FORCING PERENNIALS

**Species:** Oenothera fruticosa ‘Youngii-lapsley’

**Common Name:** Sundrops

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by EMILY CLOUGH, ARTHUR CAMERON, ROYAL HEINS, and WILL CARLSON

The genus Oenothera contains 124 herbaceous annual, biennial, and perennial species native to North and South America. In the early 1800s, many species of oenothera were collected and brought to England, where they became popular garden plants.

Commonly known as Sundrops, O. fruticosa (Figure 1) is a striking, day-flowering herbaceous perennial native to eastern North America. In the garden, these low-maintenance plants thrive in full sun, grow to a height of 1-2 feet (30-60 centimeters), and produce 1 1/2-inch flowers in June. They can tolerate partial shade, but in full shade, they tend to grow taller and produce fewer flowers.

Oenothera fruticosa is hardy to USDA zone 4. It has an obligate cold requirement and does not perform well in zone 9 or other areas where the chilling requirement is not met.

Most of our research has been conducted on O. fruticosa ‘Youngii-lapsley,’ although we also have tested several other cultivars, including ‘Fireworks,’ ‘Summer Solstice’ (‘Sonnenwende’), and ‘Highlight’ (‘Hoheslicht’). In catalogs, many O. fruticosa cultivars, including those listed above, are often listed as O. tetragona but, according to M. Griffiths’ Index of Garden Plants (1994), are in fact cultivars of O. fruticosa.

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1. Propagation
‘Youngii-lapsley’ and other oenothera clones are propagated commercially by shoot-tip cuttings or division. Approximately 4 weeks after plants flower, offsets produced from basal and root buds can be removed and rooted. In our experience, these offsets root quickly (1-2 weeks) and are immediately ready for cold treatment.

Nonclonal *O. fruticosa* can be propagated by seed, which is easy to germinate and does not require any special treatment to achieve rates of 70% or higher. Seed should not be covered during germination and does best when given bottom heat at 70°-80°F (21°-27°C).

2. Plant Size
In 72-cell trays, plants with an average of 18-19 leaves are suitable for finishing in a 5- or 6-inch pot. On a few occasions, we received small bare-root divisions that required bulking before they could be used to produce finished plants with high flower counts. Very small rosettes can perceive cold treatment and subsequently flower, but the plants will produce only a few flowers. Plants can be bulked in the fall under any daylength, since they will not flower until after a cold treatment.

3. Cold Treatment
A cold treatment of at least 3 weeks at 35°-45°F (2°-7°C) is required for complete flowering of ‘Youngii-lapsley’ (Figures 2a and 2b). With few exceptions, plants will not flower if they are grown at a consistent 68°F (20°C) without cold treatment. Increasing cold duration from 3 to 15 weeks hastens flowering by about 10 days and increases the number of flowering lat-
eral shoots and the number of flowers. Plant shape changes with increased cold duration. Plant height at first flower increases 3-5 inches as cold treatment duration increases. Height was maximized (16-21 inches) after 6 or 9 weeks of cold treatment at 41°F (5°C). The number of lateral shoots induced to flower increases with cold duration, giving the plants a fuller, stouter appearance. Plant height decreased slightly – 2-4 inches – as cold duration increased from 6 or 9 to 15 weeks. We recommend 12-15 weeks at 35°-45°F (2°-7°C) for maximum flower counts and more flowering laterals.

4. Photoperiod And Lighting

‘Youngii-lapsley’ is a facultative long-day plant, which means it will flower under any photoperiod, but it flowers fastest under longer ones. Flowering of ‘Youngii-lapsley’ occurred 2 weeks faster when plants were grown under a 24-hour photoperiod compared to a 10-hour photoperiod (Figures 3a and 3b).

Although plants flowered faster when grown under longer photoperiods, the number of flowering and vegetative lateral shoots decreased, drastically changing the plants’ appearance. Photoperiods 16 hours or greater extended with incandescent lamps made plants spindly and inhibited flower production. Plants grown under photoperiods less than or equal to 16 hours were leafier and more floriferous.

Another disadvantage of longer photoperiods is increased height. Night-interruption lighting from 10 p.m. to 2 a.m. using incandescent lamps was effective for flowering ‘Youngii-lapsley,’ but plants grown under night-interruption were similar in appearance to those grown under a 16-hour photoperiod. Tall plants had few vegetative or flowering lateral shoots.

‘Youngii-lapsley’ responds strongly to the amount of light it receives. When 16-hour photoperiods are provided by using high-intensity lights, such as high-pressure sodium, plants produce many flowers and appear similar to those grown under a 10-hour photoperiod delivered by incandescent lamps. In one experiment, when plants were grown with about twice the amount of light than the control received (supplemented by high-pressure sodium), they produced about two times the number of flowers per plant (Figure 4).

The time to flower for plants grown under high-pressure sodium lamps was 6 weeks, which is approximately the same amount of time plants flowered under a 16-hour photoperiod delivered by incandescent lamps. Because ‘Youngii-lapsley’ is so responsive to light, we suggest using supplemental lighting from high-pressure sodium lamps at 400-500 footcandles in high latitudes where there is limited natural light during winter. We recommend photoperiods greater than or equal to 14 hours if plants...
are grown in lower light or if incandescent lamps are used for day-extension lighting. If high light or high-pressure sodium lamps are available, photoperiods of 16 hours are acceptable. ‘Youngii-lapsley’ may be a perennial best suited for forcing in light-intensive locations or during summer.

5. Media, Fertilization, And Irrigation

In our experiments, we have had good results with pH levels between 5.8 and 6.2. At every irrigation, we typically apply a fertilizer solution containing 100-150 ppm N, 10-20 ppm P, and 100-150 ppm K, which has been sufficient for ‘Youngii-lapsley’s’ growth and development. The plants are quite drought tolerant and will withstand multiple occurrences of wilting without detriment.

6. Spacing

Because of their strong response to light, ‘Youngii-lapsley’ should not be spaced close together since plants placed on the interior receive less light and produce fewer flowers. A spacing of two 5-inch square pots per square foot produced high quality plants.

7. Plant Height Control

‘Youngii-lapsley’s’ natural height, 13-21 inches (33-54 centimeters), is on the tall side for production in a 5-inch contain-
er. In a screen of five commercially available plant growth regulators, only Sumagic at 15 ppm reduced final plant height (Figure 5). Plants sprayed with Sumagic were 30% shorter than the control plants, but their flowers were significantly smaller. In addition, the length of the lateral stems was reduced so that plant shape changed from its natural conical form to cylindrical.

8. Temperatures And Crop Scheduling
Flowering time is greatly decreased as forcing temperature increases. Plants grown at 73°F (23°C) flowered in 4 weeks, while those grown at 64°F (18°C) flowered in 6 weeks (Table 1). When plants were grown at 59°F (15°C), time to flower was increased to 8 1/2 weeks. The number of flowers, plant height, and flower size increased with decreasing temperatures (Figures 6a and 6b).

Plants grown at temperatures higher than 73°F (23°C) were spindly and less attractive. We suggest forcing temperatures between 64° and 68°F (18° and 20°C) to maximize the number and size of flowers while maintaining height control and limiting the finishing time.

9. Disease And Insect Pests
Uncooled plants grow rosettes and are susceptible to Botrytis. When bulking uncooled plants, let the medium dry before rewatering and apply regular fungicidal drenches to control Botrytis. After a cold treatment, stems rapidly elongate and the rosette habit is lost. The lower leaves senesce and should be removed to prevent Botrytis. No other diseases were observed on 'Youngii-lapsley.'
The large, yellow flowers of 'Youngii-lapsley' were attractive to thrips. In some cases, crinkled petals may be an indication of thrip infestation early in floral development.

10. Postharvest Concerns
Once the first flower opens, 'Youngii-lapsley' continues to bloom in the garden or greenhouse for approximately 4 weeks. In a preliminary postharvest
screen, ‘Youngii-lapsley’ performed very well indoors. At room temperature and under fluorescent lighting, plants maintained a minimum of 20 open flowers a day for 10 days and at least 14 open flowers for 10 additional days. Plants should be shipped either just before or right after the first flower opens since individual flowers last only 3-4 days on the plant, and the abscised flowers make an unsightly mess.

11. Oenothera fruticosa Cultivars

The *O. fruticosa* cultivars that we tested flowered in 6 or 7 weeks (Table 2). Plant height and number of flowers per plant varied greatly among cultivars. Like ‘Youngii-lapsley,’ other cultivars were quite responsive to light – some more than others – and supplemental lighting during winter production (in low-light areas) is recommended for all cultivars. ‘Youngii-lapsley’ was the tallest cultivar, with an average height of 18 inches, but it also produced numerous large flowers. ‘Fireworks’ and *O. fruticosa* ssp. *glauca* are both naturally short (9 and 12 inches, respectively), but in one of our studies, ssp. *glauca* flowered 1 week earlier and produced many more flowers. In a preliminary study, rooted shoot-tip cuttings of ‘Fireworks’ (cooled for 8 weeks and grown under a 16-hour photoperiod provided by high-pressure sodium lamps) produced plants that flowered in 6 weeks and had as many flowers as ssp. *glauca*. ‘Summer Solstice’ was relatively tall (16 inches), spindly, and produced few flowers even under intense light. ‘Highlight’ was impressive for its vast number of small flowers (about 500 per plant) produced under intense light, but it wasn’t drought tolerant.

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