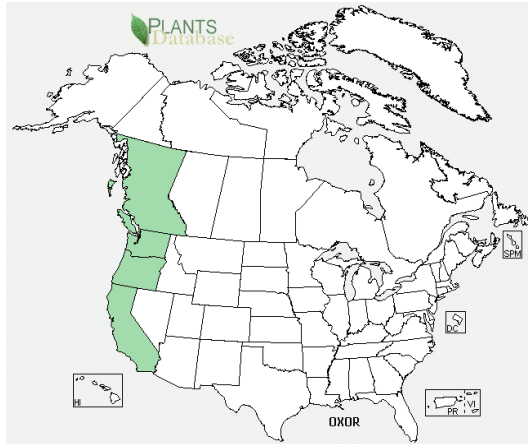
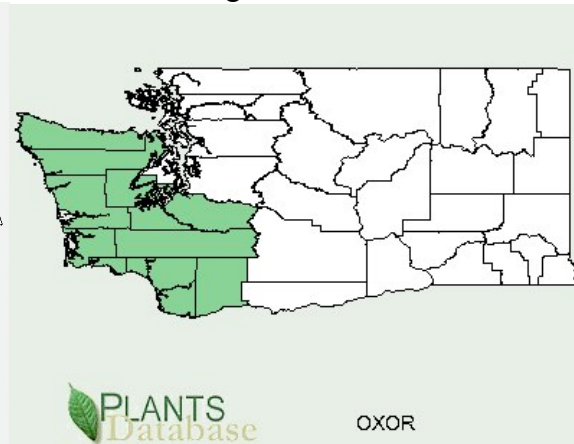


**Plant Propagation Protocol for *Oxalis oregana***  
 ESRM 412 – Native Plant Production  
 Spring 2011

North America Distribution



Washington Distribution



Source: USDA PLANTS Database (7)

| <b>TAXONOMY</b>                                                                                                                      |                                                                                                                                       |
|--------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| <b>Family Names</b>                                                                                                                  |                                                                                                                                       |
| Family Scientific Name:                                                                                                              | Oxalidaceae                                                                                                                           |
| Family Common Name:                                                                                                                  | Wood Sorrel Family                                                                                                                    |
| <b>Scientific Names</b>                                                                                                              |                                                                                                                                       |
| Genus:                                                                                                                               | <i>Oxalis</i>                                                                                                                         |
| Species:                                                                                                                             | <i>oregana</i>                                                                                                                        |
| Species Authority:                                                                                                                   | Nutt.                                                                                                                                 |
| Variety:                                                                                                                             |                                                                                                                                       |
| Sub-species:                                                                                                                         |                                                                                                                                       |
| Cultivar:                                                                                                                            |                                                                                                                                       |
| Authority for Variety/Sub-species:                                                                                                   |                                                                                                                                       |
| Common Synonym(s) (include full scientific names (e.g., <i>Elymus glaucus</i> Buckley), including variety or subspecies information) | <i>Oxalis acetosella</i> L. ssp. <i>oregana</i> (Nutt.) D. Löve<br><i>Oxalis oregana</i> Nutt. var. <i>smallii</i> (R. Knuth) M. Peck |
| Common Name(s):                                                                                                                      | Redwood sorrel, Oregon oxalis, Oregon wood-sorrel                                                                                     |
| Species Code (as per USDA Plants database):                                                                                          | OXOR                                                                                                                                  |
| <b>GENERAL INFORMATION</b>                                                                                                           |                                                                                                                                       |
| Geographical range (distribution maps for North America and Washington state)                                                        | See above.                                                                                                                            |
| Ecological distribution (ecosystems it)                                                                                              | Found preferentially in older forests with wide buffer                                                                                |

|                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| occurs in, etc):                                                                                                   | zone (6), moist forest (4, 5, 7), coastal redwood forests (3, 5), and near Douglas-fir ( <i>Pseudotsuga menziesii</i> ) (8).                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Climate and elevation range                                                                                        | From lowland to mid-elevation (4, 5, 7).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Local habitat and abundance; may include commonly associated species                                               | Productive sites with high precip and fertile soil (7), acid soils rich in OM (5), pH 4.5-6.5 (1). Associated with coastal redwoods (3, 5), Douglas-fir (8), <i>Maianthemum racemosum</i> , and <i>Trillium chloropetalum</i> (1).                                                                                                                                                                                                                                                                                                                                     |
| Plant strategy type / successional stage (stress-tolerator, competitor, weedy/colonizer, seral, late successional) | Shade tolerant (1, 3).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Plant characteristics (life form (shrub, grass, forb), longevity, key characteristics, etc)                        | Perennial, rhizomatous, creates carpet on forest floor, “shamrock” leaves with 3 leaflets, rounded or shallowly lobed, on the end of a slender, red-green stalk, which is hairy. Small white to pink flowers with 5 petals are single per stalk in April-September and fruit is five-chambered oblong capsule that ruptures when ripe to disperse almond-shaped, corrugated seeds (2, 4, 5, 7). Fruits spring to early fall (1). Leaflets fold down in direct sunlight and at night to conserve moisture, and in heavy rainfall to reduce the impact of raindrops (4). |

## PROPAGATION DETAILS

### Wildflower Gardener’s Guide (1)

|                                                                                                                                                           |                        |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| Ecotype (this is meant primarily for experimentally derived protocols, and is a description of where the seed that was tested came from):                 |                        |
| Propagation Goal (Options: Plants, Cuttings, Seeds, Bulbs, Somatic Embryos, and/or Other Propagules):                                                     | Plants                 |
| Propagation Method (Options: Seed or Vegetative):                                                                                                         | Vegetative or seed     |
| Product Type (options: Container (plug), Bareroot (field grown), Plug + (container-field grown hybrids, and/or Propagules (seeds, cuttings, poles, etc.)) | Container or bare root |
| Stock Type:                                                                                                                                               |                        |

|                                                                                                                                                                |                                                                                                        |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| Time to Grow (from seeding until plants are ready to be outplanted):                                                                                           |                                                                                                        |
| Target Specifications (size or characteristics of target plants to be produced):                                                                               |                                                                                                        |
| Propagule Collection (how, when, etc):                                                                                                                         | Division of mature rhizomes                                                                            |
| Propagule Processing/Propagule Characteristics (including seed density (# per pound), seed longevity, etc):                                                    |                                                                                                        |
| Pre-Planting Propagule Treatments (cleaning, dormancy treatments, etc):                                                                                        | No seed treatment                                                                                      |
| Growing Area Preparation / Annual Practices for Perennial Crops (growing media, type and size of containers, etc):                                             | Keep soil moist until seedlings are well established. If direct seeding, just scratch seeds into soil. |
| Establishment Phase (from seeding to germination):                                                                                                             |                                                                                                        |
| Length of Establishment Phase:                                                                                                                                 |                                                                                                        |
| Active Growth Phase (from germination until plants are no longer actively growing):                                                                            |                                                                                                        |
| Length of Active Growth Phase:                                                                                                                                 |                                                                                                        |
| Hardening Phase (from end of active growth phase to end of growing season; primarily related to the development of cold-hardiness and preparation for winter): |                                                                                                        |
| Length of Hardening Phase:                                                                                                                                     |                                                                                                        |
| Harvesting, Storage and Shipping (of seedlings):                                                                                                               |                                                                                                        |
| Length of Storage (of seedlings, between nursery and outplanting):                                                                                             |                                                                                                        |
| Guidelines for Outplanting / Performance on Typical Sites (eg, percent survival, height or diameter growth, elapsed time before flowering):                    | Plant in shady areas with moist soil, away from human foot traffic.                                    |
| Other Comments (including collection restrictions or guidelines, if available):                                                                                |                                                                                                        |
|                                                                                                                                                                |                                                                                                        |

| <b>Native Plant Network (8)</b>                                                                                                                                |                                                                                                                                                                                                                     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ecotype (this is meant primarily for experimentally derived protocols, and is a description of where the seed that was tested came from):                      | Propagules were from established nursery stock originally collected in Muir Woods, CA.                                                                                                                              |
| Propagation Goal (Options: Plants, Cuttings, Seeds, Bulbs, Somatic Embryos, and/or Other Propagules):                                                          | Plants                                                                                                                                                                                                              |
| Propagation Method (Options: Seed or Vegetative):                                                                                                              | Vegetative                                                                                                                                                                                                          |
| Product Type (options: Container (plug), Bareroot (field grown), Plug + (container-field grown hybrids, and/or Propagules (seeds, cuttings, poles, etc.))      | Container (plug)                                                                                                                                                                                                    |
| Stock Type:                                                                                                                                                    | 4 inch square pots                                                                                                                                                                                                  |
| Time to Grow (from seeding until plants are ready to be outplanted):                                                                                           |                                                                                                                                                                                                                     |
| Target Specifications (size or characteristics of target plants to be produced):                                                                               | Root system: firm plug in container                                                                                                                                                                                 |
| Propagule Collection (how, when, etc):                                                                                                                         | From nursery stock, divisions made in mid-September                                                                                                                                                                 |
| Propagule Processing/Propagule Characteristics (including seed density (# per pound), seed longevity, etc):                                                    | None                                                                                                                                                                                                                |
| Pre-Planting Propagule Treatments (cleaning, dormancy treatments, etc):                                                                                        | None                                                                                                                                                                                                                |
| Growing Area Preparation / Annual Practices for Perennial Crops (growing media, type and size of containers, etc):                                             | Four inch pots filled with potting mix of peat moss, fir bark, perlite and sand. Plants divided into sections containing root/rhizome mass and a few leaves. Stored in shadehouse with automatic irrigation system. |
| Establishment Phase (from seeding to germination):                                                                                                             |                                                                                                                                                                                                                     |
| Length of Establishment Phase:                                                                                                                                 |                                                                                                                                                                                                                     |
| Active Growth Phase (from germination until plants are no longer actively growing):                                                                            |                                                                                                                                                                                                                     |
| Length of Active Growth Phase:                                                                                                                                 |                                                                                                                                                                                                                     |
| Hardening Phase (from end of active growth phase to end of growing season; primarily related to the development of cold-hardiness and preparation for winter): |                                                                                                                                                                                                                     |

|                                                                                                                                             |                                                                           |
|---------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|
| Length of Hardening Phase:                                                                                                                  |                                                                           |
| Harvesting, Storage and Shipping (of seedlings):                                                                                            |                                                                           |
| Length of Storage (of seedlings, between nursery and outplanting):                                                                          |                                                                           |
| Guidelines for Outplanting / Performance on Typical Sites (eg, percent survival, height or diameter growth, elapsed time before flowering): | Average 90% survival in transplanting.<br>Water in well when outplanting. |
| Other Comments (including collection restrictions or guidelines, if available):                                                             | Divisions can be done on site by dividing plants in the field.            |
| <b>INFORMATION SOURCES</b>                                                                                                                  |                                                                           |
| References (full citations):                                                                                                                | See below.                                                                |
| Other Sources Consulted (but that contained no pertinent information) (full citations):                                                     | See below.                                                                |
| Protocol Author (First and last name):                                                                                                      | Natalie Schmidt                                                           |
| Date Protocol Created or Updated (MM/DD/YY):                                                                                                | 04/20/11                                                                  |

### References:

- (1)  
Art, H. W. 1990. The Wildflower Gardener's Guide, Pacific Northwest, Rocky Mountain, and Western Canada Edition. Storey Communications, Inc. Pownal, Vermont. Pgs 94-95.
- (2)  
Kruckeberg, A. R. 1982. Gardening With Native Plants of the Pacific Northwest. Second Edition. University of Washington Press. Seattle, Washington. Pg 203.
- (3)  
Lady Bird Johnson Wildflower Center Website. 2011. Native Plant Database Entry for *Oxalis oregana*. URL: <http://www.wildflower.org>. University of Texas. Austin, Texas. [http://www.wildflower.org/plants/result.php?id\\_plant=OXOR](http://www.wildflower.org/plants/result.php?id_plant=OXOR)
- (4)  
Pojar, J. and A. MacKinnon. 1994. Plants of the Pacific Northwest Coast. Lone Pine Publishing. Vancouver, British Colombia, Canada. Pg 315.
- (5)

Rose, R., C. E. C. Chachulski and D. L. Haase. 1998. Propagation of Pacific Northwest Native Plants. Oregon State University Press. Corvallis, Oregon. Pg 53.

(6)

Russel, W. 2009. *The influence of timber harvest on the structure and composition of riparian forests in the Coastal Redwood region*. Forest Ecology and Management. **257:5**. Pgs 1427-1433.

(7)

USDA Natural Resources and Conservation Service Website. Plant Profile for *Oxalis oregana*. URL: <http://plants.usda.gov> (accessed 9 April 2011).  
<http://plants.usda.gov/java/profile?symbol=OXOR>

(8)

Young, Betty 2001. Propagation protocol for vegetative production of container *Oxalis oregana* Nutt. plants (4 inch square pots); San Francisco, California. In: Native Plant Network. URL: <http://www.nativeplantnetwork.org> (accessed 4 April 2011). Moscow (ID): University of Idaho, College of Natural Resources, Forest Research Nursery.  
<http://www.nativeplantnetwork.org/network/ViewProtocols.aspx?ProtocolID=655,656>

**Other Sources Consulted (but that contained no pertinent information):**

Schmidt, M. G. 1980. Growing California Native Plants. University of California Press. Berkeley and Los Angeles, California.

Young, J. A. and C. G. Young. 1986. Collecting, Processing and Germinating Seeds of Wildland Plants. Timber Press. Portland, Oregon.

Note: This template was modified by J.D. Bakker from that available at:  
<http://www.nativeplantnetwork.org/network/SampleBlankForm.asp>

## **Wood-sorrel**

### ***Oxalis oregana***

#### **Range**

Washington, Oregon and northern California, rare in alluvial forests of western Vancouver Island and Queen Charlotte Islands (4).

#### **Climate, Elevation**

Temperate climates at low to medium elevations (4).

#### **Local occurrence** (where, how common)

In deep shade of mature alluvial forests.

#### **Habitat preference**

Productive forest sites with high precipitation and fertile soil (2, 4).

#### **Plant strategy type/successional stage**

Requiring moist conditions, it forms understory groundcover in late successional conifer forests (1).

#### **Associated species**

Sitka spruce (*Picea sitchensis*), Douglas-fir (*Pseudotsuga menziesii*), sword fern (*Polystichum munitum*), western trillium (*Trillium ovatum*), salal (*Gaultheria shallon*), and deer fern (*Blechnum spicant*). In northern California, coastal redwood (*Sequoia sempervirens*) associated overstory conifer species (1).

#### **May be collected as**

Divisions in mid September (5).

#### **Collection restrictions or guidelines**

Remove all but one or two leaves from plant division. Each division must contain a root or rhizome mass. (5).

#### **Seed germination**

Seeds require no seed pretreatment. Other members of the *Oxalis* genus are weedy pests in greenhouse environments (6). Seeds planted in cold frame in late winter to early spring. Transplant seedlings into individual pots when large enough to handle and plant in late spring or early summer (3).

#### **Seed life**

Short shelf-life, best if sown as soon as ripe (3).

#### **Propagation recommendations**

In restoration practices, propagation of divisions from vicinity of site is recommended. Seeding is also an option, but no success rates were found.

**Soil or medium requirements**

In field, moist humus. In nursery environment, standard potting mix of peat moss, fir bark, perlite, and sand (5).

**Installation form**

Transplanting divisions is cheap and survival averages 90% (5).

**Care requirements after installed**

Water transplanted divisions in well. No additional watering requirements specified (5).

**Normal rate of growth or spread; lifespan**

Can be an aggressive groundcover in appropriate growth conditions (3).

**Sources**

1. Fire Effects Information System, USDA FS. [www.feis.org](http://www.feis.org)
2. Gifford Pinchot National Forest, USDA FS. [www.fs.fed.us/gpnf/forest-research/ei/special/species/herbs/oxor.html](http://www.fs.fed.us/gpnf/forest-research/ei/special/species/herbs/oxor.html)
3. Plants for a Future, University of Leeds. "*Oxalis oregana*"  
[http://www.scs.leeds.ac.uk/cgi-bin/pfaf/arr\\_html?Oxalis+oregana&CAN=LATIND](http://www.scs.leeds.ac.uk/cgi-bin/pfaf/arr_html?Oxalis+oregana&CAN=LATIND)
4. Pojar, J. and A. MacKinnon. Plants of the Pacific Northwest Coast- Washington, Oregon, British Columbia and Alaska. B.C. Ministry of Forest and Lone Pine Publishing. 1994.
5. Young, Betty. *Oxalis oregana* protocol information. NPS, Golden Gate National Park.  
[http://www.nativeplantnetwork.org/network/view.asp?protocol\\_id=655,656](http://www.nativeplantnetwork.org/network/view.asp?protocol_id=655,656)
6. Young, J. and Cheryl G. Young. *Collecting, Processing, and Germinating Seeds of Wildland Plants*. Timber Press, Portland, Or: 1986.

*Data compiled by Sacha Johnson, 4/21/04*