Emma Greenlee

Survival and reproduction in inbred, within-fragment, and between-fragment crosses of Echinacea angustifolia

About Echinacea angustifolia

- Long-lived, perennial prairie plant

- Self-incompatible

CHALLENGE: SMALL, FRAGMENTED POPULATIONS

CONSEQUENCE OF SMALL POPULATIONS:

INBREEDING DEPRESSION

–Inbreeding depression: reduced fitness as a result of mating between closely related relatives

–Heterosis: improvement in a population's fitness when genetic material from another population is introduced

DOES INBREEDING DEPRESSION IMPACT ECHINACEA POPULATIONS?

Does *Echinacea angustifolia's* survival and reproductive success differ between inbred plants, within-population crosses, and between-population crosses?

Katy Chayka

Survival

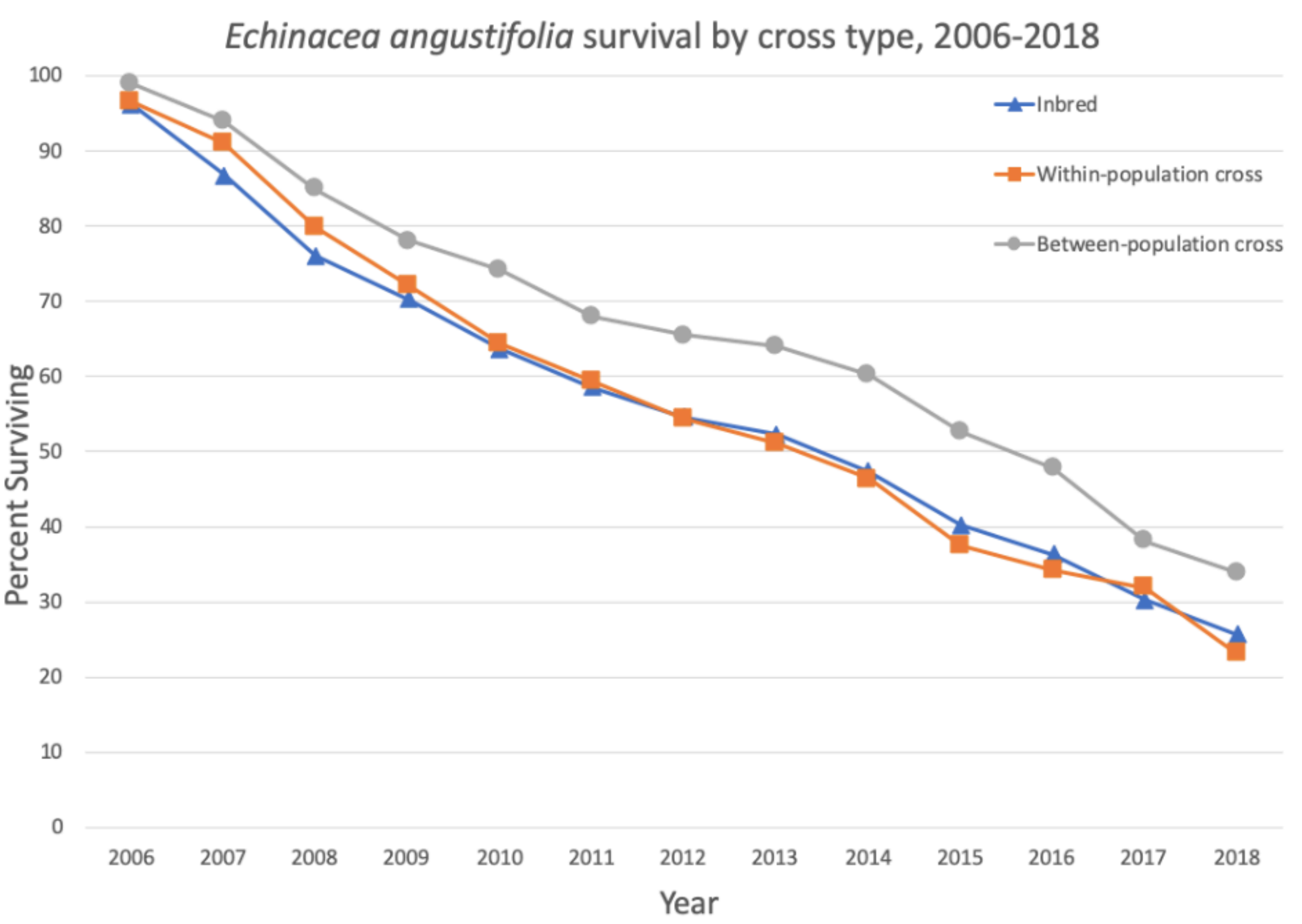
– 2006: 1136 plants total

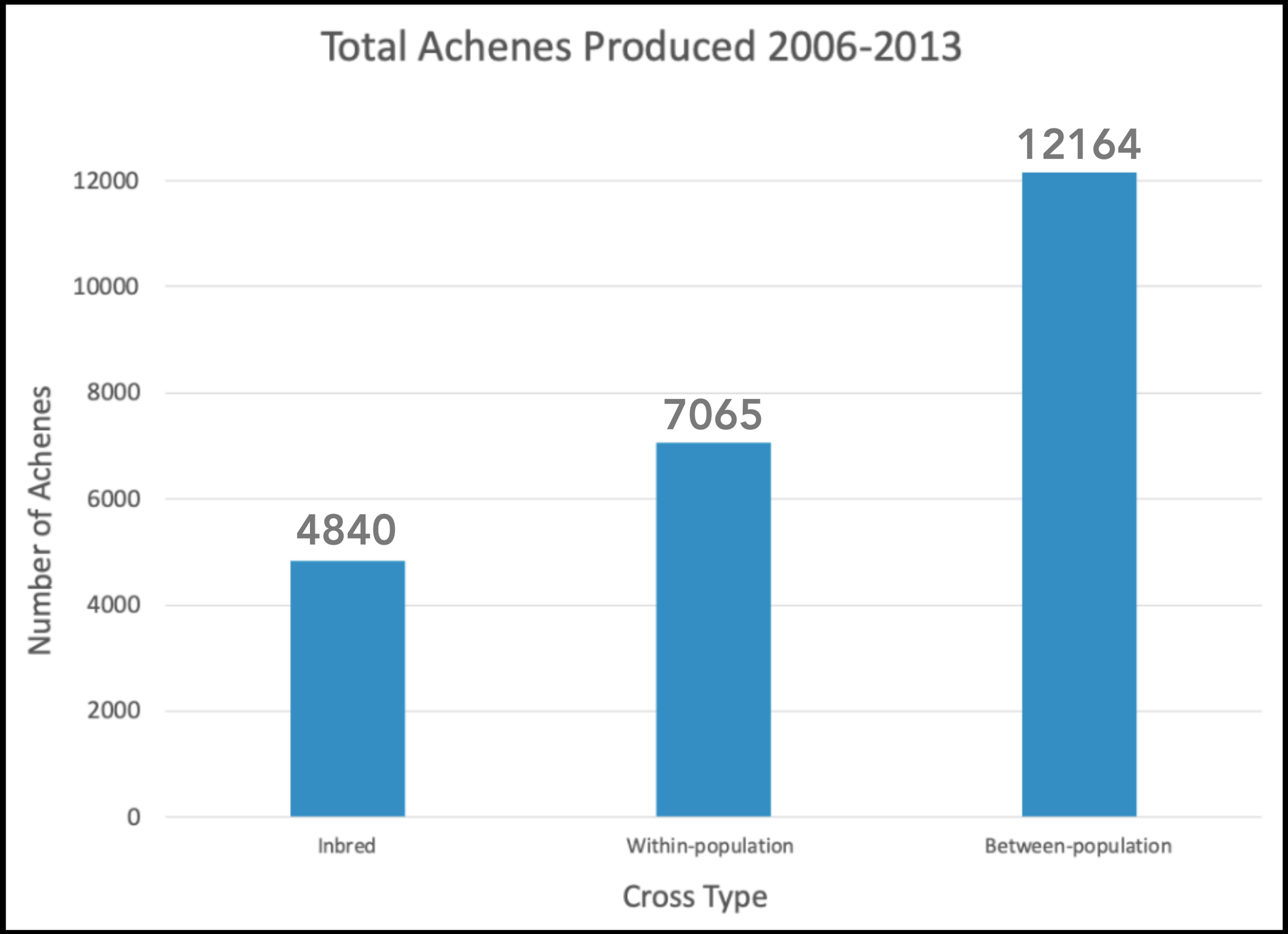
– 2018: 313 surviving—28% of original group

– Inbred crosses: 26% survival

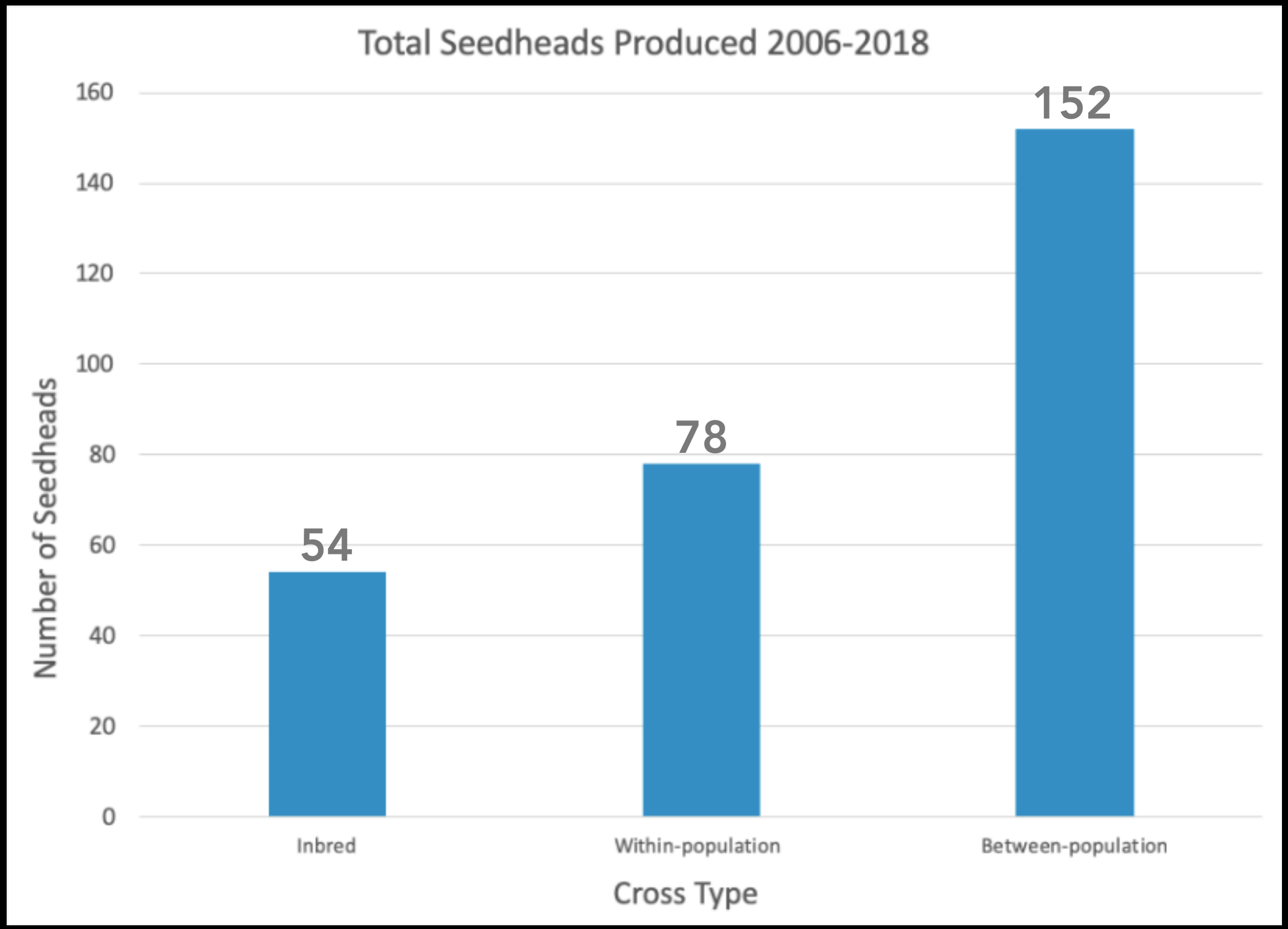
– Within-population crosses: 23% survival

– Between-population crosses: 34% survival


Echinacea angustifolia survival by cross type, 2006-2018
Inbred
Within-population cross
Between-population cross
Percent Surviving
100
90
80
70
60
50
40
30
20
10
0
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
Year



Between-population crosses produced 2.3x more achenes on average than inbred plants



Between-population crosses produced 2.7x more seedheads than inbred plants, and twice as many seedheads as within-population crosses

TAKEAWAYS

- Evidence for inbreeding depression in Echinacea, and heterosis

- Genetic structure of Echinacea populations

- Creating seed mixes including Echinacea—mixes with multiple sources may perform better

- Fragmented populations of Echinacea are at risk for inbreeding depression, and the introduction of novel genetic material may counteract its effects

Open Questions

– Are the achenes produced by each cross type viable?

-Are achenes full?

-What happens to the plants they produce?

– How to maintain successful Echinacea populations in a fragmented landscape?

Sources

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Images: personal, Wikipedia, Flickr, wildflower.org