TABLE 2. PRE-HARVEST COUNT TABLE, SHOWING THE EFFECTS OF STANDARD LEAD ARSENATE AND CRYOLITE ON THE INFESTATION OF OMNIVIROUS LEAF ROLLER INTO GRAPE BUNCHES.

Field number*	Treatment	Grape bunches infested with OLR		Bunches clean
		With rot	Without rot	
	chem.†	%	%	%
1	A	8	0	92
	B	7	0	93
	C	16	4	80
2	A	4	2	94
	C	7	6	87
3	A	3	1	96
	B	3	2	95
	C	10	6	84
4	A	2	2	96
	B	2	1	97
	C	6	4	90
5	A	4	4	92
	B	6	2	92
	C	14	8	78
6	A‡	3	1	94
	C	12	2	86
7	A	4	2	94
	B	6	2	92
	C	16	6	78
8	A	1	3	96
	B	4	2	94
	C	6	6	88

* The fields were numbered 1 through 8, starting from south to north (see map).
† A = Cryolite, B = Lead Arsenate, C = Control.
‡ Double treatment of cryolite.

Average levels

The average levels of control by cryolite and lead arsenate dropped slightly after seven weeks, at which time they ranged from 62 to 100 per cent, averaging 80.5 per cent for cryolite and 75 per cent for lead arsenate (see table 1 and graph). The readings after ten weeks indicated that control with cryolite and lead arsenate both dropped to 57 per cent, although two fields were showing as high as 80 per cent control (table 1 and graph). The results also indicated that the double treatment of cryolite performed as well as the single treatment of either cryolite or lead arsenate. Although at 7- and 10-week readings a few single-application fields showed better control than the double-application fields; the average per cent control of single treatment of both lead arsenate and cryolite at 10 weeks was lower than the double treatment (table 1 and graph).

Relative percentages

Table 2 describes relative percentages of clean and OLR infested bunches of all the eight locations (just before harvest) in the last week of August or first week of September. One hundred bunches from each replicate (or 400 bunches from each treatment) were examined to obtain such a count. The data indicate that OLR infestations in the untreated checks varied between 10 and 22 per cent with an average of 16.2 per cent. The single treatment of cryolite showed a 4 to 8 per cent bunch infestation with an average of 6.8 per cent, whereas the single treatment of standard lead arsenate ranged between 3 and 8 per cent infestation with an average of 7.2 per cent (see table 2). This reflects the fact that early single treatments of lead arsenate and cryolite each resulted in a 55 to 60 per cent reduction in the infestation of omnivorous leaf roller into grape bunches.

Double treatment

The double treatment of cryolite was as effective as the single treatment and resulted in 68 per cent control (table 2). Here again, there were individual fields treated with a single application that performed slightly better than fields treated with double applications. Both lead arsenate and cryolite can effectively reduce the OLR population, although they may take up to two weeks; their effects last as long as 2½ months.

Integrated control

In integrated pest control, the effort is to use all available methods of insect control so they will complement each other and cause little or no biological disturbance or upsurge of secondary pests. Many of the broader-spectrum contact pesticides do not fit well into this kind of approach. For instance, in most cases, the use of wide-range contact insecticides for the control of OLR on grapes may result in the higher population densities of Pacific mites, *Tetranychus pacificus*, and other insect and mite pests. The stomach poisons, such as lead arsenate and cryolite, (systemic) insecticides and other selective compounds are considered basic to a successful program of integrated pest control. Such chemicals limit their action to the target species, thus sparing the natural enemies of both the target and non-target insects; in most cases, they cause relatively little disturbance in the existing biological balance and discourage the quick onset of insecticide resistance.

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FOR

HARRY C. KOHL, JR.

THIS DISCUSSION OF FLOWER QUALITY is limited to the three major factors in grading: flower size (weight), stem size (weight per unit stem length) and stem length. In general, the larger the flower and stem, the higher the quality.

Many things influence quality-determining characteristics in carnations. Stem length varies with variety. In a recent greenhouse trial at Davis stem length of the shortest variety, Wogan, was 20 inches while that of the longest variety, Orchid Beauty, was 37 inches. A better known variety, Scania, averaged 28 inches. Greenhouse cultured flowers are longer stemmed than equivalent outdoor cultured flowers. What differences in environment are responsible for this is not known in detail. Also a warmer temperature (60°F greenhouse) during the life history of the shoot resulted in a 20 per cent longer flower stem than that achieved in a cooler greenhouse (50°F).

Less is known about weight per unit stem length since this has rarely been measured. The weight of the upper 50 cm (ca 20 inches) of stem of White Sim was found to average 16 grams for plants grown in a 50° case and only 12 grams for those grown in a 60° greenhouse. In a recent trial at Davis the weight of the upper 50 cm of stem was found to be 10 grams for the lightest variety (Light Pink Littlefield) and 21 grams for the heaviest variety (Peace River). Scania averaged 16 grams.

Flower weight

The weight of the flower also depends on which variety it is. Again referring to a recent trial at U. C. Davis, commercial varieties were found to vary from a low of 7 grams for the variety Pajee to a high of 12 grams for the variety Salmonaise. Scania averaged 11 grams per flower. A good commercial flower of the Sim variety can weigh 10 grams or more. Temperature is another important

SHOOTING CARNATIONS BETTER FLOWER QUALITY

factor determining size. White Sim flowers grown in a 60°F greenhouse averaged only 7 grams while those grown in a 50°F greenhouse averaged 12 grams. Disbudding is also important in determining flower size. Non-disbudded flowers are markedly smaller than disbudded flowers.

It is reasonable to suppose that the non-disbudded flowers are smaller because of competition with the other flower buds on the stem for the resources of the plant. The question then presents itself as to whether or not the other side shoots, which are more basal and vegetative, are competitive. A reasonable case could be made either way. One could expect them either to be competitive with the main stem or to be an aid in its growth, depending on the number of shoots and the time they occur in the life history of the mother stem. To find out if they are competitive, a deshooting experiment was carried out at U. C. Davis during the spring and early summer of 1970.

Differing varieties

Twenty-five varieties differing from each other in the quantity and timing of the development of the basal side shoots, were chosen. Cuttings were planted on March 17 in a 50° greenhouse and pinched 14 days later. Spacing was 6½ inches × 7 inches (3.17 plants per sq ft). Thirty days after pinching, the deshooting process (removal of all secondary shoots) was begun on half the plants of each variety. This deshooting process was continued on an every other day basis until the plants bloomed. The other half of the plants were not deshooted except for the normal disbudding of the top 6 nodes. The first bloom was harvested on June 23. Although it was impossible to hold a 50°F night temperature for part of the time it was possible by running the evaporative cooling system at night to keep night temperatures between 50° and 56°F except for two nights. Day temperatures peaked between 75° and 80° except for three days when they peaked at 85°. Days from planting to flowering averaged 122.

Stem length

Stem length, weight of the upper 50 cm (20 inches) of stem, and weight of the flower head were measured for each of the 718 flowers harvested. These data (summarized in the table) indicate: (1) no significant difference in stem length resulted from deshooting; (2) twenty of the 25 varieties increased in stem weight as a result of deshooting, only one showed a significant decrease as a result of deshooting, and the overall increase was 12 per cent; (3) twenty-three varieties increased in stem weight as a result of deshooting with an overall increase of 15 per cent.

The results were conclusive proof that deshooting increases quality of carnation flowers. This was true for a wide spectrum of varieties with different branching characteristics. Furthermore, since these conclusions were based on experimental evidence gained from plants spaced somewhat more widely than commercial spacing—and grown during a period of the year when growing conditions were ideal—even greater increases might be expected as a result of deshooting with commercial spacing and at times less favorable for growth.

The findings are important for building single crop production on a sound basis. As this promising production method is developed, varieties and cultural techniques which minimize competitive secondary branching must be selected.

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FLOWER QUALITY OF DESHOOTED CARNATIONS,* 1970

Variety	Not deshooted			Deshooted		
	Stem length	Flower weight	Weight of upper 50 cms of stem	Stem length	Flower weight	Weight of upper 50 cms of stem
	cms	gms	gms	cms	gms	gms
Apollo	60.2	9.2	16.7	60.9	9.1	13.3
Atlas	65.4	8.0	13.5	62.0	8.3	14.3
Coquette	59.3	10.9	17.4	54.6	12.0	20.2
Dusty	75.1	8.8	16.0	68.9	13.5	19.8
G's L. Pk. Ltlfld.	57.6	10.1	12.2	59.2	12.0	15.3
Helios	65.6	8.1	18.6	67.3	8.8	17.3
Imp. N. Pk. Sim	74.3	9.7	17.8	77.7	11.3	17.6
Imp. S. Ltlfld.	65.2	11.0	15.9	61.9	10.8	15.5
Iroquois	67.0	9.3	16.6	71.3	10.6	20.2
L. Pk. Ltlfld.	51.8	8.4	10.4	39.2	10.8	17.8
Mars	78.8	7.8	15.9	83.1	8.2	16.9
Orchid Beauty	87.8	9.3	15.5	93.8	9.9	15.2
Pajee	57.3	7.1	19.0	63.3	8.7	22.3
Peace River	65.8	7.3	20.6	63.1	8.5	22.9
Safari	59.3	9.7	19.2	57.1	11.9	21.3
Salmonaise	56.3	12.4	17.6	57.1	13.1	20.8
Scania	70.7	10.9	16.3	70.8	11.3	19.0
Silvanus	70.8	9.4	13.3	75.0	12.8	17.1
Susan	74.7	10.3	15.4	78.1	13.4	17.2
Tama	63.4	7.7	16.5	63.7	9.1	17.7
U. C. Sim #1	70.7	8.9	18.7	63.4	9.7	20.7
Va. Hercules	57.8	8.8	15.9	59.2	9.8	18.4
Wht. Ltlfld.	60.6	9.6	13.6	55.2	10.3	15.4
Wogan	48.5	8.9	18.1	50.7	9.0	19.0
Ylow. Dusty	74.0	9.8	11.3	69.6	10.1	14.5
All Varieties	65.7	9.3	16.3	65.3	10.7	18.3

* Results are presented in centimeters (cms) and gms. There are approximately 2.5 centimeters in an inch and 28 grams in an ounce.