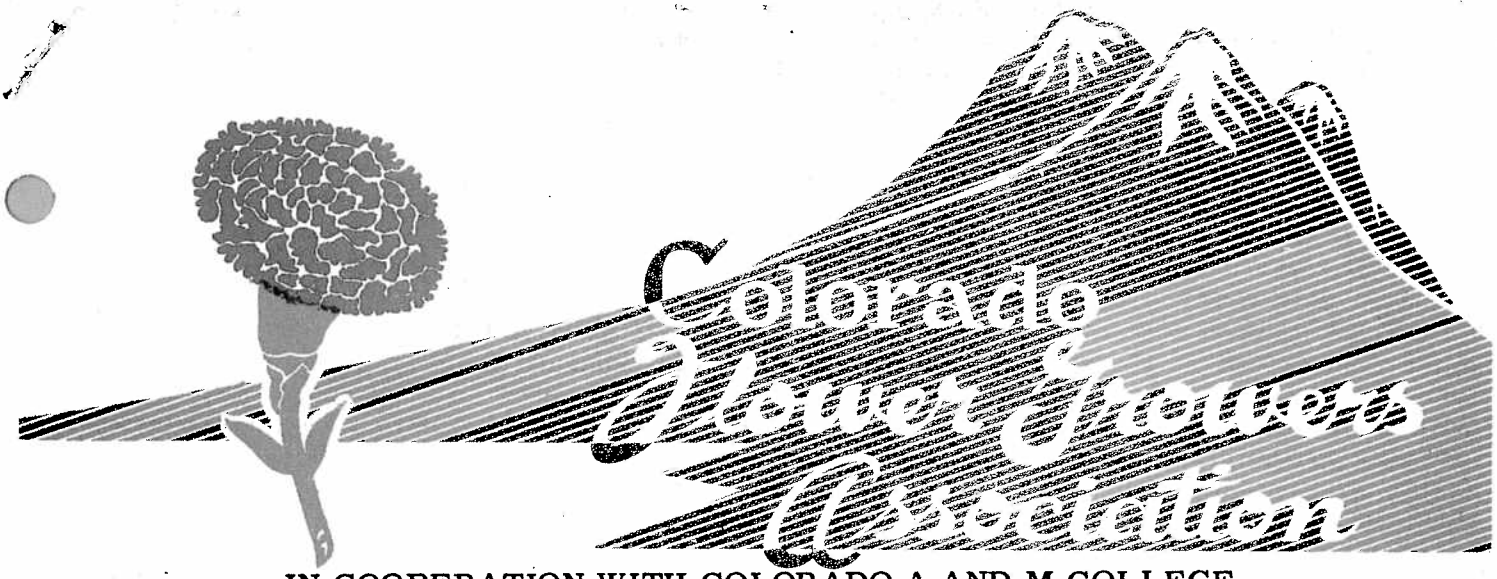

IN COOPERATION WITH COLORADO A AND M COLLEGE

Ray App, Secretary, 4434 Lowell Blvd.,
Bulletin 79 Denver, Colorado May 1956

Varaiability in Better Times Rose

by Walter F. Larson and W. D. Holley/1

The number of Better Times rose plants grown has declined materially in the past ten years, even though no good variety has been introduced to take its place. Much of this reduction in planting has been due to the loss of vigor and color and the increase in malformation in Better Times.

This study was designed to investigate the amount of variation in Better Times rose, its increase with successive vegetative generations, and the possibilities for selection of stable individuals with superior characteristics. Superior selections could be used as mother blocks to renew the variety as has been done in the carnation industry.

Three vegetative generations of three selections of Better Times were benched in three randomized blocks and grown for two years. Production, stem length, color and malformation were recorded from September 15, 1953, to June 19, 1954, and from August 22, 1954, to February 5, 1955. All records were kept on an individual plant basis.

The color index was determined by matching flower colors with spinning discs containing percentage gradations of the basic colors making up Better Times--old rose pink and carmine. Disc 1 was 100 percent old rose pink and disc 8 100 percent carmine, with percentage gradations for intermediate numbers. Some flowers of selection 144 were so intense they were assigned a color rating of 9. The desirability of the color increases with the color index.

The malformation index was obtained by grading into one of four crippling types of malformation as follows: 1--perfect flower, 2--slightly malformed with only the outer petals thickened and shortened, 3--outer petals as well as the point of the bud deformed (a work grade rose), and 4--severely flattened and malformed flower (unsaleable). In addition to the four crippling grades, four other types of malformation were recorded. "Stucks" are roses in which the outer petals do not separate from the point of the bud. In severe cases, the bud continues growing and splits the outer petals. "Bullheads" are similar to stucks except there is an excess number of petals, giving the rose a cabbage-like appearance. "Folded" roses are those with one or more petals folded over the point of the bud. "Split-nose" roses have multiple buds. Any rose having these types of malformation was arbitrarily placed in Class 4. The desirability of a rose decreases with an increase in the malformation index.

1/ Research Fellow maintained jointly by the Colorado Flower Growers Assn. and Roses, Inc. Mr. Larsen is now with the Western Colorado Wholesale Floral Co., Grand Junction, Colo.

The means of production, stem length, color and malformation for 39 plants of each of the three selections are presented in Table 1 for the period September 15, 1953 to June 19, 1954.

Although selection 144 was highly superior in color, it was inferior to the other two selections in production, stem length and malformation. Selection 37 produced more roses with a lower malformation index than either of the other two selections. Number 37 was inferior to selection 13 in mean stem length the first year. When analyzed statistically most of the differences between selections were highly significant.

Table 1--Mean production per plant, stem length, malformation index and color index for three selections of Better Times rose from September 15, 1953 to June 19, 1954.

	Selection		
	144	37	13
Mean production per plant	24.89	31.77	26.74
Mean stem length in inches	13.53	14.03	14.18
Mean color	7.92	6.57	6.49
Malformation index	1.90	1.35	1.59

Because some of the differences in yield and stem length could have been due to difference in vigor of parent budsticks, position effect, etc., the roses were pruned, pinched, and records kept for a second year. Although the differences in production between the three selections had a tendency to lessen the second year, 37 still outproduced 13 and 144 and had a much lower malformation index. Table 2 shows that 144 was again superior in color but inferior in stem length and malformation to the other two selections.

Table 2--The mean production, stem length, malformation index and color index for three selections of Better Times rose from August 22, 1954 to February 5, 1955.

Selection	144	37	13
Mean production per plant	14.74	18.79	15.72
Mean stem length in inches	11.33	11.84	11.84
Color index	7.92	6.57	6.47
Malformation index	2.24	1.39	1.70

A comparison between Tables 1 and 2 shows that malformation was greater and color was lower the second year. As will be shown later, the time of the year has a decided effect on both color and malformation. Records were terminated the second year at the beginning of the period when the least malformation and best color could be expected. For this reason results for the two years are not directly comparable.

Generation Effect

Comparisons were made between vegetative generations of the three selections. All plants propagated directly from a given parent were considered the first vegetative generation. Plants propagated from individuals of the first generation comprised the second vegetative generation, etc.

The only differences detected in later generations were color breaks in selection 13. One plant of generation 3 produced four distinct color mutants, while three other plants had color indices below 6. No other differences between succeeding generations of these selections were apparent.

Period Effect

The first year was divided into five 8-week periods to get the reaction of the three selections to different light and temperature conditions. Malformation was highest during the periods of highest light and temperature (Table 3). The malformation rate decreased during the winter months when light and temperatures were low and increased again in spring with increases in temperature. The selections did not react alike during the several periods because of their differences in susceptibility to each type of malformation.

Table 3--The mean malformation of three selections of Better Times rose for five 8-week periods in the first year.

Selection	8-week periods beginning				
	Sept.15	Nov. 8	Jan. 3	Feb.28	Apr.25
144	2.38	2.27	1.68	1.57	1.64
37	1.41	1.55	1.17	1.29	1.34
13	1.62	2.08	1.67	1.35	1.39

The mean color of the three selections followed the malformation rate inversely. Color was poorest in early fall and became increasingly better until April 25 (Table 4). With the increase of light and temperature in late spring, the mean color declined. When color was best, malformation was low. The best color and lowest malformation occurred in March and April.

Table 4--The mean color of three selections of Better Times rose for five 8-week periods in the first year.

Selection	8-week periods beginning Sept. 15	Nov. 8	Jan. 3	Feb. 28	April 25
144	7.69	7.92	7.95	8.43	7.90
37	6.27	6.60	6.54	6.70	6.69
13	6.46	6.55	6.36	6.60	6.44

Malformation Differences Between Selections

The three selections showed distinctly different kinds and amounts of malformation. Selection 144, with the highest rate of malformation, was subject most to the 3 and 4 types of crippling, producing few bullheads or stucks. Selection 13 produced about equal numbers of malformed flowers in each of the four types, as is shown in Table 5. The few malformed flowers from selection 37 were predominantly stucks.

Table 5--Percentage of the total cut of four important types of malformation for three selections of Better Times roses for the first year.

Selection	Type of malformation 3	4	Stuck	Bullhead
144	8.4	11.9	0.30	0.41
37	1.4	0.9	3.9	0.5
13	2.3	2.3	3.5	3.1

Summary

1. Each selection differed in yield and in stem length of flowers. Although the differences were less the second year, 37 and 13 produced more and longer stemmed flowers than 144.

2. The differences in color and malformation of flowers between the selections were highly significant both years.

3. The time of the year had a distinct effect on the expression of both color and malformation, with better color and lowest rate of malformation during the early spring.

4. The three selections were subject to different types and amounts of malformation.

5. Except in the case of selection 13, which produces some color mutant and was thus considered unstable for color, both color and malformation rate remained constant for three vegetative generations.

Although selection 144 was highly superior in color, its low production, short stems, and high malformation index would eliminate it from consideration as nucleus stock. Superior yield and low malformation rate of selection 37 make this line ideal for nucleus stock. It is conceivable on the basis of the differences found in this study, that lines of Better Times rose can be selected that will be superior in all respects to the Better Times now grown.

While progeny testing has long been recognized as essential in maintaining purity of seed propagated crops, the data obtained in this investigation emphasize its importance in reselection of vegetatively propagated crops, especially those subject to somatic changes. A selection from within an unstable variety cannot be relied upon for stability until its progeny has been thoroughly tested.

Selection 37 is now being propagated and will be available in small quantities in 1956-57 as Colorado No. 6.

More About the Chlorax Dip

by R. R. Baker

The clorox dip recently reported as an effective control measure for Fusarium stem Rot of carnations has been applied on a somewhat larger scale than was originally anticipated. For this reason a more detailed procedure is given below. This method is not complicated but essential details must be observed in order to minimize phytotoxicity.

1. Make up a solution of 5% clorox. This contains .28% available chlorine. Add a very small amout of detergent to improve wetting of the foliage. An ordinary household detergent (Dreft, Tide, Vel and others) is satisfactory. Do not use warm water.

2. The cuttings should be totally immersed in the solution for 5 minutes. The solution may be used again but never for any period longer than one-half hour.

3. After the dip break off the base of the cutting at the next node. This is necessary to secure satisfactory rooting.

4. Rooting hormone is applied and the cuttings stuck as usual. It is probable that the clorox dip renders cuttings more susceptible to many carnation pathogens. Thus, every care must be exercised to insure that infestation of the prop bed does not occur. All sanitation measures must be observed. Do not stick dipped and undipped cuttings in the same bed.

It should be re-emphasized that the clorox dip is not recommended at present for grower use. It is believed to be most effective as a tool in research, for specialized "clean cutting" programs, and for emergencies.

Efficiency Checks on Evaporative Pad Cooling

Now that the cooling season is well under way a constant check on the efficiency of each cooling system is in order. A few points which may help you to understand your cooling system better are listed below.

1. Type of pad material -- thickness and density. A pad too thick and heavy puts additional static pressure on your fans and reduces air flow. If the pad is thin in spots, warm air comes through without picking up the maximum amount of moisture.
2. Velocity of air through the pad should be about 3 or 4 feet per second. This can be checked by timing the movement of a little smoke. If air flow is too slow, you are underfanned, your fans are not operating to capacity, or you may have a lot of air coming in through places other than your pads.
3. Degree of wetness of pad and water distribution -- Dry spots in the pad allow warm dry air to enter. The air does not cool unless it takes up water.
4. Positioning of pads and fans -- A thorough check of the air movement in the house can be made by setting off a small niccfume pressure fumigator. Dead air spaces, or too much rise in the cool air stream should be corrected by plastic baffles, or in some cases, an additional fan. Fans from adjacent houses should never blow into one another nor should the fan from the house exhaust on the pad of another.
5. Tightness of greenhouse -- Air moves in through holes and broken panes more easily than through wet pads. Glass wool is an excellent material for stuffing in small holes around pipes and in heating tunnels.
6. Outdoor dry and wet bulb readings -- A good cooling system should drop the temperature of the air as it comes through the pad about 80% of the difference between the wet and dry bulb readings on a sling psychrometer. The lower the humidity the more you should be able to cool.
7. Force and direction of winds -- If winds are blowing into your fans, they cannot work up to capacity. Winds blowing with the fans tend to help them.
8. Shutters should be removed from fans during the summer.--They cause a drag on the fan that reduces air flow by as much as one-third for some types of shutters.
9. Length of air travel -- Air temperature rises as it travels through the greenhouse from pad to fan. The greater that distance or the slower the air is moving, the greater will be the temperature rise. Four to eight degrees of temperature rise is normal. If the rise is too great, previous points may indicate why. The cool air stream tends to rise with increasing distance from the pad. A check of the temperature (in the shade) at different levels will tell you the height of the cool air stream. There is no advantage to cooling the air in the ridge of the greenhouse. In fact it costs you money. Transparent baffles in long houses may be necessary to keep the cool air down with the plants.

Additional checks

10. Keep belts on motors tight.
11. Use a tachometer occasionally on fan shafts to be sure they are running at their RPM ratings.
12. Ammeter readings on motors will let you know if they are working up to rated capacity and moving the volume of air for which they were designed.

your editor,
W D Holley

COLORADO STATE FLOWER GROWERS ASSOCIATION
OFFICE OF EDITOR
W. D. HOLLEY
Colorado A and M College
Fort Collins, Colorado

Education at a Mile High Level
COLORADO AGRICULTURAL AND MECHANICAL COLLEGE

MAILED AT COLO. AGR. COLL.

COLO JUN 14'56 COLO
U.S. POSTAGE
PB METER
PD.167879

FIRST CLASS

Prof. H. Kamemoto
University of Hawaii
Honolulu 14, Hawaii