

**"ARANA GULCH, Santa Cruz, California, the Four Tarplant Critical Habitat Areas-- Results of Box Tests of soil, counting weed seedlings sprouting from one square foot."**

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Soil samples from the top 3-4 inches, from four "Areas" in November 2, 2020 were put into one square foot wooden boxes and watered daily. As seedlings appeared, they were removed and counted until June 2021. No native seedlings appeared, only weed grasses and broadleaf weeds.

This is an "Ex-situ Box test" to sprout the dormant seeds in the soil from the four Areas, from November to June and watering daily. The weed seedlings came up in three separate phases-- October to January, March, and April. First to sprout were the Slender Wild oats, Broad-leaved filaree, Bromus mollis, Vulpia bromoides, and the broad-leaved weeds. Then, the Perennial ryegrass sprouted, and last was the Poa annua.

The broadleaf weeds were: Broadleaf filaree, bur clover, radish, red stem filaree, rose clover and wild geranium. A single lesser rattlesnake grass seedling came up in the Area A-2 soil.

These tests produced massive numbers of weed grasses, sprouting at the rate of one to 3.5 per square inch, and these plants were producing allelochemicals that have the action of suppressing native seeds from sprouting, and also inhibit and kill any native seedlings that are able to survive that initial allelochemical onslaught. See articles in the Journal of Chemical Ecology.

As a test of native seedling survival, in January, I planted 1/8 teaspoon of California poppy seeds in each box, and hundreds of poppy seedlings germinated, but none survived by April.

<b>AREAS</b>	<b>Weed grasses</b>	<b>Broadleaf weeds</b>
A-1	139	17
A-2	374	15
A-3	129	8
B	451	29
C	464	45
D	516	33

**Per square foot      Per square foot**

The natives present in these Areas and their soil samples, should have produced a few seedlings in these Ex-situ box tests--the Brome grass, Danthonia grass, Stipa grass, Blue Eyed grass, California poppies, Coastal tarplant and Santa Cruz tarplants. However, these natives are only concentrated in two areas--a few hundred square feet in Area B and only 0.75 acre of Area A--and are mostly missing from 99% of the entire Arana Gulch Coastal Prairie acreage.

Since the weed grasses that sprouted in all of the Ex-situ box tests are all annuals in unirrigated sites in California--by cutting the seed heads off when the seeds are immature,

and mow once a month to one foot tall, stops their reproduction and removed their seeds from the soil seed-bank rapidly. The one-foot height protects native seedlings underneath.

Once the weed grass seeds are removed from the soil seed-bank, the broadleaf weeds will flourish--then each of those broadleaf weeds in turn will need to be mowed to keep them from producing any more viable seeds.



**Area A conditions when soil samples taken November 2, 2020, severely overgrazed during a drought. Only a single tarplant survived on the entire 70 acre Arana Gulch Coastal Prairie meadow area, when in the 1980s, 100,000 tarplants grew there in four populations.**



**Weed seedlings sprouting in less than 2 weeks, on November 15, 2020.**



**January 2021, the sown 1/8 teaspoon of California poppy seeds** producing hundreds of seedlings in each of the one square foot Ex-Situ Test Box. Sawdust added as organic mulch.



**Mid-March 2021, all of the Ex-Situ Test boxes** were full of hundreds of weed grass seedlings, at the rate of one to 3.5 per square inch. The poppy seedlings did not survive that massive amount of allelochemicals, produced by hundreds of weed seedlings.



**Along with the allelochemicals** being produced by the massive amount of weed grasses growing in a single square foot--were the effects of shading and the robbing of moisture and soil nutrients from the California poppy seedlings -- adding their own contributions to kill the poppy seedlings over time.



**One of the worst grasses was *Vulpia bromoides*** in the soil from Areas C and D, sprouting at 400-450 seedlings per square foot! Fortunately, was largely absent from Area A soil, but Area B soil produced 215 plants. This plant shows, that successful efforts could be made to reintroduce the native *Vulpia microstachys*, to replace this introduced species over time.