ALSTROEMERIA PLANTING DENSITY

W.E. Healy and David Lang[1]

For a first year profit maximization under Colorado conditions, vigorous *Alstroemeria* cultivars should be grown at about two square feet per plant, and less vigorous cultivars at 1.75 square feet per plant.

Due to the high cost of *Alstroemeria* plants, growers have been reluctant to plant *Alstroemeria* at higher densities than recommended. When European cultural recommendations are followed, plants are grown at a density of approximately 3.2 square feet per plant. When economic considerations of a low density planting are considered, the high overhead cost associated with planting at 3.2 square feet per plant make this density uneconomical. This experiment was to investigate the effect of various planting densities on *Alstroemeria* yield and determine a plant density which optimizes yield and minimizes overhead costs.

Material and Methods

Plants were divided into single rhizomes on October 1 then planted into 4" pots and grown under natural days in a 61°F night/61°F day fiberglass covered greenhouse. On October 22 the plants were placed into raised gravel benches. The gravel benches had one inch of limestone chips placed on top to provide calcium. The watering system consisted of a chapin twin wall system. Plants were watered approximately four times a day during winter and up to seven times a day during the summer using the standard CSU fertilizer solution (Bull. 221). Plants were grown under natural days without any long day treatment. The temperature set points in the houses were 55°F nights, 64°F days, 70°F cooling.

The single rhizome divisions were planted in seven square foot plots at a density of two plants per plot (3.5 square feet per plant), four plants per plot (1.75 square feet per plant) or six plants per plot (1.2 square feet per plant). There were 16 plots per planting density. Data was recorded for each plot without consideration for shoot quality. Shoots were harvested three times per week after the pollen began to dehisce.

Results

Depending upon how yield is expressed, very different results are evident (Table 1). On an area basis (yield per square foot), the density of 3.5 square feet per plant produced the fewest flowers (35.3). When the plant density was tripled to 1.2 square feet per plant, then the yield per square foot increased 47% to 51.9 flowers. Therefore, yield per square foot increases as plant density increases.

When the yield per plant is utilized, the reverse is observed (Table 1). The more square footage per plant the higher the yield per plant. There is an economic trade-off that must be considered between yield and area devoted to each plant.

When an average yearly price of $.40 per stem for all flower grades harvested is assumed, an average gross sales per plant can be calculated (Table 1). When the gross sales per plant at a plant density of 1.2 is considered, the gross return per plant is reduced. As the plant density increased from 3.5 to 1.2 the gross sales per plant, was reduced by 50%.

If we assume an overhead expense of $.20 per square foot per week ($10.40 per year) the higher the plant density the lower the overhead expense per plant. When the $8.00 plant cost was taken into account, the net sales per plant varied between $3.72 and $7.70. The net sales per plant followed a bell shaped curve with net sales decreasing on either side of a planting density of 1.75 square feet per plant.

If the net sales was expressed as percent profit on sale, the largest percent profit (22.7%) was obtained at 1.75 square feet per plant. This is due to the optimization of the yield per plant with a minimization of the overhead expense per plant. As the planting density decreased, the overhead expense began to increase dramatically. It is important that the yield per plant be considered. An increase in yield per plant must occur to offset the high cost of plant material and overhead. At the 1.2 density planting, the yield is insufficient to offset overhead and plant expenses.

Discussion

The first year data suggested an optimum planting density of 1.75 square feet per plant. Extrapolation of the data between densities of 1.75 and 3.5 square feet per plant presented a curve peaking around 2 square feet per plant. Therefore, an optimum density appeared to be between 1.75 and 2 square feet per plant.

Two notes should be emphasized: first, there was no quality component in the yield. The lower density we felt produced more top quality flowering shoots (more cymes per

Table 1. Influence of planting density on yield and rate of return of *Alstroemeria* 'Regina' from April through August, 1984. Plants were grown at 55°F night/61°F day temperatures.

	Square feet per plant		
	3.5	1.75	1.2
Yield per square foot	35.3	48.4	51.9
Yield per plant	123.0	84.4	60.5
Gross sales return per Plant ($.40/stem)	$49.20	$33.90	$24.20
Overhead expense ($.20/sq ft-wk)	36.40	18.00	12.48
Plant expense	8.00	8.00	8.00
Net sales per plant	4.80	7.70	3.72
Percent profit on gross sales	9.7%	22.7%	15.4%
No. of blind shoots removed on September 12			
Per square foot	19	26	24
Per plant	67	45	28

[1]*Assistant Professor and Undergraduate, respectively.*

flowering shoot and better stem strength). The overall quality component will become very critical in the second year when an increase in low-quality stems will occur at high planting densities. Secondly, differences in yield potential of various varieties must be taken into consideration. This research used 'Regina', a very vigorous growing variety. Some of the other *Alstroemeria* cultivars ('Orchid', 'Canaria', 'Orange Beauty', 'Campfire', 'King Cardinal', 'Red Sunset') were not quite as vigorous and, consequently, may require a slightly higher density planting to achieve an economic yield in the first year.

Another consideration that must be taken into account in the second year is the increased cost of labor for thinning. At the lowest density plantings a large number of blind shoots are produced per plant (Table 1), consequently much more frequent thinning is required to maintain the plant's vigor and flower yield.

Our recommendation for first year maximization of profit is that the vigorous growing cultivars be grown at approximately two square feet per plant and the less vigorous cultivars be grown at 1.75 square feet per plant.