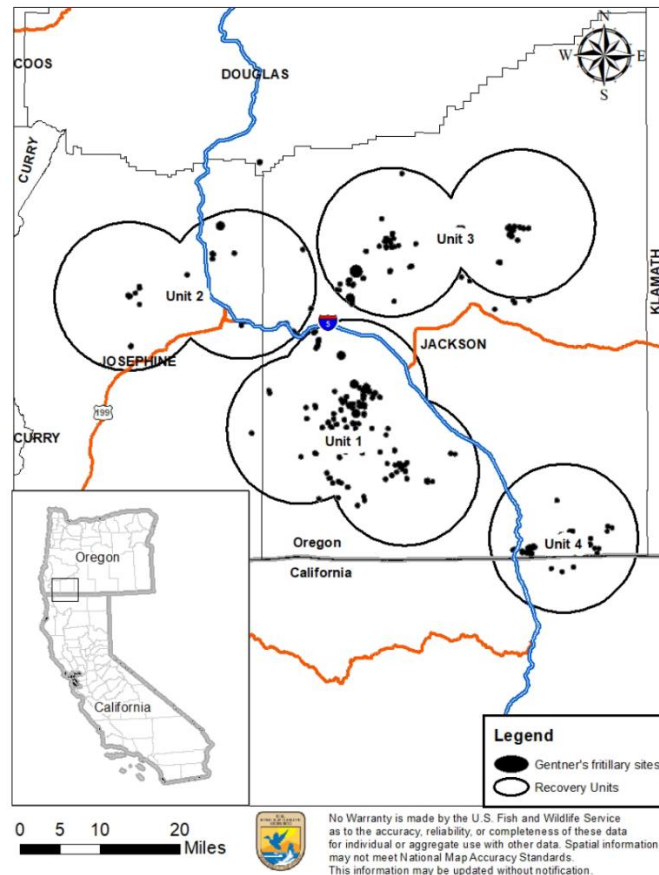


Plant Propagation Protocol for *Fritillaria gentneri*

ESRM 412 – Native Plant Production

URL: <https://courses.washington.edu/esrm412/protocols/2026/FRGE.pdf>



From USFWS Species Assessment Report¹⁰



FIGURE 2. Photograph showing comparative floral features of three co-occurring *Fritillaria* species: *Fritillaria gentneri* (center), *F. affinis* (left), and *F. recurva* (right) (photo provided by Medford Bureau of Land Management, used with permission).

Image and caption from USFWS Species Recovery Plan⁸



FIGURE 3. Mature *Fritillaria gentneri* bulbs produce dozens of rice-grain bulblets, resulting in dense clusters of young individuals that vastly outnumber flowering plants in populations. As discussed later in this plan, such bulblets could prove instrumental in future off-site cultivation and population augmentation projects. Photo by Dr. Robert Meinke, used with permission.

Image and caption from USFWS Species Recovery Plan⁸

TAXONOMY	
Plant Family	Liliaceae – Lily family
Scientific Name	<i>Fritillaria gentneri</i>
Common Name	Gentner’s Fritillary
Species Scientific Name	
Scientific Name	<i>Fritillaria gentneri</i> Gilkey
Varieties	None
Sub-species	None
Cultivar	None
Common Synonym(s)	None
Common Name(s)	Gentner’s fritillary, Gentner’s mission-bells
Species Code (as per USDA Plants database)	FRGE
GENERAL INFORMATION	
Geographical range	Found in Jackson and Josephine in Southern Oregon and just across the border in Siskiyou County California. ⁹ Restricted to Rogue and Klamath River watersheds. ⁹
Ecological distribution	Grasslands and chapparal, clearings in oak and coniferous forests. Prefers southern slopes. ⁹
Climate and elevation range	Prefers mild, warm winters and dry summers. Found from 1,000-5,000 feet in elevation. ^{8,9}
Local habitat and abundance	Found in clearings characterized by sparse shade provided by shrubs. ^{8,9} Believed to be

	affiliated with Vannoy type soils. ⁹ Most populations contain less than 100 individuals. ²
Plant strategy type / successional stage	Found in broad range of successional stages and disturbance regimes. ⁸ Too infrequent disturbance may lead to competition with weeds and grasses; too little may result in shading out by shrubs. ⁸
Plant characteristics	Fritillary of the lily family with deep red to maroon flowers patterned with yellow checkers. ⁷ Flowering plants may have 1-15 flowers and 3-5 leaves and grow to a height of 28 inches. ^{7,9} Flowers bloom from April to June. ⁸ Non-flowering plants consist of one long leaf and cannot be differentiated from similar species. ^{7,8,9} Life span and age of reproductive maturity unknown. ⁸ Hybrid species that developed from species <i>Fritillaria affinis</i> (chocolate lily) and <i>Fritillaria recurva</i> (scarlet fritillary) 10,000 years ago. ² Sources differ on if there was one or multiple hybridization events. ⁸ Propagates vegetatively through small, scaly bulbets ³ that develop around mother bulb in high numbers. ^{8,9} Hybrid ancestry may result in sterility – fruiting bodies are rare and seed viability is thought to be low. ^{8,9} Some plants have been observed to bloom in consecutive years, but many enter dormancy. ⁸ Only a small percentage of population blooms each year. ^{2,8}
PROPAGATION DETAILS: FROM SEED According to a propagation protocol for related species <i>Fritillaria pudica</i> published by the USDA⁵	
Ecotype	Seeds should come from parents from distant population centers to increase odds of seed viability due to low genetic diversity. ^{8,9}
Propagation Goal	Bulbs
Propagation Method	Seed
Product Type	Container (plug)
Stock Type	Not specified
Time to Grow	3 years
Target Specifications	
Propagule Collection Instructions	Seeds should be collected when fruiting bodies start to split in June or July. Seed capsules can

	be collected or seeds can be shaken out to be stored in paper envelopes until cleaning.
Propagule Processing/Propagule Characteristics	Seeds don't require cleaning. Capsules can be crushed and seeds separated using an air column separator. Seeds are stored at 4.5 degrees Celsius at 40% humidity. Density was determined to be 366 seeds/gram.
Pre-Planting Propagule Treatments	Seeds can be planted outside in fall and allowed to undergo natural stratification, or placed in cold, moist stratification for 90 days in the dark or 120 days in the light.
Growing Area Preparation / Annual Practices for Perennial Crops	Plant seeds in November or December in flats filled with a 2:1 mixture of sunshine mix and sand. Seeds should be covered lightly in soil and then should be covered in pea gravel. Flats should be watered generously and placed outside.
Establishment Phase Details	Water flats only during extended dry periods. Plants should germinate in March or April. Some seeds may require an extra year outdoors to germinate.
Length of Establishment Phase	4-5 months
Active Growth Phase	Plants are brought indoors for the summer to senesce. They should only be watered enough to prevent soil from completely drying. In subsequent seasons plants will emerge from bulbs in March.
Length of Active Growth Phase	Not specified
Hardening Phase	Hardening is not necessary. Plants will be dormant from the hot days of summer through the winter. Plants may need to be brought indoors during extreme cold and should be protected from rodents.
Length of Hardening Phase	Not specified
Harvesting, Storage and Shipping	After four growing seasons, bulbs can be replanted in fields in the late fall. Plants may flower the next year or require additional seasons. Large bulb may be up to 15 mm in diameter with offsets.
Length of Storage	Not specified
Guidelines for Outplanting / Performance on Typical Sites	Not specified

Other Comments	Only scientists contracted by federal or state governments should collect seeds from wild plants or attempt to germinate seeds under laboratory conditions. This species is not suitable for personal collections due to rarity and is subject to protections as a federally endangered species.
PROPAGATION DETAILS: FROM SEED	
According to a Kew Gardens guide on fritillaria propagation¹⁰ and a USDA guide to <i>Fritillaria affinis</i> propagation⁶	
Ecotype	Seeds should come from parents from distant population centers to increase odds of seed viability due to low genetic diversity. ^{8,9}
Propagation Goal	Seedlings
Propagation Method	Seed
Product Type	Container
Stock Type	Long-tom pots, 8 cm wide ¹⁰
Time to Grow	2-4 years
Target Specifications	Not specified
Propagule Collection Instructions	According to the USDA, fritillaria fruiting capsules begin to split when ripe, and seeds must be collected immediately. ⁶
Propagule Processing/Propagule Characteristics	According to the USDA, seeds should be allowed to dry without heat and then stored in a dry, cool, ventilated place in paper envelopes to prevent rot. ⁶ Fall is the best time to plant, but if seeds are available earlier, it is better to plant immediately. ⁶
Pre-Planting Propagule Treatments	None specified
Growing Area Preparation / Annual Practices for Perennial Crops	The USDA suggests a sandy commercial soil mix ⁶
Establishment Phase Details	At Kew, fritillary seeds are planted in outdoor pots in late autumn or winter. When seeds germinate in spring, they are moved to a greenhouse. ¹⁰ The USDA suggests planting seeds a seeds-width apart and sieving a thin layer of soil over the seeds, which are then covered in grit. ⁶ Both sources suggest plunging pots into a sand frame and emphasize the importance of keeping them moist. ^{6,10}

Length of Establishment Phase	3-4 months (germination occurs in the following spring) ¹⁰
Active Growth Phase	At Kew, fritillary seedlings are not disturbed until they form a small bulb. ¹⁰ Soil during this time must be kept moist. ¹⁰ Plants will enter senescence over the summer, during which time they require less watering. ¹⁰ The USDA suggests allowing bulbs to undergo at least two growing seasons before repotting. ⁶ At this stage, plants can be cultivated in the same way as bulbs covered in the vegetative propagation section.
Length of Active Growth Phase	2-4 years ¹⁰
Hardening Phase	Not specified
Length of Hardening Phase	Not specified
Harvesting, Storage and Shipping	Not specified
Length of Storage	Not specified
Guidelines for Outplanting / Performance on Typical Sites	It typically take 3-5 years for fritillaries to mature to flowering. ¹⁰
Other Comments	Only scientists contracted by federal or state governments should collect seeds from wild plants or attempt to germinate seeds under laboratory conditions. This species is not suitable for personal collections due to rarity and is subject to protections as a federally endangered species.
PROPAGATION DETAILS: FROM SEED	
According to an experimental study on breaking dormancy in <i>Fritillaria persica</i>⁴	
Ecotype	Seeds should come from parents from distant population centers to increase odds of seed viability due to low genetic diversity. ^{8,9}
Propagation Goal	Seedlings
Propagation Method	Seed
Product Type	Container
Stock Type	Agar dishes
Time to Grow	Not included
Target Specifications	Not included
Propagule Collection Instructions	Mature seed capsules were collected from experimental fields and subsequently stored in dark conditions at 24 degrees celsius for one year.
Propagule Processing/Propagule Characteristics	Seeds were removed from dry capsules and disinfected in 100% commercial bleach for

	fifteen minutes. Seeds were then rinsed in distilled water.
Pre-Planting Propagule Treatments	Seeds were placed on plates of 0.65% (w/v) agar solidified MS medium. They were then placed in dark storage at 4 degrees Celsius. Storing for 90 days resulted in germination, storage for 130 days induced bulbets.
Growing Area Preparation / Annual Practices for Perennial Crops	0.65% (w/v) agar solidified MS medium
Establishment Phase Details	Not included
Length of Establishment Phase	Not included
Active Growth Phase	Not included
Length of Active Growth Phase	Not included
Hardening Phase	Not included
Length of Hardening Phase	Not included
Harvesting, Storage and Shipping	Not included
Length of Storage	Not included
Guidelines for Outplanting / Performance on Typical Sites	Not included
Other Comments	Only scientists contracted by federal or state governments should collect seeds from wild plants or attempt to germinate seeds under laboratory conditions. This species is not suitable for personal collections due to rarity and is subject to protections as a federally endangered species.
PROPAGATION DETAILS: VEGETATIVE According to a Kew Gardens guide on growing fritillaria	
Ecotype	Not included
Propagation Goal	Seedlings
Propagation Method	Vegetative
Product Type	Bareroot
Stock Type	Not specified
Time to Grow	Not specified
Target Specifications	Not specified
Propagule Collection Instructions	Not specified
Propagule Processing/Propagule Characteristics	Not specified
Pre-Planting Propagule Treatments	The USDA suggests that the storage of <i>F. affinis</i> bulbets occur in lightly moist bark, peat, or shredded wood and warn that bulbs may

	deteriorate or rot if stored for extended periods of time. ⁶
Growing Area Preparation / Annual Practices for Perennial Crops	At Kew Gardens, <i>F. affinis</i> and <i>F. recurva</i> are grown in gritty, loam-based soils with coconut fiber or leaf mold added to retain moisture. ¹⁰ The USDA corroborates the use of leaf mold, and also suggests peat and compost for these woodland plants that prefer acidic soil. ⁶ The USDA also recommends a high-potassium fertilizer to encourage flower growth. ⁶
Establishment Phase Details	Not specified
Length of Establishment Phase	Not specified
Active Growth Phase	Not specified
Length of Active Growth Phase	Not specified
Hardening Phase	Not specified
Length of Hardening Phase	Not specified
Harvesting, Storage and Shipping	When producing <i>F. affinis</i> , the USDA suggests waiting for bulbets to set and initial leaves to senesce before removing bulbs from soil, cleaning them, and placing them in cool, moist soil (no more detail provided). ⁶
Length of Storage	Not specified
Guidelines for Outplanting / Performance on Typical Sites	Not specified
Other Comments	Only scientists contracted by federal or state governments should collect bulbs or bulbets. This species is not suitable for personal collections due to rarity and is subject to protections as a federally endangered species
INFORMATION SOURCES	
References	See below
Other Sources Consulted	None
Protocol Author (First and last name)	Emma Howell
Date Protocol Created or Updated	5/16/26

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