

Expedition to Collect Genetic Resources of Temperate Fruit Crops in Hokkaido, Japan

Funded by: USDA ARS Plant Exploration Grant 2004

Dates of Travel: 7 to 27 July 2004

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Fig. 1. The plant collectors, Drs. Imanishi, Davis, Hummer, and Iketani, near Mt. Apoi, Hokkaido, 23 July 2004.

Executive summary

From 7 to 27 July 2004, a plant collecting trip was taken to obtain genetic resources of temperate fruit genera throughout Hokkaido, Japan. A material transfer agreement was prepared in advance and signed by Dr. Allan Stoner (USDA ARS) and Dr. Kazutoshi Okuno (MAFF), according to the new rules of the International Treaty on exploration and exchange of plant genetic resources (effective 30 June 2004). This expedition was a collaborative effort between the United States Department of Agriculture, the Japanese Ministry of Forestry and Fisheries, the University of New Hampshire, and Akita Agricultural University, Japan. Additional assistance was provided by the Hokkaido Governmental Plant Genetic Resources Center, several Forest Research stations of the University of Hokkaido, and private botanists. Plant and seed materials that were collected were shared between the scientists of both countries. The expedition obtained 100 accessions including 9 genera, and 29 species. In all, 84 seedlots, and 23 plants were obtained. The genera collected included: *Actinidia*, *Fragaria*, *Leucothoe*, *Lonicera*, *Morus*, *Ribes*, *Rubus*, *Sambucus*, and *Vaccinium*. Plant and seed accessions from this trip will be preserved at and distributed from the USDA ARS National Clonal Germplasm Repository in Corvallis, Oregon. Evaluation of this germplasm by morphological and molecular techniques will be performed at the USDA ARS Corvallis Repository and at the University of New Hampshire.

Additional Japanese collaborators

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Introduction

Small fruit (berry) species are highly diverse in Asia. Asian localities may represent centers of diversity for these genera but western botanists and horticulturists have had limited opportunity to examine these species. Additional Asian berry samples could provide answers to questions concerning plant phylogenetic relationships as well as increase genetic diversity available to plant breeders. This plant collecting expedition was undertaken because accessions of *Actinidia*, *Fragaria*, *Lonicera*, *Ribes*, *Rubus*, *Sambucus* and *Vaccinium* species from Hokkaido were under-represented in the USDA ARS National Plant Germplasm System. Also, these species are not specifically preserved or available from Japanese genebanks on an exchange basis. Japanese botanists know of these species, but the related crops are not of a high priority in the Japanese agricultural system.

To meet the requirements of the International Treaty on Plant Genetic Resources (effective from 30 July 2004), an a priori material transfer agreement (Appendix 1) was prepared between the U. S. Department of Agriculture and the Japanese Ministry of Fisheries and Food to collect *Actinidia*, *Fragaria*, *Lonicera*, *Sambucus*, *Sorbus*, *Ribes*, *Rubus*, and *Vaccinium* from Hokkaido during July 2004. The expedition traveled 3,895 KM (2,419 miles) and the general route is presented (Appendix 2).

Procedure

Dr. Hiroyuki Iketani was assigned by MAFF to lead the Japanese portion of the expedition. He and Dr. Hummer e-mailed frequently for several months prior to the expedition. Dr. Iketani contacted Dr. Hiroyuki Imanishi, and the additional Japanese contacts previously listed, to work out the itinerary and likely collecting sites. Drs. Iketani, Imanishi, Davis and Hummer flew into Sapporo (Chitose Airport) and met at the Toyoko Inn in Sapporo, on July 8, 2004. The itinerary for the expedition is presented (Table 1).

Material Transfer Agreement

An MTA was prepared in advance of the expedition and was signed by Dr. Allan Stoner for the USDA and by Dr. Okuno for the Japanese MAFF (Appendix 1).

Importation Permits

Kim Hummer had two APHIS importation permits, one for the importation of strawberry plants from Japan, and a second one for the importation of post-entry qualifying plant materials from foreign countries. Tom Davis had an APHIS import permit for strawberry plant material from Japan. Seed importation for the specified genera required no import permit but did require Japanese phytosanitary certification.

Phytosanitary Certification and Inspection

The Japanese phytosanitary certification was obtained at the Narita Airport plant inspection facility on the morning of departure (27 July 2004). Inspection went smoothly and required about 1 hour. Shipment of plants by courier from Japan would have been very difficult to arrange (if not impossible). Both Drs. Hummer and Davis hand carried the plant materials during their return flights. The Repository staff informed the Seattle APHIS that Dr. Hummer would be arriving in the afternoon of 27 July 2004 with permits, phytosanitary certificates, and plant materials. The APHIS agricultural inspectors were prepared for Dr. Hummer's arrival. The plant material (seeds and cuttings) and the paperwork were deposited with the Airport APHIS inspectors. They

delivered the plant material to the downtown APHIS facility for inspection and subsequent shipment to NCGR-Corvallis. The plant materials from Seattle arrived in Corvallis on August 5, 2004. The *Actinidia* plant was sent to Beltsville, MD, for processing through National Plant Quarantine. The *Fragaria* material carried by Dr. Davis was submitted for inspection, along with import permit and phytosanitary certificate, to US Customs officials in Chicago, and the samples were immediately admitted without incident.

Funding Arrangements

The USDA Plant Exploration Grant 2004 provided per diem, lodging and transportation for Drs. Hummer, Davis, and Imanishi. MAFF provided the travel costs for Dr. Iketani. A car was rented in Sapporo on 9 July 2004, and was returned on 25 July 2004. The USDA paid for car rental, gasoline, and road tolls during the trip. The car performed well and had no breakdowns. The expedition members traveled 2,000 km in the rental car. At various points along the route, additional Japanese collectors joined the expedition, but their travel costs were borne individually or by their sponsoring institutions. The costs of the expedition totaled about \$US 13,000 (Table 2).

Results

The expedition obtained 100 samples (Tables 3 and 4). These samples included 9 genera and 29 species. These accessions are identified by the following number formats:

- Collector number, e.g., HD-2004-01 through HD-2004-100
- Tom Davis number, e.g., Davis -1 through Davis-36
- Corvallis local number, e.g., CRUB xxxx
- Nippon Agricultural Research Number, e.g., NAR xxxx
- Plant Introduction number (USDA), e.g., PI xxxxxx

Seeds, plants, and one herbarium specimen were obtained.

Plant Comments

Our comments follow for some of the major plant genera that were collected.

Actinidia

Actinidia kolomikta was obtained from the northern part of Hokkaido. *Actinidia polygamma* was obtained from the southern part. The plants for this genus were commonly present in the mountain forests. They vined upon *Betula platyphylla* and other common forest trees. The fruits for this genus were very green and immature at the time of the expedition. The seeds collected at the beginning of the trip were left in the fruits and were extracted at the end of the trip with the intent of allowing some further maturity of the seeds could occur.

Fragaria

This was a target genus for the trip. *Fragaria vesca* was observed near Chitose-cho. *Fragaria iinumae* was observed in mountain forests in central and northwestern Hokkaido. *Fragaria yezoensis* was very common at sea level up to several thousand km elevation on the eastern side of Hokkaido. Fruits of these plants at most sites were ripe and perfect for collection. On a few sites the ripening season had passed and dried fruits with seeds were collected from the plants themselves or from the ground around the plant crown. In one protected site (at a shrine, Konhoku Pass) only fruit could be collected. In all others, seeds and/or runners and young leaves

were collected for DNA analysis at University of New Hampshire. Several plants were sampled at some sites to allow for assessment of within-site genetic diversity. We frequently found *Potentilla* spp. at niches where strawberries were growing. We had to examine some specimens carefully to be sure that we were collecting *Fragaria* and not *Potentilla*.



Fragaria iinumae collected from Mt. Penkeyama on 16 July 2004.



Fragaria yezoensis from Konhoku Pass collected on 19 July 2004.

Ribes

Six species of *Ribes* (one gooseberry and five currants) were collected (Table 3, 4). The gooseberry, *Ribes horridum*, was found at only one location at high elevation in the central mountain area. No fruits were observed so only a plant sample was collected. The northern red currant, *Ribes triste*, previously had a wider species distribution in Japan but in recent years has become more limited due to human activity and development. We found plants in riparian areas of the central forest region. The fruits we observed were fully ripe or just past ripeness and were collected from the plants or the ground around the plants. *Ribes japonicum* was found in more upland sites than expected – but still in moist drainage locations. This species was impressive in its stature, which reached to 4 meters tall.

White pine blister rust was observed at the Hokkaido Forestry Research Institute in Bibai. At this institute they had *Pinus strobus* and *Ribes* growing within 2 km of each other. Other than that, no white pine blister rust uredia were observed on leaves of *Ribes* growing in the wild on Hokkaido.

Rubus

Some species of *Rubus* could be found at almost every collection locality throughout Hokkaido. The most common species were the red raspberry, (*Rubus idaeus* var. *aculeatissimus* (according to the Japanese flora = *Rubus sachalinensis* in GRIN), and *Rubus parvifolius*. The red raspberry was just beginning to ripen at the early part of the trip and was found to be fully ripe in the southern part of the trip which we visited during the last week. Unfortunately *Rubus parvifolius* was only in bloom (pink petals) or just past bloom during the entire expedition. We sampled immature fruits in hopes that some seeds would be sufficiently viable. Another common *Rubus* to the central mountains was *Rubus pseudo-japonicus*. This penta-phyllus species had stolons or runners and the fruit presentation was similar to the cloudberry, *Rubus chamaemorus*. *Rubus crataegifolius* was observed in the southern mountain region. One other species of interest was the Japanese black raspberry, *Rubus mesogaeus*. The fruits of this species, which was growing under cultivation at the Hokkaido Forestry Research Institute in Bibai, were the furthest along in ripening, being red ripe and not yet black. In the wild we found this species at Tottabetsu River drainage, though only green, immature fruit could be collected from that site. We collected *Rubus chamaemorus* from several boggy and marshy localities.



Rubus pseudojaponicus collected from Mt. Penkeyama on 16 July 2004.



Rubus chamaemorus male flower from Northern Research Forest Bog, 14 July 2004.

Vaccinium

We obtained seven species of *Vaccinium*. The cranberry *Vaccinium oxycoccos* was observed and collected from only one bog growing at the North Forest Research Laboratory near Nayoro. This species was in flower and no fruits were present. *Vaccinium praestans* was observed at moist locations near lakes and in bogs associated with sundews and sphagnum. Fruits of this species were green and only were beginning to turn red in some localities at the later part of the trip. We collected immature fruits and some plant specimens. The blueberry *Vaccinium ovalifolium* seemed to have much fewer fruits on Hokkaido than were present in Primorye. This species was less common on Hokkaido than on the continent. The fruits of this species ripen dark purple-black and are presented above the leaves. *Vaccinium smallii* seemed to be the most common *Vaccinium* on Hokkaido. The leaves of this species were beginning to turn or had turned red at many of the localities. The fruits of this species ripen dark-purple black, are round, and hang under the leaves. *Vaccinium hirtum* is the Japanese red huckleberry. The fruits hang under the leaves – but the fruits have a polygonal shape and are not round like *V. smallii*. They also ripen red – not black as *V. smallii* does. *Vaccinium vitis-idaea* was found in only one location. The fruits of this plant were mostly green but were beginning to turn red.



Vaccinium oxycoccos flowers (left) and (right) Hiroyuki Imanishi, Hiroyuki Iketani, Tom Davis, and Mutsumi Takahashi at Northern Forest Research Station cranberry bog on 12 July 2004.

General trip comments

- Working under the new IT rules presented some difficulties. We found several genera that we would like to have collected (such as the several *Potentilla* species) that we were not on the original approved list.
- The Japanese had set a rigid schedule of “appointments” so that changing the schedule in mid course was not possible. For example, on some days we would have liked to spend more time collecting – but we had to get to our meal or official introduction appointment.
- We traveled about 2,000 km which was a lot of ground to cover – but was reasonable within the 21 days planned.
- The Japanese Plant Genetic Resources system is interested in preparing bilateral agreements for future plant collecting missions.
- We suggest that a subsequent trip be planned to examine potential zones of hybridization between *F. iinumae* and *F. nipponica*, and to sample *F. iinumae* on Honshu, where other small fruit genera (such as *Rubus*, *Ribes*, and *Vaccinium*) could be collected as well. The localities of interest on Honshu (and some areas not visited on Hokkaido) are protected and would require 6 months to 1 year lead time for the Japanese hosts to obtain collecting permission for such a trip.
- *Vitis*, *Prunus*, and *Juglans* were observed on this trip so we would encourage the USDA repository at Davis to consider a follow up collecting expedition to Hokkaido and Honshu.
- The seasonal timing of the trip was perfect for the target genera, *Fragaria* and *Lonicera*, and for many *Rubus*. It was early for most *Ribes* and *Vaccinium*. If the trip had been any later, the strawberry fruits and seeds would not have been available.
- The remote locations in Hokkaido did not have international phone service or readily accessible internet. Not many people spoke or understood English and American credit cards were not accepted in most places. A good knowledge of the Japanese language or an interpreter, and a “fist full of yen” were required.
- Two new *Rubus* species were collected that were previously unrepresented in the NCGR repository. Gene pools were expanded for the other collected species.
- We found that mashing fruits on smooth white art paper, drying overnight, and scraping off dried seeds to be a satisfactory seed extraction technique.
- We left immature fruit of *Actinidia* in a plastic bag that was collected early in the trip. Near the end of the trip we extracted the seed. The fruits had ripened during the trip and seed extraction was much easier than it would have been at an earlier stage.

References

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Makino, Tomitaro Makino's new Illustrated Flora of Japan. Hokuryu-kan Pub. Co. Ltd. Tokyo. 1060 pp. [in Japanese]

Sato, Takao. 2000. Trees and Shrubs of Hokkaido. Third Edition. Alice Inc. Publishers. Japan. 303 pp.

Table 1. Itinerary for the plant collecting expedition

Date	Location	Additional Japanese Collaborators
July 8	Arrive at Sapporo	
July 9	Bibai	Sato
July 10	Mt. Shirahata	Nakai, Igarashi
	Nakayama Pass,	
	Mt. Hakkenzan	
July 11	Shikotsuko National Park	
	Kuchinashi Numa	
July 12	Takikawa City	Takahashi
July 13	Uryu Experimental Forest, Nayoro	Uemura
July 14	Uryu Experimental Forest, Nayoro	Takahashi
	Lake Shumarinai	Takahashi
July 15	Nayoro City	
	Otoineppu	
	Nakagawa Experimental Forest	Takahashi
July 16	Mt. Penkeyama	Takahashi
	Teshio-cho on NW coast	Takahashi
	Monomanai River	
July 17	Omucho	
	Shimararagy River	
	Yubetsu-cho	
July 18	Tunnel on route 39	
	Sekihoka Pass	
July 19	Koshimizu-cho	
	Lake Abashiri,	
	Konhoku Pass (strawberry lane – yezoensis)	
	Abashiri City	
	Barasanto Lake	
	Betsukai	
July 20	Nemuro	
	Cape Nosappumisaki (misaki = cape)	
	Habomai	
	Tanneuma Marsh	
	Ochishi	
July 21	Hamanaka	
	Kiritappuri Inn	
	Akkeshi-cho	
	Satsunai River	
	Makubetsu-cho	
	Obihiro-shi	
July 22	Tottabetsu River	Tanaka, Takahashi

	Samani-sho	
	Road to Mt. Apei	
July 23	Mt. Apei area	Tanaka, Takahashi
July 24	Drove to Sapporo; inventory of samples	
July 25	Travel from Chitose Airport to Haneda Airport	
	Bus from Haneda to Tsukuba, Japan	
July 26	Visit with Dr. Okuno at Tsukuba	
	Visit with Dr. Yamamoto (pear geneticist)	
July 27	Return to the United States	

Table 2. Costs of the trip

On July 28, 2004 1 Japanese Yen = 0.00897871 USD \$

Person	Expense	Cost Yen (¥)	Cost USD(\$)
Kim Hummer	Airfare	---	1,390.70
Kim Hummer	Per Dieum M& IE (estimate)	---	2,400.00
Tom Davis	Airfare	---	1,432.50
Tom Davis	Per dieum, M& IE (estimate)	---	2,400.00
Hiroyuki Imanishi	Airfare, per diem M&IE	321,610	3,223.88
	Car Rental	194,554	1746.84
	Total Gasoline Cost	25,258	266.78
	Total Toll roads	11,750	105.50
	Car parking expense	5,640	50.63
Total Cost			13,022.83

Table 3. List of species collected for the USDA ARS National Plant Germplasm System.

Species	Form	
<i>Actinidia kolomikta</i>	Seed	
<i>Actinidia polygama</i>	Seed, Plant	
<i>Fragaria iinumae</i>	Seed, Plant	
<i>Fragaria vesca</i>	Seed, Plant	
<i>Fragaria yezoensis</i>	Seed, Plant	
<i>Leucothoe grayana</i> var. <i>glabra</i>	Cuttings	
<i>Lonicera caerulea</i> var. <i>edulus</i>	Seed	
<i>Lonicera caerulea</i> var. <i>emphylocalyx</i>	Seed, Plant	
<i>Morus australis</i>	Seed	
<i>Ribes horridum</i>	Plant	
<i>Ribes japonicus</i>	Seed	
<i>Ribes latifolium</i>	Seed	
<i>Ribes nigrum</i>	Herbarium voucher	
<i>Ribes sachalinensis</i>	Seed	
<i>Ribes triste</i>	Seed	
<i>Rubus chamaemorus</i>	Seed, Plant	
<i>Rubus crataegifolius</i>	Seed	
<i>Rubus idaeus</i> var. <i>aculeatissimus</i> = <i>Rubus sachalinensis</i>	Seed, Plant	
<i>Rubus mesogaeus</i> *	Seed	
<i>Rubus parvifolius</i>	Seed	
<i>Rubus phoenicolasius</i>	Seed	
<i>Rubus pseudojaponicus</i> *	Seed, Plant	
<i>Sambucus racemosa</i>	Seed	
<i>Vaccinium hirtum</i>	Seed, Plant	
<i>Vaccinium oldhamii</i>	Seed, Plant	
<i>Vaccinium ovalifolium</i>	Seed, Plant	
<i>Vaccinium oxycoccos</i>	Plant	
<i>Vaccinium praestans</i>	Seed, Plant	
<i>Vaccinium smallii</i>	Seed, Plant	
<i>Vaccinium vitis-idaea</i>	Seed	

* previously unrepresented species for the NCGR-Corvallis Repository.

Table 4. Identification number and plants collected in Hokkaido, Japan in July 2004.

Corvallis Genus	Corvallis Local	Collection Number	Plant Name	Date Collected	Locality	Latitude (N)	Longitude (E)	Elevation (meters)
CLON	37	HD-2004-01	<i>Lonicera caerulea</i> var. <i>emphylocalyx</i>	07/09/2004	Bibai	43.29019	141.8542	33
CLON	38	HD-2004-02	<i>Lonicera caerulea</i> var. <i>emphylocalyx</i>	07/09/2004	Bibai	43.29019	141.8542	33
CLON	39	HD-2004-03	<i>Lonicera caerulea</i> var. <i>edulus</i>	07/09/2004	Bibai	43.29019	141.8542	33
CRUB	2256	HD-2004-04	<i>Rubus mesogaeus</i>	07/09/2004	Bibai	43.29019	141.8542	33
CRUB	2257	HD-2004-05	<i>Rubus crataegifolius</i>	07/09/2004	Bibai	43.29019	141.8542	33
CRIB	1400	HD-2004-06	<i>Ribes japonicum</i>	07/09/2004	Bibai	43.29019	141.8542	33
CRIB	1401	HD-2004-07	<i>Ribes latifolium</i>	07/09/2004	Bibai	43.29019	141.8542	33
CRIB	1402	HD-2004-08	<i>Ribes triste</i>	07/09/2004	Bibai	43.29019	141.8542	33
CACT	201	HD-2004-09	<i>Actinidia kolomikta</i>	07/09/2004	Bibai	43.29019	141.8542	33
CVAC	1624	HD-2004-10	<i>Vaccinium smallii</i>	07/09/2004	Bibai	43.29019	141.8542	33
CVAC	1625	HD-2004-11	<i>Vaccinium praestans</i>	07/09/2004	Biba	43.29019	141.8542	33
CRUB	2258	HD-2004-12	<i>Rubus pseudojaponicus</i>	07/09/2004	Bibai	43.29019	141.8542	33
CFRA	1848	HD-2004-13, Davis-1	<i>Fragaria vesca</i>	07/10/2004	Mt. Shirahata (translated: Mt. White Flag)	42.96044	141.4256	184
DMOR	8	HD-2004-14	<i>Morus australis</i>	07/10/2004	Mt. Shirahata (translated: Mt. White Flag)	42.96044	141.4256	184
CFRA	1849	HD-2004-15, Davis-4	<i>Fragaria iinumae</i>	07/10/2004	Nakayama Pass on Rt 230 1 hr SE of Sapporo	42.85671	141.0958	823
CRUB	2259	HD-2004-16	<i>Rubus pseudojaponicus</i>	07/10/2004	Nakayama Pass on Rt 230 1 hr SE of Sapporo	42.85671	141.0958	823
CVAC	1626	HD-2004-17	<i>Leucothoe grayana</i> var. <i>glabra</i>	07/11/2004	Shikotsu Toya National Park	42.71896	141.4069	186
CVAC	1627	HD-2004-18	<i>Vaccinium praestans</i>	07/11/2004	Kuchinashi-numa (numa = pond)	42.6986	141.4597	181
CLON	40	HD-2004-19	<i>Lonicera caerulea</i> var. <i>emphylocalyx</i>	07/11/2004	Yufutsu near Tomakomai	42.6333	141.7214	3

CRIB	1403	HD-2004-20	<i>Ribes nigrum</i>	07/12/2004	Bibai	43.29019	141.8542	33
CSAM	159	HD-2004-21	<i>Sambucus racemosa</i>	07/12/2004	Takikawa	43.56984	141.9404	46
CACT	202	HD-2004-22	<i>Actinidia kolomikta</i>	07/13/2004	Uryu North Forest Research Laboratory	44.36589	142.2825	401
CFRA	1850	HD-2004-23, Davis-5, Davis-6, Davis-7, Davis-8	<i>Fragaria iinumae</i>	07/13/2004	Uryu North Forest Research Laboratory	44.36845	142.2835	460
CRUB	2260	HD-2004-24	<i>Rubus idaeus</i> var. <i>aculeatissimus</i>	07/13/2004	Uryu North Forest Research Laboratory	44.38397	142.2914	550
CFRA	1851	HD-2004-25; Davis-9	<i>Fragaria iinumae</i>	07/13/2004	Uryu North Forest Research Laboratory	44.39814	142.2056	520
CVAC	1627	HD-2004-26	<i>Vaccinium ovalifolium</i>	07/13/2004	Uryu North Forest Research Laboratory	44.39764	142.2047	289
CVAC	1628	HD-2004-27	<i>Vaccinium smallii</i>	07/13/2004	Uryu North Forest Research Laboratory	44.39764	142.2047	289
CVAC	1629	HD-2004-28	<i>Vaccinium praestans</i>	07/13/2004	Uryu North Forest Research Laboratory	44.39764	142.2047	289
CVAC	1630	HD-2004-29	<i>Vaccinium hirtum</i>	07/13/2004	Uryu North Forest Research Laboratory	44.39764	142.2047	289
CRUB	2261	HD-2004-30	<i>Rubus chamaemorus</i>	07/13/2004	Uryu North Forest Research Laboratory	44.39764	142.2047	289
CVAC	1631	HD-2004-31	<i>Vaccinium oxycoccos</i>	07/14/2004	Uryu North Forest Research Laboratory bog	44.47621	142.1425	679
CRUB	2262	HD-2004-32	<i>Rubus pseudojaponicus</i>	07/14/2004	at edge of bog of the North Forest Research Laboratory near Nayoro	44.47621	142.1425	679

CRUB	2263	HD-2004-33	<i>Rubus chamaemorus</i>	07/14/2004	in bog of the North Forest Research Laboratory near Nayoro	44.47621	142.1425	679
CRUB	2264	HD-2004-34	<i>Rubus idaeus</i> var. <i>aculeatissimus</i>	07/14/2004	at edge of bog of the North Forest Research Laboratory near Nayoro	44.47621	142.1425	679
CFRA	1852	HD-2004-35; Davis-10	<i>Fragaria iinumae</i>	07/14/2004	Shore of Lake Shumarinai	44.30741	142.1829	292
CRUB	2265	HD-2004-36	<i>Rubus idaeus</i> var. <i>aculeatissimus</i>	07/14/2004	Shore of Lake Shumarinai	44.30741	142.1829	292
CRUB	2266	HD-2004-37	<i>Rubus idaeus</i> var. <i>aculeatissimus</i>	07/15/2004	north of Otoineppu-mura on forest trail off of route 275	44.8161	142.263	171
CFRA	1853	HD-2004-38; Davis-11; Davis-12; Davis-13	<i>Fragaria iinumae</i>	07/15/2004	north of Otoineppu-mura on forest trail off of route 275	44.76739	142.1832	144
CRUB	2267	HD-2004-39	<i>Rubus pseudojaponicus</i>	07/15/2004	north of Otoineppu-mura on forest trail off of route 275	44.76678	142.1653	436
CFRA	1854	HD-2004-40; Davis-14; Davis-15; Davis -16	<i>Fragaria iinumae</i>	07/15/2004	north of Otoineppu-mura on forest trail off of route 275	44.76678	142.1653	436
CVAC	1632	HD-2004-41	<i>Vaccinium smallii</i>	07/15/2004	north of Otoineppu-mura on forest trail off of route 275	44.77486	142.1621	498

CFRA	1855	HD-2004-42; Davis-17; Davis-18	<i>Fragaria iinumae</i>	07/15/2004	Mt. Pankesan	44.77486	142.1621	498
CVAC	0	HD-2004-43	<i>Vaccinium ovalifolium</i>	07/16/2004	north of Otoineppu-mura on Mt. Penkeyama	44.84652	142.1654	331
CVAC	1634	HD-2004-44	<i>Vaccinium smallii</i>	07/16/2004	north of Otoineppu-mura on Mt. Penkeyama	44.84652	142.1654	331
CVAC	1635	HD-2004-45	<i>Vaccinium praestans</i>	07/16/2004	north of Otoineppu-mura on Mt. Penkeyama	44.85672	142.1493	599
CRUB	2268	HD-2004-46	<i>Rubus idaeus</i> var. <i>aculeatissimus</i>	07/16/2004	north of Otoineppu-mura on Mt. Penkeyama	44.85635	142.1496	595
CVAC	1636	HD-2004-47	<i>Vaccinium smallii</i>	07/16/2004	north of Otoineppu-mura on Mt. Penkeyama	44.85635	142.1496	595
CFRA	1856	HD-2004-48; Davis-19	<i>Fragaria iinumae</i>	07/16/2004	north of Otoineppu-mura on Mt. Penkeyama	44.85672	142.1493	599
CACT	203	HD-2004-49	<i>Actinidia kolomikta</i>	07/16/2004	north of Otoineppu-mura on Mt. Penkeyama	44.85672	142.1493	599
CFRA	1857	HD-2004-50; Davis-20	<i>Fragaria iinumae</i>	07/16/2004	north of Otoineppu-mura on Mt. Penkeyama	44.86241	142.1506	513
CRUB	2269	HD-2004-51	<i>Rubus pseudojaponicus</i>	07/16/2004	north of Otoineppu-mura on Mt. Penkeyama	44.86241	142.1506	513

CRUB	2270	HD-2004-52	<i>Rubus parvifolius</i>	07/16/2004	north of Teshio on the coast of Japan Sea	44.9227	141.7219	6
CFRA	1858	HD-2004-53; Davis-21	<i>Fragaria iinumae</i>	07/16/2004	Monomanai River	44.66	142.2	93
CVAC	1637	HD-2004-54	<i>Vaccinium hirtum</i>	07/17/2004	Shimararagy River	44.22312	143.3844	94
CVAC	1638	HD-2004-55	<i>Vaccinium smallii</i>	07/17/2004	Shimararagy River	44.22312	143.3844	94
CRUB	2271	HD-2004-56	<i>Rubus idaeus</i> var. <i>aculeatissimus</i>	07/17/2004	Shimararagy River	44.22312	143.3844	94
CVAC	1639	HD-2004-57	<i>Vaccinium smallii</i>	07/17/2004	off of the road to Yubetsu	44.094	143.3727	427
CVAC	1640	HD-2004-58	<i>Vaccinium vitis-idaea</i>	07/17/2004	Shimararagy River	44.22312	143.3844	427
CRIB	1404	HD-2004-59	<i>Ribes horridum</i>	07/18/2004	North end of tunnel near Kinshinotaki	43.66522	143.1046	933
CRUB	2272	HD-2004-60	<i>Rubus idaeus</i> var. <i>aculeatissimus</i>	07/18/2004	North end of tunnel near Kinshinotaki	43.66522	143.1046	933
CVAC	1641	HD-2004-61	<i>Vaccinium smallii</i>	07/18/2004	North end of tunnel near Kinshinotaki	43.66522	143.1046	933
CRUB	2273	HD-2004-62	<i>Rubus pseudojaponicus</i>	07/18/2004	North end of tunnel near Kinshinotaki	43.66522	143.1046	933
CFRA	1859	HD-2004-63; Davis-22	<i>Fragaria iinumae</i>	07/18/2004	at parking turn-off edge of parking lot	43.66522	143.1046	933
CVAC	1642	HD-2004-64	<i>Vaccinium praestans</i>	07/18/2004	Sekihoka Pass	43.65495	143.1653	1070
CRUB	2274	HD-2004-65	<i>Rubus pseudojaponicus</i>	07/18/2004	Sekihoka Pass	43.65495	143.1653	1070
CFRA	1860	HD-2004-66; Davis-23	<i>Fragaria yezoensis</i>	07/18/2004	old mercury pit parking lot	43.65495	143.1653	1070
CFRA	1861	HD-2004-67; Davis-24	<i>Fragaria yezoensis</i>	07/18/2004	on route 88 about 5 km south from the Route 39	43.67944	143.3954	616

					junction			
CRUB	2275	HD-2004-68	<i>Rubus idaeus</i> var. <i>aculeatissimus</i>	07/18/2004	on route 88 about 5 km south from the Route 39 junction	43.67857	143.3946	588
CRUB	2276	HD-2004-69	<i>Rubus idaeus</i> var. <i>aculeatissimus</i>	07/19/2004	Lake Abashiri	43.99088	144.2038	28
CMOR	9	HD-2004-70	<i>Morus australis</i>	07/19/2004	Lake Abashiri	43.99088	144.2038	28
CFRA	1862	HD-2004-71; Davis-25	<i>Fragaria yezoensis</i>	07/19/2004	Abashiri-Kokusai road	43.93272	144.3215	11
CFRA	1863	HD-2004-72; Davis-26; Davis-27; Davis-28; Davis-29	<i>Fragaria yezoensis</i>	07/19/2004	Konhoku Pass	43.76318	144.7963	493
CFRA	1864	HD-2004-73; Davis-30	<i>Fragaria yezoensis</i>	07/19/2004	on road leading to Barasato Lake	43.6058	145.0881	0
CFRA	1865	HD-2004-74; Davis-31	<i>Fragaria yezoensis</i>	07/19/2004	Barasato Lake	43.42363	145.2523	11
CRUB	2277	HD-2004-75	<i>Rubus idaeus</i> var. <i>aculeatissimus</i>	07/19/2004	Barasato Lake	43.42363	145.2523	11
CFRA	1866	HD-2004-76; Davis-32	<i>Fragaria yezoensis</i>	07/20/2004	Habomai	43.35221	145.7632	13
CFRA	1867	HD-2004-77; Davis-33	<i>Fragaria yezoensis</i>	07/20/2004	Tanneuna Marsh	43.32481	145.6214	0
CFRA	1868	HD-2004-78; Davis-34	<i>Fragaria yezoensis</i>	07/20/2004	Ochi-ichi forest	43.20181	145.5235	45
CRIB	1405	HD-2004-79	<i>Ribes sachalinensis</i>	07/20/2004	Ochi-ichi forest	43.20181	145.5235	45
CRIB	1406	HD-2004-80	<i>Ribes sachalinensis</i>	07/21/2004	Akkeshi-wan peninsula	42.96858	144.7268	53

CRUB	2278	HD-2004-81	<i>Rubus pseudo-japonicus</i>	07/21/2004	Akkeshi-wan peninsula	42.96858	144.7268	53
CRUB	2279	HD-2004-82	<i>Rubus idaeus</i> var. <i>aculeatissimus</i>	07/21/2004	Akkeshi-wan peninsula	42.96858	144.7268	53
CFRA	1869	HD-2004-83; Davis-35	<i>Fragaria yezoensis</i>	07/21/2004	Akkeshi-wan peninsula	42.96858	144.7268	53
CSAM	160	HD-2004-84	<i>Sambucus racemosa</i>	07/21/2004	Akkeshi-wan peninsula	42.81178	143.4792	16
CRIB	1407	HD-2004-85	<i>Ribes triste</i>	07/21/2004	Obihiro-Shi	42.80394	143.1703	61
CRIB	1408	HD-2004-86	<i>Ribes triste</i>	07/21/2004	Obihiro-Shi	42.913	143.2398	34
CRIB	1409	HD-2004-87	<i>Ribes latifolium</i>	07/22/2004	Tottabetsu River drainage	42.74451	142.8472	513
CRIB	1410	HD-2004-88	<i>Ribes sachalinensis</i>	07/22/2004	Tottabetsu River drainage	42.74451	142.8472	513
CFRA	1870	HD-2004-89; Davis-36	<i>Fragaria iinumae</i>	07/22/2004	Tottabetsu River drainage	42.74451	142.8472	513
CRUB	2280	HD-2004-90	<i>Rubus mesogaeus</i>	07/22/2004	Tottabetsu River drainage	42.74451	142.8472	513
CRIB	1411	HD-2004-91	<i>Ribes triste</i>	07/22/2004	Tottabetsu River drainage	42.73404	142.8857	448
CRUB	2281	HD-2004-92	<i>Rubus idaeus</i> var. <i>aculeatissimus</i>	07/22/2004	Tottabetsu River drainage	42.73404	142.8857	448
CRUB	2282	HD-2004-93	<i>Rubus idaeus</i> var. <i>aculeatissimus</i>	07/23/2004	Mt. Apoi region	42.15338	143.0099	298
CRUB	2283	HD-2004-94	<i>Rubus crataegifolius</i>	07/23/2004	Mt. Apoi region	42.15338	143.0099	298
CACT	204	HD-2004-95	<i>Actinidia polygama</i>	07/23/2004	Mt. Apoi region	42.15338	143.0099	298
CRIB	1412	HD-2004-96	<i>Ribes japonicus</i>	07/23/2004	Mt. Apoi region	42.15966	143.0412	179
CRUB	2284	HD-2004-97	<i>Rubus crataegifolius</i>	07/23/2004	Mt. Apoi region	42.15725	143.0459	434
CRUB	2285	HD-2004-98	<i>Rubus phoenicolasius</i>	07/23/2004	Mt. Apoi region	42.14121	142.9591	43
CVAC	1643	HD-2004-99	<i>Vaccinium oldhamii</i>	07/23/2004	Mt. Apoi region	42.1132	142.9905	73
CRUB	2286	HD-2004-100	<i>Rubus parvifolius</i>	07/21/2004	Totabetsu River	42.74451	142.8472	513

Appendix 1.

Material Transfer Agreement

between the

**National Institute of Agrobiological Sciences
Japan**

and the

**U.S. Department of Agriculture
Agricultural Research Service
U.S.A.**

This Material Transfer Agreement (MTA) is made and entered into, by and between the National Institute of Agrobiological Sciences (hereinafter referred to as “NIAS”) and the U.S. Department of Agriculture, Agricultural Research Service (hereinafter referred to as “USDA/ARS”).

Recognizing the importance to humanity of protecting, utilizing and conserving plant genetic resources for present and future generations, the Parties hereto have signed the present MTA to support collaborative research involving the collection, exchange and preservation of plant genetic resources. This MTA is in accordance with the [Bonn Guidelines on Access to Genetic Resources and Fair and Equitable Sharing of the Benefits Arising out of their Utilization](#).

The objectives of the research are to collect and preserve germplasm of *Actinidia*, *Corylus*, *Fragaria*, *Lonicera*, *Pyrus*, *Rubus*, *Ribes*, *Sambucus*, *Sorbus*, and *Vaccinium* from Hokkaido, Japan. The research will be conducted in July 2004. The following are the collaborators in the research:

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The NIAS is the central coordinating institute in Japan for plant, animal and microorganism genetic resources and operates the national genebank.

USDA/ARS operates the U.S. National Plant Germplasm System (US/NPGS), a network of plant genetic resources repositories, research stations, and service elements that maintain, regenerate, characterize, document, preserve and distribute germplasm under USDA policies to research scientists all over the world.

Samples of the germplasm and associated documentation collected through this collaboration will be divided between the NIAS and the U.S. collaborators. The US portion of the germplasm and documentation will be deposited in the US/NPGS where the accessions will be conserved and made available to scientists worldwide for use in research, breeding and training, according to the policies of the US/NPGS.

USDA/ARS agrees to the following conditions for germplasm provided through this collaboration:

- a. not to claim ownership over the materials in the form received, or seek intellectual property rights over that germplasm in the form received, or over related information.
- b. to notify any subsequent persons or institutions to whom the NPGS provides samples of the germplasm that they are not to claim ownership or seek intellectual property rights over the germplasm in the form received, or over related information.
- c. upon the request of the NIAS, to make available the names and addresses of persons to whom the NPGS distributes the germplasm.
- d. not to exploit the material collected as such or as essentially derived material for commercial purposes without prior approval from NIAS.

- e. to place documentation of the accessions in the NPGS, including data collected through subsequent research, into the Germplasm Resources Information Network (GRIN), where it will be available on the Internet at <http://www.ars-grin.gov/npgs/searchgrin.html>. Written reports of passport, characterization, evaluation, inventory, viability and distribution data corresponding to these accessions that have been incorporated into the GRIN database will be provided to NIAS upon request.
- e. to assume full responsibility for complying with the recipient nation's quarantine/biosafety regulations and rules on importing and releasing genetic material.
- f. to submit a duplicate set of collected material to NIAS for in-country conservation for future use.

The benefits to Japan from this collaboration are:

- a. Germplasm collected through this collaboration will be conserved in the long-term (-20°C and possibly cryopreservation) and medium-term germplasm storage facilities of the US/NPGS, an internationally recognized genebank. Samples of this germplasm will be provided to the NIAS upon request by an appropriate official of the government of Japan.
- b. All funds needed to support this collaboration will be provided by the USDA/ARS National Germplasm Resources Laboratory, according to the approved budget.
- c. Professional associations between the Japanese and US scientists will be strengthened and may result in additional collaborations and shared scientific publications.
- d. Scientific knowledge on the location, size and nature of native plant populations in Japan will be documented and made available to other scientists.

Authorized Signatures: USDA/ARS

Allan K. Stoner
Research Leader
National Germplasm Resources Laboratory
USDA/ARS
Beltsville, Maryland
USA

Date

Harry D. Dansforth
Technology Transfer Coordinator
Beltsville Area
USDA/ARS
Beltsville, Maryland
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Date

Authorized Signature: NIAS

Dr. Kazutoshi Okuno
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Genebank
National Institute of Agrobiological Sciences
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Date

Appendix 2. Map of Hokkaido, Japan, with the general route of the expedition in yellow.

