Thinking beyond the garden: How the Santa Barbara Botanic Garden addresses invasive plants via horticulture, education and research

Heather Schneider, PhD
Rare Plant Biologist

Santa Barbara Botanic the GARDEN

What has the role of botanic gardens been?

- Studying medicinal plants
- Introduction, cultivation, dissemination of important crops
- Exploration and documentation of plant diversity
- Development of horticultural cultivars
- Enjoyment of botanical beauty

How has the role of botanic gardens evolved?

"In the 21st century, botanic gardens are challenged to address issues that extend beyond the garden walls by placing social and environmental responsibility as key mission drivers" (Krishnan & Novy 2016)

- Public education
- Conservation
  - *Ex-situ*
  - *In-situ*
- Restoration
- Research

Santa Barbara Botanic Garden

We specialize in California native plants

We address invasive plants via:

- Horticulture
- Education
- **Conservation & Research**

Horticulture

- Integrated pest management
- Sale of native alternatives to invasive landscaping plants
- Growing natives for restoration

Education

- California Naturalist Certification
  - Education about invasive species
  - Training in invasive species monitoring
- Xstream science
  - Engages teens in science
  - Weed pull project with restoration planting
- Guest lectures for the public
- Plant Right and Cal-IPC brochures
- Future: iNaturalist project to track invasive plants in Santa Barbara

Conservation & Research

- Herbarium
  - Documenting the arrival spread of invasive species
- Research & Conservation
  - San Nicolas Island
  - Salt marsh bird's beak
  - Burton Mesa Ecological Reserve invasive plant management plan
  - Los Padres National Forest weed and rare plant mapping

San Nicolas Island Study


Dr. Denise Knapp

- Question: What is the impact of *Mesembryanthemum crystallinum* (MECR) on native arthropod diversity on SNI?

- Objectives:
  - Reduce MECR cover
  - Increase native cover & diversity
  - Increase biological soil crust cover
  - Benefit higher trophic levels (arthropods, foxes, etc.)

San N
Sandy

- 61 m
- 14,00
- US Na


Invasive *Mesembryanthemum crystallinum*, everywhere, starting ~1898


And yet: endemic plants, rare habitat remain and there are areas of intact soil crust

Eriogonum grande var. *timorum*

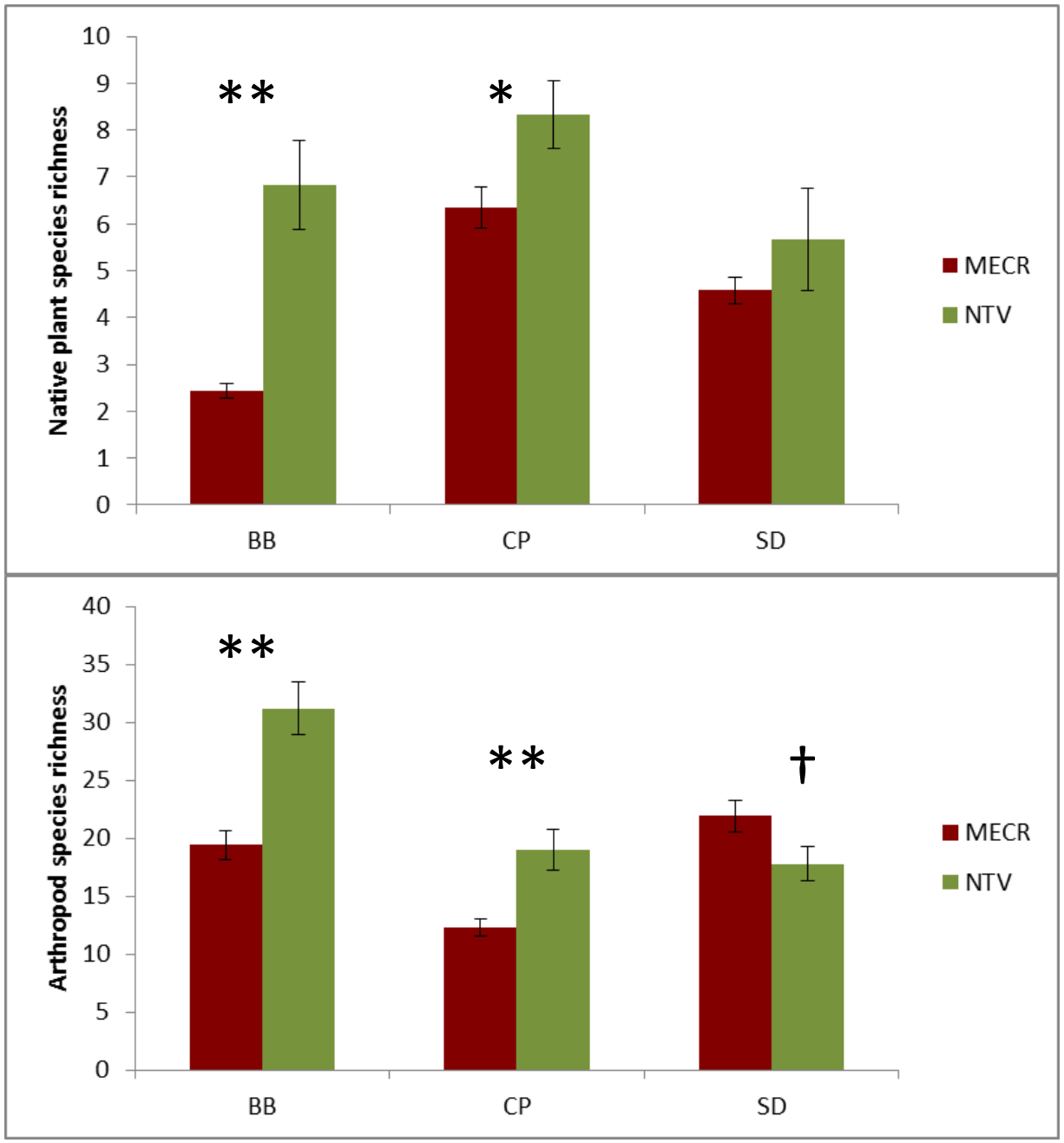
Dudleya virens ssp. *insularis*

Soil crust

Soil seed bank

42 plots at each of 4 sites formed a gradient of MECR cover

% cover surveys



Native plant richness lower in MECR at 2/3 sites

Arthropod richness lower in MECR at 2/3 sites

Restoration Experiment: Fall 2016

- Grow (water)-kill (hoe) MECR and hydroseed
- Grow-kill MECR, no hydroseed
- Herbicide MECR and hydroseed
- Herbicide MECR, no hydroseed
- No MECR treatment, with hydroseeding
- No MECR treatment, no hydroseed

Hydroseeder: Turbo-Turf HS 50-M

Note: A parallel experiment by Northern Arizona University will investigate biological soil crust restoration

Preliminary Results:

Both methods killed MECR.

Still too early to say on the natives…

Effects of European sea lavender on salt marsh bird's beak at Carpinteria salt marsh

Chloropyron maritimum ssp. *maritimum*

Long-horned bee

Wool carder bee

Limonium duriusculum

Horticulture + Education/Outreach + Research

- Botanic gardens are increasingly becoming places of conservation & restoration
- SBBG addresses invasives at all levels, but especially via research and management in local conservation areas
- Botanic gardens can be allies in the fight against invasive species