Capsella bursa-pastoris (L.) Medikus (Brassicaceae)
Shepherd's Purse

Description. Annuals from slender taproots; stems 5-80 cm tall, erect, simple or branched, somewhat angled or striate, pubescent below, the trichomes stellate. Leaves alternate, lowermost ones in a basal rosette, 3-15 cm long, oblanceolate in outline, slightly lobed to pinnatifid, upper cauline leaves 2-6 cm long, lanceolate to oblong, sessile, clasping, margins remotely toothed. Inflorescence a raceme; petals 2-3 mm long, white; pedicels in fruit 7-15 mm long, spreading to somewhat ascending, fruit a silicle, 4-9 mm long, 4-9 mm wide, obcordate, strongly flattened perpendicular to the internal septum, valve surfaces reticulate near the margins. Seeds several per locule, ca. 1 mm in diameter, reddish brown, wingless. In California, flowering from January to December. (Abrams 1944, Aksoy et al. 1998, Chater 1964, Fernald 1950, Barker 1986, Munz 1959, Rollins 1993).

Note: Shepherd's purse is a tetraploid, believed derived from two other species, *C. grandiflora* and *C. rubella,* and shows a broad range of ecotypic variation and phenotypic plasticity for a number of morphological and life history traits (Hurka and Neuffer 1997, Neuffer 1996, Neuffer and Albers 1996, Neuffer and Eschner 1995, Neuffer and Meyer-Walf 1996).

Geographic distribution. A native of Europe, it is widespread throughout the temperate world, including all continents and New Zealand (Arnold and de Wet 1993, Hewson 1982, Holm et al. 1977, Lorenzi and Jeffery 1987, Neuffer and Albers 1996, Rollins 1993, Tammaro and Giglio 1993-94).

Shepherd's purse is believed to have been introduced into California sometime during the 19th century (Robbins 1940), although molecular evidence suggests several introductions, with some presumably during the Spanish period (Neuffer 1996). Naturalized populations occur on San Clemente, San Miguel, Santa Catalina, Santa Cruz, and Santa Rosa islands (Junak et al. 1995), and is reported from most counties west of the Sierra Nevada (Anonymous 1998, Rollins 1993).

Ecological distribution. In its natural range, shepherd's purse occurs in open sites, often in fallow fields, gardens, or abandoned urban lots. It may occur in a wide array of habitats in the area of naturalization, but commonly occurs in disturbed or recently cultivated sites (Munz 1959, Robbins et al. 1970, Rollins 1993, Tammaro and Giglio 1993-94).

Reproductive and vegetative biology. Shepherd's purse reproduces entirely by seeds. Like many small-flowered, annual mustards, shepherd's purse is presumably self-compatible and largely self-pollinating, although it does possess minute nectaries (Rollins 1993).

Seed dispersal presumably takes place through cultivation of agricultural fields and contamination of soils under horticultural conditions, although ground-dwelling beetles are reported to disperse and bury seeds in northern Europe (Bernhardt, K-G. 1995). Conn and Deck (1995) reported 2- 5 % viability in seeds that had been buried for almost 10 years. Seed dormancy is generally broken by cool temperatures followed by a light requirement (Popay and Roberts 1970a, 1970b, Terpstra 1995), which may explain early spring germination in temperate climates. Although often germinating in the fall or winter and fruiting in the spring, it may

become biennial in subtropical or warm-temperate climates (Milbert and Andersson 1997). Alternatively, fluctuating temperatures at higher levels (e.g., 25-30 degrees C), in combination with certain solutes (e.g., nitrates or nitrites) also stimulates germination, which may explain similar patterns of germination in warm-temperate or subtropical climates (Neuffer and Koch 1996, Popay and Roberts 1970a, 1970b).

Plants are capable of growing and reproducing throughout the year, given sufficient moisture (Holm et al. 1977, Neuffer and Eschner 1995). Demars and Boerner (1994) observed vesicular-arbuscular mycorrhizal infection in a substantial portion of plants growing under urban conditions.

Weed status. Shepherd's purse is considered a noxious weed in agricultural or horticultural practice, at least at a global level (Holm et al. 1977), and in the United States (Lorenzi and Jeffrey 1987, but it is not considered a noxious weed by the State Dept. of Food and Agriculture (Anonymous 1996).

Note: Shepherd's purse has been considered a potential crop plant in some parts of the world (e.g., Guil Guerrero and Torija Isasa. 1997, Yang et al. 1998). Consequently some studies of potential pathogens (listed under microbial and invertebrate pathogens below) are directed at control of pathogens rather than control of shepherd's purse as a weed.

Microbial pathogens. A number of fungal pathogens have been reported to infest shepherd's purse, including *Alternaria brassicae*, *A. brassicicola*, *Leptosphaeria maculans*, *Verticillium dahliae* (Cooke et al. 1997, Henriksson 1995, Petrie et al. 1995). *Capsella* also is know to be a host of beet yellowing viruses, which cause deleterious effects to certain mustard crops (Stevens et al. 1994), and tomato spotted leaf virus (Bitterlich and McDonald 1993).

Insect pathogens. Several invertebrates have been identified as infesting shepherd's purse, including nematodes (*Meloidogyne hapla*), and cotton aphids (*Aphis gossypii*) [Belair and Benoit 1996, Hosoda et al. 1993].

Herbicide control. Several herbicides have been found to be effective in controlling shepherd's purse, including imazethapyr (Darwent et al. 1997), 2,4-D (Cudney et al. 1993), rimsulfuron (Eberlein et al. 1994), dimethenamide (Quaghebeur 1993), and paraquat (Foy and Witt 1993). Staats and Klett (1993) evaluated several pre-emergent herbicides (Surflan, Pennant, Gallery, and Treflan) , in attempting to control *Capsella* under greenhouse and container-grown conditions. Lorenzi and Jeffery (1987) recommend dinoseb, paraquat, or soil sterilants in fallow fields.

Other control methods. Fire, using propane generated flames, proved unsuccessful in eliminating shepherd's purse relative to other weeds in certain crop fields (Ascard 1995).

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