FORCING PERENNIALS
- CROP BY CROP -

SPECIES: Gaillardia x Grandiflora 'Goblin'
COMMON NAME: Blanket Flower

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Gaillardia x Grandiflora is a very common herbaceous perennial, albeit relatively short-lived. In the summer, this species from the aster family produces large, showy flowers that are usually red or red with yellow rings (Figure 1). The beautiful, daisylike inflorescences make long-lasting cut flowers. Blanket flower is a hybrid between G. aristata and G. puchella and now has naturalized in the western U.S. It is fully hardy from zones 4 through 8. Plants can grow 2 feet tall in natural conditions and usually need staking because of their long, tender stems.

Gaillardia x grandiflora is a very attractive plant in the landscape.

Editor's note: In this exclusive series, Michigan State University researchers tell growers how to give the public what they want: perennials in flower. This final part provides precise prescriptions for Gaillardia x grandiflora. These articles are now bound in a handy booklet.
stems. It is a very showy potted plant when in flower.

Cultivars
‘Goblin’ is the most common cultivar and has red flowers with yellow rings. Plant populations exhibit some morphological variability such as plant height, leaf shape, and flower color. Some plants may have double flowers. ‘Dazzler’ bears yellow-tipped red flowers, while ‘Wirral Flame’ is a short-lived perennial with deep cardinal-red flowers.

Flower Induction Requirements
The following production information is based on ‘Goblin’ and may not apply to other cultivars. To flower, *Gaillardia x grandiflora* ‘Goblin’ must be mature before being exposed to cold treatment and then long days. Compared to many other species where 100% flowering is possible on uniform-looking plants, flowering of ‘Goblin’ populations is often less than 100%, and morphology of plants that do flower tends to vary (Figure 2).

1. PLANT SIZE
‘Goblin’ has a distinct juvenility phase after germination, during which plants should be grown under photoperiods shorter than 14 hours. While individual plants will flower when smaller, most of a population reaches maturity when each plant has developed about 16 nodes (visible leaves).

2. COLD TREATMENT
‘Goblin’ requires cold treatment for fast and uniform flowering (Figure 3). A 10-week cold period at about 41°F (5°C) in a cold greenhouse or cooler is recommended for flower induction. We have found extending the cold period from 10 to 15 weeks will enhance flowering percentage on marginally mature plants and result in more flower buds.

3. PHOTOPERIOD
Horticulturally, ‘Goblin’ is an obligate long-day plant. Fast uniform flowering occurs when plants are exposed to long days (16 hours or more) or night-interruption lighting for 4 hours from 10 p.m. to 2 a.m. Flowering can occur under short days (Figure 4), but flowering is delayed and less uniform, and the flowering percentage and number of flowers per plant is low compared to that of plants grown under long days.

4. PROPAGATION
‘Goblin’ can be propagated by seed or division (Figure 5). Division is used most commonly by gardeners for rejuvenation and plant-size control, preferably in...
Appearance of Gaillardia x grandiflora 'Goblin' after 10 weeks of greenhouse forcing under long days. Plants did not receive a cold treatment. Flowering, at best, was sporadic. Plant size is described in Figure 5.

Appearance of plant material at the start of cold treatment for plants shown in Figures 6 and 7. The 128 and 50 represent the number of plants per plug tray.

Appearance of Gaillardia x grandiflora 'Goblin' after 10 weeks of greenhouse forcing under long days. Plants did not receive a cold treatment. Flowering, at best, was sporadic. Plant size is described in Figure 5.

**5. MEDIA AND FERTILIZATION**

'Goblin' prefers well-drained medium with a pH of 5.8-6.4. Fertility should be moderate; constant fertilization at 100-200 ppm N from a balanced fertilizer is adequate.

**6. LIGHTING AND SPACING**

'Goblin' requires bright light. Supplemental lighting from high-pressure sodium lamps at 400-500 footcandles accelerates development and improves quality during winter. Spacing plants properly can minimize the incidence of disease and insect pests.

**7. IRRIGATION**

Frequent irrigation is required during hot, sunny days. On bright days, plants may wilt before the medium dries because of their large leaf area.

**8. PLANT HEIGHT CONTROL**

'Goblin' tends to be too tall when grown in 4- or 6-inch pots and usually needs staking. Unfortunately, we have not observed any significant height reduction when using any growth retardant.

**9. TEMPERATURES AND CROP SCHEDULING**

After germination, plants should be grown at 70°-75°F (21°-24°C) to shorten the juvenile phase. However, the plants do not tolerate high temperatures well from forcing to flower. Temperatures higher than 75°F (24°C) will delay time to flower and reduce quality, so 18°-20°C (65°-68°F) is optimum.

Once long-day forcing begins after cold, time to flower depends on the forcing temperature. Allow 9-10 weeks at daily averages of 60°F (15°C), 7-8 weeks at 65°F (18°C), or 6-7 weeks at 70°F (21°C) (Table 1). Remember, these are 24-hour averages, not just day or night temperatures.

Time to flower and flowering percentage among seed-propagated 'Goblin' plants are highly variable within a population and between years. Older plants flower more uniformly.

Consider using field-grown plants or 2½-inch plugs for most uniform flowering. Plants can be purchased in 128-cell, 50-cell, or 2½-inch plugs or as field-grown bare-root plants (Figure 5).

Bare-root plants can make very attractive finished plants (Figures 6 and 7) and are ideal for 1-gallon or larger containers, but bare-root materials may deteriorate during cold storage unless they are planted first.

All plugs can be stored directly in coolers. Final plant size will depend on the size of the plant at the start of long days.

**10. DISEASE AND INSECT PESTS**

'Goblin' plants are susceptible to...
TABLE 1. *Gaillardia x grandiflora* ‘Goblin’ Production Schedule

<table>
<thead>
<tr>
<th>Growing Time</th>
<th>Cultural Practice</th>
<th>Temperature</th>
<th>Photoperiod</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 week</td>
<td>Sow seeds</td>
<td>68°-72°F (20°-22°C)</td>
<td>Natural day length</td>
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<tr>
<td></td>
<td>Germination OR purchase plugs</td>
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<tr>
<td>9-10 weeks</td>
<td>Grow until at least 16 leaves have formed</td>
<td>72°-76°F (22°-24°C)</td>
<td>&lt;12 hours of light</td>
</tr>
<tr>
<td>10-15 weeks (Can be held longer if needed)</td>
<td>Cold treatment</td>
<td>35°-45°F (1°-7°C)</td>
<td>Natural day length or 9 hours of light in cooler</td>
</tr>
</tbody>
</table>

Begin Forcing

70°F (21°C) 6-7 weeks flower

Visible Bud to Flower

60°F (15°C) – 20 days
65°F (18°C) – 18 days
70°F (21°C) – 14 days

FORMULA FOR SUCCESS: ‘GOBLIN’

1. Force only plants with 16 or more nodes (leaves).
2. Provide plants at least 10 weeks’ cold treatment at 41°F (5°C) before long-day treatment.
3. Force at 60°-70°F (15°-21°C).
4. Grow plants under long days after cold treatment. Long days can be provided by natural or extended photoperiods of at least 16 hours or by night interruption from 10 p.m. to 2 a.m. with a minimum of 10 footcandles of light.

Asp, especially in crowded humid conditions. Aster yellows and powdery mildew may be problematic also.

**11. POSTHARVEST CONCERNS**

For a long shelf life, the plants should be shipped when the first flowers open. If the plants are not sold soon after first flower, dead-heading will be necessary to remove spent flowers.

Ideally, dead-heading would not be necessary; however, nonuniformity in populations can be so great that the first flowering plants will require dead-heading before the last plants in the population flower. Flowering will continue if spent flower heads are dead-headed and enough light and water are provided. Flowering ceases if spent flowers are not removed.

Appearance of *Gaillardia x grandiflora* ‘Goblin’ after 8 weeks of greenhouse forcing under long days. Plants were potted, grown for 3 weeks under normal photoperiods (ND) in October, then given a cold treatment for 13 weeks before forcing. Growth prior to cold is necessary only if plants are still juvenile (i.e., they have not yet developed 16 leaves). Plant size is described in Figure 5.

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