Plant Propagation Protocol for *Hierochloe odorata*
ESRM 412 – Native Plant Production

TAXONOMY	
Family Names	
Family Scientific Name:	Poaceae
Family Common Name:	Grass Family
Scientific Names	
Genus:	Hierochloe
Species:	Odorata
Species Authority:	P. Beauv.
Variety:	Hierochloe hirta (Schrank) var. arctica
Sub-species:	
Cultivar:	Hierochloe odorata
Authority for Variety/Sub-species:	(J.Presl) G.Weim.
Common Synonym(s) (include full scientific names (e.g., *Elymus glaucus* Buckley), including variety or subspecies information)	Anthoxanthum nitens (Weber) Y. Schouten & Veldkamp Hierochloe fragrans (Willd.) Roem. & Schult. Hierochloe nashii (E.P. Bicknell) Kaczmarek Hierochloe odorata (L.) P. Beauv. var. fragrans (Willd.) K. Richt. Holcus odoratus L. Savastana nashii E.P. Bicknell Savastana odorata (L.) Scribn. Torresia odorata (L.) Hitchc. (9)
Common Name(s):	vanilla grass, sweetgrass, Indian sweetgrass, holy grass, seneca grass, Zebrovka , Buffalo Grass (4)
Species Code (as per USDA Plants database):	HIODO (7)
GENERAL INFORMATION	
Geographical range (distribution maps for North America and Washington state)	Found from Alaska to Labrador, south to Oregon, Nevada, Arizona, New Mexico, South Dakota, the Great Lakes region, Pennsylvania, Eurasia (6)
Ecological distribution (ecosystems it occurs in, etc):	This species is found in wet meadows, shaded stream banks, moist slopes, edges of sloughs and marshes, bogs, lakeshores, cool mountain canyons, and foothills to sub-alpine elevations. Usually found in mid-successional communities. (1) and (3)
Climate and elevation range	Cool and moist climate; widely scattered from low to high elevations; has been found in Washington at elevations from 325 to 4420 feet. (6)

Local habitat and abundance; may include commonly associated species	Locally in Washington, this species has been found in Benton, Chelan, Kittitas, Klickitat, Pend Oreille, Skagit, Skamania, Spokane, Stevens, Whitman, and Yakima counties. Associated species: slender wheatgrass (Elymus trachycaulus), slough sedge (Carex atherodes), false-melic (Schizachne purpurascens), brome (Bromus spp.), reed grass (Calamagrostis spp.), meadow sedge (Carex praticola), American vetch (Vicia americana). (1)
Plant strategy type / successional stage (stress-tolerator, competitor, weedy/colonizer, seral, late successional)	Rhizomatous perennial; and usually found in mid-successional communities and can withstand small amount of soil disturbance. (2)
Plant characteristics (life form (shrub, grass, forb), longevity, key characteristics, etc)	A perennial grass with shoots growing from a rhizome deep beneath soil surface. Plant has a distinct odor- a sweet vanilla smell due to the coumarin compound. (8). It reaches height of 7 dm. and hollow stems have open sheaths. At maturity, leaf blades are flat and glabrous. Inflorescence is an open panicle 4-9 cm. and long,lower branches are drooping to spreading. The spikelets are 3-flowered, the 2 lowest florets are male and the uppermost is perfect, female and male. An early blooming plant that flowers from May to July. (2)
PROPAGATION DETAILS **There are 2 different ways to propagate: vegetative and seed. The 2 different propagation techniques are direct citations from this link: http://www.nativeplantnetwork.org/network/ViewProtocols.aspx?ProtocolID=152,436,1874 (10)** **The vegetative technique is numbered (1) and seed technique is (2)**	
Ecotype (this is meant primarily for experimentally derived protocols, and is a description of where the seed that was tested came from):	(1) Moist meadows, Sweet Grass Hills, Liberty Co., MT. (2) Sweetgrass Hills, Montana
Propagation Goal (Options: Plants, Cuttings, Seeds, Bulbs, Somatic Embryos, and/or Other Propagules):	(1) and (2) Plants
Propagation Method (Options: Seed or Vegetative):	(1) Vegetative: Can be most easily propagated through cuttings and division, from container or bare rootstock since it produces many rhizomes. (2) Seed (Plant rarely proudces vaiable seed, low

	germination rate) (5)
Product Type (options: Container (plug), Bareroot (field grown), Plug + (container-field grown hybrids, and/or Propagules (seeds, cuttings, poles, etc.))	(1) Container (2) Bareroot
Stock Type:	(1) 800 ml containers (2) Bareroot
Time to Grow (from seeding until plants are ready to be outplanted):	(1) 6 weeks (2) 12 months
Target Specifications (size or characteristics of target plants to be produced):	(1) and (2) Want height of 30-38 cm
Propagule Collection (how, when, etc):	(1) Rhizomatous propagation: Plant division is the most successful method of reproducing sweetgrass. Dividing a plant is accomplished by separating the individual propagules that have developed from the rhizomes from established nursery plants. Each propagule can then be placed in a container for further separation or future planting. (2) Collect seeds in late summer
Propagule Processing/Propagule Characteristics (including seed density (# per pound), seed longevity, etc):	(1) Propagule will be rhizomes (2) 2,400,000 seeds/kg
Pre-Planting Propagule Treatments (cleaning, dormancy treatments, etc):	(1) Take nursery stock and get rhizome divisions with 3 leaf bud shoots per rhizome. Plant rhizome divisions into individual containers. (2) Seeds need a period of cold temperatures before germination. Sow seeds during late fall, late winter, or early spring.
Growing Area Preparation / Annual Practices for Perennial Crops (growing media, type and size of containers, etc):	(1) Make sure that divisions are irrigated early morning so that containers are very wet and moist. (2) Field site soil should be loose, free of weeds, and moistened to a depth of 7.5 cm. Drop seeds in rows and make sure there is contact between seed and soil. Keep area very moist.
Establishment Phase (from seeding to germination):	(1) Take rhizome divisions in June and put into 800 ml square containers using Promix #1 potting media which is 3:1 peat perlite with 4 grams of 13:13:13: N:P:K (Osmocote) controlled release fertilizer, along with 3 grams of micronutrient fertilizer for every 800 ml

	square container. (2) Seedlings emerge in 2 weeks. Seedlings are established when they are 10-15 cm tall.
Length of Establishment Phase:	(1) 10-14 days
Active Growth Phase (from germination until plants are no longer actively growing):	(1) Irrigate the plant during the entire growing season; plant will be root tight after 6 weeks; plant will have grown to minimum of 4 to 6 inches
Length of Active Growth Phase:	(1) 5 weeks (2) 3 months
Hardening Phase (from end of active growth phase to end of growing season; primarily related to the development of cold-hardiness and preparation for winter):	(1) Reduce irrigation and leach plants with clear water before winterization. (2) Plan final harvest in late summer
Length of Hardening Phase:	(1) 4 weeks (2) 1-2 months
Harvesting, Storage and Shipping (of seedlings):	(1) Can harvest after 6 weeks from initial divisions. Store under insulation cover. (2) Bareroot stock can be taken in spring and rhizomes can be transplanted anytime for growth in containers in greenhouse.
Length of Storage (of seedlings, between nursery and outplanting):	(1) 5 months
Guidelines for Outplanting / Performance on Typical Sites (eg, percent survival, height or diameter growth, elapsed time before flowering):	(1) and (2) Sweetgrass needs a very moist site with both sun and some shade.
Other Comments (including collection restrictions or guidelines, if available):	No other comment
INFORMATION SOURCES	
References (full citations):	(1) Cronquist et al. 1977. Intermountain Flora Vascular Plants of the Intermountain West, U.S.A. Volume 4: the Monocotyledons. The New York Botanical Garden, Bronx, New York. 584 pp. (2) "Fact Sheet." USDA. April 19, 2010. http://74.125.155.132/search?q=cache:suBmSC62gAYJ:plants.usda.gov/factsheet/doc/fs_hiod.doc+Hierochloe+odorata+site:usda.gov&cd=10&hl=en&ct=clnk&gl=us&client=firefox-a (3) "Hierochloe odorata." April 18, 2010. http://www.rook.org/earl/bwca/nature/grass/hierochloe.html

	(4) "Hierochloe odorata." Ecocrop. April 17, 2010. http://ecocrop.fao.org/ecocrop/srv/en/cropView?id=6720 (5) "Hierochloe odorata (L.) Beauv." Walpole Island Heritage Centre. April 20, 2010. http://docs.google.com/viewer?a=v&q=cache:KC6AIJaLqOkJ:www.bkejwanong.com/MNFI_SAR/hieodor.pdf+cultivated+Hierochloe+odorata&hl=en&gl=us&pid=bl&srcid=ADGEEShp-CW_dWV4nUej2gQVIIc5ggkFhc-MA5Nj0gCEndSAn5SKHYMs3o-RPoT24Yk437FYeep0n_pCs6NJZQxldGb2LAeNj5KP0Ortp125NwGnrjV6Sdh4c7ZLk1iNAR8udOiklWef&sig=AHIEtbRGf-1QhP3ZXbM357dPoxuIVUXBjQ (6) Hitchcock, C.L., A. Cronquist, M. Ownbey, J.W. Thompson. 1969.Vascular Plants of the Pacific Northwest Part 1:Vascular Cryptogams, Gymnosperms, and Monocotyledons. University of Washington Press, Seattle, WA. 914 pp. (7) "Index of Species Information." FEIS. April 20, 2010. http://www.fs.fed.us/database/feis/plants/graminoid/hieodo/all.html#MANAGEMENT%20CONSIDERATIONS (8) "NRCS This Week." NRCS. April 16, 2010. http://www.nrcs.usda.gov/NEWS/thisweek/2006/041206/techtip.04.12.06.html (9) "Plants Profile." USDA Natural Resources Conservation Services on-line. April 18, 2010. http://plants.usda.gov/java/profile?symbol=HIOD (10) "Protocol Information." Native Plant Network. April 16, 2010. http://www.nativeplantnetwork.org/network/ViewProtocols.aspx?ProtocolID=152,436,1874
Other Sources Consulted (but that contained no pertinent information) (full citations):	
Protocol Author (First last name):	Christine Ha
Date Protocol Created or Updated (MM/DD/YY):	04/19/10

Note: This template was modified by J.D. Bakker from that available at:
http://www.nativeplantnetwork.org/network/SampleBlankForm.asp

Appendix: Previous ESRM 412 Plant Protocol for *Hierochloe odorata*
Link: http://depts.washington.edu/propplnt/Plants/hierochloe.htm

Species (common name, Latin name):
Sweetgrass, Hierochloe odorata

Range
Sweetgrass grows in wet meadows, low prairies, and the edges of sloughs and marshes in Minnesota, North Dakota, Montana, South Dakota, northwest Iowa, and western and central Montana. It grows from Labrador to Alaska, south to New Jersey, Indiana, Iowa, New Mexico, and Arizona (McGregor 1991).

Climate, elevation
Widely scattered from low to high elvations

Local occurrence (where, how common)
Common, northern – mid to high elevations, southern low to middle elevations. (Pojar and Mackinnon 1994).

Habitat preferences
Moist meadows, lake-shores, stream banks, streamside areas, forest openings, beaches, upper parts of tidal marshes. (Pojar and Mackinnon 1994)

Plant strategy type/successional stage (stress-tolerator, competitor, weedy/colonizer, seral, late successional)
Rhizomatous perennial. (NRCS)

Associated species
?

May be collected as: (seed, layered, divisions, etc.)
Seed, plugs

Collection restrictions or guidelines
None

Seed germination (needs dormancy breaking?)
Seeds only 5% viable

Seed life (can be stored, short shelf-life, long shelf-life)

?

Recommended seed storage conditions
?

Propagation recommendations (plant seeds, vegetative parts, cuttings, etc.)

Rhizoimatous propagation gives by far the best results

Soil or medium requirements (inoculum necessary?)
Not clay or fine textured. (NCRS)

Installation form (form, potential for successful outcomes, cost)
Rhizomatous cutting.

Recommended planting density
13 plants per square foot. (NRCS)

Care requirements after installed (water weekly, water once etc.)
Water highly and grow in partial shade, then in full sun. Outdoors only.

Normal rate of growth or spread; lifespan
Can grow to full height (2ft) in 6 months if grown from rhizome cutting.

Sources cited
Pojar and Mackinnon 1994. Plants of the Pacific Northwest Coast. Lone Pine Publishing. Vancouver

McGregor, R.L. T.M. Barkley, R.E. Brooks, E.K. Schofield (eds.) 1991. Flora of the Great Plains. University Press of Kansas. 1402 pp.

http://plant-materials.nrcs.usda.gov/pubs/mtpmcpghiod.pdf viewed 06-10-03

Data compiled by
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