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Interim Report On  
Sand Dune Stabilization Experiments  
Padre Island National Seashore - July 1966

by

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Objectives of experiments:

- 1- Stop the movement of sand.
- 2- Experiment with vegetation which can be used in stabilizing sand.
- 3- Find some effects of fertilizing sand.
- 4- Fence area to find some effects of grazing.
- 5- Test water salinity.
- 6- Find effects of irrigating dune areas.

In August 1965, 6.6 acres were fenced to keep the cattle out of a control area. Area is located approximately 1000' south of the proposed North Entrance Development - Residence Area. The fenced area includes active dunes, stabilized dunes, grassed and bare sand flats and a sand drift. A water system was installed to irrigate portions of the area. Soil tests made in July 1965 showed that the soil was low in nitrogen, phosphorous, potash, organic matter and salt. In February and March 1966 the plots were planted. The labor and materials were furnished by the Seashore Staff.

Plot 1 Natural Vegetation - An area 5000 SF was fertilized with a complete fertilizer on 2-2-66. 20 lb/acre for each element was applied. To date no evidence can be seen where fertilizer has affected plant growth. Natural vegetation includes seacats and croton.

Plot 2 Natural Vegetation - Area has been flooded by rain water since September 1965. No fertilizer was applied. Natural vegetation consists of cordgrass.

Plot 3 Natural Vegetation - An area 8000 SF was fertilized with a complete fertilizer on 2-2-66. 20 lb/acre for each element was applied. Area is easily distinguished from unfertilized areas by greener and taller vegetation. Natural vegetation consists of sea oats, croton and cordgrass.

Plot 4 <sup>*Quatern*</sup> Seashore Panicumgrass, Panicum amarulum - An area of 2500 SF was fertilized with a complete fertilizer on 2-2-66. 20 lb/acre for each major element was applied. Culms were planted on 2-8-66. Culms were planted 18" o.c., 12" deep, leaves were left 10" above ground, 1 culm per hole. Leaves longer than 10" were sheared off. Planting labor required 12 manhours. March and April winds, both north and southeast, caused wind erosion on center of plot killing the exposed culms. After planting the top leaf growth turned brown. One month after planting the roots and leaf stems sprouted. Grass culms came from Cameron County Park, South Padre Island Texas. Culms were hauled in wet burlap sacks. Plot received no water other than rain. At July 1, 1966 plot shows vigorous top and root growth with 75% survival.

Plot 5 <sup>*amarulum*</sup> Seashore Panicumgrass, Panicum amarulum - An area 2500 SF was fertilized with a complete fertilizer on 2-2-66. 20 lb/acre for each element was applied. Culms were planted on 2-8-66. Culms were planted 18" o.c., 12" deep, leaves 10" above ground, 1 culm per hole. Leaves longer than 10" were sheared off. Planting labor required 12 manhours. On March 10 the north half of plot was sprayed with resin emulsion binder "Coherez". Plot was watered on 2-11-66. After planting the top leaf growth turned brown. One month after planting, the roots and leaf

stems sprouted. Grass culms came from Cameron County Park, South Padre Island, Texas. Culms were hauled in wet burlap sacks. Plot received no water other than rain water and at time of planting. To date plot shows vigorous top and root growth with 100% survival.

Plot 6 European Beachgrass, *Ammophila arenaria* - An area 15,000 SF was fertilized on 2-2-66. The area received 20 lb/acre for each element except the west 50' wide strip which received nitrogen at the rate of 40 lb/acre. Culms were planted by hand, 3 culms per hole, holes 18" o.c., 12" deep, 8" above ground. Culms came from Wave Beach Grass Nursery, Florence, Oregon. Culms were shipped by air freight and cost \$225 f.o.b. Corpus Christi. Date of planting was 2-24 to 3-2-66. Labor took 96 manhours. West half of plot was watered following planting. Plot was again watered on 3-9-66. On 3-10-66 the northwest corner of plot was sprayed with resin emulsion binder "CohereX". Inspection on 3-20-66 showed that grass was sprouting in ground and on surface. On 5-1-66, grass showed good root and top growth. Grass growing near the pond water edge showed more vigorous top and root growth. On 5-26-66 the beach grass tops had turned brown, with some plants remaining green. Noticed that root growth was thicker on the complete fertilizer portion. March, April and May winds caused erosion on the gulf end of the plot killing the exposed culms. Sand has drifted heavily in several portions of the area smothering the culms completely. The resin emulsion binder has prevented the northwest portion sand from migration. To date the plot shows that several culms have turned brown on top. New shoots have started sprouting in some of the culms root zone. 50% of plants have survived. From time to time rodents have eaten the top growth down to

ground level on several culms. In most cases the culms have resprouted.

Plot 7 Seaoats, Uniola paniculata - An area of 2500 SF was fertilized with complete fertilizer on 2-2-66. 20 lb/acre for each major element was used. The culms came from the foredunes bordering the north fence. Culms were planted on 2-9-66. Culms were planted 1 culm per hole, 18" o.c., 12" deep, 10" above ground. Leaves longer than 10" were sheared off. Labor required 24 manhours. Plot was watered after planting. One month after planting, a portion of the plot was sprayed with resin emulsion binder. One month following planting the roots were sprouting and 2 weeks later top growth started sprouting. South corner of plot was sprayed with MC-1. End of May showed good root and top growth. To date the majority of culms have good root and top growth. 90% of culms have survived.

Plot 8 Croton, Codiaeum punctatus - An area of 2500 SF was fertilized with complete fertilizer on 2-2-66. 20 lb/acre for each major element was applied. Plants came from the dunes bordering the west fence. Stock was planted the same day it was dug on 2-8-66. Stock was planted 12" deep, 3' o.c., 50% of top growth was headed back at time of planting. Planting required 24 manhours. Stock had excellent feeder roots. Top growth wilted 2 days after planting. Top growth started dying after 1 month. Plants were watered after completion of planting. Roots started calousing after 1 month. End of May showed that all plants have died out. One month after planting the area was sprayed with resin emulsion binder and MC-1. To date the wind has carried away the sand in areas bordering the plot in the areas that weren't treated with oil surface binders. One

week following planting, Croton was observed sprouting from seed in the foredune areas.

Plots 9 & 10 Birdsfoot Trefoil, Lotus corniculatus - Two 150 SF plots were planted, one in foredunes and one at the west end of the area. Areas were fertilized with complete fertilizer at time of planting, 3-3-66, with 20 lb/acre for each major element. Planting labor was 1/2 manhour per plot. Seed was mixed with inoculant at time of planting. One month after planting, the seeds in plot 9 sprouted 1" high and then the salt spray burned the sprouts back, killing them. Following this the north winds funneled out the sand in the plot 9 area. The seeds in plot 10 never sprouted. Suspect that ants may have carried away the seeds. Seeds came from United Seed Company, San Francisco, California.

Plot 11 Common Bermudagrass, Cynodon dactylon - An area 2500 SF was fertilized with complete fertilizer at the time of planting. 20 lb/acre for each major element was applied. Seed was broadcast on plot on 3-3-66. Took 1/2 manhour for labor. Inspection on May 26 showed no evidence of seed sprouting. Inspection on 6-2-66 showed grass sprouting on west end of plot. On July 1, to date, one fourth of plot has seed sprouting.

Plot 12 "Texturf 10" Bermudagrass, Cynodon "Texturf 10" - 6 sod blocks 6" diameter were planted in 50 SF on west end of area. 2 clods were planted at ground level, 2 clods with 1" of sand cover, 2 clods with 4" of sand cover. Fertilizer was applied to water at time of planting. Required 1 manhour. Plants stayed alive for 1 month, then appeared to be dying out. On June 2 the clods started sprouting on the surface again.

Plot 13 Georgia Cane, Arundo donax - Present plans are to plant the cane with the onset of cooler weather and northern winds. Planting of the cane will be an attempt to establish a barrier to trap the moving sand from the southeast winds.

Plot 14 Coastal Bermudagrass, Cynodon "Coastal Bermudagrass" - Present plans are to sprig an area this fall.