Elite Vitis amurensis at Zuojia, Jilin, China

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Background

Vitis amurensis has been used for at least eight decades in breeding programs in the Peoples Republic of China (PRC), CIS countries, and Eastern Europe. Although most of this breeding was based on *amurensis* selections obtained from the wild without extensive screening, these Eurasian efforts have shown the types of results that can be obtained with *amurensis* germplasm – over 70 named varieties with a at least a 25% *amurensis* background exist. In general, these varieties have fewer objectionable flavors and lower fruit acid levels than similar selections from *riparia*-based breeding, but lack the levels of late winter hardiness, and resistance to *Oidium* and *Phylloxera* achieved using *Vitis riparia*. The existing evidence from grape breeding suggests that they could play a valuable role in breeding programs, especially if elite *amurensis* germplasm was selected and utilized.

During the past 10-15 years there have been three programs in Eurasia to collect additional wild *amurensis* germplasm, evaluate it and select elite germplasm in standardized plantings. Two of these were in Russia; at the Potapenko Institute in Novocherkassk, and at the Far Eastern VIR station near Vladivostok. The third program, which remains very active is at the Chinese Academy of Agricultural Science's Institute of Special Economic Wild Animal and Plant Sciences in Zuojia, Jilin Province in NE China, This Chinese *Vitis amurensis* repository was established in 1956, and has collected elite germplasm from eight Chinese Provinces, particularly Jilin and Heilongjiang, the coldest regions of China. Over 400 of these selections remain in the collection and have been extensively characterized by the Institute over the last decade for resistance traits and agronomic potential. The collection is largely unknown outside of China.

In September, 2005, we were honored to spend ten days in Heilongjiang and Jilin Provinces learning more about viticulture in the far North of China. We spent two-plus days in the town of Zuojia, Jilin Province, visiting China's national *Vitis amurensis* grape repository at the Institute of Wild Plant and Animal Culture branch of the Chinese Academy of Agricultural Sciences. It was our second visit there in three years, but this second visit allowed time for more extensive observation and discussion. In those two days, we saw some of the most elite *Vitis amurensis* selections in the world. Our observations from that trip were never published. So, we present here a summary for the VitiNord audience that describes what we saw and learned there.

Mission of the Zuojia Program

Wild *Vitis amurensis* are the only Chinese grapes that are fully hardy in this extremely cold part of the world. We were surprised to find that these wild amurensis grapes are a commercially-important crop in Heilongjiang and Jilin Provinces. During our visit we tasted well-made sweet red wines, as well as dry rose wines produced from 100% wild *Vitis amurensis* grapes by wineries in the village of Zuojia in Jilin Province and in the cities of Harbin and Shangzhi in Heilongjiang Province. The best of the wines from *Vitis amurensis* had a pleasant characteristic flavor of strawberry that we appreciated. As expected, these wild grape wines had a fair amount of acid that needed to be offset by some sugar. However, our overall impression was that these were well-made products that appealed to Chinese tastes. In addition to the wines, we noticed that bottled grape juice from wild amurensis grapes was readily available in markets. Also, there is at least one commercial enterprise in Heilongjiang producing frozen grape juice concentrates from wild amurensis grapes.

Given this surprising commercial demand for fruit from wild grapes in Northeastern China, it became apparent to us that the primary mission of the Chinese Academy of Agricultural Sciences Institute at Zuojia is to breed pure *Vitis amurensis* selections that are improved over wild selections for disease resistance, cluster size and sugar-acid balance. They also breed for perfect flowers, which makes these selections more useful for fruit production than the generally

pistillate selections that occur in the wild. Their collection of over 400 accessions of *V. amurensis* from the far fringes of northern China provides quite a gene pool for their development work. We believe that some of the most elite *Vitis amurensis* selections in the world have been collected and/or bred at Zuojia. Some of the better selections that we observed in the collection at Zuojia are described below. Note that several of them have been released as named varieties. Unfortunately, we were presented with data from Zuojia that was incomplete, so some items are missing for some varieties. These selections, as well as a sample of others we observed in Zuojia, are pictured in the accompanying Powerpoint file.

Selection	Ave. (Max.) Weight of 1 cluster (g)	Ave. Weight of 1 berry (g)	Sugar (%)	Total acidity (%)	Origin	Notes 9-11 September, 2005
Shuang Hong	127 (285)	0.83	15.6	1.96	Zuojia	Perfect flowers
Shuang You	132.6 (500)	1.2	14.6	2.23	Heilongjiang	
Shuang Feng	117.9 (253.9)	0.81	14.3	2.03	Zuojia	Perfect flowers
Zuoshan #2	109.3 (163)	1.0	16	1.66	Zuojia	Perfect flowers
75-048			14.91	0.99	Zuojia mountain area	Perfect flowers; large compact cluster with long wing; very good disease resistance

So what is the value of these elite *Vitis amurensis* grapes for viticulture in North America? From a grape breeder's perspective, the best of these selections, such as 75-048, 86-905, Shuang Hong, Shuang You,and Shuang Feng, offer genes for cold hardiness without the curse of tiny berries and clusters, odd herbaceous flavors, and super-high acidity that we experience in our breeding with *Vitis riparia*. Also, from the many dozens of elite *Vitis amurensis* selections we observed in China, the prevailing American notion that all *Vitis amurensis* are disease-prone is clearly false. Jilin is an area similar to south-central Minnesota in spring and summer temperatures, humidity, and rainfall. Yet, under a minimal spray program, at least some of the selections we observed in Zuojia showed little or no Downy or Powdery Mildew by harvest time. Clearly there are hardy elite varieties of *Vitis amurensis* that combine traits of large cluster and berry size with good disease resistance. These selections simply have never been described outside of China nor imported into our North American breeding programs. We believe that these selections could make a valuable contribution to northern grape breeding. We intend to work with our friends in Heilongjiang and Jilin to import pollen from the best of these and use it in our future crosses.

We now have a fair number of seedling vines from elite Zuojia material that are in the early stages of evaluation. Some are showing the promising traits observed in Zuojia--large cluster, perfect flower, adequate PM and DM resistance.

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