excellent for over 7 weeks, to *Verbena* which was unacceptable in both flower and foliage characteristics in less than a week. Some cultivars of *Episcia, Exacum, Capsicum,* and *Celosia* performed as well as or better than *Chrysanthemum* 'Puritan' (florist type), while a few cultivars of *Begonia, Chrysanthemum* (garden type), *Achimenes, Catharanthus* and the above cultivars performed as well as *Sinningia.*

In several cases, cultivars within a genera varied widely in response to the SHC. For example, *Tagetes* 'Goldfinch' and *Impatiens* 'Scarlet Baby' continued to bloom past 4 weeks while 2 other cultivars of these genera were not flowering at 1 to 3 weeks. The foliage of *Celosia* 'Kardinal' was unacceptable at 3 weeks while 'Jewel Box' and 'Golden Torch' were still satisfactory at 6 weeks. This would indicate that cultivars as well as species should be tested to establish acceptable flowering plants for the home.

Although the relative humidity was higher than can be found in the home in northern climates, the change in relative humidity (20-30% differential) was apparently great enough to cause complete desiccation of *Verbena* and *Phlox* in 1 and 2 weeks, respectively. Plants in this test had very little leaf abscission. Foliage plants grown in open fields and then placed indoors abscised a large number of leaves (1). Most of the flowering plants in this test were grown under relatively low light conditions (50-80% shade) which may have prevented this phenomenon. The SHC appeared to provide a severe enough stress or "shock" to separate plants not suited for the home. Additional variations in the growing conditions or SHC might allow further separation of plants being evaluated.

This study indicates that *Episcia* 'Acajou,' 'Frosty,' and 'Tropical Topaz'; *Exacum* 'Elfin' and 'Midget'; *Capsicum* 'Fiesta'; *Celosia* 'Jewel Box'; *Chrysanthemum* 'Baby Tears'; *Achimenes* 'Tarantella'; and *Begonia* 'Gin' can easily be maintained and expected to flower for 4 to 8 weeks in the home. These plants also have potential for production in 10 cm or smaller pots and mass merchandizing in flower.

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Cultivar and Cultural Influences on the Establishment of Kentucky Bluegrass from Plugs[1]

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Abstract. **Rate of coverage from plugs of 'A-20' Kentucky bluegrass (*Poa pratensis* L.) planted in Flanagan silt loam and treated with oxadiazon at 3.4 kg/ha increased as mowing height increased from 1.9 to 3.8 to 7.5 cm and with fertilization at 25 kg N/ha per growing month or higher. Sod strength measurements taken 2 years after planting were highest in plots receiving 25 kg N/ha per growing month compared to 0, 50, and 100 kg. Where plugs of 48 cultivars of Kentucky bluegrass received the same oxadiazon treatment, phytotoxicity ranged from no injury to complete necrosis.**

Most Kentucky bluegrass cultivars are highly apomictic, and seeding has been a traditional means of propagation. However, some cultivars are vegetatively propagated since they produce many off types from seed, or they may be poor seed producers. Vegetative propagation of Kentucky bluegrass is done by sodding and plugging.

Solon and Turgeon (4) found that vegetative establishment of weed-free 'A-20' Kentucky bluegrass turf was successful following planting of closely-spaced sod plugs and application of oxadiazon (2-*tert*-butyl-4-(2,4-dichloro-5-isopropoxyphenyl)-Δ^2-1,3,4-oxadiazolin-5-one) at 3.4 kg/ha for weed control. Where annual bluegrass (*Poa annua* L.) was seeded in conjunction with plugging, the fastest rate of Kentucky bluegrass establishment and best weed control were in plots treated with oxadiazon. Solon and Turgeon (5) also reported that 'A-20' plugs spaced on 15-cm centers formed solid turfs much more rapidly than plugs on 30-cm centers regardless of plug size.

The purposes of this study were to determine the effects of different mowing heights and fertilization rates on the coverage of 'A-20' plugs subsequently treated with oxadiazon, and the adaptability of oxadiazon for use on other Kentucky bluegrass cultivars planted in the same fashion.

Field studies were conducted at the Ornamental Horticulture Research Center in Urbana, Illinois on a Flanagan silt loam with a pH of 6.6

Mowing and fertilization. Plugs of 'A-20' Kentucky bluegrass, measuring 5 by 5 cm across and 2 cm deep, were planted on 7 May 1975 using a Beck's Lawn-O-Matic Plugger-Sprigger.[3] The plugs were spaced on 20-cm centers. The site was irrigated to supply 2 cm of water over the area. After 1 week, the area was divided into 3.0-by 1.8-m plots, and mowing and fertilization treatments were initiated. Mowing heights included 1.9, 3.8, 7.5 cm, and no mowing. Mowing frequency was 2 to 3 times per week during the growing season. Fertilization levels included 0, 25, 50 and 100 kg N/ha per growing month using a 10N-2.6P-3.3K water-soluble fertilizer. The preemergence herbicide oxadiazon, was applied immediately after planting at 3.4 kg/ha for annual weed control. After 17 weeks, the previously unmowed plots were mowed at 7.5 cm, clippings were removed, and these plots were treated as the 7.5-cm plots throughout the rest of the experiment. Ratings of percent cover were taken after 3, 5, and 14 months following planting.

Each treatment combination was replicated 3 times in a randomized complete block split-plot design with mowing height as the main plot treatment and fertilization rate as the subplot treatment. Irrigation water was applied as needed. In June, 1977, sod

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Table 1. Effects of mowing height and fertilization rate on the establishment of Kentucky bluegrass sod from plugs planted on May 7, 1975 and treated with oxadiazon at 3.4 kg/ha.

Treatment	Cover (%)			Sod strength (kg/m^2)
	Aug. 75	Oct. 75	July 76	June 77
Mowing height (cm)				
1.9	23.7	42.9	90.0	48.3
3.8	38.4	59.6	92.5	55.6
7.5	51.7	73.8	94.4	52.2
Unmowed[z]	58.7	70.8	96.0	55.9
Significance	*	**	ns	ns
Fertilization (kg N per growing month)				
0	39.2	53.7	84.2	79.3
25	41.2	62.5	96.2	91.2
50	46.2	63.3	96.2	53.2
100	45.8	67.5	96.4	41.8
Significance	ns	**	**	**

[z]After 17 weeks, these plots were mowed at 7.5 cm for the duration of the experiment.
*, **, [ns]Significance of the F values at the 5% and 1% levels, and not significant, respectively.

Table 2. Effects of oxadiazon applied at 3.4 kg/ha in May 1975 to field-planted plugs of Kentucky bluegrass cultivars.

Cultivar	Phytotoxicity[z]	Cover (%)	
		Oct. 1975	July 1976
A-20	2.3	25	98
A-34	1.0	23	96
Adelphi	4.3	25	87
BA 61-91	4.3	25	70
BA 62-55	2.3	35	78
Baron	3.0	20	77
Bonnieblue	3.7	31	87
Brunswick	1.0	27	96
Campina	7.7	8	40
Cheri	4.3	18	73
Enmundi	2.7	25	88
EVB-305	9.0	0	12
Enoble	2.7	18	78
Entopper	4.7	14	78
Fylking	5.0	11	72
Galaxy	2.3	25	88
Geronimo	3.0	35	93
PSU-190	5.0	8	73
PSU-197	1.7	50	93
RAM #1	2.3	27	98
RAM #2	2.3	37	98
Rugby	4.3	38	93
Sodco	1.7	37	98
Sydsport	4.3	11	72
Glade	1.0	28	96
KI-131	3.0	32	96
KI-132	1.7	35	97
KI-133	2.3	18	93
Kenblue	4.3	25	81
Majestic	3.0	22	95
Merion	7.7	4	30
Monopoly	3.7	28	98
Nugget	4.3	14	70
P-59	6.3	13	70
P-140	4.0	18	90
Parade	7.3	7	72
Park	6.3	17	57
Pennstar	6.3	9	77
Plush	2.3	37	93
PSU-150	1.0	43	98
PSU-169	1.0	52	100
Touchdown	4.3	20	83
KI-138	5.0	5	58
KI-143	2.3	13	92
KI-157	6.3	29	70
Vantage	2.3	35	83
Victa	3.0	28	83
Windsor	1.0	50	98
LSD 5%	1.7	16.5	17.2

[z]Phytotoxicity ratings based on a scale of 1 (no injury) to 9 (complete plug necrosis).

strips measuring 180 by 45 by 2 cm were harvested from each plot and sod strengths were measured by a procedure developed by Rieke et al. (3) and modified by Turgeon et al. (6).

The results indicate that a more rapid rate of initial coverage is favored by high mowing heights (Table 1). Lateral growth of plugs was retarded by the 1.9 cm mowing height during 1975; however, at 60 weeks following planting, all plots were more than 90 percent covered. Close mowing has been shown to reduce root and rhizome growth and lower the amount of carbohydrate reserves available for regrowth (1). As the spread of 'A-20' plugs can be severely restricted by competition from companion grasses and weed species (5), treatments which result in rapid coverage favor the desirable turfgrass and minimize weed competition after the effectiveness of oxadiazon diminishes.

'A-20' coverage was comparable in all fertilized plots during the 60-week period after planting; however, lateral growth from the plugs was significantly lower where no fertilizer was applied.

Sod strength measurements taken 2 years after planting were not significantly affected by mowing treatment but were influenced by fertilization rates (Table 1). The lowest fertilization rate (25 kg N/ha per growing month) produced the strongest sod compared to higher rates, or no fertilization. This was consistent with the results of English (2) which showed that N rates greater than 7 kg N/ha per growing month on muck soils tended to decrease sod strength, reduce root systems, and produce fewer rhizomes. Thus, on the finer-textured silt loam, 25 kg N/ha per growing month appears adequate to provide rapid, first-season cover followed by maximum cover and sod strength in subsequent years. There were no significant interactions between mowing height and fertilization rate in this study.

Cultivar screening. Forty-eight cultivars were hand planted using four 5 cm diameter plugs in 0.6 by 0.6 m plots on May 7, 1975. Oxadiazon was applied at the rate of 3.4 kg/ha. The plots were fertilized with 10N-2.6P-3.3K water-soluble fertilizer to provide 50 kg N/ha per growing month. Mowing was performed 2 or 3 times per week at 7.5 cm with clippings returned. Irrigation was performed as needed. Each treatment was replicated 3 times in a randomized complete block design. Phytotoxicity ratings were made after 2 months, and % coverage was estimated after 5 and 14 months following planting.

Plugs of 48 Kentucky bluegrass cultivars treated with oxadiazon immediately after planting varied from no injury to nearly complete necrosis depending on cultivar (Table 2). Phytotoxicity from oxadiazon was highest with the cultivars 'Campina', 'EVB-305', 'Merion', and 'Parade', and resulted in a serious reduction in turfgrass cover. No phytotoxicity was observed on the cultivars 'A-34', 'Brunswick', 'Glade', 'PSU-150', 'PSU-169' and 'Windsor'. These results suggest that plugging in conjunction with oxadiazon applications is a feasible establishment method for some cultivars of Kentucky bluegrass and, at least for 'A-20', can be assisted by increasing the mowing height to 7.5 cm and fertilizing at 25 kg N/ha per growing month.

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