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EVALUATION OF MARIGOLD CULTIVARS AS BEDDING PLANTS, SPRING AND FALL 1989

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Abstract. Marigold (*Tagetes* spp.) cultivars were evaluated for earliness of flowering, flower diameter, flower color, plant dimensions, growth habit, uniformity and overall appearance. Ninety-four cultivars in the spring and 108 cultivars in the fall were grown in field plots on raised polyethylene-mulched beds in full sun. In the spring evaluations, 41-65 days were required for flowering from seed, depending upon cultivar. Only French marigolds and interspecific hybrids flowered in 45 days or less, while those which flowered at 60 days or later were all American (African) marigolds. American types produced flowers with diameters greater than 2.5 inches. Fifty entries were equivalent in smallest flower diameter to 'Yellow Boy' at 1.5 inches. Entries greater in height than 12.5 inches, but less than 15.2 inches, included only American types and interspecific hybrids. Fourteen entries were less than 8.0 inches tall. In the fall evaluations the time from sowing to first flower ranged from 41 to 70 days. Thirty entries flowered at 60 days or later. 'Inca Yellow' and 'Inca Gold' had flowers of 4 inches or greater diameter. Of the 22 entries with flower diameter greater than 2.5 inches, only four were French types. Eleven entries were 12 inches in height or shorter. 'Discovery Orange' was less than 10 inches high. Subjective ratings for both seasons indicated that American and interspecific hybrids declined in quality sooner than French types.

Florida is ranked fifth in the nation in the reported wholesale value of floriculture crops for use as bedding or garden plants (1). In 1989 total bedding plant wholesale value was \$55.2 million, with \$41.7 million of the crop produced in pots, \$9.0 million in flats and \$4.5 million in hanging baskets. This represents 6.4% of total U.S. bedding plant production value (1). Marigolds produced for garden and landscape use ranked ninth among the best selling bedding plants according to a Professional Plants Growers Association national survey conducted in 1989. Additionally, they ranked fifth as a planned increase item for 1990 (13).

The importance of marigold as a major bedding plant for use in landscapes was illustrated by results of two trials conducted at this location in 1982 (2,3). Many new cultivars have been released to the industry since 1982 which have introduced new flower types, colors, shortened flowering times and improved plant characteristics (4-11). In 1989, a

two-season trial was conducted to evaluate marigold cultivars introduced since 1982 and to compare these with established cultivars.

Materials and Methods

Transplant production. Seed of marigold cultivars were sown in germination flats filled with coarse vermiculite on 26 Jan. and 14 Aug., 1989. Seedlings were transplanted into 1.5 x 1.5 x 2.5 inch containerized cells filled with a peat:vermiculite medium (1:1, v:v, amended with dolomite, superphosphate and hydrated lime). Transplants received liquid fertilizer as needed during production. No plant growth regulators were used.

Field preparation and crop management. Beds of Eau Gallie fine sand were formed to a width of 32.5 inches and height of 8 inches on 5 ft centers. Slow release fertilizer at 1544 lb/bedded acre as Osmocote 18-2.6-11.2 (N-P-K) was broadcast over the full bed surface and incorporated to a depth of 3-4 inches (Acre = 43,560 sq ft). Beds were fumigated with 67% methyl bromide:33% chloropicrin and covered with black polyethylene in the spring and white-on-black polyethylene in the fall. Fields were irrigated by seepage via lateral ditches spaced every 40.5 ft. The trial area was in full sun. Plants were set on 2 Mar. and 11 Sep. 1989 on 12 inch centers with 3 staggered rows per bed. Four replications with 6 plants per cultivar were arranged in a randomized complete block design.

Metaxyl was applied as a drench to prevent damp-off one week after transplanting in the fall. Other pesticides were utilized as needed to control botrytis, lepidopterous larvae and mites. Pests were not a problem generally.

Data collection. Cultivars were evaluated for flowering time, flower diameter and color, plant dimensions, longevity and other horticultural qualities. Subjective ratings for overall appearance were assigned to plots based on a 0 to 10 scale (0 = all plants dead to 10 = excellent). Vigor, floriferousness, habit and uniformity were considered in this overall rating. Statistical analysis was handled by the analysis of variance and means were separated using the Tukey method at an HSD of 5%. Temperature and rainfall data (12) are in Table 1.

In the spring, the 94 cultivars evaluated consisted of 18 American (African) marigolds (*Tagetes erecta* L.), 66 French marigold (*Tagetes patula* L.), 9 triploid (3N) interspecific hybrids (*T. patula* x *T. erecta*) and 1 tetraploid (4N) interspecific hybrid. In the fall the 108 cultivars consisted of 16 American (African) marigolds, 81 French marigolds, 10 triploid, and 1 tetraploid.

Discussion

Spring. The range of time from sowing to the first flower was 41 to 65 days (Table 2). Thirty cultivars flowered in less than 45 days. Of these, twenty-five cultivars

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Table 1. Average high and low temperatures, and average monthly rainfall measured at GCREC-Bradenton from 1954-1989 compared to 1989 data (12).

Month	1989			35-yr Mean		
	Daily Temp (°F)		Rainfall (in)	Daily Temp (°F)		Rainfall (in)
	Max	Min		Max	Min	
Mar. ^z	81	59	2.97	77	55	3.43
Apr.	84	60	1.38	82	60	1.56
May	89	65	2.44	87	64	3.10
Sep. ^y	92	93	14.10	89	71	8.60
Oct.	86	62	1.20	85	64	2.72
Nov.	82	59	0.59	78	57	2.05

^zCrop sown 26 Jan. Transplanted to field 2 Mar.

^yCrop sown 14 Aug. Transplanted to field 11 Sep.

were French types, notably from the 'Little Devil', 'Little Hero', 'Janie', 'Bounty', 'Bonanza', and 'Disco' series. Additionally, six triploids, including all four of the 'Nugget' series, 'Yellow Fireworks' and 'Red Fireworks', were among the earliest cultivars. Latest flowering cultivars included 'Royal Orange', 'Royal Yellow', 'Perfection Gold', 'Cortez Yellow' and 'Yellow Galore', all of which were American (African) marigolds.

All flowers with diameters greater than 2.5 inches were produced by American types. The largest flowers came from 'Cortez Yellow' (3.8 inches), which was not significantly different from 'Inca Gold' (3.6 inches) or 'Orange Galore' (3.3 inches). 'Safari Yellow' (2.4 inches) produced among the largest French type flowers, although not significantly larger than 48 other French cultivars. Forty-eight cultivars were equivalent in smallest flower size to 'Yellow Boy' at 1.5 inches.

Table 2. Growth and performance of marigold (*Tagetes* spp.) cultivars in field beds during Spring 1989.

Entry	Species or type ^z	Days to Flower ^y	Flower diameter ^x (inches)	Plant height ^x (inches)	Plant diameter ^x (inches)	Rating ^w 1	Rating ^v 2	Rating ^u 3
Nugget Orange Supreme	3N	40.5 ¹	1.8	10.2	15.0	8.1	6.5	5.3
Little Devil Yellow	F	40.5	1.7	8.2	14.4	9.6	9.3	8.5
Yellow Fireworks	3N	41.0	2.2	11.5	16.4	8.9	4.0	3.8
Nugget Gold Supreme	3N	41.0	1.7	11.8	18.1	9.6	9.0	8.3
Little Hero Orange	F	41.3	1.9	5.7	10.7	9.1	8.3	8.5
Little Devil Orange	F	41.5	1.7	7.2	13.9	9.4	9.3	9.3
Janie	F	41.5	1.5	7.8	13.2	9.5	9.1	9.3
Bounty Orange	F	41.5	1.8	7.8	14.2	9.6	9.4	9.5
Bonanza Gold	F	41.8	1.6	8.6	15.5	9.6	9.5	8.8
Nugget Red Supreme	3N	42.0	1.8	8.0	14.5	8.8	7.9	6.5
Disco Orange	F	42.3	1.9	9.0	14.8	9.6	8.6	9.0
Bonanza Orange	F	42.5	1.9	9.9	16.0	9.6	9.0	8.5
Red Fireworks	3N	42.5	2.0	14.3	20.0	9.9	8.9	7.0
Bonanza Yellow	F	42.7	2.0	11.5	16.0	9.8	8.6	8.8
Nugget Yellow Supreme	3N	42.7	1.9	11.1	16.3	9.5	7.3	5.3
Bounty Gold	F	43.0	1.7	7.4	13.7	9.6	9.1	8.8
Little Hero Yellow	F	43.0	2.1	9.2	14.9	9.8	8.5	8.3
Bonanza Deep Orange	F	43.0	1.7	9.5	14.5	9.8	9.8	8.8
Little Devil Bicolor	F	43.3	1.6	6.7	12.7	9.3	8.5	8.8
Bounty Flame	F	43.5	1.8	8.1	13.8	9.6	9.1	9.3
Bonanza Harmony	F	43.5	1.9	10.6	15.6	9.6	9.3	8.8
Granada	F	43.5	1.9	8.9	14.0	9.3	8.6	8.5
Little Devil Flame	F	43.8	1.6	7.0	13.1	9.4	9.4	8.8
Hero Red	F	44.0	2.1	9.8	15.0	9.8	9.4	8.8
Disco Red	F	44.3	1.6	10.4	16.1	9.1	8.3	7.3
Bonanza Spry	F	44.3	1.9	10.0	15.1	9.5	8.3	7.8
Ginger	F	44.5	2.0	9.6	14.6	9.9	9.4	9.5
Golden Gate	F	44.5	2.3	11.0	15.2	9.8	9.8	8.5
Little Hero Flame	F	44.8	1.9	6.5	12.7	9.6	9.5	8.8
Disco Marietta	F	44.7	1.9	9.5	15.6	9.3	8.4	8.5
Little Devil Fire	F	45.0	1.8	5.9	11.8	9.6	9.6	8.5
Hero Harmony	F	46.0	2.1	8.3	14.1	9.0	9.1	8.8
Super Star Orange	4N	46.3	2.5	13.3	19.1	9.0	6.8	4.8
Cheerful Mix	F	46.3	1.6	9.6	15.0	9.1	8.6	8.0
Orange Spice	F	46.5	2.2	8.4	13.9	10.0	9.9	9.0
Bonanza Bee	F	46.5	2.0	7.3	14.3	9.9	9.9	9.8
Bonanza Flame Improved	F	46.5	2.0	8.7	14.1	10.0	9.6	8.5
Yellow Boy	F	46.5	1.5	9.4	15.0	8.8	9.3	9.3
Hero Yellow Improved	F	46.5	1.9	8.9	13.6	9.6	9.3	7.5
Janie Bright Yellow	F	47.0	1.7	7.6	13.3	9.5	8.8	8.0
Hero Flame	F	47.0	2.0	9.4	15.0	10.0	9.6	8.3
Red Seven Star	3N	47.0	2.0	12.7	18.1	9.8	8.8	6.8
Red Cherry	F	47.3	2.0	12.4	16.3	9.5	9.1	7.0
Janie Harmony	F	47.3	1.7	8.6	14.7	9.4	9.0	8.8
Spry Boy	F	47.5	1.6	9.4	15.3	9.6	9.3	9.0

Table 2. Continued

Entry	Species or type ^z	Days to Flower ^y	Flower diameter ^x (inches)	Plant height ^x (inches)	Plant diameter ^x (inches)	Rating ^w 1	Rating ^v 2	Rating ^u 3
Disco Golden Yellow	F	47.8	2.1	10.5	16.8	9.9	9.8	9.3
Espana Mix	F	47.8	1.7	9.8	15.6	9.0	7.1	7.8
Hero Orange	F	47.8	2.2	11.7	16.4	9.6	8.3	7.5
Disco Flame	F	48.0	1.8	7.9	13.2	9.6	9.0	7.8
Early Queen Sophia	F	48.5	2.3	9.5	15.1	9.9	8.5	7.5
Gold Fireworks	3N	48.5	2.5	11.8	16.8	9.3	6.3	5.3
Orange Fireworks	3N	48.5	2.2	12.9	18.6	9.8	9.0	7.5
Bonanza Flame	F	48.8	1.9	9.0	15.4	9.5	9.3	9.5
Pretty Joy Mix	F	49.3	1.6	9.3	13.9	8.9	8.4	6.8
Harmony Boy	F	49.5	1.6	9.4	14.9	9.9	9.8	9.8
Janie Flame	F	49.8	2.0	9.5	14.4	9.8	9.4	9.3
Calico	F	50.0	2.2	12.1	16.3	9.9	9.5	7.8
Red Marietta	F	50.3	1.7	11.2	15.8	9.6	9.3	8.3
Happy Days Mix	F	50.3	1.9	11.0	15.9	9.8	9.6	7.8
Orange Boy	F	50.3	1.7	9.5	14.1	9.9	9.4	8.8
Janie Tangerine	F	50.5	1.9	8.0	13.1	9.1	8.5	8.0
Ole	F	50.8	1.8	10.7	16.2	9.6	9.5	7.8
Aurora Gold	F	50.8	2.0	9.2	13.6	9.9	9.8	9.5
Safari Yellow	F	51.3	2.5	9.0	15.2	9.6	9.6	8.5
Hero Gold	F	51.5	2.0	9.5	15.4	9.6	9.0	8.8
Bolero	F	51.8	1.8	10.7	16.1	9.9	9.9	9.5
Aurora Fire	F	52.5	2.0	10.1	15.4	9.6	9.5	8.8
Saffron	F	52.8	2.0	9.5	13.2	9.8	9.3	8.8
Golden Boy	F	53.0	1.5	10.6	14.6	9.0	9.0	9.0
Viva	F	53.5	1.8	9.5	15.4	9.6	9.3	9.0
Scarlet Sophia	F	55.0	2.1	9.8	14.5	9.3	9.5	8.8
Regular Queen Sophia	F	55.0	2.1	9.9	14.2	9.4	9.4	8.8
Yellow Sophia	F	55.0	2.0	9.5	14.3	9.1	8.9	8.3
Discovery Yellow	A	56.0	2.3	6.1	10.3	9.6	9.1	8.8
Orange Sophia	F	56.3	2.1	11.0	15.8	9.3	9.6	9.5
Honeycomb	F	56.5	1.8	10.5	15.3	9.9	9.9	9.5
Discovery Orange	A	56.5	2.6	5.6	10.2	10.0	7.8	8.0
Lady Mix	A	57.3	2.7	9.6	12.4	9.0	7.8	7.0
Inca Orange	A	57.3	2.8	11.5	14.8	8.6	7.8	7.0
Inca Yellow	A	58.3	3.0	9.4	13.1	8.9	6.8	5.3
Perfection Orange	A	58.3	2.8	11.5	15.0	9.1	7.8	5.3
Gold Galore	A	58.3	3.1	10.2	14.9	9.3	8.6	7.3
Voyager Gold	A	58.5	3.0	11.1	13.1	9.4	9.3	8.8
Inca Gold	A	58.8	3.6	12.1	14.5	9.6	8.3	6.5
Sunshot	A	59.5	3.2	12.1	16.4	8.9	8.6	7.8
Orange Galore	A	59.5	3.3	10.5	13.8	9.8	8.1	5.5
Aurora Yellow Fire	F	59.5	2.0	8.2	13.3	9.6	9.4	8.5
Perfection Yellow	A	59.5	3.0	12.7	15.8	9.1	8.5	6.8
Voyager Yellow	A	60.0	3.0	10.9	15.0	9.4	8.9	8.8
Yellow Galore	A	60.5	2.8	13.2	16.9	9.4	9.8	5.3
Cortez Yellow	A	62.5	3.8	9.4	13.4	8.8	8.0	6.3
Perfection Gold	A	63.3	2.9	15.2	16.6	9.6	8.6	6.0
Royal Yellow	A	64.3	3.0	11.9	15.4	8.6	8.4	7.5
Royal Orange	A	64.8	3.2	11.1	15.4	9.3	8.6	7.0
HSD (5%)		4.4	0.5	3.0	3.8	1.9	3.0	3.2

^z = American or African (*Tagetes erecta*), F = French (*T. patula*), 3N = Triploid hybrid (*T. patula* x *T. erecta*), 4N = Tetraploid hybrid (*T. patula* x *T. erecta*).

^yFrom sowing 26 Jan. 1989.

^xMeasured flowers 6 Apr. 1989 at peak; measured plant size 19, 20 Apr. 1989 still at peak.

^wRating 1: 11 Apr. 1989. Overall rating scale: 0 = all plants dead, 1 = v poor, 5 = acceptable, 10 = excellent.

^vRating 2: 26 Apr. 1989. Overall rating scale: 0 = all plants dead, 1 = v poor, 5 = acceptable, 10 = excellent.

^uRating 3: 8 May 1989. Overall rating scale: 0 = all plants dead, 1 = v poor, 5 = acceptable, 10 = excellent.

^uMean separation by Tukey's procedure, HSD 5% level.

Tallest entries, between 12.3 inches and 15.2 inches in height, included three American, four triploid types and one French cultivar. Three cultivars were less than 6 inches tall and fourteen cultivars were less than 8 inches tall. Among the shortest cultivars were the 'Little Devil', 'Discovery', 'Little Hero' and 'Janie' series.

Plant diameter ranged from 10.2 inches for 'Discovery Orange' to 20.0 inches for 'Red Fireworks'. Of the cultivars greater than 16.2 inches, eight were interspecific hybrids

(triploid and tetraploid), three were American and five were French types. Twenty-five cultivars were similar to 'Discovery Orange' in plant width.

Ratings were given to each plot during the season on the following dates: 11 Apr., 26 Apr. and 8 May 1989. On the first date, all cultivars were rated high in quality, ranging from 8.1 to 10.0. On the second date, ratings ranged from 4.0 for 'Yellow Fireworks' to 9.9 for 'Bolero'. Poorest ratings, below 6.8, included four interspecific hybrids and

one American type. The rating on the second date provided a key indication of the shorter longevity of the interspecific hybrids for which stem breakage and/or splitting (primarily in 'Fireworks' series) and plant mortality (primarily in 'Nugget' series) were factors in low ratings. 'Inca Yellow' was rated low due to bent pedicels which allowed the flowers to droop toward the ground. On the third date, ratings ranged from 3.8 for 'Yellow Fireworks' to 9.8 for 'Harmony Boy'. Six of the ten interspecific hybrids and seven of the 18 American types in the trial were among the lowest rated cultivars.

Fourteen of the eighteen American types in the trial were rated below 8.0. The outstanding exceptions to generally poor ratings for American types late in the season were the 'Voyager' and 'Discovery' series.

Fall. The time from sowing to first flower ranged from 41.0 days for 'Little Hero Flame' to 69.8 days for 'Regular Queen Sophia' (Table 3). Forty-eight cultivars flowered in less than 51 days. Nine of these were interspecific hybrids, the remaining 39 were French marigolds. Twenty-seven cultivars, flowered at 60 days or later and included 13 of the 16 American marigold tested and 14 French marigolds.

Table 3. Growth and performance of marigold (*Tagetes* spp.) cultivars in field beds during Fall 1989.

Entry	Species or type ^z	Days to Flower ^y	Flower diameter ^x (inches)	Plant height ^x (inches)	Plant diameter ^x (inches)	Rating ^w 1	Rating ^v 2
Little Hero Flame	F	41.0"	2.1	12.8	19.6	9.5	6.3
Little Devil Orange	F	41.3	1.9	15.5	21.1	9.0	4.8
Bounty Orange	F	41.5	2.0	12.8	20.0	9.6	7.5
Little Hero Yellow	F	42.3	2.3	14.4	19.4	9.8	6.6
Bonanza Spry	F	42.3	2.1	14.7	22.2	8.9	4.8
Little Hero Orange (lot 864)	F	42.5	2.1	10.8	16.3	9.4	7.0
Nugget Gold Supreme	3N	43.0	2.0	14.3	22.0	5.8	4.0
Bonanza Bee	F	43.3	2.3	12.8	17.7	9.9	7.4
Bonanza Orange	F	43.3	2.0	16.3	23.7	8.5	3.8
Gold Fireworks	3N	43.5	2.6	13.1	20.5	5.3	3.8
Hero Flame	F	44.0	2.2	15.0	21.8	9.4	3.8
Mighty Marietta Orange	3N	44.3	2.1	12.7	19.8	6.0	3.8
Little Hero Orange (lot 384)	F	45.0	2.5	11.5	18.0	9.5	7.0
Bonanza Flame Improved	F	45.0	2.4	11.9	16.6	9.8	7.3
Hero Yellow Improved	F	45.5	2.0	13.1	19.6	9.0	4.0
Bonanza Harmony	F	45.5	2.1	18.1	24.4	8.6	4.3
Nugget Orange Supreme	3N	45.5	2.0	13.2	20.4	7.5	5.3
Hero Red	F	45.5	2.1	14.2	21.8	9.1	5.3
Bonanza Flame	F	45.8	2.0	14.8	21.9	8.9	5.5
Disco Flame	F	46.0	2.0	13.9	20.6	9.4	4.0
Champion Gold	F	46.0	2.0	16.1	21.9	8.4	3.8
Disco Golden Yellow	F	46.0	2.0	15.4	21.5	8.8	6.0
Nugget Yellow Supreme	3N	46.3	1.9	12.0	18.5	4.6	2.8
Bonanza Gold	F	46.3	1.9	15.7	21.9	9.3	6.8
Little Devil Fire	F	46.5	2.1	10.3	16.3	9.9	7.8
Little Devil Bicolor	F	46.5	2.0	12.8	18.1	9.6	6.0
Super Star Orange	4N	46.5	2.8	13.8	23.1	6.4	4.8
Bounty Flame	F	46.8	2.0	14.6	20.7	10.0	6.0
Bonanza Yellow	F	47.0	1.9	16.7	23.4	8.4	4.3
Yellow Calico	F	47.3	2.6	16.1	23.2	8.6	4.3
Legend Gold	F	47.3	2.2	16.2	23.3	9.9	5.5
Little Devil Flame	F	47.3	1.8	12.2	19.0	9.9	6.8
Nugget Red Supreme	3N	47.3	2.1	10.9	17.8	6.4	3.3
Hero Orange	F	47.5	2.5	17.2	24.3	9.5	4.0
Golden Gate	F	47.8	2.2	15.6	21.6	9.5	4.5
Hero Gold	F	48.0	2.2	15.6	20.7	9.9	6.0
Granada	F	48.8	2.1	16.3	21.0	9.8	5.8
Legend Orange	F	49.0	2.2	14.9	20.9	9.4	5.5
Legend Yellow	F	49.3	2.1	15.0	21.6	9.5	4.3
Red Fireworks	3N	49.3	2.3	15.7	21.7	7.4	4.5
Janie	F	49.5	1.9	14.1	20.4	10.0	5.8
Janie Bright Yellow	F	49.8	1.9	11.9	16.9	9.9	7.3
Hero Harmony	F	49.8	2.3	14.0	18.3	9.9	6.0
Little Devil Yellow	F	50.3	1.9	15.0	20.3	9.4	4.0
Bounty Gold	F	50.3	2.1	13.2	18.5	9.6	7.5
Bonanza Deep Orange	F	50.5	2.0	15.4	20.2	8.9	5.0
Orange Fireworks	3N	50.5	2.4	15.0	21.1	7.5	3.3
Calico	F	50.5	2.3	16.1	24.1	7.6	3.8
Janie Harmony	F	51.3	1.9	16.0	20.7	9.6	4.8
Yellow Boy	F	51.8	1.6	14.6	19.7	9.6	4.5
Early Queen Sophia	F	51.8	2.5	15.8	20.6	9.5	4.5
Orange Spice	F	52.3	2.3	13.4	18.3	10.0	7.3
Red Seven Star	3N	52.3	2.6	14.9	25.2	7.3	3.5
Espana Mix	F	52.5	2.2	16.7	23.9	9.1	3.8
Janie Flame	F	52.5	2.1	15.3	21.7	9.1	5.8
Disco Red	F	53.3	2.1	15.5	22.9	8.6	4.3

Table 3. Continued

Entry	Species or type ^z	Days to Flower ^y	Flower diameter* (inches)	Plant height* (inches)	Plant diameter* (inches)	Rating ^w 1	Rating ^v 2
Harmony Boy	F	53.5	1.8	16.0	21.4	9.8	6.0
Mighty Marietta Yellow	3N	54.3	1.9	14.7	22.1	6.5	5.5
Safari Yellow	F	54.5	2.5	14.3	19.4	9.0	5.1
Disco Orange	F	54.8	2.2	18.6	23.5	8.8	3.5
Primo Orange	F	54.8	2.0	17.1	19.8	9.4	4.5
Champion Yellow	F	54.8	2.0	18.3	24.9	8.0	4.5
Champion Flame	F	55.0	2.2	16.6	22.9	9.0	4.3
Ginger	F	56.5	2.2	14.9	20.0	9.8	6.5
Janie Tangerine	F	56.8	2.1	12.3	18.4	8.8	5.3
Legend Spry	F	57.3	2.0	16.3	21.0	9.5	7.0
Red Marietta	F	57.5	2.1	18.1	23.1	9.6	3.0
Voyager Yellow	A	57.5	3.3	14.4	19.5	9.3	4.3
Champion Orange	F	57.5	2.2	17.5	23.3	9.4	3.8
Aurora Gold	F	57.8	2.1	13.7	19.0	9.5	5.8
Saffron	F	57.8	2.2	14.8	19.3	9.3	5.5
Aurora Fire	F	58.0	2.2	15.1	21.3	9.9	7.0
Sunshot	A	58.3	3.1	14.5	20.0	6.3	2.0
Spry Boy	F	58.3	1.7	16.0	20.7	9.8	6.5
Golden Boy	F	58.8	1.8	16.3	21.2	9.8	7.6
Ole	F	59.0	2.1	17.7	23.2	9.3	5.5
Aurora Yellow Fire	F	59.3	2.5	12.0	16.1	9.8	5.8
Red Cherry	F	59.5	2.2	16.6	21.7	7.6	3.5
Primo Gold	F	59.8	1.7	17.9	23.3	9.4	6.3
Orange Boy	F	60.0	1.8	15.2	21.2	9.9	5.8
Inca Yellow	A	60.0	4.2	15.3	19.1	8.8	3.8
Disco Marietta	F	60.0	2.1	14.9	19.3	9.6	4.8
Primo Apricot	F	60.3	1.9	14.4	20.8	10.0	8.3
Viva	F	60.8	2.1	14.6	20.5	9.1	4.8
Primo Harmony	F	61.0	2.0	17.4	23.7	9.6	7.6
Bolero	F	61.5	2.1	18.4	22.2	9.8	5.8
Forever Red	F	61.8	2.2	14.7	20.1	9.5	7.1
Inca Gold	A	62.5	4.0	18.7	23.7	8.8	3.3
Lady Mix	A	62.8	2.8	14.1	21.3	6.8	3.8
Champion Harmony	F	62.8	2.1	16.9	21.5	9.8	5.1
Discovery Yellow	A	63.0	2.4	10.3	14.2	8.9	2.8
Perfection Gold	A	63.3	3.2	18.4	24.3	8.6	3.0
Discovery Orange	A	63.3	2.7	9.8	13.6	9.1	3.8
Inca Orange	A	63.5	3.7	17.1	22.8	8.4	3.3
Perfection Yellow	A	64.3	3.0	17.3	23.0	9.4	4.0
Perfection Orange	A	64.8	2.9	16.2	22.0	8.6	3.8
Yellow Galore	A	64.8	3.2	13.8	20.3	7.6	2.3
Orange Galore	A	65.3	3.7	15.0	18.7	8.6	2.5
Orange Sophia	F	65.5	2.2	16.1	19.3	9.8	8.8
Royal Orange	A	65.8	3.2	15.5	19.8	8.8	1.8
Gold Galore	A	66.0	3.3	14.5	20.2	9.0	2.8
Scarlet Sophia	F	66.3	2.1	15.1	18.4	8.3	4.8
Cortez Yellow	A	66.3	3.6	14.6	18.3	8.8	2.3
Honeycomb	F	66.3	2.3	17.1	21.1	9.9	6.0
Primo Apricot Brown	F	67.0	2.3	14.2	18.2	9.8	6.9
Yellow Sophia	F	67.8	2.2	13.3	17.5	9.8	4.5
Orange Winner	F	69.3	2.0	10.9	15.4	9.4	6.3
Primo Yellow	F	69.3	1.9	15.9	20.5	8.9	6.8
Regular Queen Sophia	F	69.8	2.0	14.8	18.6	9.8	5.3
HSD (5%)		9.6	0.6	3.2	5.1	2.7	3.4

^zA = American or African (*Tagetes erecta*), F = French (*T. patula*), 3N = Triploid hybrid (*T. patula* x *T. erecta*), 4N = Tetraploid hybrid (*T. patula* x *erecta*).

^yFrom sowing 14 Aug. 1989.

*Measured flowers 30 Oct. through 6 Nov. 1989. Measured plant size 8, 9 Nov. 1989.

^wRating 1: 7 Nov. 1989. Overall rating scale: 0 = all plants dead, 1 = v poor, 5 = acceptable, 10 = excellent.

^vRating 2: 29 Nov. 1989. Overall rating scale: 0 = all plants dead, 1 = v poor, 5 = acceptable, 10 = excellent.

^uMean separation by Tukey's procedure, HSD 5% level.

The newly developed 'Early Queen Sophia' was 18 days earlier than 'Regular Queen Sophia', released in 1979. Clearly, plant breeders are meeting the challenge of providing significantly earlier cultivars.

Flower diameter ranged from 1.6 inches for 'Yellow Boy' to 4.2 inches for 'Inca Yellow'. Four American cul-

tivars, 'Cortez Yellow', 'Orange Galore', 'Inca Orange' and 'Inca Gold' were not significantly different than 'Inca Yellow' in flower diameter. This was very similar to the data obtained from the spring trial. All cultivars with flower size of 2.8 inches or greater were American marigolds and accounted for 14 of the 16 American marigolds in the trial.

The dwarf 'Discovery' cultivars were the two American marigolds with smaller flower size.

Plant height ranged from 9.8 inches for 'Discovery Orange' to 18.7 inches for 'Inca Gold'. Forty-two cultivars were similar in height to 'Inca Gold', while 17 cultivars were similar to 'Discovery Orange'. Key among the dwarf marigolds were the 'Discovery', 'Little Devil', 'Little Hero', 'Janie' and 'Nugget' series, as well as the individual cultivars 'Orange Winner' and 'Aurora Yellow Fire'.

Plant diameter ranged from 13.6 inches for 'Discovery Orange' to 25.2 inches for 'Red Seven Star'. Among the most compact series were 'Discovery', 'Little Hero', 'Bonanza', 'Janie', 'Little Devil', 'Sophia' and 'Nugget'. The most compact individual cultivars were 'Orange Winner', 'Cortez Yellow' and 'Aurora Yellow Fire'.

Ratings were assigned on 7 Nov. and 29 Nov. 1989. On 7 Nov., only ten cultivars were rated significantly less than a perfect 10.0. Of these, eight cultivars were interspecific hybrids. As in the spring, the interspecific hybrids proved to decline in overall quality before the American or French types. Chief reasons for low ratings included broken or split stems, plant mortality and lodging. By 29 Nov., ratings ranged from 1.8 for 'Royal Orange' to 8.8 for 'Orange Sophia'. Reasonable field quality at this date was almost exclusive to French marigolds. Of the forty-seven cultivars not significantly different than the highest rating of 8.8, forty-six were French types. The fifty-nine cultivars not significantly different than the lowest rating of 1.8, included nine of the eleven interspecific hybrids in trial and all 16 of the American marigolds.

Summary. Cultivars with superior longevity in terms of overall quality as defined by the ratings were too numerous to enumerate. Cultivar selection among those becomes a question of earliness of flower and preference for particular flower type, flower color, flower size, and ultimate plant dimensions. Subjective ratings for both seasons indicated that American and interspecific hybrids declined in quality before French types.

Splitting of stems and stem breakage among some interspecific hybrids indicate a basic problem of these types for prolonged use in the landscape. Past observational trials have documented the same weakness in triploids (5,7,11), so the 1989 trials were not unique. It is unclear why the stems are prone to splitting longitudinally or breaking near the nodes. Among all entries in the spring and fall, only the interspecific hybrids presented characteristics which precluded them from use as landscape items in central Florida. Since triploid and tetraploid seed is much more expensive than French or American marigold seed, the benefit of extended longevity due to sterile (non-

seed bearing) flowers is negated by weak stems, lodging and plant mortality.

Note. The information contained in this report is a summary of experimental results and should not be used as recommendations for crop production. Where trade names are used, no discrimination is intended and no endorsement is implied.

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Literature Cited

1. Anonymous, 1990. Floriculture Crops 1989 Summary. Nat'l Agric. Statistics Serv., USDA. SpCr6-1(90).
2. Howe, T. K. and W. E. Waters. 1982. Evaluation of flowering annuals: Marigold and zinnia. Proc. Fla. State Hort. Soc. 95:282-285.
3. Howe, T. K. and W. E. Waters. 1983. Evaluation of flowering annuals during fall 1982: Marigold and zinnia. Proc. Fla. State Hort. Soc. 96:131-135.
4. Howe, T. K. and W. E. Waters. 1984. The performance of assorted flowering annuals at the Gulf Coast Research and Education Center: Spring 1984. Bradenton GCREC Research Rpt BRA1984-11.
5. Howe, T. K. and W. E. Waters. 1985. Observations of unreplicated flowering annuals field trial—Fall 1984. Bradenton GCREC Research Rpt BRA1985-20.
6. Howe, T. K. and W. E. Waters. 1986. Observations of flowering bedding plants, Spring 1985. Bradenton GCREC Research Rpt BRA1986-6.
7. Howe, T. K. and W. E. Waters. 1986. Observations of flowering bedding plants, Fall 1985. Bradenton GCREC Research Rpt BRA1986-8.
8. Howe, T. K. and W. E. Waters. 1987. Observations of flowering bedding plants, Spring 1986. Bradenton GCREC Research Rpt BRA1987-13.
9. Howe, T. K. and W. E. Waters. 1987. Observations of flowering bedding plants Fall 1986. Bradenton GCREC Research Rpt BRA1987-15.
10. Howe, T. K. and W. E. Waters. 1988. Observations of flowering bedding plants, Spring and Fall 1987. Bradenton GCREC Research Rpt BRA1988-12.
11. Howe, T. K. and W. E. Waters. 1989. Observations of flowering bedding plants, Spring and Fall 1988. Bradenton GCREC Research Rpt BRA1989-8.
12. Stanley, C. D. 1990. Temperature and rainfall report for 1989. Bradenton GCREC Research Rpt BRA1990-05.
13. Voigt, A. O. 1990. Weather causes "character-building" 1989 bedding plant season; '90 intentions and prospects optimistic. PPGA News, Prof. Plant Growers Assoc., Lansing, MI, 221 (1):1-19.