

Fully compact to the ground. Propagated by cuttings. Hardy in Zones 4 to 8.

***Thuja* (Syn. *Platyclusus*) *orientalis* 'Erecta' Cupressaceae.** This is a highly underused specimen, a very dense upright hardy evergreen shrub. Matures 12 ft in height by 5 ft wide. Propagated by cuttings. Hardy in Zones 2 to 7.

From Seed to Seed: Producing Native Grass and Wildflower Seed for the National Park Service®

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As part of the USDA's Natural Resources Conservation Service, the National Plant Materials Center (NPMC) in Beltsville, Maryland, has had a changing role over time. The Center has come a long way from its inception in the 1930s as an observation station for introduced conservation plants to its current role as an innovative regional facility focused on selecting both native and introduced plant species and developing technology for controlling erosion, improving water quality, enhancing wildlife habitat, and revitalizing pasture lands. The goal of the Plant Materials Program is to make improved plants and information available to land owners and managers. In addition to its traditional conservation plant activities, the NPMC has been involved in a unique cooperative effort with the National Park Service (NPS) that has established the Center as a leader in native plant production techniques. This cooperative work has been a result of the mandate within many National Parks that revegetation must be completed with native plant germplasm collected from within Park boundaries. Since the late 1980s, the NPMC has propagated and delivered plants of over 125 native species to various National Parks in the region, from black gum (*Nyssa sylvatica*) and poison sumac (*Toxicodendron vernix*) to woodland sunflower (*Helianthus divaricatus*), lady fern (*Athyrium filix-femina*), and Virginia creeper (*Parthenocissus quinquefolia*). Parks served by the NPMC over the years have included Cumberland Gap National Park (Tennessee and Kentucky), Shenandoah National Park (Virginia), Great Smoky Mountains National Park (Tennessee), George Washington Memorial Parkway (Virginia), and Oxon Run Parkway (Washington D.C.).

While woody plant production methods have been well defined by many nurseries and the Forest Service, methods for growing plugs and establishing seed production fields for herbaceous natives have been much more experimental at our facility. The "seed to seed" process is how we are able to generate large seed increase fields from small amounts of seed wild-collected at National Parks. It begins with a little as a handful of seeds collected into a paper bag by NPMC or NPS staff or college students hired expressly for the purpose. Since the aim is not to strip a single area of all its seed but rather to assemble a representative sample from a native plant population, generally small batches are collected from several locations (if possible) and combined.

When the seeds reach the NPMC, they may have bits of leaves or pieces of stem mixed in, but the lots are too small to run through our large seed cleaning machinery, so hand cleaning is necessary. We have a small but enthusiastic volunteer force to

accomplish this. Volunteers separate visibly good seeds from damaged seeds, leaves, stem, and other chaff; hairy and awned appendages are usually not removed from lots of seed this small, since the material will be hand-seeded in the greenhouse. Cleaned material is packed in envelopes or small bags until it is needed for seeding.

We find that a lot of the initial seed is often not collected at the ideal time, and since we have such a small amount of material, we can't send it off to our state seed testing laboratory for germination testing. This uncertainty makes seeding somewhat of a challenge, since we're trying to get as many seedlings as possible from the tiny batch.

Greenhouse plug production generally entails working out a new propagation procedure or refining methods we have previously worked out. We have tried various stratification pre-treatments. We have tried seeding in germination trays and larger plug trays, and have compared seeds started under mist with those germinated on a greenhouse bench and given regular hand watering. Regardless of how our wildflowers and grasses are started, they inevitably end up in 72-cell plug trays or Ropak[®] Multi-Pot plug trays in preparation for field planting. Most of the native grasses and wildflowers we grow are ready for the field 12 to 15 weeks from the time the seeds germinate.

Field planting techniques vary depending on the growth habit of the species being outplanted, but we set up production fields in weedmat wherever possible to cut down on weeding labor and herbicide use. Upright bunch plants with few stems like bottlebrush grass (*Elymus hystrix*), Virginia wildrye (*Elymus virginicus*), and goldenrod (*Solidago* sp.) are well suited for planting into small holes in weed barrier fabric. The weedmat planting process is especially effective with the use of a tool invented by one of our staff members. The tool consists of an electric barbecue grill starter attached to a long handle, and it operates off a portable generator. Holes the size of individual plugs are quickly burned into a prepared weedmat, and a planting crew (dibbler, planter, quality control person) follows along behind. Some of the larger clumping, spreading species like indiagrass (*Sorghastrum nutans*) and grass-leaved goldenaster (*Pityopsis graminifolia*) we grow for seed production are better planted without mats, and weeds are managed through cultivation and cover cropping.

We harvest seeds from our production fields of grasses and many of the wildflowers using a small plot combine. With adjustments to airflow, the unit can handle varied seed sizes and types, with the exception of very fluffy seeds. For fields of grass-leaved goldenaster, oldfield aster (*Aster pilosus*), and late purple aster (*A. patens*), we use a modified leaf vacuum unit. The unit is pulled along behind a small tractor, and has an adjustable vacuum hood that works off the tractor's hydraulics. It has enough suction to pull off ripe seeds, and can be used several times over a production field's ripening period.

Large lots of harvested seeds are cleaned through a two-screen clipper (and a debearder if the seeds have a hairy pappus), and samples are sent to our state seed testing lab for standardized germination and weed seed analysis. Seeds are stored in cloth bags at 40°F until we ship them back to a National Park for highway revegetation seeding, or they are used at the NPMC for additional plug production.