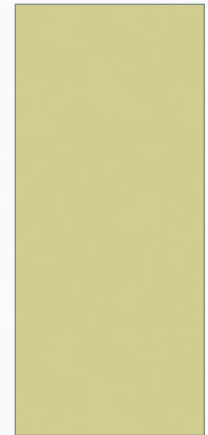


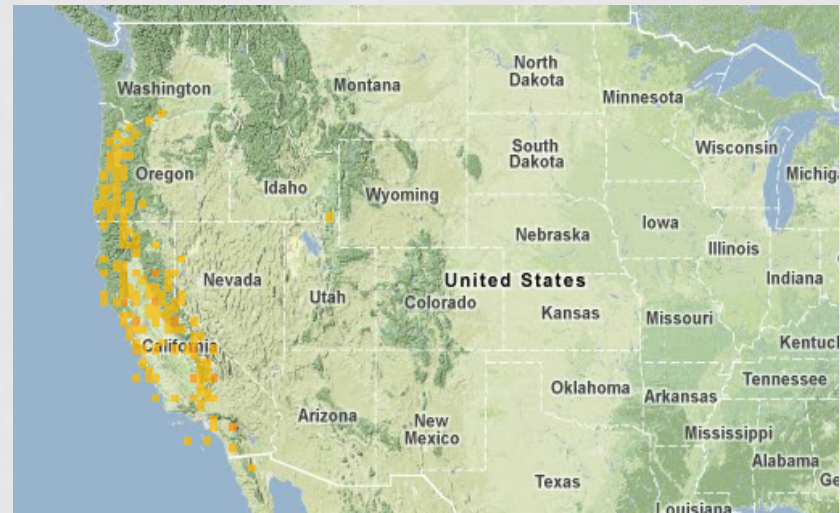
**An Initial Exploration into the
Horticultural Potential of *Madia
elegans ssp. vernalis***

Andy Petran



TAXONOMY AND RANGE

- *Madia elegans*
- Common name: Common Madia
- Member of *Asteraceae* family
- Also known as the Common Tarweed
- Has many subspecies, including *densiflora*, *vernalis* and *wheeleri*



- Can be found throughout California, Nevada, Washington, Oregon and Idaho
- Not present > 3500m

TAXONOMIC DESCRIPTION

- Annual herb, 1-2.5 dm tall, strongly scented
- Leaves 2-10 cm long, linear, entire to serrate
- Floral heads 5-21 yellow ray flowers and 25-30 yellow or maroon disk flowers with yellow or black anthers
- 2.5-5 mm fruits are black or dark brown achenes, sometimes mottled, and compressed or 3-angled



NATIVE HABITAT AND USES

- Found most predominantly in San Joaquin Valley
 - Semiarid climate with hot, dry summers and up to 8 inches of precipitation annually
- Very drought tolerant crop
- Common Madia seeds have been used by the Hupa, Cahuilla, Digueño, Chumash, Costanoan, Kawaiisu, and Maidu tribes in California to make pinole
- Tribes would burn stretches of land to harvest the burnt seed, where it would be stored and eventually ground into flour



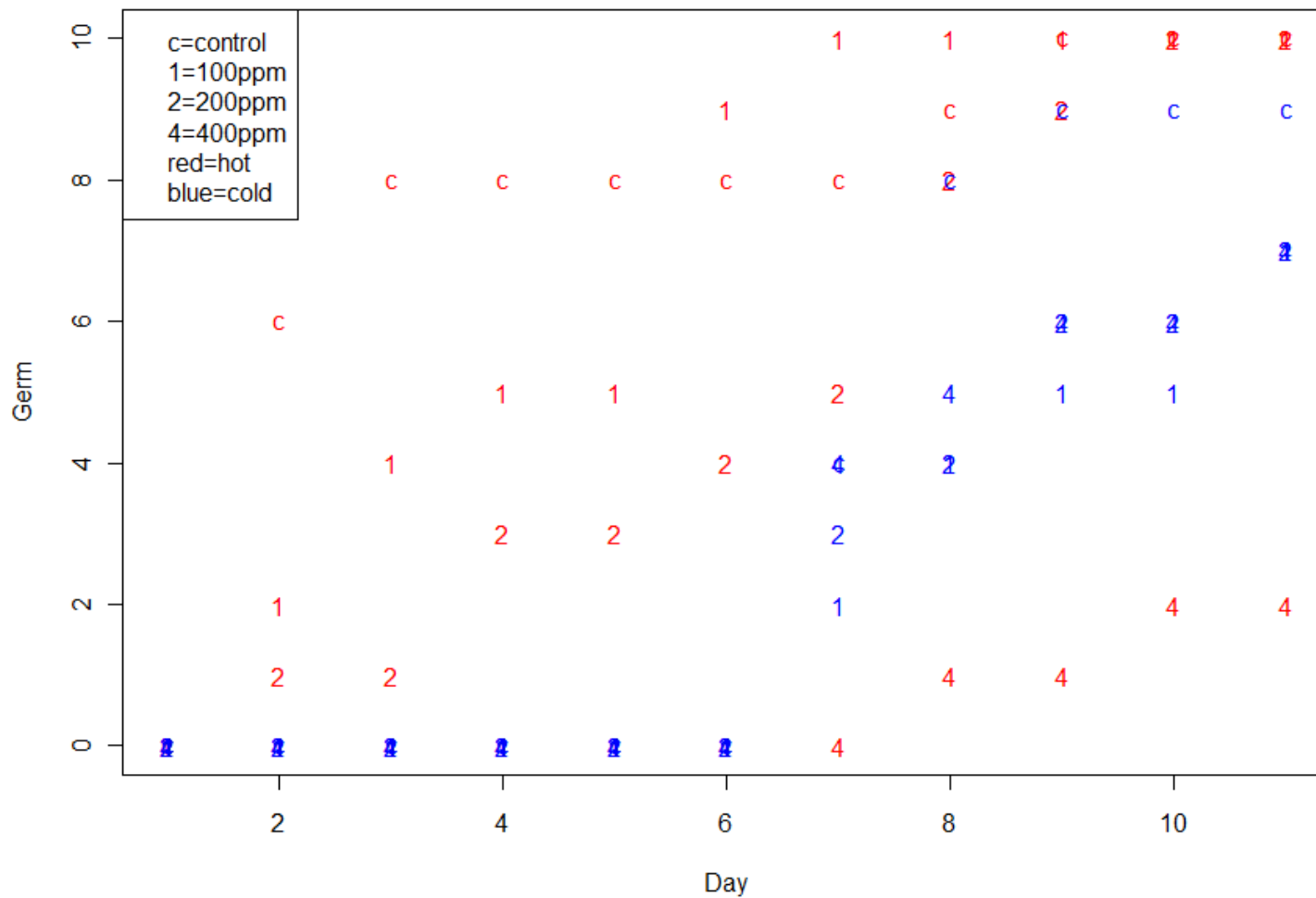
GERMINATION EXPERIMENTS

- Sowed 72 seeds into mist house B-2 and 72 more into HORT 5051 Plant Cooler
 - Is cold strat needed?
- Took weekly germination counts
- Results: 'warm seeds' 38% 7-day germination, 60% 14-day germination and 100% 21-day germination
 - All stage 4 by week 3
- 'Cold seeds' week 1- 0%, week 2- 26%, week 3- 61%
 - No seeds past stage 1
- Brought to mist house after week 3, after one day 79% of the seeds were germinated in stage 2
- No more seeds germinated after that time
- Cold stratification not needed

GA GERMINATION

- Common Madia seeds were soaked in 400, 200, 100 and 0 ppm solutions of GA
- Two treatments of each concentration, one in 21 C conditions and one in 4 C conditions
- Germination counts taken for 11 days

GA Effect on Germination of Hot and Cold Treated M.elegans

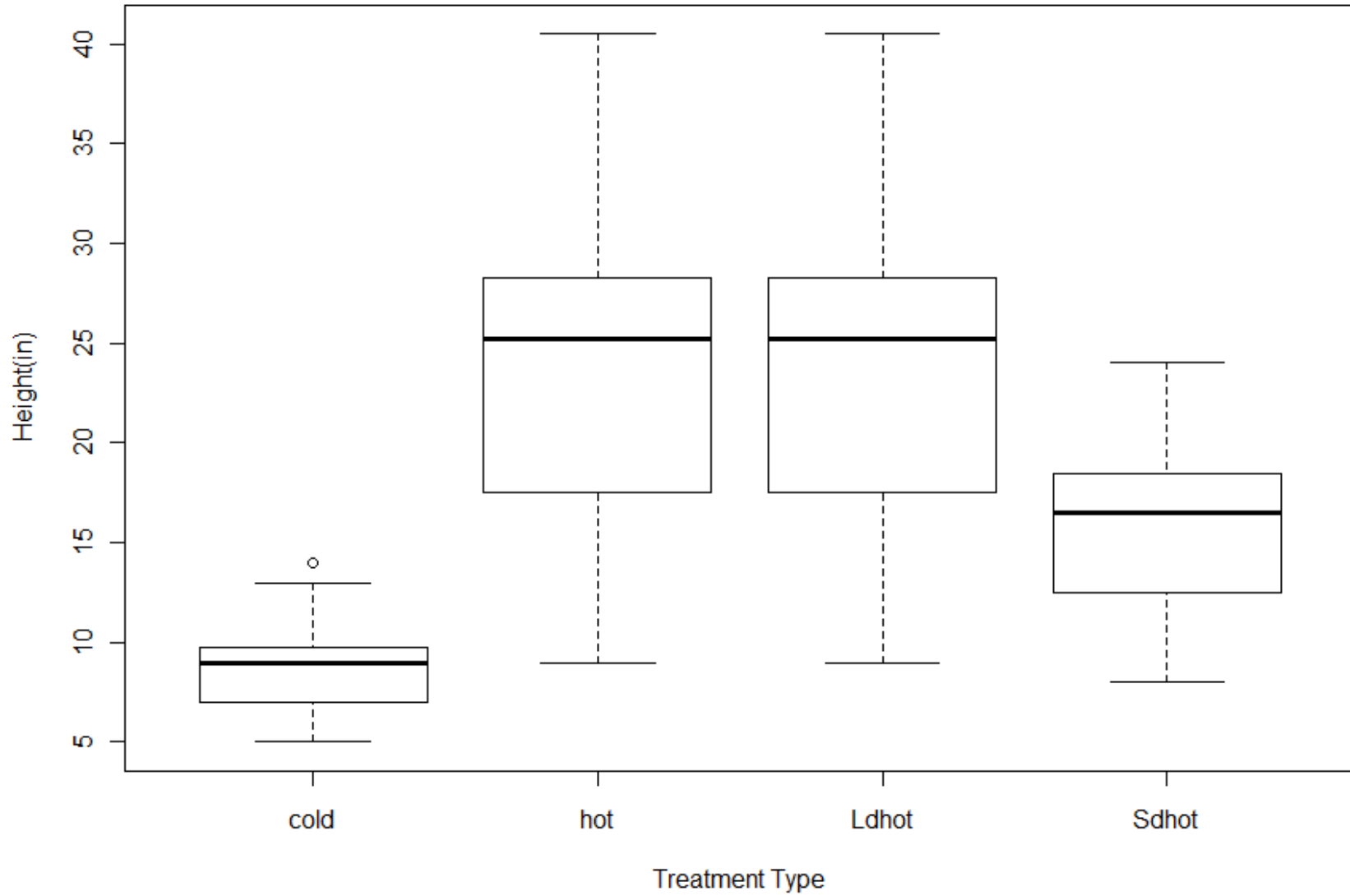


PLANT HEIGHT EXPERIMENT

- Mature plant height was compared of plants initially germinated at different temperatures and grown under short and long day lengths
- \bar{x} 'Hot' = 24 inches
- \bar{x} 'Cold' = 8 inches
 - $p = 1.306034e-10$
- \bar{X} 'LD' = 24 inches
- \bar{x} 'SD' = 18 inches
 - $p = 0.8562681$

M.elegans

Height Based on Temperature and Daylength Treatments

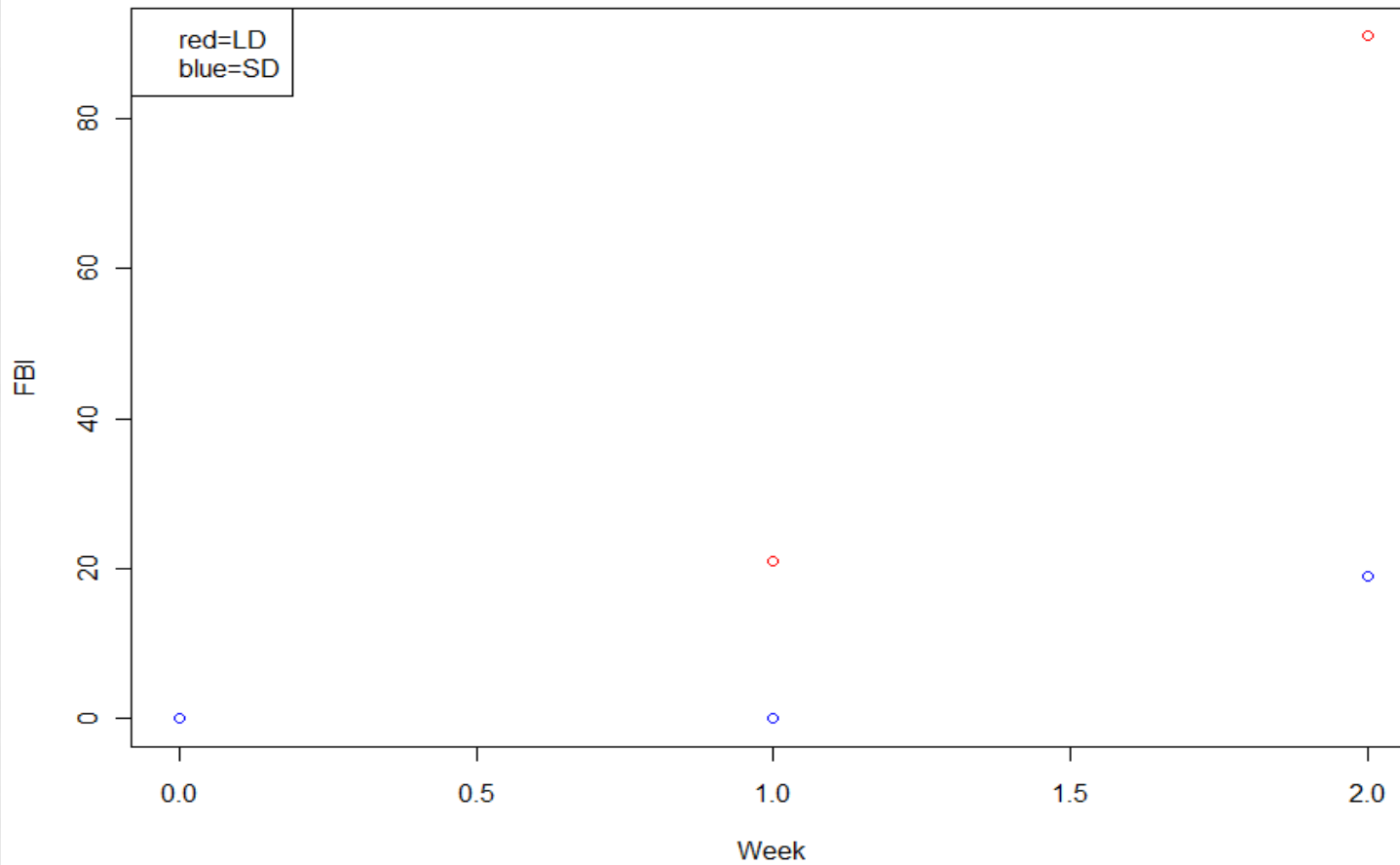




FBI EXPERIMENT

- 41 days after initial sowing, 'Hot' treated *M. elegans* were split into 'LD' and 'SD' groups
- No FBI was present at this time
- Purpose to determine photoperiod requirements on flowering

Photoperiod Effect on FBI of M.elegans



- By week 3 LD FBI= 91, SD FBI= 19
- Initial conclusion- Facultative Long Day

BREEDING TRIALS

- 6 plants were chosen based off of differing morphological characteristics to undergo initial breeding trials
 - plant Height, flower color, stem diameter
- Plants have yet to set seed at this time, so compatibility cannot yet be determined

EXPERIMENTAL CONCLUSIONS

- No seed dormancy period to overcome,
- Scarification is unnecessary
- GA treatments inhibit rather than expedite germination
- Germination temperature is dependent upon desired height of mature plants
- FBI is facultative long day
- Self-compatibility yet to be determined



PRODUCTION SCHEDULE

	Week 1	Week 2	Week 3	Week 4
Madia elegans ssp. vernalis- Normal size	Sow into 288 plug tray, cover with coarse vermiculite, place in misthouse, 70 degrees F	take germination count	Remove from misthouse, place on capillary mat in LD greenhouse, 65 degrees F, early morning DIF to 50 degrees F if possible	Transplant 1 plant/ 4" pot, CLF at 15-5-15 with Calcium and Magnesium
Madia elegans ssp. vernalis- 'Dwarf' size	Sow into 288 plug tray, irrigate thoroughly, cover with coarse vermiculite and moisture lid, place in 4 degrees C cooler	take germination count		Remove from cooler, place on capillary mat in LD greenhouse, 65 degrees F, early morning DIF to 50 degrees F if possible
Week 5	Week 6	Week 7		
Apply PGR if transportation requirement is less than 24 inches mature size	FBI	Plants should be flowering and at saleable size		
Transplant 1 plant/ 4" pot, CLF at 15-5-15 with Calcium and Magnesium	FBI	Plants should be flowering and at saleable size		

No PGR data

MARKETING

- Drought tolerant mid to late Spring crop that flowers throughout the summer
- Because of its wild status, Common Madia would be ideal for gardeners attempting to mimic a native prairie/grassland landscape
- The strong aromatic oils present in the foliage and flowers can lend an added bonus to consumers- “Walking through a densely packed plot of Common Madias smells like strolling through a grove of lemon trees!”
- Cool germinated ‘dwarf’ Common Madias would make an attractive, manageable houseplant
- Warm germinated Common Madia should be sold in seed packets only, as their immense size would make shipping difficult and unprofitable

MARKETING FOR HOLIDAYS

- 4th of July- Bright, summer plant, the sunflower qualities are reminiscent of childhood summers, and the plant is native to the United States
 - “patriot plant for the patriot holiday”

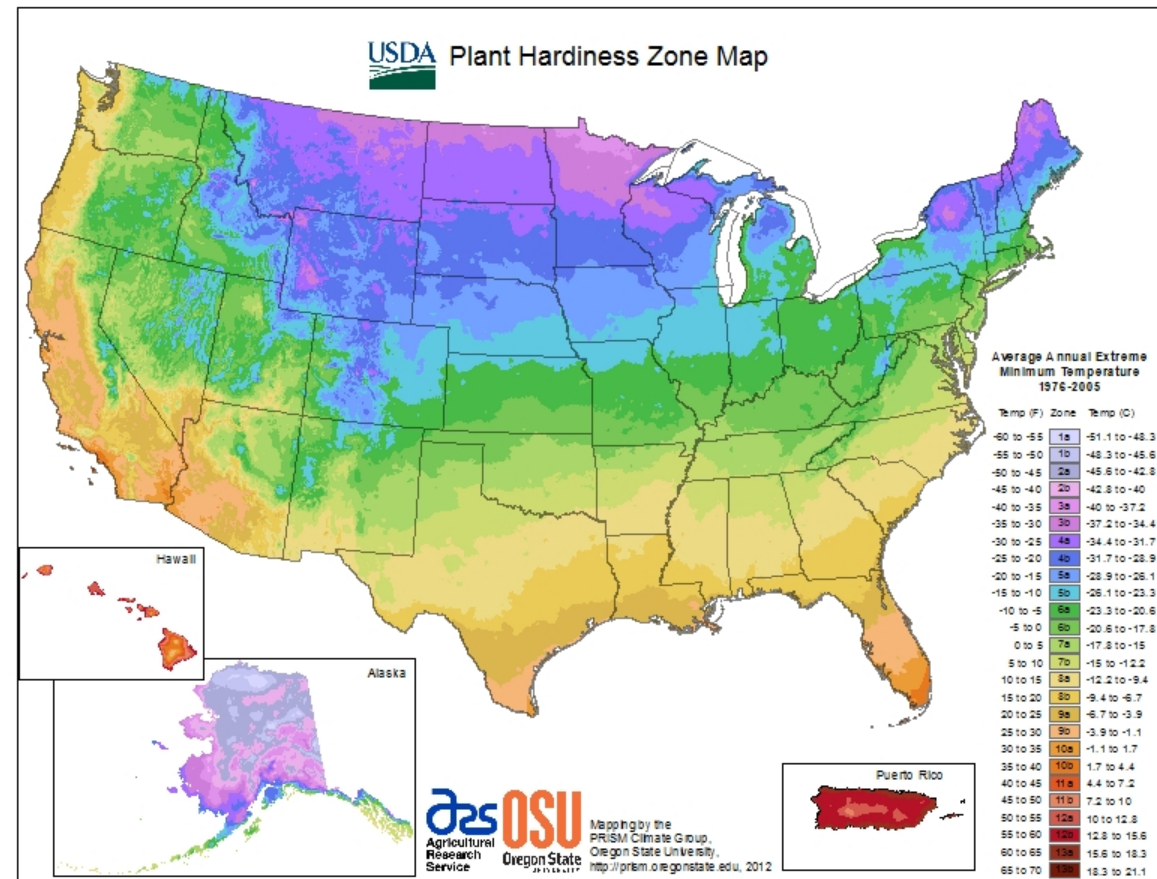


MARKETING FOR FOOD

- As a food crop, Common Madia seed packets can come with recipes for Pinole or other Native American traditional dishes that include Common Madia seeds
- Extend the crop's marketability into the Fall

CULTURAL REQUIREMENTS

- From it's native geographic range, we can initially assign Common Madia Winter Hardiness zone as 7a
 - Further research in determining it's maximum range is needed



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