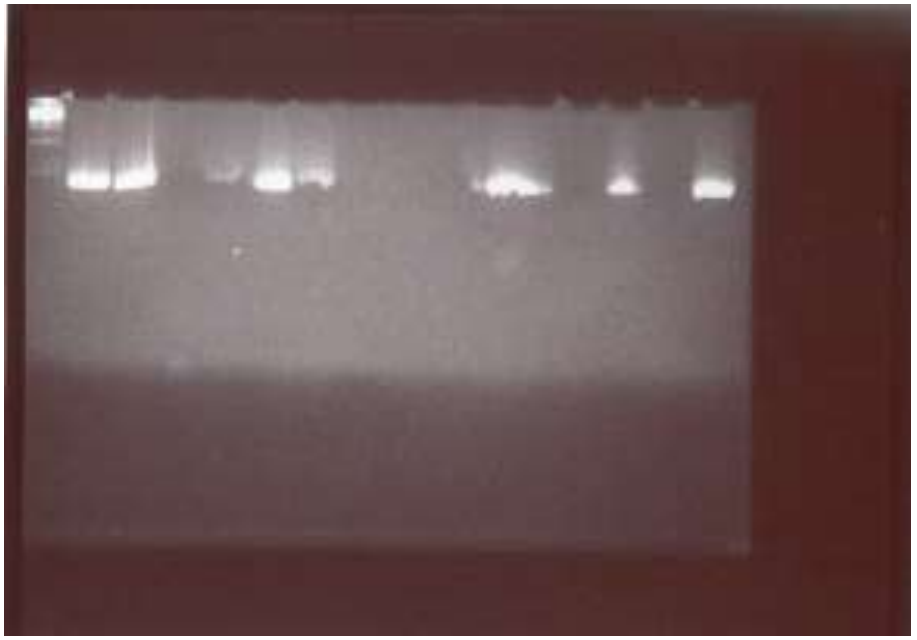
- Didn’t work
- Computer reads spectral signatures

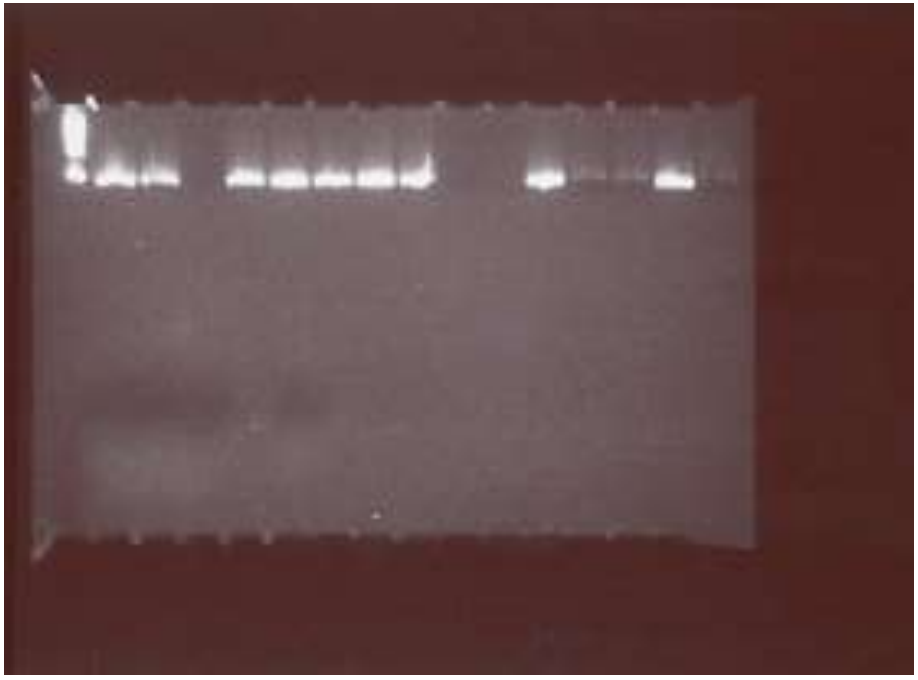
Results

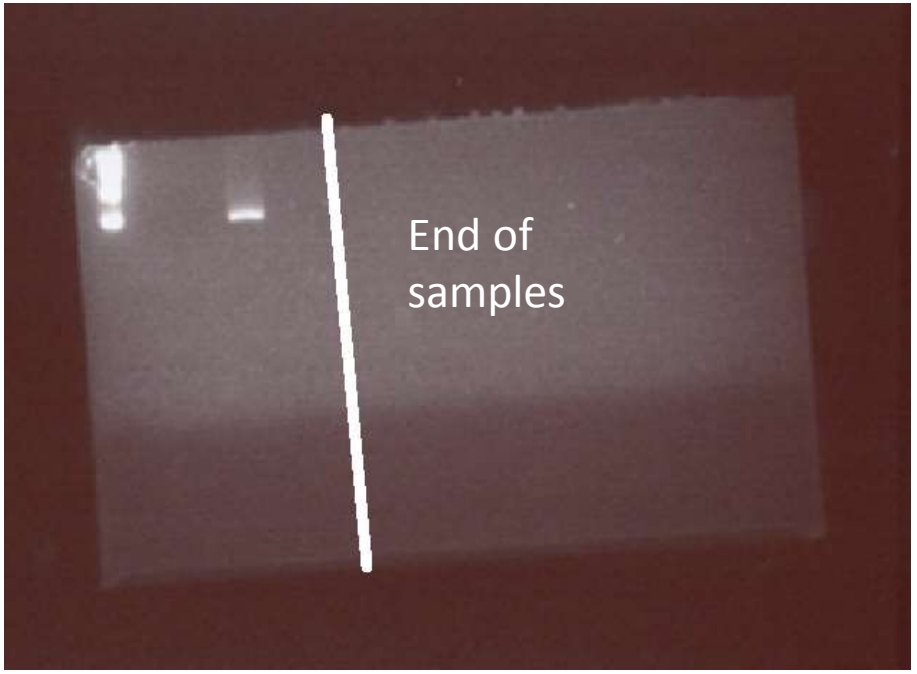
Marker 158—Homeobox Protein 33










End of
samples

Conclusions

- Is there genetic variation in Mayweed?
- Future Directions
- Climate Change

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Sources

- http://county.wsu.edu/whitman/agriculture/plants/weeds/Documents/MayweedCamomile2006.pdf
- Kay QON. (1971) *Anthemis Cotula L*. J of Eco. 59.2: 623-636.
  - http://www.jstor.org/stable/2258336?origin=JSTOR-pdf
- Barrett SCH, Colautti RI, Eckert CG. (2008) *Plant Reproductive Systems and Evolution During Biological Invasion*. Mol Eco. 17.1: 373-383.
  - http://onlinelibrary.wiley.com/doi/10.1111/j.1365-294X.2007.03503.x/pdf
- Novak SJ, Mack RN. (2005) Genetic Bottlenecks in Alien Plant Species: Influence of Mating Systems and Introduction Dynamics, in *Exotic Species: a source of insight into ecology, evolution, and biogeography*. Sinauer Associates: Sunderland, MA. pp:201-228.
  - http://forest.mtu.edu/info/ecologyseries/pdfs/NOVAK%20&%20MACK%20%282005%29.pdf
- Neher RA, Shraiman BI, Fisher DS. (2010) *Rate of Adaptation in Large Sexual Populations*. Gen. 184.2: 467-481.
  - http://www.genetics.org/content/184/2/467.full.pdf
- Smith AE. (1987) *Increasing Importance and Control of Mayweed Chamomile in Forage Crops*. Agron J. 79.4: 657-660.
  - https://dl.sciencesocieties.org/publications/aj/abstracts/79/4/AJ0790040657
- Ogg AG, Stephens RH, Gealy DR. (1993) *Growth Analysis of Mayweed Chamomile* (Anthemis cotula) *Interference in Peas* (Pisum sativum). Weed Sci. 41.3: 394-402.
  - http://www.jstor.org/stable/pdfplus/4045365.pdf?acceptTC=true
- O'Malley MA, Barba R. (1990) Bullous Dermatitis in Field Workers Associated with Exposure to Mayweed. Am J of Contact Dermatitis. 1.1: 34-42.
  - http://www.contactderm.org/files/public/DermatitisVolume1%281%29March1990.pdf
- http://mips.helmholtz-muenchen.de/plant/athal/reportsjsp/geneticElement.jsp?gene=AT1G75240.1
- http://www.arabidopsis.org/servlets/Search?action=search&type=annotation&tair_object_id=2025121&locus_name=AT1G75240
- Qureshi SN, Saha S, Kantety RV, Jenkins JN. (2004) *EST-SSR: A New Class of Genetic Markers in Cotton*. J of Cotton Sciences. 8.2: 112-123.
  - http://naldc.nal.usda.gov/download/2852/PDF