

MODERATOR FURUTA: Our first speaker this morning is Mr. Herb Swim of Armstrong Nurseries, Ontario, California. He is a world famous rose breeder and will speak to you about "Hybridization of Roses — Some Limitations". Herb.

MY EXPERIENCES IN ROSE HYBRIDIZING

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I wish to make clear at the onset that I make no claim to original discovery with respect to any of the experiences I shall relate. I deal with them only because they seem, from my point of view, to have been the more useful of the observations I've made over the years and that come to mind now.

In looking back, it seems to me that among the more significant of my early discoveries was one that made itself apparent after a series of frustrating experiences associated with failure.

My first experiences in the making of exploratory rose crosses, while not entirely failures, were sufficiently so as to make it appear expedient to evaluate the factors involved in the failures and further, to try to give them a rating as to importance.

In casting about for some apt title for this procedure (entirely for my own use I have thought in terms of a phrase which is meaningful to me, "A Priority of Limiting Factors.")

I shall try to illustrate what I mean by using some actual experiences and telling of them in the approximate order of their influence on the success or failure of a given objective. It seems to me that the clearest way to do this is to name a subject problem and to follow with a discussion of the problem, and this I shall be doing.

Vigor. I noticed in my first years of crossing that many of the families of seedlings were disappointingly lacking in vigor to the extent that often as few as 10% of a family were vigorous enough to be acceptable on this basis alone. Since in the early stages of any plant breeding program one must do some close inbreeding in order to explore the inheritance traits of the prospective parents, it naturally followed that there were a number of such populations (families) in my early crossings. I noted that almost without exception these populations displayed a major regression in vigor. I discovered soon also that this result could be predicted from such crossings with a high degree of accuracy. Beyond this, however, I discovered that unless I was very careful to use parents that were not only distantly removed from one another in origin, but in themselves having more than ordinary vigor I could again expect no more than a small proportion of the resulting offspring to be acceptable in vigor.

Flower Petalage. As the result of selfing (using the same cultivar for both seed and pollen parent) we early dis-

covered that the single petaled cultivars bred completely true to this trait; in other words, all singles when crossed with singles (providing they had no petaloids) gave single petaled cultivars only as offspring. Since there are, of course, a great many petalage levels in rose cultivars, it would seem probable that the inheritance of petalage quantity may be due to a complex of factors. Be that as it may, it became apparent that a generality in this area could be made with a reasonable degree of assurance. If the breeder were expecting or desiring rose progeny with double flowers, he had best make sure that any semi-double cultivar he uses as a parent be complemented by another parent that has a good degree of doubleness (not necessarily fully double, but at least adequately so). I discovered that if one fails to do this, very few of the progeny will be acceptable in quantity of petalage. This once again is a "limiting" factor.

Mildew Resistance. This quality, together with the next two, rank about equally in the degree to which they limit the breeder to selecting offspring with an acceptable level of each given quality. It is generally felt among the rose breeders to whom I have talked that this quality is a dominant one (covering up its alternative quality, mildew susceptibility, when both are present in a given cultivar or seedling). Unfortunately, the wild roses that formed the basis for much of the early breeding work, particularly in the larger flowered cultivars, have a fairly substantial degree of susceptibility to mildew. As a result, we have very few garden cultivars today that can be considered immune or nearly immune to mildew.

This inevitably means that in our eager search for advance or novelty with respect to the flower qualities of our larger flowered garden roses, we are working with parents on both sides with at least some degree of susceptibility to mildew. This also inevitably means that we will have very little resulting that is better than the better parent, and with most of the seedlings being not only no better but somewhat worse than the better parent with respect to this quality. Here, again, if we find it expedient to use a parent cultivar with some susceptibility to mildew, then we should also find it expedient to use a mate for it that has a corresponding degree of resistance to the same disease. Otherwise, our resulting offspring will be useless because of their susceptibility to that disease. I'm glad to report that in this field some very fine progress is being made by various breeders, and we are confident that it is only reasonable to expect that in the next decade or so we shall see some substantial progress, especially in resistance to powdery mildew.

Flower Form. I would incorporate in this category the form of the bud also. The rosarian of today seems to like most of his flowers to be regular in form. This, in spite of the fact that the popular old or "classic" rose is very informal in

the arrangement of the petals. Perhaps the rather globular buds and informal open blooms of yesteryear's rose is the more natural form pattern for the flowers of this great plant. Be that as it may, today's rosarians seem to prefer larger quantities of the cultivars that have long, slender, pointed or urn-shaped buds opening to perfectly imbricated flowers of not less than semi-double petalage and preferably double or very double in his respect (I've often wondered if the form of the "first hybrid tea," La France, could have set the style for the roses of today). The bud form popular today is not greatly difficult to achieve, particularly since we have many prospective parent cultivars today that have this characteristic. The form of the open bloom, however, seems ever to tend to the informal, irregular, and unfortunately often even the messy, lopsided, etc. This is so to the extent that if one does not have both parents with fine form in the open flower, than one had better have one of them with such form, or the breeder will preclude the possibility of having a meaningful quantity of progeny plants with acceptable open flower form.

Size and Shape of Foliage. As near as I can determine, most rosarians prefer foliage that is more or less flat in character, large, heavy, leathery, and perhaps glossy. All of these qualities except the last seem to be difficult to attain, and in combination this is particularly so. Experience has shown that it is very difficult to obtain foliage of medium to large size from a cross where even one parent is afflicted with small foliage.

Some growers contend that this is not such a handicap in the floribunda class, but most would concede that it is a handicap in a popularity contest among hybrid teas.

I should point out before leaving this subject that it is not my intent to imply that the foregoing topics, either singly or in combination, may be considered total objectives in breeding roses. Obviously, the form, color, substance, etc., of the flower itself must be the final measuring stick of a rose cultivar's value. The foregoing qualities are merely shown as the principal road blocks to reaching our final destination.

A most important experience, from my point of view, is fairly frequent contact with buyers of rose plants, particularly those sufficiently interested to show them at flower shows, or to judge them. Such experience is for me an essential, not only for inspiration but for education. To know what my fellow rose lovers see as beautiful in the rose, sets a pattern for my own effort. It is satisfying to see some of the cultivars from one's own effort appearing in a rose show accompanied by a blue ribbon.

MODERATOR FURUTA: Thank you Herb. Our next speaker is a colleague of mine for more years than I care to mention at this time. Most recently we have been associated through the Agricultural Extension Service, University of California. He is stationed at Davis some 400 miles from me,

so we don't get into each others hair too often. Dr. Ray Hasek has been in California for a number of years and has had wide commercial as well as educational experience. At this time I should like to have him discuss with you "Some Scion-Stock Interrelations".

SOME SCION-STOCK INTERRELATIONS

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Much has been written about scion-rootstock relationships in commercial rose plant production. However, many instances of peculiar growth patterns or responses occurring in greenhouse cut flower plantings have been often talked about in the trade yet seldom mentioned in print. Entirely different growth requirements exist between outdoor roses grown for the home garden and greenhouse plants grown for cut flower production. Outdoor rose understocks should have such characteristics as drought resistance, cold resistance, exhibit good dormancy during the winter to prevent scion or understock growth and finally be easy to bud. In the greenhouse the rootstocks are pampered since they are usually subjected to very little drought or cold stress. Production of cut flowers goes on all year round; therefore, optimum growing conditions are maintained to assure continued growth and activity of the understock during the winter as well as the summer months.

At present, by far the most popular understock used for greenhouse roses is *Rosa x noisettiana* 'Manetti'. To a lesser degree *Rosa odorata* and *Rosa x sp.* 'Dr. Huey' (Schafter) are used. Usually, yellow flowered varieties have been budded on *Rosa odorata* although 'Dr. Huey' understock is becoming more commonly used. When *Rosa multiflora* is the understock, winter cut flower production is often greatly reduced.

Some of the reasons for differential responses of scion varieties to various understocks already have been reported. The selectivity of ion adsorption by various rootstocks has been explored (1) and it was shown that accumulation of chlorides and boron was less in the foliage of five seedling varieties when budded on *Rosa x sp.* 'Dr. Huey' than when the same varieties were budded on *Rosa multiflora*. This would indicate that under saline conditions the use of 'Dr. Huey' understock might be preferred unless adverse scion response of a particular variety to this understock is known.

The cultivar Happiness has been budded on both *Rosa x noisettiana* 'Manetti' and 'Dr. Huey' for commercial greenhouse cut flower production. Growth habits of the resulting plants are quite similar with a slight increase in overall stem length being evident in those with the 'Dr. Huey' understock.