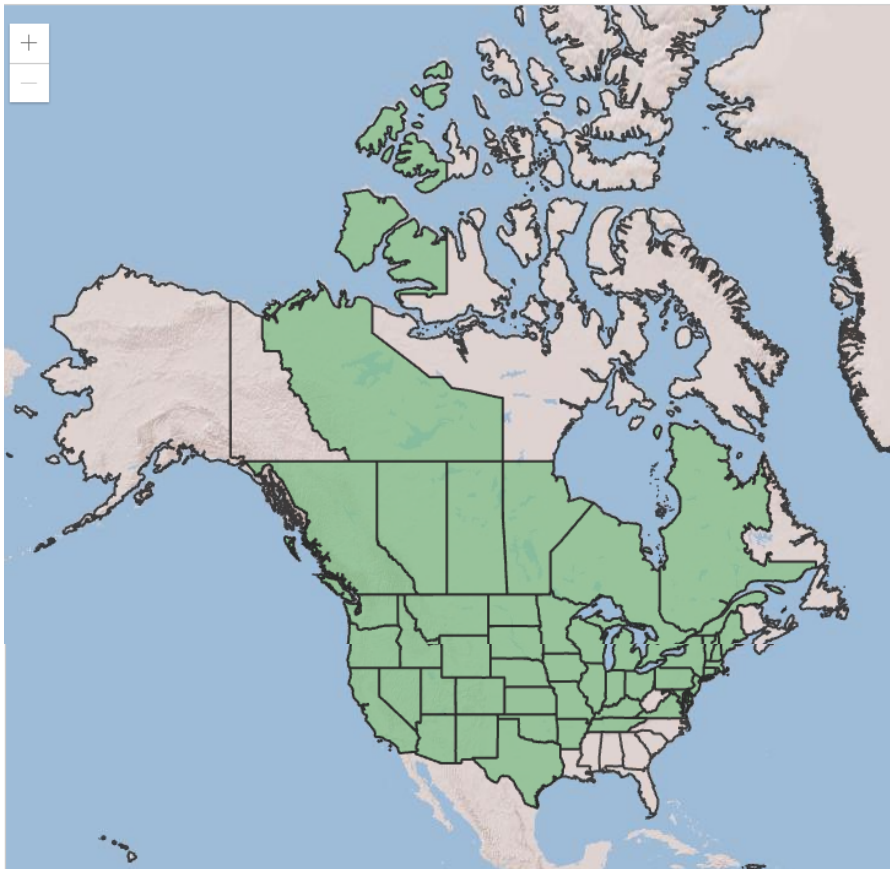
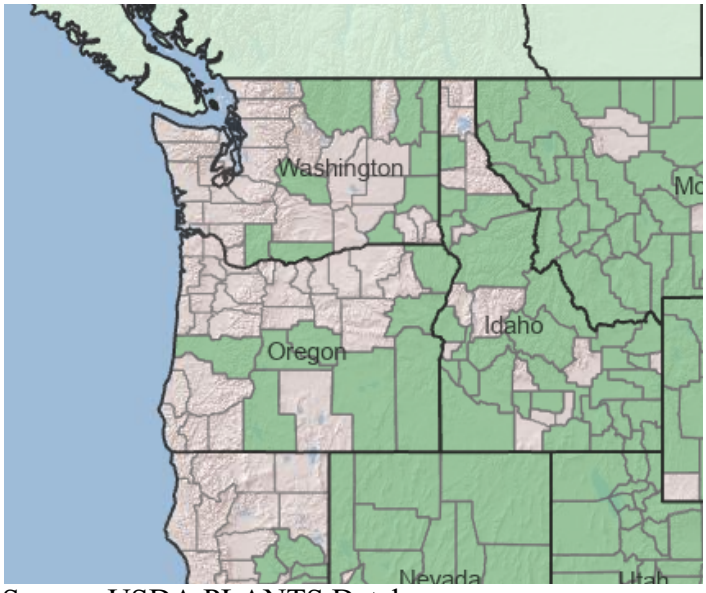
Plant Propagation Protocol for *Grindelia squarrosa*
ESRM 412 – Native Plant Production
Spring 2024
URL: https://courses.washington.edu/esrm412/protocols/*[2024]*/*[GRSQ.pdf]*

Source: Utah State University


Source: University of Nevada

TAXONOMY	
Plant Family	
Scientific Name	Asteraceae
Common Name	Sunflower
Species Scientific Name	
Scientific Name	*Grindelia squarrosa* (Pursh) Dunal
Varieties	
Sub-species	*Grindelia squarrosa* (Pursh) Dunal var. *squarrosa* *Grindelia squarrosa* (Pursh) Dunal var. *serrulata* (Rydb.) Steyerm. *Grindelia squarrosa* (Pursh) Dunal var. *quasiperennis* Lunell
Cultivar	
Common Synonym(s)	Tarweed, resinweed, rosinweed, curlytop [6]
Common Name(s)	Curlycup gumweed
Species Code (as per USDA Plants database)	GRSQ
GENERAL INFORMATION	

Geographical range	North America:  Source: USDA PLANTS Database Pacific Northwest:  Source: USDA PLANTS Database
Ecological distribution	Native all over the United States, except for Southeastern states, Alaska, and Hawaii. Also found throughout Canada. Most often found in prairies and waste places.[10]

Climate and elevation range	Facultative upland plant that is usually found in arid plant communities.[8] Able to inhabit saturated soils if lacking other vegetation.[6] Elevation: 3000 – 8000 ft [9]
Local habitat and abundance	Thrives best in sandy loam, loam, and clayey loam soils.[9] Able to grow well on gentle to steep slopes.[10] Its preferred soil depth is 25-50 cm.[10] Adapted to areas that receive 10 to 20 inches annual precipitation.[10] Associated with sites occupied by non-native grasses.[6]
Plant strategy type / successional stage	Stress-tolerator. Does well in and is adapted to drought and saline conditions. *G. squarrosa* is seral species and subdominant in prairie landscapes. Not the first to colonize after disruption but found in longer-abandoned areas.[10] Commonly found in abandoned or disturbed areas such as roadsides, railroads, abandoned crop/rangelands.[9,10]
Plant characteristics	Erect forb that is typically 1 to 3 feet tall. Multiple stems that emerge from a central base are covered in alternating leaves. The leaves are 1 to 4 inches in length with curly/wavy margins and pointy tips.[6] The plant has daisy-like yellow flower heads with resinous bracts. Flowering begins in July, continuing into September. Variety *quasiperennis* is a short-lived perennial, while var. *serrulata*, and var. *squarrosa* are biennials. Species usually only occur for a few growing seasons.[6] The first year the species forms a rosette, and following years forms multiple branched stems with flowers and fruits, growing from a taproot.[2] Reproduces by seeds that are transported by wind.[6,9,10] Requires partial to full sun.[5] Germination time: 3-5 days.[10,5]
PROPAGATION DETAILS: FROM SEED	
Ecotype	Ecotypes of past protocols: Wildland stand north of Jackpot, Nevada,[7] Waterton Lakes National Park, Alberta[3]
Propagation Goal	Plants
Propagation Method	Seed
Product Type	Container
Stock Type	160 mL container.
Time to Grow	Nuzzo (1978) found 10 weeks from seeding to out planting, whereas protocol by Luna (2008) reported about 30 weeks.
Target Specifications	7 cm in height.[3]
Propagule Collection Instructions	Seeds can be collected late summer, early fall. Dried flower heads can be carefully collected with pruning scissors and kept in paper bags for storage in a well-ventilated drying room. Harvest can also be done by swathing, racquet-and-hopper, and Flail-Vac harvester. Hirning, Tilley, Wolf, and Jolley (2021) found yields to be six higher with the first two methods.

	Seeds are removed from debris by using screens.[3] Tilley (2017) achieved 90-95% purity by cleaning with a multi-deck air-screen cleaner.[7]
Propagule Processing/Propagule Characteristics	Aberdeen Plant Materials Center reports approximately 400,000 seeds/lb and 39 lbs/bushel.[6] Nuzzo (1976) reports 1,700 seedlings per ounce cleaned seed. Seeds maintain viability for at least 3 years under cool-dry storage conditions.[2]
Pre-Planting Propagule Treatments	Seeds exhibit non-deep physiological dormancy which be partly overcome through cold stratification (Dormancy is not always overcome; natural temperature and moisture fluctuations in field setting may prove more effective).[2] Cold and moist stratification for 60 – 70 days.[3,10] Seeds should be soaked in water and then placed in mesh bags, buried in peat moss, and placed in ventilated containers. Temperature kept at 1 – 3°C.[3]
Growing Area Preparation / Annual Practices for Perennial Crops	Hirning, Tilley, Wolf, and Jolley (2021) found no significant differences in seed emergence based on soil texture (sand, loam, clay loam).[2] Can be grown in 160 mL plug containers.[3]
Establishment Phase Details	Plant seeds at 0 – 1 cm soil depth. Hirning, Tilley, Wolf, and Jolley (2021) found highest germination rates of *G. squarrosa* in seeds planted in soil at 0 cm depth/near the soil surface.[2] Soil should be kept slightly moist through daily misting.[3] Important not to overwater as the species prefers dryer soils. Higher rates of germination reported for seeds in the presence of light.[1] Germination occurs at 10°C.[5]
Length of Establishment Phase	4 to 6 weeks.[3]
Active Growth Phase	Rapid shoot and root growth the following weeks after germination. Luna (2008) fertilized plants with 20-20-20 liquid NPK at 100 ppm weekly during the growing season.[3]
Length of Active Growth Phase	Luna (2008) reports 12 weeks.
Hardening Phase	Plants are given less water and irrigated less to prepare for winter season. [3]
Length of Hardening Phase	4 weeks.[3]
Harvesting, Storage and Shipping	Store in greenhouse at temperature of 22°C.[5] Luna (2008) allowed seedlings to overwinter under foam cover and snow.
Length of Storage	Luna (2008) reports 5 months.
Guidelines for Outplanting / Performance on Typical Sites	Flowering usually occurs the second year of growth, however, can happen the first year as well.[2,4] Nuzzo (1976) reports excellent survival when planting in field. Seedlings were easily transplanted and grew rapidly once in field.[4]
Other Comments	There are currently no commercial sources of *G. squarrosa* seeds.[6] Consuming gumweed may be poisonous to animals due to accumulation of selenium in the plant.[9]

	Under proper management and control, *G. squarrosa* should not pose a threat to native plant communities.[6] Improper management can lead to invasive characteristics. Has been reported as a host to Colorado red node virus of bean.[6] Species is used in indigenous communities for a variety of medicinal practices such as skin diseases, whooping cough, and bronchial spasm.[6,9]
INFORMATION SOURCES	
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Protocol Author	Lara Andres
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