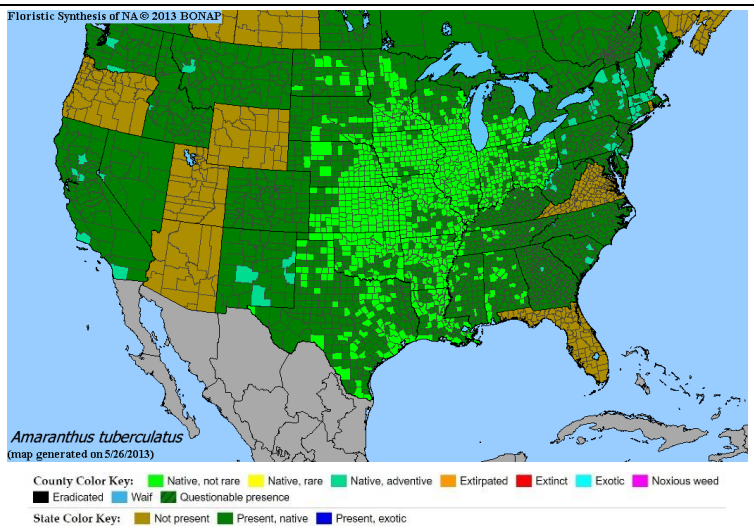
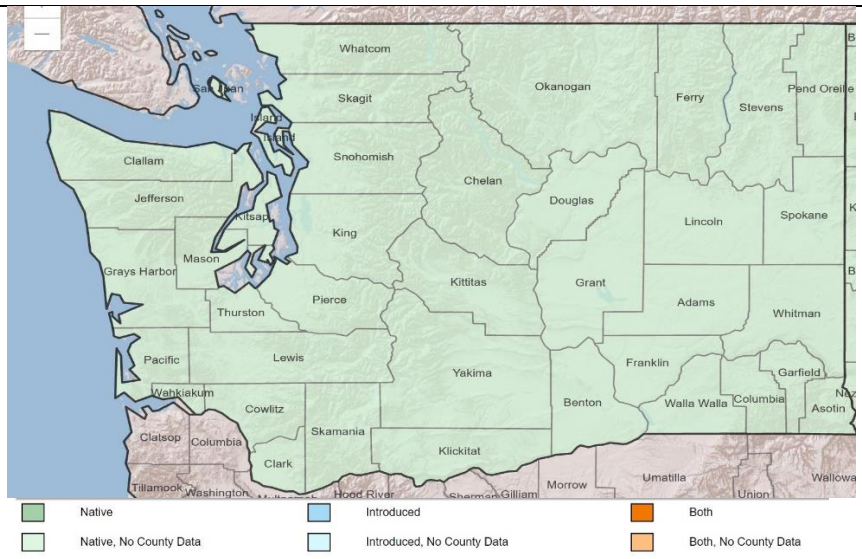
Plant Propagation Protocol for *Amaranthus tuberculatus*

ESRM 412 – Native Plant Production

TAXONOMY	
Plant Family	
Scientific Name	Amaranthaceae
Common Name	Amaranth
Species Scientific Name	
Scientific Name	*Amaranthus tuberculatus* (Moq.) Sauer
Varieties	None
Sub-species	None
Cultivar	None
Common Synonym(s)	*Acnida tamariscina* var. tuberculata (Moq.) Uline & Bray *Acnida tuberculata* Moq. *Amaranthus rudis* J.D. Sauer *Amaranthus tuberculatus* var. rudis Costea & Tardif
Common Name(s)	Roughfruit amaranth, Tall waterhemp, Common Waterhemp, Tubercled Amaranth
Species Code (as per USDA Plants database)	AMTU
GENERAL INFORMATION	
Geographical range7 (North America)	

Geographical range (cont.) (Washington State)[5]	
Ecological distribution	Anthropogenic (man-made or disturbed habitats), marshes, wetland margins (edges of wetlands)[1]. It is found in North-Eastern Canada and USA. It is considered a major weed of agricultural fields and other disturbed habitats.[2]
Climate and elevation range	It prefers warm temperate climates with dry summers where the warm average temp. is > 10°C and the cold average temp. is > 0°C. But it can tolerate warm temperate climate that are wetter year-round.[3]
Local habitat and abundance	It occurs naturally on the margins of freshwater bodies, rivers, lakes, ponds, marshes and bogs, while preferred human-made habitats are roadsides, railroads, cultivated fields, waste land and gardens.[3]
Plant strategy type / successional stage	It is a summer annual herb. It can tolerate temporary flooding. But it has no salinity tolerance.[3]
Plant characteristics[16]	 Illustration by Britton et al., 1913  Photo by Giorgio Faggi  Photo by Paul Rothrock It is an erect summer annual measuring 3 m tall. Seedling leaves are oar shaped. Leaves are without hairs and oval to lanceolate in shape. They have a waxy appearance. Stems are brightly colored and range in color from murky red or pink to green. They are dioecious plants

	having male and female parts on separate plants. Flowers and bracts are green to reddish pink and have spikes that are densely packed. Seed are black to dark red in color and measure 0.8-1.0mm in diameter.[4]
PROPAGATION DETAILS	
Ecotype	N/A
Propagation Goal	Plants
Propagation Method	Seed
Product Type	N/A
Stock Type	N/A
Time to Grow	Seeds can be directly seeded/sown in late spring. Seeds can also be grown in the green house and seedlings can be transplanted outside when there is less chance of frosts[6]. The cuttings from the growing plants can also be used as a planting material and roots easily[6].
Target Specifications	N/A
Propagule Collection Instructions	Plants produce seeds in the summer. After maturity, the dry seeds are enclosed in the persistent ovary shell (pericarp)[7] but do not split open when ripe[1]. Seeds can be collected by hand picking.
Propagule Processing/Propagule Characteristics	Each plant can produce up to 1 million seeds.[8] Seed size varies from .7 to 1.5 mm in length, shiny, lens-shaped, and dark reddish-brown to dark brown[7].
Pre-Planting Propagule Treatments	Seeds can be germinated using sand or blotting paper as media. Usually, the seeds collected from the matured plants are dormant.[9] After-ripening conditions are needed to allow germination. The minimum temperature for germination is 10 °C. Germinate best after 12 weeks of dark and wet stratification at 4 °C (39 °F). [10,11]
Growing Area Preparation	Seeds can be planted in 30 × 60 cm plastic trays filled with any potting mix[12]. It should be kept under greenhouse conditions at 28/20°C day/night temperature. Artificial lighting can be provided to ensure a 15-hour photoperiod.[12] It can tolerate a broad range of soil types and textures but prefers those that are well-drained and rich in nutrients with medium to fine textured soils. It can grow well on poorly drained soils too.[13] However, seedlings should be supplied with adequate water.[13]
Establishment Phase Details	Growth is influenced by both temperature and light. Biomass accumulation, height and root volume is higher at 25/20°C and 35/30°C than at 15/10°C according to greenhouse trial[14]. In full sunlight, plants can produce 720 g of biomass and under 40% and 68% shading plants produce only 550 and 370 g, respectively.[15]

Length of Establishment Phase	Seedlings can establish quickly and germinate from the soil within 3 to 4 days.[10]
Active Growth Phase	Spring to Fall.
Hardening Phase	Unknown
Length of Hardening Phase	Unknown
Harvesting, Storage and Shipping	Unknown
Length of Storage	
Guidelines for Outplanting / Performance on Typical Sites	Seedlings can be transplanted in a row. Moderate watering is helpful.
Other Comments	Generally, it is considered a weed in agricultural fields.
Protocol Author (First and last name)	Shubroto Kumar Sarkar
Date Protocol Created or Updated (MM/DD/YY)	05/03/2023

References

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