PROPAGATION PROTOCOL FOR

SHOWY FOUR O'CLOCK

Mirabilis multiflora

| Cheryl Decker

Photos by Cheryl Decker, USDI National Park Service

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Nyctaginaceae, container, rock garden, scarification

NOMENCLATURE
USDA NRCS (2004)

Showy four o'clock (*Mirabilis multiflora* (Torr.) Gray [Nyctaginaceae]) is an attractive, drought-tolerant perennial sub-shrub. The Latin name translates as a "marvelous multi-flowered plant." Indeed, these marvelous funnel-shaped, magenta-colored flowers are 2.5 to 7.5 cm (1 to 3 in) long and about 2.5 cm (1 in) wide with bright yellow stamens extending beyond the flower. Flowers are subtended by a fused calyx-like involucre. These plants form large clumps from multiple stems that emerge from substantial underground tubers, and are up to 60 cm (2 ft) tall and as broad or broader. The dark green leaves are round to egg-shaped or sometimes heart-shaped.

Plants are found from Oregon and California east through the Great Basin states to Colorado and south to Arizona, New Mexico, Texas, and northern Mexico; from low elevations in the Mojave Desert of California to 2290 m (7500 ft) elevation in the Colorado Plateau region and southwestern mountains. It is adapted to medium- to coarse-textured soils with a pH ranging from 6.5 to 8.5. It is often found in small crevices in rock formations where there is soil, making them candidates for the

xeric rock garden. Three botanical varieties are recognized: *glandulosa* (Standl.) J.F. Macbr. is found from California east to Colorado and Arizona; *multiflora* is found throughout the range of the species; *pubescens* S. Wats. is found exclusively in California.

Like the species name suggests, plants can have multiple flowers covering the plant from April to September, especially after a rain. And as the common name indicates, four o'clocks bloom in the late afternoon and are open throughout the night. The flowers release a musky odor several hours after opening that attracts hawk moths [Lepidoptera: Sphingidae], the primary pollinator of these flowers. Following pollination, the lower portion of the floral tube becomes hardened and closely surrounds the indehiscent achene. The large seeds, as many as 4 per flower, are dispersed when the papery involucre breaks apart. In southern Utah, the fruits are ready for collection in June and early July, and if heavy monsoon rains occur, again in September and October. Fruits are 6 to 11 mm (0.2 to 0.4 in) long containing a large, single, brown seed.

At Zion National Park, seeds are hand-collected when they are dark brown to black, ribbed, and very hard. Fruits are enclosed in a papery cup that can be carefully tipped into a collection bag to release the seed, which reduces the amount of chaff to remove later. We clean seeds by rubbing off any remaining flower parts and sifting out debris with a sieve. We have stored seeds in sealed containers at 4 to 15 °C (40 to 60 °F) for up to 3 y with success. We typically see 9800 seeds/kg (4400/lb) with our seed source.

Seeds require scarification and cold moist stratification for high rates of germination. We carefully crack the hard seed coats with a rubber mallet or with pliers, taking care not to damage the seeds. If the seed is longer than it is round, the end may simply be cut off with pruning shears. Seeds need approximately 1 mo of cold moist stratification, which we provide naturally by sowing seeds in late winter and placing them in an outdoor nursery where they are subject to ambient weather. Seeds are sown in flats 10 cm (4 in) deep having drainage holes and filled with a medium of 1.5:1:1:2 (v:v:v:v) vermiculite, sterile sand, coarse turface, and peat moss. Seeds are covered with a layer of vermiculite about as deep as the seed is thick. After stratification, flats may be brought inside the greenhouse to accelerate germination and lengthen the growing season. Germination begins within 1 wk of being exposed to warmer temperatures. Trays are watered thoroughly after sowing and are not allowed to dry out completely during germination.

At the cotyledon stage, we transplant from the germination flats to 3.3-1 (1-gal) containers filled with the same medium used in the germination flats but also incorporated with Osmocote ($13N:13P_2O_5:13K_2O$; 8 to 9 mo release rate; The Scott's Company, Marysville, Ohio) at the rate of 2 to 4 kg (4.4 to 8.8 lb) per 0.76 m^3 (1 yd^3) of medium mix. It is important to transplant at the cotyledon stage because root growth is fast, and root deformation will occur if delayed beyond this stage of development. Cotyledons are large and easy to handle without damaging the emerging root.

We water seedlings by hand throughout the growing season. During the active growth phase, we irrigate when containers are nearly dry as a method of conditioning the plants while they are being grown. Watering can be tricky—showy four o'clock is a very drought-tolerant plant and responds poorly to excess water. When grown in containers with a well-aerated medium, however, they cannot be allowed to dry out completely for more than half a day.

When seeds are collected, treated, and sown in fall for natural winter stratification, we can grow plants to sufficient size in 3-1 (1-gal) containers in 10 mo. Storage tubers begin to form almost immediately after seedlings are transplanted, and a firm root-ball will have formed by fall. Plants are precocious and may flower during the first growing season in the container.

We typically outplant in the fall after daytime temperatures have cooled or fall rains have begun. Plants will quickly produce additional shoot growth once outplanted. We try to outplant all our stock because they do not overwinter well in pots unless kept fairly dry.

REFERENCE

[USDA NRCS] USDA Natural Resources Conservation Service. 2004. The PLANTS database, version 3.5. URL: http://plants.usda.gov (accessed 10 Jan 2005). Baton Rouge (LA): National Plant Data Center.

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