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COLLECTING ROSES IN CHINA

by Campbell G. Davidson, PhD

During the month of October, 1997, a group of rose breeders and experts had a tremendous opportunity to travel and visit many locations across China to exchange information on rose taxonomy and breeding as well as to collect plant material. It was a trip of a lifetime to say the least. Our Chinese hosts were very gracious and tried to assist us wherever possible. It took a little over three years to put this trip together from the time the initial contacts were made among the rose team in Canada and USA to the time we left to travel overseas. There were many moments when we were not sure whether or not we would get the necessary approvals or funding to travel. Persistence paid off! In early October, the team members met in Beijing and spent three weeks travelling across China; meeting and talking about roses.

The team was composed of six members from Texas to Canada, and from Minnesota to Oregon. Our team leader was Dr David Byrne, from Texas A&M University. He and his research associate, Dr Yan Ma did a great deal of the legwork prior to the trip, contacting various institutes and gardens as well as various levels of the Chinese government. Dr Ma, who is originally from China, had a great number of contacts throughout the country which proved to be very valuable. Mr Mike Shoup from the Antique Rose Emporium in Texas rounded out the Texas connection. Mr Shoup brought along a strong understanding of the history of rose development and a keen interest in old Chinese cultivars. Ms Cathy Zuzek, from the University of Minnesota Landscape Arboretum in Chanhassen, MN, Mr Ping Lim of Bailey's Nursery, Oregon, and myself rounded out the team. All these people have active rose breeding programs and were particularly interested in learning more about rose breeding in China as well as collecting roses.

WHY ROSES?

Roses are among the world's most important ornamental crops. In the United States alone, garden roses account for $300,000,000 in annual sales to 23,000,000 households (Byrne et al., 1995; Fenyvesi, 1995). In 1990, about 60,000,000 rose plants were produced in the United States (Streeper, 1990). The market for rose cut flowers is worth $200,000,000 (USDA, 1991).

Historically about 20,000 rose cultivars have been developed as a result of the introduction of Chinese germplasm into Europe around the year 1800. Many modern roses were developed with only eight to ten wild species, leaving 95% of the genus untapped.

Disease and insect infestations in roses are numerous and are often controlled with a combination of cultural treatments and pesticides which is leading to a great deal of concern from rose growers around the world. How do we continue to grow this species with reduced or limited pesticide applications? The incorporation of genetic resistance to diseases such as blackspot (*Diplocarpon rosae* [Lib.] Wolf), powdery mildew (*Sphaerotheca pannosa* (Wallr. [ex Fr.] Lev), rust (*Phragmidium* spp.) and rose mosaic virus (PNRSV), into rose genotypes is one approach (Xue and Davidson 1998). Since China is a major centre for wild roses, it is hoped that new, novel genes can be identified from species from there as well as other locations around the world.

WHY CHINA?

China is the centre of diversity for roses. Of the 200 (approx.) rose species world-wide, over 50% of these are native to China (Ma and Chen, 1990b, 1994). Species diversity is highest in the mountains of southwest China (Yunnan Province) and decreases northeastward.

Relatively few rose species have been used in breeding studies due to limited knowledge concerning taxonomic and other characteristics as well as limited access. Some of the species may have the potential or are known to carry genes for disease resistance (blackspot, powdery mildew, rust) and other horticultural traits such as

cold hardiness, ever-blooming or repeat flowering, white or yellow petal colour, novel or stronger scent and double flowers (Ma, 1990, 1994; Ma and Chen, 1990a). The introduction of such species into modern rose breeding programs would be highly beneficial.

SPONSORSHIP

The collection trip was sponsored and financed by the Chinese government through the office of International Cooperation and Development except for incidental charges and airfare to China. In return, the team agreed to provide a series of seminars at each centre we visited. Information about our different programs was outlined in slide presentations and discussions.

Having a diversified team composed of industry, university and government researchers enabled us to develop a balanced series of talks dealing with rose breeding (eg. selection methods, molecular mapping, amphidiploids, disease resistance and cold hardiness), taxonomy, commercial sales, testing and evaluation. Since two of our team members were fluent in Chinese (Dr Ma and Mr Lim), this greatly assisted in the technical aspects of translation. It also enabled a lot of lively discussions to develop although the unilingual types spent a lot of time sipping tea.

At each site we were met with a local person in charge of arrangements and translation. This was in addition to our travelling companion, John ?, who accompanied us for the entire trip. John was responsible for getting us in and out of the airports and train stations with speed and efficiency !

The degree of interest expressed by our Chinese hosts in our programs was very high. With the changes China is undergoing at the present time, there is considerable interest in the development of new crops, products, and in the diversification of existing production programs. Interest was expressed in both greenhouse (cut flower) and landscape plant production. The abundance of labour, the large land resource base and varied climatic conditions present the Chinese with a very strong potential for large scale commercial production, for domestic consumption, and export.

LOCATIONS

The main group visited five different cities across China (Beijing, Kunming, Shanghai, Nanjing and Zengzhou). In addition, two of the team members (Ms Zuzek and Mr Lim) visited more northern locations (Harbin, Shenyang and Chenchung) to collect in these regions. These northerly locations hopefully will provide new sources of hardy plant material. A listing of the sites visited is presented in Appendix 1.

With the tight travel schedule (we met with over 20 different groups, organizations and institutes in five different cities in 21 days), it was often difficult to enter into in-depth discussions with the researchers at any one location. There often was little funding targetted directly for rose research (or for research in general). Food crop research appeared to fare a little better but funding for research in general was limited. Ornamental crops are just now starting to be recognized as new potential crop species. There is now the opportunity to protect new cultivars (Plant Breeders' Rights of sorts) which will surely help the development of this industry.

Interestingly, most of the Botanical Gardens had their display gardens composed of modern roses bred in North America, Europe, or Japan. Our hosts were very excited to show us these gardens but in reality these held little interest for team members; we wanted to see Chinese roses!

Our Chinese hosts were very gracious. The accommodations that were provided were excellent, the food exciting and the travel plans went off without any major hitches. At most locations, we attended a banquet. This meant that we often had two banquets a day, each with an exciting array of new foods. I think it is safe to say that we ate every part of the duck except the quack! Many new foods were tried by everyone, some with better results than others! The presentation of the foodstuffs was often exceptional. The materials were arranged carefully on a serving tray, colours were carefully coordinated, and the sauces delicately applied. All in all, eating was a full time job — even if all we wanted was a bowl of soup and half a sandwich.

PLANT COLLECTIONS

During the course of our trip, we visited a number of larger plant collections (arboretums and botanical gardens). Many of these had very interesting plant materi (roses, other woody and herbaceous material) that we could have spent hours or days exploring. Unfortunately we were

on a tight schedule and had little time to explore on our own.

The garden of the Zhengzhou Institute of Landscape Architecture had some interesting traditional Chinese rose cultivars collected in that province. Unfortunately the garden did not have the plants labelled nor were they willing to let us collect hips or cuttings. Zhengzhou has a very hot dry climate, and may be a good source of drought tolerant material.

The Kunming Botanical Garden (Kunming city) is the one best situated from a botanical perspective. The region (Yunnan Province) has a great diversity of plant material, including roses. This garden has been the start of several expeditions into the more mountainous areas where botanical diversity is very high. The garden is also in a state of expansion. Kunming will be the host to a world wide horticultural exhibition in 1999. Many events are being planned.

We visited many other smaller collections that had limited rose material. The cultural revolution has taken a toll on many of these collections. Interest in gathering together old cultivars as well as native plant material is just being rekindled. Financing these collections is a real problem. Many efforts are in place to help raise money — some at the expense of research programs.

Development of a more formalized exchange programs with various Botanical Gardens (BG) appears feasible (eg. Beijing BG, Kunming BG, and the Nanjing BG). Several North American institutions already have active cooperative programs with some of these centres (eg. Missouri BG — Flora of China group — and UBC-BG have linkages to the Nanjing BG) and it would help to cement relationships and long term needs for germplasm exchanges and potentially many other programs (research, education and fund raising).

ROSE BREEDING

Several Chinese researchers have been developing triploid roses for landscape settings. Since these plants do not develop seed, flowering is reported to be superior to traditional tetraploid roses. It was difficult to determine what species/cultivars were being used in these programs but the plant material did look very visually appealing. In several plantings, disease resistance appeared very good. We did meet two researchers who were involved in collecting old traditional Chinese cultivars (and some species): Professor Huang Shanwu (Institute of Vegetables and Flowers, Beijing) and Professor Chen Junyu (Bejing Forestry University). Regardless of the locations we visited, disease resistance and cold hardiness were key components in the programs (as they often are around the world).

Several researchers have developed a database of rose cultivars. The main thrust of the program appears to be at the Beijing Forestry University although we did see several versions of the program at other locations. The program details the parentage and history of the plant material (in Chinese of course). When asked about plans for distribution of the database, our hosts said this would happen at some point in the future since the program was still under development.

At the start of the trip we had submitted lists of desired species to be collected by the team to the Chinese government. After several revisions, a final list of roses was approved (*Rosa rugosa* was excluded from our list). However, we did encounter some confusion as, unfortunately, other protected species were not listed (eg. *Rosa odorata*). There was no explanation of why we were prohibited from collecting these plants.

At the last research institute we visited, we asked Professor Zhang Jie, a respected taxonomist about the restrictions. She explained that specific sites (where the roses occurred were protected. It was the sites that were endangered not the species! According to her, all species collected from botanical gardens (not wild stands) were allowed! The goal of the Chinese program was to preserve the endangered environments and sites.

Collectively, we gathered about 40 accessions of roses. Approximately 20% of the material was collected from native stands (Beauty Mountain, Yunnan Province) of the plants with the remainder originating from Botanic Gardens or Arboretums visited. Although the quantity and diversity of material collected was somewhat below our expectations, it will be well utilized. All seed was cleaned, inspected and returned to Canada or the USA with team members. The seed was divided into separate lots before we left China in case any one person's luggage went astray on the way home. Several scions of roses were imported as well. These are in quarantine as we write and will be released once they are tested for diseases and other organisms. A listing of the material collected is presented in

Appendix 2. Researchers interested in obtaining cuttings of this material should contact one of the team members.

The germplasm we collected only scratched the surface of the diverse genetic resources available in China. Further investigation and collection is warranted. Of particular interest, is material in the mountainous region of Yunnan Province in the south of China and in the northwest areas where cold hardiness could be obtained. Both provide tremendous opportunities for new and interesting plant material.

APPENDIX 1 — RESEARCH CENTRES VISITED

BEIJING: College of Landscape Architecture, Beijing Forestry University; Institute of Vegetables and Flowers, Chinese Academy of Agricultural Sciences; Head of International Cooperation Department; Beijing Rose Association; Beijing Botanical Garden, Beijing Landscape Architecture Bureau; BBG, Institute of Botany, Chinese Academia Sinica; Department of Horticulture, China Agricultural University.

KUNMING: Botanical Garden, Institute of Botany, Chinese Academia Sinica; Department of Biology, Yunnan University.

SHANGHAI: Institute of Horticulture, Shanghai Academy of Agricultural Sciences; Shanghai Rose Society; Shanghai Ornamental Horticulture Science Institute; Shanghai Botanical Garden, Shanghai Landscape Architecture Bureau.

NANJING: Nanjing Botanical Garden, Jiangsu Province and Chinese Academy of Sciences; Department of Horticulture, Nanjing Agricultural University; Horticultural Institute, Jiangsu Academy of Agricultural Sciences.

ZHENGZHOU: Zhengzhou Institute of Landscape Architecture; Zhengzhou Fruit Research Institute, Chinese Academy of Agricultural Sciences.

HARBIN, SHANYANG and CHANCHUNG: Harbin Botanical Garden.

APPENDIX 2 — PARTIAL LISTING OF ACCESSIONS COLLECTED IN CHINA

Species / Location *Rosa acicularis* / Harbin, *R. alba* / Beijing Bot. Garden, *R. beggariana* / Beijing Bot. Garden, *R. bella* / Shanyang, *R. bracteata* / Nanjing Bot. Garden, *R. centifolia* / Beijing Bot. Garden, *R. damascena* / Harbin, *R. davurica* / Harbin, *R. gallica* / Kunming Bot. Garden, *R. helenae* / Beauty Mountain, Kunming, *R. koreana* / Harbin, *R. laevigata* / Beijing, *R. laxa hybrida?* / Beijing University, *R. laxa* / Chanchung, *R. longicuspis* / Kunming Bot. Garden, *R. multiflora* / Kunming Bot. Garden and Nanjing Bot. Garden, *R. palustris* / Nanjing Bot. Garden, *R. roxburghii* / Beijing Bot. Garden, *R. xanthina* / Harbin.

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Dr Davidson is manager of the Morden Research Centre located in Morden, Manitoba. It is, among other things, the rose research facility maintained by Agriculture Canada, a department of the Canadian Government. He described the Sweden / Canada Rose Breeding Project in The Rosebank Letter *No. 13, May 1997. His latest scientific publication shared with Dr Allen Xue, a colleague, is entitled "Components of partial resistance for black spot disease (Diplocarpon rosae* Wolf) *in garden roses."* HortScience *(in press). We welcome Campbell Davidson to these pages again; we are certain his trip with his US friends to China will mark a watershed in rose development — perhaps an end to disease and tenderness. And we are looking for a recipe for duck quack.*

WELL DONE

Phyllis Coulter has edited the *Rose Round-Up* for **16 years** for the Calgary Rose Society. She has produced the newsletter six times a year through thick and thin. Working outside the home, being a mother and grandmother to a large family, helping her husband through critical times — enough time was found to go on with the show.

Now a young man has stepped forward to take on the challenge. We wish Stuart Dechkat well, and we wish Phyllis Coulter a well deserved time to relax.

The *Rose Round-Up* has drawn on the resources offered by *The Rosebank Letter* perhaps more than any other rose medium. We feel a special bond, and a hope that the service may continue strong.

Good luck Stuart Dechkat. Thank you Phyllis Coulter; we trust that now you will have enough time to smell your roses.