

DISCUSSION NUMBER ONE

Santamour: Joe, you mentioned that the *Soulangiana* cultivars 'Grace McDade', 'Lombardy Rose', 'Rustica' and 'Lennei' were all hexaploids. Could you give the authority for this work?

McDaniel: They're all fertile, and Bill Kosar considers them hexaploid.

Santamour: I was just wondering. The only one I know of that has been counted was 'Lennei'.

McDaniel: These others are probably seedlings of 'Lennei'. That's assuming from the appearance of them; they have bigger and thicker leaves and tepals than the ordinary *M. soulangiana*. At least the probability is that they are hexaploid, and breeding experience with these would indicate that such is true. One quite recent pink flowered introduction is the Japanese 'Picture'. The introducer called it *denudata*, but it is more likely a cross between *denudata* and 'Lennei', or possibly *denudata* with the hybrid *veitchii*, which is *denudata* x *campbellii*. In either case, it would be a recombination, mainly *denudata*, but with hybrid ancestry on one side.

Polk: I would like to ask Professor McDaniel, "Is there any evidence of increased adaptability of the hybrids over the parent?"

McDaniel: Yes. I believe there's evidence in the case of the 'Freeman', at least, of better winter cold resistance over the usual *M. grandiflora*. It, of course, being an Ft combination of the two species, would have 3 sets of chromosomes from *grandiflora* and 1 set from the *virginiana* parent. With the hexaploid-diploid combination, you might expect the Ft generation to lean pretty far toward the hexaploid parent, and it does. It comes out mostly evergreen, with a more nearly *grandiflora* type leaf. The flower is above intermediate in size and looks more like *grandiflora*. While the Arnold Arboretum has never been able to overwinter any *grandiflora*, they tried the 'Freeman' and after 2 years in the lath house it was still evergreen and growing well. I think they have put it now against a sheltered wall outside the lath house. We find that it is quite winterhardy at Urbana, Illinois, and at other similar locations elsewhere. Perhaps it is not any more fully evergreen than some of the hardiest *grandiflora* that have survived in central Illinois. Often by March they get pretty brown, but there is generally very little tip killing of the wood at Urbana. In that respect, 'Freeman' shows more adaptation than at least the more tender clones of its *grandiflora* parent. It is a cross of the northern variety of *virginiana* by *grandiflora*. I have in recent years gotten some controlled hybrids between *grandiflora* and the southern *M. virginiana australis*. Some of those also are surviving in Urbana, outside, but not always evergreen.

For the var. *australis* x var. *virginiana* hybrid sweetbays, those are hardier than some pure *australis* in Urbana.

Polk: I am interested in the theme of this conference from the standpoint of the relationship between horticulturists and foresters in terms of development and actual use of ornamental trees. At the University of Missouri we have a tree service working group in our School of Forestry Advisory Council. At our meeting last week there was some discussion as to whether or not we should disband the working group. For a long time, we in forestry were getting most of the shade tree questions, but about 2 years ago the Horticulture Department hired an Extension Specialist in this area. I think we are going to shunt this over to him, but with increased knowledge about racial adaptabilities, better form, etc., what is the role of forest genetics in the ornamental use of trees? I am thinking of uses of forest trees in highway landscaping, the development of state parks, and city forestry. Would you care to make a statement of your view as to the forester's role in connection with these programs?

Santamour: Si Little can probably tell you more about that since he is presently the only "urban" forester in the Forest Service. The Forest Service is moving in closer to the cities, and the Agricultural Research Service is expanding their work. Where the two meet, I don't know. However, it is likely that in the management of urban forest tracts the experience of foresters should provide the major guidelines. The shade tree work within U.S.D.A. and the various state and university programs has not given us a sufficient body of knowledge regarding urban forests. Foresters coming into urban forest programs bring with them the experience gained in managing the same or related species under wild forest conditions. Granted that the problems of the city are different, the management practices developed in wild forests could be adapted for urban areas.

Mokry: Brooks, I am with the Missouri Conservation Department. A year ago August I was put into the St. Louis County area working as an urban forester with a 6-year background in service forester work. As you say, there is an extension horticulturist in the county. However, we have over 2,000,000 people in St. Louis county and this brings in a large number of requests. Too much for one extension horticulturist; too much for one urban forester, which I am. And we have 95 different municipalities in the county that I serve. This ranges from undeveloped forest tracts to shade tree requests. So I feel that there is a definite need for this work. And as Mr. Santamour said, the Forest Service has, I think, some idea of moving into this area. Right

now, our department is undertaking this work in the St. Louis area.

Sharik: Mr. McDaniel, I have a question concerning crosses at different ploidy levels. Specifically, I would like to ask if any cytological observations have been made of chromosomal pairing behavior between different species.

McDaniel: I have done no cytological work myself. Perhaps Frank could give you some answer on that.

Santamour: Meiosis in the diploid hybrid *M. virginiana* x *M. tripetala* shows a maximum of 6 univalents. Precocious migration of univalents and occasional lagging of bivalents leads to the production of only 1.2% good pollen (Univ. Pa. Morris Arb. Bull. 17:29-30, 1966). In the cross between *M. virginiana* and *M. grandiflora*, the progeny are tetraploid (n=38). The most usual pairing configurations were 32 bivalents, 3 univalents, and 3 trivalents. There is apparently considerable autosyndetic pairing among *grandiflora* chromosomes. Pollen sterility ranges up to 75 percent, and the plants seldom set seed. The National Arboretum has recently released a group of hybrid cultivars derived from crosses between *M. liliflora* and *M. stellata*. These are triploids and show irregularities of pairing and subsequent high pollen abortion. Data on the cytology of these hybrids will be published next year.

McDaniel: Those hybrids appear entirely sterile so far, don't they?

Santamour: Yes, none of the triploids have set seed to natural pollination. We have not had much opportunity yet to test them as male parents in controlled crosses. It is likely that some progeny may be obtained in this way, similar to your use of 'Freeman' (*virginiana* x *grandiflora*) in backcrossing studies.

Sharik: Then you have no markers for distinguishing the genomes of the various species?

Santamour: I have not been able to determine any pronounced morphological markers for the various genomes. The assumption of autosyndetic pairing is based on the numbers of chromosomes involved in the different meiotic configurations.

Hunt: Could we discuss Frank Santamour's statement that horticulture is neither dependent on, nor eager to receive

the forest culls which we reject from progeny tests? What about all the dwarf forms, weeping branch types and twisted shapes? Wright, Schreiner and Gabriel outplanted some very interesting hybrid pines in New Jersey. Some have quite a picturesque form with multiple stems. Others might even be described as grotesque.

Santamour: Oh, absolutely. I know those trees. In fact, one fellow in Pennsylvania was very fond of the bizarre shape of some of these trees. Yes, these things will come up, Clyde. Some of them may have value but the amount of time and money that has to be spent in propagating the horticultural cultivar and getting it into the hands of nurserymen in sufficient numbers to make an impact just doesn't jibe with the basic objectives concerned in a forestry program.

Hunt: Is it difficult to introduce these because of propagation problems—that is, to maintain a desired characteristic?

Santamour: Following any breeding, testing, and selection work necessary to assure that a plant is worthy of introduction, it must be propagated vegetatively, and distributed to various nurseries for increase and further distribution in the trade. Furthermore, the cultivar must be named, in accordance with the International Code of Nomenclature for Cultivated Plants, and registered with the appropriate authority for the plant group (generally the genus) to which it belongs. It is not a difficult process, but the time lag between release of a cultivar and its appearance in a retail nursery catalogue may be as much as 5 to 10 years. Research workers at the National Arboretum are trying to shorten this time interval.

McDaniel: I have a comment in answer to the gentleman who 'was asking about boxelders. I've rooted one staminate clone from a wild tree that has a fastigate columnar form. It may have some usefulness when it is grown in narrower yards than the average. Recently one of the students watering my greenhouse benches said he saw something that people in southern Illinois considered a very bad weed. I asked, "Is it that Mexican annual pokeweed?"; and he said, "No, that boxelder!"