COLORADO FLOWER GROWERS ASSOCIATION

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PERFORMANCE OF WHITE, STANDARD CARNATION CULTIVARS

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On June 15, 1978, 24 plots of white, standard carnation cultivars were benched. Plant density was 2.8 plants per sq.ft., with most plots containing 6 rows across the 40 inch bench and 7 rows down the bench, 8 plots per bench. These were grown in soil, watered by Chapin double wall trickle tubing on demand with automatic fertilizer injection, following CSU recommendations. All plants were initially pinched on July 3, followed with an additional one-half pinch, and started production in October, 1978. CO_2 was injected. The roof was Tedlar coated fiberglass, with night temperatures at 52 to 54°F, heating to 60-62 during the day and ventilation starting at 67°F. Records of yield and grade were kept on an individual plant basis for 6 months, ending the first of April, 1979. The SAF standard grading procedure was followed. For purposes of statistical analyses, 2 plots of each of 10 cultivars, 36 plants per plot, were selected. The data in Tables 1 and 2, therefore, represent the results obtained on a total of 72 plants for each cultivar.

There were statistically significant variations in yield and grade between cultivars (Table 1). Values for the "standard deviations" in Table 1 provide an idea as to variability of individual plants in any given cultivar. For an individual plant to be truly different from the mean, the "standard deviation" should be multiplied by 2. Thus, Improved White - DWF had an average per plant yield of 29.5 flowers, with most of the plants within plus or minus 6.6 flowers of that mean. Similarly, such observations as to quality can be applied to the mean grade. There was much less variation in grade, for example, Elliott White - CSU mother block being significantly better than Improved White - DWF and White Pikes Peak - DWF. Quality of the other cultivars were not statistically significantly different.

Note that the yield per sq.ft. bench area of some cultivars was high (94.1 and 93.2 flowers). This was considerably better than the average commercial yield ranging between 35 to 40 flowers per sq.ft. bench area, with better growers sometimes reaching 55 to 60 flowers per sq.ft. per year bench area. As a general rule, one break was taken with the flower. General observation indicated 2 to 3 visible breaks nearly always left on the stem. A little figuring will indicate the theoretical possibility of plus 30 flowers per plant, but it is obvious that there could be absolutely no check to growth (CFGA Bul. 320). Over a 2 year period, 111 flowers per sq.ft. have been reported for standard carnations at a 6 plants per sq.ft. density (CFGA Bul. 302). The 1½ pinch applied here, combined with 2.8 per sq.ft. probably tended to "load" the plants. In some respects, we are not surprised. Similar results have been obtained in other endeavors such as hybrid corn production; with comments sometimes made that if it were possible for 25% of the corn growers to achieve and utilize available technology, we could reduce our corn acreage by more than 50%. If nothing else, these results indicate potentials of which our present cultivars are capable of reaching if available technology is applied. As many know, we do attempt to utilize what is considered as best commercial procedure in culture, although considerably reduced in scale.

The "standard deviation" can be used with the mean for selecting outstanding clones. The data includes variation resulting from the fact that plants on the outside rows will produce more (6 plus) flowers on the average than those on

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Table 1: Yield, mean grade and standard deviations of individual plants in 10 white, standard carnation cultivars, planted 2.8 per sq.ft., 15 June 1978 and given 1½ pinches. There were 72 plants per cultivar, with records terminated April, 1979.

	Yield			Mean grade[z]	
Cultivar - Source	Average per sq.ft. bench area	Average per plant	Standard deviation[y]	Average per plant	Standard deviation[y]
Ohio White-Yoder	94.1	33.6	6.5	3.52	0.10
Improved White-Yoder	54.3	19.4	4.6	3.60	0.18
Improved White-Tack	81.5	29.1	4.6	3.55	0.12
Improved White-DWF	82.6	29.5	6.6	3.51	0.11
White Boston-DWF	93.2	33.3	5.4	3.58	0.11
Mount Everest-DWF	87.4	31.2	3.6	3.53	0.12
White Pikes Peak-DWF	82.3	29.4	4.9	3.51	0.11
Atlantis-DWF	83.4	29.8	4.8	3.56	0.11
White No. 1 - CSU Mother block[x]	76.2	27.2	4.2	3.60	0.15
Elliott White - CSU Mother block[x]	68.3	24.4	3.9	3.63	0.18
Difference required for significance (Chances that the values are wrong are 1 in 20)		3.5		0.13[w]	

[z] Mean grade determined by assigning the values 5, 4, 3 and 2 to each grade, beginning with Fancy, following SAF standard grading procedure. Grading was rigorous.

[y] Standard deviation is a measure of dispersion of individual values about the means given in the table. Any value for an individual plant which exceeds twice the standard deviation, plus or minus, is truly different from the others.

[x] CSU mother block plants originally obtained from DWF the previous year.

[w] Note that 3.63-3.51 is 0.12 not 0.13. This probably arises from rounding error.

the inside rows. Table 2 lists the number of outstanding clones in each category based on doubling the "standard deviation". Thus, for a clone in Ohio White-Yoder to be selected, that clone would have had to produce 47 flowers with a mean grade of 3.72. If an inside plant did this well, it would be really worth keeping!

Interestingly enough, Table 2 says that in every 1000 plants, we will be lucky to find 6, or about one-half percent, that meet criteria of both yield and grade, and may be worth looking at for improved yields. This, we think, is a very optimistic estimate, and probably out of those 6, less than 1% will continue to show the qualities that resulted in their original selection.

Table 1 also suggests the variation the grower might expect in his yield and quality — all other conditions equal — and still be within the limit for the given averages. For example, a yield of 30 flowers per plant for White Boston would not be different from a yield of 33.3 — assuming our population was representative of all carnations grown in the Colorado area. If, however, yield was less than 29.8, one might suspect that some other factor was significantly influencing yield, or that the population was different from the plants we tested.

Table 2: Numbers of outstanding clones in 10 white, standard carnation cultivars. To be selected, must have been better than twice the standard deviation. Total population was 72 in each cultivar.

	Numbers of plants			
Cultivar - Source	Both yield and grade	Yield only	Mean grade only	Yield & grade for selections
Ohio White - Yoder	1	1	2	61 - 3.77
Improved White - Yoder	0	2	1	— —
Improved White - Tack	1	3	0	38 - 3.79
Improved White - DWF	0	0	0	— —
White Boston - DWF	0	1	1	— —
Mount Everest - DWF	1	0	1	39 - 3.77
White Pikes Peak - DWF	0	2	1	— —
Atlantis - DWF	0	3	1	— —
White No. 1 - CSU Mother Block	1	1	2	37 - 3.95
Elliott White - CSU Mother Block	0	6	1	— —