

Native soil materials; what can soil biota do for our restoration efforts?



NORTHERN
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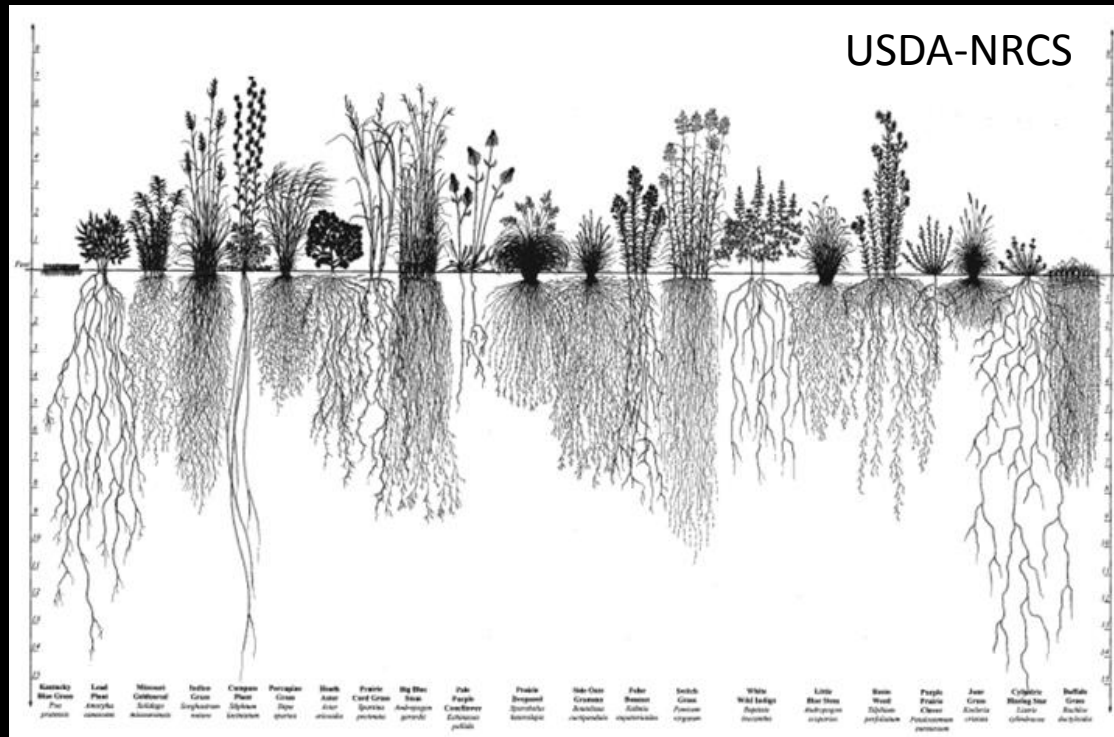
Michael Remke;
Nancy Johnson;
Matthew Bowker



In 10 seconds...

draw the plant you would
most like to seed successfully

Plants don't just stick out of soil,
they **interact with it...alot**



Do we know how much soils affect
restoration seeding success?

Soils influence plant success

Exhibit A. Abiotic soil environment



Problem? Seed transfer zones
pretend plants care only about climate

Exhibit B. Soil biota
(e.g. mycorrhizal fungi)



Problem? Seeding
divorces plants from
co-adapted soil biota

The “home team” hypothesis



Nancy Johnson

Plants + soil organisms from same neighborhood = **home team**

The home team grows better than
away teams (combos of plant and soil organisms that don't
“know” each other)

Maybe some soil awareness can help us use seed better

Seed strategy actions:

Improve tech for seed use

use of soil organisms with seeding?

Develop tools for land managers

soil-smart seed transfer

DOI Priorities

Stewardship

Climate Change

BLM Leadership Priorities

Conservation Stewardship

Enhance environmental

responsibility of energy
extraction

Our blue grama common gardens at SEGA



3C Cooler

2C Cooler

2 C Warmer

3 C Warmer



Transplant here:
simulate assisted migration &
“pre-storage” (Butterfield et al.)

Source sites

Transplant here:
simulate warming climate



3C Cooler
Basalt Soils

2C Cooler
Limestone Soils

Home Sites

2 C Warmer
Basalt Soils

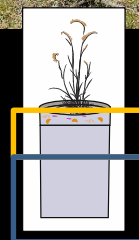
3 C Warmer
Mixed Alluvium



Soil Biota
Soils



Basalt Soils
Limestone Soils



Soil Biota
Soils





3C Cooler
Basalt Soils

2C Cooler
Limestone Soils

Home Sites

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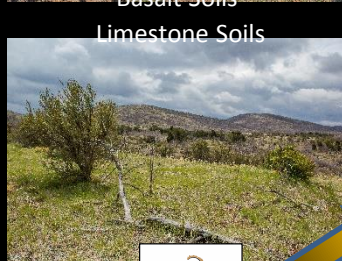
3 C Warmer
Mixed Alluvium



Soil Biota

Soils

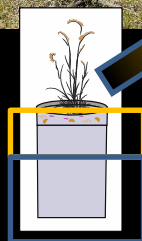
Home Team
Home Soil



Basalt Soils
Limestone Soils



Home Team
Home Soil



Soil Biota

Soils



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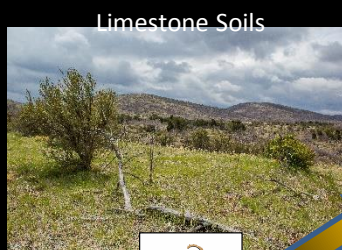
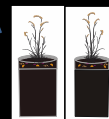
3 C Warmer
Mixed Alluvium



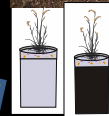
Soil Biota

Soils

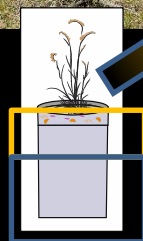
Home Team
Away Soil



Basalt Soils
Limestone Soils



Home Team
Away Soil



Soil Biota

Soils



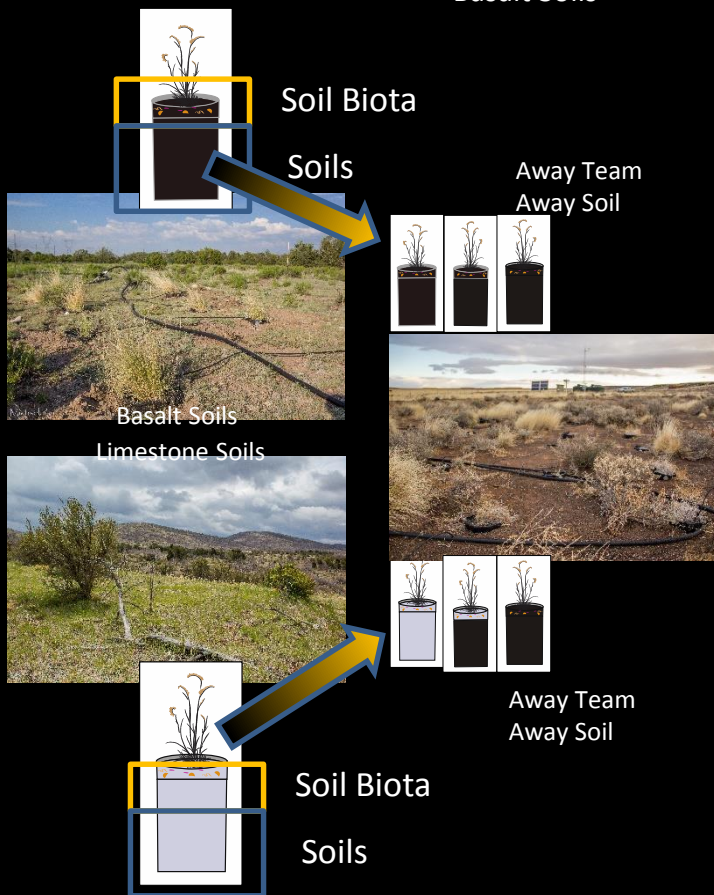
3C Cooler
Basalt Soils

2C Cooler
Limestone Soils

Home Sites

2 C Warmer
Basalt Soils

3 C Warmer
Mixed Alluvium





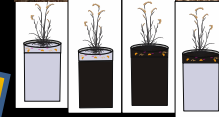
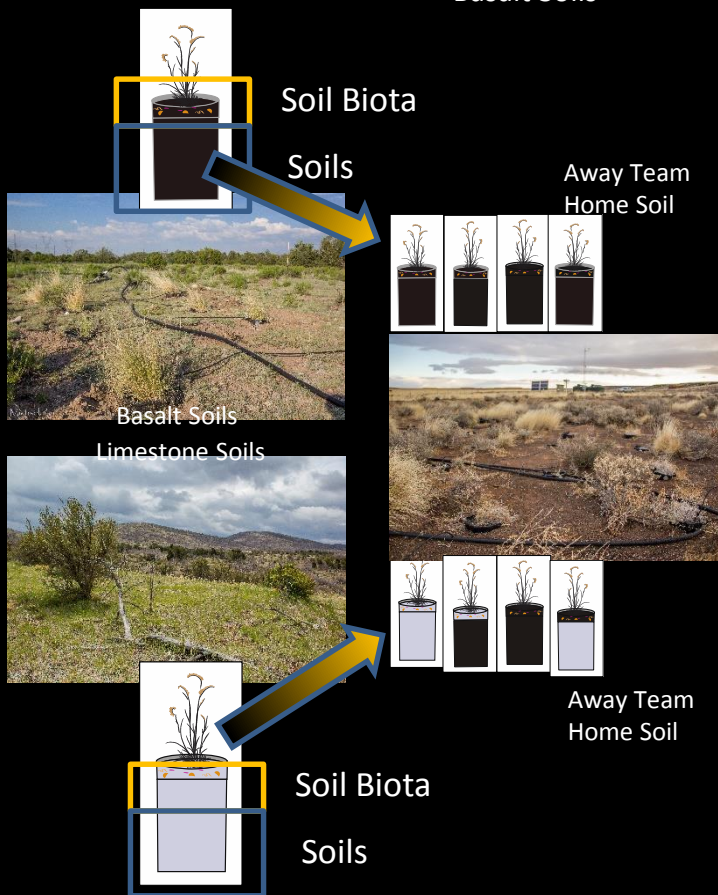
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Basalt Soils

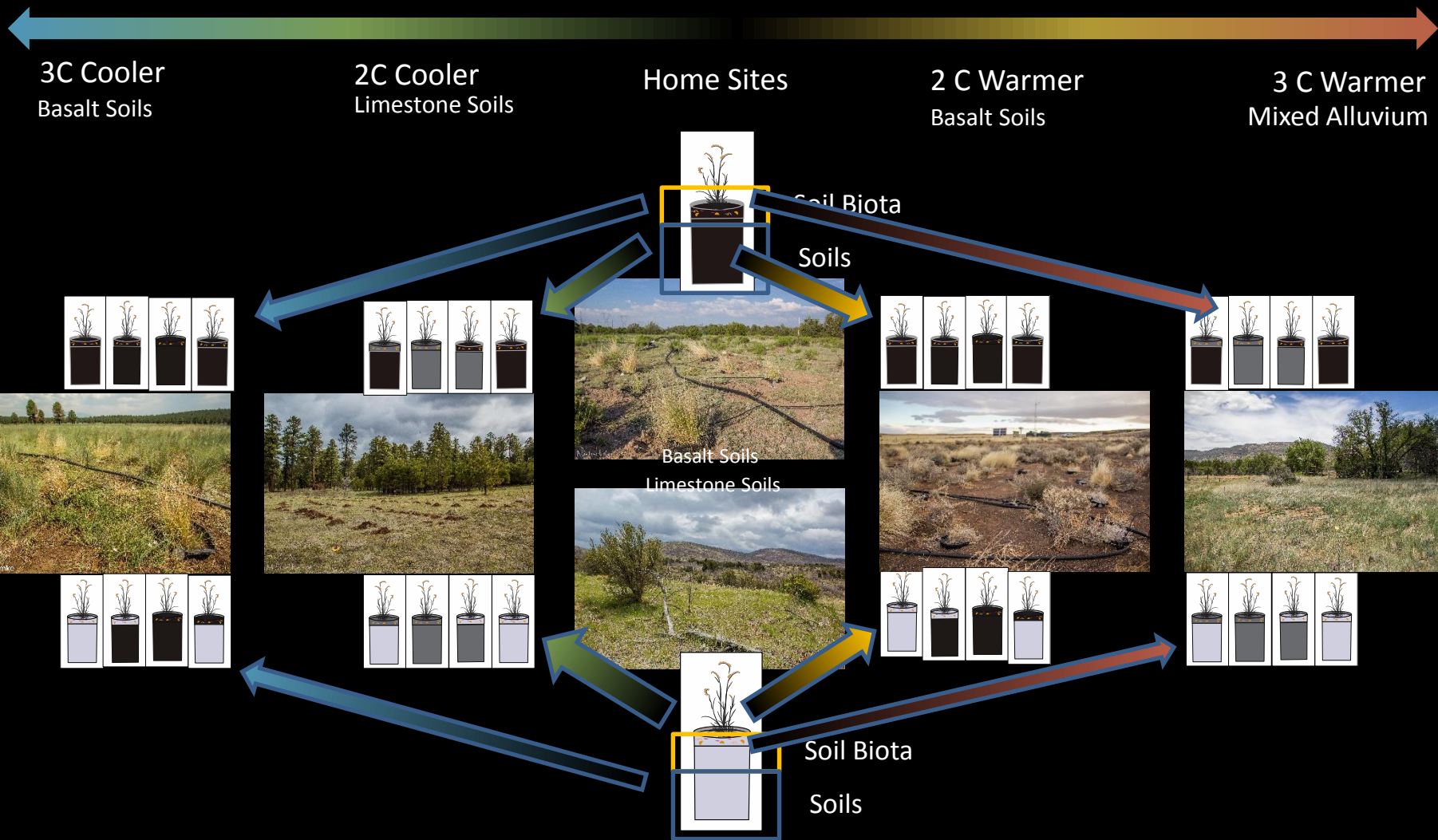
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Home Sites

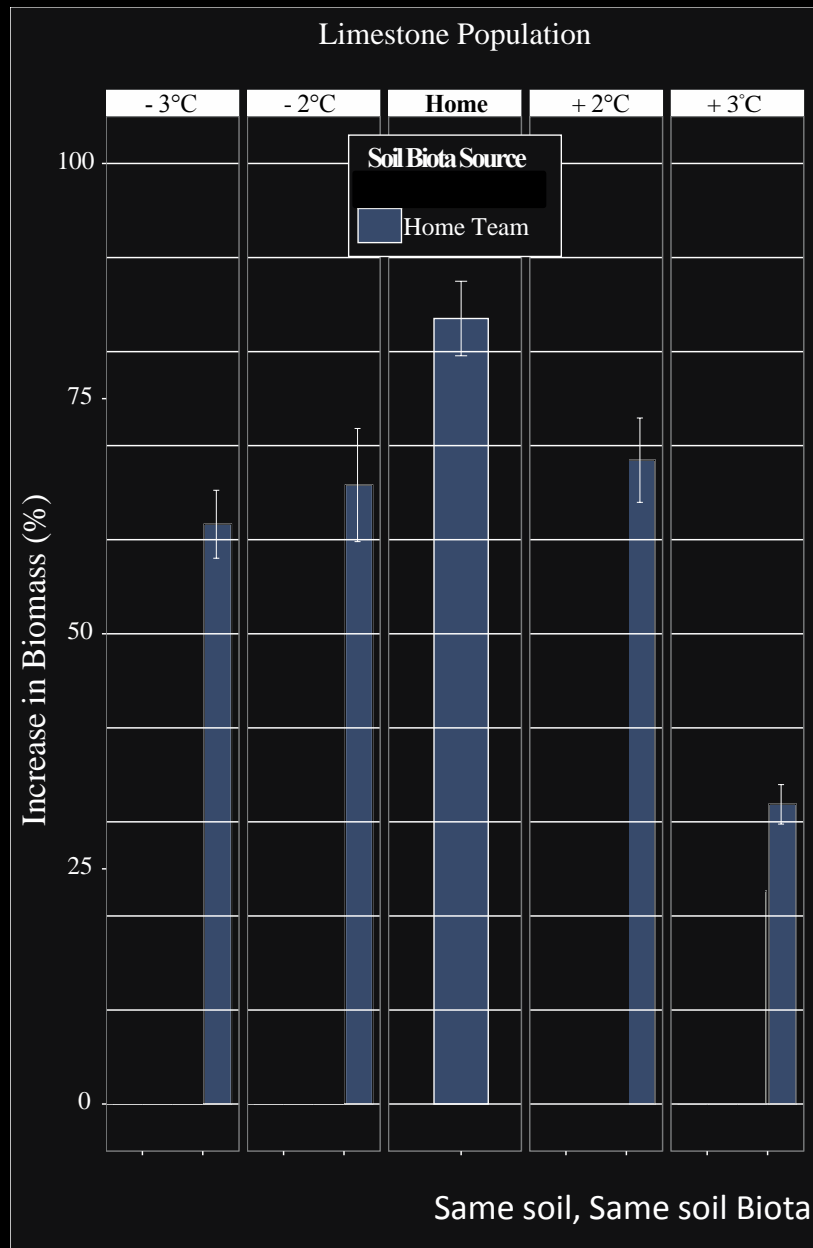
2 C Warmer
Basalt Soils

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Climate Matters.....



Home soil **not** consistently better

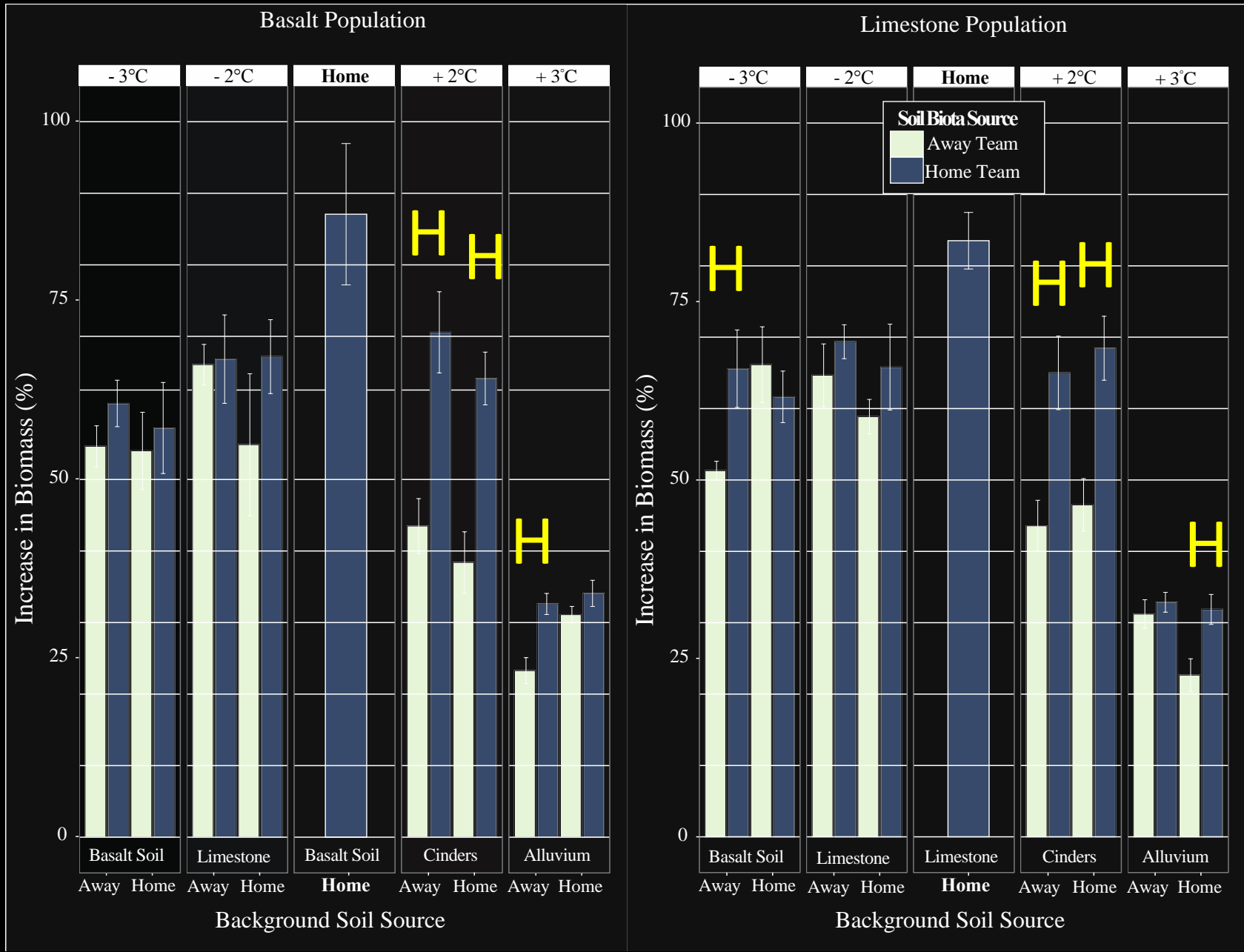
All of these outcomes were observed:

No preference

Preference for home soil

Preference for away soil

Home team effects are common!



Concluding thought darts

Seed transfer zones may be OK without soil data
(for one species anyway)...yay!

With CPNPP support, we're testing in *Pleuraphis jamesii*

If a general pattern, maybe **home team** soil
biota in seed coats is the key to operationalize

Home soil **not** consistently better

