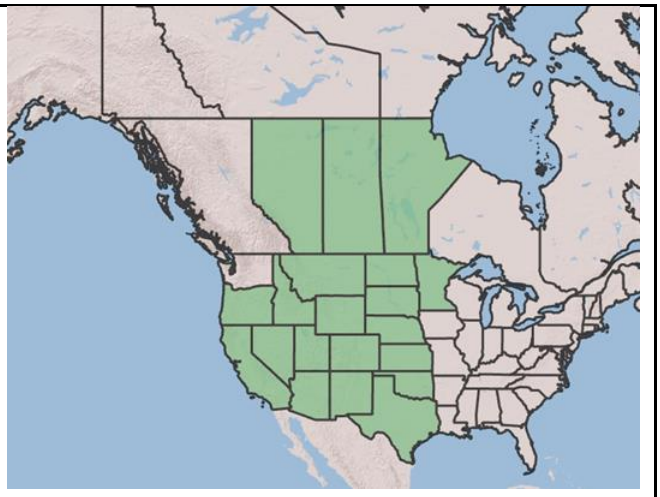
Plant Propagation Protocol for *Escobaria vivipara*

ESRM 412 – Native Plant Production

URL: https://courses.washington.edu/esrm412/protocols/2022/ESVI2

TAXONOMY	
Family Names	
Scientific Name	Cactaceae
Common Name	Cactus family
Species Name	
Scientific Name	*Escobaria vivipara* (Nutt.) Buxbaum
Varieties	None recognized by USDA
Sub-species	None recognized by USDA
Common Synonym(s)	*Coryphantha neomexicana, C. radiosa var. neomexicana, Mammillaria vivipara var. neomexicana, Coryphantha vivipara, Cactus viviparus* (Loflin 2009).
Common Name(s)	Spinystar, ball cactus
Species Code (as per USDA Plants database)	ESVI2
GENERAL INFORMATION	
Geographical range	 (Photo credit: USDA plants database)

	Additionally, *Escobaria Vivipara* range expands into Mexico (ASU Campus Arboretum)
Ecological distribution	Rock outcrops, sedimentary desert soils, desert scrub to mountain forests. Occurs above the frost line in Canada, as well as in hot environments of Mexico (Loflin 2009, Cota-Sanchez 2002).
Climate and elevation range	200-2700m (Loflin 2009)
Local habitat and abundance	Species of least concern in most areas of its wide range. Endangered status in Minnesota in 1996. Threatened in Colorado (Cota-Sanchez 2002, Smith 2020).
Plant strategy type / successional stage	Tolerates low and high temperature stress but does not survive fire or reproduce from roots (Smith 2020). Unlikely to find in areas following disturbance.
Plant characteristics	Colony forming, non-branching, spherical cactus shrub with radial and central spines in mature plants. Spines are lightly pigmented, with dark tips. Flowers are pink and funnel shaped, with a white stigma and yellow/orange stamens (ASU Campus Arboretum, Loflin 2009). Reproduces viviparously, hence the epithet *Vivipara* (Cota-Sanchz 2002).
PROPAGATION DETAILS	
Ecotype	Nearctic ecozone (ASU Campus Arboretum). No experimentally derived protocols found.
Propagation Goal	Viviparous offsets from mother plant, propagules germinated from seeds before dispersal (Smith 2020).
Propagation Method	Use vegetative offsets. Seed germination rates are very low (ASU Campus Arboretum).
Product Type	Propagules from viviparous seeds (ASU Campus Arboretum).

Time to Grow	No specific time, as species are slow growing and maturation rates have not been reported (ASU Campus Arboretum). Outplant when target specifications are met.
Target Specifications	Mature plants develop coarse stems and spines. With a slow growth rate, plants can grow up to 60 cm in diameter (ASU Campus Arboretum, Smith 2020). For outplantins, cacti should reach at least 2 in in diameter (Toogood 1999).
Propagule Collection Instructions	Seeds and fruits on plant from August-September. Break open fruits and store/ remove propagules (Smith 2020). Sow after the last frost of the local season (ASU Campus Arboretum).
Propagule Processing/Propagule Characteristics	50-100 seeds per fruiting flower (Smith 2020). Seeds will germinate before dispersal.
Pre-Planting Propagule Treatments	Allow surface of offsets to callus and dry before planting (Grantham 1999, Ashley 1977).
Growing Area Preparation / Annual Practices for Perennial Crops	Use fast draining and rocky/ sandy soil (mix native soil with one half coarse sand), do not add organic matter, only trace amounts of fertilizer (Chance 2012). Allow full sunlight or partial shade and water sparingly (once a week) during the summer, allowing drought during the winter. Use containers that promote drainage (ASU Campus Arboretum). Since *Escobaria vivipara* is slow growing, small 2 inch containers may be used to save space (Toogood 1999).
Establishment Phase Details	No specific information found for *Escobaria vivipara,* but information for another viviparous cactus, *Epiphyllum phyllanthus*, suggests that establishment is the limiting factor affecting mortality and that the first week of establishment should be held under controlled conditions (Cota-Sanchz 2007). Set on rooting soil or strike very shallow (Ashley 1977). Avoid

	high humidity, but bottom heat may be beneficial (Hartmann 2002).
Length of Establishment Phase	Germination occurs before dispersal.
Active Growth Phase	Allow full sunlight or partial shade and water once a week (ASU Campus Arboretum).
Length of Active Growth Phase	*Escobaria vivipara* is slow growing, so the active growth phase may vary (ASU Campus Arboretum). Toogood 1999 suggests that cacti seedlings/ propagules should double in size every 3-6 months, until they reach 2in diameter after 2-4 years.
Hardening Phase	Allow full sunlight or partial shade and water sparingly (once a week) during the summer, allowing drought during the winter (ASU Campus Arboretum). Cut off watering in autumn months to induce dormancy before temperatures drop below freezing (Chance 2012). Hardiness zone 4b (Calhoun 2012).
Length of Hardening Phase	Spring typically begins in March and flowering occurs in July-August, so the hardening phase is about 5-6 months (Smith 2020).
Harvesting, Storage and Shipping	Do not allow propagules to dry out completely during transportation (Ashley 1977). Since vivipary is an adaptation to protect propagules from extreme temperature fluctuations, do not allow propagules to freeze (Cota-Sanchez 2002).
Length of Storage	Seedlings germinate before collection. Store for as little time as possible to reduce mortality before establishment (Cota-Sanchez 2007).
Guidelines for Outplanting / Performance on Typical Sites	No information found for outplanting performance. However, it is recommended to only repot every 4 years to avoid damage to the roots (ASU Campus Arboretum).

Other Comments	No collection restrictions found in the Pacific Northwest region. Consult state and federal guidelines for collections in other areas.
INFORMATION SOURCES	
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Protocol Author	Phoebe Smurthwaite
Date Protocol Created or Updated	05/04/2022