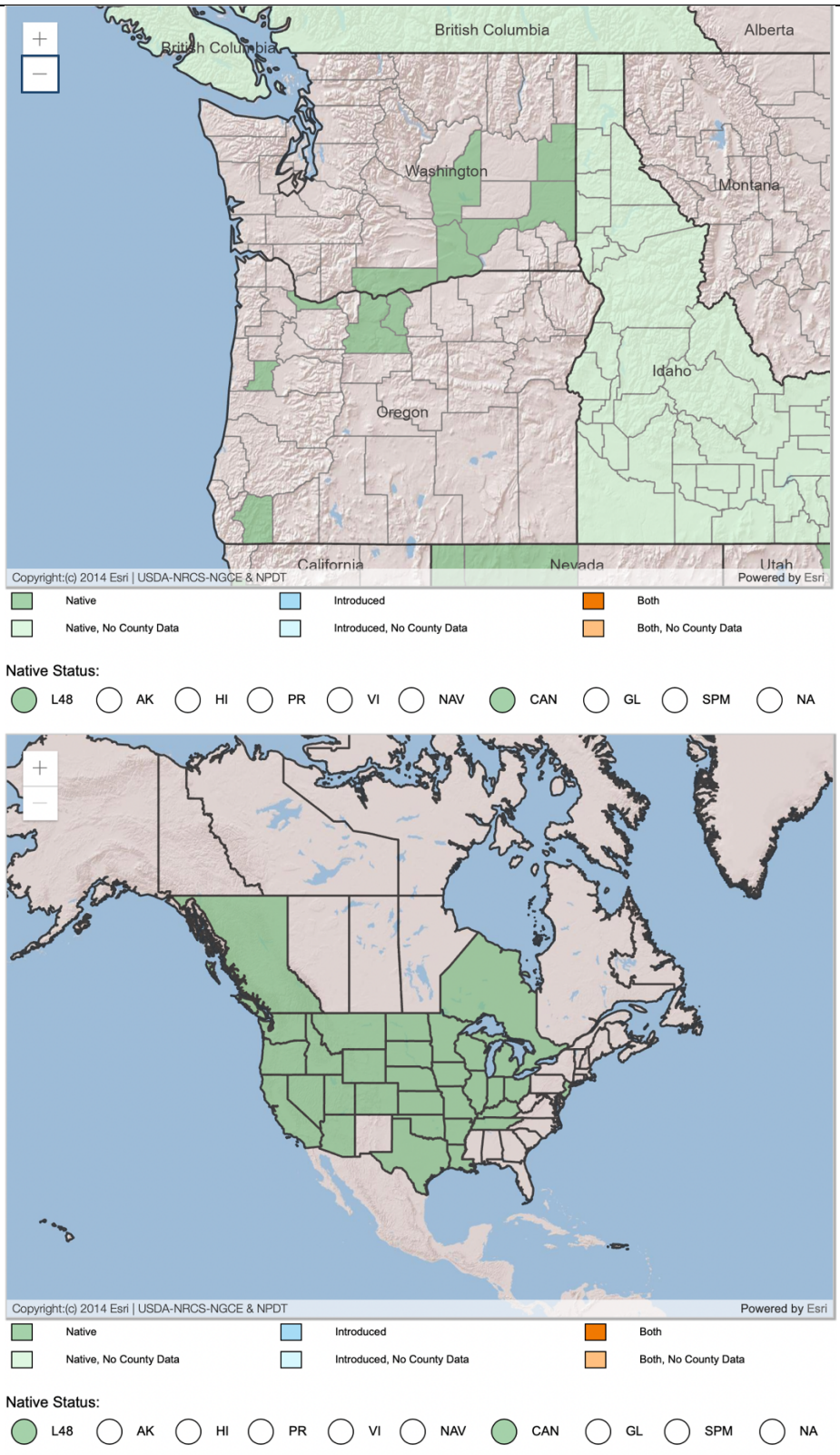
Plant Propagation Protocol for *[Insert Species]*
ESRM 412 – Native Plant Production
URL: https://courses.washington.edu/esrm412/protocols/*[year]*/*[USDASpeciesCode.pdf]*
(example: http://courses.washington.edu/esrm412/protocols/2008/LAJA.pdf)

There are few propagation information about *Ammannia robusta* and about other species in *Ammannia* genus. Some propagation detail listed includes information about *Ammannia coccinea* and Ammannia baccifera L.

TAXONOMY	
Plant Family	
Scientific Name	Lythraceae
Common Name	Loosestrife Family
Species Scientific Name	
Scientific Name	*Ammannia robusta* Heer & Regel
Varieties	
Sub-species	
Cultivar	
Common Synonym(s)	*Ammannia coccinea* Rottb. ssp. *robusta* (Heer & Regel) Koehne *Ludwigia scabriuscula* Kellogg
Common Name(s)	Grand redstem Longleaf ammannia Robust redstem Scarlet ammannia
Species Code (as per USDA Plants database)	AMRO3(USDA)
GENERAL INFORMATION	

Geographical range	 (USDA)
Ecological distribution	*A. robusta* lives prefer moist environment like drying ponds and ditch margin with saline or alkaline soil (Graham, 2012).

Climate and elevation range	Annual precipitation: 3.3" - 39.8" Humidity: 1.28" - 42.79" Elevation: under 500m (Salive, 2020).
Local habitat and abundance	The local habitat of *A. robusta* is fresh water aquatic. Some associated species include Eleocharis acicularis, Lindernia dubia, Rorippa columbiae, and Rotala ramosior (WADNR).
Plant strategy type / successional stage	Weedy/ Competitor of rice (Zelenskaya, 2017)
Plant characteristics	*A. robusta* is an annual herb that can grow up to 100 cm high. It's leaves are 1.5-8cm long and 5-15mm wide, growing oppositely. Stems branched in lower plants. Flowering time of *A. robusta* ranged from June to August, producing 1 to 5 yellow, green, lavender, and red flowers per axil. Ripen fruits are red with a size of 0.6 cm with 4 chambers, which is produced from September to early October.
PROPAGATION DETAILS	
Ecotype	Leamington and Pelee Island, Ontario
Propagation Goal	Seeds
Propagation Method	Seeds
Product Type	Container
Stock Type	Plastic seedling trays (52 x 26 x 6 cm)
Time to Grow	2 months
Target Specifications	Around 3 ft tall, Firm root
Propagule Collection Instructions	Fruiting time of *A. robusta* is in September to early October. (Canada, 2015) Seeds can be collected when fully ripend but not dispersed. 3-10 days drying at room temperature is conducted after seed collection.
Propagule Processing/Propagule Characteristics	Seeds of *Ammannia* remain viable up to 12 years. (Makings et al., 2011)
Pre-Planting Propagule Treatments	Seed dormancy of *Ammannia coccinea* was a method to avoid autumn flood in natural habitat. Dormancy was broken at 30/15 °C. (Baskin et al., 2002) No seed germinated 10/5°C.(Kayla, 2020)
Growing Area Preparation / Annual Practices for Perennial Crops	Muddy, moist, alkaline substrate Plastic seedling trays (52 x 26 x 6 cm) (Kayla, 2020) 15-cm-diameter plastic pots with drainage holes(Baskin et al., 2002)
Establishment Phase Details	The percentage of seeds germinating increased with an increase in light intensity (100% full light) and light duration (up to 15 hours of daylight). Optimal germination rate occurs at a day/night temperature cycle of 20/15 °C. The maximum and minimum temperature for germination is 35/30°C, and 15/10°C. As light intensity (25% to 100%)and length(12.5 hours to 15 hours) increase, germination rate increase significantly. (Kayla, 2020)

	Ammannia coccinea seeds will gernimante better if they are flooded during dormancy. (Baskin et al., 2002)
Length of Establishment Phase	12 days after a day/night temperature cycle of 20/15 °C 15 days after a day/night temperature cycle of both 30/25 and 25/20°C. Low germination rate 9 days at 15/10°C, and 3 days at 35/30°C (Kayla, 2020)
Active Growth Phase	(For Ammannia baccifera L.) The maximum number of shoots when treated with BA (1.0 mg/l) + IAA (Indole-3- acetic acid) (0.5 mg/l) + 100 mg/l B2 vitamin combinations after 30 days of culture (Devi & Srinivasan, 2008).
Length of Active Growth Phase	15 days (For Ammannia baccifera L.) (Kolar et al., 2022)
Hardening Phase	(For Ammannia baccifera L.) Take seedling from media and wash with sterilized water, and then were transfer to paper cups filled with vermiculite: sand: soil in the ratio of 1:2:1 (w/w). For the first 28 days, seedling can be secured by polyethylene bags for to maintain moisture. (Kolar et al., 2022)
Length of Hardening Phase	4 weeks
Harvesting, Storage and Shipping	Containers will be shipped to outplanting site with water and stored at a temperature of around 5 °C .
Length of Storage	*Ammannia robusta* is an annual plant, so the time between seedling mature and outplanting is limited.
Guidelines for Outplanting / Performance on Typical Sites	*Ammannia robusta* prefer floodplain and mudflat with moist environment and alkline soil.
Other Comments	Fruit is produced from September to late October, which is the end of the growing season. Since *Ammannia robusta* is an annual plant, it will not need to prepare for winter cold tolerance. *Ammannia coccinea* is a potential self-pollinated plant, but if facilitated pollination is needed for *Ammannia robusta* is still unknown. 70% of survivial rate was observed after 4 weeks of Ammannia baccifera L. transplanted. (Kolar et al., 2022)
INFORMATION SOURCES	
References (full citations)	USDA. (n.d.). *Ammannia robusta Heer & Regel*. USDA plants database. Retrieved May 8, 2022, from https://plants.usda.gov/home/plantProfile?symbol=AMRO3 Graham, S. A. (2012). *Ammannia robusta*. Retrieved May 8, 2022, from https://ucjeps.berkeley.edu/eflora/eflora_display.php?tid=13035

	WADNR (n.d.). *Ammannia robusta Heer & Regel* Retrieved May 8, 2022, from https://www.dnr.wa.gov/publications/amp_nh_amro3.pdf Salive, K. (2020). *Assessing threats and mitigation for Scarlet Ammannia (Ammannia robusta) in Southwestern Ontario* Theses and Dissertations (Comprehensive). 2309. https://scholars.wlu.ca/etd/2309 Canada, E. and C. C. (2015, May 21). *Government of Canada*. Canada.ca. Retrieved May 8, 2022, from https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/recovery-strategies/scarlet-ammannia-2015.html Makings , E., Butler , L., Chew , M., & Juliet. (2011). *Desert Plants*. Desert Plants, volume 27, Number 1 (June 2011). Retrieved May 8, 2022, from https://repository.arizona.edu/handle/10150/297337 Baskin, C. C., Baskin, J. M., & Chester, E. W. (2002). Effects of flooding and temperature on dormancy break in seeds of the summer annual mudflat species Ammannia coccinea and Rotala Ramosior (Lythraceae). *Wetlands*, *22*(4), 661–668. https://doi.org/10.1672/0277-5212(2002)022[0661:eofato]2.0.co;2 Devi, C. S., & Srinivasan, V. M. (2008). In vitro propagation of Gymnema Sylvestre. *Asian Journal of Plant Sciences*, *7*(7), 660–665. https://doi.org/10.3923/ajps.2008.660.665 Kolar, A. B., Sulaiman, S. M., Mohamed Hussain, G. B., & Mahaboob Khan, S. K. (2022). In vitro regeneration of shoot and roots of the wild folkloric medicinal plant ammannia baccifera l. via indirect organogenesis from Leaf Explant cultures. *Research Journal of Biotechnology*, *17*(3), 48–54. https://doi.org/10.25303/1703rjbt4854 California native plant society . (n.d.). *Grand Redstem, Ammannia robusta*. California Native Plant Society. Retrieved May 8, 2022, from https://calscape.org/loc-California/Ammannia%20robusta%20(Grand%20Redstem)?newsearch=1 Zelenskaya, O. V. (2017). New Adventive Weed Plant Ammannia coccinea rottb. in the rice fields of the Krasnodar region. *Polythematic Online Scientific Journal of Kuban State Agrarian University*. https://doi.org/10.21515/1990-4665-131-130
Other Sources Consulted	
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