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Response of African Violets to Fertilizer Source and Rate

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Abstract. **Six cultivars of African violet (*Saintpaulia ionantha* H. Wendl) were grown during 2 seasons. Three fertilizer sources were used: Osmocote 1) 13N–6P–11K; 2) 14N–6P–12K; and 3) 50% each of 13N–6P–11K and 14N–6P–12K (1:1 by weight). Five fertilizer rates, 0, 0.75, 1.5, 2.25, and 3.0 kg·m^{-3} were tested in factorial combinations for a total of 15 treatments. Source of fertilizer usually had no effect on plant grade, number of flowers, number of days to first flower, number of leaves, total leaf area, and weight. When differences were significant, results were variable. Fertilizer rate affected indicators consistently, with the exception of number of days to flower, which was unaffected in 10 of the 12 experiments. Plant grade increased with an increase in fertilizer to 2.25 kg·m^{-3} in 11 of 12 experiments, but 3.0 kg·m^{-3} did not improve plant grade in 7 of 12 experiments. The remaining indicators responded similarly. More flowers were produced during the warm season than during other months.**

Soil mix influences effectiveness of mat irrigation (3), but plants on mats respond equally to surface-applied liquid fertilizer or incorporated slow-release fertilizer (2). Maximum dry weights of the African violets 'Lisa' and 'Ulli' were produced by 2.7–3.6 kg·m^{-3} of 14N–6.1P–11.6K Osmocote (1.87–2.94 g per 11.4-cm pot) during the summer and winter in Oklahoma (6). Fertilizer levels of 0–24 mg N per 15-cm pot from a ratio of 18N–3P–10K did not affect leaf or flower production when grown indoors at 0.5–2.0 klx during a 12-hr day (4). Other researchers have found poly-creseal to be a good slow-release fertilizer for African violets (5), and a ratio of 100N–25P–175K was recommended (1). When African violets were grown in hydroculture, 150 mg N·liter^{-1} was adequate (7).

This experiment was initiated to determine African violet response to 2 sources of fertilizers and their combination at 5 rates. Factorial experiments (3 × 5) in randomized block design with 6 replications were established 19 Jan. 1984. The fertilizers tested were Osmocote 14N–6P–12K, a 3 to 4 month fertilizer, and Osmocote 13N–6P–11K, a 8 to 9 month fertilizer (Sierra Chemical, Milipitas, Calif.), and a combination of the 2 materials in a 1:1 ratio, the 5 fertilizer levels tested were 0, 0.75, 1.50, 2.25, 3.00 kg·m^{-3}, (0, 0.32, 0.64, 0.96, or 1.28 g per pot of incorporated material). African violets were grown on capillary mats in 10-cm pots containing Verlite container mix (a peat–vermiculite mix manufactured by Verlite, Tampa, Fla.) in a glass greenhouse under a maximum of 150–200 μmol·s^{-1}·m^{-2} and temperatures of 18° to 35°C, depending on season of year. Plantlets of 6 cultivars, California, Crater Lake, Everglades, Glacier, Texas, and Washington, were grown during 2 seasons (one cool, one warm) during 1984. Data taken included plant grade (1 = poor quality, 5 = excellent quality), number of flowers and leaves, days to flower, leaf area, and leaf weight. Duration of each test was about 2½ months.

Source of fertilizer produced variable results. Of the 72 indicators determined, 49 were nonsignificant. Source had no effect on any measurement of 'California', but 'Washington' had 9 significant effects from source, with 13N–6P–11K best for the cool season planting and 14N–6P–12K best for the warm season planting. Considering the lack of variability of results among 6 cultivars, sources of fertilizer tested do not appear to be an important factor. Because of space limitation and similarity of results, only 'Everglades' is presented in tabular form (Table 1).

Fertilizer rate did produce significant differences for most of the factors evaluated. The lowest rates, 0 and 0.75 kg·m^{-3}, almost always produced less desirable plants. The 1.5-kg·m^{-3} rate sometimes produced plants as good as those receiving the higher rates, but best plants overall received 2.25 or 3.00 kg·m^{-3} of fertilizer. The 3.00 kg·m^{-3} rate was slightly more beneficial during the summer than during the cool season. The fertilizer rates used in this test are about equal to those used previously (6), and results are in agreement. Fertilizer rates used were not high enough to produce poor-quality plants. High rates might improve the plants, but the abundance of quadratic equations indicates 3 kg·m^{-3} is near the maximum desirable. Interactions were not significant.

Table 1. Response of African violet 'Everglades' to fertilizer source and rate.

Treatment	Plant grade[z]	No. flowers	Days to flower	No. leaves	Leaf A (cm^2)	Leaf wt (g)
			Planted 22 Mar. 1984[y]			
Fertilizer source						
13–6–11	3.2 a[x]	44 a	48 a	19 a	384 a	35 a
14–6–12	3.5 a	47 a	50 a	22 a	395 a	35 a
1&2, 1:1 (v/v)	3.6 a	46 a	50 a	11 a	386 a	35 a
Fertilizer rate (kg·m^{-3})						
0	2.2	16	51	18	243	24
0.75	2.7	29	51	18	334	30
1.50	3.9	55	48	21	436	40
2.25	4.7	73	48	23	538	46
3.00	3.7	54	48	24	390	34
Significance (rate)						
Linear	0.01	0.01	NS	0.01	0.01	0.01
Quadratic	0.01	0.01	NS	NS	0.01	0.01
			Planted 10 July 1984[w]			
Fertilizer source						
13–6–11	2.9 b	68 b	54 b	22 a	419 a	36 a
14–6–12	3.4 a	82 a	46 c	20 a	483 a	39 a
1&2, 1:1 (v/v)	3.6 a	80 a	58 a	20 a	493 a	40 a
Fertilizer rate (kg·m^{-3})						
0	1.8	29	54	18	274	25
0.75	2.4	56	53	20	362	31
1.50	3.4	85	54	19	503	42
2.25	4.0	98	53	22	566	44
3.00	4.8	115	50	24	620	49
Significance (rate)						
Linear	0.01	0.01	NS	0.01	0.01	0.01
Quadratic	NS	NS	NS	NS	NS	NS

[z] 1 = poor quality, 5 = excellent quality.
[y] Data taken 8 June 1984.
[x] Numbers followed by same letter not significant at 5% level.
[w] Data taken 21 Sept. 1984.

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Days to flower did not reflect a clear trend with respect to fertilizer rate. Plant grade, the only subjective determination, followed the trends of the objective determinations, number of flowers, number of leaves, leaf area, and leaf weight. Results of this test show that good-quality African violets can be produced in about 2½ months with either the 3 to 4 month or the 8 to 9 month Osmocote at rates of 2.25 to 3.00 kg·m^{-3}.

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Kentucky Bluegrass Cultivar Evapotranspiration Rates

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Abstract. **Twenty well-watered Kentucky bluegrass (*Poa pratensis* L.) cultivars were evaluated for evapotranspiration (ET) under controlled environment, using the water-balance method. ET ranged from a low of 3.86 mm·day^{-1} for 'Enoble' to a high of 6.43 mm·day^{-1} for 'Merion', 'Birka', and 'Sydsport'. Cultivars differed in shoot density, verdure, root density, stomatal density, and stomatal index. Only verdure was significantly correlated (r = 0.60) to ET for the 20 cultivars. Five cultivars were selected using cluster analysis to represent categories of high, medium, and low ET rates. ET for these cultivars increased from 1.1- to 1.7-fold when temperature was increased from 25° to 35°C, depending on cultivar. ET at 35° was positively correlated to vertical elongation rate (r = 0.96), and negatively correlated to shoot density (r = −0.87) and verdure (r = −0.83) under well-watered conditions.**

Daily turfgrass evapotranspiration (ET) rates have been reported to range between 2 and 6 mm (1). A limited number of investigations exist in the turfgrass literature that are pertinent to interspecific ET rates (2, 3, 6, 7, 10, 12). Much of this research emphasized warm-season turfgrass species and was conducted under growing conditions conducive to these species. Even less data exists for intraspecific differences in ET (1, 2). This study was conducted to determine Kentucky bluegrass (*Poa pratensis* L.) cultivar ET rates.

Twenty Kentucky bluegrass cultivars (Table 1) were harvested as plugs (200 mm in diameter × 13 mm in depth) from a field trial located at the Univ. of Nebraska Research and Development Center near Mead. The field trial had been established in Sept. 1980. Turfs were reestablished in containers (200 mm in diameter × 250 mm in depth) filled with fritted clay. Fritted clay was selected for the growing medium based on work by van Bavel et al. (11). Reestablishment consisted of 4 weeks growth in a greenhouse at 25° ± 5°C. The turfs were fertilized at 5 g N·m^{-2}·month^{-1}; mowed twice weekly at 50 mm; and watered daily to prevent visual drought stress.

After 4 weeks, turfs were well-rooted. The turfs were transferred to a controlled environment chamber at 35°C, 11° dew point, and 14 hr photoperiod at 275 μmol·s^{-1}·m^{-2} for 2 weeks. Airflow in the chamber was 0.14 m^3·s^{-1}, which was sufficient for complete air exchange every 12 sec. A randomized complete block design with 4 blocks was used in both the greenhouse and controlled environment.

Evapotranspiration rates were assessed in a specially designed chamber similar to that described by Johns (4). Mini-lysimeters were

Table 1. Evapotranspiration (ET), shoot density, verdure, and root density for 20 Kentucky bluegrass cultivars.

Culvitar	ET[z] (mm·day^{-1})	Percentage	Shoot density[y] (no.·m^{-2})	Verdure[x] (kg·m^{-2})	Root density[w] (mg·1000 cc^{-1})
Enoble	3.86	0	3.76	0.9	410
A-20	4.03	4	3.79	1.2	250
Adelphi	4.03	4	2.75	1.2	560
Newport	4.03	4	3.08	0.9	470
Baron	4.20	9	2.38	0.9	480
Cheri	4.46	16	2.35	0.8	580
Touchdown	4.63	20	2.79	0.9	530
Parade	5.14	33	2.77	1.3	290
Bensun	5.31	38	3.23	1.5	470
Victa	5.40	40	2.72	1.4	620
Park	5.57	44	2.38	0.9	520
Fylking	5.74	49	3.54	1.1	350
S. Dakota	5.91	53	2.57	0.8	370
Bristol	5.99	55	2.39	1.3	670
Bonnieblue	5.99	55	2.03	1.7	880
Nugget	6.08	58	3.03	1.3	310
Majestic	6.17	60	2.62	1.5	650
Birka	6.34	64	3.20	1.5	540
Sydsport	6.34	64	2.46	1.4	710
Merion	6.34	64	3.16	1.5	620
LSD (0.05)	0.59	---	0.27	0.3	19

[z]ET based on lysimeter measurements made in controlled environment having a 14-hr photoperiod with light intensity of 275 μmol·s^{-1}·m^{-2} 25°C, and 11° dew point. Percentage based on ET rate of cultivar − ET rate of Enoble ÷ ET rate of Enoble.

[y]Shoot density counts were made on a 314 cm^2 and were factored to number per m^2. Values should be increased by 10^4.

[x]Verdure was measured as fresh weight per 314 cm^2 and factored to kg·m^{-2}.

[w]Root density was determined as ashed weights per 1000 cc of soil.

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