TECHNICAL NOTES

UNITED STATES DEPARTMENT OF AGRICULTURE — NATURAL RESOURCES CONSERVATION SERVICE
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PLANT MATERIALS TECHNICAL NOTE NO. 16

RECOMMENDED PLANT SPECIFICATIONS FOR

CONTAINER GROWN COASTAL PLANTS

Nursery-grown container stock is generally the most reliable and ecologically appropriate way to obtain plant materials for restoration projects. When obtaining container size plant materials, following the information below should be considered.

Plant Materials

In order to produce nursery-grown container stock, vegetative propagation material is needed in the form of starter transplants. Starter transplants are usually described as a small single or multi-stem bareroot plant, slip, sprig, rhizome, or stem used to grow out large container plants. Starter transplants needed for the production of container grown plants may be obtained from a donor native site (wetland, dune, etc.) or from an established commercial wetland pond or field. Refer to Table 1 for recommended starter transplant materials for commonly used coastal species.

Removing plant materials from a donor native site (wetland, dune, etc.) is not recommended but may be an option if commercial supplies are limited. Removing plants from natural sites regardless of the care taken in frequency, spacing, and location of plant removal will eventually affect the health and vigor of the donor stand. In addition, the removal without applicable permits may be in violation of state and federal regulations.

Harvesting starter transplants from a commercial nursery site (ponds and fields) provides multiple benefits including:

- donor plants are usually an improved variety with proven traits
- they have increased health and vigor
- less chance of insect or disease problems being transmitted to containers
- will not damage natural communities

Nursery-grown container plants should be started in the type container desired for the project. Under certain conditions (i.e. limited starter material) plants may be propagated in a small container and then transplanted into a larger container for grow out to a larger size. Before moving plants from one container size up to a larger size make sure the plant has developed adequate top growth and below ground root mass.

Plants must be viable and actively growing within a container long enough to produce sufficient root development so that a soil root ball is formed when the plant is removed from its container. During the grow-out period, occasionally pull gently on the plants to evaluate below surface root mass development. Plants should not be loose in the container.

Container grown plants should meet minimum standards before being taken to the restoration site. Minimum standards for container grown plants are included in Table 1. In addition, plants need to be free of defects, disfiguring, sun scalding, disease, insects, insect eggs, and insect larval, or other forms of infections or infestations.

Containers
Common types include, trade gallons, four inch (4") pots, and bullet tubes.

Trade gallon containers should be round in shape and be individual containers, not molded trays or tray liners. A trade gallon pot is smaller than a normal 1 gallon size pot. A typical trade gallon container has dimensions that are not less than 5 ¾" nor more than 6 ½" across the top (outside diameter) and not less than 6" nor more than 7" in height (outside dimensions). Trade gallon containers need to be constructed of rigid plastic. Paper, peats, plastic bag, or other biodegradable container materials generally do not work well due to the length of time needed to grow out the plant.

Four inch (4") pots can be round or square in shape. Typical sizes for round and square pots are not less than 3 ½" nor more than 4 ½" across the top (outside diameter) and not less than 3" nor more than 4" in height (outside dimensions). Four inch (4") containers also need to be constructed of some type of rigid plastic material. Paper, peats, or other biodegradable container materials should not be used due to the length of time needed to grow out the plant.

Bullet tubes are small plastic tube pots ranging in size from 4-10 inches tall with a top diameter of 1-2 ½ inches. Bullet tubes are not self supported such as an individual trade gallon pot and must be supported in some type of special tray or rack designed for the specific tube size. Bullet tubes are used primarily for growing out small plants for later transplanting into larger containers. Bullet tubes are good when large numbers of transplants are needed in a short time or when there is limited amount of donor material available to propagate large containers. This type of container needs to be monitored closely during the grow out period due to the limited amount of potting media around the root mass of the plant. Refer to Table 1 for recommended container sizes used for the propagation of common coastal species.

Potting Medium
Potting medium (potting soil) should be completely free of any foreign objects such as glass, shell, stones, pottery, or other debris not generally considered standard potting media. Standard potting media have various concentrations of sand, silt, and clay with or without the addition of organic matter. The inclusion of 20-30% clay in the potting medium is recommended to insure against the soil washing off the root ball when planting in water.

Salt Hardening
If planting in an area with high salinity, it is recommended that plants be salt hardened. Salinity hardening levels will vary according to planting site conditions. However, hardening plants to 12 parts per thousand (ppt.) is a general rule when working in brackish to lower saline conditions. Plants should be salt hardened to a minimum level of 12 ppt for at least 14 consecutive days under ponding conditions. Plants need to stay salt hardened at the minimum salt level and the minimum hardening duration to within three (3) weeks prior to delivery and planting.

Shipping and Handling
Plant should be packed for delivery in such a manner as to ensure protection against climatic, seasonal, or other injuries during transit. Special care should be taken for prompt delivery and careful handling in loading and unloading. Plants need to be transported in an enclosed truck or trailer, or they may be moved in an open trailer if sufficient wind protection (netting) is provided to prevent damage to sensitive leaves.

Plants may be cut to facilitate transportation; however, stems should not be cut shorter than ½ the normal mature plant height. Stems should not be broken, nor physically damaged during transport. In addition, plants should not show signs of being water stressed by displaying dry wilted leaves and/or stems. Plants need to maintain their stem and leaf rigidity at all times indicating adequate moisture and low stress.

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Table 1 Recommended Plant Specifications for Commonly Used Container Grown Coastal Plants

		Minimum Sizes for Use		
Plant Species	Propagation Material	Trade Gallon	4 inch pots	Bullet tubes
Marshhay Cordgrass, *Spartina patens*	bare root slips	6 actively growing stems, 6-10 inches minimum height	4 actively growing stems, 4-6 inches minimum height	2 actively growing stems, 4 inch minimum height
Smooth Cordgrass, *Spartina alterniflora*	bare root slips	6 actively growing stems, 8-12 inches minimum height	4 actively growing stems, 4-6 inches minimum height	2 actively growing stems, 4 inch minimum height
California Bulrush, *Schoenoplectus californicus*	bare root plants	6 actively growing stems, 24 inch minimum height	N/A	N/A
Seashore Paspalum, *Paspalum vaginatum*	unrooted stems, rooted cuttings	6 actively growing stems, 6-10 inches minimum height	4 actively growing stems, 4-6 inches minimum height	2 actively growing stems, 4 inch minimum height
Sea Oats, *Uniola paniculata*	bare root slips	6 actively growing stems, 6-10 inches minimum height	4 actively growing stems, 4-6 inches minimum height	N/A
Bitter Panicum, *Panicum amarum*	bareroot shoots, rooted, unrooted stems	6 actively growing stems, 6-10 inches minimum height	4 actively growing stems, 4-6 inches minimum height	2 actively growing stems, 4 inch minimum height
Seacoast Bluestem, *Schizachyrium maritimum*	bareroot shoots, rooted, unrooted stems	6 actively growing stems, 6-10 inches minimum height	4 actively growing stems, 4-6 inches minimum height	2 actively growing stems, 4 inch minimum height
Black Mangrove, *Avicennia germinans*	seed	1 actively growing stem, 8-12 inches minimum height	N/A	1 actively growing stem, 3-6 inches minimum height