

## STRAWBERRY CLOVER

*Trifolium fragiferum* L.

Plant Symbol = TRFR2

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Program



Strawberry Clover. FAO, Rome, Italy. Used with permission.

### Alternate Names

*Trifolium fragiferum* L. ssp. *Bonannii* (C. Presl)  
Sojak. TRFRB.

### Uses

Strawberry clover is mainly used for pasture and in mixtures with grass for hay and silage. It has also been used to a limited extent as groundcover in orchards and vineyards and for green manure cover crop applications. Forage and seeds of strawberry clover are also used by big and small game and upland birds (Stevens and Monsen, 2004).

### Status

Consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status (e.g., threatened or endangered species, state noxious status, and wetland indicator values).

### Description

General: Pea Family (Fabaceae). Strawberry clover is an introduced perennial low-growing plant with creeping stems that root at the node (stolons) to

spread and it also produces seed. It is subglabrous with slender, pointed trifoliate leaves. Leaf veins are distinctive with veins meeting edge of leaf at right angles. Hairs are present on the petioles and underside of the leaflet. Stipules are mostly inconspicuous and become gradually narrowed to apex. Seedlings are initially tap-rooted and stolons that initiate from leaf axils form a prostrate plant network. The inflorescence is globular and compact, 10-12 mm (0.03-0.04 in) diameter, with pink or purplish red florets. When seed is ripe, the florets become reddish and resemble strawberries. Flower heads enlarge to a fuzzy reddish ball approximately 2 cm (0.78 in) in diameter when ripe. The pubescent fruiting calyces contain 1-2 heart-shaped seeds that are light brown in color with dark brown flecks. Chromosome number is  $2n=2x=16$  and is cross-pollinated by bumble bees and honey bees (Frame, 2005). Plant height is 20 to 35 cm (8-14 in). Strawberry clover resembles white clover in stature.



Strawberry clover leaf. FAO, Rome, Italy. Used with permission.

### Distribution

Strawberry clover is native to the eastern Mediterranean and southern Asia Minor Countries and has been intentionally and inadvertently spread by man to every continent on earth (Hollowell, 1939). It is grown to a limited degree as a pasture plant in moist alkaline and saline soils in the western and northern Great Plains states (McGregor, 1976).

For current distribution, consult the Plant Profile page for this species on the PLANTS Web site.

### Adaptation

Strawberry clover is noted for its ability to establish and persist on wet saline and alkaline soils and is adapted to wet meadows, streams and seeps. It is the

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Plant Fact Sheet/Guide Coordination Page <<http://plant-materials.nrcs.usda.gov/intranet/pfs.html>>

National Plant Data Center <<http://npdc.usda.gov>>

most saline tolerant clover commercially available. Strawberry clover withstands flooding because the stolons have a tropic response that causes the tips to be elevated above the water level (Stevens and Monsen, 2004). It is adapted to a wide range of soil textures from loam to clay and tolerates soil pH of 5.3-8.2. It is tolerant of flooding for up to 2 months, salinity (up to 3 percent concentration), and short-term drought. It needs at least 25 inches of annual precipitation to thrive but can withstand mean annual precipitation as low as 17 inches and can tolerate mean annual temperatures of 40-50°F. (UC SAREP Online). Strawberry clover is more hardy and tolerant of harsh environmental conditions than white clover.

### **Establishment**

There are approximately 300,000 seeds per pound (PLANTS Database) and the seeding rate is 4 pounds Pure Live Seed (PLS) per acre. If used as a component of a seeding mix, adjust to percent of mix desired. For grazing situations, strawberry clover should be limited to 1 pound PLS per acre or 25 percent of the total seed mix (Ogle, et.al 2009). Strawberry clover seed requires inoculation in order to fix nitrogen and also requires the special strain of *Rhizobia leguminosarum trifolii* (Miller, et. al, 2010), (UC SAREP Online). Seedbed should be clean (weed-free) and firm and seed may be drilled to 1/8 - 1/4 inch depth and light but firm soil cover or broadcast seeded followed by culti-packing or a light harrowing. On saline soils, a cover crop of barley is recommended to help establish strawberry clover (Frame, 2005). A cover crop to help establish strawberry clover is not recommended for non-saline sites.

Planting should take place in late fall (dormant) or in spring. Late summer planting can be successful if there is adequate moisture (may require irrigation) and time for seedlings to establish before cold temperatures. Seed may contain up to 70 percent hard seed, so if seeding during the growing season, seed should be scarified prior to seeding. Dormant fall planting will allow natural seed scarification. Strawberry clover seedlings are easily established and grow rapidly but do not compete well with weeds (Frame, 2005). Successful stands establish from seeding and natural spread and get better over time (Stevens and Monsen, 2004).

### **Management**

Strawberry clover is tolerant of grazing once the plants have developed strong stolons or runners. It is suited to either rotational or set-stocking and heavy grazing pressure. McDonald, 2006) recommends that

a 2-4 inch stand be maintained to reduce shading by grasses so that strawberry clover persists. Close grazing (2 inch stubble height) favors clover persistence and light grazing (grass taller than 4 inches) favors grass growth (Ogle, et. al, 2008). The recommended minimum plant height to begin grazing or haying for most clovers is 4 inches and the minimum stubble height to remain at end of grazing or haying is 3 inches (Ogle, et. al, 2008).

Strawberry clover can cause bloat in ruminants and increase the incidence of urinary calculi in sheep. These problems can be managed by maintaining a significant component of grass in the pasture. In waterlogged, mildly saline conditions, tall wheatgrass or 'Newhy' RS Hybrid wheatgrass are good companion crops and for non-saline, waterlogged conditions, tall fescue, perennial ryegrass and paspalum are suitable companion crops (McDonald, 2006).

When seed is properly inoculated at time of planting, strawberry clover will fix nitrogen from N<sub>2</sub> in the atmosphere, requiring little or no additional nitrogen fertilizer. However, legumes require relatively large amounts of phosphorus, potassium and sulphur, and will respond to additions of these nutrients as fertilizer when they are not adequately supplied by the soil. In grass-legume mixtures, it is not possible to supply the ideal combinations of elements for both grass and legume. If nitrogen is applied, the grass will tend to increase at the expense of the legume (Ogle, et. al, 2008).

Strawberry clover in mixture with grass is highly suitable for hay but care needs to be taken to avoid the loss of the nutritious leaf from the clover during the curing and bailing process (Frame, 2005).

### **Pests and Potential Problems**

Strawberry clover is susceptible to clover rot (*Sclerotinia trifoliorum*), clover rust (*Uromyces* spp.) and root-knot nematodes (*Meloidogyne* spp.) (Frame, 2005), (UC SAREP Online). Based on observations in California, strawberry clover may attract gophers (UC SAREP Online).

### **Environmental Concerns**

Strawberry clover spreads primarily by stolons and to a lesser degree by seed and can spread into adjoining vegetative communities under ideal climatic and environmental conditions.

Contact your local extension specialist or county weed specialist to learn what works best in your area and how to use it safely. Always read label and

safety instructions for each control method. Trade names and control measures appear in this document only to provide specific information. USDA NRCS does not guarantee or warranty the products and control methods named, and other products may be equally effective.

### Seed Production

For seed production, plant strawberry clover seed at 1 to 3 pounds PLS per acre in 20-24 inch rows. To facilitate seed production and between-row weed control, it is desirable to plant strawberry clover in spaced rows instead of a solid stand. Seed yields in the United States range from 35 – 265 pounds per acre and average 90 pounds per acre (Frame, 2005).

Common strawberry clover is reported to be self-fertile but the variety ‘Salina’ is reported to be self-sterile and needs cross pollination. Self-pollinated plants are less vigorous. Placing colonies of honey bees near fields will help increase seed yields (Hollowell, 1939), (McGregor, 1976).

Seed is usually harvested in July by swathing to allow the seed to complete maturity and dry followed by combining. Fields should be swathed when most seed envelopes are light brown and slightly damp (from dew) to avoid seed loss due to shattering. Vacuum collection of seed has been reported to be possible but not common. Processed seed may have 40-70 percent hard seed but under proper seed storage conditions, seed will remain viable for a long time (UC SAREP Online), (Frame, 2005).

### Cultivars, Improved, and Selected Materials (and area of origin)

‘Fresa’ strawberry clover was developed and released by the Department of Crop and Soil Sciences at New Mexico State University in 1982. The original collection was from Turkey and was selected for its low growing habit in southern New Mexico. It remains green throughout the year, but shows some dormancy with extremely high or low temperatures (Curtis and Curtis, Inc.).

‘Salina’ was released by the California Agricultural Experiment Station in 1962. It is palatable to all classes of livestock, can tolerate periods of winter flooding and is suitable for poorly drained soils in low-lying areas (Curtis and Curtis, Inc.).

‘Palestine’, ‘Prinsep Park’, ‘O’ Connors’, ‘Grasslands Onward’ and ‘Grasslands Upward’ are strawberry clover releases developed and used in Australia and New Zealand (McDonald, K. 2006).

### Acknowledgement

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<http://www.fao.org/ag/AGP/AGPC/doc/gbase/Default.htm>

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