Fruit and Nut collecting Expedition to the Russian Far East

August 5 through 25, 2001

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Fig. 1. Dr. Nicoli Vorsa and Dr. Kim Hummer, U. S. members of the Russian-American Russian Far East Expedition, sponsored by a USDA ARS Plant Exploration Grant in August 2001 to explore the Primorsky and Khabarovsk Territories.

Executive Summary

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Countries Visited: Russia, Primorsky and Khabarovsk Territories

Dates of Travel: August 5 through 25, 2001

Objectives: To obtain diverse samples, of hardy kiwifruit, *Actinidia*, hazelnuts, *Corylus*, strawberries, *Fragaria*, pears, *Pyrus*, currants, *Ribes*, raspberries, *Rubus*, blueberries, cranberries and lingonberries, *Vaccinium*. The Russians also targeted the above genera plus honeysuckle, *Lonicera*, and magnoliavine, *Schizandra*. Some other fruit genera, such as Mountain ash, *Sorbus*, elderberry, *Sambucus*, and several ornamental genera were also targeted for collection as requested by U.S. crop germplasm committees.

Accomplishments: More than 111 clonal and seed samples were collected representing 32 species and 22 genera. Five or more samples each were collected for hardy kiwifruit, pear, black currant, red raspberry, magnolia vine, cranberry, and blueberry. Open-pollinated population seed samples were obtained for raspberries, black currants, blueberries, hardy kiwifruits, magnolia vine, and hazelnuts. These were collected from dense forested regions in both territories. Strawberry plants were collected in the southern to middle region of Primorsky. Fruit of large-fruited clones of apple and pear were collected from towns throughout the Ussurie Valley. Nine species of currants were collected. Powdery mildew and white pine blister rust were observed in both territories. Black currant gall mites were observed at 3 localities. Blind buds were observed on red currants. Red raspberries were collected along road edges and open meadows throughout both territories. Arctic raspberry, cloudberry, blueberry, lingonberry, and cranberry were collected from sphagnum bogs in central and eastern Khabarovsk territory (49° N latitude). Samples were divided and these genetic resources are preserved at the VIR stations in Russia and the USDA, ARS, NCGR in Corvallis, Oregon. About 3000 km of roads throughout Primorsky and Khabarovsk Territory were traversed to obtain this plant material. Wild plants were primarily collected as population seed samples although some clonal propagules were collected for specific genotypes such as cranberries.

Fig. 2. Left to right, Dr. Nicholi Vorsa (Rutgers Universtiy), Dr. Vera Tserenko (Director VIR FEES, Vladivostok), Dr. Andrey Sabitov and Dr. Pavel Cherbukin (both scientists at FEES, Vladivostok), review the plans for the plant collecting expedition in Primorsky and Khabarovsk Territories.

Itinerary

Sunday, August 5

Kim Hummer and Nicholi Vorsa left the United States through San Francisco.

Monday, August 6

Kim Hummer and Nickoli Vorsa arrived at Seoul, South Korea.

Tuesday August 7

Kim Hummer and Nicholi Vorsa's flight from Seoul to Vladivostok (Владивосток) returned to Seoul, South Korea because of extreme flooding in the Vladivostok region.

Vera Funtova left St. Petersburg and arrived in Vladivostok.

Wednesday August 8

Kim Hummer and Nicholi Vorsa left Seoul and arrived in Vladivostok.

They met with Vera Tserenko, Director of the VIR Far East Experiment Station, along with Pavel Cherbukin, Andrey Sabitov, Irina Vvedenskaya and discussed the planned expedition routes.

Thursday August 9

Collected *Fragaria orientalis* at Bagataya Greva, 43° 13.303' N latitude, 132° 03.985' E longitude, elevation 936 ft. From this overlook both bays around the peninsula of Vladivostock could be seen.

Began the plant collecting expedition.

Camp set up at about 8 km East of Shumny (Шумныи), Primorsky Territory, 44° 22.571 N Latitude, 134° 39.160' E Longitude, Elevation 1237 feet.

Friday August 10

Traveled through Dalnegorsk (Дальнегорск) then traveled on dirt roads about 12 km north.

We camped on the north fork of the Krasnaya Rechka (Red River) 44° 40.365' N Latitude, 135° 35.175' E Longitude Elevation 2460 feet.

Saturday August 11

Most of the day was spent collecting in several hours walking distance from the campsite and at another location at the end of a road 14 km NE of Dalnegorsk
44° 41.945' N Latitude 135° 32.981' E Longitude Elevation 2040 feet.
Camp was set up about 70 km SE of Melnichove (Мельничное)

Sunday August 12

Plant collecting at Nebsny pass on Verkhny Irtysh (Creek)
At 45° 06.187 N Latitude 135° 48.937' E Longitude Elevation 2646 feet.
Camp was set up on the Kolumbe (Копумде) River at:
45° 12.920 N Latitude 135° 41.353' E Longitude Elevation 1800 feet

Monday August 13

Drove northeast and then north on the main Khabarovsk road through Luchegorsk (Лучегорск)
45° 25.930 N Latitude 135° 31.700 E Longitude Elevation 1114 feet

Tuesday August 14

Drove north through Fedoseevka (Федосьевка)
46° 32.073 N Latitude 134° 25.421' E Longitude Elevation 228 feet
continued driving north in the Khabarovsk Territory (Хабаровский Край) through Bikin (Бикин)
lodging with a Russian farm family in a small Russian village called Kotikovo (Комиково) at:
47° 25.248' N Latitude 134° 33.855 E Longitude Elevation 227 feet

Wednesday August 15

We collected plant material from a wooded area at the edge of town.
We then drove north to sphagnum bogs for additional collecting at:
48° 05.557' N Latitude 135° 08.061 E Longitude Elevation 276 feet
We drove north to the city of Khabarovsk (Хабаровск) the capitol of the territory
We visited the Arboretum, also known as the Dendrology Institute.
48° 27.955 N Latitude 135° 05.178 E Longitude Elevation 248 feet
We drove northeast along the Amur (Амур) River
Camp was set up at 49° 00.431 N Latitude 136° 28.298 E Longitude, Elevation 134'

Thursday August 16

We drove northeast along the Amur River.
We drove east following the Manoma (Манома)
We camped on the Anou River (our "black fly camp" at:
49° 22.390' N Latitude 137° 43.893' E Longitude Elevation 693 feet.

Friday August 17

We drove eastward to the conjunction of the Gobeelee and Bol Ertukulee Rivers.
We collected Ribes at: 49° 19.228'N 138° 03.440 E Longitude Elevation 1055 feet.
We set up camp at the Аджалами River
49° 07.246' N Latitude 139° 14.388 E Longitude Elevation 1095 feet.

Saturday August 18

We drove eastwards to the coast. We collected in several sphagnum bogs along the way. We set up camp on the coast of the Sea of Japan about 4 km north of the seaport of Vanino (Ванино).

Sunday August 19

We collected in sphagnum bogs near the coast.
We drove south to the Чинали River at:
48° 48.669' N Latitude 139° 57.636'E Longitude Elevation 325 feet

Monday August 20

We drove south through the city of Гатка At 48° 39.228' N Latitude, 139° 47.570' E Longitude, Elevation 1112; then on to the Koppi (Konnu) River. We drove back to Vanino (Ванино) and spent the night in a hotel.

Tuesday August 21

We drove west by the "Halfway" (Половинка) River for lunch and some plant collecting. We drove west and ended up rooming at a truck stop on the road towards Khabarovsk.

Wednesday August 22

We kept driving west. We stopped at roadside stands that were selling pears and bought fruit for seed extraction.

Thursday August 23

Drove south returned to Vladivostok
Cleaned seed and prepared it for inspection.

Friday August 24

Vera Funtova left Vladivostok to return to St. Petersburg.
Plant samples brought to the Inspection station for phytosanitary certification.
Discussion with Vera Tserenko, Director of the VIR Far East Experiment Station.
Tour of the field collections at the VIR station in Vladivostok.

Saturday August 25

Kim Hummer and Nicholi Vorsa returned to U. S. through Los Angeles.
Plant material was left for inspection by USDA APHIS in Los Angeles.

Fig. 3. Vehicle used for the Plant Collecting Expedition. Back row from left to right, Dr. Vera Funtova, Scientist from VIR St. Petersburg, Russia; Dr. Vera Tserenko, Director VIR FEES, Vladivostok, Russia; Dr. Irina Vvedenskaya, Scientist VIR, Vladivostok, Dr. Andrey Sabitov, Scientist VIR, Vladivostok; Dr. Pavel Cherbukin, Scientist VIR, Vladivostok; and front and center, Jim, the dog.

Abstract

From August 5 through 25, 2001, a joint American-Russian plant collecting expedition explored the Primorsky and Khabarovsk Territories of Eastern Siberia for genetic resources of temperate fruit and nut crops. Participants included staff from the U. S. Department of Agriculture, Agricultural Research Service, National Clonal Germplasm Repository (USDA, ARS, NCGR) in Corvallis, Ore.; Rutgers University, Philip E. Marucci Center for Blueberry and Cranberry Research and Extension, Chatsworth, N.J.; Vavilov All-Russian Research Institute of Plant Industry (VIR), St. Peters burgh and the Far East Experiment Station (FEES), Vladivostok, Russia. More than 111 clonal and seed samples were collected representing 32 species and 22 genera. Five or more samples were collected for *Actinidia kolomikta*, hardy kiwifruit, *Pyrus ussuriense*, pear, *Ribes fontaneum*, black currant, *Rubus sacchanlinensis*, red raspberry, *Schizandra chinensis*, *Vaccinium oxycoccos*, cranberry, and *V. uliginosum*, blueberry. Open pollinated population seed samples were obtained for *Rubus sacchalinensis*, *Ribes fontaneum*, and *Vaccinium uliginosum*. Clonal *Vaccinium oxycoccos* populations were collected based on leaf morphology consistent with diploid or tetraploid phenotypes. *Actinidia kolomikta*, and *Schizandra chinensis*, *Corylus heterophylla*, hazelnut, and *C. mandschuricum*, Manchurian hazelnut, were observed throughout the dense forested regions in both territories. The fruits of these species were green and just beginning to ripen. The tetraploid *Fragaria orientalis*, strawberry, was observed in the southern to middle region of Primorsky. Fruits ripen in June and only vegetative specimens were available. Larger fruited clones of *Malus baccata*, apple, and *Pyrus ussuriense*, grew as cultivated landraces in the Ussurie River Valley from Vladivostok to Khabarovsk. Nine *Ribes* species of black, red, spiney and dioecious currants were collected. Powdery mildew, *Spherothecia mors-uvae* and white pine blister rust, *Cronartium ribicola*, were observed in both territories. Black currant gall mites, *Cecidophyopsis ribis*, were observed at 3 localities on two black currant species. Blind buds, were observed on red currants. *Rubus sacchalinensis* grew along road edges and open meadows throughout both territories. *Rubus arcticus*, Arctic raspberry, *R. chamaemorus*, cloudberry, *Vaccinium uliginosum*, *V. vitis-idaea*, lingonberry, and *V. oxycoccos*, were observed in sphagnum bogs in central and eastern Khabarovsk territory (49° N latitude). The blueberries were commonly collected from natural stands and sold on the roadside by local people. This fruit was plentiful in sphagnum bogs in the mountainous central and eastern parts of both territories. Collection samples of seeds and clones were divided and the genetic resources are preserved at the VIR stations in Russia and the USDA, ARS, NCGR in Corvallis, Oregon.

Key words: genetic resources, germplasm, small fruits, pomes, nuts, *Actinidia*, *Corylus*, *Malus*, *Pyrus*, *Ribes*, *Rubus*, *Schizandra*, *Vaccinium*, currants, gooseberries, pears, apples, hardy kiwifruit, hazelnuts, raspberries, blueberries, cranberries, lingonberries.

Acknowledgement

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Introduction

Vladivostok, "Lord of the East" in Russian, is a southeastern seaport for the Russian Federation. A French whaling vessel explored and over-wintered in this region in 1852 and returned to the courts of Europe with the description. Vladivostok was established in 1860 when a Russian military transport "Manchur" landed at the site of Port May. The Chinese territory was ceded to Russia in 1898, fell in January 1905, during the Russo-Japanese war, and was regained during World War II. This city is the home base of the Russian Pacific Fleet and was closed to non-Soviets from 1958 to 1991. Now the city contains about 700,000 permanent residents with a large Chinese population. Businesses from many parts of the world are beginning to develop the region.

Vladivostok is the southern point of the Muravyov-Amursky Peninsula and the provincial capital for Primorsky Territory. In this territory, roads are poorly developed, under construction or non-existant. Our plant collecting expedition crossed the Primorsky Territory through the Sikhote-Alyin Mountains east to the Sea of Japan, travel northwest, once again crossing the mountains to the west towards Khabarovsk; driving north following the Amur River then driving east to the port of Vanino, driving south to the Koppi River then returning to Vladivostok (Fig. x). Our expedition occurred from August 5 through 25, 2001. Participants included staff from the USDA, ARS, NCGR in Corvallis, Ore.; Rutgers University, Philip E. Marucci Center for Blueberry and Cranberry Research and Extension, Chattsworth, N.J.; Vavilov All-Russian Research Institute of Plant Industry (VIR), St. Petersburg and the Far East Experiment Station (FEES), Vladivostok, Russia.

Geography and climate

Vladivostok, is located at 43° N by 142° E. The Primorsky Territory is bounded by the Ussurie River and the Chinese border on the West; the Sea of Japan on the south and east; the Khabarovsk Territory to the north. The Khabarovsk Territory begins at about 47°N, is bounded by the Amur River and the Amur Territory on the west and north, and the Sea of Japan on the east. Winter temperatures of this region are severe, commonly -20 °C with winter minima at -40 °C.

Fig. 4. Flooding on roadways in Vladivostok two days after the typhoon of August 2001. Many low-lying houses were washed away; potholes were created in major roadways. The underpavement was washed out of roads. Asphalt was cracked and fissues up to 4 ft deep were washed in fields by nearby streams. Cars, houses and general wreckage were washed into stream beds.

Average daily temperature is generally above freezing in mid-March. April through June brings pleasant spring weather. July through September are the hottest months, with temperatures commonly above 30 °C. Typhoon rains are common in August and September. August 7, 2001, the day we were scheduled to arrive in Vladivostok, a typhoon dropped more than 50 cm rain on the city in two days. The airport was closed due to flooding. Our plane from Seoul was rescheduled for August 8, 2001, and this time it landed. The following 21 days were sunny, warm and suitable for camping and plant collecting. Mosquitoes and black flies abounded; ticks were present but not too plentiful. We observed one family of black bears (while we were driving down the road), several bear prints, one rock snake, deer, fox, rabbits, shrews, herons, and the ubiquitous crows and magpies.

Fruit culture

The Russians impressed me. They were racially diverse. They were rugged, hardy, weathered folk who had just survived yesterday's disaster and were mentally prepared to survive tomorrow's. They accepted what they had and made things work with the little resources at hand. The people were very much aware of using plants directly from the wild. The group that we were with were very excited about collecting and eating wild plants – including the delicacies of wild mushrooms, boletes, oyster mushrooms, and morels; wild herbs such as thyme found along the seashore and black currant leaves from the forest, for infusions in combination with tea besides collecting wild berries for direct eating. Many of the local people would collect buckets of honeysuckle berries (*Lonicera edulus*) in early June and sell them on the roadsides. These berries would sell for 50 Rubels per 5 gallon bucket along the roadside. In contrast, the vendors who sold that same amount of blueberries (*Vaccinium uliginosum*) were considered exorbitant at 20 Rubels. I ended up paying 50 Rubels for about 5 gallons of *Pyrus ussuriense* for a particular cultivar.

Native species collected

During our plant collecting expedition more than 111 clonal and seed samples were collected representing 32 species and 18 genera (Table 1). Brief summaries of the main genera are given below. Collection notebooks are filed at the USDA ARS Plant Exploration Office, Beltsville, Maryland; the VIR station in St. Petersburg, Russia, and at the USDA ARS NCGR, Corvallis, Oregon.

<u>*Actinidia* hardy kiwifruit</u>

Actinidia kolomikta Maxim. was observed throughout the Primorsky and Khabarovsk Territories during our tour. We collected open pollinated fruit samples at five locations. The fruit was not fully ripe upon at collection. This genus is dioecious. The male plants had characteristic white or pale tipped leaves.

Actinidia arguta Planch ex Miq. and *A. polyaama* Maxim.occur as far north as Vladivostok. We had hoped to collect these species but they were not ripe during our visit.

<u>*Corylus* hazelnuts</u>

Two species, *Corylus sieboldiana* var. *mandschurica* (Maxim.) C. K. Schneider and *C. heterophylla* Fischer are native to this region. We observed both of these species throughout both territories. We collected nuts, however, these nuts were very green. *Corylus sieboldiana* var. *mandschurica* had closed bracts, which were reminiscent of *C. cornuta*

Marsh of the Pacific Northwestern United States. *C. sieboldiana* var. *mandshurica* had fine hairs throughout the surface of the bracts. These hairs would come attach to hands, like little splinters, whenever the nuts with bracts were handled.

Fig. 5. *Corylus sieboldiana* var. *mandschurica* (HVSC-026) collected from dense woods in the region of the north fork of the Krasnoya River, about 12 km NE of Dalnegorsk, in the Primorsky Territory. The nuts were immature in early August. We collected some nuts and also brought back scionwood for grafting.

<u>*Fragaria* – strawberry</u>

Fig. 6. The tetraploid strawberry, *Fragaria orientalis* Losinsk was observed throughout the southern part of the Primorsky Territory. Fruits ripen in June and were gone by our trip in August. We collected runners and crowns for clonal propagations of representative genotypes.

<u>Pome fruits, pears, apples, mountain ash</u>

One of our target species was *Pyrus ussuriense* Maxim., the Asian pear native to the Ussurie River Valley. The trees that we saw were more like landraces than wild trees. These trees were cultivated by the local people. The fruits were about 6 to 8 cm in diameter. The fruits ripen during the winter and have good "keeping" qualities. The whole fruits are collected and dried (to blackness) and used year-around for fruit compotes. One clone 'Primorsky Sour' that we obtained from a local roadside market tasted very sour – like a lemon. I enjoyed the flavor of these fruits very much but it certainly made my whole mouth pucker. While we observed many *Pyrus ussuriense* in towns throughout the Primorsky Territory the only location in Khabarovsk Territory where we observed the trees was at the Khabarovsk Arboretum as a cultivated plant.

We observed *Malus baccata* (L.) Borkh. at many of the locations where *P. ussuriense* was cultivated. In the wild *M. baccata* fruit were small, < 1 cm diameter. Cultivated landraces of this species had fruits that were as much as 6 cm diameter. We also collected ripe fruits of native mountain ash, *Sorbus korensis*. These genera were common throughout Primorsky Territory in the Sikhote-Alin Mountains, but their fruits are not commonly used by local people.

Fig. 7. *Ribes pauciflorum* Turcz. Seed collection and processing. The fruits darkened upon ripening. Many green fruits were present although other fruits were ripe, dark, and ready to fall off when the branch was touched.

Ribes currants

Eight species of *Ribes* were collected including black, red, and spiney currants. The Primorsky and Khabarovsk territories are a center of diversity of currants. White pine blister rust disease, a significant disease of pines and *Ribes*, may have originated in Siberia. One local black currant species, *Ribes fontaneum* Boczkarn, has long racemes containing from 19 to 21 berries per raceme. Another native black currant, *Ribes pauceflorum* Turcz., is very cold hardy and desiccation tolerant. We collected the unripe and ripening fruits of this species at xx locations. We observed, and collected the red currants, *R. pallidiflorum* xx, *Ribes palczewskii* (Janez.) Pojark, *Ribes maximowiczianum* and *R. triste* Pallas. We obtained one sample of the spiney currant, *Ribes horidum* Rupr., on the eastern side of the Sikhote-Alyin Mountains near the town of Lidovka. We did not observe or collect *Ribes procumbens* Pall.

Rubus - raspberries

Fig. 8. Red raspberry, *Rubus sachalinensis* A. Leveille, primocanes in the Khabarovsk Territory.

Red raspberries, *Rubus sachalinensis* A. Leveille were ubiquitous throughout the Primorsky and Khabarovsk Territories. Fruits had ripened and were few in numbers in the south of Primorsky Territory. As we traveled further north, more fruits were ripe and we had greater accessibility for collection. We observed the arctic raspberry, *Rubus arcticus* L., and cloudberry, *Rubus chamaemorus* L. in bogs in the middle and eastern parts of the Khabarovsk Territory at about 48° to 49° N latitude. Both of these species were observed in mosquito infested sphagnum bog ecosystems similar to those of Alaska. Some of the associated vegetation included sundews, blueberries, cranberries, lingonberries and the crow berry, *Empitrum nigrum*. Larch or white birch, were infrequently observed in the over-story. Mostly the bogs were directly open to sunlight.

Rubus crataegifolius Bunge. was present in the southern part of Primorsky, particularly in the Vladivostok vicinity. We collected one sample of this species. This fruit is also natively distributed around the VIR station in Vladivostok. Most of the fruits of this species that were growing near Vladivostok were passed ripe and were gone by the time of our visit in August.

Schizandra – magnolia vines

This vine, *Schizandra chinensis*, allegedly contains stimulant properties. Local people chew or suck on the stem for a similar effect to coffee. The berries are being used in some gourmet "energy" drinks that are sold in the United States (e.g., Sobe sells a drink containing this plant). This species has potential as a new small fruit crop for the United States. It is cold hardy and may be appropriate for production in Alaska or northern great plains states. It would need trellising. The berries start green and ripen to red. The fruits we collected were very green and immature. They ripen in early to mid-September in Primorsky and Khabarovsk.

Fig. 9. Berries at a bog near the seaport of Vanino, on the Sea of Japan. The blueberries in the photo are *Vaccinium uliginosum* L. The orange fruited *Rubus chamaemorus* L. is in the center of the photograph. Lingonberry, *V. vitis-idaea* L., and cranberry, *V. oxycoccos* L. Associated plants included the black fruited crowberry, *Empetrum nigrum* L., sundew, leatherleaf, and a few scattered larches.

Vaccinium – blueberries, cranberries, lingonberries

Fig. 10. *Vaccinium uliginosum* L., Blueberries from a bog near Fedoseevka, Primorsky Territory at 46o 37.073 N latitude by 134o 25.421 E longitude at about 228 feet in elevation.

Three species of *Vaccinium* were collected: blueberries, *V. uliginosum* L.; lingonberries, *V. vitis-idaea* L.; and cranberries, *V. oxycoccos* L. Each of these species were common in sphagnum bogs of the region throughout both territories.

Vaccinium uliginosum L.

The blueberries, which were fully ripe during our trip, were commonly collected by local peoples from native stands and sold at roadside markets. We purchased two lots of these fruits from local vendors but collected at nine specific native localities. The lingonberry fruits were green in most locations and were just beginning to develop red color. We observed fungus affecting the inside of some fruit.

Vaccinium oxycoccos L.

We observed two forms of cranberries, the little-leaf, *V. oxycoccos* subsp. *microphylla*, and the large-leaf form, *V. oxycoccos* subsp. *palustris*. The little leaf form was most common at our location sites. At some localities both forms appeared to be introgressed. Fruits and leaves of some of the large-leaf forms appeared very close in size (fruits about 1 cm diameter; leaves about 1 cm long) to *V. macrocarpon* L. of eastern North America.

Fig. 11. Upon returning from the plant collecting expedition the hard working seed-cleaning crew takes a much needed break at 3:00 AM at the VIR Far East Esperiment Station in Vladivostok, Russia. From left to right: Dr. Andrey Sabitov, Dr. Pavel Cherbukin, Dr. Nicholi Vorsa, Dr. Irina Vvedinskaya, Dr. Vera Funtova.

Diseases and pests observed

Both powdery mildew, *Sphaerothecia uva-crispa*, and white pine blister rust, *Cronartium ribicola*, were observed at locations throughout both territories.

White pine blister rust was observed on *Ribes pauciflorum* near Lidoga, Primorsky and *R. maximowiczianum* in Vladivostok, Primorsky; and on *Ribes pallidiflorum* near the Anoui River and on *R. palczewski* near the Adzhalomu River in Khabarovsk

We observed big bud mite, *Cecidophyopsis ribis*, in *Ribes pauciflorum* near Lidoga; and on *Ribes fontaneum* on the Anoui, Gobeellee and Ertukulee Rivers in Khabarovsk.

In *Vaccinium* we observed a fungal infection (*Monilinia oxycocci* (Woronin) Honey) within lingonberry, *Vaccinium vitis-idaea* in the Primoria and Khabarovsk Territories.

Fig. 11. Map of the Primorsky Territory of the Russian Far East. The blue line represents the first five days of the northward route of the American-Russian plant collecting expedition in August 2001. The white circles represent the camping locations.

Fig. 12. Map of the Primorsky and Khabarovsk Territory in the Russian Far East. The blue line represents the northern route of the American-Russian Plant Collecting Expedition of August 5 through 25, 2001. The return route included driving to Khabarovsk vicinity and then south on the main road to Vladivostok.

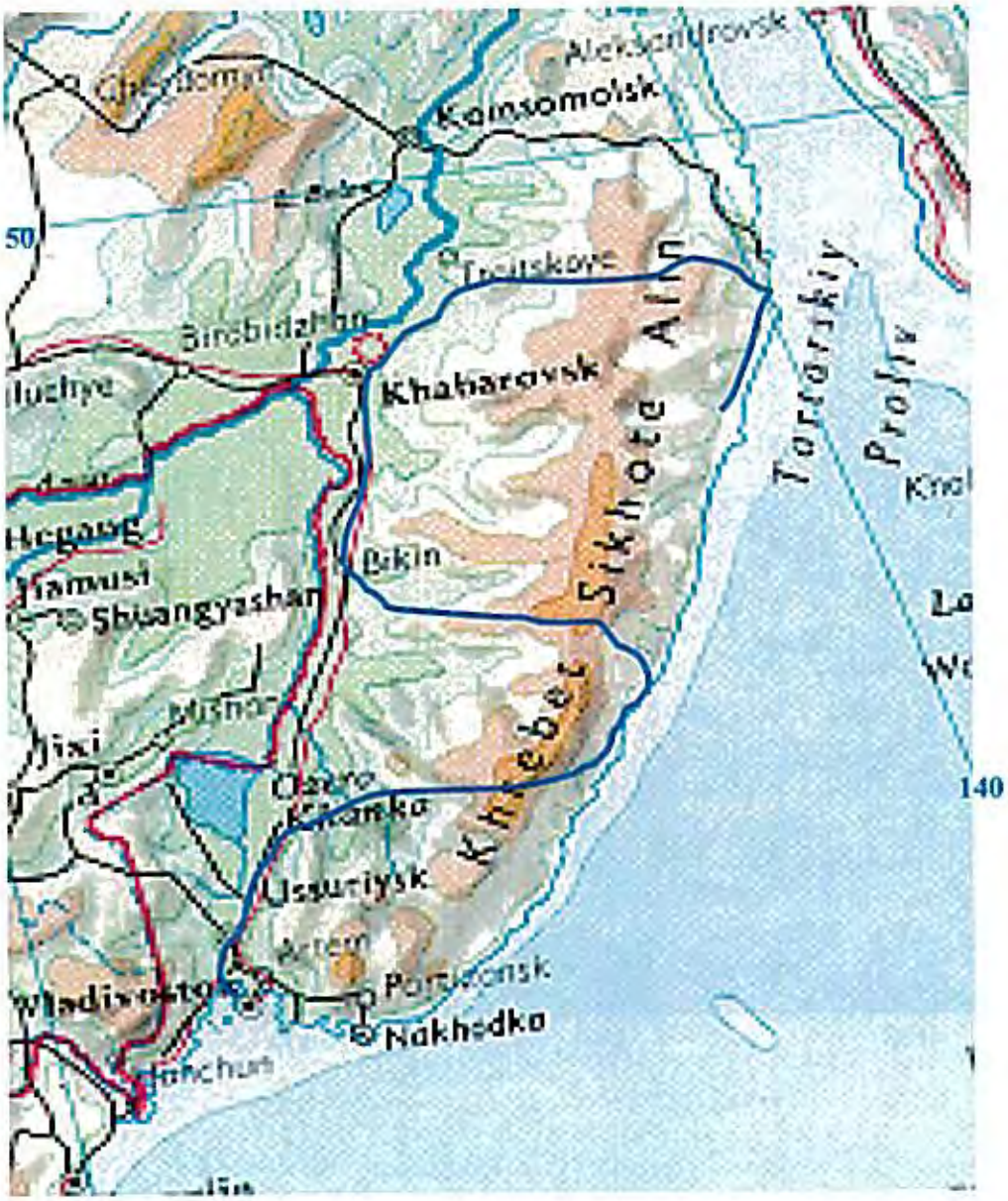

Table 1. Plant and seed accessions from the Russian Far East, collected in August 2001. Sorted by collection number.

Corvallis local number	Collection number	Genus	Species	Form received
CFRA 1801	HVSC-001	Fragaria	*F. orientalis* Losinsk	PL
CVAC 1451	HVSC-002	Vaccinium	*V. uliginosum* L.	SD
CPYR 2725	HVSC-003	Pyrus	*P. pyrifolia (Burm. f.) Nakai*	SD
xxxx	HVSC-004	Pinus	*P. korensis*	SD
CSAM 0147	HVSC-005	Sambucus	*S. mandshuricum*	SD
CSOR 0272	HVSC-006	Sorbus	*S. coreanus*	SD
CRUB 2142	HVSC-007	Rubus	*R. crataegifolius* Bunge	SD
CRUB 2143	HVSC-008	Rubus	*R. sachalinensis* A. Leveille	SD
CFRA 1802	HVSC-009	Fragaria	*F. orientalis* Losinsk	SD
CACT 0156	HVSC-010	Actinidia	*A. kolomikta* Maxim.	SD
CSCH 0001	HVSC-011	Schisandra	*S. chinensis* (Turcz.) Baill.	SD
CSAM 0148	HVSC-012	Sambucus	*S. coreanus*	SD
CVAC 1452, 1453	HVSC-013	Vaccinium	*V. vitis-idaea* L.	SD, PL
CRUB 2144	HVSC-014	Rubus	*R. sachalinensis* A. Leveille	SD
CSAM 0149	HVSC-015	Sambucus	*S. coreanus*	SD
CACT 0157	HVSC-016	Actinidia	*A. kolomikta Maxim.*	SD
CVAC 1454	HVSC-017	Vaccinium	*V. vitis-idaea* L.	SD
CVAC 1455	HVSC-018	Vaccinium	*V. uliginosum L.*	SD
CRIB 1239	HVSC-019	Ribes	*R. pauciflorum Turcz.*	SD
CVAC 1456	HVSC-020	Vaccinium	*V. vitis-idaea L.*	SD
CRIB 1240	HVSC-021	Ribes	*R. pauciflorum Turcz.*	SD
CRIB 1241	HVSC-022	Ribes	*R. pallidiflorum* Pojark.	SD
CSAM 0150	HVSC-023	Sambucus	*S. coreanus*	SD
CRIB 1242	HVSC-024	Ribes	*R. maximowiczianum Kom.*	SD
CRUB 2145	HVSC-025	Rubus	*R. sachalinensis* A. Leveille	SD
CCOR 0757	HVSC-026	Corylus	*C. sieboldiana* var. *mandschuricum*	SD, PL
CACT 0158	HVSC-027	Actinidia	*A. kolomikta Maxim.*	SD, PL
CVAC 1457	HVSC-028	Vaccinium	*V. uliginosum L.*	SD
CSCH 0002	HVSC-029	Schisandra	*S. chinensis (Turcz.) Baill.*	SD, PL
xxxx	HVSC-030	Physocarpus	*P. amurensis* (Maxim.) Maxim.	SD
xxxx	HVSC-031	Clintonia	*C. udensis* Trautv. & C. A.	SD
xxxx	HVSC-032	Rhododendron	*xRhodo*	SD
xxxx	HVSC-033	Juniper	*J. sibericum*	PL
CLON 0016	HVSC-034	Lonicera	*L. caerulea var. edulis Turcz. ex Herder*	SD
CFRA 1803	HVSC-035	Fragaria	*F. orientalis* Losinsk	PL
CRUB 2146	HVSC-036	Rubus	*R. sachalinensis* A. Leveille	PL
CACT 0159	HVSC-037	Actinidia	*A. kolomikta Maxim.*	SD
CRUB 2147	HVSC-038	Rubus	*R. sachalinensis* A. Leveille	SD
CSCH 0003	HVSC-039	Schisandra	*S. chinensis (Turcz.) Baill.*	SD
CRIB 1243	HVSC-040	Ribes	*R. fontaneum Boczkam*	SD
CVAC 1459	HVSC-041	Vaccinium	*V. uliginosum L.*	SD
CMAL	HVSC-042	Malus	*M. baccata* (L.) Borkh.	SD

Corvallis local number	Collection number	Genus	Species	Form received
CSOR 0273	HVSC-043	Sorbus	*S. coreanus*	SD
CMAL	HVSC-044	Malus	*M. baccata* (L.) Borkh.	SD
CVAC 1460, 1461	HVSC-045	Vaccinium	*V. oxycoccos* L.	SD, PL
CVAC 1462	HVSC-046	Vaccinium	*V. uliginosum* L.	SD
CVAC 1463	HVSC-047	Vaccinium	*V. uliginosum* L.	SD
CVAC 1464	HVSC-048	Vaccinium	*V. oxycoccos L.*	PL
CVAC 1465	HVSC-049	Vaccinium	*V. oxycoccos L.*	PL
CVAC 1466	HVSC-050	Vaccinium	*V. oxycoccos L.*	PL
CVAC 1467	HVSC-051	Vaccinium	*V. uliginosum L.*	SD
CMAL	HVSC-052	Malus	*M. baccata (L.) Borkh.*	SD
CPYR 2726	HVSC-053	Pyrus	*P. ussuriense Maxim.*	SD, PL
CHUM 1026	HVSC-054	Humulus	*H. lupulus* L.	SD
CCOR 0758	HVSC-055	Corylus	*C. heterophylla*	PL
CCOR 0759	HVSC-056	Corylus	*C. sieboldiana* var. *mandschuricum*	PL
CVAC 1468, 1469	HVSC-057	Vaccinium	*V. oxycoccos* L.	SD
CVAC 1470, 1471	HVSC-058	Vaccinium	*V. oxycoccos* L.	SD, PL
CVAC 1472	HVSC-059	Vaccinium	*V. uliginosum* L.	SD
CPYR 2727	HVSC-060	Pyrus	*P. ussuriense Maxim.*	SD
xxxx	HVSC-061	Syringa	*Sp.*	SD
CMOR 0007	HVSC-062	Morus	*M. nigrum* L.	SD
CRIB 1244	HVSC-063	Ribes	*R. maximowiczianum*	SD
CRIB 1245	HVSC-064	Ribes	*R. diacantha*	SD
CMAL	HVSC-065	Malus	*M. baccata (L.) Borkh.*	SD
CVAC 1473, 1474	HVSC-066	Vaccinium	*V. oxycoccos* L.	SD, PL
CVAC 1475	HVSC-067	Vaccinium	*V. uliginosum* L.	SD
CRUB 2148	HVSC-068	Rubus	*R. sachalinensis* A. Leveille	SD
CCOR 0760, 0764	HVSC-069	Corylus	*C. heterophylla*	SD,PL
CRIB 1246	HVSC-070	Ribes	*R. pauciflorum* Turcz.	SD
CRUB 2149	HVSC-071	Rubus	*R. sachalinensis* A. Leveille	SD
CACT 0160	HVSC-072	Actinidia	*A. kolomikta Maxim.*	SD
CCOR 0761	HVSC-073	Corylus	*C.sieboldiana* var. *mandschuricum*	SD
CRIB 1247	HVSC-074	Ribes	*R. pallidiflorum* Pojark.	SD
CRUB 2150	HVSC-075	Rubus	*R. sachalinensis* A. Leveille	SD
CSCH 0004	HVSC-076	Schisandra	*S. chinensis (Turcz.) Baill.*	SD
CRIB 1248	HVSC-077	Ribes	*R. pallidiflorum* Pojark.	SD
CRIB 1249	HVSC-078	Ribes	*R. fontaneum* Boczkarn	SD
CRUB 2151	HVSC-079	Rubus	*R. sachalinensis* A. Leveille	SD
CRUB 2152	HVSC-080	Rubus	*R. sachalinensis* A. Leveille	SD
CRIB 1250	HVSC-081	Ribes	*R. fontaneum* Boczkarn	SD
CRIB 1251	HVSC-082	Ribes	*R. pallidiflorum Pojark.*	SD
CRIB 1252	HVSC-083	Ribes	*R. triste* L.	SD
CRUB 2153	HVSC-084	Rubus	*R. sachalinensis* A. Leveille	SD
xxxx	HVSC-085	Cornus	*C. stolonifera* L.	SD
CRIB 1253	HVSC-086	Ribes	*R. palczewski (Jancz.) Pojark*	SD
CVAC 1476	HVSC-087	Vaccinium	*V. uliginosum* L.	SD
CRUB 2154	HVSC-088	Rubus	*R. arcticus* L.	SD

Corvallis local number	Collection number	Genus	Species	Form received
CVAC 1477, 1478	HVSC-089	Vaccinium	*V. oxycoccos* L.	PL
CVAC 1479, 1480	HVSC-090	Vaccinium	*V. vitis-idaea L.*	SD
CLON 0017	HVSC-091	Lonicera	*L. caerulea var. edulis Turcz. ex Herder*	SD
CRUB 2155	HVSC-092	Rubus	*R. sachalinensis* A. Leveille	SD
CRUB 2156	HVSC-093	Rubus	*R. chamaemorus* L.	SD
xxxx	HVSC-094	Empitrum	*E. nigrum* L.	SD
CVAC 1481	HVSC-095	Vaccinium	*V. oxycoccos*	SD
CVAC 1482	HVSC-096	Vaccinium	*V. vitis-idaea* L.	SD
CVAC 1483, 1484	HVSC-097	Vaccinium	*V. uliginosum* L.	SD
CRIB 1254	HVSC-098	Ribes	*R. palczewski* (Jancz.) Pojark	SD
CRIB 1255	HVSC-099	Ribes	*R. horidum* Rupr.	SD
CRIB 1256	HVSC-100	Ribes	*R. fontaneum* Boczkarn	SD
CRIB 1257	HVSC-101	Ribes	*R. fontaneum* Boczkarn	SD
CSCH 0005	HVSC-102	Schisandra	*S. chinensis (Turcz.) Baill.*	SD
CRUB 2157	HVSC-103	Rubus	*R. sachalinensis* A. Leveille	SD
CVAC 1485	HVSC-104	Vaccinium	*V. vitis-idaea* L.	SD
CRIB 1258	HVSC-105	Ribes	*R. fontaneum* Boczkarn	SD
CRIB 1259	HVSC-106	Ribes	*R. fontaneum* Boczkarn	SD
CPYR 2728	HVSC-107	Pyrus	*P. ussuriense* Maxim.	SD
CPYR 2729	HVSC-108	Pyrus	*P. ussuriense* Maxim.	SD
CPYR 2730	HVSC-109	Pyrus	*P. ussuriense* Maxim.	SD
CRIB 1260	HVSC-110	Ribes	*R. dikusha* Fisch.	SD
CRIB 1261	HVSC-111	Ribes	*R. pallidiflorum* Pojark.	SD

Table 2. Russian plant collections, sorted on Corvallis local number.

Corvallis local no.	Collection number	Genus	Species	Form received
CACT 0156	HVSC-010	Actinidia	*A. kolomikta* Maxim.	SD
CACT 0157	HVSC-016	Actinidia	*A. kolomikta Maxim.*	SD
CACT 0158	HVSC-027	Actinidia	*A. kolomikta Maxim.*	SD, PL
CACT 0159	HVSC-037	Actinidia	*A. kolomikta Maxim.*	SD
CACT 0160	HVSC-072	Actinidia	*A. kolomikta Maxim.*	SD
CCOR 0757	HVSC-026	Corylus	*C. sieboldiana* var. *mandschuricum*	SD, PL
CCOR 0758	HVSC-055	Corylus	*C. heterophylla*	PL
CCOR 0759	HVSC-056	Corylus	*C. sieboldiana* var. *mandschuricum*	PL
CCOR 0760, 0764	HVSC-069	Corylus	*C. heterophylla*	SD,PL
CCOR 0761	HVSC-073	Corylus	*C.sieboldiana* var. *mandschuricum*	SD
CFRA 1801	HVSC-001	Fragaria	*F. orientalis* Losinsk	PL
CFRA 1802	HVSC-009	Fragaria	*F. orientalis* Losinsk	SD
CFRA 1803	HVSC-035	Fragaria	*F. orientalis* Losinsk	PL
CHUM 1026	HVSC-054	Humulus	*H. lupulus* L.	SD
CLON 0016	HVSC-034	Lonicera	*L. caerulea var. edulis Turcz. ex Herder*	SD
CLON 0017	HVSC-091	Lonicera	*L. caerulea var. edulis Turcz. ex Herder*	SD
CMAL	HVSC-042	Malus	*M. baccata* (L.) Borkh.	SD
CMAL	HVSC-044	Malus	*M. baccata* (L.) Borkh.	SD
CMAL	HVSC-052	Malus	*M. baccata (L.) Borkh.*	SD
CMAL	HVSC-065	Malus	*M. baccata (L.) Borkh.*	SD
CMOR 0007	HVSC-062	Morus	*M. nigrum* L.	SD
CPYR 2725	HVSC-003	Pyrus	*P. pyrifolia (Burm. f.) Nakai*	SD
CPYR 2726	HVSC-053	Pyrus	*P. ussuriense Maxim.*	SD, PL
CPYR 2727	HVSC-060	Pyrus	*P. ussuriense Maxim.*	SD
CPYR 2728	HVSC-107	Pyrus	*P. ussuriense* Maxim.	SD
CPYR 2729	HVSC-108	Pyrus	*P. ussuriense* Maxim.	SD
CPYR 2730	HVSC-109	Pyrus	*P. ussuriense* Maxim.	SD
CRIB 1239	HVSC-019	Ribes	*R. pauciflorum Turcz.*	SD
CRIB 1240	HVSC-021	Ribes	*R. pauciflorum Turcz.*	SD
CRIB 1241	HVSC-022	Ribes	*R. pallidiflorum* Pojark.	SD
CRIB 1242	HVSC-024	Ribes	*R. maximowiczianum Kom.*	SD
CRIB 1243	HVSC-040	Ribes	*R. fontaneum Boczkarn*	SD
CRIB 1244	HVSC-063	Ribes	*R. maximowiczianum*	SD
CRIB 1245	HVSC-064	Ribes	*R. diacantha*	SD
CRIB 1246	HVSC-070	Ribes	*R. pauciflorum* Turcz.	SD
CRIB 1247	HVSC-074	Ribes	*R. pallidiflorum* Pojark.	SD
CRIB 1248	HVSC-077	Ribes	*R. pallidiflorum* Pojark.	SD
CRIB 1249	HVSC-078	Ribes	*R. fontaneum* Boczkarn	SD
CRIB 1250	HVSC-081	Ribes	*R. fontaneum* Boczkarn	SD
CRIB 1251	HVSC-082	Ribes	*R. pallidiflorum Pojark.*	SD
CRIB 1252	HVSC-083	Ribes	*R. triste* L.	SD
CRIB 1253	HVSC-086	Ribes	*R. palczewski (Jancz.) Pojark*	SD
CRIB 1254	HVSC-098	Ribes	*R. palczewski* (Jancz.) Pojark	SD

Corvallis local no.	Collection number	Genus	Species	Form received
CRIB 1255	HVSC-099	Ribes	*R. horidum* Rupr.	SD
CRIB 1256	HVSC-100	Ribes	*R. fontaneum* Boczkarn	SD
CRIB 1257	HVSC-101	Ribes	*R. fontaneum* Boczkarn	SD
CRIB 1258	HVSC-105	Ribes	*R. fontaneum* Boczkarn	SD
CRIB 1259	HVSC-106	Ribes	*R. fontaneum* Boczkarn	SD
CRIB 1260	HVSC-110	Ribes	*R. dikusha* Fisch.	SD
CRIB 1261	HVSC-111	Ribes	*R. pallidiflorum* Pojark.	SD
CRUB 2142	HVSC-007	Rubus	*R. crataegifolius* Bunge	SD
CRUB 2143	HVSC-008	Rubus	*R. sachalinensis* A. Leveille	SD
CRUB 2144	HVSC-014	Rubus	*R. sachalinensis* A. Leveille	SD
CRUB 2145	HVSC-025	Rubus	*R. sachalinensis* A. Leveille	SD
CRUB 2146	HVSC-036	Rubus	*R. sachalinensis* A. Leveille	PL
CRUB 2147	HVSC-038	Rubus	*R. sachalinensis* A. Leveille	SD
CRUB 2148	HVSC-068	Rubus	*R. sachalinensis* A. Leveille	SD
CRUB 2149	HVSC-071	Rubus	*R. sachalinensis* A. Leveille	SD
CRUB 2150	HVSC-075	Rubus	*R. sachalinensis* A. Leveille	SD
CRUB 2151	HVSC-079	Rubus	*R. sachalinensis* A. Leveille	SD
CRUB 2152	HVSC-080	Rubus	*R. sachalinensis* A. Leveille	SD
CRUB 2153	HVSC-084	Rubus	*R. sachalinensis* A. Leveille	SD
CRUB 2154	HVSC-088	Rubus	*R. arcticus* L.	SD
CRUB 2155	HVSC-092	Rubus	*R. sachalinensis* A. Leveille	SD
CRUB 2156	HVSC-093	Rubus	*R. chamaemorus* L.	SD
CRUB 2157	HVSC-103	Rubus	*R. sachalinensis* A. Leveille	SD
CSAM 0147	HVSC-005	Sambucus	*S. mandshuricum*	SD
CSAM 0148	HVSC-012	Sambucus	*S. coreanus*	SD
CSAM 0149	HVSC-015	Sambucus	*S. coreanus*	SD
CSAM 0150	HVSC-023	Sambucus	*S. coreanus*	SD
CSCH 0001	HVSC-011	Schisandra	*S. chinensis* (Turcz.) Baill.	SD
CSCH 0002	HVSC-029	Schisandra	*S. chinensis (Turcz.) Baill.*	SD, PL
CSCH 0003	HVSC-039	Schisandra	*S. chinensis (Turcz.) Baill.*	SD
CSCH 0004	HVSC-076	Schisandra	*S. chinensis (Turcz.) Baill.*	SD
CSCH 0005	HVSC-102	Schisandra	*S. chinensis (Turcz.) Baill.*	SD
CSOR 0272	HVSC-006	Sorbus	*S. coreanus*	SD
CSOR 0273	HVSC-043	Sorbus	*S. coreanus*	SD
CVAC 1451	HVSC-002	Vaccinium	*V. uliginosum* L.	SD
CVAC 1452, 1453	HVSC-013	Vaccinium	*V. vitis-idaea* L.	SD, PL
CVAC 1454	HVSC-017	Vaccinium	*V. vitis-idaea* L.	SD
CVAC 1455	HVSC-018	Vaccinium	*V. uliginosum L.*	SD
CVAC 1456	HVSC-020	Vaccinium	*V. vitis-idaea L.*	SD
CVAC 1457	HVSC-028	Vaccinium	*V. uliginosum L.*	SD
CVAC 1459	HVSC-041	Vaccinium	*V. uliginosum L.*	SD
CVAC 1460, 1461	HVSC-045	Vaccinium	*V. oxycoccos* L.	SD, PL
CVAC 1462	HVSC-046	Vaccinium	*V. uliginosum* L.	SD
CVAC 1463	HVSC-047	Vaccinium	*V. uliginosum* L.	SD
CVAC 1464	HVSC-048	Vaccinium	*V. oxycoccos L.*	PL
CVAC 1465	HVSC-049	Vaccinium	*V. oxycoccos L.*	PL

Corvallis local no.	Collection number	Genus	Species	Form received
CVAC 1466	HVSC-050	Vaccinium	*V. oxycoccos L.*	PL
CVAC 1467	HVSC-051	Vaccinium	*V. uliginosum L.*	SD
CVAC 1468, 1469	HVSC-057	Vaccinium	*V. oxycoccos* L.	SD
CVAC 1470, 1471	HVSC-058	Vaccinium	*V. oxycoccos* L.	SD, PL
CVAC 1472	HVSC-059	Vaccinium	*V. uliginosum* L.	SD
CVAC 1473, 1474	HVSC-066	Vaccinium	*V. oxycoccos* L.	SD, PL
CVAC 1475	HVSC-067	Vaccinium	*V. uliginosum* L.	SD
CVAC 1476	HVSC-087	Vaccinium	*V. uliginosum* L.	SD
CVAC 1477, 1478	HVSC-089	Vaccinium	*V. oxycoccos* L.	PL
CVAC 1479, 1480	HVSC-090	Vaccinium	*V. vitis-idaea L.*	SD
CVAC 1481	HVSC-095	Vaccinium	*V. oxycoccos*	SD
CVAC 1482	HVSC-096	Vaccinium	*V. vitis-idaea* L.	SD
CVAC 1483, 1484	HVSC-097	Vaccinium	*V. uliginosum* L.	SD
CVAC 1485	HVSC-104	Vaccinium	*V. vitis-idaea* L.	SD
xxxx	HVSC-004	Pinus	*P. korensis*	SD
xxxx	HVSC-030	Physocarpus	*P. amurensis* (Maxim.) Maxim.	SD
xxxx	HVSC-031	Clintonia	*C. udensis* Trautv. & C. A.	SD
xxxx	HVSC-032	Rhododendron	*XRhodo*	SD
xxxx	HVSC-033	Juniper	*J. sibericum*	PL
xxxx	HVSC-061	Syringa	*Xsyringa*	SD
xxxx	HVSC-085	Cornus	*C. stolonifera* L.	SD
xxxx	HVSC-094	Empitrum	*E. nigrum* L.	SD

24. Budget

Airfare round trip from Portland to Vladivostok	1,800
New York to Vladivostok	2,000
St. Petersburg – Vladivostok	400
Per diem 22 days x 5 scientists x $40	3,850
2 Vehicle rentals plus gasoline and drivers	6,000
Tents, sleeping bags,	1,000
Refractometer, scale, hand lenses	1,000
Herbarium presses	250
Excess baggage for return trip	1,000
Camera , GPS, batteries	1,000
Water filters, medical supplies	500
Clippers, shovel, plastic bags, seed bags	600
Post-collection shipment of plant materials	600
	0
	20,000

Total 20,300