Searching for appropriate seed sources to use in restoration

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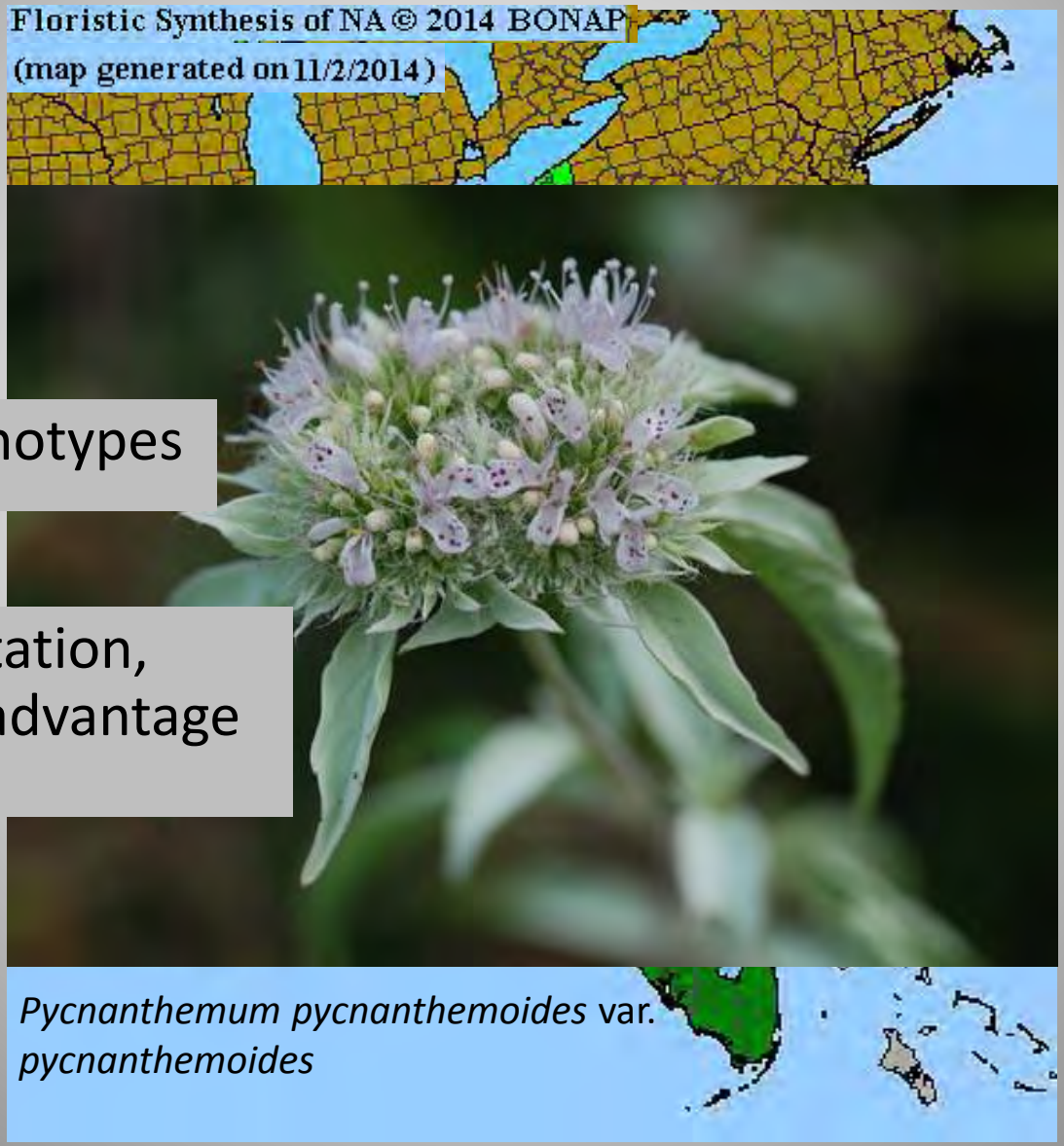
Species is a species is a species?

- Non-local genotypes

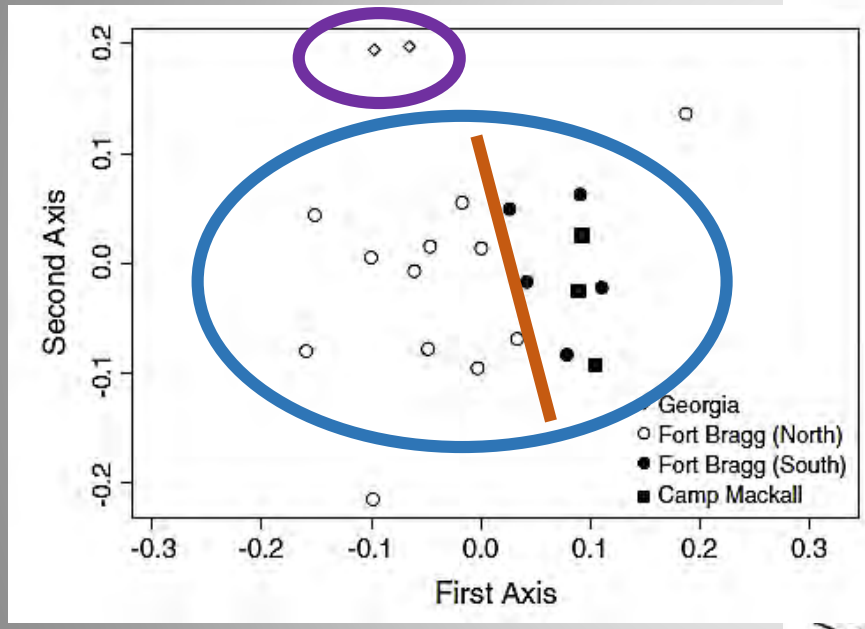
- Local adaptation, home site advantage = ecotype

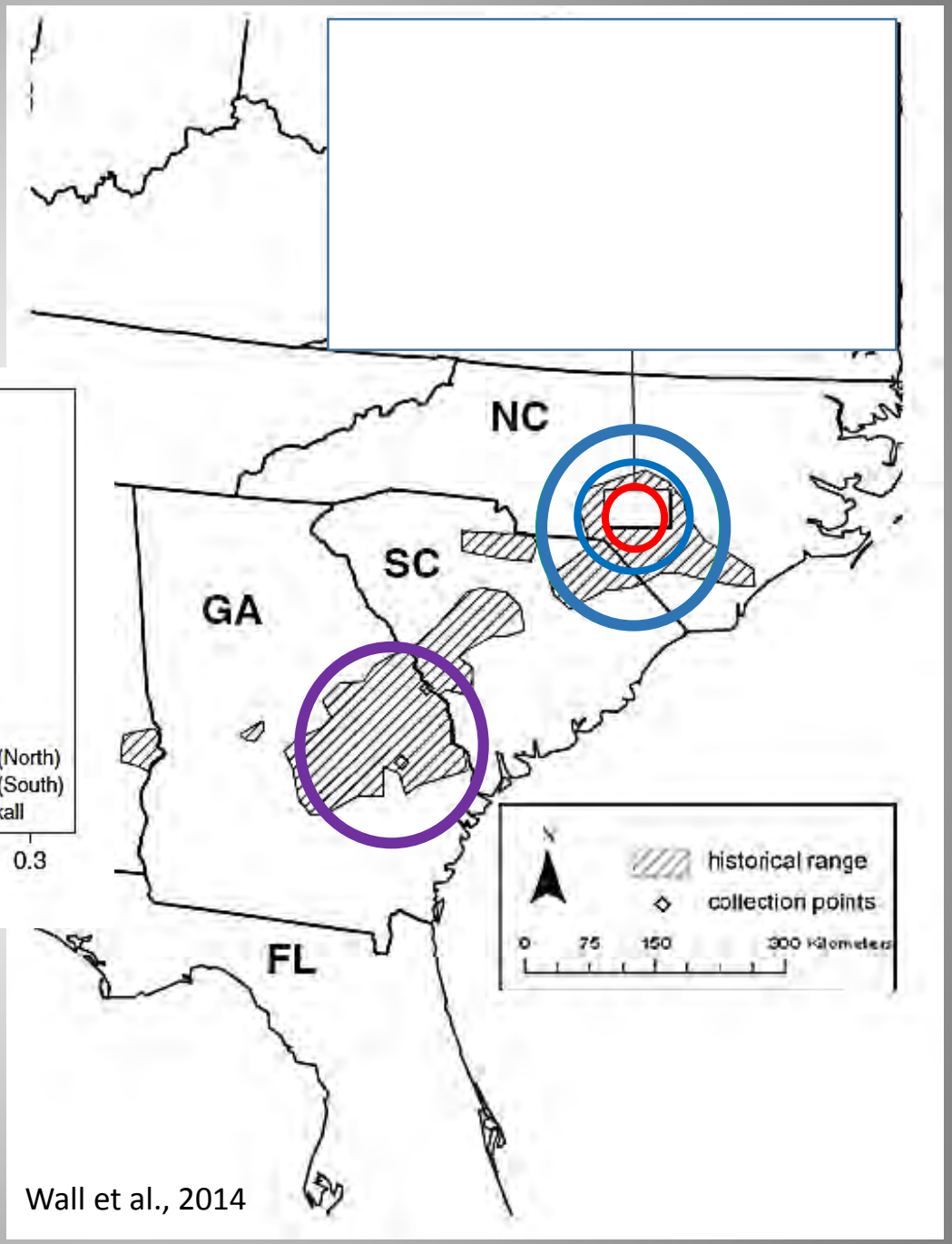


Pycnanthemum pycnanthemoides var. *pycnanthemoides*

Do ecotypes matter?

Power in proximity?





Wall et al., 2014


Atlantic Ocean
Gulf of Mexico
Charleston
Richmond
Norfolk
Raleigh
Wilmington
Columbia
Charlotte
Greenville
Spartanburg
Atlanta
Birmingham
Montgomery
Memphis
Nashville
Knoxville
Chattanooga
Huntsville
Jackson
Tuscaloosa
Mobile
Baton Rouge
Tallahassee
Jacksonville
Gainesville
Orlando
Tampa
45 Piedmont
45a Southern Inner Piedmont
45b Southern Outer Piedmont
45c Carolina Slate Belt
45d Talladega Upland
45e Northern Inner Piedmont
45f Northern Outer Piedmont
45g Triassic Basins
45h Pine Mountain Ridges
45i Kings Mountain
63 Middle Atlantic Coastal Plain
63b Chesapeake Pamlico Lowlands and Tidal Marshes
63c Swamps and Peatlands
63d Virginian Barrier Islands and Coastal Marshes
63e Mid-Atlantic Flatwoods
63g Carolinian Barrier Islands and Coastal Marshes
63h Carolina Flatwoods
63n Mid-Atlantic Floodplains and Low Terraces
65 Southeastern Plains
65a Blackland Prairie
65b Flatwoods/Blackland Prairie Margin
65c Sand Hills
65d Southern Hilly Gulf Coastal Plain
65e Northern Hilly Gulf Coastal Plain
65f Southern Pine Plains and Hills
65g Dougherty Plain
65h Tifton Upland
65i Fall Line Hills
65j Transition Hills
65k Coastal Plain Red Uplands
65l Atlantic Southern Loam Plains
65m Rolling Coastal Plain
65n Talladenian Hills/Pinelands Limestone
65p Southeastern Floodplains and Low Terraces
65q Bottomland Lime Hills
65r Jackson Prairie
66 Blue Ridge
66c New River Plateau
66d Southern Crystalline Ridges and Mountains
66e Southern Sedimentary Ridges
66f Limestone Valleys and Coves
66g Southern Metasedimentary Mountains
66i High Mountains
66j Broad Basins
66k Amphibolite Mountains
66l Eastern Blue Ridge Foothills
66m Saurattown Mountains
67 Ridge and Valley
67f Southern Limestone/Dolomite Valleys and Low Rolling Hills
67g Southern Shale Valleys
67h Southern Sandstone Ridges
67i Southern Dissected Ridges and Knobs
68 Southwestern Appalachians
68a Cumberland Plateau
68b Sequatchie Valley
68c Plateau Escarpment
68d Southern Table Plateaus
68e Dissected Plateau
68f Hazle Hills
69 Central Appalachians
69d Dissected Appalachian Plateau
69e Cumberland Mountain Thrust Block
70 Western Allegheny Plateau
70h Monongahela Transition Zone
70d Kenova-Lower Scioto Dissected Plateau
70f Ohio/Kentucky Carboniferous Plateau
70g Northern Forested Plateau Escarpment
70h Carter Hills
71 Interior Plateau
71a Crawford-Mammoth Cave Uplands
71b Mitchell Plain
71c Knobs-Norman Upland
71d Outer Bluegrass
71e Western Pennyroyal Karst Plain
71f Western Highland Rim
71g Eastern Highland Rim
71h Outer Nashville Basin
71i Inner Nashville Basin
71j Little Mountain
71k Hills of the Bluegrass
71l Inner Bluegrass
72 Interior River Lowland
72a Wabash-Ohio Bottomlands
72c Green River Southern Wabash Lowlands
72h Caseyville Hills
73 Mississippi Alluvial Plain
73a Northern Holocene Meander Belts
73b Northern Pleistocene Valley Trains
73d Northern Backswamps
73k Southern Holocene Meander Belts
73m Southern Backswamps
74 Mississippi Valley Loess Plains
74a Bluff Hills
74b Loess Plains
74c Southern Rolling Plains
75 Southern Coastal Plain
75a Gulf Coast Flatwoods
75b Southwestern Florida Flatwoods
75c Central Florida Ridge and Uplands
75d Eastern Florida Flatwoods
75e Okefenokee Plain
75f Sea Island Flatwoods
75g Okefenokee Swamps
75h Bacon Terraces
75i Floodplains and Low Terraces
75j Sea Islands/Coastal Marsh
75k Gulf Barrier Islands and Coastal Marshes
75l Big Bend Coastal Marsh
76 Southern Florida Coastal Plain
76a Everglades
76b Big Cypress
76c Miami Ridge/Atlantic Coastal Strip
76d Southern Coast and Islands
Status of Ecoregion Revisions and Subdivision Projects as of December 2004
Complete
Draft
In progress
Planned
ECOLOGICAL REGIONS OF NORTH AMERICA
LEVEL I
LEVEL II
The names and identification numbers for level I and II ecological regions are given in CEC 1997.
Level III Ecoregions of the Conterminous United States
Level III Boundary
Level IV Boundary
State Boundary
County Boundary
SCALE 1:2 000 000
Albers Equal Area Projection

Ecotypes affect multiple trophic levels

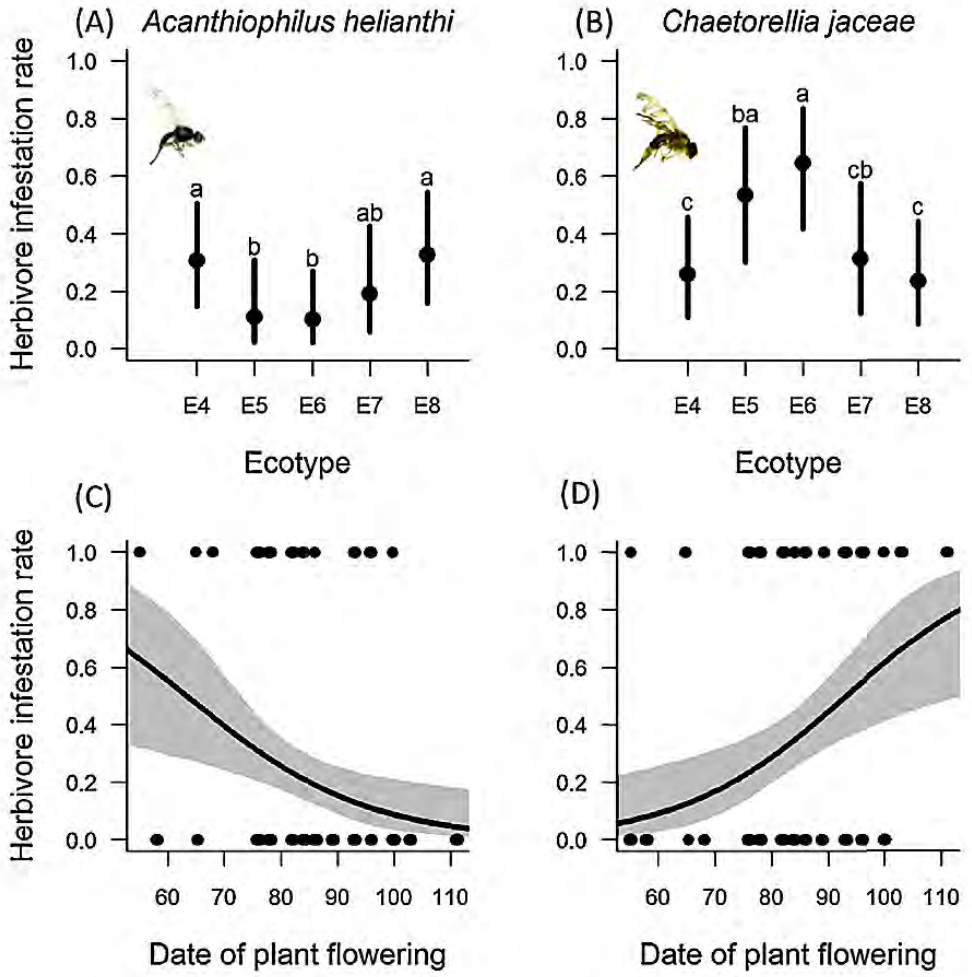


Fig. 2. Frequencies of two flower head herbivores, the tephritid flies *Acanthiophilus helianthi* and *Chaetorellia jaceae*, in five different ecotypes (E4–E8) of *Centaurea jacea* when grown in the Tübingen common garden. (A) and (B) show the estimated mean infestation rates (whiskers: credible intervals) of each ecotype, (C) and (D) the cross-ecotype relationships between plant phenology and herbivore infestation rates.

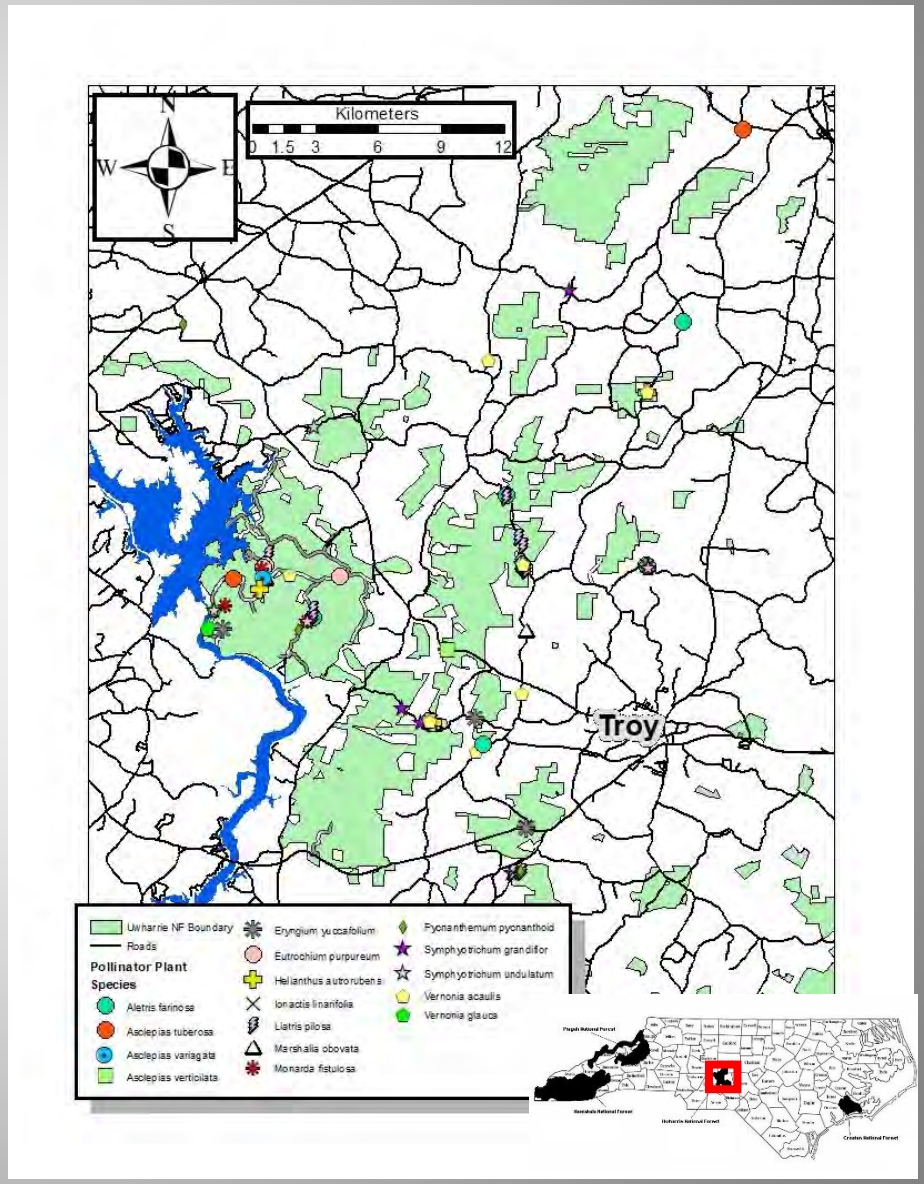
Bucharova et al., 2016

Applying idea to conservation action

Common recommendations

Adapted from (McKay, Christian, Harrison, & Rice, 2005)

- Collect locally if possible
  - And from multiple populations and individuals/maximize diversity
- Match climate and environmental conditions
- Minimize artificial selection in seed increase
- Determine breeding system and ploidy levels



Finding local seed sources

- Use of existing data networks and area expertise
- What other resources can be developed?
  - Searchable fields in existing databases…

iNaturalist

SERNEC
Southeast Regional Network of Expertise and Collections

Increasing seed for restoration

- Trials, protocols and increase
- Finding local producers
- And local botanical professionals!

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