Colorado Flower Growers Association Inc.
IN COOPERATION WITH COLORADO STATE UNIVERSITY
Doris Fleischer, Executive Secretary
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The Use of IBM and Conveyor Belt in Grading Flowers

by John J. Hollberg

The method of grading flowers at the Leo C. Hollberg Greenhouses in Englewood, Colorado, differs from the system used by most carnation growers in that it is possible to measure the performance of each grader from both quality and quantity angles. We all want grading done with a minimum labor cost, and most of us know our cost is maximum when the job is done poorly. For years we have tried to find a method of compensating the employees who were doing the best job while improving the grading of our flowers.

Taking advantage of modern methods available today, we use a combination of IBM prepunched cards, identification tape, conveyor belt, and a time clock. We have a set of four cards for each grader--color-coded for fancy, standard, short, and design grades to make selection easy. Each card carries the grader's number, the grade, and the number of carnations (in this case always 25). A colored tape identifies each grader. This is placed on the string at the top of the finished bunch.

We have a bonus pay plan based on a point system--5 points for fancy, 3 for standard, 2 for short, and 1 for split or design. The girls punch the time clock before they start grading and again when they finish. The grader's total points are divided by the total hours worked to give us the wage earned. For example, a girl working two hours and finishing 400 fancy and 400 standard flowers would have a total of 3200 points divided by 2 hours or $1.60 per hour earnings. We pay a guaranteed wage of $1.25 an hour and a maximum of $2.00. If we find a new grader's points after a week of training do not equal $1.25 per hour, she is still paid the minimum, but must make up her deficiency of points before she can earn bonus points.

The carnations are brought in from the greenhouses and laid in No. 10 corrugated boxes lined with polyethylene. If the cutters get too far ahead of the graders, the polyethylene can be folded over the flowers for dry storage. We have experimented with this procedure, and find that flowers are just about as easy to grade after 48 hours storage as they are when freshly cut. In summer months they are sometimes easier to grade. When these boxes are filled, a lid is put on so the graders cannot tell what is in the box. They must take the boxes in rotation. Experienced graders can pick out a difficult box with ease, so the new girl always gets these unless rotation rules are followed.

The grader lays the carnations on her table, grades and bunches them, and puts a piece of identification tape on the top string of the bunch. She lays the bunch on the conveyor with an IBM card for that grade. A different color for each grade makes identification easy at the end

of the conveyor where the bunch is picked up, inspected, and tags and a collar placed on it. If the bunch is unsatisfactory, it is sent back for regrading.

When the flowers are inspected for the second time at the wholesale house, a record is kept of each grader's cut-back according to grade. The grader is deducted the total number of points she would have received for an accurately graded bunch multiplied by 2. Twenty-five standards properly graded would give her 75 points. If, however, she puts these in the fancy grade and they do not pass inspection, she is penalized 250 points (double the points for a bunch of fancy grade). Naturally the graders are anxious to get as many fancy flowers as possible, but they must put each flower in the proper grade to earn maximum points with minimum penalty.

At the end of each period, the girl with the least number of points per hour is relieved by one of the women who disbud in the greenhouses. Why should a grader worry too much in which grade she puts a flower unless she can help herself financially? We find that with this method of identification the grader takes much more personal pride in her finished product. We also find that some people cannot grade flowers--the decisions are too numerous.

This is not a new method of grading. It is merely a system for finding out what we are doing, and how to select more efficient people for the task. By this method we can also estimate the cost of doing the job poorly--either by overgrading or undergrading. If a grader is paid $1.25 per hour and grades 250 carnations per hour, the cost is about 50 cents per hundred. If she is paid $1.75 an hour and grades 600 carnations an hour, the cost is 29 cents per hundred. This is labor saving. If a girl misgrades from fancy to standard, the loss is $2.00 per hundred. In our viewpoint, the big thing is getting the proper grading done at a minimum cost for labor. Anything which can be done to raise the standard of pay while decreasing the cost of our product is bound to benefit the flower industry. We cannot measure the cost when a customer is dissatisfied because of inferior grading.

One of the reasons this system works so well for us is its simplicity. Before IBM punched cards were available, one could have spent all he saved on reams of paper work and valuable time. Once a month our cards are sorted and tabulated on an IBM machine for a small fee. The entire calculation takes about two hours and gives us the total number of carnations graded by each girl, the total number of flowers in each grade, the percentage of each grade, the grader's total points, and the total hourly bonus. We realize that few greenhouses have IBM machines, but there are firms in nearly all cities who rent such machines and who will tabulate these cards for a nominal fee. The cards can be used over and over again.

We are most pleased with the results we have obtained from this grading method. We can see what is being done and can compare this with what we have done in the past. We want to get the best price our flowers deserve. Our employees want the best price for effort expended--and our customer wants the value he pays for. Our graders have increased the number of flowers graded per hour considerably and have brought our unit cost down while doing a more accurate job of grading for us and our customers.

Centralized Grading

We are now grading flowers for one other grower who pays us in accordance with the grades we deliver to the wholesale house--more for fancy and standard, less for short and design grades. The Kirschner Greenhouses are using this system without the conveyor belt and are highly pleased with it. Some years may elapse before completely automatic grading is perfected. The meat and lumber industries still require human judgement in their grading procedures. In the meantime, five or six, or no more than ten units such as ours could grade efficiently and economically the majority of the flowers produced in the Denver area. A measure of standardization could be achieved not now possible from some 130 individual units. In this grading system as in any other, the better the quality of flowers you have to grade, the better the system works.

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Recent Research on Nutrient Balance

Shanks, James B. and Conrad B. Link, University of Maryland, College Park, Md. (Presented at the American Society for Horticultural Science Meetings at Purdue Univ., Lafayette, Ind. Aug. 27-30, 1961.) Fertilizer ratios for use with greenhouse cut-flower crops. Soil in the greenhouse received the same fertilizer ratio exclusively for a period of nine years. All soils received the same amount of nitrogen and the ratios of phosphorus and potassium in relation to nitrogen were varied. Amounts and times of application were based on the nitrogen requirements of the plant. Ground limestone was added between crops as required to attain a desirable soil acidity and peat moss was added to maintain soil tilth. There was good correlation between soil test results and the amounts of elements applied. Plant growth responses ranged from severe deficiencies to indications of excess. On the basis of these long term experiments, fertilizer ratios were proposed which should adequately meet the phosphorus and potassium requirements of a crop while supplying nitrogen at desirable level. A 3-1-1 ratio was adequate for roses and snapdragons while results indicated that a 3-1-3 ratio was more desirable for carnations, chrysanthemums and certain miscellaneous crops.

Ed. note--The fertilizer ratio refers to N-P-K in that order. To calculate the fertilizer ratio you are feeding, multiply the percentage of nitrogen, phosphorus, or potash in the fertilizer chemical used by the pounds of that fertilizer added to a given amount of water. If you are adding 3 lbs of ammonium nitrate per 1000 gallons of water, the amount of nitrogen added is 33% x 3 or .99 lbs of nitrogen.

The amount of muriate of potash required to balance 3 lbs of ammonium nitrate in a 3-1-3 ratio (the amount to yield 1 lb of potash) would be calculated as follows: Muriate of potash yields 60% potash (K_2O) or 0.6 lb of K_2O per pound of muriate. .99/.60 = 1.65 lbs of muriate of potash for every 3 lbs of ammonium nitrate used. To refine this a bit further, equal amounts of nitrogen and potash would be supplied by using .55 lbs muriate of potash for every 1 lb of ammonium nitrate.

Since phosphorus is normally applied to the soil as treble superphosphate, we are less concerned about its place in the ratio. Shanks and Link found 1/3 as much

most all crops. If this were applied in the liquid feed as 52% phosphoric acid, roughly 1/5 of a pound of phosphoric acid should be applied for every pound of ammonium nitrate.

If phosphate is added to the soil to keep the Spurway level in the 2 to 5 ppm range, a ratio of 3-1-1 for roses and snapdragons converted to the CSU feeding recommendations would be

> 3 lbs ammonium nitrate and 8.8 ounces of muriate of potash per 1000 gal. of irrigation water.

A ratio of 3-1-3 for carnations, chrysanthemums, and miscellaneous crops would be

> 3 lbs of ammonium nitrate and 1 lb 11 ounces muriate of potash per 1000 gallons.

Where higher rates of nitrogen are used, the ratio should be maintained, according to Shanks and Link.