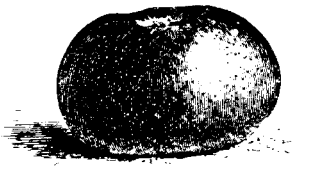
ers victimized by bureaucratic machinations and the media circus. "I thought good science would win out," Uniroyal's John Lacadie now says quietly. "I guess I was naive."

The fear crusade against Alar succeeded. But we should not cave in to the next campaign based on manipulated data and slick P.R. techniques. It is this threat—to common sense—that posed the most intolerable risk.

For information on prices and availability of reprints write: Reprint Editor, Reader's Digest, Pleasantville, N.Y. 10570, or call: 914-241-5374.

THE READER'S DIGEST ASSOCIATION, INC., PLEASANTVILLE, N.Y. 10570 PRINTED IN U.S.A.



Roses Are Red? Violets Are Blue?

Mark Strefeler
University of Minnesota

Recent news releases make it clear that roses may soon be blue and violets...? Well, we will just have to wait and see. The hype surrounding the quest for blue roses has been astonishing, especially in light of recent public outcry against genetic engineering of animals and plants raised for human consumption. I have yet to read any negative press about attempts to genetically engineer roses. It appears that the public feels much more comfortable with the idea of genetically engineered ornamental plants and may actually be inclined to purchase such plants simply for the novelty of having an genetically altered organism.

First, we should ask, how much is hype to sell a new product and the idea of biotechnology to the public, and how much of this type of work can lead to new varieties which are profitable to the commercial grower? Transgenic flowering plants may be big money makers for the biotech firms but will they really profit the growers? New flower colors may expand the appeal of a particular crop, but if this is at the expense of sales of other crops, there may be no net gain in per capita consumption. Thus, the net economic gain industry wide may be negligible.

Next, we should realize that transgenic plants may not be better or as good as what we already have. I have no doubt that a blue rose will be forthcoming in the future and that it will have a impact on the market, simply on the basis that no other true blue roses (pun, intended) exist. What remains to be seen is whether the color will be aesthetically pleasing or some gaudy blue. How much demand will there be for blue roses in the U.S.—the target market of Calgene Pacific, Ltd. and Suntory, Ltd. is Japan—and what cost per stem will the grower need to charge to make a reasonable profit on blue roses? An Associated Press release stated that the anticipated retail cost

"I thought good science would win out," Uniroyal's John Lacadie now says quietly. "I guess I was naive."

The fear crusade against Alar succeeded. But we should not cave in to the next campaign based on manipulated data and slick P.R. techniques.

It is this threat—to common sense—that posed the most intolerable risk.

Transgenic flowering plants may be big money makers for the biotech firms but will they really profit the growers?

The anticipated retail cost of a blue rose may be as high as $80 per stem!

The Dutch government has given the go ahead for the "new" transgenic white mums to be field tested this coming spring.

of a blue rose may be as high as $80 per stem! Although the Japanese consumer may be willing to shell out this kind of money for flowers, I do not believe the American consumer will be quite so free with his/her pocketbook.

A representative from Calgene Pacific reports that his company is planning to field test roses with a blueness gene from petunia in the spring of 1992. The other biotech firm in search of the blue rose, Plant DNA Technology, has not released any plans to field test plants nor have they indicated they have any transgenic plants in hand. When we will actually get a look at a blue rose is still not clear. Even more uncertain is whether it will be commercially feasible to produce blue roses.

In the Netherlands, researchers at Florigene have introduced a gene into chrysanthemums that blocks pigment formation in flowers. The result is genetically engineered plants with white flowers. Researchers believe that this accomplishment is the first step in developing new colors in flowers using biotechnology. The Dutch government has given the go ahead for the "new" transgenic white mums to be field tested this coming spring.

Transgenic is not always going to mean better.

Genetic engineering of flower color appears to be moving forward in leaps and bounds and more biotech companies are looking to genetically engineering flowering plants. Why this sudden interest in ornamental plants? The answer is quite simple, economics. The cost of developing and testing genetically altered plants is quite high and floral crops offer a potentially high return on investment due to their high per unit value.

Furthermore, since these crops are not used for human consumption,less testing is required to release transgenic plants for commercial use. Finally, the perceived threat of ornamental plants wreaking havoc on our environment and mankind is considerably less than that for our food crops. In fact, many in the biotech industry believe that novelty of genetically altered plants in the mind of the public will provide a strategy for marketing these plants. Why else would so much time and effort be spent in developing transgenic white flowered mums when white mums are already available in traditional mum cultivars?

"Caveat emptor"-Buyer beware!

What do you as growers need to know about genetic engineering in light of all this hype over genetically altered floral crops? First, remember that transgenic is not always going to mean better. When genes are introduced into a plant they may have more than the intended effect on the plant. In some cases the gene may be introduced in such a way as to reduce the effect of another gene or completely shut a gene off. If this gene is important for plant growth and development the result may be a weak or difficult to grow plant which may be of low quality. The current rush to release blue roses may mean that proper selection for other horticultural characteristics may be overlooked and truly improved plants will not be available.

In a rapidly advancing area of new technology there will always be exaggerated promises as to the true impact of a technology on an industry. Also, we must beware of those who will try to market plants as being the result of biotechnological methods, so they will command a higher price. I have my suspicions about one such plant that has already been marketed as a genetically engineered plant. Although they claim a patent is pending, no patent number is given and I as a scientist have a hard time swallowing the story they provide on how this plant was developed. My best advice is "Caveat emptor"-Buyer beware! There will always be a few unscrupulous individuals who will try to capitalize on a rapidly growing trend and exploit the less informed with misinformation and false claims. You can best protect yourself by checking all claims with your extension specialist or other University staff with expertise in biotechnology. Also, be sure if the plant is claimed to be patented or has a patent pending that the patent number is included on the product information and if you have any doubt as to the validity of the the number check out with a U.S. patent office. Finally, if you continue to deal with well established reputable companies you can protect yourself from fly by night companies.

The availability of genes for important traits (such as resistance to insects and diseases) is currently very limited. Those that have been isolated are owned by private companies so they are not readily available to plant breeders. Furthermore, the bulk of research funding, both public and private, has gone toward developing gene transfer systems in crops with little or no funding for isolating useful genes to use in these systems. If this trend continues, we will have many gene transfer systems but no useful genes to transfer. We must be willing to fund longer term research if we hope to reap the rewards of biotechnology. If we all want to be in on the "quick fix" biotech promises we must be willing to fund the basic groundwork that must be down to fully enjoy the power of biotechnology. The

bottom line is simply that the flashy changes that can be made in flower color is only a small part of the potential of biotechnology. The more potent changes such as genetic engineered resistance to tomato spotted wilt virus will only come about with longer term research on isolating resistance genes and understanding mechanisms of resistance.

Biotechnology offers a new and exciting tool for the plant breeder but in itself is not a solution to all problems. Thus, we must keep a balanced perspective on our funding priorities and must not abandon sound conventional breeding methods for the high profile techniques of biotechnology. Our industry stands to gain much from the current efforts in plant biotechnology but the rewards can be even greater if it can be combined with conventional planting breeding methods. Progress in both areas can lead to plants that are not only different but better and easier to produce. Biotechnology offers the way to make rapid progress in plant improvement and convention plant breeding methods and evaluation procedures will help ensure more rapid progress and truly superior varieties for commercial production.

What is next on the biotechnology front? Maybe, glow in the dark flowers!

Biotechnology offers a new and exciting tool for the plant breeder but in itself is not a solution to all problems.

Soil Test Review

Debra Schwarze
University of Minnesota

Crop	pH	SS	NO3	NH4	P	K	Ca	Mg	Na	Fe	Mn	Zn	B
Poinsettia	6.3	76	87	24	9	50	111	17	20	.39	.42	.04	.06

This soil test shows low nitrates and high ammonium. The magnesium level is also low. This type of problem has been showing up on a number of recent soil tests.

I. The ammonium level needs to be lowered. The fastest way to do this is to leach the media. Media which contain greater amounts of soil can to have ammonium build up more readily than soilless mixes.

High ammonium levels are often seen as greenhouse temperatures decrease in fall and winter, especially when fertilizers containing ammonium are used. If you have high ammonium levels, discontinue using fertilizers that contain ammonium.

Problems with ammonium toxicity can be increased by high pH, low potassium and low light. Therefore, other ways to reduce ammonium toxicity include lowering pH and increasing potassium levels. In the case of this soil test, the pH is at a recommended level. Since there are other options to deal with the ammonium toxicity, the pH should be left alone. An increase in the potassium level would be an option, however, the best solution would be to simply leach the medium.

II. Low nitrate levels can be dealt with easily by increasing the ppm of nitrogen in the fertilizer mix, if you mix your own fertilizer. If you do not mix your own fertilizer, select another premixed fertilizer with a higher nitrogen content. If you leach to remove the ammonium, you will have to follow up the leaching with a one time 400-600 ppm fertilizer application.

III. Low magnesium levels can cause inter veinal yellowing of the lower leaves on a plant. Since magnesium leaches readily from the medium, regular applications may be necessary. Drench a minimum of once a month with magnesium sulfate (Epsom salts) at a rate of 8 ounces/100 gallons. Do not mix magnesium sulfate and calcium nitrate together in a stock tank, they will react and fall out of solution.

High ammonium levels are often seen as greenhouse temperatures decrease in fall and winter, especially when fertilizers containing ammonium are used.

Since magnesium leaches readily from the medium, regular applications may be necessary.