UC Landscape Plant Irrigation Trials
Final Report 2015-2017

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Table 1. Average annual overall appearance ratings from May to October 2017 for 16 perennial landscape species on 3 ET_o-based irrigation treatments.

PLANT NAME	Average Overall Appearance Rating Scale is 1-5 (1 is low, 5 high)			Recommended (ET_o %)
Percentage of ET_o	80	50	20	
SUN				
Lomandra confertifolia 'Finescape'	2.4	2.4	2.2	**NR[1]**
Lygeum spartum	4.6	4.9	4.5	**20-80**
Muhlenbergia capillaris 'White Cloud'	2.4	2.1	1.9	**NR[1]**
Muhlenbergia reverchonii 'Undaunted'™	4.0	4.2	4.2	**20-80**
Rosa 'KORdiagraf' Dark Desire™	3.0	2.7	2.9	**80**
Rosa 'KORvodacom' Plum Perfect™ Sunbelt®	2.4	2.3	2.3	**NR[1]**
Rosa 'Meiradena' Icecap ™	4.4	4.2	4.1	**20-80**
Rosa 'Meizorland' White Drift ®	3.9	3.8	4.0	**20-80**
Rosa 'Radgor' Peachy Keen ™	3.8	3.8	3.7	**50-80**
Rosa 'Radsunny' Sunny Knock Out®	3.6	3.8	3.4	**50**
Rosa 'Radtko' Double Knock Out®	3.9	4.2	4.0	**20-50**
Sporobolus wrightii	4.0	4.2	4.4	**20-80**
SHADE				
Geranium 'Biokovo'	3.5	3.3	3.3	**20-80**
Lomandra confertifolia 'Seascape'	1.8	2.5	2.4	**NR[1]**
Lomandra longifolia 'Roma13' Platinum Beauty™	4.0	4.1	4.1	**20-80**
Nandina domestica 'Lemon-Lime'	3.1	3.0	3.5	**20**

1. Not recommended in this climate zone. See individual species notes.

Overview

These are results from 2-year perennial plant trials conducted from 2015-2017 at the UC Landscape Plant Irrigation Trials (UCLPIT) field on the UC Davis campus in USDA climate hardiness zone 9b, USDA heat zone 8, Sunset climate zone 14. The field soil is Yolo silty clay-loam with a water holding capacity measured at 0.32 g/cm^3 with approximately 2.7" plant available water in the top half meter of soil. Irrigation is applied to target a root zone volume equal to a 1m-wide circle ½m deep which holds approximately 14.3 gallons plant available water. The field is maintained free of weeds manually in sensitive areas and by herbicide applications where there is no risk of damage from drift. Pre-emergent herbicides are used only on the perimeter of the field and not between rows so that we may evaluate the potential for re-seeding. We apply no insecticides, miticides, fungicides, or fertilizers.

Research Methods

Twenty-four plants of each cultivar or species (Table 1) were placed 2 meters apart in rows 2 meters apart. The 1m-wide rows were covered with 3 inches of chipped-wood mulch, and a ring of inline drip tubing was laid beneath the mulch in the root zone of each plant. Each drip tubing ring had 4 emitters, 6" apart, each rated at 0.8gph, for a total of 3.2gph per plant. Plants were placed according to a randomized complete block pattern in two blocks (north and south) to provide 8 of each species on each of 3 irrigation treatments. The four species under 50% shade cloth were in one randomized complete block.

All plants except roses were planted in October or November 2015. All roses were installed in February 2015 from bareroot stock provided by cooperators, except 'Harlow Carr', which was planted in spring from pots. Irrigation treatments were based on percentages of reference evapotranspiration, or ET_o as described in Water Use Classification of Landscape Species IV (http://ucanr.edu/sites/WUCOLS). Immediately following planting and during the first irrigated growing season (from the cessation of rain in spring to recurrence in fall) all plants were irrigated at 100% of ET_o when 25% of plant available water was depleted from spring through mid-summer; at 50% depletion of plant available water from mid-summer to September, and 75% depletion until rainfall began. This encourages establishment of a deep, healthy root system without imposing stress. During the subsequent irrigated growing season, rain was sufficient for plant need through the middle of April, when the last significant precipitation of .35" fell. All plants were fully watered April 28, and the deficit schedule was begun. From May through October 2017, all the plants received the same amount of water when irrigated to replace plant available water, but how often they received it was determined by their designated water-use percentage of ET_o. The hypothesis is that plants using water at a lower rate than the reference plant will take longer to use up the plant available water in the soil, provided water loss to evaporation is minimized with mulch. Data from the local Davis California Irrigation Management System station (CIMIS) was used in a water budget to determine the irrigation timing for each treatment (http://wwwcimis.water.ca.gov/). The budget in shade is adjusted for lower solar radiation. The percentages of ET_o used in this trial were 20% (low), 50% (moderate), and 80% (high). The frequency of irrigation for 2017 is shown in Table 2.

Plant width, length, and height measurements were taken monthly during treatments. A plant growth index (PGI) was calculated to quantify the growth of plants using the formula **[(l +w)/2 +h]/2,** where l, w, and h represent length, width, and height of the plant. To account for differences in initial plant size a relative PGI was calculated for each plant each month during the deficit irrigation treatments using the formula $\mathbf{PGI_m/PGI_i}$, where PGI_i stands for the initial PGI, and PGI_m stands for the specific monthly PGI. Qualitative performance ratings (on a scale of 1-5) were taken monthly in the following categories: foliage appearance, flowering abundance, pest tolerance, disease resistance, vigor, and overall appearance (the "WOW" factor). Flowering in the grasses is

counted as coverage when either the flower head or seed spike remains attractive and ornamental. A description of the ratings criteria is shown in Table 3.

Since mortality led to uneven "n" values for some species, weighted means were used in data analysis across and between treatments using ANOVA and Tukey's HSD, respectively at $p \leq 0.05$ and $p \leq 0.01$.

Table 2. 2017 Deficit Irrigation Frequency Details – April 28 to October 1, 2017

Irrigation % of ET_0	# of Irrigations	Avg. Interval (days)	Dates of Irrigation (all treatments irrigated fully on 4/28)	Total water applied	
SUN				**inches**	**gallons**
80	11	15	5/11, 5/22, 6/5, 6/22, 7/4, 7/16, 7/29, 8/11, 8/26, 9/12, 10/1	27.14	143.3
50	6	23	5/22, 6/20, 7/9, 7/28, 8/19, 9/13	16.81	88.8
20	2	54	7/4, 8/26	5.51	29.1
SHADE					
80	4	35	5/22, 6/30, 7/31, 9/16	11.22	59.2
50	2	46	6/7, 7/31	5.59	29.6
20	0				

General Discussion and Notes

We have chosen to investigate the hypothesis that some plants will be able to maintain health as soil moisture deficit approaches the permanent wilting point, because they are adapted to using water at a lower rate during the hot summer months. This produces a remarkably long irrigation interval and small amounts of total applied water at the lower end of the treatment spectrum (Table 2). We hope the success of plants in these trials using this irrigation method will inform the way water is used in landscapes, resulting in even greater conservation of this precious resource.

Generally speaking, grasses are pruned in very early spring by cutting very low to just above the primary meristems; subsequent measurements do not include flower stalks. Roses are pruned the second winter by lopping all main canes to approximately 2' above the ground; groundcover roses are cut back using a hedge trimmer to about 8" high and 18" wide. One grass species, *Lygeum spartum*, was not winter pruned since it did not show significant blade death and had self-cleaned its previous year's flowering stalks.

Recommendations for rate or range of irrigation in Table 1 are based on a combination of best overall appearance ratings and growth data, as well as other factors such as flowering and pest and disease resistance. Where a range is given, there were no significant differences between treatments. These plants may be used in hydrozones irrigated at any of the indicated rates without adverse effects on health or appearance. For the purposes of water conservation, ***the lowest recommended ET% should be used whenever possible.***

Over the years it has become increasingly evident that very few species show significant differences in growth on the various irrigation levels their second year in the trials. This seems to indicate that, given equal chance to develop well the first year, the plants evaluated may be genetically delimited in annual summer growth when grown without artificial fertilizers. This maximum annual growth appears to occur on a very minimal amount of water. Since we have evaluated plants believed to be water-conserving, this may not be surprising.

Detailed discussion of each species' performance follows in the Results section. Individual species ratings tables, growth charts, and photos of interest are found in the appendices. Since September and October are the months with the most accumulated drought stress, we have chosen

to display comparative photos of all treatments in one of these months for most species as well as selected peak bloom time photos (Appendix II). These are also the months that most often, if not always, show the most significant differences in ratings. Please note that the photos displayed are for the best looking and not the "average" representative of a particular treatment to show the potential for that plant on a given irrigation treatment.

Table 3. Description of quality ratings

RATING	5	4	3	2	1
Foliage	perfect to excellent; plant is in full leaf with no signs of leaf burn, disease or insect damage, and has an appealing shape and uniformity	same as 5 except for minor tip burn, edge damage, or minor damage to only a few leaves that does not much affect the overall appearance	acceptable but not its best; non-uniform; minor damage to all leaves that is less evident from a distance, or severe damage to no more than 25% of plant	unacceptable; moderate damage to most of the plant or major damage to more than 25%; plant is declining and may not recover; may be extremely non-uniform	unacceptable; close to dead
Flowering	full bloom; the height of bloom for the species	61-80% of plant in bloom	41-60% of plant in bloom	21-40% of plant in bloom	1 bloom open to 20% in bloom
Pest Tolerance/ Disease Resistance	no visible damage	minor to moderate damage to one or two leaves or stems, or only very minor damage to a few leaves (<25%)	minor damage to many of the leaves or flowers; appearance still acceptable from a distance (25-50%)	major damage; appearance unacceptable (51-75%)	severely damaged and probably dying (>75% affected)
Vigor	pushing out a lot of new growth from every growing point	pushing out new growth from many growing points (50-75%)	Plant is surviving and healthy, but not pushing out much new growth, if any (<50%)	Plant is very small for the species or unhealthy, and declining	Plant is barely alive; close to death
Overall Appearance	**An impressive plant**; everything works together: flowers (if present), leaves, the shape and condition of the plant are all very appealing. It has the WOW factor that makes it an attractive garden plant, even if each individual factor isn't perfect.	**A very attractive plant**; may be a 5 when in bloom, or just a very nice plant that lacks the WOW factor, or is not quite at its prime.	**An acceptable plant**; may be past or not quite to its prime; might be better if more uniform; may be described as an 'okay' plant.	**Unacceptable plant** for any of the above reasons	**Completely unacceptable** and not likely to improve

Open House Ratings Field Days

In 2017 the UCLPIT program held three Open House events, inviting members of the horticulture and landscape fields to visit the trial and evaluate samples of the plant material undergoing deficit irrigation. Events occurred in early May, mid-July, and late September, corresponding to the beginning, middle, and end of the deficit irrigation treatment period. Attendance was 46, 42, and 64 participants per event, respectively (Table 5). Participants evaluated plants in the Foliage Quality, Floral Quantity and Overall Appearance categories using the same rubric trials staff use to perform monthly ratings (Table 3). Participants evaluated one individual plant per treatment per species (Table 4). Rated plants were selected by trials staff before the May Open House, and all participants rated the same material at each subsequent event. Plants selected in May were deemed at that time to be the best looking plant on the treatment. This should be taken into consideration when comparing staff ratings means (from 8 specimens on each treatment) to participant means (1 specimen with multiple raters). Our guests were also asked to record comments on each species and to name their favorite(s) as well as plants they would use or recommend. These comments are summarized in the results narrative that follows and the complete tabulated results of their ratings for each species are shown in Appendix I with means, medians, maximum and minimum scores. We include these to demonstrate the wide range of preferences and perceptions that exist regarding landscape plants. In most cases the **median** is most reflective of the majority opinion and is highlighted in the tables.

Table 4. Average overall appearance scores given by Open House participants to samples of 16 landscape species on 3 ET_o-based irrigation treatments in May, July, and September 2017.

	May			July			September		
Treatment % of ET_o	80	50	20	80	50	20	80	50	20
SUN									
Lomandra confertifolia 'Finescape'	1.7	1.4	1.7	3.2	3.1	3.2	3.5	3.3	3.4
Lygeum spartum	4.4	4.1	4.2	4.0	4.2	4.1	3.9	4.0	4.0
Muhlenbergia capillaris 'White Cloud'	2.1	1.4	1.9	2.7	2.0	2.0	2.9	2.2	2.2
Muhlenbergia reverchonii 'Undaunted'™	3.4	4.0	4.0	3.5	3.3	3.6	4.5	4.2	4.6
Rosa 'KORdiagraf' Dark Desire™	2.9	3.1	3.5	2.8	2.9	3.2	2.8	2.9	3.2
Rosa 'KORvodacom' Plum Perfect™	3.2	3.0	3.0	2.2	1.7	1.8	2.0	1.5	1.8
Rosa 'Meiradena' Icecap ™	4.1	4.2	3.9	3.4	3.9	3.5	3.4	4.1	2.6
Rosa 'Meizorland' White Drift ®	3.0	3.5	3.0	3.2	3.1	3.0	3.7	3.2	3.2
Rosa 'Radgor' Peachy Keen ™	2.9	3.4	3.4	3.4	3.9	3.5	2.3	3.3	3.1
Rosa 'Radsunny' Sunny Knock Out®	4.0	4.2	4.2	3.6	3.4	3.8	2.9	3.1	3.5
Rosa 'Radtko' Double Knock Out®	4.3	4.3	4.4	2.8	3.0	3.7	2.6	3.6	3.2
Sporobolus wrightii	3.6	2.5	3.1	3.4	4.4	4.2	3.7	3.4	3.9
SHADE									
Geranium x *cantabrigiense* 'Biokovo'	4.1	4.1	4.2	2.8	3.0	3.2	4.0	3.4	3.3
Lomandra confertifolia 'Seascape'	3.8	2.3	1.5	3.8	2.8	1.3	-	1.9	-
Lomandra longifolia 'Roma13' Platinum Beauty™	4.2	4.4	4.0	4.5	3.9	4.2	4.7	4.5	4.5
Nandina domestica 'Lemon-Lime'	3.7	3.6	3.4	3.9	4.1	3.7	3.9	3.8	4.2

Table 5. 2017 Open House participant breakdown by self-identified horticultural category.

Professional Category	May	July	September
Horticulturalist/Gardener	3	2	3
Horticultural Enthusiast (genus expert, plant society member)	0	0	1
Horticultural Outreach (garden writer, speaker and/or blogger)	1	0	2
Horticultural Research (scientists, academics & affiliates, public or private sector)	3	4	1
Landscape Architect or Landscape Designer	6	7	8
Landscape Contractor/Landscape Construction	1	0	1
Landscape Maintenance Professional	8	2	3
Nursery Industry, e.g. plant breeder, plant introductions, marketing	2	2	0
Nursery - Retail Nurseries and Garden Centers	0	0	1
Nursery - Wholesale, e.g. growers, plant propagators, plant producers	3	3	4
Public Horticulture, e.g. botanical gardens, public gardens or parks	0	2	1
UCCE Master Gardener	16	19	33
Declined to State	3	1	6
Total Number of Participants	**46**	**42**	**64**

Table 6. Counties represented with UC Master Gardener participants in 2017 Open House events.

May	July	September
Colusa	Alameda	Alameda
Napa	Napa	Calaveras
Sacramento	Sacramento	Colusa
San Joaquin	San Joaquin	Contra Costa
Solano	Solano	Sacramento
Stanislaus	Yolo	San Joaquin
Yolo		Solano
		Stanislaus
		Tuolumne
		Yolo

Results

SUN

***Lomandra confertifolia* 'Finescape'** **Final H x W: 14" (35cm) x 19" (49cm)**

This cultivar of Australian dwarf mat rush only achieved moderately acceptable appearance in our trials on the two higher irrigation treatments near the end of the second year (Table 7a). While one to a few plants on the two higher treatments rose to the level of acceptable or very good, the performance was inconsistent across the field and within treatments and showed no statistical difference in any month. This tracks with online sources from Australia which recommend cultivars of this species in shadier, more pampered locations when planted in hot inland locations. There was no significant difference in growth between treatments (Figures 1a-1b).

Open House participant ratings for the species were comparable to those collected by trials staff, but there was a wide range between the minimum and maximum ratings, particularly in the last two events. Comments left by participants supporting this mixed reaction included "[a] stunning plant," "a bit of green – nothing interesting," and "too wimpy." Participants also rated the floral structure highly or did not recognize it as such and recorded a 0 for no flowers (Table 7b).

Lygeum spartum **Final H x W: 34" (87cm) x 58" (147cm)**

False esparto grass is the common name for this very interesting Mediterranean native. Its leaves stay green throughout the winter which means no end of season pruning was necessary. It was outstanding looking on all irrigation treatments with no significant difference in growth or overall appearance between treatments throughout the season (Table 8a, Figures 2a-2b). The stiff leaf blades are a consistent bluish gray-green that lean somewhat in the direction of the prevailing winds. However, this was not particularly unattractive and lent a sense of motion to the plant. The tan flower/seed heads, which look like small crane's heads, make an attractive contrast with the foliage. The only significant difference in any rating was in September when the 80% and 50% treatments had higher floral ratings than the 20% treatment at $p \leq 0.05$. Since flowers had actually dried, this was probably due to a higher rate of senescence and hence self-cleaning in the lowest treatment. With its low maintenance requirements and consistent good looks, this landscape plant most certainly deserves wider use.

Participants rated *L. spartum* highly at all three events, and declared it as one of the top three favorite species each time (Table 8b). Participants extolled the virtues of *L. spartum* in the comments section of the rating form, recording "love this plant! My favorite of the sun plants" and "all looking outstanding, very". Their unique floral display was found to be aesthetically pleasing and the seed structure continued to provide interest to the end of the season, with one participant listing it as a "very spectacular flower."

***Muhlenbergia capillaris* 'White Cloud'** **Final H x W: 41" (105cm) x 39" (99cm)**

The southeastern U.S. origin of this cultivar of hairy awn muhly grass is likely responsible for its poor performance in this trial in our hot, dry location. The annual average overall appearance was not acceptable at any rate under this irrigation regime (Table 9a). It is possible that the cultivar would have performed better with the same amount of total water, but delivered more frequently or in a more humid coastal area. In August, only the highest irrigation treatment was marginally acceptable, and though the 50% ET_o was briefly acceptable in September after receiving irrigation, by the end of the trial it had fallen into the unacceptable range again. For us, only a few plants flowered, but too few flowered heavily enough to earn its moniker. Three plants on 80% bloomed, 3 plants on the 50%, and 1 plant on 20%, but most with a floral rating of 1. Most plants in the field had the appearance pictured in Figure 3d, while only 2 achieved the floral display of Figure 3e. The largest plants were on the highest irrigation treatment, but there was no significant difference in *relative* growth during the trial period (Figures 3a-3b).

While several Open House participants championed 'White Cloud' in their ratings, for most it was "not a very exciting plant". This is borne out in the ratings, where only the 20% achieved an acceptable overall appearance as the season progressed. Plant selection for the open houses occurred before the May event, with staff choosing the best performing plant material at the time. After assessing the data, we suspect the individual selected for the 80% treatment may not have performed as well as the others replicates for that treatment, creating the difference between ratings collected by project staff and open house participants.

***Muhlenbergia reverchonii* 'Undaunted' Final H x W: 17.6" (44.7cm) x 40" (100.9cm)**

'Undaunted' was a handsome ruby muhly grass on every irrigation treatment, consistently scoring very good overall appearance ratings throughout the growing season (Table 10a). It's only minor drawback was a few plants developed a non-uniform habit or flopped open in the middle. Flower heads appeared in June and peaked in September and October in a massive cloud of dusty rose (Figures 4c – 4e). Although striking enough as an individual specimen, this would be stunning planted in a large sweep in a border. There was no significant difference in size or quality between treatments (Figures 4a-4b).

Muhlenbergia reverchonii 'Undaunted' "had the wow factor" and was a highly rated during all open houses (Table 10b). Participants praised this species "tight habit + small form" and "purplish seed heads". Starting with high initial ratings in May, Overall Appearance scores dipped slightly in July as plants were in the initial stages of flowering when the open house occurred. Ratings reached their zenith for this cultivar by September when the full effect of the flower display or "good show", could be fully seen and evaluated. In September, *M.* 'Undaunted' was "beautiful" and due to its "good size [it] can be very versatile in the landscape," which resulted in participants consistently recording it as one of their favorite plants at the events.

***Rosa* 'KORdiagraf' Dark Desire™ Final H x W: 40" (102cm) x 64" (162cm)**

Dark Desire is a dark red, fragrant hybrid tea rose that develops a lax, sprawling habit that might be more attractive with some support or if placed at the back of a large border where it could blend with other plants (Figures 5c – 5f). Roses were displayed at the ends of long canes, which became arching as the season progressed, in a mostly non-uniform habit. Flowering was greatest in May, though there was not uniformly full coverage on all plants on any treatment (Figure 5c). This was the only rose in our trial with damage from raspberry horntail larvae. Where most roses in our climate will perk up in September for a fall bloom and look good through at least November, this one began to decline in foliage quality and overall appearance in September, though it threw up a few blooms. It was marginally acceptable in overall appearance only on the highest irrigation treatment, and would probably fare better in a cooler climate (Table 11a). Its apparent water stress lent it to pest damage, though it was very disease resistant. The lowest treatment appears to be smaller in size than the two higher irrigation treatments, but these differences were not significant (Figures 5a – 5b).

The habit and performance of *Rosa* 'KORdiagraf' was unevenly acceptable to Open House participants based upon the Overall Appearance scores, declining after the May event (Table 11b). Their comments noted its "leggy form" as undesirable. Flower color was either praised as "unique" or deemed "not particularly attractive" with some participants recording they did not prefer the open appearance of older blooms.

***Rosa* 'KORvodacom' Plum Perfect™ Sunbelt® Final H x W: 29" (73cm) x 38" (98cm)**

Plum Perfect is a shrub rose on the small side that performed far from perfectly in our trial. The moderately acceptable foliage appearance and pretty floral display in spring had disappeared by June with sunburn significant by July. Foliage on all treatments was pale, prone to pests, and

began to decline into fall dormancy in September. The first flush of blooms in May showed the lovely flower color for which the plant is named, but the small, non-uniformly shaped shrubs never achieved full floral coverage, as shown in the ratings (Table 12a). Subsequent flowering was very light and could not make up for the poor foliage quality the rest of the summer. The only significant growth difference was in the month of August, but subsequent plant decline in the moderate treatment (the largest plants) saw that difference disappear by September (Figures 6a – 6b). Since this rose never achieved acceptable appearance after May, we do not recommend this plant on any irrigation treatment in this growing region.

Plum Perfect started the season with marginally acceptable scores in the May Open House ratings, but by the summer ratings, this cultivar didn't "look happy at all." Scores remained low in September as Plum Perfect "didn't fare well over the summer." Participants' scores in the Open House echo those of project staff (Table 12b).

***Rosa* 'Meiradena' Icecap™** **Final Ht. x Width: 39" (100cm) x 61" (154cm)**

Icecap is an extremely floriferous shrub rose that achieved better overall appearance ratings on the two higher irrigation treatments only during the hottest month of July (Table 13a). There were no significant differences in growth between treatments and no other treatment-related quality ratings were seen (Figures 7a – 7b). This shrub rose's one flaw is that the white blooms turn parchment colored and remain on the plant for too long without self-cleaning (Figure 7d). Because the plant is so floriferous, the number of clinging dead flowers can be significant and were the only detrimental comment. Fortunately, there was always some floral display on the plants and combined with disease-free foliage and an overall good rounded habit, the plant consistently achieved good to very-good appearance. Even the lowest irrigation treatment put on a late season flower show (Figure 7e).

Icecap was warmly received by Open House participants, posting respectable scores in both May and July. The ratings in September show a difference in scores between the treatments in that month, which can be attributed to the blooming pattern for this cultivar (Table 13b). Raters encountered plants on the highest treatment as they were finished blooming and many of the flowers had faded and not yet dropped. When the plant is in full bloom participants noted it is "impressive." However, they noted that this cultivar held on to spent blooms, perhaps longer than the other cultivars tested, a condition that was "not appealing". Regardless of the Overall Appearance scores in September, as a cultivar, participants continued to list Icecap as one of their favorite plants as it was "attractive, healthy, vigorous with loads of flowers", had "great structure", and "in general the foliage was very clean."

***Rosa* 'Meizorland' White Drift®** **Final Ht. x Width: 23" (59cm) x 61" (156cm)**

This new member of the Drift® rose series was a steady bloomer, but showed leaf edge necrosis beginning in July. Plants on the highest irrigation treatment showed the most dramatic symptoms, leading us to believe this cultivar may be more boron sensitive than others in the series we have evaluated (since the irrigation water is known to contain boron). About 25% of the plants threw stems which had reverted to pink flowers which we pruned out (Figure 8d). This might be a troubling characteristic for landscape managers. This groundcover rose was very good at self-cleaning spent blossoms. There were no significant differences in quality ratings between treatments with one exception: flowering in July was higher at 20% of ET_o than at 80% (Table 14a). There were no significant differences in growth measurements between treatments (Figures 8a – 8b). Overall the appearance was good to very good on all treatments throughout the year.

White Drift scored acceptably throughout all three open house events (Table 14b). Attributes participants noted as positives included the "size, shape, and flowers."

***Rosa* 'Radgor' Peachy Knock Out® (Peachy Keen™)** **Final Ht. x Width: 28" (72cm) x 49" (123cm)**

This peach-colored shrub rose is smaller than most with dark green foliage (Figure 9c). It displayed a somewhat inconsistent form halfway between shrub and spreader with a tendency to send out random sprawling canes and leave a low, open center to the shrub. There were no significant treatment-related effects on growth parameters or quality ratings (Table 15a; Figures 9a – 9b). The plant showed excellent disease resistance and fairly good pest tolerance; the foliage showed slight edge burn on the lowest irrigation treatment and consistent midday wilt on all treatments. Because of the inconsistent form combined with very little flowering after July, this plant on average reached just better than acceptable but not "very good" level of overall appearance rating after July's second flush of bloom.

As evidenced by their ratings, participants felt this rose was acceptable at all three events with participants enjoying the "beautiful peach color flowers," and they also found it attractive how the petal color faded to white as the flower ages. The ratings for this rose show how widely differently some individuals interpreted the floral display category (Table 15b). The scoring system for this category is intended to be *quantitative*, with participants determining what percentage of the plant is in flower. Due to the wide range of floral display scores, a few participants may have evaluated the floral display *qualitatively*, recording a score of how they felt about the flowers.

***Rosa* 'Radsunny' Sunny Knock Out®** **Final Ht. x Width: 31" (80cm) x 50" (126cm)**

Foliage damage from aphids, thrips, and some powdery mildew were the main detriments to the appearance of this yellow shrub rose. The plant was good at self-cleaning spent blossoms and maintained a mostly uniformly rounded habit with an occasional horizontal branch thrown out near the base of the plant. Flowering was high in late April to May (Figure 10c), with the highest rebloom percentage averaging 50% coverage on the 50% ET_o treatment (Table 16a). Unfortunately, with low mid-season flowering rates, the foliage needed to carry the appearance of the shrub. After July, only the 50% irrigation treatment had acceptable average foliage ratings. With average flowering between 20 to 50% coverage, the plants on 50% of ET_o therefore averaged the best overall appearance ratings. There were no significant differences in growth between treatments (Figures 10a – 10b).

This was one of the most discussed roses in the comment forms in the spring Open House event. Many listed this as their favorite plant, with some ascribing it the title "Best rose in the field." The flowers, both their initial yellow color ("love the bright yellow!") and their "change from yellow to white" were positively received by participants. Also noted was their scent and perceived "pollinator friend[liness]" due to the open, single nature of the flower. While scores did decline in subsequent open houses, this could be due to the bloom pattern of the cultivar (Table 16b). This cultivar put on a spectacular show with its initial bloom, then transitioned to a more subdued blooming pattern, always retaining a few flowers on the plant rather than cycling in and out of bloom in a boom and bust fashion. Overall, many continued to list this cultivar as their favorite plant and one they would recommend. One participant perfectly summed up the zeitgeist of Sunny Knock Out with the comment: "I am not a rose person, but this was lovely."

***Rosa* 'Radtko' Double Knock Out®** **Final Ht. x Width: 32" (82cm) x 48" (122cm)**

As most of our roses in previous trials, the highest average overall quality rating for Double Knock Out was on the moderate irrigation level at 50% of ET_o (Table 17a). The highest floral and overall appearance ratings were in May when the first full flush of bloom occurred with all roses achieving the highest possible rating (Figure 11c)), but the flowering continued throughout the season with the highest rebloom rate on the 50% irrigation treatment in August (Figures 11d – 11e) - not a time roses are typically known to have high numbers of blooms! The plants maintained

a good or very good appearance all season on all treatments with no significant differences between treatments. Neither did plants display differences in growth between treatments (Figures 11a-11b). The vivid pink blooms fade to pale pink and finally parchment color. They do not hold onto the plant for too long, before shattering and self-cleaning. Foliage appearance was only slightly affected by thrips, but was completely disease-free. This rose has rightly earned its hardy reputation in standard rose trials.

Guests at our Open Houses commented on flower color and "lush green leaves" that contrasted with "beautiful red rose." At least one individual listed it as their favorite plant of the day. On average, they scored it as very good or good at all three events (Table 17b).

Sporobolus wrightii **Final H x W: 48" (123cm) x 90" (228cm)**

Giant Sacaton is the common name for this large California and Southwest native grass. This species improved in appearance throughout the growing season and averaged very good overall appearance from late June through the end of the trial with highest ratings on the lowest treatment (Table 18a). There were no significant differences in growth between treatments (Figures 12a-12b). The flowering stalks are very tall and dramatic, rising several feet above the foliage and adding significantly to the plant profile in both height and width as it matured and became looser in habit (Figures 12c – 12e). This species would need a large landscape.

Much like other grasses, *Sporobolus wrightii* scores increased as the season progressed, and the plants initiated their floral display (Table 18b). Aside from a comment or two listing the cultivar as "not my taste," in general most participants praised *S. wrightii*'s "amazing shape and form" and noting it was "consistently wonderful" and a "nice local plant". While this plant was generally well received, with potential to be a "replacement for pampas grass", it was noted that it's large size makes it impressive "for some contexts, not for small gardens." As with many grasses, they do possess the ability to add a graceful movement in the garden, since the "seed clusters sway in [the] breeze."

SHADE (Note: the lowest irrigation treatment- 20% of ET_0- received *no* summer irrigation.)

***Geranium* × *cantabrigiense* 'Biokovo'** **Final H x W: 13" (33cm) x 16" (41cm)**

Biokovo hardy geranium is a naturally occurring hybrid first found in the mountains of Croatia. It was named Perennial Plant Association's Plant of the Year™ in 2015, and was placed in these trials by the UC Davis Arboretum for evaluation. It started the season strong by putting out a great show of pink flowers and rich green foliage. Although Biokovo performed acceptably, it had a couple of flaws that could have been minimized in a trial with a more aggressive maintenance policy. The first is that spent flowers remained on the plants through June, which detracted from the overall appearance of the plants (Table 19a). If we had hand-pruned before rating, these would have been rated higher in overall appearance. Additionally, there were some yellowed older leaves, especially on the two lowest treatments that also reduced the overall appearance, but this would have been easily handled by a minimally involved home gardener in routine maintenance. Still, as an understory plant receiving absolutely no maintenance this performed well enough on all treatments to be recommended. There were no significant differences in growth between treatments (Figures 13a – 13b).

This geranium received high ratings from Spring Open House participants. While a few staunch supporters remained in July, noting "'Biokovo' is an impressive performer" despite having leaves that don't appear similar to other low-water plants, many agreed it looked a little weary after battling the June and July heat. By September plants' return to "great shape" was reflected in increased scores (Table 19b). Its low, dense, "nice growth habit" and performance in dry shade resulted in it being listed in comments from all three events as one of the plants participants would recommend.

***Lomandra confertifolia* 'Seascape' Final H x W: 14" (35cm) x 22" (56cm)**

As with our other attempts to grow *L. confertifolia* cultivars, we killed more plants than we were able to keep alive; in this case 8 out of 24 plants survived, roughly evenly distributed between treatments (80% n=3; 50% n=2; 20% n=3). We present the data in the appendix for the survivors, but the sample size was insufficient to determine statistical significance between treatments (Table 20a; Figures 14a – 14b). Plants that survived never looked robust and healthy in our soil and climate. For this reason, we do not recommend this species/cultivar in this growing region.

Trials staff attempted to select the best-looking individual for each treatment and species before the May Open House for participants to rate throughout the season. However, the individuals of *L.* 'Seascape' selected to represent the 80% and 20% ET_o treatments died after the July open house. This is an accurate representation of how the species performed as a whole as discussed in the previous paragraph. It should be mentioned that the individual selected for the 80% ET_o treatment was the best specimen in the field, which is why its initial (May) mean and median scores were significantly higher than the other two individuals (Table 20b). Perhaps the best conclusion that could be drawn from looking at this set of Open House data is 1) if a large enough sample size of plant material is grown, at least one individual will look exceptional; 2) if a large enough sample of people rate the plant, at least one individual will think a plant cultivar is exceptional.

***Lomandra longifolia* 'Roma 13' Platinum Beauty™ Final H x W: 33" (85cm) x 65" (165cm)**

Platinum Beauty is an outstanding cultivar of this *Lomandra* species. Plants maintained excellent overall appearance throughout the trial and showed no significant differences in growth between treatments (Table 21a; Figures 15a – 15b). The pale yellow, spikey flowers were held down inside the foliage (Figure 15c), and though not a major factor in the plant's looks, were nevertheless an interesting bonus. At any irrigation level, including ***no additional summer water***, this plant was a shimmering beauty in our shadehouse all year.

Platinum Beauty was a consistent favorite at our Open House Ratings events. Reasons participants were enamored with it included uniformity and color. Comments included: "all examples looked great," "consistently nice," "perfect size," "good form," and [added a] "lovely, light, bright color" to the space. Platinum Beauty consistently drew praise from participants at each open house, both in conversations with trials staff and in written comments. A large majority of participants listed this as their favorite plant and recorded that they would recommend it. Its "health & interest" even endeared it to one individual self-described as "not particularly a grass freak!"

***Nandina domestica* 'Lemon-Lime' Final H x W: 13" (33cm) x 16" (41cm)**

This cultivar of heavenly bamboo is an extremely diminutive form with pale green leaves as its name suggests. This put on very little growth in two years' time. This would make it appropriate as a front of border or mid-border plant where bright color is needed in shade. For us this developed the best color contrast between new and older foliage in spring and fall (Figures 16c – 16f). It did not bloom during its two years in the trial. Interestingly, the highest ratings overall were on the lowest irrigation treatment even though measurements indicated the most relative growth during the middle of the summer on the highest irrigation treatment (Table 22a; Figures 16a- 16b). Clearly, faster growth is not related to best appearance in this cultivar.

Evaluation of Lemon-Lime heavenly bamboo split participants into two groups, those who loved its "interesting, bright – cheerful" coloration or those who disliked this "chlorotic" "sad plant." On balance a majority of participants appreciated this plant and gave it high ratings (Table 22b), valuing the pop of "lovely color" Lemon-Lime injects into a shady situation, its small size and the "fresh appearance all examples."

Appendix A
DATA TABLES & CHARTS

2017 Open House Ratings Events

All photos: Karrie Reid; may be used by permission with photo credit; contact skreid@ucanr.edu.

Table 7a. *Lomandra confertifolia* 'Finescape' average monthly quality ratings (scale of 1-5) on 3 ET_0-based irrigation levels during 2017. There were no significant differences between treatments.

	May	June	July	Aug	Sept	Oct	AVG
Overall Appearance							
80%	1.5	1.7	2.3	3.0	2.9	3.3	2.4
50%	1.6	1.8	2.3	2.5	2.8	3.3	2.4
20%	1.3	1.9	2.1	2.8	2.4	2.9	2.2
Foliage							
80%	1.4	2.0	2.7	3.0	3.1	3.3	2.6
50%	1.6	2.8	2.8	3.2	3.7	3.5	2.9
20%	1.3	2.4	2.3	3.0	3.0	3.1	2.5
Flowering							
80%				4.0			4.0
50%							
20%				5.0	1.0		3.0
Pest Tolerance							
80%	5.0	4.4	5.0	4.8	5.0	5.0	4.9
50%	5.0	5.0	5.0	5.0	5.0	5.0	5.0
20%	5.0	5.0	5.0	5.0	4.7	5.0	5.0
Disease Resistance							
80%	5.0	4.4	5.0	5.0	5.0	5.0	4.9
50%	5.0	5.0	5.0	5.0	5.0	5.0	5.0
20%	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Vigor							
80%	1.4	1.7	2.3	2.9	3.0	3.6	2.5
50%	1.6	2.2	2.5	2.8	2.8	3.3	2.6
20%	1.3	2.0	2.6	3.1	2.6	2.7	2.4

Table 7b. Open House participant ratings for *Lomandra confertifolia* 'Finescape' on 3 ET_0-based irrigation treatments in May, July, and September 2017.

		May			July			September		
	ET_0 %	**80**	**50**	**20**	**80**	**50**	**20**	**80**	**50**	**20**
Overall Appearance	Max	4	4	4	5	5	4	5	5	5
	Mean	1.8	1.6	1.4	3.1	3.0	3.2	3.4	3.3	3.5
	Median	**2**	**1**	**1**	**3**	**3**	**3**	**3**	**3**	**4**
	Min	1	1	1	1	1	2	2	1	1
Foliage Quality	Max	4	4	4	5	5	5	5	5	5
	Mean	1.8	1.6	1.4	3.4	3.4	3.4	3.6	3.5	3.7
	Median	**2**	**1**	**1**	**3**	**3**	**4**	**4**	**4**	**4**
	Min	1	1	1	2	1	1	2	2	2
Floral Display	Max	3	1	0	3	4	4	5	5	5
	Mean	0.3	0.0	0.0	0.2	0.3	0.3	0.2	0.2	0.1
	Median	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	Min	0	0	0	0	0	0	0	0	0

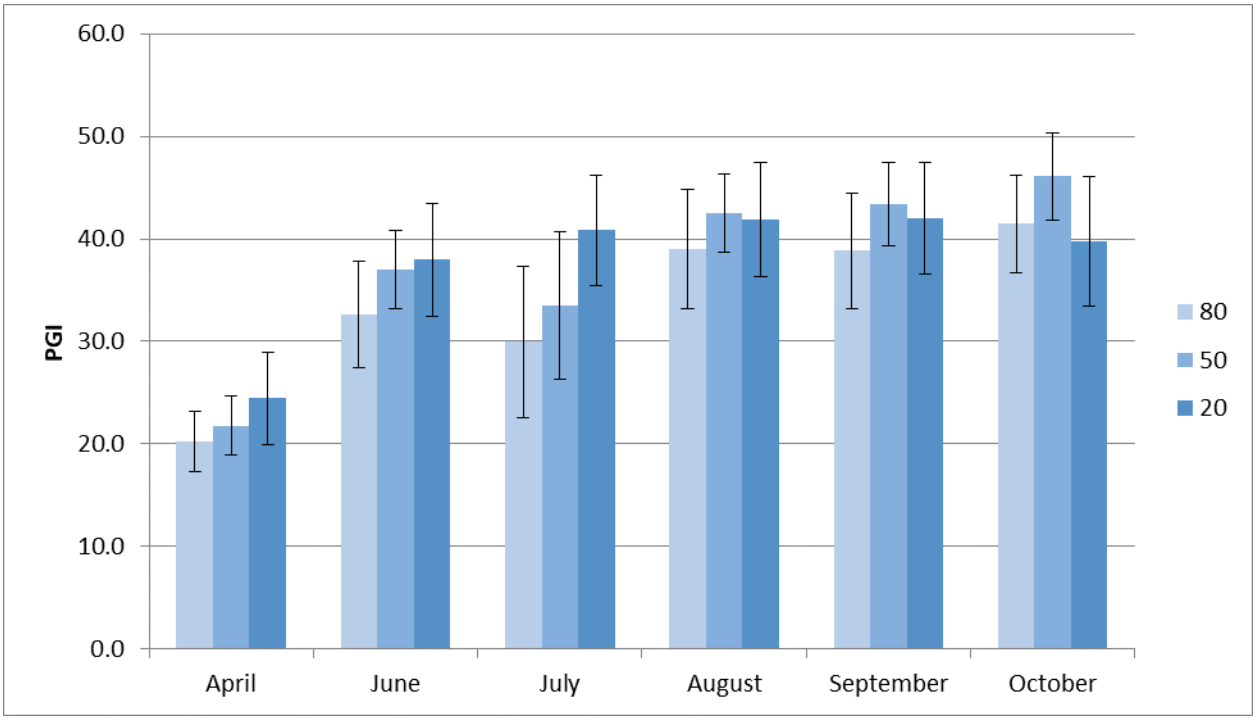

Figure 1a. *Lomandra confertifolia* 'Finescape' average monthly plant growth index on 3 ET_o-based irrigation treatments in 2017. (May data unavailable.) There were no significant differences between treatments. Bars represent ±1 SE.

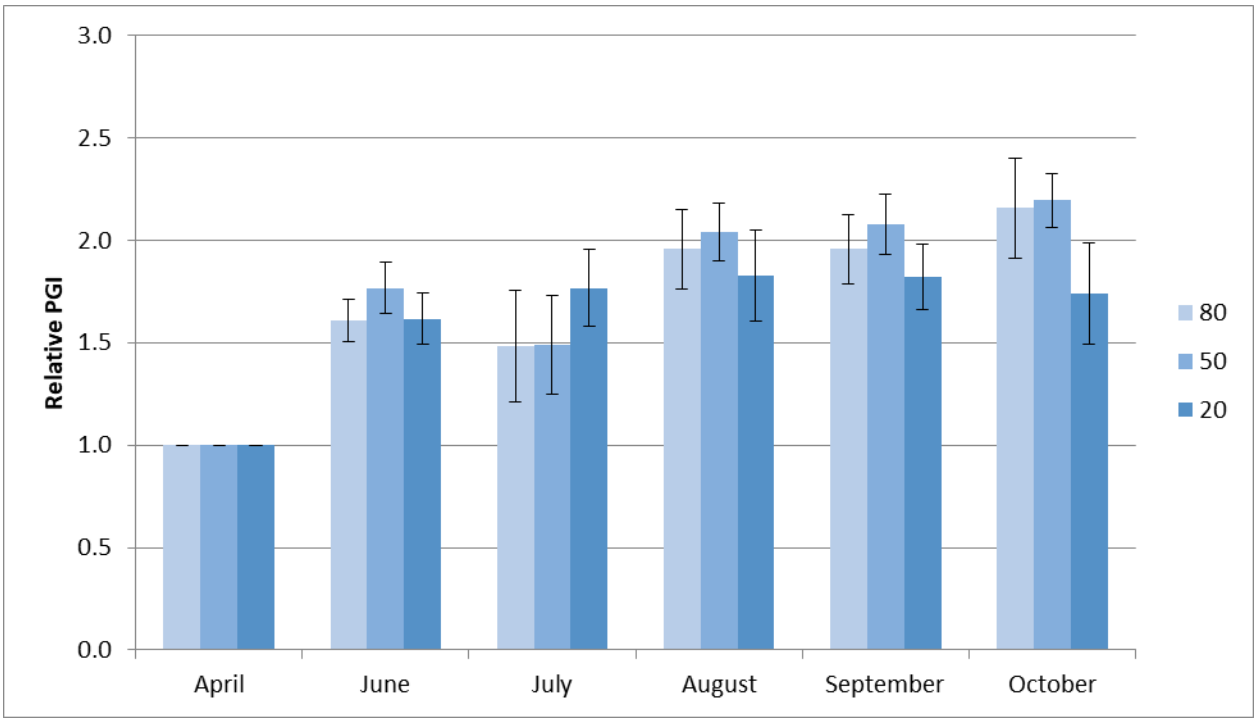

Figure 1b. *Lomandra confertifolia* 'Finescape' average monthly relative plant growth index on 3 ET_o-based irrigation treatments in 2017. (May data unavailable.) There were no significant differences between treatments. Bars represent ±1 SE.

Table 8a. *Lygeum spartum* average monthly quality ratings (scale of 1-5) on 3 ET_o-based irrigation levels during 2017. Different superscripts denote significant differences within the month at p≤0.05 using ANOVA and Tukey's HSD.

	May	June	July	Aug	Sept	Oct	AVG
Overall Appearance							
80%	4.4	5.0	4.5	4.6	4.5	4.9	4.6
50%	4.7	4.9	5.0	5.0	4.9	5.0	4.9
20%	4.4	4.8	4.8	4.6	4.1	4.6	4.5
Foliage							
80%	4.9	5.0	4.8	4.7	4.9	5.0	4.9
50%	5.0	5.0	5.0	5.0	5.0	5.0	5.0
20%	5.0	5.0	4.8	4.9	4.4	4.8	4.8
Flowering							
80%	3.4	5.0	4.9	4.8	4.8[a]	4.8	4.6
50%	2.4	5.0	5.0	5.0	4.9[a]	5.0	4.5
20%	2.3	4.9	4.9	4.9	3.4[b]	4.6	4.2
Pest Tolerance							
80%	5.0	5.0	5.0	5.0	5.0	5.0	5.0
50%	5.0	5.0	5.0	5.0	5.0	5.0	5.0
20%	5.0	5.0	5.0	5.0	4.8	5.0	5.0
Disease Resistance							
80%	5.0	5.0	5.0	5.0	5.0	5.0	5.0
50%	5.0	5.0	5.0	5.0	5.0	5.0	5.0
20%	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Vigor							
80%	4.6	5.0	4.5	4.6	4.8	5.0	4.8
50%	4.7	5.0	5.0	4.7	5.0	5.0	4.9
20%	4.1	4.4	4.1	4.4	4.1	4.6	4.3

Table 8b. Open House participant ratings for *Lygeum spartum* on 3 ET_o-based irrigation treatments in May, July, and September 2017.

		May			July			September		
	ET_o %	**80**	**50**	**20**	**80**	**50**	**20**	**80**	**50**	**20**
Overall Appearance	Max	5	5	5	5	5	5	5	5	5
	Mean	4.1	4.1	4.1	4.2	4.2	4.1	4.0	3.9	3.9
	Median	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**
	Min	3	3	2	3	3	3	2	2	2
Foliage Quality	Max	5	5	5	5	5	5	5	5	5
	Mean	4.2	4.2	4.2	4.1	4.2	4.0	4.0	3.9	3.9
	Median	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**
	Min	2	3	2	3	3	3	2	2	2
Floral Display	Max	5	5	5	5	5	5	5	5	5
	Mean	2.1	2.1	1.6	3.6	3.6	3.6	3.6	3.6	3.6
	Median	**2**	**2**	**1**	**4**	**4**	**4**	**4**	**4**	**4**
	Min	0	0	0	0	0	0	0	0	0

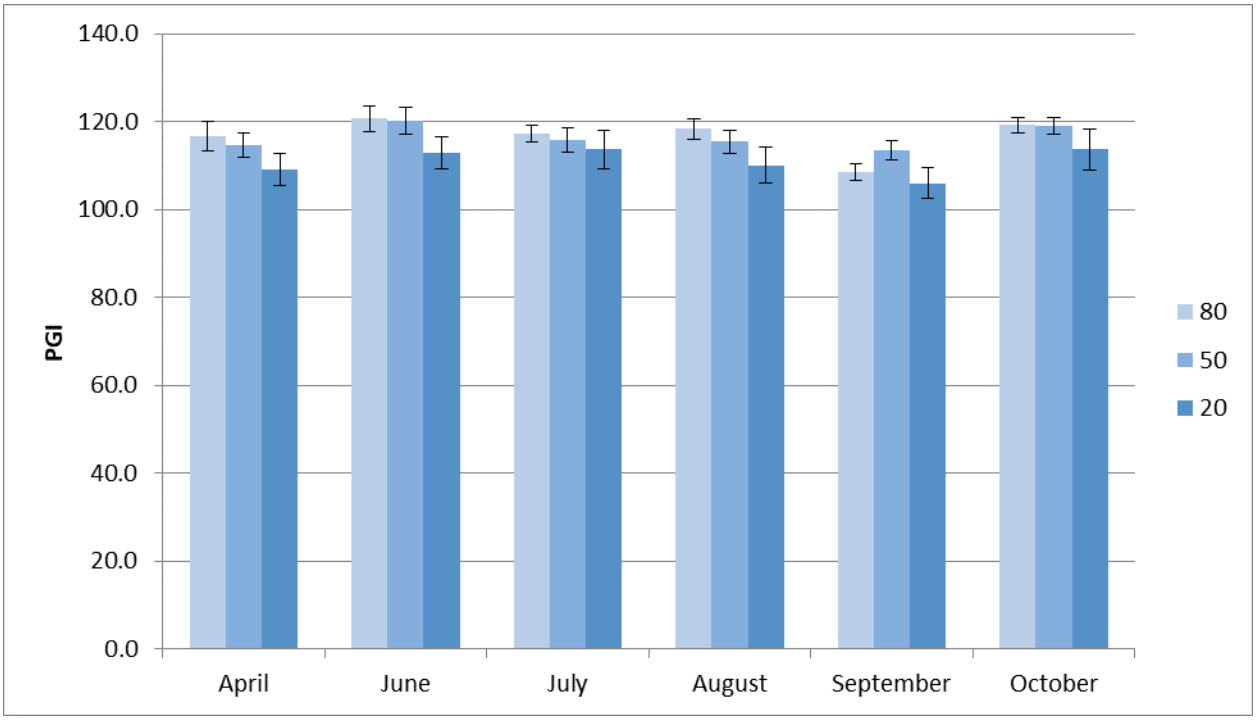

Figure 2a. *Lygeum spartum* average monthly plant growth index on 3 ET_o-based irrigation levels during 2017. (May data unavailable.) Bars represent ±1 SE.

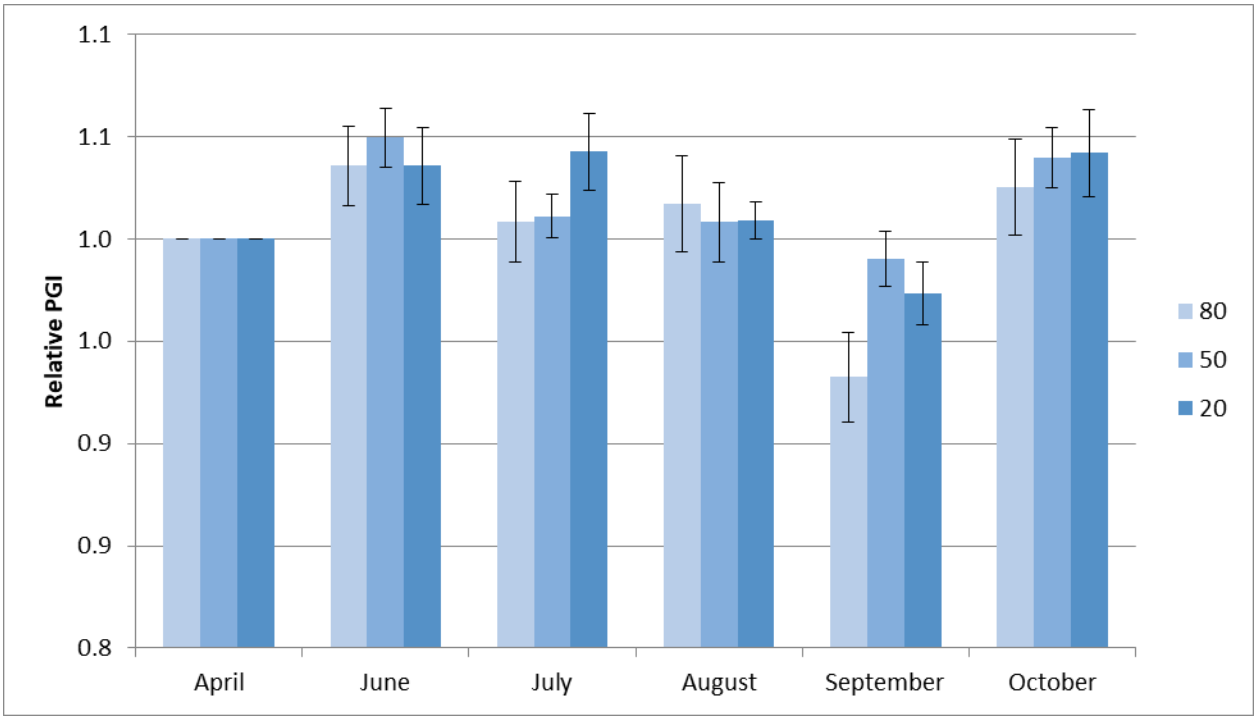

Figure 2b. *Lygeum spartum* average relative monthly plant growth index on 3 ET_o-based irrigation levels during 2017. (May data unavailable.) Bars represent ±1 SE. There were no significant differences between treatments.

Table 9a. *Muhlenbergia capillaris* 'White Cloud' average monthly quality ratings (scale of 1-5) on 3 ET_o-based irrigation treatments in 2017. Different superscripts denote significant differences within the month at p≤0.05 using ANOVA and Tukey's HSD. Red superscripts denote a significant difference at p≤0.01.

	May	June	July	Aug	Sept	Oct	AVG
Overall Appearance							
80%	2.1	2.2	2.3	2.6	2.7	2.7	2.4
50%	1.8	2.1	1.9	2.0	2.5	2.3	2.1
20%	2.0	1.8	1.5	1.7	2.3	2.0	1.9
Foliage							
80%	3.1	2.4	2.4	2.7	3.0	3.1[a]	2.8
50%	2.0	2.1	2.0	2.0	3.0	2.4[b]	2.3
20%	2.0	2.0	1.7	1.7	2.7	2.2[b]	2.0
Flowering							
80%		1.0	1.0			1.0	1.0
50%					1.0	1.3	1.2
20%		1.0			1.0	1.5	1.2
Pest Tolerance							
80%	5.0	5.0	5.0	5.0	5.0	5.0	5.0
50%	5.0	5.0	5.0	5.0	5.0	5.0	5.0
20%	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Disease Resistance							
80%	5.0	5.0	5.0	5.0	5.0	5.0	5.0
50%	5.0	5.0	5.0	5.0	5.0	5.0	5.0
20%	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Vigor							
80%	2.4	2.6	2.3	3.0	3.3	3.4[a]	2.8
50%	1.9	2.4	2.1	2.1	3.3	2.5[b]	2.4
20%	2.0	2.0	1.7	2.0	2.3	2.3[b]	2.1

Table 9b. Open House participant ratings for *Muhlenbergia capillaris* 'White Cloud' on 3 ET_o-based irrigation treatments in May, July, and September 2017.

		May			July			September		
	ET_o %	**80**	**50**	**20**	**80**	**50**	**20**	**80**	**50**	**20**
Overall Appearance	Max	5	4	4	3	4	5	3	4	5
	Mean	1.8	1.6	2.0	2.0	2.0	2.8	2.0	2.2	2.9
	Median	**2**	**1**	**2**	**2**	**2**	**3**	**2**	**2**	**3**
	Min	1	1	1	1	1	2	1	1	1
Foliage Quality	Max	4	4	4	3	4	5	3	4	5
	Mean	1.7	1.6	2.2	2.1	2.1	3.0	2.1	2.4	3.1
	Median	**2**	**1**	**2**	**2**	**2**	**3**	**2**	**2**	**3**
	Min	1	1	1	1	1	2	1	1	2
Floral Display	Max	2	1	2	3	2	4	3	3	3
	Mean	0.0	0.0	0.2	0.6	0.1	0.2	0.3	0.1	0.2
	Median	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	Min	0	0	0	0	0	0	0	0	0

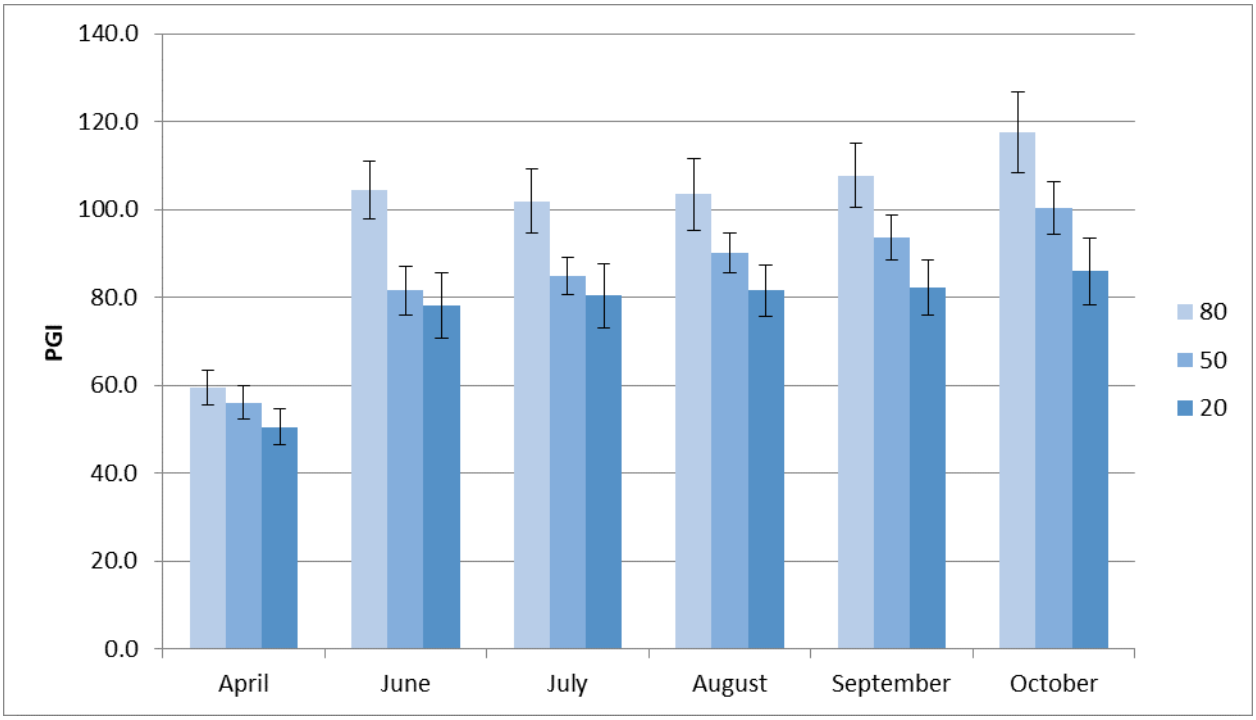

Figure 3a. *Muhlenbergia capillaris* 'White Cloud' average plant growth index on 3 ET_o-based irrigation treatments in 2017. (May data unavailable.) Bars represent ±1 SE.

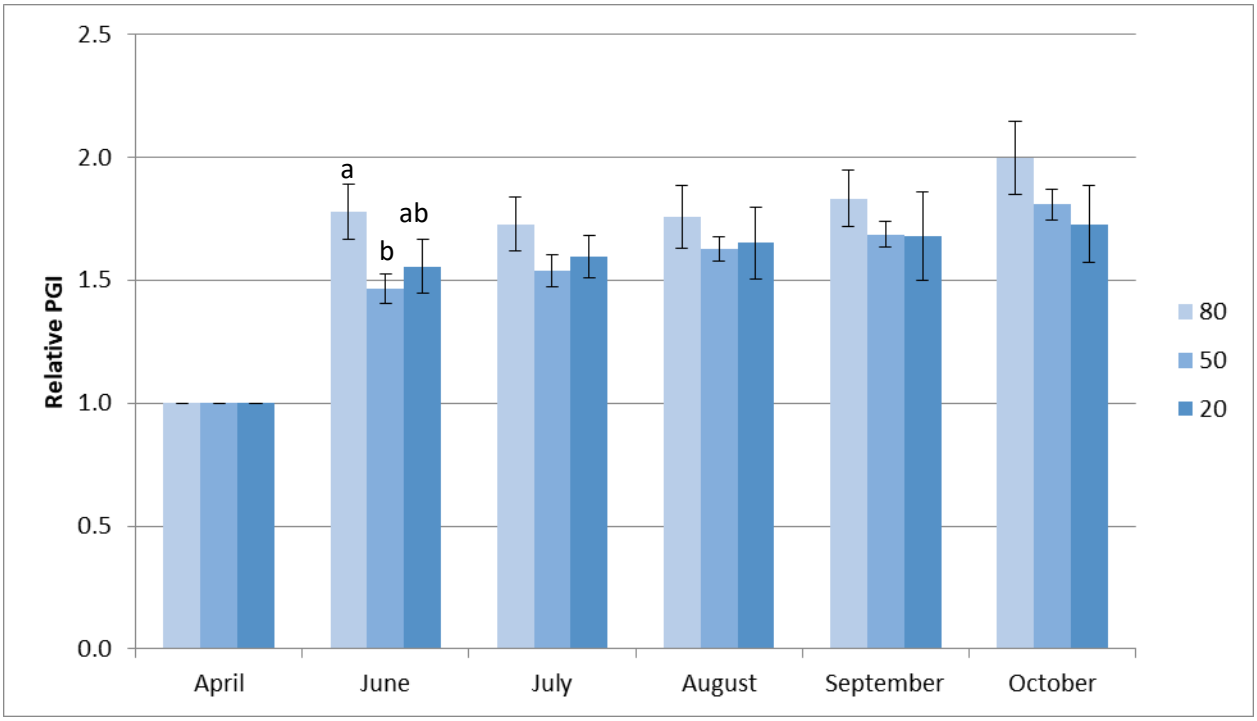

Figure 3b. *Muhlenbergia capillaris* 'White Cloud' average relative plant growth index on 3 ET_o-based irrigation treatments in 2017. (May data unavailable.) Bars represent ±1 SE. Different superscripts denote significant differences within the month at $p \leq 0.05$ using ANOVA and Tukey's HSD.

Table 10a. *Muhlenbergia reverchonii* 'Undaunted' average monthly quality ratings (scale of 1-5) on 3 ET_o-based irrigation treatments in 2017. There were no significant differences between treatments.

	May	June	July	Aug	Sept	Oct	AVG
Overall Appearance							
80%	3.5	3.6	3.8	4.0	4.5	4.9	4.0
50%	3.6	3.9	4.3	4.5	4.4	4.9	4.2
20%	3.6	3.9	4.3	4.0	4.5	4.9	4.2
Foliage							
80%	4.1	4.0	3.9	4.3	4.4	4.4	4.2
50%	4.6	4.8	4.3	4.5	4.4	4.8	4.5
20%	4.3	4.1	4.3	4.4	4.6	4.8	4.4
Flowering							
80%		1.3	1.8	3.0	4.6	5.0	3.1
50%		1.0	1.7	3.3	4.5	5.0	3.1
20%		1.0	1.4	2.5	4.5	5.0	2.9
Pest Tolerance							
80%	5.0	5.0	5.0	5.0	5.0	5.0	5.0
50%	5.0	5.0	5.0	5.0	5.0	5.0	5.0
20%	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Disease Resistance							
80%	5.0	5.0	5.0	5.0	5.0	5.0	5.0
50%	5.0	5.0	5.0	5.0	5.0	5.0	5.0
20%	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Vigor							
80%	4.4	4.8	4.4	4.4	4.6	4.6	4.5
50%	4.4	4.9	4.8	4.8	4.1	5.0	4.6
20%	4.4	4.9	4.8	4.5	4.5	4.9	4.6

Table 10b. Open House participant ratings for *Muhlenbergia reverchonii* 'Undaunted' on 3 ET_o-based irrigation treatments in May, July, and September 2017.

		May			July			September		
	ET_o %	**80**	**50**	**20**	**80**	**50**	**20**	**80**	**50**	**20**
Overall Appearance	Max	5	5	5	5	5	5	5	5	5
	Mean	4.0	4.0	3.5	3.6	3.3	3.6	4.5	4.2	4.5
	Median	**4**	**4**	**4**	**4**	**3**	**4**	**5**	**4**	**5**
	Min	2	3	2	2	2	2	3	3	2
Foliage Quality	Max	5	5	5	5	5	5	5	5	5
	Mean	4.1	4.1	3.7	3.8	3.5	3.8	4.4	3.9	4.4
	Median	**4**	**4**	**4**	**4**	**4**	**4**	**5**	**4**	**5**
	Min	3	3	3	1	2	2	2	2	2
Floral Display	Max	5	5	5	4	4	5	5	5	5
	Mean	0.5	0.4	0.4	1.7	1.5	2.4	4.0	3.9	3.9
	Median	**0**	**0**	**0**	**1**	**1**	**2**	**5**	**5**	**5**
	Min	0	0	0	0	0	0	0	0	0

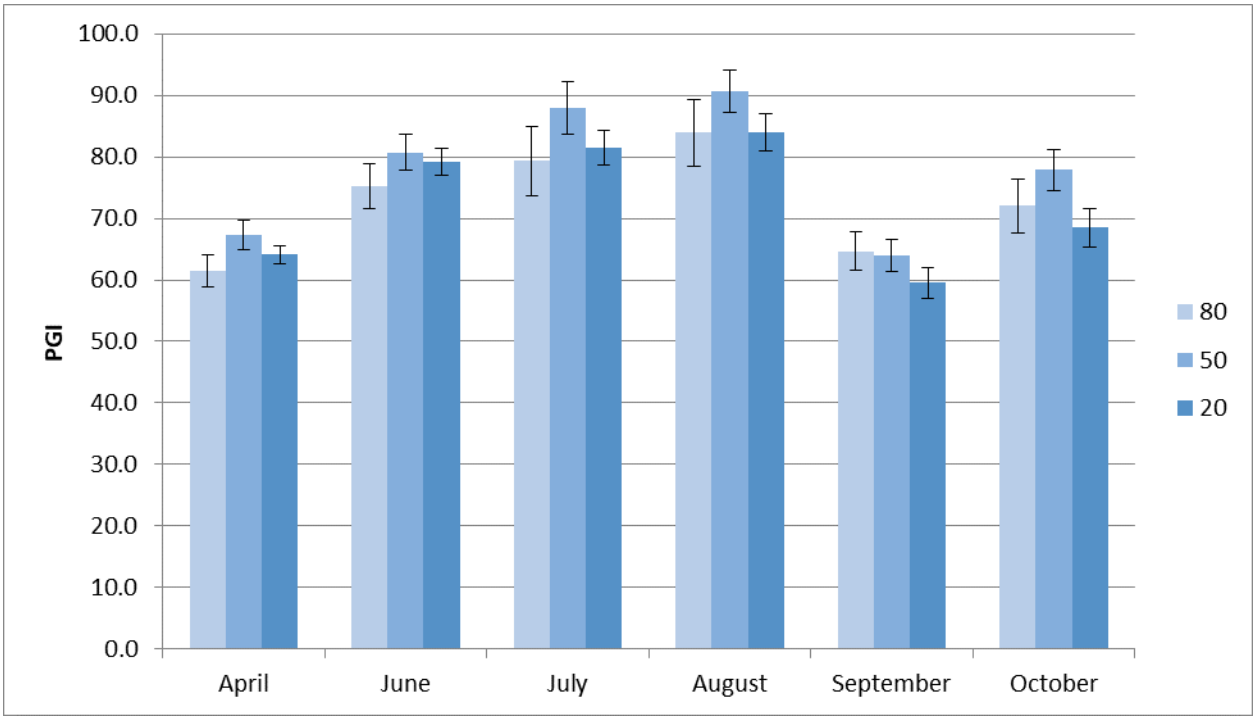

Figure 4a. *Muhlenbergia reverchonii* 'Undaunted' average monthly plant growth index on 3 ET_o-based irrigation treatments in 2017. (May data unavailable.) Bars represent ±1 SE.

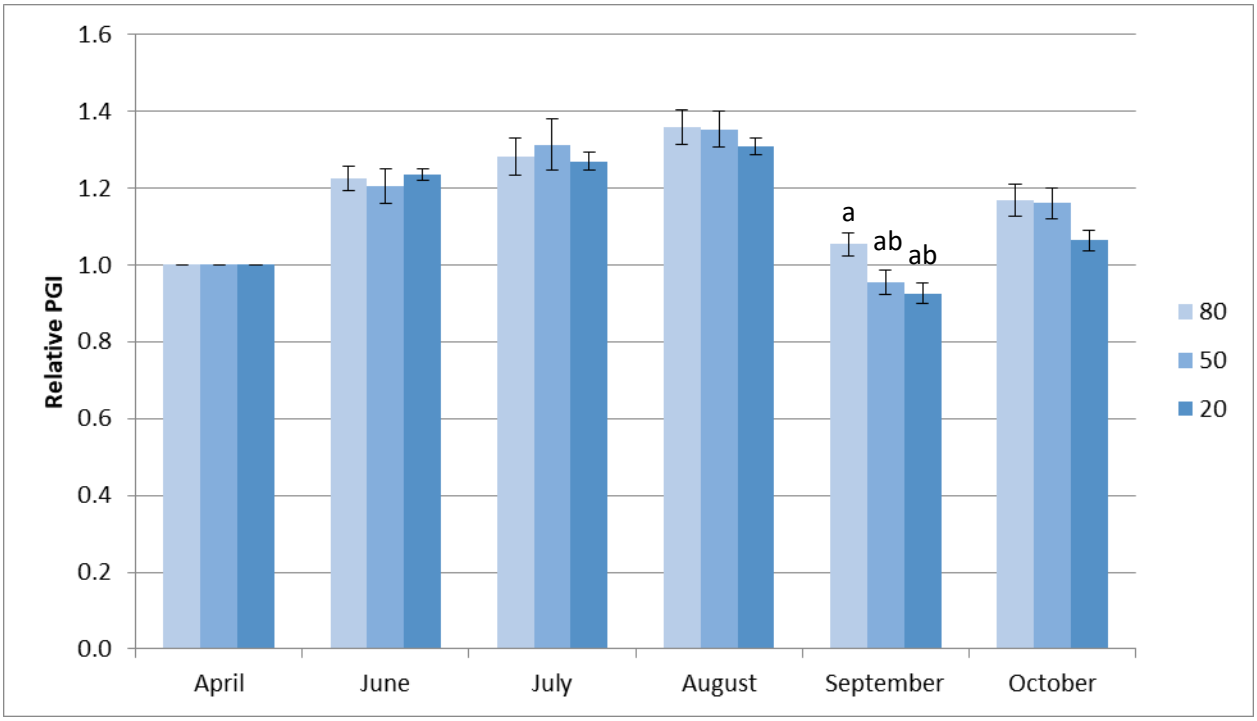

Figure 4b. *Muhlenbergia reverchonii* 'Undaunted' average monthly relative plant growth index on 3 ET_o-based irrigation treatments in 2017. (May data unavailable.) Bars represent ±1 SE. Different superscripts denote significant differences within the month at $p \leq 0.05$ using ANOVA and Tukey's HSD.

Table 11a. *Rosa* 'KORdiagraf' Dark Desire™ average monthly quality ratings (scale of 1-5) on 3 ET_o-based irrigation treatments in 2017. There were no significant differences between treatments.

	May	June	July	Aug	Sept	Oct	AVG
Overall Appearance							
80%	3.1	3.0	3.5	3.0	2.9	2.8	3.0
50%	2.9	2.9	2.9	2.6	2.6	2.4	2.7
20%	3.3	2.9	3.4	2.6	2.8	2.4	2.9
Foliage							
80%	3.4	3.3	3.5	3.1	3.4	2.4	3.2
50%	2.7	3.4	3.0	3.1	2.9	2.4	2.9
20%	3.3	3.5	3.3	3.0	2.8	2.6	3.1
Flowering							
80%	2.0	1.0	1.1	1.2	1.1	1.3	1.3
50%	1.1	1.2	1.0	1.0	1.0	1.0	1.1
20%	2.4	1.2	1.0	1.0	1.1	1.0	1.3
Pest Tolerance							
80%	3.5	3.5	3.5	3.1	4.3	3.3	3.5
50%	3.1	3.6	3.1	3.4	3.6	3.1	3.3
20%	3.5	3.6	3.5	3.0	3.5	3.4	3.4
Disease Resistance							
80%	4.0	3.9	4.4	5.0	5.0	5.0	4.5
50%	4.0	4.6	4.9	4.6	4.9	5.0	4.6
20%	4.1	4.5	5.0	5.0	5.0	4.9	4.8
Vigor							
80%	4.5	4.8	5.0	4.6	3.6	4.0	4.4
50%	3.7	4.0	3.9	3.9	3.3	3.3	3.7
20%	4.3	4.5	4.4	4.0	3.9	3.6	4.1

Table 11b. Open House participant ratings for *Rosa* 'KORdiagraf' Dark Desire™ on 3 ET_o-based irrigation treatments in May, July, and September 2017.

		May			July			September		
	ET_o %	**80**	**50**	**20**	**80**	**50**	**20**	**80**	**50**	**20**
Overall Appearance	Max	5	5	5	4	4	4	4	4	4
	Mean	3.6	3.1	2.9	3.2	3.0	2.8	3.2	2.8	2.8
	Median	**4**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**
	Min	2	2	1	1	1	1	2	2	1
Foliage Quality	Max	5	5	5	5	5	5	5	5	5
	Mean	3.8	3.3	3.2	3.7	3.4	3.4	3.8	3.2	3.2
	Median	**4**	**3**	**3**	**4**	**3**	**3**	**4**	**3**	**3**
	Min	2	2	2	1	1	2	2	2	2
Floral Display	Max	4	4	4	4	4	4	4	4	4
	Mean	0.4	0.7	0.8	1.9	1.7	1.5	1.6	1.2	0.3
	Median	**0**	**0**	**0**	**2**	**2**	**1**	**1**	**1**	**0**
	Min	0	0	0	1	0	0	0	0	0

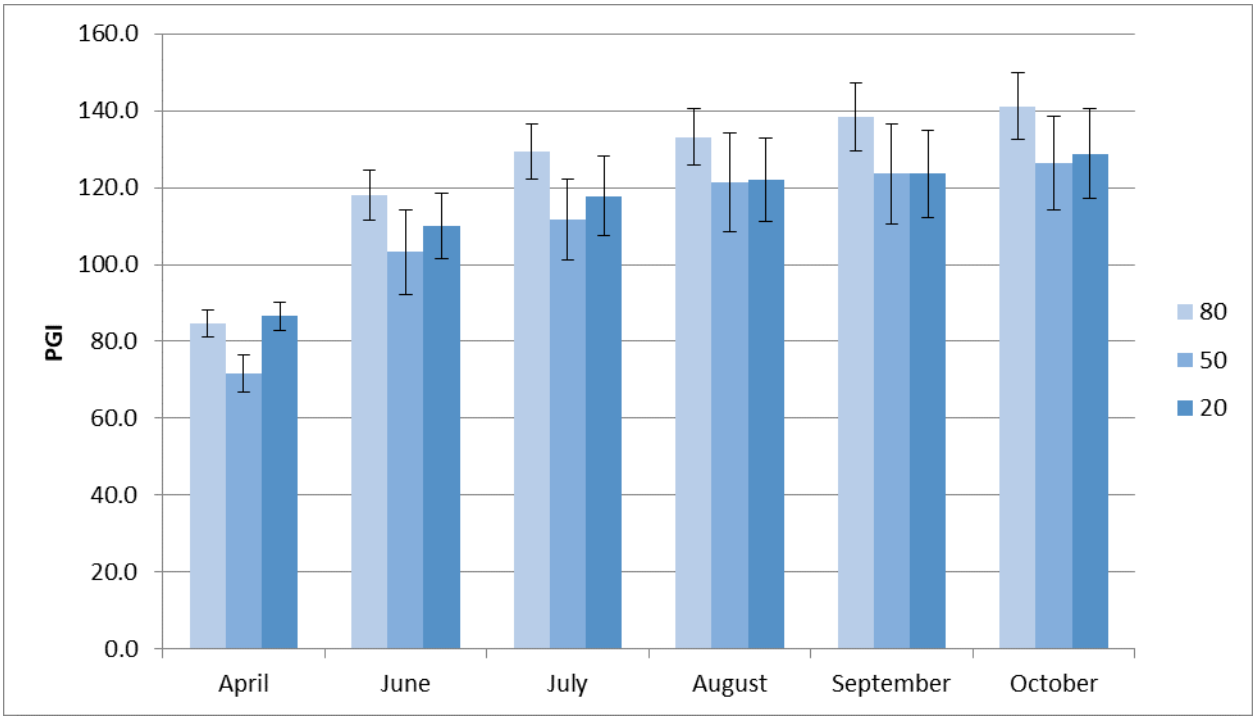

Figure 5a. *Rosa* 'KORdiagraf' Dark Desire™ average monthly plant growth index on 3 ET_o-based irrigation levels in 2017. Bars represent ±1 SE.

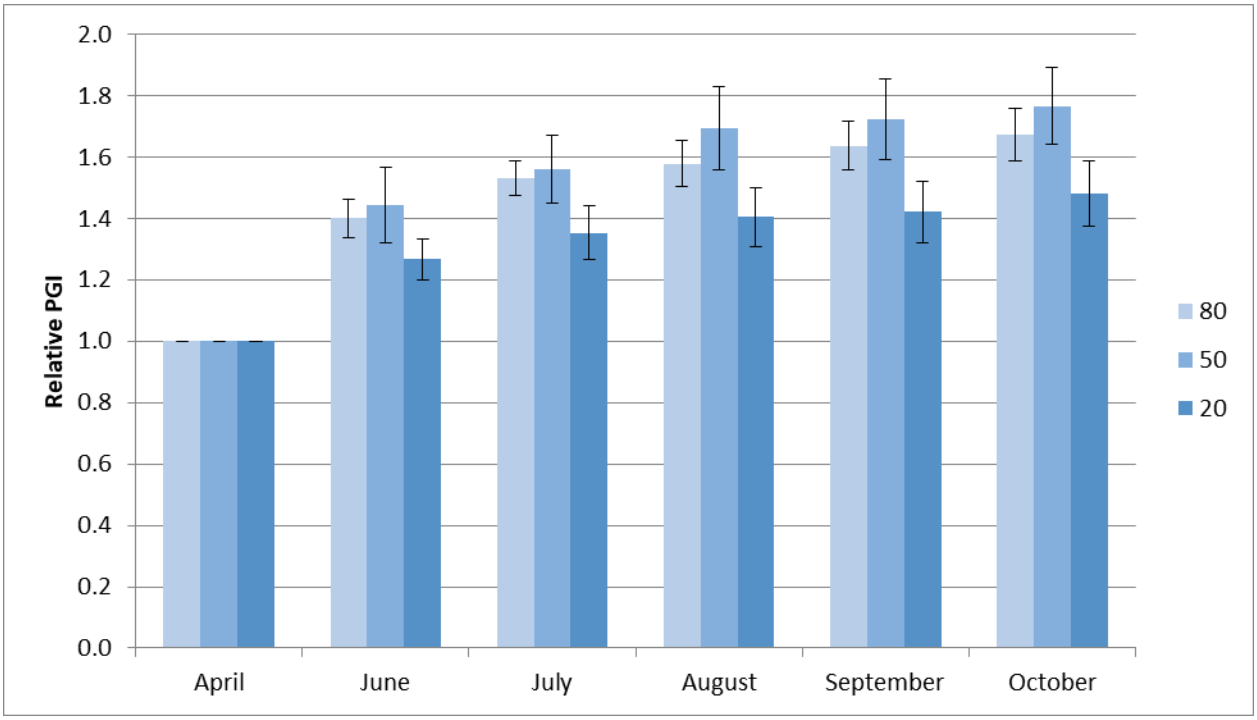

Figure 5b. *Rosa* 'KORdiagraf' Dark Desire™ average monthly relative plant growth index on 3 ET_o-based irrigation levels in 2017. Bars represent ±1 SE. There were no significant differences between treatments.

Table 12a. *Rosa* 'KORvodacom' Plum Perfect™ Sunbelt® average monthly quality ratings (scale of 1-5) on 3 ET_o-based irrigation treatments in 2017. Different superscripts denote significant difference within the month at p≤0.05 using ANOVA and Tukey's HSD.

	May	June	July	Aug	Sept	Oct	AVG
Overall Appearance							
80%	3.8	2.3	2.1	2.1	2.0	2.1	2.4
50%	3.9	2.3	2.3	2.0	1.9	1.7	2.3
20%	3.7	2.1	2.0	2.0	1.9	1.9	2.3
Foliage							
80%	3.0	2.6	2.1	2.0	2.0	1.9	2.3
50%	3.1	2.3	2.0	2.0	1.9	1.7	2.2
20%	2.9	2.1	2.0	2.1	1.9	1.9	2.1
Flowering	4.1		1.0	1.0	1.0	1.0	1.6
80%	4.3	1.3	1.0		1.0	1.0	1.7
50%	3.6	1.0		1.0	1.0	1.0	1.5
20%	4.1		1.0	1.0	1.0	1.0	1.6
Pest Tolerance							
80%	3.3	3.3	2.9	2.5	3.9	3.3	3.2
50%	3.1	3.1	2.6	2.9	4.0	3.0	3.1
20%	2.9	2.9	2.9	2.7	4.1	3.3	3.1
Disease Resistance							
80%	4.9[a]	3.8	4.8	4.4	4.8	5.0	4.6
50%	5.0[a]	3.1	3.9	4.0	4.6	5.0	4.3
20%	4.1[b]	3.1	3.9	4.1	5.0	4.9	4.2
Vigor							
80%	4.1	3.3	3.0	2.8	2.4	2.8	3.0
50%	4.7	4.0	3.1	3.1	2.3	2.4	3.3
20%	3.4	2.9	2.9	2.7	1.7	2.1	2.6

Table 12b. Open House participant ratings for *Rosa* 'KORvodacom' Plum Perfect™ Sunbelt® on 3 ET_o-based irrigation treatments in May, July, and September 2017.

		May			July			September		
	ET_o %	**80**	**50**	**20**	**80**	**50**	**20**	**80**	**50**	**20**
Overall Appearance	Max	5	5	5	3	3	3	4	3	3
	Mean	2.8	3.0	3.3	1.8	1.7	2.2	1.7	1.5	2.0
	Median	**3**	**3**	**3**	**2**	**2**	**2**	**2**	**1**	**2**
	Min	1	2	2	1	1	1	1	0	1
Foliage Quality	Max	4	4	5	3	3	4	4	3	4
	Mean	2.5	2.9	3.2	2.0	1.9	2.4	1.9	1.6	2.0
	Median	**3**	**3**	**3**	**2**	**2**	**2**	**2**	**2**	**2**
	Min	1	2	2	1	1	1	1	1	1
Floral Display	Max	5	5	5	2	4	2	3	2	3
	Mean	3.0	3.1	3.6	0.4	0.5	0.8	0.3	0.2	1.1
	Median	**3**	**3**	**4**	**0**	**0**	**1**	**0**	**0**	**1**
	Min	0	1	2	0	0	0	0	0	0

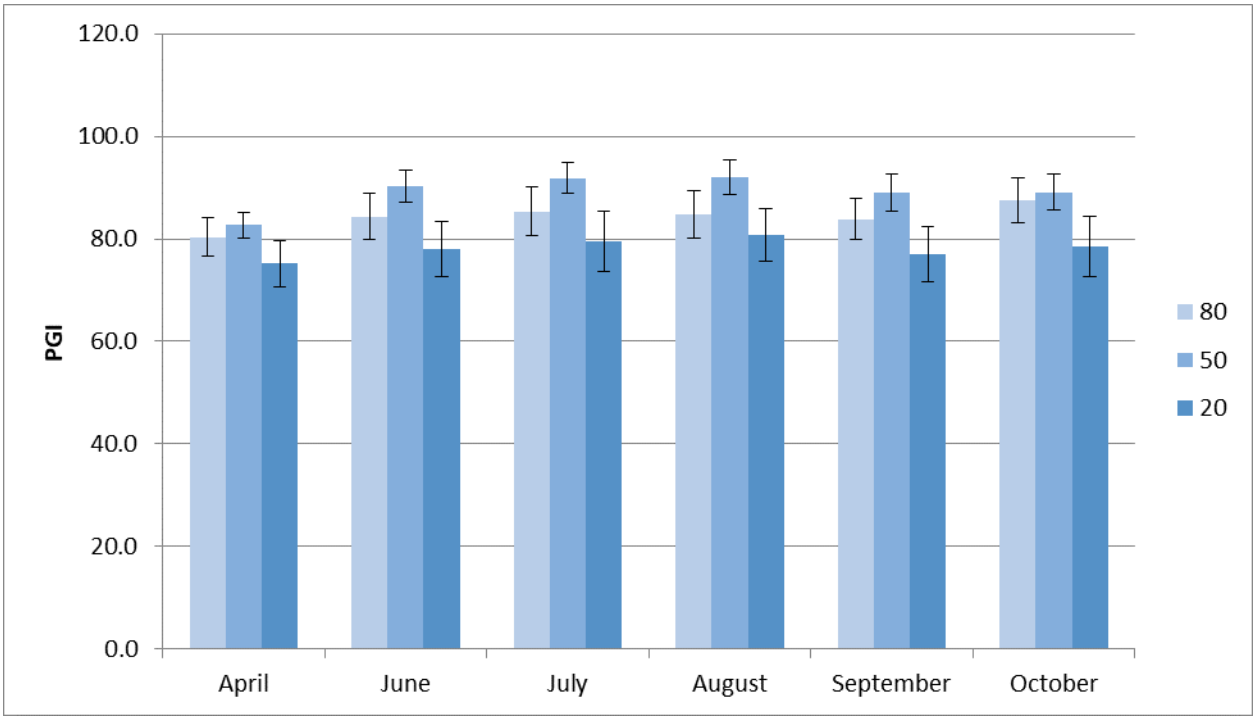

Figure 6a. *Rosa* 'KORvodacom' Plum Perfect™ Sunbelt® average monthly plant growth index on 3 ET_o-based irrigation levels in 2017. Bars represent ±1 SE.

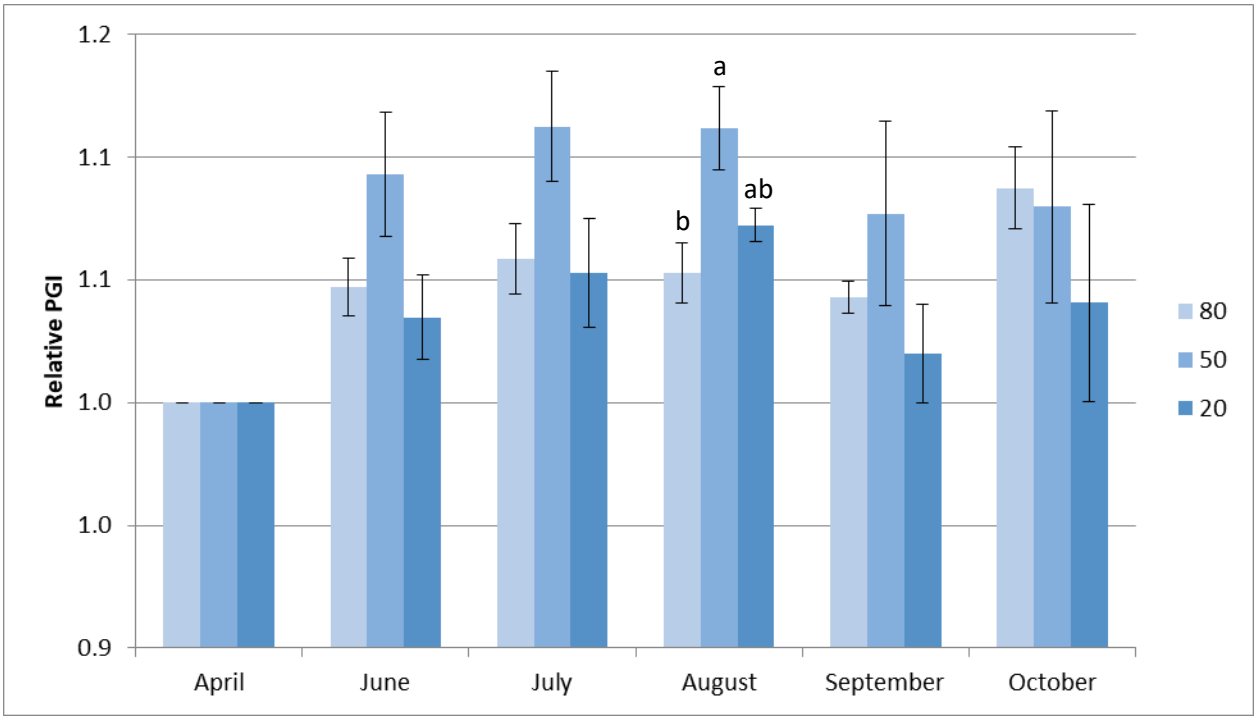

Figure 6b. *Rosa* 'KORvodacom' Plum Perfect™ Sunbelt® average monthly relative plant growth index on 3 ET_o-based irrigation levels in 2017. Bars represent ±1 SE. Different superscripts denote significant differences within the month at $p \leq 0.01$ using ANOVA and Tukey's HSD.

Table 13a. *Rosa* 'Meiradena' Icecap™ average monthly quality ratings (scale of 1-5) on 3 ET_o-based irrigation treatments in 2017. Different superscripts denote significant differences within the month at p≤0.05 using ANOVA and Tukey's HSD. Red superscripts denote a significant difference at p≤0.01.

	May	June	July	Aug	Sept	Oct	AVG
Overall Appearance							
80%	4.9	4.4	4.9[a]	4.1	4.0	4.0	4.4
50%	5.0	4.1	5.0[a]	4.3	3.1	3.6	4.2
20%	4.8	4.1	4.4[b]	4.5	3.3	3.6	4.1
Foliage							
80%	3.8	4.9	4.6	4.0	3.8	3.6	4.1
50%	4.0	4.4	4.3	4.0	3.1	3.3	3.8
20%	4.0	4.6	4.4	4.4	3.8	3.4	4.1
Flowering							
80%	4.9	2.1	3.4	3.5	2.6	3.5	3.3
50%	5.0	2.1	3.6	3.6	2.0	3.1	3.3
20%	4.9	2.4	2.8	3.8	1.8	3.3	3.1
Pest Tolerance							
80%	3.8	4.9	4.6	4.1	4.1	3.9	4.2
50%	4.1	4.4	4.3	4.1	4.1	3.8	4.1
20%	4.1	4.6	4.4	4.6	4.3	3.9	4.3
Disease Resistance							
80%	5.0	5.0	5.0	5.0	4.9	5.0	5.0
50%	5.0	5.0	5.0	4.9	5.0	5.0	5.0
20%	5.0	5.0	5.0	5.0	4.8	5.0	5.0
Vigor							
80%	5.0	5.0	5.0	4.9	4.8	4.8	4.9
50%	5.0	5.0	5.0	4.9	4.0	4.4	4.7
20%	4.9	5.0	4.9	4.5	4.0	4.5	4.6

Table 13b. Open House participant ratings for *Rosa* 'Meiradena' Icecap™ on 3 ET_o-based irrigation treatments in May, July, and September 2017.

		May			July			September		
	ET_o %	**80**	**50**	**20**	**80**	**50**	**20**	**80**	**50**	**20**
Overall Appearance	Max	5	5	5	5	5	5	4	5	5
	Mean	3.9	4.0	3.9	3.5	4.0	3.4	2.6	4.1	3.3
	Median	**4**	**4**	**4**	**4**	**4**	**4**	**3**	**4**	**3**
	Min	2	2	3	2	3	2	1	2	2
Foliage Quality	Max	5	5	5	5	5	5	5	5	5
	Mean	4.0	4.1	3.9	3.7	4.2	3.9	2.7	4.2	3.7
	Median	**4**	**4**	**4**	**4**	**4**	**4**	**3**	**4**	**4**
	Min	3	3	2	3	3	3	1	2	2
Floral Display	Max	5	5	5	5	5	5	4	5	5
	Mean	3.1	3.0	3.1	2.8	3.5	2.8	1.5	4.0	2.3
	Median	**3**	**3**	**3**	**3**	**4**	**3**	**1**	**4**	**2**
	Min	0	0	0	1	2	1	0	2	0

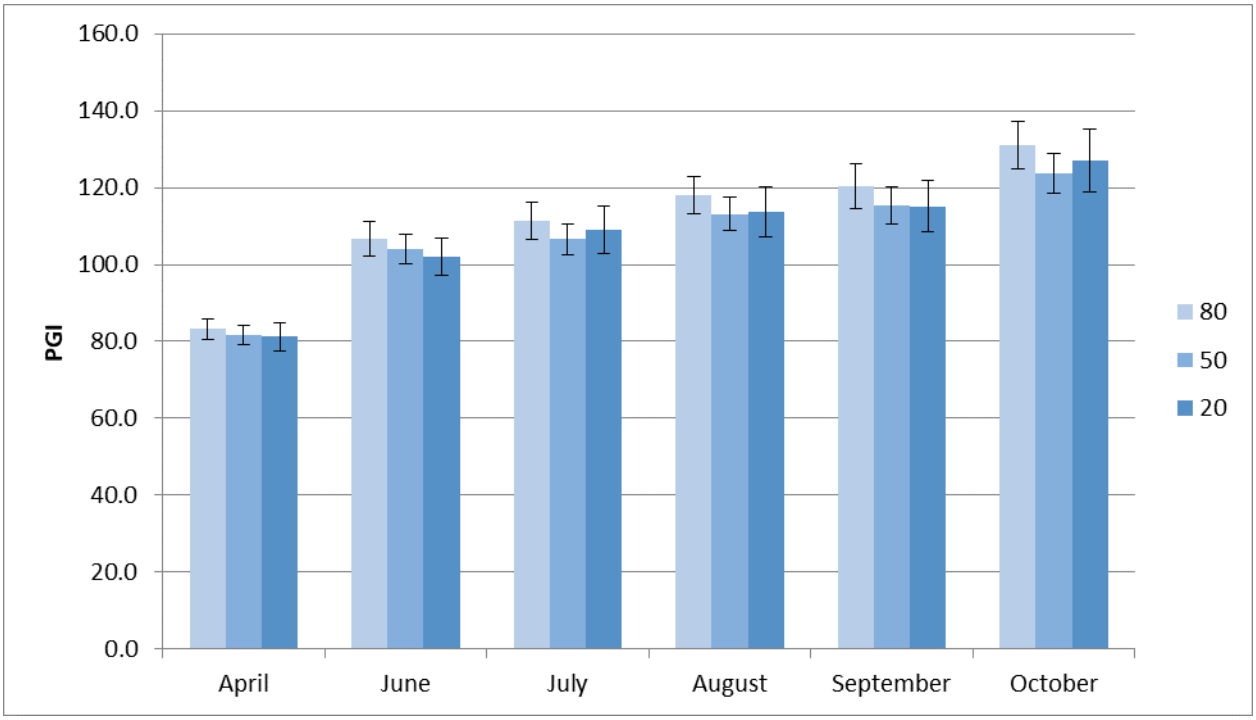

Figure 7a. *Rosa* 'Meiradena' Icecap™ average monthly plant growth index on $3ET_o$-based irrigation treatments in 2017. (May data unavailable.) Bars represent ±1 SE.

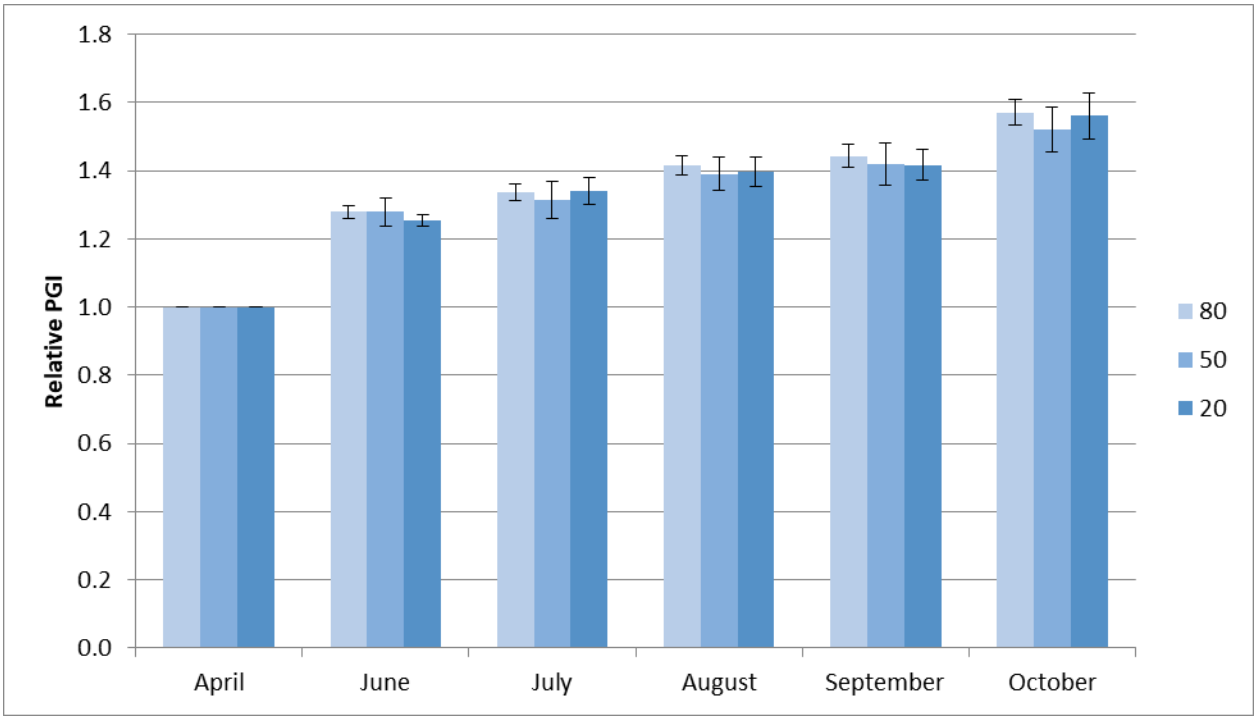

Figure 7b. *Rosa* 'Meiradena' Icecap™ average monthly relative plant growth index on 3 ET_o-based irrigation treatments in 2017. (May data unavailable.) Bars represent ±1 SE. There were no significant differences between treatments.

Table 14a. *Rosa* 'Meizorland' White Drift® average monthly quality ratings (scale of 1-5) on 3 ET_o-based irrigation treatments in 2017. Different superscripts denote significant differences within the month using ANOVA and Tukey's HSD at p≤0.05.

	May	June	July	Aug	Sept	Oct	AVG
Overall Appearance							
80%	4.4	4.3	3.8	4.1	3.5	3.6	3.9
50%	4.5	4.3	3.8	3.8	3.4	3.4	3.8
20%	4.6	4.1	4.3	4.1	3.4	3.5	4.0
Foliage							
80%	3.6	3.8	3.5	3.5	3.4	3.1	3.5
50%	4.0	4.1	3.4	3.4	2.8	2.8	3.4
20%	4.0	4.0	3.6	3.5	3.3	3.3	3.6
Flowering							
80%	3.8	2.3	1.5[b]	2.5	1.6	2.4	2.3
50%	4.1	2.1	2.6[ab]	1.9	1.9	1.6	2.4
20%	4.4	2.9	3.1[a]	2.9	1.4	2.1	2.8
Pest Tolerance							
80%	3.9	3.9	3.9	3.9	4.4	3.8	3.9
50%	4.0	4.1	3.8	3.8	4.3	4.1	4.0
20%	4.0	4.0	3.9	3.9	4.4	4.0	4.0
Disease Resistance							
80%	4.1	4.5	5.0	4.9	5.0	5.0	4.8
50%	4.6	4.8	5.0	4.9	4.9	5.0	4.9
20%	4.4	4.6	5.0	5.0	5.0	5.0	4.8
Vigor							
80%	5.0	5.0	4.9	4.5	4.0	4.5	4.6
50%	5.0	5.0	4.9	4.6	4.0	4.0	4.6
20%	4.8	4.9	4.8	4.8	3.6	3.9	4.4

Table 14b. Open House participant ratings for *Rosa* 'Meizorland' White Drift® on 3 ET_o-based irrigation treatments in May, July, and September 2017.

		May			July			September		
	ET_o %	**80**	**50**	**20**	**80**	**50**	**20**	**80**	**50**	**20**
Overall Appearance	Max	4	5	4	4	5	4	5	4	5
	Mean	2.7	3.7	3.1	3.0	3.2	3.2	3.1	3.2	3.7
	Median	**3**	**4**	**3**	**3**	**3**	**3**	**3**	**3**	**4**
	Min	1	2	1	2	2	2	1	1	2
Foliage Quality	Max	5	5	5	5	5	5	5	4	5
	Mean	2.9	3.9	3.1	3.0	3.3	3.5	3.3	3.2	3.9
	Median	**3**	**4**	**3**	**3**	**3**	**3**	**3**	**3**	**4**
	Min	1	3	1	2	2	2	2	2	1
Floral Display	Max	3	5	4	4	4	4	4	4	5
	Mean	1.3	2.1	1.3	2.3	2.5	2.0	2.0	2.3	2.6
	Median	**1**	**2**	**1**	**2**	**3**	**2**	**2**	**2**	**3**
	Min	0	0	0	1	1	1	0	0	1

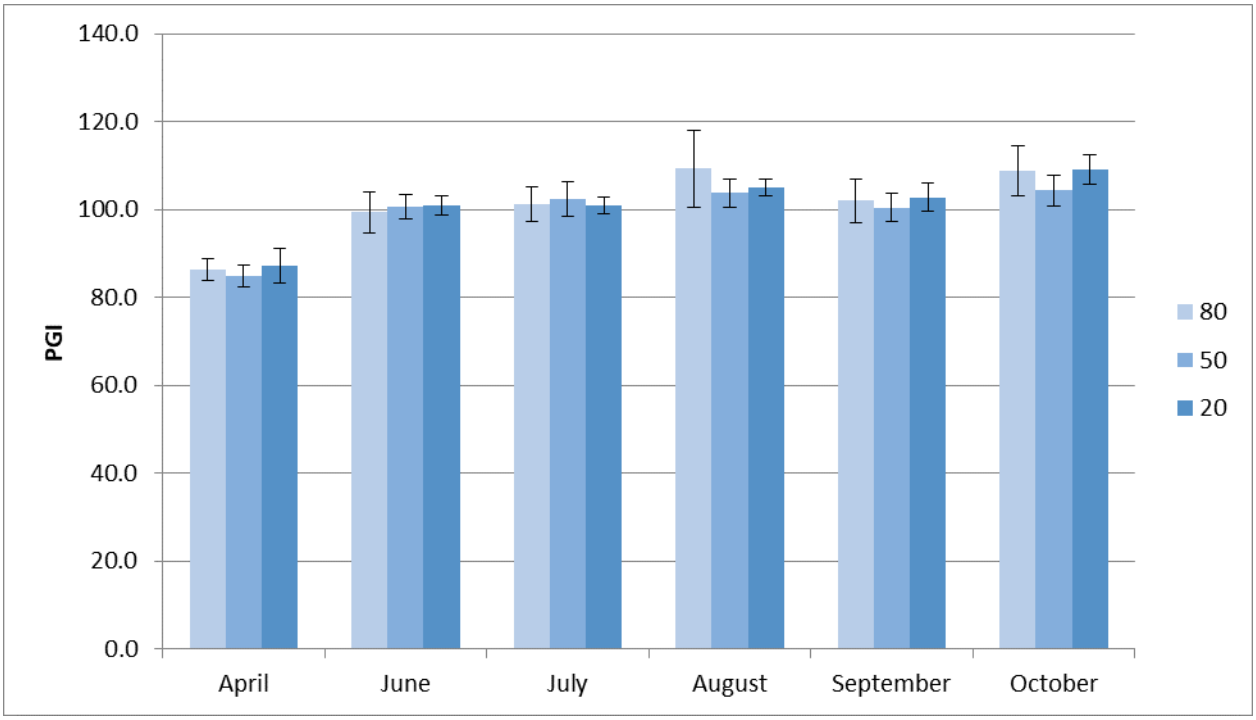

Figure 8a. *Rosa* 'Meizorland' White Drift® average monthly plant growth index on 3 ET_o-based irrigation treatments in 2017. Bars represent ±1 SE.

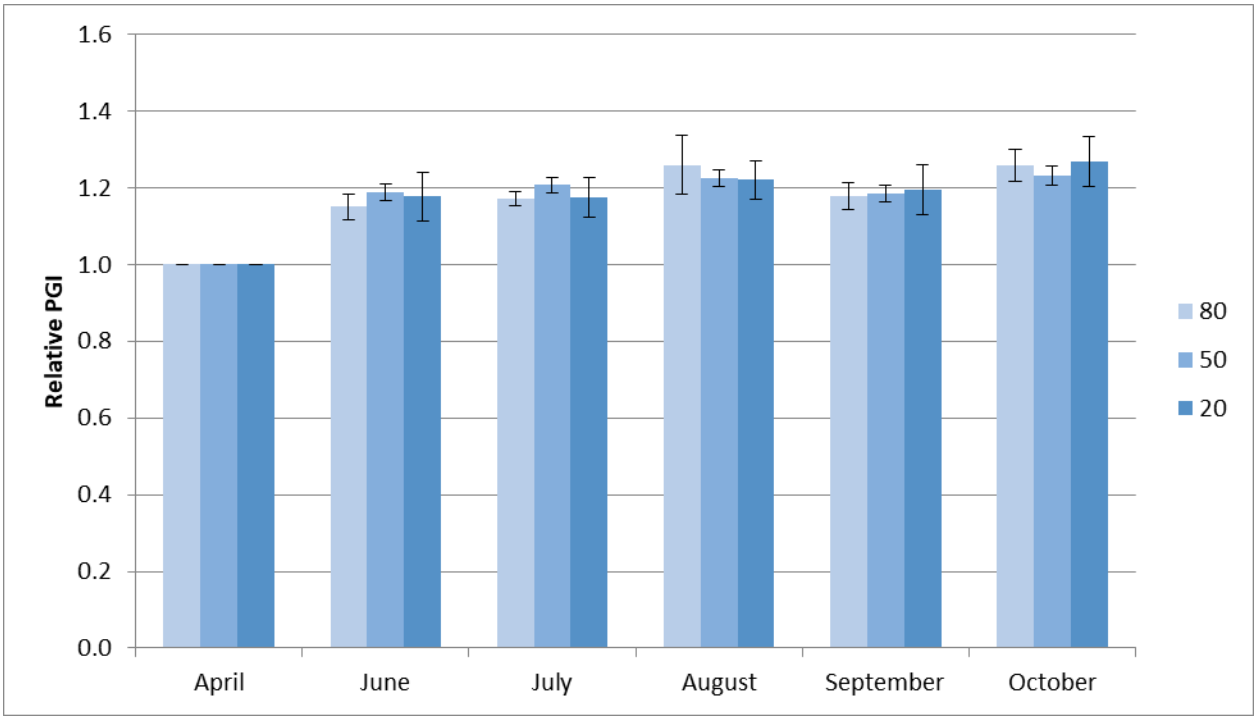

Figure 8b. *Rosa* 'Meizorland' White Drift® average monthly relative plant growth index on 3 ET_o-based irrigation treatments in 2017. Bars represent ±1 SE. There were no significant differences between treatments.

Table 15a. *Rosa* 'Radgor' Peachy Keen™ (Peachy Knock Out®) average monthly quality ratings (scale of 1-5) on 3 ET_o-based irrigation treatments in 2017. Different superscripts denote significant differences within the month at p≤0.05 using ANOVA and Tukey's HSD.

	May	June	July	Aug	Sept	Oct	AVG
Overall Appearance							
80%	4.1	3.6	4.6	3.8	3.4	3.5	3.8
50%	3.9	3.8	4.1	3.6	3.6	3.5	3.8
20%	4.3	3.5	4.3	3.5	3.4	3.3	3.7
Foliage							
80%	3.9[a]	4.0	4.3	4.3	3.5	3.9	4.0
50%	3.3[b]	3.8	3.9	3.8	3.9	3.8	3.7
20%	3.3[b]	3.9	4.0	3.8	3.6	3.4	3.6
Flowering							
80%	4.0	1.7	3.3	1.3	1.0	1.0	2.0
50%	3.6	1.9	2.6	1.4	1.0	1.0	1.9
20%	3.6	1.8	2.8	1.0	1.0	1.0	1.9
Pest Tolerance							
80%	3.9[a]	4.1	4.3	4.3	4.3	4.3	4.2
50%	3.3[b]	3.8	3.9	3.8	4.0	3.9	3.8
20%	3.4[ab]	3.9	4.3	4.0	3.8	3.8	3.8
Disease Resistance							
80%	5.0	4.9	5.0	5.0	5.0	4.9	5.0
50%	5.0	4.9	5.0	5.0	5.0	5.0	5.0
20%	4.6	5.0	4.9	4.9	4.9	5.0	4.9
Vigor							
80%	4.8	4.6	5.0	4.5	3.6	4.5	4.5
50%	4.4	4.6	4.6	4.1	4.1	4.0	4.3
20%	4.5	4.1	4.3	3.9	4.0	3.8	4.1

Table 15b. Open House participant ratings for *Rosa* 'Radgor' Peachy Keen™ on 3 ET_o-based irrigation treatments in May, July, and September 2017.

		May			July			September		
	ET_o %	**80**	**50**	**20**	**80**	**50**	**20**	**80**	**50**	**20**
Overall Appearance	Max	4	5	5	5	5	5	5	5	4
	Mean	3.1	3.1	3.1	3.5	3.8	3.5	3.1	3.3	2.3
	Median	**3**	**3**	**3**	**3**	**4**	**3**	**3**	**3**	**2**
	Min	2	1	2	2	2	2	1	1	1
Foliage Quality	Max	5	5	5	5	5	5	5	5	4
	Mean	3.2	3.2	3.5	3.9	3.9	3.8	3.6	3.7	2.6
	Median	**3**	**3**	**3**	**4**	**4**	**4**	**4**	**4**	**3**
	Min	2	1	2	3	3	2	2	1	1
Floral Display	Max	5	5	5	5	5	5	5	5	4
	Mean	2.1	2.2	1.2	2.6	3.5	2.7	1.1	1.3	0.3
	Median	**2**	**2**	**1**	**3**	**4**	**3**	**1**	**1**	**0**
	Min	0	0	0	1	1	1	0	0	0

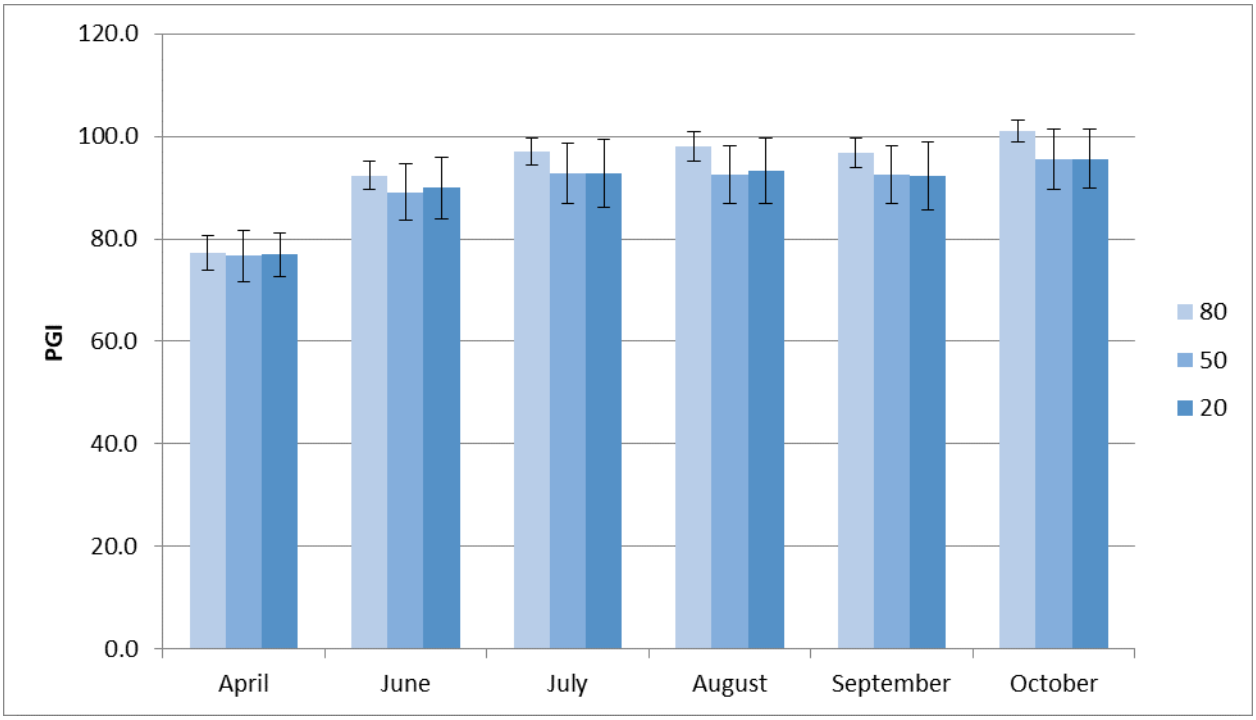

Figure 9a. *Rosa* 'Radgor' Peachy Keen™ average monthly plant growth index on 3 ET_o-based irrigation treatments in 2017. Bars represent ±1 SE.

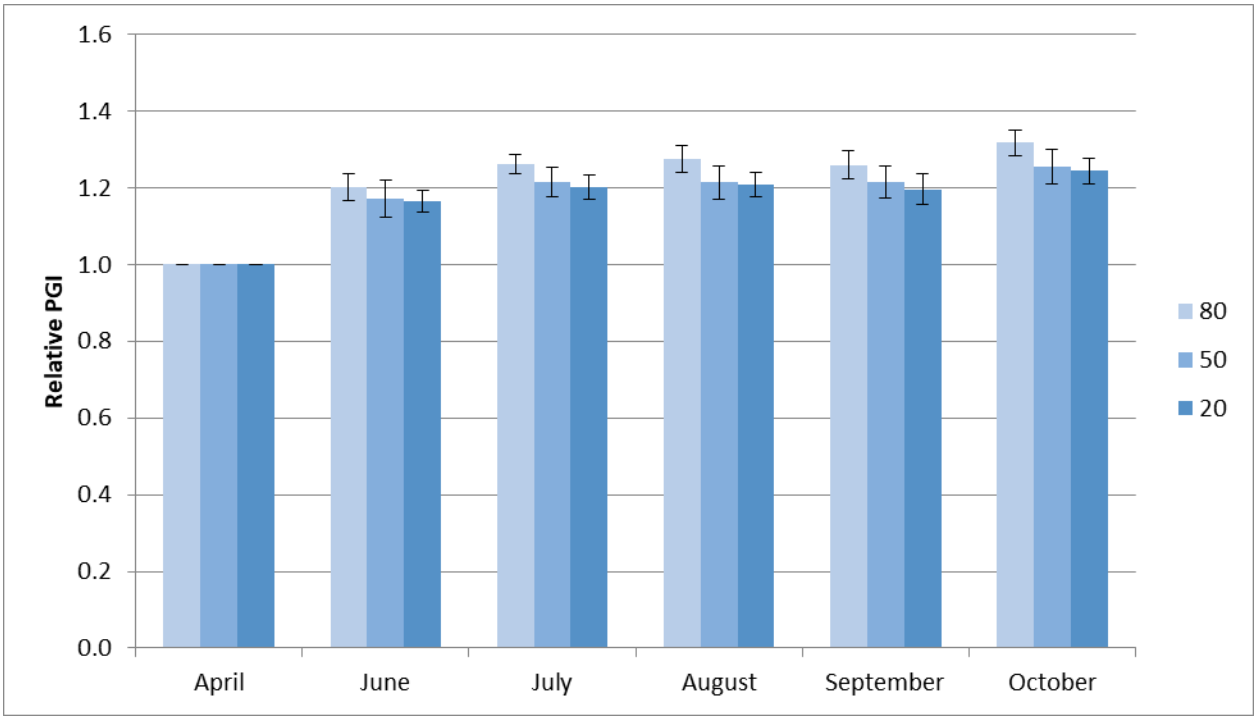

Figure 9b. *Rosa* 'Radgor' Peachy Keen™ average monthly relative plant growth index on 3 ET_o-based irrigation treatments in 2017. Bars represent ±1 SE. There were no significant differences between treatments.

Table 16a. *Rosa* 'Radsunny' Sunny Knock Out® average monthly quality ratings (scale of 1-5) on 3 ET_o-based irrigation treatments in 2017. Different superscripts denote significant differences within the month at p≤0.05 using ANOVA and Tukey's HSD.

	May	June	July	Aug	Sept	Oct	AVG
Overall Appearance							
80%	4.5	3.6	3.6	3.1	3.3[ab]	3.3	3.6
50%	4.1	3.8	4.0	3.5	3.5[a]	3.8	3.8
20%	4.6	3.6	3.4	2.9	2.6[b]	3.4	3.4
Foliage							
80%	3.5	3.6	3.3	2.8	2.5	3.0	3.1
50%	3.9	3.4	3.5	3.0	3.1	3.3	3.4
20%	3.6	3.4	3.1	2.5	2.5	2.6	3.0
Flowering							
80%	4.4	1.5	1.3	1.4	2.8	1.8	2.2
50%	3.8	1.5	1.5	1.9	2.9	2.9	2.4
20%	4.1	1.9	1.1	1.8	1.4	2.4	2.1
Pest Tolerance							
80%	3.6	3.6	3.6	3.4	3.9	3.4	3.6
50%	3.9	3.5	3.5	3.1	3.6	3.6	3.5
20%	3.5	3.6	3.6	3.3	3.9	3.3	3.5
Disease Resistance							
80%	5.0	5.0	4.8	5.0	4.9	4.6	4.9
50%	4.6	4.4	5.0	4.9	5.0	5.0	4.8
20%	4.8	4.6	5.0	5.0	5.0	5.0	4.9
Vigor							
80%	4.9	4.3	4.3	4.0	3.6[ab]	4.6	4.3
50%	4.3	4.4	4.5	4.0	4.1[a]	4.6	4.3
20%	4.0	4.0	4.1	3.5	2.8[b]	3.9	3.7

Table 16b. Open House participant ratings for *Rosa* 'Radsunny' Sunny Knock Out® on 3 ET_o-based irrigation treatments in May, July, and September 2017.

		May			July			September		
	ET_o %	**80**	**50**	**20**	**80**	**50**	**20**	**80**	**50**	**20**
Overall Appearance	Max	5	5	5	5	5	4	4	5	4
	Mean	4.4	4.2	4.3	3.7	3.0	2.7	3.2	3.6	2.6
	Median	**4**	**4**	**4**	**4**	**3**	**3**	**3**	**4**	**3**
	Min	3	1	3	2	2	2	1	2	1
Foliage Quality	Max	5	5	5	5	5	4	5	5	4
	Mean	4.2	3.8	4.2	4.0	3.0	2.8	3.2	3.7	2.7
	Median	**4**	**4**	**4**	**4**	**3**	**3**	**3**	**4**	**3**
	Min	2	1	2.5	1	2	2	1	2	1
Floral Display	Max	5	5	5	4	4	4	4	5	4
	Mean	**3.7**	**3.5**	**3.8**	**2.0**	**2.5**	**1.9**	**2.5**	**2.4**	**1.1**
	Median	4	4	4	2	3	2	2	2	1
	Min	0	0	0	0	0	1	0	0	0

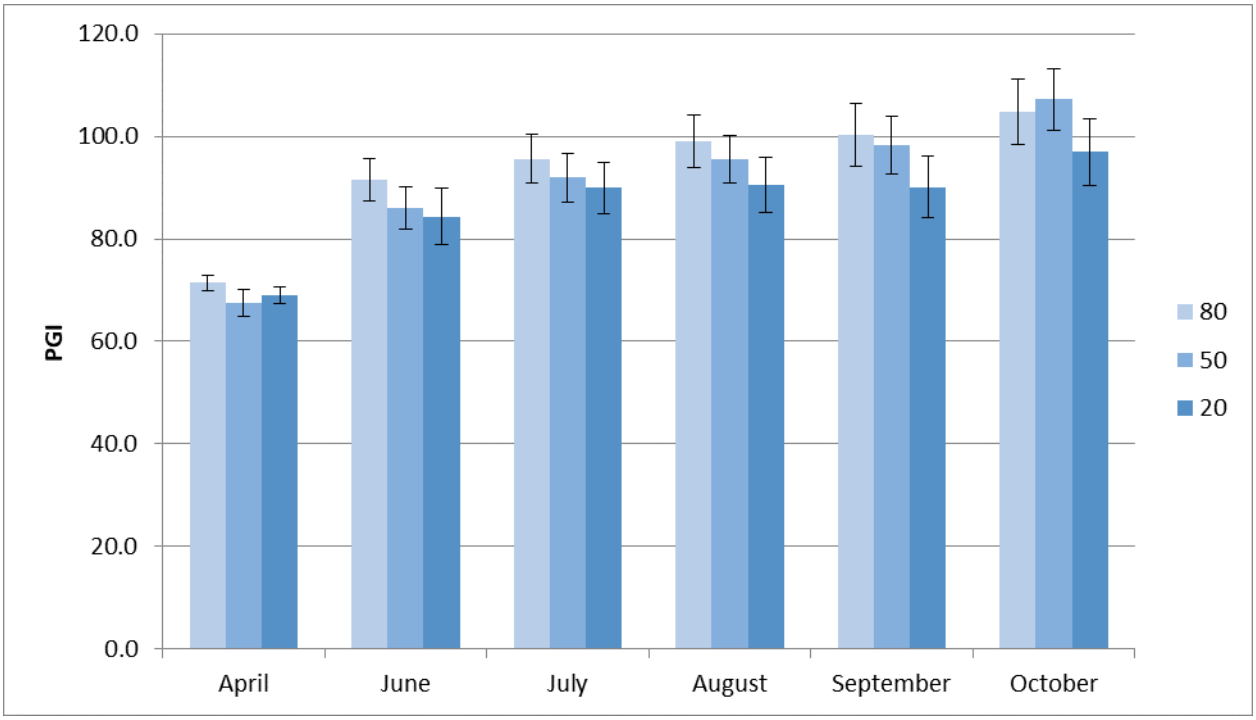

Figure 10a. *Rosa* 'Radsunny' Sunny Knock Out® average monthly plant growth index on 3 ET_o-based irrigation treatments in 2017. Bars represent ±1 SE.

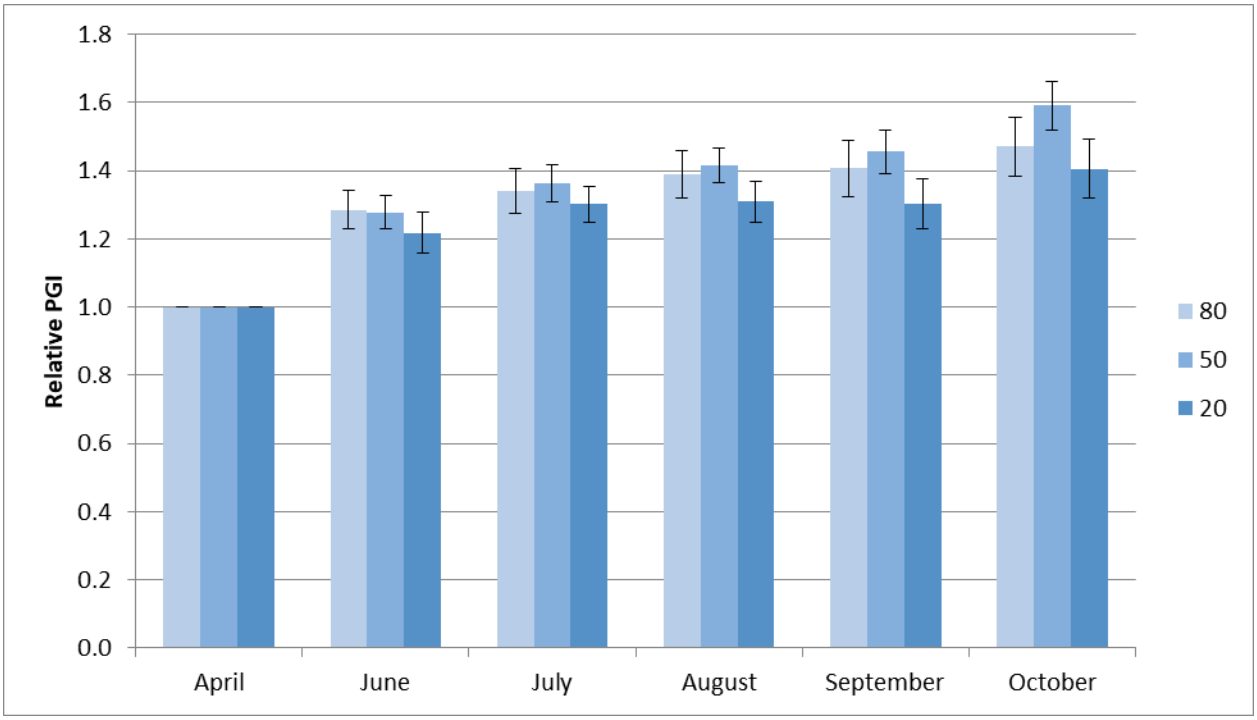

Figure 10b. *Rosa* 'Radsunny' Sunny Knock Out® average monthly relative plant growth index on 3 ET_o-based irrigation treatments in 2017. Bars represent ±1 SE. There were no significant differences between treatments.

Table 17a. *Rosa* 'Radtko' Double Knock Out® average monthly quality ratings (scale of 1-5) on 3 ET_o-based irrigation treatments in 2017. There were no significant differences between treatments.

	May	June	July	Aug	Sept	Oct	AVG
Overall Appearance							
80%	5.0	3.9	4.1	3.8	3.3	3.1	3.9
50%	5.0	3.9	4.4	4.3	3.9	3.6	4.2
20%	5.0	3.9	4.1	3.9	3.9	3.1	4.0
Foliage							
80%	3.5	4.3	4.5	4.3	3.5	3.3	3.9
50%	3.8	4.3	4.6	4.5	4.0	3.4	4.1
20%	3.8	4.3	4.4	4.3	4.0	3.3	4.0
Flowering							
80%	5.0	1.5	1.4	1.9	1.0	1.0	2.0
50%	5.0	1.3	1.9	3.0	1.5	2.0	2.4
20%	5.0	1.9	2.0	2.4	1.7	1.4	2.4
Pest Tolerance							
80%	3.5	4.5	4.5	4.4	4.4	3.6	4.1
50%	3.8	4.1	4.6	4.6	4.4	4.0	4.3
20%	3.8	4.4	4.4	4.4	4.4	3.8	4.2
Disease Resistance							
80%	4.9	4.9	5.0	5.0	5.0	4.9	4.9
50%	5.0	4.8	5.0	5.0	5.0	4.9	4.9
20%	4.8	4.6	5.0	5.0	5.0	5.0	4.9
Vigor							
80%	4.4	4.6	4.4	4.0	3.4	3.4	4.0
50%	4.9	4.6	4.6	4.4	4.1	4.1	4.5
20%	4.6	4.5	4.5	4.0	4.0	3.9	4.3

Table 17b. Open House participant ratings for *Rosa* 'Radtko' Double Knock Out® on 3 ET_o-based irrigation treatments in May, July, and September 2017.

		May			July			September		
	ET_o %	**80**	**50**	**20**	**80**	**50**	**20**	**80**	**50**	**20**
Overall Appearance	Max	5	5	5	5	4	4	5	4	4
	Mean	4.3	4.1	3.9	3.8	3.5	3.7	3.5	3.0	2.9
	Median	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**3**	**3**
	Min	3	3	3	2	2	2	2	2	2
Foliage Quality	Max	5	5	5	5	5	5	5	4	5
	Mean	4.1	3.8	3.8	4.2	4.1	4.0	3.9	3.3	3.2
	Median	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**3**	**3**
	Min	3	3	2	3	3	3	2	2	2
Floral Display	Max	5	5	5	5	4	5	5	4	5
	Mean	4.1	3.8	3.6	3.4	2.1	3.2	2.6	1.7	1.5
	Median	**4**	**4**	**4**	**4**	**2**	**3**	**2**	**1**	**1**
	Min	2	2	2	2	1	1	0	0	0

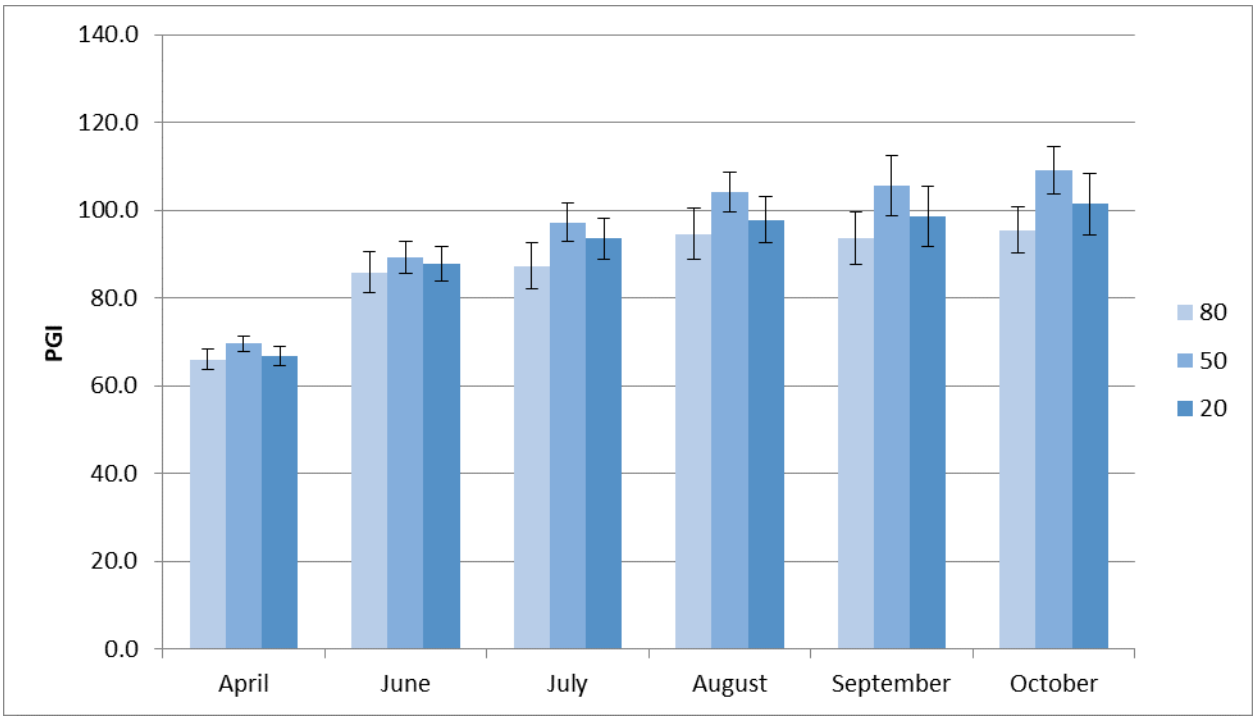

Figure 11a. *Rosa* 'Radtko' Double Knock Out® average monthly plant growth index on 3 ET_o-based irrigation treatments in 2017. (May data unavailable.) Bars represent ±1 SE.

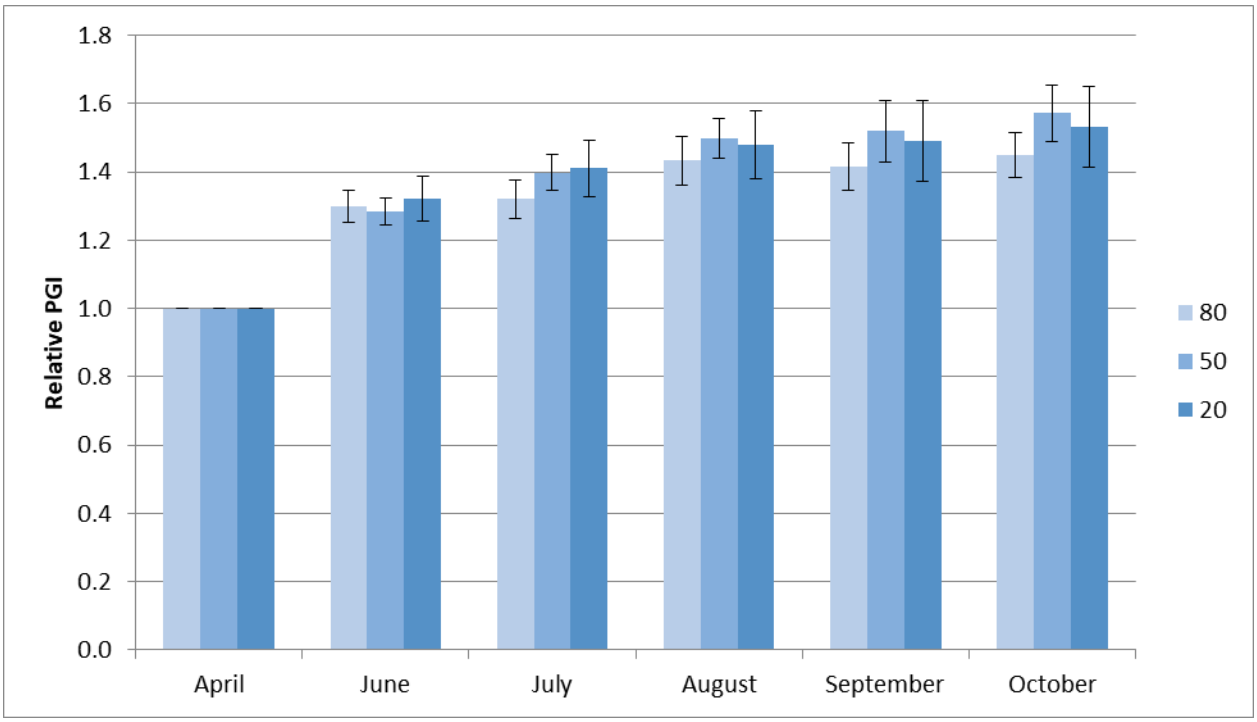

Figure 11b. *Rosa* 'Radtko' Double Knock Out® average monthly plant growth index on 3 ET_o-based irrigation treatments in 2017. (May data unavailable.) Bars represent ±1 SE. There were no significant differences between treatments.

Table 18a. *Sporobolus wrightii* average monthly quality ratings on (scale of 1-5) 3 ET_o-based irrigation treatments in 2017. Different superscripts denote significant difference within the month at p≤0.05 using ANOVA and Tukey's HSD.

	May	June	July	Aug	Sept	Oct	AVG
Overall Appearance							
80%	3.2	3.8	4.3	4.0[b]	4.0	4.5	4.0
50%	3.3	3.8	4.5	4.6[ab]	4.4	4.5	4.2
20%	3.4	3.8	4.6	5.0[a]	4.8	5.0	4.4
Foliage							
80%	4.0	4.7	4.3	4.0	4.0[ab]	3.8	4.1
50%	4.1	4.6	4.5	4.0	3.8[b]	3.8	4.1
20%	4.6	5.0	5.0	4.4	4.6[a]	4.2	4.6
Flowering							
80%			2.8	3.7	3.3	4.3	3.5
50%		1.0	4.4	4.5	4.3	4.6	3.8
20%		2.0	3.0	4.2	4.4	5.0	3.7
Pest Tolerance							
80%	5.0	5.0	5.0	5.0	4.8	5.0	5.0
50%	5.0	5.0	5.0	5.0	4.9	4.9	5.0
20%	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Disease Resistance							
80%	5.0	5.0	5.0	5.0	5.0	5.0	5.0
50%	5.0	5.0	5.0	5.0	5.0	5.0	5.0
20%	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Vigor							
80%	4.2	4.3	4.3	3.7	4.5	4.5	4.3
50%	4.6	4.4	4.6	4.6	4.4	4.5	4.5
20%	3.8	4.4	4.6	4.4	4.8	5.0	4.5

Table 18b. Open House participant ratings for *Sporobolus wrightii* on 3 ET_o-based irrigation treatments in May, July, and September 2017.

		May			July			September		
	ET_o %	**80**	**50**	**20**	**80**	**50**	**20**	**80**	**50**	**20**
Overall Appearance	Max	5	5	5	5	5	4	5	5	5
	Mean	3.2	3.4	2.7	4.2	4.5	3.5	3.9	3.4	3.7
	Median	**3**	**3**	**3**	**4**	**4**	**4**	**4**	**3**	**4**
	Min	2	2	1	3	3	1	3	2	2
Foliage Quality	Max	5	5	4	5	5	5	5	5	5
	Mean	3.4	3.5	2.8	4.1	4.4	3.8	3.7	3.3	3.5
	Median	**3**	**4**	**3**	**4**	**4**	**4**	**4**	**3**	**4**
	Min	2	2	1	3	4	2	2	2	2
Floral Display	Max	5	3	5	5	5	4	5	5	5
	Mean	0.6	0.2	0.5	2.8	3.6	1.8	3.6	3.6	3.7
	Median	**0**	**0**	**0**	**3**	**4**	**2**	**4**	**4**	**4**
	Min	0	0	0	0	0	0	0	0	0

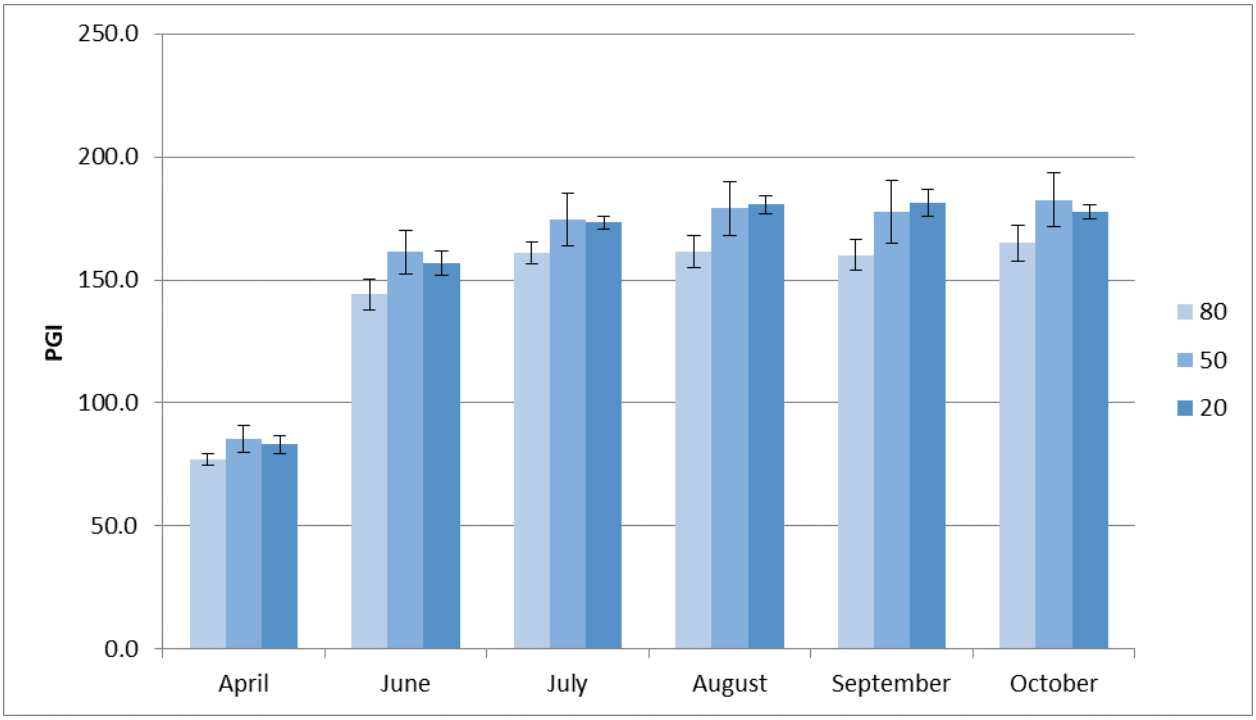

Figure 12a. *Sporobolus wrightii* average monthly plant growth index on 3 ET_o-based irrigation treatments in 2017. (May data unavailable.) Bars represent ±1 SE.

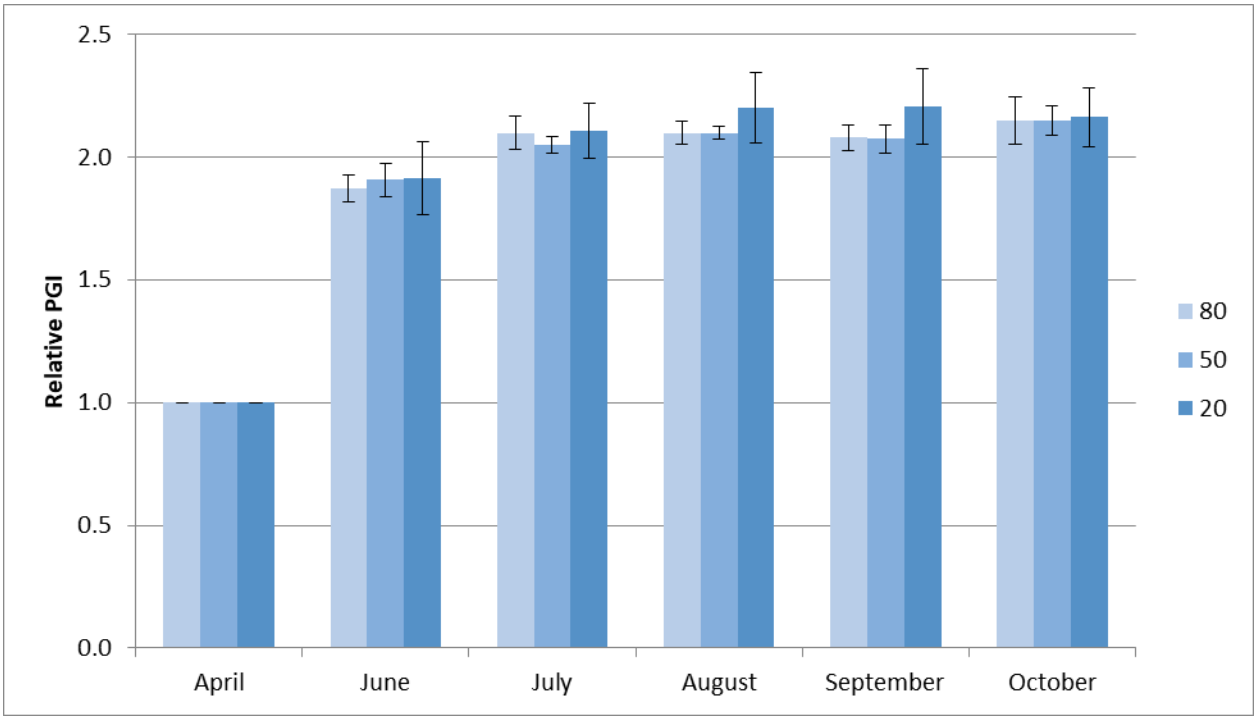

Figure 12b. *Sporobolus wrightii* average monthly relative plant growth index on 3 ET_o-based irrigation treatments in 2017. (May data unavailable.) Bars represent ±1 SE. There were no significant differences between treatments.

Table 19a. *Geranium* x *cantabrigiense* 'Biokovo' average monthly quality ratings on 3 ET_o-based irrigation treatments in 2017. Different superscripts denote significant differences within the month using ANOVA and Tukey's HSD at p≤ 0.05.

	May	June	July	Aug	Sept	Oct	AVG
Overall Appearance							
80%	3.3	2.8	3.5	3.8	3.8	4.0	3.5
50%	3.3	2.9	3.6	3.1	3.1	3.5	3.3
20%	3.3	3.0	3.9	3.0	3.3	3.6	3.3
Foliage							
80%	4.4	3.4	3.6	3.5	3.9	3.9	3.8
50%	4.3	3.8	3.5	3.4	3.4	3.5	3.6
20%	4.5	4.1	3.9	3.1	3.4	3.5	3.8
Flowering							
80%	1.4	1.1	1.0	1.0	4.0		1.7
50%	1.6	1.1	1.0	1.0			1.2
20%	1.1	1.3	1.0	1.0	4.0		1.7
Pest Tolerance							
80%	5.0	5.0	5.0	5.0	4.1	5.0	4.9
50%	5.0	5.0	5.0	5.0	3.8	5.0	4.8
20%	5.0	5.0	5.0	5.0	4.3	4.9	4.9
Disease Resistance							
80%	5.0	5.0	5.0	5.0	5.0	5.0	5.0
50%	5.0	5.0	5.0	5.0	5.0	5.0	5.0
20%	5.0	5.0	5.0	5.0	4.9	5.0	5.0
Vigor							
80%	3.6	3.0	3.9	3.9[a]	3.9	4.4	3.8
50%	3.6	3.5	3.6	3.8[ab]	3.5	4.0	3.7
20%	3.6	3.3	3.9	3.1[b]	3.8	3.9	3.6

Table 19b. Open House participant ratings for *Geranium* x *cantabrigiense* 'Biokovo' on 3 ET_o-based irrigation treatments in May, July, and September 2017.

		May			July			September		
	ET_o %	**80**	**50**	**20**	**80**	**50**	**20**	**80**	**50**	**20**
Overall Appearance	Max	5	5	5	4	5	5	5	4	5
	Mean	4.1	4.2	4.3	2.5	3.0	3.2	3.3	3.2	4.0
	Median	**4**	**4**	**4**	**3**	**3**	**3**	**3**	**3**	**4**
	Min	3	2	2.5	1	2	2	2	1	3
Foliage Quality	Max	5	5	5	5	5	5	5	5	5
	Mean	4.0	4.2	4.3	2.6	3.4	3.4	3.4	3.5	4.3
	Median	**4**	**4**	**4**	**3**	**3**	**3**	**3**	**4**	**4**
	Min	2	2	1	1	2	2	2	2	3
Floral Display	Max	5	5	5	3	4	4	4	3	5
	Mean	4.2	4.3	4.3	1.4	1.4	1.6	0.4	0.2	0.3
	Median	**4**	**5**	**4**	**1**	**1**	**1**	**0**	**0**	**0**
	Min	0	3	2.5	0	0	0	0	0	0

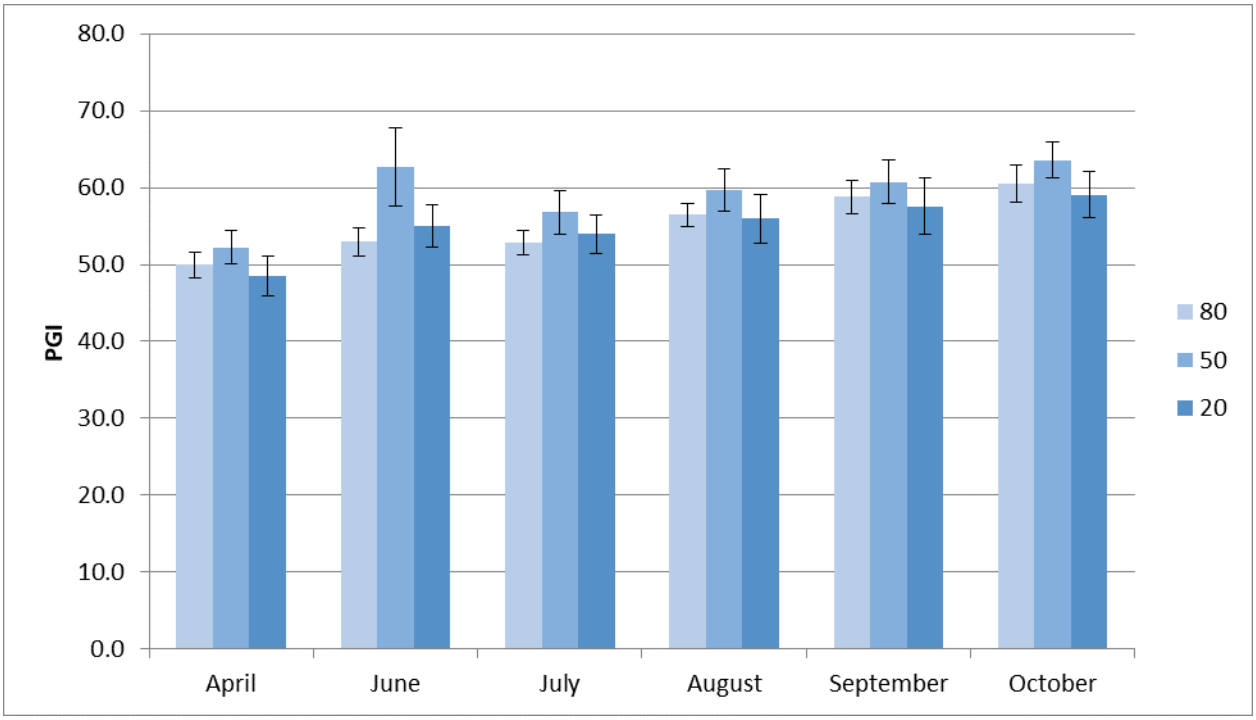

Figure 13a. *Geranium* x *cantabrigiense* 'Biokovo' average monthly plant growth index on 3 ET_o-based irrigation treatments in 2017. Bars represent ±1 SE.

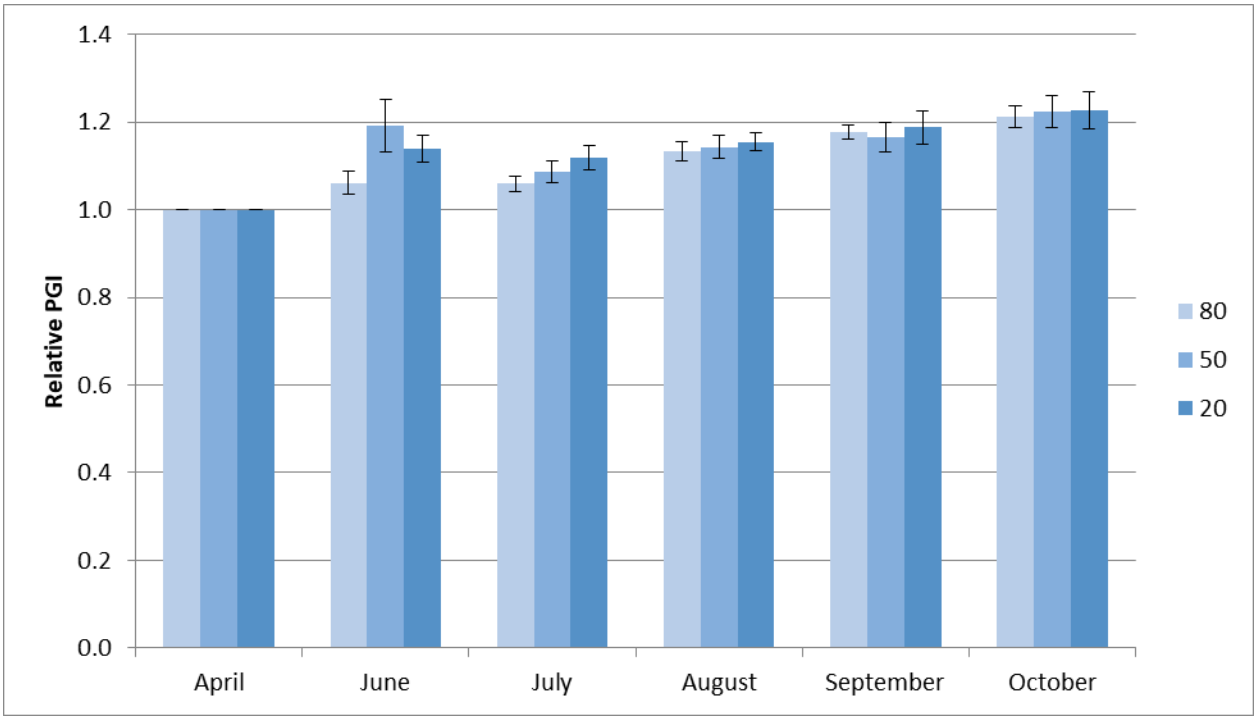

Figure 13b. *Geranium* x *cantabrigiense* 'Biokovo' average monthly plant growth index on 3 ET_o-based irrigation treatments in 2017. Bars represent ±1 SE. There were no significant differences between treatments.

Table 20a. *Lomandra confertifolia* 'Seascape' average monthly quality ratings (scale of 1-5) on 3 ET_0-based irrigation levels in 2017. No significant differences between treatments at any level using ANOVA and Tukey's HSD.

	May	June	July	Aug	Sept	Oct	AVG
Overall Appearance							
80%	2.0	1.7	2.0	1.7	1.7	1.7	1.8
50%	2.5	2.5	2.5	3.0	2.5	2.0	2.5
20%	2.7	2.3	2.3	2.3	2.7	2.3	2.4
Foliage							
80%	2.3	3.0	2.3	2.3	2.7	3.0	2.6
50%	2.5	2.5	2.5	3.0	3.5	3.0	2.8
20%	3.3	3.0	3.0	3.0	4.0	3.3	3.3
Flowering							
80%							
50%							
20%		1.0		1.0			1.0
Pest Tolerance							
80%	5.0	5.0	5.0	5.0	5.0	5.0	5.0
50%	5.0	5.0	5.0	5.0	5.0	5.0	5.0
20%	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Disease Resistance							
80%	5.0	5.0	5.0	5.0	5.0	5.0	5.0
50%	5.0	5.0	5.0	5.0	5.0	5.0	5.0
20%	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Vigor							
80%	2.0	1.7	1.7	1.7	2.0	1.7	1.8
50%	2.5	2.5	2.5	3.0	2.5	2.5	2.6
20%	3.0	2.3	2.7	2.0	3.0	2.7	2.6

Table 20b. Open House participant ratings for *Lomandra confertifolia* 'Seascape' on 3 ET_o-based irrigation treatments in May, July, and September 2017.

		May			July			September		
	ET_o %	**80**	**50**	**20**	**80**	**50**	**20**	**80**	**50**	**20**
Overall Appearance	Max	5	4	5	5	5	4	-	4	-
	Mean	3.8	2.3	1.4	3.9	2.6	1.2	-	1.9	-
	Median	**4**	**2**	**1**	**4**	**3**	**1**	**-**	**2**	-
	Min	1	0	0	3	1	0	-	1	-
Foliage Quality	Max	5	4	3	5	5	4	-	5	-
	Mean	4.0	2.6	1.4	4.0	2.9	1.2	-	2.0	-
	Median	**4**	**2**	**1**	**4**	**3**	**1**	**-**	**2**	-
	Min	2	1	1	1	1	0	-	1	-
Floral Display	Max	5	5	1	4	1	2	-	2	-
	Mean	0.6	0.2	0.0	0.6	0.1	0.1	-	0.1	-
	Median	**0**	**0**	**0**	**0**	**0**	**0**	**-**	**0**	-
	Min	0	0	0	0	0	0	-	0	-

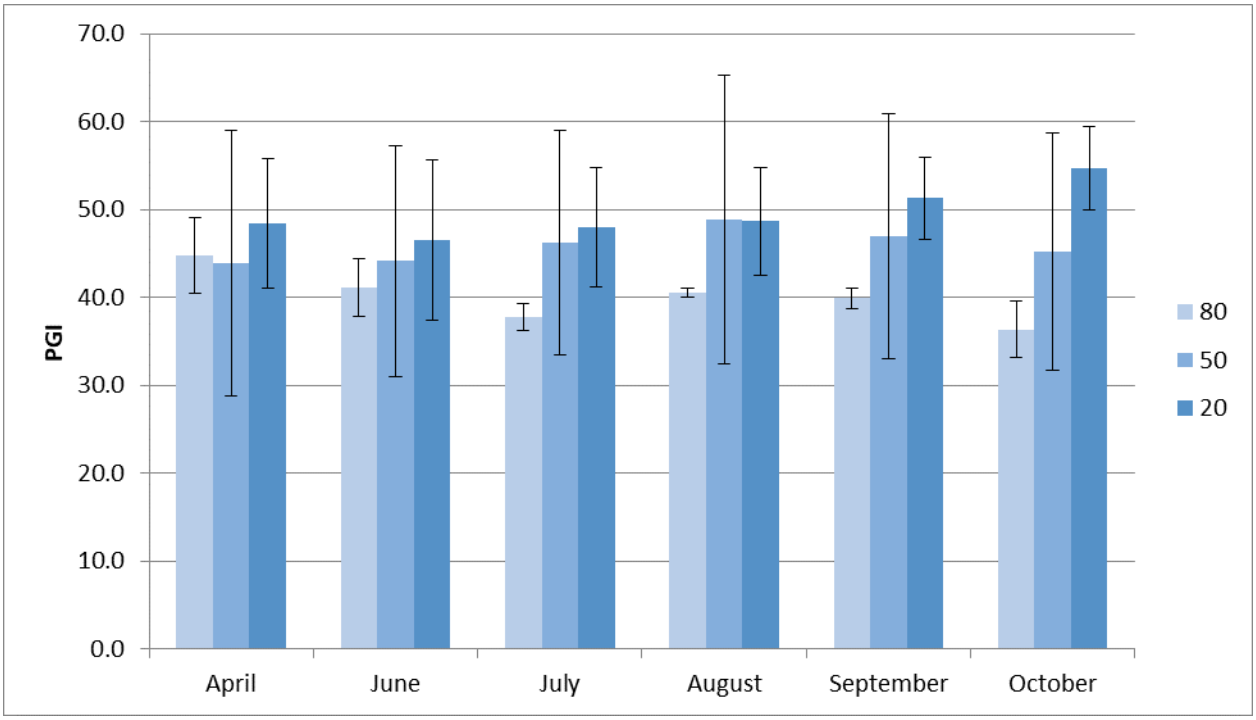

Figure 14a. *Lomandra confertifolia* 'Seascape' average monthly plant growth index on 3ET_o-based irrigation treatments in 2017. Bars represent ±1 SE.

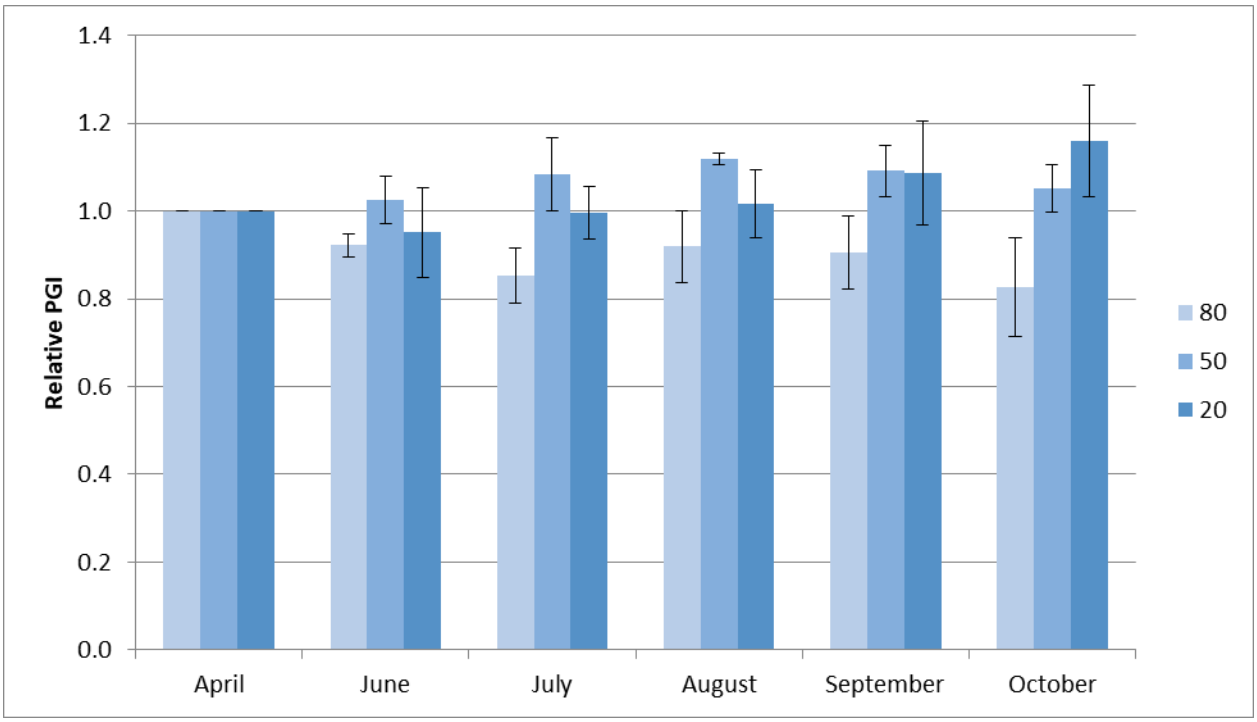

Figure 14b. *Lomandra confertifolia* 'Seascape' average monthly relative plant growth index on 3 ET_o-based irrigation treatments in 2017. There were no significant differences between treatments.

Table 21. *Lomandra longifolia* 'Roma 13' Platinum Beauty™ average monthly quality ratings (scale of 1-5) on 3 ET_o-based irrigation treatments in 2017. There were no significant differences between treatments using ANOVA and Tukey's HSD.

	May	June	July	Aug	Sept	Oct	AVG
Overall Appearance							
80%	4.1	4.0	3.9	4.0	3.9	4.3	4.0
50%	4.3	4.0	4.1	3.9	4.0	4.3	4.1
20%	4.1	4.0	4.1	3.9	4.1	4.4	4.1
Foliage							
80%	4.9	5.0	4.0	4.0	4.0	3.9	4.3
50%	5.0	4.9	3.9	4.0	3.9	4.0	4.3
20%	4.9	5.0	4.0	3.7	4.0	4.0	4.3
Flowering	1.4	1.0	1.0	1.0	1.0	1.0	1.1
80%	1.3	1.0	1.0	1.0	1.4	1.0	1.1
50%	1.1	1.0	1.0	1.0	1.0	1.0	1.0
20%	1.4	1.0	1.0	1.0	1.0	1.0	1.1
Pest Tolerance							
80%	5.0	5.0	5.0	5.0	5.0	5.0	5.0
50%	5.0	5.0	5.0	5.0	4.9	5.0	5.0
20%	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Disease Resistance							
80%	5.0	5.0	5.0	5.0	5.0	5.0	5.0
50%	5.0	5.0	5.0	5.0	4.9	5.0	5.0
20%	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Vigor							
80%	4.0	3.8	4.0	4.0	3.9	3.9	3.9
50%	3.8	3.8	4.1	4.0	4.1	4.0	4.0
20%	4.1	3.9	4.3	3.9	4.1	4.3	4.1

Table 21b. Open House participant ratings for *Lomandra longifolia* 'Roma 13' Platinum Beauty™ on 3 ET_o-based irrigation treatments in May, July, and September 2017.

		May			July			September		
	ET_o %	**80**	**50**	**20**	**80**	**50**	**20**	**80**	**50**	**20**
Overall Appearance	Max	5	5	5	5	5	5	5	5	5
	Mean	4.2	4.4	4.0	4.5	4.0	4.3	4.5	4.5	4.6
	Median	**4**	**5**	**4**	**5**	**4**	**4**	**4**	**5**	**5**
	Min	3	3	3	2.5	2	3	3	3	4
Foliage Quality	Max	5	5	5	5	5	5	5	5	5
	Mean	4.3	4.4	4.0	4.4	4.1	4.3	4.5	4.5	4.6
	Median	**4**	**5**	**4**	**4**	**4**	**4**	**5**	**5**	**5**
	Min	3	3	2	3	3	3	3	3	0
Floral Display	Max	5	5	5	4	4	4	5	5	5
	Mean	2.5	2.6	2.9	0.2	0.1	0.3	0.5	1.1	0.7
	Median	**3**	**3**	**3**	**0**	**0**	**0**	**0**	**1**	**0**
	Min	0	0	0	0	0	0	0	0	0

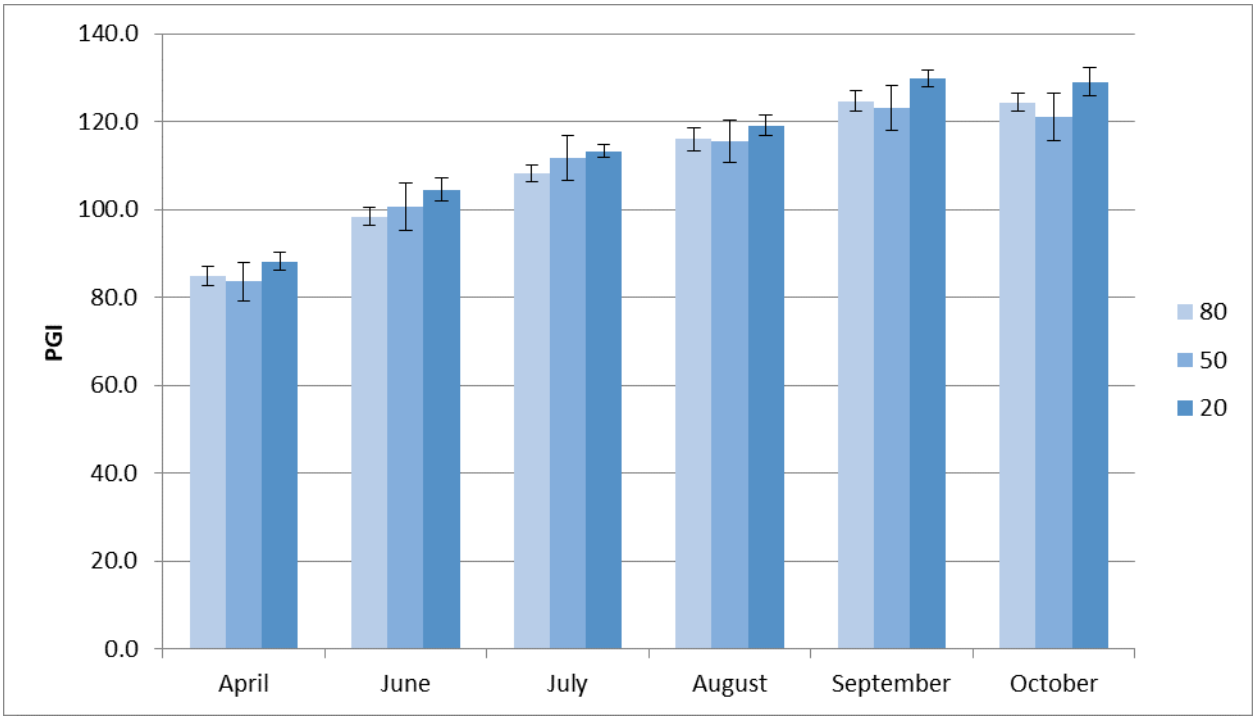

Figure 15a. *Lomandra longifolia* 'Roma 13' Platinum Beauty™ average monthly plant growth index on 3 ET_o-based irrigation treatments in 2017. Bars represent ±1 SE.

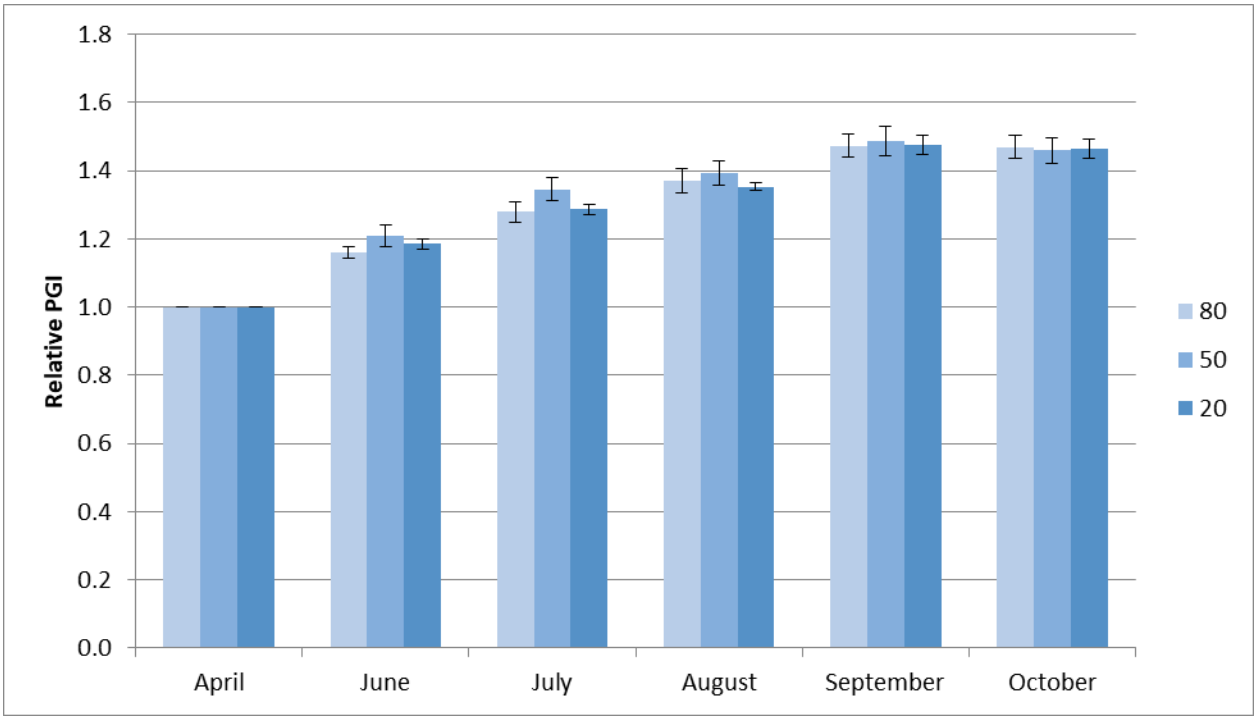

Figure 15b. *Lomandra longifolia* 'Roma 13' Platinum Beauty™ average monthly relative plant growth index on 3 ET_o-based irrigation treatments in 2017. There were no significant differences between treatments.

Table 22a. *Nandina domestica* 'Lemon-Lime' average monthly quality ratings on 3 ET_o-based irrigation treatments in 2017. Different superscripts denote significant differences within the months using ANOVA and Tukey's HSD at p≤ 0.05. Red superscripts denote significance at p≤0.01.

	May	June	July	Aug	Sept	Oct	AVG
Overall Appearance							
80%	3.3	3.0	2.9	3.3[ab]	3.0	3.4	3.1
50%	2.9	2.6	3.0	3.0[b]	3.1	3.4	3.0
20%	3.5	3.1	3.8	4.1[a]	3.0	3.8	3.5
Foliage							
80%	3.9[ab]	3.9[ab]	3.0[b]	3.4	3.6	4.0	3.6
50%	3.5[b]	3.0[b]	3.3[b]	3.5	3.4	3.8	3.4
20%	4.3[a]	4.1[a]	4.3[a]	4.3	3.8	3.9	4.1
Flowering							
80%							
50%		1.0					1.0
20%				1.0			1.0
Pest Tolerance							
80%	5.0	5.0	5.0	5.0	5.0	5.0	5.0
50%	5.0	5.0	5.0	5.0	5.0	5.0	5.0
20%	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Disease Resistance							
80%	5.0	5.0	5.0	5.0	5.0	5.0	5.0
50%	5.0	5.0	5.0	5.0	4.9	5.0	5.0
20%	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Vigor							
80%	3.7	3.1	3.3	3.6[ab]	3.6	3.4	3.5
50%	3.5	2.8	3.4	3.0[b]	3.4	3.3	3.2
20%	4.0	3.4	4.0	4.0[a]	3.1	4.0	3.8

Table 22b. Open House participant ratings for *Nandina domestica* 'Lemon-Lime' on 3 ET_o-based irrigation treatments in May, July, and September 2017. (Plants did not flower during trial.)

		May			July			September		
	ET_o %	**80**	**50**	**20**	**80**	**50**	**20**	**80**	**50**	**20**
Overall Appearance	Max	5	5	5	5	5	5	5	5	5
	Mean	3.7	3.6	3.4	3.9	4.1	3.7	4.2	3.8	3.9
	Median	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**
	Min	0	0	0	2	2	2	2	2	2
Foliage Quality	Max	5	5	5	5	5	5	5	5	5
	Mean	4.0	4.0	3.6	4.0	4.0	3.9	4.3	4.0	4.1
	Median	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**
	Min	2	2	2	1	2	3	3	3	2

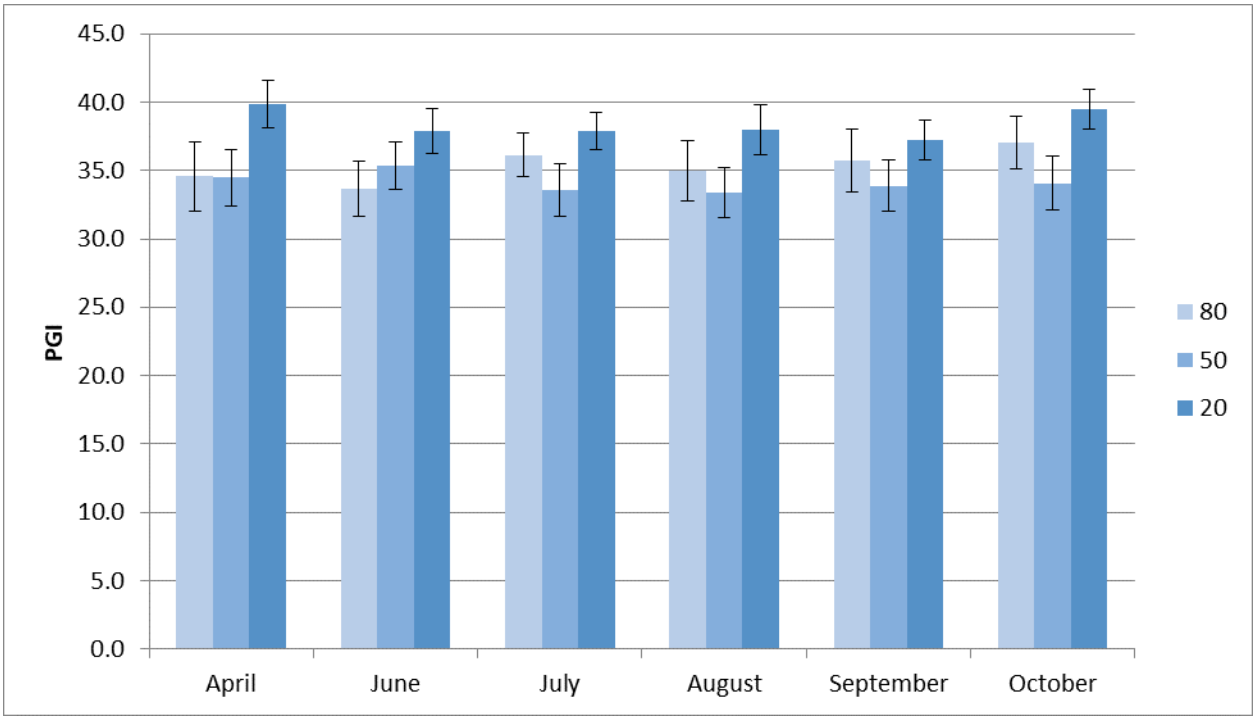

Figure 16a. *Nandina domestica* 'Lemon-Lime' average monthly plant growth index on 3 ET_o-based irrigation treatments in 2017. Bars represent ±1 SE.

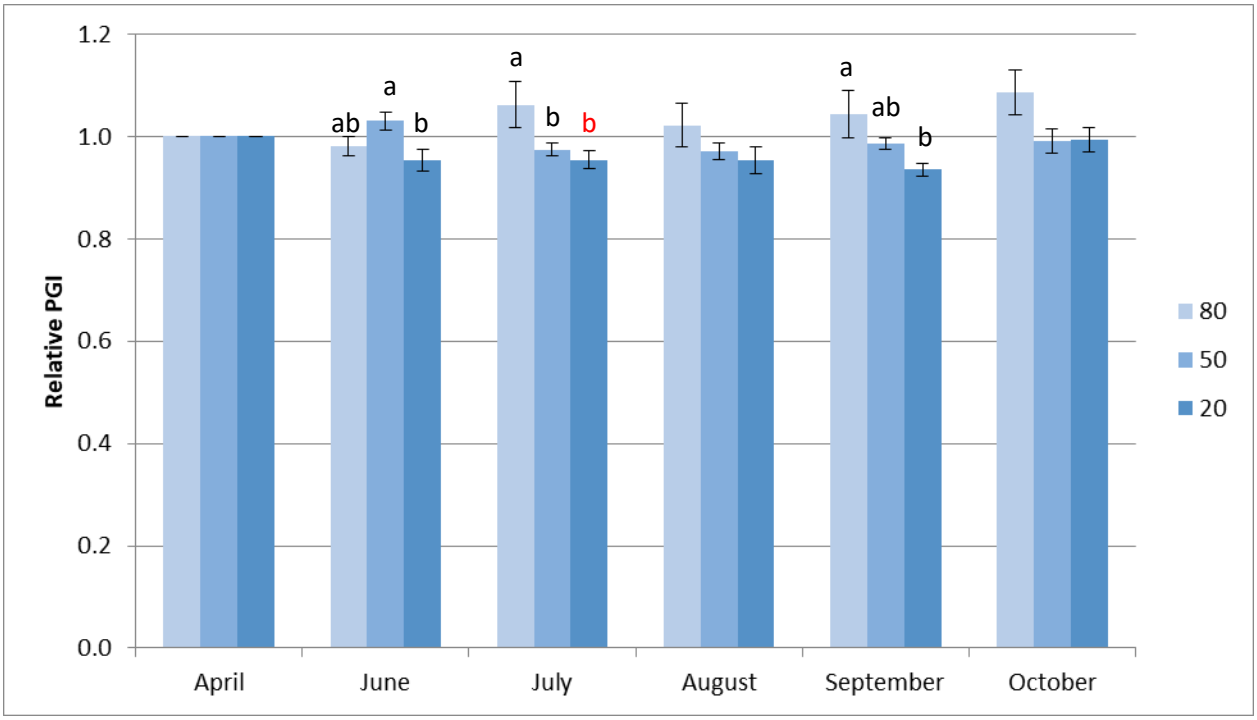

Figure 16b. *Nandina domestica* 'Lemon-Lime' average monthly relative plant growth index on 3 ET_o-based irrigation treatments in 2017. Bars represent ±1 SE. Different superscripts denote significant differences within the month using ANOVA and Tukey's HSD at p≤ 0.05. Red superscripts denote significance at p≤0.01

Appendix B
PHOTOS

All photos: Karrie Reid; may be used by permission with photo credit; contact skreid@ucanr.edu.

Figure 1c. *Lomandra confertifolia* 'Finescape' on 20% ET_o in October 2017.

Figure 1d. *Lomandra confertifolia* 'Finescape' on 50% ET_o in October 2017.

Figure 1e. *Lomandra confertifolia* 'Finescape' on 80% ET_o in October 2017.

Figure 2c. Lygeum spartum already showing striking flower heads in June 2017.

Figure 2d. *Lygeum spartum* on 20% ET_o in September 2017.

Figure 2e. *Lygeum spartum* on 50% ET_o in September 2017.

Figure 2d. *Lygeum spartum* on 80% ET_o in September 2017.

Figure 3c. *Muhlenbergia capillaris* 'White Cloud' on 80% ET_0 in June 2017 showing poor regrowth.

Figure 3d. *Muhlenbergia* 'White Cloud' on 20% ET_o in Sept. 2017

Figure 3e. *Muhlenbergia* 'White Cloud' on 80% ET_o in Sept. 2017

Figure 3f. *Muhlenbergia* 'White Cloud' on 50% ET_o in Sept. 2017

Figure 4c. *Muhlenbergia reverchonii* 'Undaunted' on 20% ET_0 Oct. 2017.

Figure 4d. *Muhlenbergia reverchonii* 'Undaunted' on 50% ET_0 Oct. 2017.

Figure 4e. *Muhlenbergia reverchonii* 'Undaunted' on 80% ET_0 Oct. 2017.

Figure 5c. *Rosa* 'Dark Desire' at peak bloom on 20% ET_o in May 2017 before treatment effects.

Figure 5d. *Rosa* 'Dark Desire on 20% ET_o in early October. 2017

Figure 5e. *Rosa* 'Dark Desire on 50% ET_o in September. 2017.

Figure 5f. *Rosa* 'Dark Desire' on 80% ET_o in September 2017.

Figure 6c. *Rosa* 'Plum Perfect' in full bloom in May 2017 on 20% ET_o.

Figure 6d. *Rosa* 'Plum Perfect' on 50% ET_o in July 2017 showing poor leaf color and sunburn.

Figure 6e. *Rosa* 'Plum Perfect' on 20% ET_o in October 2017.

Figure 6f. *Rosa* 'Plum Perfect' on 50% ET_o in October 2017.

Figure 6g. *Rosa* 'Plum Perfect' on 80% ET_o in October 2017.

Figure 7c. *Rosa* 'Icecap' on 80% ET_o in May 2017. Other treatments showed similar bloom coverage.

Figure 7d. *Rosa* 'Icecap' on 50% ET in July 2017 showing an abundance of dead flower heads.

Figure 7e. *Rosa* 'Icecap' on 20% ET_o in October 2017 looking surprisingly fresh.

Figure 7f. *Rosa* 'Icecap' on 50% ET_o in October 2017

Figure 7g. *Rosa* 'Icecap' on 80% ET_o in October 2017.

Figure 8c. *Rosa* 'White Drift' on 80% ET_o May 2017.

Figure 8d. *Rosa* 'White Drift' in July 2017 showing reversion to pink on select stems. Reversion was not treatment-related.

Figure 8e. *Rosa* 'White Drift' on 20% ET_o in October 2017.

Figure 8g. *Rosa* 'White Drift' on 50% Et_o in October 2017; taken from above to show self-cleaning.

Figure 8f. *Rosa* 'White Drift' on 80% ET_o in October 2017. (Pink reversion has re-appeared.)

Figure 9c. *Rosa* 'Peachy Keen' on 80% ET_o in May 2017.

Figure 9d. *Rosa* 'Peachy Keen' on 20% ET_o in October 2017; wilted leaves showing in early morning.

Figure 9e. *Rosa* 'Peachy Keen' on 50% ET_o in October 2017.

Figure 9f. *Rosa* 'Peachy Keen' on 80% ET_o in October 2017.

Figure 10c. *Rosa* 'Sunny Knock Out' on 20% ET_o on May 1, 2017.

Figure 10d. *Rosa* 'Sunny Knock Out' on 50% ET_o (the recommended treatment) in July 2017.

Figure 10e. *Rosa* 'Sunny Knock Out' on 20% ET_o in October 2017 (September photo unavailable).

Figure 10f. *Rosa* 'Sunny Knock Out' on 50% ET_o in September 2017.

Figure 10g. *Rosa* 'Sunny Knock Out' on 80% ET_o in September 2017.

Figure 11c. *Rosa* 'Double Knock Out' on 80% ET_o in May 2017.

Figure 11d. *Rosa* 'Double Knock Out' on 2% ET_o in August 2017. It had only 1 irrigation since April.

Figure 11e. *Rosa* 'Double Knock Out' flower closeup on 20% in August 2017 with very clean foliage.

Figure 11f. *Rosa* 'Double Knock Out' on 20% ET_o in October 2017.

Figure 11g. *Rosa* 'Double Knock Out' on 50% ET_o in October 2017.

Figure 11h. *Rosa* 'Double Knock Out' on 80% ET_o in October 2017.

Figure 12c. *Sporobolus wrightii* on 20% ET_o in September 2017.

Figure 12d. *Sporobolus wrightii* on 50% ET_o in September 2017.

Figure 12d. *Sporobolus wrightii* on 80% ET_o in September 2017.

Figure 13c. *Geranium* x *cantabrigiense* 'Biokovo' on May 1, 2017. (80% ET_o treatment)

Figure 13d. *Geranium* x *cantabrigiense* 'Biokovo' on 20% ET_o in October 2017. (No summer water.)

Figure 13e. *Geranium* x *cantabrigiense* 'Biokovo' on 50% ET_o in October 2017.

Figure 13f. *Geranium* x *cantabrigiense* 'Biokovo' on 80% ET_o in October 2017.

Figure 13c. *Lomandra* 'Seascape' on 20% ET_o in September 2017. (No summer water.)

Figure 13d. *Lomandra* 'Finescape' on 50% ET_o in September 2017.

Figure 13e. *Lomandra* 'Finescape' on 80% ET_o in September 2017. (This individual was dead by October.)

Figure 14c. *Lomandra* 'Platinum Beauty' flowers in foliage closeup in May 2017.

Figure 15d. *Lomandra* 'Platinum Beauty' on 80% ET_0 in May 2017.

Figure 15e. *Lomandra* 'Platinum Beauty' on 20% ET_0 in October 2017.

Figure 15f. *Lomandra* 'Platinum Beauty' on 50% ET_0 in October 2017.

Figure 15g. *Lomandra* 'Platinum Beauty' on 80% ET_0 in October 2017.

Figure 16c. *Nandina* 'Lemon-Lime' on 50% ET_o in May 2017.


Figure 16d. *Nandina* 'Lemon-Lime' on 20% ET_o in September 2017.

Figure 16e. *Nandina* 'Lemon-Lime' on 50% ET_o in September 2017.

Figure 16f. *Nandina* 'Lemon-Lime' on 80% ET_o in September 2017.