Larkspur (Ranunculaceae) as a Cut Flower Crop

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The genus *Delphinium L.* contains probably 300 or more species (2).* Annual, biennial, and perennial delphiniums occur in nature, and most species are from the north temperate zone. Many species are grown as perennials in the border and wild gardens and have not been horticulturally modified. These are often referred to as "botanical" larkspurs.

The Latin names for horticultural delphiniums are confused. *D. elatum,* a native to Southern and Central Europe, was introduced into cultivation in 1578. The parentage of today's horticultural varieties contain characteristics of several species due to hybridization. Perennial delphiniums offered in the horticultural trade (Table 1) include several strains that may have cut flower potential. The material in the table is based upon catalog listings (6) and not upon evaluation by the authors. Growers should consult seed company representatives to determine if the cultivars are suitable for California growing conditions.

Cultural Practices

Annual and perennial delphiniums are both grown from seed. Because of insect and disease problems, perennial delphiniums should be started each year for flowering the following year. Post in 1952 (5) noted that most available strains of delphinium would respond for greenhouse forcing and lighting. He suggested that most economical greenhouse production consisted of sowing seeds about October 1, growing the seedling at 50°F, and lengthening the day until flowering occurs. Auman (3) in 1980 suggested sowing seeds August 1 and maintaining the seedlings in a cold frame until planting in a cool greenhouse in November. Plant spacing of 12 × 20 cm was suggested. Post found most cultivars would not bloom before March in the greenhouse. The Ball Redbook (1) also suggests methods for handling seeds and transplants. Varieties suitable for cut flower are also discussed.

Plants grown for outdoor production have been produced in two ways. Seeds planted in the early spring will flower in late summer. More consistent results occur when seeds are sown in September (1), and the plants are flowered the following summer.

Diseases

Delphiniums are susceptible to a wide range of diseases (4). Verticillium wilt has historically been the most serious problem in California. Preplant soil fumigation should be used whenever Verticillium wilt is encountered. Table 2 summarizes the diseases of delphinium and means of control.

Pests

Serious pests of delphinium include cyclamen mite, twospotted mite, aphids, thrips, snails, slugs and nematodes. For current pest control measures, please refer to Leaflet 2166, Insect and Mite Control Guide for Outdoor Nursery Crops, and Leaflet 2181, Insect and Mite Control Guide for California Commercial Floricultural Crops. Both publications are available from your local farm advisor's office.

Postharvest Care

Shattering of blooms limits long distance shipment of many delphinium cultivars. Hollow stems also reduces the value of some cultivars. Chemical treatment to reduce shattering and to prolong vaselife have not been evaluated. Select shatter-resistant cultivars.

Literature Cited

1. Ball Red Book.
   1965. Written by the staff of George J. Ball, Inc., 11th ed.
2. Hortus Third.
   1976. A Concise Dictionary of Plants Cultivated in the United States and Canada. Staff of the L. H. Bailey Hortorium, Cornell University.
3. Introduction to Floriculture.
   1980. Ray A. Larsen, editor. N.Y., N.Y.: Academis Press.
4. Pirone, Pascal P.
   1978. Diseases and Pests of Ornamental Plants, 5th ed.
5. Post, Kenneth.
   1952. "Florists crop production and marketing. New York: Orange, Judd Publishing Co. Inc.
6. Wayside Gardens Catalog.
   1981. Hodges, South Carolina 29695.

*Numbers in parentheses refer to "Literature Cited" at end of article.

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TABLE 1. Delphiniums Available 1981.

Cultivar	Description	Cut flower adaptation
Pacific Giants	This strain grows over 6-feet high in fertile ground. Nine separate colors available. Double and semi-double flowers.	Plants need staking. Blooms may be too large to ship. Flowers may shatter.
(Belladonna Imp.) *D. elatum* x *D. grandiflorum*	Grows to 3 to 3½ feet. Available in light blue, deep blue, and white only. Single flowers.	Used commercially as cut flowers. Short plants should eliminate need for staking.
Connecticutt Yankees	2½ ft. plants produce flowers 2½ inches across. Single blue flowers.	Flowers resist shattering.
Blue Fountains	Pacific giant "type" flowers on plants 2 to 2½ feet high with flowers in various shades of blue.	New cultivar.
D. Blackmore plus Longdon strain	Distinctive broad, conical spikes; mixed colors of blue mauve and violet.	One of the most permanent and popular garden cultivars.

TABLE 2. Delphinium Disease Control Guide

Disease (causal agent)	Symptoms	Survival of pathogen	Effect of environment	Control
Black leaf spot *(Pseudomonas syringae)*	A bacterial disease, causes irregular, shining, tar-like spots, especially on upper sides of leaves. Spots are browner on opposite side of leaf. Spread in cool, wet weather.	Survives on foliage and stems left from previous year.	Favored by cool wet weather.	Cut and discard old stems and foliage in fall. Fumigate seedbed with chloropicrin-methyl* bromide combination. Grow in clean land or only once in five years on infected land. Avoid overhead irrigation.
Soft crown rot and black leg *(Erwinia chrysanthemi)* *(Erwinia cartovora)*	Crown rot: Infection results in rapid wilt and death of plant. Decay gives off strong offensive odor. Black leg causes stunting and killing back, but may later produce healthy branches.	Bacteria are common in soil and plant debris.	Favored by hot humid weather. Avoid over-watering.	Avoid fields known to have disease, or fumigate the soil as described for black leaf spot. This may help, but does not completely eliminate the bacteria.
Crown gall *(Agrobacterium tumefaciens)*	Galls form at base of plants.	Survives in galls on living plants and in soil for many years.	Favored by moist conditions. Wounds are necessary for infection.	Preplant soil fumigation. Use clean planting stock. Avoid injuries. Allow cuts and wounds to dry thoroughly before the next irrigation.
Crown rots				
1. *(Diplodina delphinii)*	1. Cankers and necrotic lesions on stems and leaf stock.	Infected soil, tools and cultivation equipment.	1. Favored by excess moisture.	1. Avoid poorly drained soils. Fumigate seed flats and soil mix.
2. *(Pythium ultimum)*	2. Rot of roots and basil parts.		2. Favored by cool, moist conditions.	2. Drench seedlings at two to four-week intervals with fenaminosulf (Pythium).
3. *(Sclerotium rolfsii)*	3. Yellow, brown or buff colored *Sclerotia*, 1/16" to 1/8" in diameter, on base of plants and soil.		3. Favored by high moisture and high temperatures.	3. Preplant fumigation. PCNB will help control spread down the row.
Gray mold *(Botrytis cinerea)*	Basal rot; brown water-soaked basal rot of plants; wooly gray fungus spores form on rotted tissues. Also affects flowers.	Plant debris.	Favored by cool, wet weather.	Protect plants with fungicide.
Stem canker and wilt *(Fusarium oxysporum f. delphinii)*	Light brown water-soaked lesions on stems, later become brown. Yellowing progresses from base of stem upward.	In the soil for many years.	Disease develops during periods of high temperature.	Use clean flats; grow on clean land or fumigate the soil, as described for black leaf spot.
Smut *(Urocystis sorosporioides)*	Swellings on stems, leaves, and petioles. Break open to reveal dark masses of spores.	In plant debris and soil. Spores infect seedlings.		Treat seed with a fungicide. Remove and destroy infected parts.
Powdery mildew *(Erysiphe polygoni,* and *Sphaerotheca humuli)*	White powdery masses of fungus on leaves and stems.	On living plants and as resting structure. Spores are airborne.	Favored by locations having poor air movement.	Select resistant cultivars. Spray with dinocap or benomyl.
Leaf spots *(Asochyta aquilegiae, Cercospora delphinii, Ovularia delphinii, Phyllosticta sp.,* and *Ramularia delphinii*	Foliage leaf spotting.	Infected plants and debris.	Favored by moist conditions.	Avoid overhead watering. Protect foliage with a fungicide.
Rusts *(Puccinia delphinii)*	Orange pustules of powdery spores on underside of leaves.	On living plants.	Favored by free moisture from rain, fog, dew or irrigation.	Protect foliage with dithiocarbamate fungicide.
Verticillium wilt *(Verticillium dahliae)*	Wilting of single branch or entire plant. Yellowing of lower leaves. Brown discoloration of water-conducting tissues. Common disease in California.	In the soil for many years. Fungus attacks many kinds of plants.	Symptoms most severe during warm weather following a cool period.	Avoid disease-infected fields, or fumigate the soil as described for black leaf spot.

(Table ends on next page)

TABLE 2. Delphinium Disease Control Guide (continued)

Disease (causal agent)	Symptoms	Spread	Control
Virus diseases:			
Ringspot, Calico, Curly top, Mosaic, Stunt	Various leaf symptoms; color break of blooms.	By leaf sucking insects.	Clean up weeds. Eliminate susceptible ornamental plants. Control insects. Eliminate infected plants.
Aster yellows (Mycoplasma-like organism)	Stunting and spindly foliage. Flower petals may be green.	Leafhoppers	

*Requires permit from County Agricultural Commissioner for purchase, possession, or use.