**Currant and Gooseberry Crop Vulnerability Statement**

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*Ribes nigrum* ‘Ben Lomond’, black currant fruit

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**‘Jeanne’ gooseberry, released from the NCGR-Corvallis in 2006.**

**Initial Comments on Currants and Gooseberries production in the United States**

At the turn of the twentieth century, currants and gooseberries were widely grown in North America with more than 7,000 acres of fields in commercial production. The US currant production value was > $1.4 million in 1919 (Hedrick, 1925). Unfortunately, white pine blister rust, an Asian disease that had colonized into Europe, was introduced into the US on white pine seedlings.

The “remedy” for this disease was to prohibit currants and gooseberries from being cultivated in the US because *Ribes* is a co-host. This disease is not particularly damaging to currants and gooseberries but it could kill weakened pine trees, which were of great economic value to many lumber industries in the Eastern US. Initially a federal prohibition to restrict *Ribes* was enacted by congress and was in effect from 1944 to 1966. After that, it became a states-rights issue and those that were involved put in separate regulations controlling *Ribes*. Other states have chosen not to control *Ribes* and have no restriction. At the present 12 states have active restriction or prohibition against currant or gooseberry production, although *Ribes* cultivation is the remaining states is unrestricted. Thus, currants and gooseberries remain as an underutilized crop in the US, although the fruits have high nutritive value, and many valuable products can be produced from these plants

Currants and gooseberries continue to be multi-million dollar crops, and are particularly enjoyed and produced and enjoyed in Europe, Scandinavia, Canada, Australia, and New Zealand.

Entrepreneurs are interested in increasing the production of this crop for its healthful

1. **Introduction to the crop (3 pp. maximum)**

Currants and gooseberries and their wild relatives are classified as members of the genus *Ribes*. Black (*R. nigrum*, *R. ussuriense*.), red (*R. rubrum,* *R. sativum*), and white currants (*R*. *rubrum*), and gooseberries (*R. uva-crispa*, *R. hirtellum*, *R. oxyacanthoides* and hybrids) are small to medium sized, multi-stemmed shrubs, with or without nodal spines (gooseberries), that produce berries with nutritive and nutraceutical value. Cultivated currants and gooseberries were initially derived from English and European species, although American species have been chosen as parents to contribute disease resistance to the cultivated gooseberries. For black currants, the primary species of commerce is *Ribes nigrum* L.; for red and white currants, *R. rubrum* L.; and for gooseberries, *R. uva-crispa* L*.*

 Black and red currants were collected for medicinal use in Europe in the 1400s and 1500s. Black currants were first selected for their fruits in the 1600s as recorded in early herbals (Brennan 1996). The first recorded cultivation of red and white currants for their fruit was in the 1400s, and that of gooseberries in the 1200s.

Currants and gooseberries are underutilized crops in the United States but are economically important agricultural commodities in Russia, Poland, Germany, Scandinavia, Great Britain, New Zealand, and Australia. Black currant juice is the most economically important commercial product, with some fruit used fresh or processed for jams, jellies, baked goods and dairy products.

During the past 75 years plant breeders have incorporated genes for disease and pest resistance, increased fruit size and quality, and frost resistance into elite fruiting cultivars. In Europe and New Zealand, black currant reversion virus, which is transmitted by the black currant gall mite, causes the most serious disease problem for *Ribes* growers. The absence of this disease and the gall mite in North America would give American growers a great production advantage. Unfortunately, two other diseases, the native powdery mildew (*Sphaerotheca mors-uvae*) and the introduced white pine blister rust (*Cronartium ribicola*), provide challenges for American growers. New high-quality black currant cultivars with resistance to reversion and gall mites are being developed for Europe; while those with immunity or resistance to white pine blister rust and powdery mildew are being developed for North America.

**1.1 Botanical features and ecogeographical distribution**

The genus *Ribes* L., commonly known as currants and gooseberries, is botanically placed in the family Grossulariaceae DC. (previously in Saxifragaceae) and includes about 150 species worldwide (Brennan 2008). The centers of diversity of the genus are temperate North America, the Andes and Eurasia (Fig. 3) with the greatest number of recognized species occurring in North America from Alaska through Mexico (Senters and Soltis 2003). The genus appears to be monophyletic with a number of subgenera some of which are monophyletic and some of which are not (Messinger et al. 1999; Schultheis and Donoghue 2004; Senters and Soltis 2003).



Fig. 3. World distribution of *Ribes* (green).

The Flora of North America (eFloras.org) describes the genus as having flowers that are borne singularly or on terminal or axillary racemes or corymbs with as many as 40 flowers. Flower morphology is diverse from saucer- or cup-shaped to campanulate or tubular and ranging in color from white or green to purple. Fruit color ranges from clear white or green to deep black. Fruit can be glabrous or have varying degrees of glands. The plant is an upright to spreading shrub. Shrubs with spines and/or prickles are generally called gooseberries, while those that are unarmed are called currants.

**1.3 Plant breeding**

*Ribes* are perfect-flowered, with the exception of the dioecious subgenera *Berisia* and *Parilla* (Berger, 1924). Apomixis is rare in *Ribes* although it can be induced by application of auxin or gibberellin (Zatyko, 1962). *Ribes* species are diploid and natural polyploidy is extremely rare (Brennan, 1996). Cross pollination is normal, although some self-pollination can occur, particularly where the anthers and stigma reside at the same level.

 *Ribes* flowers are emasculated in preparation for breeding by removing the entire calyx and anthers at the bud stage. Pollen is applied to the stigma using a fine brush. Pollen stored at 68 to 75 °F (20 to 24 °C) in diffuse light loses viability within two weeks (Brennan, 1996). Pollen viability may be extended with desiccation, but that trait is genotype dependent (Brennan, 1996). Fruit ripen within one to two months.

 Seeds are extracted using a blender with blunted blades. The mixture is flocculated and floating seeds (generally non-viable) are discarded. Seeds are air dried, placed within a desiccator and stored in paper or aluminum foil envelops at –4 °F (–20 °C). Frozen seeds remain viable for several years of storage (Brennan, 1996). Seeds should be prechilled (cold stratified) at 39 °F (4 °C) for three months prior to sowing (Goodwin and Hummer, 1993). After prechilling, daily alternation of warm and cool temperatures increases the germination rate and percentage. Seedlings are grown out and selected for desirable characteristics

**Black currant development**

Black currants were originally collected from the wild by herbalists, and were first imported from Holland to the United Kingdom by Tradescant in 1611 (Brennan, 1996). Gerarde (1636) described these plants and their medicinal qualities in his Herbal. By 1826, black currants were grown for fruit and five black currant cultivars appeared on the Royal Horticultural Society’s recommended plant list. The cultivars ‘Black Naples’ and ‘Black Grape’, both of unknown origin, were most widely grown. During the 1800’s the number of black currant cultivars increased with the introduction of open pollinated seedlings from early cultivars. Hatton (1920) divided the named sorts into four groupings of similar genotypes: ‘French Black’, ‘Boskoop Giant’, ‘Goliath’, and ‘Baldwin’. Bunyard (1925) described more than 15 cultivars in England while Hedrick (1925) described 61 cultivars (with 15 synonyms) in the United States.

 In the late 1800s, white pine blister rust was introduced into North America on white pines from Europe. A. W. Hunter (1950, 1955) made specific crosses to develop rust-resistant *Ribes* cultivars. He crossed *R. ussuriense* containing the *Cr* gene for rust immunity with the black currant ‘Kerry’ and released three resistant cultivars, ‘Crusader’, ‘Coronet’, and ‘Consort’. None of these cultivars have been observed to host uredia of white pine blister rust, either in laboratory or field studies, between 1945 and the present.

 Black currant breeding or selection programs are significant in Belgium, Czech Republic, Denmark, Finland, France, Germany, Hungary, Latvia, New Zealand, Poland, Russia, Sweden, The Netherlands, Ukraine, and the United Kingdom (UK). Recently, a resurgence of interest in black currant development in North America has occurred in British Columbia, Oregon, Idaho, Maryland, Minnesota, New York, and Pennsylvania.

Active breeding programs are currently based in the UK, Russia, Poland, Estonia, Lithuania and New Zealand (Brennan 2008). Important parents include white pine blister rust-resistant ‘Consort’ from Canada, the ‘Ben’ series of black currants from the UK breeding program in Scotland, and ‘Laxton’s No. 1’ red currant (Brennan 2008). Recent improvements are the result of the crosses of black currant species with gooseberry species performed by Rudolf Bauer to produce the hybrid species *R*. ×*nidigrolaria* Rud. Bauer and A. Bauer. ‘Josta’, released in 1977, was the first of these types (Bauer 1986). Bauer released additional cultivars of this hybrid species so that cultivars of this group have become commonly known as jostaberries.

Genetic research into *Ribes* has revealed many species that have contributed key traits for improving cultivation (Barney and Hummer 2005; Brennan et al. 2009). Breeders have incorporated germplasm from about 18 species in the pedigrees of modern fruit cultivars of currants and gooseberries (Harmat et al. 1990). The cluster length and yields of black currant cultivars have been improved by incorporating *Ribes bracteosum* Douglas ex Hook., the California black currant. *R. americanum* Mill., the American black currant, also has potential to provide powdery mildew resistance in interspecific hybrids (Brennan 2008). Other North American species that could broaden the genepool are *R. hudsonianum* Richardson, the North American black currant, and *R. aureum* Pursh var. *villosum* DC., golden currant, that has a large, sweet fruit that ripens much later than traditional black currant cultivars. Additional species have commercial ornamental landscape application or potential.

**Red currant and gooseberry development**

While the cultivated red currants have been derived from many European species (Barney and Hummer 2005), the North American red currant, *R. triste* Pall.,has fruit quality similar to the European species, but has not yet been utilized for breeding. The commercial gooseberry was primarily derived from the European gooseberry *R. uva-crispa* (synonym = *R. grossularia*) that is native to the UK. The North American gooseberry species *R. divaricatum* Douglas, *R. hirtellum* Michx., and *R. oxyacanthoides* L. have contributed to improved disease resistance and decreased spines when bred with the larger fruited European species. Many North American gooseberry species have fuchsia-like flowers and are planted for their ornamental features (Brennan 1996).

**1.4**

**Primary crop products and their value (farmgate)**

The US Statistical Service provides no production values for currants or gooseberries in the United States.

**1.5 Domestic and international crop production**

**1.5.1 U.S. (regional geography)**

# *Ribes* were grown on a large scale in the United States and Canada during the late 1800s and early 1900s. Hedrick (1925) reported 7,379 acres of *Ribes* (a value of more than $1.4 million) were grown in the United States in 1919. This production was halted in the 1920s when quarantines and regulations in the United States prohibited *Ribes* cultivation because of white pine blister rust. Development of blister rust-resistant pines and *Ribes* cultivars has made currant and gooseberry production in North America feasible. As of 1999, the United States gooseberry crop, produced primarily in Oregon, had a farm gate value of about $2 million. Black currant production of the east coast is sporadic through New York and Connecticut. Recent events of resistance-breaking strains of *Cronartium ribocola* J. C. Fischer, which causes white pine blister rust, were reported in Connecticut.

**1.5.2 International**

Total world currant production averaged > 644,000 tonnes (t) during the past decade (FAOSTAT, 2018). The Russian Federation (395,045 t), Poland (166,110 t), Ukraine (24,500 t), Germany (13,992 t), and United Kingdom (11,353 t) lead the world production of currants. Red currants are valued for fresh markets and for the production of preserves and juice. The main red currant producers are Poland, Germany, Holland, Belgium, France, and Hungary.

Total world gooseberry production was 174,309 t in 2016 (FAOSTAT, 2018). The top producing countries were Germany, Russian Federation, Poland, Ukraine, and United Kingdom. The US does not have reportable currant or gooseberry production on a global scale.

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1. **Urgency and extent of crop vulnerabilities and threats to food security**

Currants and gooseberries, being minor crops, lack appropriate security propagation protocols for maintaining genetic fidelity, and official certification programs are not present. Primary collections at national genebanks consist of living plants, protected in containers in greenhouses or screenhouses, or growing in the field. Plant material grown outdoors cannot be certified as pathogen negative.

Secondary backup tissue culture collections are maintained *in vitro* under refrigeration. Long-term backup collections of meristems are placed in cryogenic storage at remote locations to provide decades of security. Species diversity is represented by seed lots stored in −18 °C. Conservation of clonally propagated material, where genotypes are maintained, is more complicated and expensive than storing seeds, where the objective is to preserve genes rather than genotypes. The health status of both forms of storage is of primary importance for plant distribution to meet global plant quarantine regulations.

Currants and gooseberries, being specialty crops, have limited world resources available for conservation of these crops and their wild relatives. These limited resources constrain the management of *Ribes* genetic resources. Pathogen testing and elimination procedures are critical to maintain pathogen-negative plants to satisfy quarantine requirements.

* 1. **Genetic uniformity in the “standing crops” and varietal life spans**

Various methods have been used to develop molecular markers (Brennan et al. 2002; Cavanna et al. 2009; de Mattia et al. 2008; Russell et al. 2011; Russell et al. 2014) and to create linkage maps (Brennan et al. 2008; Russell et al. 2014) for *Ribes*.

Examples of *Ribes* cultivars, their year of release, origin, and pedigree

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Cultivar** | **Crop** | **Release date** | **Origin** | **Pedigree** |
| Ben Lomond | black currant | 1975 | Scotland, United Kingdom | ('Consort' x 'Magnus') x ('Brodtorp' x 'Janslunda') |
| Boskoop Giant | black currant | 1800s | The Netherlands | 'Goliath' x 'Ojebyn' |
| Consort | black currant | 1951 | Ontario, Canada | 'Kerry' x *R. ussuriense* |
| Coronet | black currant | 1948 | Ontario, Canada | *R. ussuriense* x 'Kerry' |
| Titania | black currant | 1984 | Sweden | ['Golubka' x ('Consort' x 'Wellington XXX')] |
| Glenndale | gooseberry | 1932 | Maryland, United States | [(*R. missouriense* x 'Red Warrington') x 'Triumph'] x 'Keepsake' |
| Industry | gooseberry | 1855 | England, United Kingdom | selection of *R. uva-crispa* |
| Invicta | gooseberry | 1981 | England, United Kingdom |  ('Resistenta' x 'Whinham's Industry') x 'Keepsake'  |
| Jahn's Prairie | gooseberry | 1996 | Oregon, United States | selection of *R. oxyacanthoides* |
| Jeanne | gooseberry | 2006 | Oregon, United States | selection of *R. uva-crispa* |
| Oregon | gooseberry | 1960 | Oregon, United States | 'Crown Bob' x 'Houghton' |
| Pixwell | gooseberry | 1932 | North Dakota, United States | *R. missouriense* x 'Oregon' |
| Poorman | gooseberry | 1888 | Utah, United States | 'Houton' x 'Downing' |
| Sabine | gooseberry | 1950 | Ontario, Canada | 'Spinefree' x 'Clark' |
| Josta | jostaberry | 1970 | Germany | F2 open pollinated selection of an amphidiploid; F2 (*R. nigrum* L. 'Langtraubige Schwarze' x *R. divaricatum* Dougl.) |
| Jonkheer Van Tets | red currant | 1941 | The Netherlands | 'Fay's Prolific' seedling |
| Red Lake | red currant | 1933 | Minnesota, United States | selection of red currant unknown parentage |
| Rovada | red currant | 1980 | The Netherlands | 'Fay's Prolific' x 'Heinemann's Rote Spatlese' |
| Viking | red currant | 1945 | Norway | *R. petraeum* x *R. rubrum* |
| Wilder | red currant | 1877 | Indiana, United States | 'Versailles' seedling |
| Blanca | white currant | 1977 | Slovakia | 'Heinemann's Rote Spatlese' x 'Red Lake' |
| White Dutch | white currant | 1729 | The Netherlands | white sport of red currant |
| White Imperial | white currant | 1890 | New York, United States | white sport of red currant |
| White Versailles | white currant | 1883 | France | white sport of red currant |

**Threats of genetic erosion *in situ***

According to the Plants database (USDA NRCS, 2018), *Ribes echinellum* (Coville) Rehder, the Miccosukee gooseberry, is listed as threatened by the U.S. Fish and Wildlife Service (CFR 50 part 17, 1985) and critically imperiled by NatureServe (NatureServe 2017). It is known only from the two localities of Jefferson County, Florida (US), near Lake Miccosukee, and McCormick County, South Carolina (US) (U.S. Fish and Wildlife Service, 2015); thus it is vulnerable to human encroachment and regional development in the areas. The PLANTS Database (USDA-NRCS 2017) lists 12 additional *Ribes* taxa of concern under state laws in a total of 13 states. With the exception of *R. cereum* Douglas var. colubrinum C.L. Hitchc. and *R. echinellum* (Coville) Rehder, the species in the table below have robust populations in at least several US states and/or Canadian provinces.

|  |  |  |  |
| --- | --- | --- | --- |
| Species name | Common Name | Federal status | State status |
| [*Ribes americanum* Mill.](https://plants.usda.gov/java/profile?symbol=RIAM2) | American black currant |   | MD (E, PRX) |
| [*Ribes aureum* Pursh var. *villosum* DC.](https://plants.usda.gov/java/profile?symbol=RIAUV) | golden currant |   | TN (T) |
| *Syn. = Ribes* *odoratum* H. Wendl. |   |   |   |
| [*Ribes cereum* Douglas var. *colubrinum* C.L. Hitchc.](https://plants.usda.gov/java/profile?symbol=RICEC) | wax currant |   | WA (S) |
| [*Ribes echinellum* (Coville) Rehder](https://plants.usda.gov/java/profile?symbol=RIEC) | Miccosukee gooseberry | T | FL (E) |
| [*Ribes glandulosum* Grauer](https://plants.usda.gov/java/profile?symbol=RIGL) | skunk currant |   | CT (E), NJ (E), OH (PRX) |
| [*Ribes hirtellum* Michx.](https://plants.usda.gov/java/profile?symbol=RIHI) | hairystem gooseberry |   | IL (E), RI (SC) |
| [*Ribes hudsonianum* Richardson](https://plants.usda.gov/java/profile?symbol=RIHU) | northern black currant |   | IA (T) |
| [*Ribes lacustre* (Pers.) Poir.](https://plants.usda.gov/java/profile?symbol=RILA) | prickly currant |   | CT (SC), MA (SC), PA (E) |
| [*Ribes missouriense* Nutt.](https://plants.usda.gov/java/profile?symbol=RIMI) | Missouri gooseberry |   | NJ (E), OH (E), PA (E) |
| [*Ribes oxyacanthoides* L.](https://plants.usda.gov/java/profile?symbol=RIOX) | Canadian gooseberry |   | WI (T) |
| [*Ribes oxyacanthoides* L. ssp. *irriguum* (Douglas) Sinnott](https://plants.usda.gov/java/profile?symbol=RIOXI) | Idaho gooseberry |   | WA (S) |
| [*Ribes rotundifolium* Michx.](https://plants.usda.gov/java/profile?symbol=RIRO2) | Appalachian gooseberry |   | CT (SC) |
| [*Ribes triste* Pall.](https://plants.usda.gov/java/profile?symbol=RITR) | red currant |   | CT (E), OH (E), PA (T) |

T = threatened; E = endangered; SC = special concern; PRX = presumed extirpated; S =sensitive

According to the International Union for Conservation of Nature (IUCN, 2018), outside of North America, four *Ribes* species are listed as vulnerable, threatened, or endangered. *Ribes* *austroecuadorense* is a recently described shrub native to Ecuador at elevations of 3,000 to 3,480 meters and is presently known to occur in two populations, one of which is relatively protected due to its remote location. The second population is threatened by colonization and mining (Freire-Fierro and Pitman, 2004a).

A second Ecuadorian species, *Ribes lehmannii* Jancz., is found in the east-central Andes of Ecuador. The species is found in at least 10 wetland/forest populations, most of which are inside the Parque Nacional Llanganates and the Parque Nacional Cajas. Fires and grazing are threats to this species (Freire-Fierro and Pitman, 2004b).

*Ribes malvifolium* Pojarkova is listed by IUCN as critically endangered (IUCN, 2018c), although The Plant List (The Plant List, 2018) reports that the species name is presently unresolved and does not represent an accepted name nor a synonym with original publication detail. According to the IUCN listing, *R. malvaceum* Pojark is found in Uzbekistan in two tiny, fragmented populations that are threatened and declining due to fruit collection and livestock grazing (IUCN, 2007).

*Ribes sardoum* Martelli (Sardinian currant) is listed by IUCN as a critically endangered species found on the island of Sardinia in the Mediterranean Sea. According to the listing, only about 50 mature plants remain in a 1 km2 area and are threatened by low seed viability and grazing by sheep and goats (Bacchetta et al., 2011).

* 1. **Current and emerging biotic, abiotic, production, dietary, and accessibility threats and needs**

**Biotic issues**

Currants and gooseberries are some of the first deciduous shrubs to flower in the spring. With climate change in the temperate zones, spring temperatures tend to fluctuate more in the spring than in previous decades. With warm temperatures occurring earlier in the year, but intermittent with frosts, *Ribes* flowers tend to be blooming earlier and are subjected to freezes. Species such as Ribes aureum are subject to freezing with the opportune Botrytis strikes blasting back terminal branches.

**Pests and pest management**

Common insect pests in North American *Ribes* include aphids [*Capitophorus ribis* L., North America and Europe; *Aphis grossulariae* Kalt., Europe; *Hyperomyzus pallidus* (H.R. L.) and *Nasonovia ribisnigri* (Mosley), Europe], currant borer(*Synanthedon tipuliformis*, North America), and gooseberry sawfly (*Nematus ribesii* Scop., North America).

While the major pest challenge for European black currant production is black currant gall mite [*Cecidophyopsis ribis* (Westw.)] (Adams and Thresh 1987) the vector of *Blackcurrant reversion virus*,this is not the case for North America as the mite. does not occur in North America (Brennan et al. 2009).

The key *Ribes* pest in North America is white pine blister rust (caused by *Cronartium ribicola* C J Fisher) (Barney and Hummer, 2005). Originally from Asia, this rust was introduced in the late 19th and early 20th centuries into North America on infected white pine nursery stock. It spread across North America during the 1900s. This rust requires two co-hosts to complete its life cycle, a 5-needle pine and a currant or gooseberry. To reduce infection of pines, *Ribes* production is prohibited or restricted by regulations in 12 states. Several black currant cultivars with resistance have been identified (Barney and Fallahi 2009; Barney and Hummer 2005).

Powdery mildew [Podosphaera mors-uvae (Schwein.), formerly Sphaerotheca mors-uvae], is another primary problem in currant and gooseberry production plantations. Resistant cultivars are an effective control strategy. European gooseberries are most susceptible, followed by European black currants, American gooseberries, red and white currants, and jostaberries.

 Currants and gooseberries are susceptible to many pest and disease problems that interfere with production worldwide. In North America, the most serious problems include white pine blister rust, powdery mildew, imported currant worm, and currant fruit fly. These and a few other pests and diseases are discussed below. The reader is referred to Harmat et al. (1990) and Brennan (1996) for additional discussion of diseases and pests. A disease diagnostic webside (Hummer and Postman, 2000) is available at:

[www.ars-grin.gov/cor/ribes/ribsymp/ribsymp.html](http://www.ars-grin.gov/cor/ribes/ribsymp/ribsymp.html).

**Diseases**

Powdery Mildew, *Sphaerotheca mors-uvae*

These fungi over-winter on gooseberry and currant twigs, attacking shoots, leaves, and fruit. Powdery mildew is extremely serious on susceptible cultivars, limiting production in North America and around the world. Powdery mildew appears as white powdery growths on the surfaces of leaves, green shoots, and fruits. Infected plants are often stunted and severely affected plants can be killed. Mildew attacks fruits of susceptible cultivars, producing a dark brown, felt-like coating that renders berries unmarketable. Affected leaves develop scorch symptoms, become deformed, and dry out. During hot weather, damaged leaves may fall off.

Planting resistant cultivars is the best management strategy, although mineral oil sprays (Hummer and Picton, 2001), and biological fungicides provide other integrated pest management strategies. Most European gooseberries are highly susceptible to powdery mildew, and are difficult to grow in many parts of North America. Hybrid American/European cultivars resistant to the disease are available. European black currants range from highly susceptible to resistant. White and red currants and jostaberries show foliar symptoms some years, but the berries are generally not damaged.

Good plant nutrition can, reportedly, provide some degree of protection against mildew. Keeble and Rawes (1948) recommended reducing nitrogen fertilization but increasing potassium applications to develop “hardened foliage and hard, well-ripened growth less liable to attack.” These authors also recommended pruning in late fall to remove mildew-damaged shoot tips. The tips should be removed from the field immediately and burned to prevent them from being a source of infection in the spring. For commercial fields, such pruning may be cost-prohibitive. Sulfur sprays from pre-budbreak through the growing season are the most common control, although some other fungicides are available.

**White Pine Blister Rust** *Cronartium ribicola*

This rust fungus attacks both wild and cultivated species of gooseberries and currants. The wild species of California (*R. bracteosum*), flowering currant (*R. sanguineum*), Sierra gooseberry (*R. roezlii*), and Sierra currant (*R. nevadinse*) are highly susceptible. European black currants (*R. nigrum*) are more susceptible than red currant or gooseberry species. Many red currant, white currant, and gooseberry cultivars are moderately to very resistant to blister rust, while most European black currant cultivars are susceptible to highly susceptible to the disease. Several black currant cultivars that are resistant to blister rust are available.

Susceptible five-needled soft pines in North America include whitebark (*Pinus albicaulis*), limber (*P. flexilus*), western white (*P. monticola*), eastern white (*P. strobus*), sugar (*P. lambertiana*.), and bristlecone (*P. aristata*).

The fungus develops small cup-like spots, formed from minute, orange, hair-like structures, on the undersides of affected currant and gooseberry leaves. Spores from these cups cause additional infections of *Ribes* leaves throughout the summer. Affected plants are weakened and may show premature defoliation. Fortunately, the basidiospores produced by *Ribes* seldom travel more than several hundred yards (0.28 Km). Growers should keep domestic *Ribes* at least one-half mile (0.8 Km) from the nearest susceptible pines. In regions with native five-needled pines, growers should plant *Ribes* cultivars resistant to blister rust. Unfortunately, spores produced by pines can travel many miles to infect currants and gooseberries. The black currant cultivars that are immune to rust include: ‘Consort’, ‘Coronet’, ‘Crusader’, and ‘Titania’. Highly resistant types include: ‘Doez Siberjoczk’, ‘Lowes Auslese’, ‘Lunnaja’, ‘Polar’, ‘Sligo’, ‘Willoughby’, ‘Rain-in-the-face’ (*R. americanum*), and ‘Crandall’ (*R. aureum* var*. villosum*). Red currants that are highly resistant include: ‘London Market’, ‘New York 72’, ‘Sabine’ (selected as O-273), ‘Rondom’, and ‘Viking’. One white currant, ‘Gloire de Sablons’, is also highly resistant. Resistant gooseberry cultivars include: ‘Careless’, ‘Clark’, ‘Columbus’, ‘Crown Bob’, ‘Downing’, ‘Early Sulfur’, ‘Glenton Green’, ‘Golda’, ‘Greenfinch’, ‘Hinnonmaen keltainen’, ‘Hoennings Frueheste’, ‘Howard’s Lancer’, ‘Industry’, ‘Invicta’, ‘Josselyn’, ‘Jumbo’, ‘Robustenta’, ‘Whitesmith’, ‘White Lion’, and ‘Weisse Voltragende’.

**Viruses**

About 12 viruses or virus-like diseases have been reported on *Ribes* and have been described in Converse (1987). The most serious virus is *Black currant reversion*, which is vectored by eriophyoid mites. Aphids vector *Gooseberry vein banding* and *Cucumber mosaic*, and nematodes vector *Arabis mosaic*, *Tomato ring spot* and others. A range of minor virus and virus-like diseases are also described by Converse (1987).

**Reversion disease**

Reversion is the most serious disease affecting black currants in Europe and New Zealand (Trajkovski and Anderson, 1992). The causal agent of this disease is *Black currant reversion agent* virus. The disease affects black currants and is spread by the black currant gall mite (*Cecidophyopsis ribis*). According to Jones (1992), more than 30,000 mites can occupy a single bud and an infested bush often contains more than 100 infested buds. While neither the gall mite nor reversion disease have been reported in Canada or the United States (Converse, 1987), both are common in other countries where *Ribes* are grown. National quarantine regulations are in effect to prevent this disease from entering the United States. Gooseberries are immune to this disease (Jones, 1992).

Symptoms in black currants appear one year after inoculation and are limited to one or a few shoots. By the second year, one-third to one-half of the bush is affected, and the entire plant becomes affected by the third or fourth year. Infected bushes tend to have more but shorter canes than uninfected plants. Leaf and bud morphology are affected. Swollen globular dormant buds are a symptom of black currant gall mite presence.

**Pests**

Numerous pests attack currants and gooseberries. Like most other small fruit crops, deer and other herbivores damage canes and birds are attracted to the fruits. Deer fencing and bird netting or other bird-control devices may be necessary for some planting sites. Gophers can cause root damage and voles and mice can girdle canes. Avoidance of straw and similar mulches, and aggressive rodent control programs for *Ribes* plantings are recommended. Insects are more difficult to control. Some of the most common and/or serious insect pests presently in North America include: currant aphid, *Cryptomyzus ribis*; currant borer, *Synanthedon tipuliformis*; currant fruit fly or gooseberry maggot, *Epochra canadensis*; gooseberry mite, *Cecidophyopsis* *grossularae*; goosebery fruitworm, *Zophodia convolutella*; imported currantworm, *Nematus ribesii*; and pacific flat-headed borer, *Chrysobothris mali*. See Harmat et al. (1990) for further discussion on this pest.

* + 1. **Production/demand (inability to meet market and population growth demands)**

Commercial currant and gooseberry production has historically been volatile, with frequent wide swings in production and demand. The situation remains volatile today. As of 2017, Russia was the leading producer of currants and gooseberries at 389K tonnes, with Poland being the next largest producer at 169K tonnes (Index Box Marketing and Consulting, 2018). Russia’s production, however, is primarily for domestic consumption, whereas Poland produces *Ribes* crops for export. In 2017, Poland accounted for 35% of *Ribes* exports, followed by The Netherlands, Spain, Denmark, Belgium, the Czech Republic, and Germany. The value of Poland’s crop, however, was low compared to the other exporting countries, led by The Netherlands’ $27 million representing 50% of global export values (Index Box Marketing and Consulting, 2018).

Poland’s situation is characteristic of the volatility historically faced by commercial *Ribes* producers. Although Poland is the world’s second-largest *Ribes* producer, the majority of Poland’s currant and gooseberry farmers operate small farms. According to the International Blackcurrant Association (IBA), as of 2014, 52% of Poland’s currant and/or gooseberry farms were smaller than 5 ha and only 14% were larger than 15 ha. Poland’s National Association of Black Currant Growers (KSPCP) represents relatively few producers in that country. Reportedly, “The production of more than 70% of all blackcurrants in Poland is therefore mostly uncontrolled and impossible to cover statistically.” (IBA, 2016).

The IBA report further noted that, as of 2016, there were 32 professional juice concentrate processing plants in Poland. Fruit quality and traceability are very important for global export markets. With an estimated 15,000 black currant growers in Poland and 3,000 to 4,000 fruit collection points, consistently high fruit quality and traceability are difficult or impossible to obtain. The larger producers represented by the KSPCP stress the importance of matching supply to demand, high and consistent fruit quality, traceability, and growing crops under contract. By growing under contract to processors, they are able to maintain a balance between supply and demand.

Poland’s smaller, independent growers, however, face a “boom or bust” situation leading to severe product shortages or surpluses, resulting in low prices. According to the IBA in 2011, “Financial returns to the blackcurrant grower are not good at present. For the last two decades the industry has been plagued by rollercoaster pricing. Low prices cause growers to pull out plants. This results in low production and prices go up. Increased prices means growers come back into the market. And their new plantings come into full production after their third year of production and suddenly, a surplus. And prices plummet again.” (IBA 2011). An example is the Polish black currant crop in 2013. The KSPCP reported that “… prices currently being proposed do not even cover the cost of harvesting and transporting the fruit.” The KSPCP affirms that, in view of the current market situation, many households may go bankrupt. “The prices currently proposed by the processing plants barely cover one third of the production costs.” (Freshplaza, 2014).

Other *Ribes* exporting countries, such as The Netherlands, Belgium, and Spain, appear to be focused on quality and matching supply and demand. There is still the challenge, however, of increasing demand in regions, such as North America, where black currants and other *Ribes* crops are unknown or even vilified because of historic disease problems. Recent advances in *Ribes* breeding, particularly for black currants, and improved mechanical harvesters available even for small farms have allowed increased productivity and quality. Improved coordination and cooperation between producers, processors, and marketers will be required for the global *Ribes* industry to further expand.

* + 1. **Dietary (nutritional components)**

*Ribes* species have been used medicinally throughout the centuries. North American indigenous peoples used the fruits of wild currants and gooseberries as food, the inner bark as a poultice for sores and swelling, and the root for sore throats (Moerman 2009). Gerard’s Herbal, an English herbal published in 1597, describes black and red currants and gooseberries and their medicinal uses (Woodward 1924).

Black currants are particularly rich in vitamin C, phenolics, anthocyanins and other phytonutrients (Moyer et al., 2002a; 2002b). The primary anthocyanins present in black currants are 3-0-glucoside and 3-0-glutinoside. Black currant fruit extracts have been studied for use in cardiovascular health, as anticancer agents, to lower oxidative stress and postprandial glycemic responses (Mortaş and Şanlıer, 2017).

* + 1. **Accessibility (inability to gain access to needed plant genetic resources because of phytosanitary/quarantine issues, inadequate budgets, management capacities or legal and bureaucratic restrictions)**

More than 50 *Ribes* species are native to North America (Hummer and Bushakra, in press). The Pacific Northwest in North America is a center of gooseberry species diversity (Sinnott, 1985).

*Ribes* species grow in a range of habitats in temperate woods and mountainous regions. They tend to be shade tolerant and can be found as elements of the understory in conifer forests and in disturbed sites along roadways and drainage ditches. Some species grow in moist areas or bogs.

1. **Status of plant genetic resources in the NPGS available for reducing genetic vulnerabilities (5 pp. maximum)**
	* 1. **Holdings**

**3.1.2 Genetic coverage and gaps**

|  |  |
| --- | --- |
| Species | No. NPGS accessions |
| *Ribes aciculare* Sm.  | 1 |
| *Ribes diacanthum* Pall. | 3 |
| *Ribes dikuscha* Fisch. | 50 |
| *Ribes fontaneum* Boczkarn. | 8 |
| *Ribes manschuricum* (Maxim.) Kom. | 9 |
| *Ribes multiflorum* Kit. ex Schult. | 0 |
| *Ribes nigrum* var. *sibiricum* W.Wolf. | 3 |
| *Ribes orientale* Desf. | 0 |
| *Ribes palczewskii* (Jancz.) Pojark | 14 |
| Ri*bes pallidiflorum* Pojark. | 6 |
| *Ribes pauciflorum* Turcz. | 8 |
| *Ribes procumbens* Pall.  | 11 |
| *Ribes triste* Pall. |   18 |
| *Ribes ussuriense* Jancz.  | 0 |
| *Ribes warszewiczii* Jancz.  | 0 |

Greater representation of these species is needed from the Russian Far East, i.e., Siberia.

**3.1.3 Acquisitions**

A list of Ribes accessions are in Appendix Table 1.

**3.1.4 Maintenance**

Plants are maintained in the field on approximately 1 ha (2.5 ac) in Corvallis, OR in sets of 1 to 3 plants. The planting is currently arranged with cultivars separated from species. A small set of non-hardy plants are maintained in pots in a greenhouse. A set of virus infected plants are maintained in pots in a greenhouse or screenhouse.

Field plants are fertilized, pruned, and managed for weeds by hand. Irrigation is overhead. Dormant oil sprays are applied in the early spring when funding allows.

Future management will include drip irrigation and moving the species to the same area as the cultivars to reduce the water and weeding needed. If funding is available, we will incorporate weed mat.

* + 1. **Regeneration**

Plants are propagated as needed from dormant wood. The black currant cultivars that were in poor health or when only one or two plants were present. In January 2018, 127 cultivars of gooseberry and currant were collected for cryopreservation. Propagation of the species from cuttings is in progress (2018). Fruit from most fruiting species were collected and seeds extracted summer of 2018.

**3.1.6 Distributions and outreach**

The 25 most distributed *Ribes* between 1981 and 2017.

|  |  |  |  |
| --- | --- | --- | --- |
| PI | *Species* | Cultivar | Times shipped |
| 556263 | *Ribes oxyacanthoides* | Jahns Prairie | 127 |
| 555830 | *Ribes uva-crispa* | Jeanne | 99 |
| 556163 | *Ribes nigrum* | Boskoop Giant | 90 |
| 556017 | *Ribes uva-crispa* | Poorman | 89 |
| 556298 | *Ribes spicatum* | Cherry | 82 |
| 556051 | *Ribes uva-crispa* | Captivator | 78 |
| 556256 | *Ribes aureum* var. *villosum* | Crandall | 74 |
| 556053 | *Ribes spicatum* | Rovada | 72 |
| 556048 | *Ribes spicatum* | White Imperial | 69 |
| 684888 | *Ribes nigrum* | R. nigrum education sample  | 64 |
| 555836 | *Ribes uva-crispa* | Malling Invicta | 63 |
| 684889 | *Ribes rubrum* | R. rubrum educational seed | 63 |
| 617726 | *Ribes nigrum* | Noir de Bourgogne | 62 |
| 556055 | *Ribes xnidigrolaria* | Josta | 59 |
| 556056 | *Ribes uva-crispa* | Pixwell | 59 |
| 555853 | *Ribes uva-crispa* | Colossal | 57 |
| 556061 | *Ribes spicatum* | White Currant 1301 | 57 |
| 556068 | *Ribes xnidigrolaria* | Jostaberry type (red) | 56 |
| 556037 | *Ribes spicatum* | Viking | 55 |
| 555828 | *Ribes uva-crispa* | Whitesmith | 52 |
| 555835 | *Ribes uva-crispa* | Jumbo | 52 |
| 556044 | *Ribes spicatum* | Perfection | 51 |
| 556040 | *Ribes hirtellum* | Downing | 49 |
| 556313 | *Ribes spicatum* | White Dutch | 49 |
| 556043 | *Ribes spicatum* | Rondom | 48 |

**3.2 Associated information**

**3.2.1 Genebank and/or crop-specific web site(s)**

The US National Plant Germplasm Germplasm Resources Information Network (GRIN)-Global database has Ribes information stored and available to the public. The searchable plant database is: **https://npgsweb.ars-grin.gov/gringlobal/search.aspx**

The NCGR *Ribes* collections and research have been summarized at berry symposia and research meetings (Hummer and Finn, 1999; Hummer, 2000; Hummer, 2001a, 2001b; Hummer and Barney, 2002)

NCGR staff has prepared station reports concerning recommended *Ribes* cultivars (Pluta and Hummer, 1985; Hummer, 1996; Hummer and Finn, 1999; Hummer, 2000; Hummer and Reed, 2007; Hummer, 2006; Hummer, 2014). Messinger et al. (1999) reviewed *Ribes* infragenetic systematics and nomenclature.

**3.2.2 Genotypic characterization data**

Fruit components

Moyer et al. (2002a, 2002b) examined total anthocyanins, antioxidant capacity, and anthocyanin content in black currant fruit.

Rust resistance

The staff at the NCGR has collaborated with many national and international scientists to examine rust resistance in the NCGR collection (Pluta et al, 1996; Hummer, 1997; Hummer and Sniezko, 2000; Sabitov and Hummer, 2002; Hummer and Picton, 2002; Hummer and Dale, 2010). Hummer (2000) described the history and dispersal of white pine blister rust in North America.

Hummer and Picton (2000) described markers for the *Cr* gene for rust resistance. Dalton and Hummer (2009) examined the inheritance of the *Cr* gene for white pine blister rust resistance. Dalton et al. (2010) examined the comparative infectivity of rust spores in *Ribes* cultivars.

The state regulations on restrictions of *Ribes* due to white pine blister rust continue to change. Hummer and Bartlett (1995) summarized state restrictions of currants and gooseberries due rust.

Now these regulations can be found on line through the National Plant Board laws and regulations. <https://nationalplantboard.org/laws-and-regulations/>

Mildew resistance

Hummer and Picton (2000; Picton and Hummer, 2003) determined that powdery mildew could be reduced in gooseberries by using dormant oil spray.

Pest infestations

Hummer and Postman (2000) prepared an on-line diagnostic tool for distinguishing pests and diseases of Ribes.

Hummer et al. (1998) surveyed the collection for infestation of gooseberry mite in *Ribes* cultivars of the NCGR collection.

Hummer and Sabitov (2002, Sabitov and Hummer, 2004; Sabitov et al., 2004) surveyed the NCGR *Ribes* collection for cane borer infestation.

**3.2.3 Phenotypic evaluation data**

Dalton and Hummer (2010) observed the phenology of bloom times in subg. *Botrocarpum* and subg. *Ribes* in Corvallis Oregon.

**3.3 Plant genetic resource research associated with the NPGS**

**3.3.1 Goals and emphases**

* Obtain wild *Ribes* with pest resistance
* Obtain heritage cultivars with desirable fruit qualities
* Obtain wild *Ribes* species from Europe, Asia, and North America
* Develop SSR markers for identity assessment of *Ribes* cultivars.
* Analyze of fruit content variability within the genus

**3.3.2 Significant accomplishments**

* *Ribes* collections from Russia, China, Republic of Georgia, Azerbaijan, Japan, Pacific Northwestern US, Southeastern US, in multiple collecting trips over 30 years.
* Conservation of heritage *Ribes* cultivars dating back to the 1500s.
* Tissue culture core cultivars and species clones in the NCGR-Corvallis and at the NCGRP Ft. Collins.
* Development of techniques for cryopreservation of dormant *Ribes* buds

**3.4 Curatorial, managerial and research capacities and tools**

**3.4.1 Staffing**

0.1 FTE Cat. 4 support scientist Curator

0.1 FTE Cat. 4 support scientist Geneticist for genetic analysis and interpretation

0.5 FTE Bio Sci Res Tech (GS 9) plant manager

0.1 FTE Program Support Assistant (GS-5)

0.1 FTE Bio Sci Res Tech (GS 9) – greenhouse manager

0.1 FTE Bio Sci Res Tech (GS 9) – tissue culture/cryogenic technician

0.1 FTE Bio Sci Res Tech (GS 9) – distribution

0.5 FTE Bio aid (GS 7) – propagation

0.1 FTE time slip labor- for plant management

1.3 FTE total USDA labor for *Ribes* efforts

**3.4.2 Facilities and equipment ft2 m2**

1 polycarbonate growing potting area 6,000 700

Main Office and Laboratory Space 9,830 929

Four Greenhouses 10,229 937

Headhouse 6,500 614

One Shadehouse 1,720 164

Boiler Room 400 38

Shop Work Area 1,704 161

Two Storage Sheds 3,960 374

Two Walk-in coolers 360 36

North Farm Building 2,220 210

Additional facilities and support

Fuel Tanks

 Above ground diesel 2 @ 500 gal

 Above ground gasoline 1 @ 500 gal

4 wells

Land

Buildings and Grounds 5 acres (2.23 hectares)

(25 year lease from OSU starting January 1, 1978)

(Lease has been signed for additional 25 year extension 2004 through 2029)

Planted

20 acres (8.09 hectares) at 33447 Peoria Road, Corvallis, OR 97333

 (Agreement with OSU Department of Horticulture on Lewis Brown Farm)

Additional Plantings 42 acres (17 hectares) USDA-ARS owner

 33707 S.E. Peoria Road, Corvallis, OR 97333

Staffing for Facilities Management

Location Facilities operations specialist GS-12 available for consultation and advice

Unit Maintenance Technician WG-5 provides 0.15 FTE of facilities maintenance.

Janitor 0.15 FTE

**Equipment**

Tissue culture laboratory (media prep, culturing, growth room, cryogenic option)

Molecular marker laboratory (molecular marker determination)

 Pathogen testing laboratory (bio assays, ELISA, PCR, rtPCR)

 Plant propagation equipment (mistbed, propagation houses, quarantine facility)

 Field propagation

**3.5 Fiscal and operational resources**

Federal funding to support federal *Ribes* germplasm management at NCGR-Corvallis:

CRIS 2072-21000-049-00D FY 2018 – $153,000.

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Appendix Table 1. *Ribes* accessions in GRIN-Global (2018).

1. Ribes acerifolium ([3 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=465858;:siteid=3))
2. Ribes aciculare ([1 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=315993;:siteid=3))
3. Ribes alpestre ([1 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=31770;:siteid=3))
4. Ribes alpinum ([7 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=31773;:siteid=3))
5. Ribes amarum ([2 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=410538;:siteid=3))
6. Ribes americanum ([9 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=31774;:siteid=3))
7. Ribes aureum ([4 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=31779;:siteid=3))
8. Ribes aureum var. aureum ([16 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=405085;:siteid=3))
9. Ribes aureum var. gracillimum ([1 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=405082;:siteid=3))
10. Ribes aureum var. villosum ([28 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=405086;:siteid=3))
11. Ribes binominatum ([3 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=315171;:siteid=3))
12. Ribes brachybotrys ([3 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=417135;:siteid=3))
13. Ribes bracteosum ([25 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=301080;:siteid=3))
14. Ribes burejense ([6 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=31782;:siteid=3))
15. Ribes californicum var. hesperium ([1 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=315172;:siteid=3))
16. Ribes cereum ([32 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=31785;:siteid=3))
17. Ribes cereum var. cereum ([1 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=316230;:siteid=3))
18. Ribes cereum var. colubrinum ([1 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=316229;:siteid=3))
19. Ribes ciliatum ([1 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=400907;:siteid=3))
20. Ribes cruentum var. cruentum ([1 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=448026;:siteid=3))
21. Ribes cuneifolium ([1 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=417136;:siteid=3))
22. Ribes curvatum ([3 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=31789;:siteid=3))
23. Ribes cynosbati ([7 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=31791;:siteid=3))
24. Ribes diacanthum ([3 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=31793;:siteid=3))
25. Ribes dikuscha ([50 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=31794;:siteid=3))
26. Ribes divaricatum ([1 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=31796;:siteid=3))
27. Ribes echinellum ([3 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=301084;:siteid=3))
28. Ribes erythrocarpum ([4 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=316518;:siteid=3))
29. Ribes fasciculatum ([3 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=31797;:siteid=3))
30. Ribes fasciculatum var. chinense ([8 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=31798;:siteid=3))
31. Ribes fontaneum ([11 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=419503;:siteid=3))
32. Ribes formosanum ([1 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=301082;:siteid=3))
33. Ribes glandulosum ([7 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=31803;:siteid=3))
34. Ribes heterotrichum ([2 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=315694;:siteid=3))
35. Ribes himalense ([1 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=31814;:siteid=3))
36. Ribes hirtellum ([2 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=31817;:siteid=3))
37. Ribes horridum ([2 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=317943;:siteid=3))
38. Ribes hudsonianum ([9 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=31820;:siteid=3))
39. Ribes hudsonianum var. petiolare ([21 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=313953;:siteid=3))
40. Ribes hybr. ([3 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=313952;:siteid=3))
41. Ribes incarnatum ([2 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=429739;:siteid=3))
42. Ribes inerme ([18 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=31822;:siteid=3))
43. Ribes janczewskii ([3 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=316070;:siteid=3))
44. Ribes japonicum ([4 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=316365;:siteid=3))
45. Ribes komarovii ([7 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=313588;:siteid=3))
46. Ribes laciniatum ([1 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=403302;:siteid=3))
47. Ribes lacustre ([35 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=31825;:siteid=3))
48. Ribes latifolium ([15 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=313587;:siteid=3))
49. Ribes laurifolium ([2 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=31826;:siteid=3))
50. Ribes laxiflorum ([8 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=301078;:siteid=3))
51. Ribes leptanthum ([3 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=31828;:siteid=3))
52. Ribes lobbii ([7 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=31829;:siteid=3))
53. Ribes magellanicum ([5 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=316514;:siteid=3))
54. Ribes malvaceum ([4 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=410408;:siteid=3))
55. Ribes malvaceum var. viridifolium ([1 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=453051;:siteid=3))
56. Ribes mandshuricum ([8 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=31833;:siteid=3))
57. Ribes maximowiczianum ([2 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=313951;:siteid=3))
58. Ribes maximowiczii ([3 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=31834;:siteid=3))
59. Ribes menziesii ([3 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=316228;:siteid=3))
60. Ribes mescalerium ([3 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=411945;:siteid=3))
61. Ribes meyeri ([5 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=31835;:siteid=3))
62. Ribes missouriense ([17 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=31838;:siteid=3))
63. Ribes montigenum ([8 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=31840;:siteid=3))
64. Ribes multiflorum ([7 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=31843;:siteid=3))
65. Ribes nevadense ([5 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=31844;:siteid=3))
66. Ribes nigrum ([243 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=31845;:siteid=3))
67. Ribes nigrum var. nigrum ([2 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=465889;:siteid=3))
68. Ribes nigrum var. sibiricum ([3 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=316071;:siteid=3))
69. Ribes niveum ([9 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=313585;:siteid=3))
70. Ribes orientale ([5 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=31847;:siteid=3))
71. Ribes oxyacanthoides ([3 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=31848;:siteid=3))
72. Ribes oxyacanthoides subsp. irriguum ([5 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=313583;:siteid=3))
73. Ribes oxyacanthoides subsp. setosum ([1 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=316085;:siteid=3))
74. Ribes pallidiflorum ([6 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=317747;:siteid=3))
75. Ribes pauciflorum ([8 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=313590;:siteid=3))
76. Ribes pentlandii ([1 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=403297;:siteid=3))
77. Ribes petraeum ([5 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=70568;:siteid=3))
78. Ribes petraeum var. altissimum ([2 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=466077;:siteid=3))
79. Ribes petraeum var. atropurpureum ([1 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=31850;:siteid=3))
80. Ribes petraeum var. biebersteinii ([3 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=407830;:siteid=3))
81. Ribes petraeum var. carpathicum ([1 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=311663;:siteid=3))
82. Ribes pinetorum ([2 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=411946;:siteid=3))
83. Ribes procumbens ([11 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=31852;:siteid=3))
84. Ribes quercetorum ([6 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=31855;:siteid=3))
85. Ribes roezlii ([13 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=31858;:siteid=3))
86. Ribes roezlii var. cruentum ([6 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=413493;:siteid=3))
87. Ribes rotundifolium ([9 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=31859;:siteid=3))
88. Ribes rubrum ([31 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=31860;:siteid=3))
89. Ribes sachalinense ([13 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=317748;:siteid=3))
90. Ribes sanguineum ([29 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=31862;:siteid=3))
91. Ribes sanguineum var. glutinosum ([2 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=413538;:siteid=3))
92. Ribes sanguineum var. sanguineum ([2 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=413537;:siteid=3))
93. Ribes speciosum ([2 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=31867;:siteid=3))
94. Ribes spicatum ([80 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=313955;:siteid=3))
95. Ribes spicatum subsp. palczewskii ([14 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=466074;:siteid=3))
96. Ribes spp. ([59 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=301086;:siteid=3))
97. Ribes stenocarpum ([1 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=31868;:siteid=3))
98. Ribes thacherianum ([1 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=448842;:siteid=3))
99. Ribes triste ([15 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=31872;:siteid=3))
100. Ribes turbinatum ([1 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=403299;:siteid=3))
101. Ribes uva-crispa ([152 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=31874;:siteid=3))
102. Ribes valdivianum ([1 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=31875;:siteid=3))
103. Ribes velutinum ([4 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=31876;:siteid=3))
104. Ribes viburnifolium ([6 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=31877;:siteid=3))
105. Ribes viscosissimum ([27 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=301083;:siteid=3))
106. Ribes watsonianum ([1 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=31883;:siteid=3))
107. Ribes wolfii ([2 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=31884;:siteid=3))
108. Ribes x gordonianum ([1 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=31805;:siteid=3))
109. Ribes x nidigrolaria ([21 Accessions](https://npgsweb.ars-grin.gov/gringlobal/view2.aspx?dv=web_site_taxon_accessionlist&params=:taxonomyid=318352;:siteid=3))