

Seabeach Amaranth Seed Sowing Protocol



Sea Girt National Guard Training Facility
2019



Prepared By:

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Stockton University Environmental Internship Program



Introduction

Seabeach Amaranth (*Amaranthus pumilus*) is a federally threatened plant species native to New Jersey. It grows in open sandy beachfronts along the Atlantic coast. Habitat destruction and alteration, such as grooming beachfronts for recreational use, are the primary threats to this species. Seabeach amaranth is also intolerant to overcrowding by other native and non-native plant species, and can be easily displaced by fast growing competitors such as the invasive Asiatic Sand Sedge (*Carex kobomugi*).

The Department of Military and Veterans Affairs, with cooperation from the Stockton University Environmental Internship Program (SUEIP) and the United States Fish and Wildlife Service (USFWS) will conduct an experimental growing season at the Sea Girt National guard Training Facility. The Northern and Southern Protection Areas (NPA and SPA) of the beachfront will serve as experimental plots for determining the effectiveness of three different seed sowing methods:

1. Casting – seeds deposited on the surface, not covered
2. Cast and Cover – seeds deposited on the surface, then covered with sand
3. Seed Planting – seeds placed in depressions 1cm deep, then covered with sand

Methods for each sowing method are included below. Results from this experiment will be used to determine which of the three sowing methods, if any, are most effective and practical for planting in the future. Seeds will be provided by Wendy Walsh from the USFWS.

Important parameters:

1. Experimental plots must not be established near previously documented amaranth locations to avoid any pre-existing seedbanks that could skew trial results.
2. Experimental plots must not be established near previously documented Asiatic Sand Sedge locations, as uprooting of regenerating sand sedge could disrupt the conditions of the plot.
3. Experimental Plots must not be established in the vegetation thinning area.
4. Wind at this beachfront typically blows in a S, SW, or SE direction. Experimental plots should be arranged in an East – West direction to avoid potential seed distribution between experimental plots.
5. E-W plots should not be located more than 5m from each other.
6. N-S plot rows should not be located more than 15m from each other.
7. Each plot will receive the same number of seeds, regardless of the sowing method.
8. Plot arrangement should be staggered, as shown in Figure SG1 to avoid any bias in regards to location or conditions.

9. The persistent winds at the Sea Girt facility, as well as the low density of the amaranth seeds could pose experimental challenges due to seeds dispersing out of the experimental plots. Weather conditions, including wind speed and direction should be documented at the time of planting. If wind conditions prove to be an issue, perhaps a cold stratification/post-germination planting method should be implemented in future years.
10. An additional 9 plots will be designated as “Control” plots. These plots will not receive any treatment or planting.

Methods

Plot Establishment and Seed Sowing

1. Back-navigate to documented sand sedge and amaranth locations using historical location data. Flag these locations so they can be avoided when establishing the experimental plots.
2. Starting at the north end of the NPA, establish the first E-W plot line, as shown in Figure SG2, spacing each plot at least 5m apart.

Establishing a Plot

- A. Using Orange flags, mark the boundaries of a 2m x 2m square.
 - B. Write the plot number on the flag with a permanent marker.
 - C. Record the number, coordinates, planting method, and other notes on “Datasheet A: Seabeach Amaranth Experimental Plot - Sowing” (see attached).
3. After the first E-W plot line has been established, fill a sample bag with surface sand for grain size and moisture content analysis. Label the bag with the Plot number.
 4. Sow the seeds with the assigned planting method according to Table 1: Assigned Sowing Method.

Casting – Gently cast 30 seeds into the plot area, with an attempt to distribute them evenly throughout the plot area. Do not cover.

Cast and Cover - Gently cast 30 seeds into the plot area, with an attempt to distribute them evenly throughout the plot area. Using a gentle kicking motion, kick sand from outside of the plot area to evenly cover

(approximately 1cm deep) the sown seeds inside of the plot area, being careful not to move the seeds out of the plot area in the process.

Planting – Make 15 depressions in the sand, evenly spaced (at least 10 inches apart) in the established plot area. Place a white flag 2 inches East (toward the ocean) of each depression to mark its location. Place 2 seeds in each depression, then gently fill the depression with sand.

Control – No seeds. This plot will remain unaltered.

Table 1: Assigned Sowing Method

Protection Area	Plot Line	Plot #	Planting Method	# of Seeds Sown
SPA	9	9A	CAST	30
SPA	9	9B	PLANT	30
SPA	9	9C	CAST & COVER	30
SPA	8	8A	PLANT	30
SPA	8	8B	CAST & COVER	30
SPA	8	8C	CAST	30
SPA	7	7A	CAST & COVER	30
SPA	7	7B	CAST	30
SPA	7	7C	PLANT	30
NPA	6	6A	CAST	30
NPA	6	6B	PLANT	30
NPA	6	6C	CAST & COVER	30
NPA	5	5A	CAST & COVER	30
NPA	5	5B	CAST	30
NPA	5	5C	PLANT	30
NPA	4	4A	PLANT	30
NPA	4	4B	CAST & COVER	30
NPA	4	4C	CAST	30
SPA	3	3A	Control	0
SPA	3	3B	Control	0
SPA	3	3C	Control	0
NPA	2	2A	Control	0
NPA	2	2B	Control	0
NPA	2	2C	Control	0
NPA	1	1A	Control	0
NPA	1	1B	Control	0
NPA	1	1C	Control	0

- Continue to establish the remaining plot lines in the NPA and SPA, working North to South, spacing each plot line at least 15m apart.

Sample Analysis – Grain Size

1. Analyze the collected sand samples for grain size using dry sieving and roto-tapping lab methods.

Sample Analysis – Moisture Content

1. Record the sample ID and Collection Date on Datasheet C.
2. Using a permanent marker, label a drying oven tin with the Sample ID.
3. Weigh the tin, and record the tin mass on Datasheet C.
4. Empty the contents of the sample bag into a plastic bin.
5. Using a plastic spatula, mix the sand thoroughly.
6. Tare the drying tin.
7. Add 160-200g of sand to the tin and weigh immediately. Record the mass on Datasheet C.
8. Place the tin in the drying oven. Repeat steps 1-7 for each sample.
9. Record the Drying Date 1 and Drying Time 1 on Datasheet C.
10. Dry the samples at 105°C, periodically checking to make sure the temperature is still 105 C.
11. After 24 hrs, re-weigh each sample, recording the weight on Datasheet C (Drying Weight 2).
12. After 5 hrs, re-weigh each sample, recording the weight on Datasheet C (Drying Weight 3). If Drying Weight 3 is the same as Drying Weight 2, the sample is dry. If Drying Weight 3 is less than Drying Weight 2, continue to dry the sample until there is no change in mass.
13. Calculate Moisture Content:
$$(\text{Wet Mass} - \text{Dry Mass} / \text{Wet Mass}) * 100 = \% \text{ Moisture}$$
14. Monitor each plot bi-weekly throughout the growing season, collecting and analyzing additional sand samples. Document plot observations on the “Datasheet B: Seabeach Amaranth Experimental Plot – Bi-Weekly Monitoring” (see attached).

Materials Needed

For Sowing:

Seeds

Datasheet A

Table 1

Sample bags for sand collection

Measuring Tape – at least 15m

GPS

Historical amaranth and sand sedge location data – loaded on GPS

Camera

Clip Board, Pens, Pencils

For Bi-Weekly Monitoring:

Shovels and garbage bags – for uprooting sand sedge

Datasheet B

Sample bags for sand collection

Measuring Tape – at least 15m

GPS

Historical amaranth and sand sedge location data – loaded on GPS

Camera

Clip Board, Pens, Pencils









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SPA	8	8C	CAST	30
SPA	7	7A	CAST & COVER	30
SPA	7	7B	CAST	30
SPA	7	7C	PLANT	30
NPA	6	6A	CAST	30
NPA	6	6B	PLANT	30
NPA	6	6C	CAST & COVER	30
NPA	5	5A	CAST & COVER	30
NPA	5	5B	CAST	30
NPA	5	5C	PLANT	30
NPA	4	4A	PLANT	30
NPA	4	4B	CAST & COVER	30
NPA	4	4C	CAST	30
SPA	3	3A	Control	0
SPA	3	3B	Control	0
SPA	3	3C	Control	0
NPA	2	2A	Control	0
NPA	2	2B	Control	0
NPA	2	2C	Control	0
NPA	1	1A	Control	0
NPA	1	1B	Control	0
NPA	1	1C	Control	0

**Figure SG1
Sea Girt Beachfront
NPA and SPA
Seabeach Amaranth Seed Sowing
Exerimental Plots**



Legend

-  Vegetation Thinning Area
-  Site Boundary
-  NPA Boundary
-  SPA Boundary
-  Plot - Cast
-  Plot - Cast & Cover
-  Plot - Plant
-  Plot - Control

0 50 100 200 300 400 500 Feet

1 inch = 209 feet



Notes:
SPA boundary approximate



Scale: 1 inch = 209 feet

File:
Figure SG1- 6-21-2019

Date: 6/21/2019

Created By: John Hallagan



Datasheet B: Seabeach Amaranth Experimental Plot - Bi-Weekly Monitoring

Site: Sea Girt

Surveyors Present: John Hallagan, Nicholas Gamarro

Weather Conditions:

Date	Time	Plot #	# of Amaranth Plants Observed	Amaranth Diameter	Plot Intact?	Sand Sample Collected?	Photo Taken? (Y/N)	# Beach Grass Plants Present	Notes (disturbances to plot, sand sedge presence, etc)
		1A							
		1B							
		1C							
		2A							
		2B							
		2C							
		3A							
		3B							
		3C							
		4A							
		4B							
		4C							
		5A							
		5B							
		5C							
		6A							
		6B							
		6C							
		7A							
		7B							
		7C							
		8A							
		8B							
		8C							
		9A							
		9B							
		9C							

