Evaluation of New Floricultural Crops: 
a Systems Approach

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New crops for pot plant and cut flower production are perhaps in greater demand in this country now than ever before. European research programs for new cultivars have generally been ahead of those here and a greater range of crops is commonly produced by European growers than in America. Research results from European countries are not often published in readily available journals and are difficult to translate, and production data often pertain only to the environment in which the plants were produced. (15).

One of the difficulties in new crop research is the lack of an adequate definition of what constitutes a new crop and thus what constitutes new crop research. In general, 3 main areas have evolved based on prior selection within the species. The first area is the evaluation of new selections or clones of existing crops and species with the highest degree of prior selection. This procedure has been a common means of screening potential cultivars as commercial crops. Improvements through breeding and selection have led to much improved cultivars, which may tolerate pot or cut flower culture better than their predecessors. Work by Harbaugh and Waters (6) and Sachs et al. (15) have shown significant differences among selections in production and postproduction characteristics.

The 2nd area of new crop research concerns some new use (e.g., pot culture) for a common species. For example research on Armeria maritima (Mill.) Willd. as a new pot crop is currently being conducted at several locations; however, this species has been well known to garden enthusiasts for many years. The degree of prior selection varies considerably with species tested. Other examples of type 2 crops include calendula (2), bouganvillea (5), orchids (4), hybrid lilies (13), aquilegia (16), and fuchsia (8, 14). Research with all of these plants involves new uses.

The 3rd area of new crop research is the work on a species about which very little garden or greenhouse cultural information exists. In general no prior selection has been done, and these plants usually exist as single selections or clones; few if any cultivars have been named. Examples include Trachelium...
There is much work being done today on type 1 research which does not fall into the category of new crops. For example, vigorous programs for clonal evaluation are being conducted on crops such as *Rosa hybrida* Hort. and *Chrysanthemum × morifolium* Ramat., but these species no longer can be included as new crops. A discussion of the definition of a new crop invariably leads to heated arguments, but a new crop is usually, by definition of the word “new”, a minor floriculture crop. The intent of this article is not to define what is or is not “new”, but rather to discuss an approach to new crop research which may have merit for scientists involved in this fascinating area.

Considerable work on new crops continues to be conducted here and abroad. There are, however, a great number of species which have potential as commercial crops (11). It would be difficult to conduct in-depth research on all of these, and a systematic approach may be useful for screening species or cultivars for usefulness as a pot or cut flower crop. There is little uniformity today in new crop research, and a systems analysis approach may be appropriate for those scientists who wish to look at the total crop life cycle from propagation to postproduction.

The procedure outlined in this paper (Fig. 1) is one of eliminating species at certain stages of their life cycles. If plants of a species are to pass through this system, they must pass certain “tests” at various stages. The system is divided into 3 phases, each of which tests the plants’ suitability as a commercial crop. The system has 2 worthy features: 1) it acts to eliminate species with obvious shortcomings in any of the phases; and 2) it demonstrates where the major problems lie for species with exceptional potential. For example, early cultivars of *Rosa hybrida* likely would have failed the postproduction test if they were being evaluated as a new crop in this system. The scientists either would have eliminated this crop from the program or would have recognized its potential and worked on improving the postproduction habit of the species. This is true of *Eustoma grandiflorum* (Raf.) Shinn. today. Once the propagation phase has been lengthened in many species with improved production techniques (1, 17), and some species of potted plants have greatly benefited by the application of silver-based chemicals (3). Other chemicals are also available for postproduction studies for cut flowers, but if satisfactory shelf life cannot be demonstrated, then there is little reason to spend the time and effort to learn how to propagate and produce this species efficiently.

Once the crop has “passed” the postproduction aspect, the propagation/production phase is started (Fig. 1). Are there viable means of propagating the crop? Is sexual or asexual propagation most appropriate? Often, there will be no commercial source of germplasm available for a little-known (i.e., type 3) species. A lack of source in itself is not important at this stage. Commercial sources will emerge if the selection or clone is worthy of introduction. This phase of research simply asks the question, “Can the species be propagated and by what means?” If propagation requires complex procedures — such as stratification techniques for breaking double dormancy or accomplished by asexual propagation only during a short period during the life cycle — then the decision may be made to terminate research on this species as a commercial crop at this time. This is not to say the crop is not deserving of continued research to solve those problems. If work on the crop is terminated, it simply means time and effort in the new crop program can be better spent on other crops with greater commercial potential.

Finally, if propagation is commercially feasible, then production aspects can be addressed. Researchers usually spend the bulk of their time in this phase. This phase, however, should only be vigorously pursued if the species has passed the postproduction and propagation phases of the program. Production research involves the effect of light, temperature, growth regulators, and photoperiod on year-round scheduling (Fig. 1). This research will be the backbone of the information provided to the commercial grower. Numerous experiments in controlled environment chambers and in greenhouse conditions can be carried out during this phase to “fine tune” the production program. Termination of a line or clone may also occur at this time, if the production period is significantly longer than a predetermined time set by the researcher or if environmental parameters necessary for flowering are impossible to achieve.

The marketing phase of the program is one which provides additional data as to the direction the research should take for selection of particular characteristics. Samples of propagation material along with propagation and production information sent to cooperating growers in many different locations provide feedback on the performance and acceptance of the crop. No doubt exists that crop timing will vary in different parts of the country, as will consumer preferences. If possible, programs in new crop research should have a member qualified to do market research on the various species which emerge. It is an often overlooked aspect in floriculture and one that is increasingly important (7).

The role of new crop research is to introduce a backbone of data upon which other scientists and growers will undoubtedly improve. New crop research should strive to be multidisciplinary and include a team of scientists with expertise in postproduction, propagation, production, marketing, and breeding. This approach is possible only with a good deal of cooperation among faculty and staff but is one which can provide the most accurate and detailed information on the commercial use of potential species in the least amount of time.

The systems approach outlined here and in Fig. 1 will certainly not appeal to all re-
searchers engaged in new crop research. It is strongest in evaluating type 2 and type 3 research and is not designed for type 1 work. In working with type 3 research, it does not adequately address the important aspect of selection. Seed-propagated material, in particular, is notoriously variable, and selections for beneficial characteristics for pot culture need to be made. In the approach outlined herein, selection is one of the improvements left to the breeders and producers. The system does, however, provide an objective system of screening prior selections of many potential species. The scientist still makes the decision to terminate or continue research on the species based on the definition of what he or she feels are acceptable limits to each of the various phases in the system. The number of possible species which has commercial potential for potted or cut flower production is enormous. A systematic approach to eliminate marginal species and strengthen the database for those with the greatest commercial potential would be most welcome.

Literature Cited