Commercial Production of Currants and Gooseberries in the Inland Northwest and Intermountain West of the United States: Opportunities and Risks

Danny L. Barney

ADDITIONAL INDEX WORDS. *Ribes*, white pine blister rust

SUMMARY. During the 1800s and early 1900s, red and white currants (*Ribes* L. subgenus *Ribes*), black currants (*Ribes* subgenus *Coreosma*), and gooseberries (*Ribes* subgenus *Grossularia*) were grown commercially in the United States. Because *Ribes* serve as alternative hosts of white pine blister rust (*Cronartium ribicola* J. C. Fischer) (WPBR), which was introduced from Europe, the federal government and many states either banned or severely restricted currant and gooseberry production beginning about 1933. The development of WPBR resistant pines and black currants (the most susceptible cultivated *Ribes*) renewed interest in commercial *Ribes* production. Climatic and soil conditions in selected areas of the U.S. inland northwest and intermountain west (INIW) are favorable for commercial currant and gooseberry production. Challenges to the establishment of a *Ribes* industry are labor, marketing, diseases, and pests. Careful site and cultivar selection are critical for successful commercial production. This article describes *Ribes* opportunities and risks associated with currant and gooseberry production in the INIW. The region includes Idaho and surrounding areas in Montana, Nevada, Oregon, Utah, Washington, and Wyoming.

Beginning as early as the 1400s, herbalists collected wild currants and gooseberries for use in medicines (Bunyard, 1917 cited by Hedrick, 1925). By the 1500s, domestication efforts had begun. Two centuries later red currants and gooseberries were popular garden fruit in Western Europe, and black currants were sold at farmers markets in Russia. Currants came to North America in 1629 in a shipment to the Massachusetts Bay Colony (Shoemaker, 1955) and gooseberries soon followed.

Ribes are quite easy to breed and progeny generally resemble their parents. Commercial and hobby growers in Europe and North America took on the challenge of improving the crops and the number of cultivars increased rapidly. Gooseberries exemplify this point. In 1778, at least 23 cultivars were known (Brennan, 1996). Hedrick (1925) described more than 1,000 gooseberry cultivars.

Plant, Soil, and Entomological Sciences Department, University of Idaho, Sandpoint Research and Extension Center, 2105 N. Boyer Avenue, Sandpoint, ID 83864.

This research was supported by the University of Idaho and Idaho Agricultural Experiment Station, manuscript no. 99729. Funding was also provided by the USDA–ARS Pacific Northwest Small Fruit Research Program, Special Project IDA9104214. Use of trade names in this publication does not imply endorsement of the named products or criticism of similar ones not mentioned. The cost of publishing this paper was defrayed in part by the payment of page charges. Under postal regulations, this paper therefore must be hereby marked *advertisement* solely to indicate this fact.

Harmat et al. (1990) stated that several thousand gooseberries had been named, but emphasized that only a few were suitable for commercial cultivation. Currant breeding programs were active in the U.S. in the first half of the 1900s in Illinois, Minnesota, Oregon, New York, North Dakota, and South Dakota. At least 18 species have contributed to the development of currant and gooseberry cultivars (Harmat et al., 1990).

By the late 1800s, currants and gooseberries were grown commercially in Canada and the United States. According to the 1920 census (Hedrick, 1925), U.S. farmers grew approximately 7,400 acres (3,000 ha) of commercial currants and gooseberries. Most of that production was centered in middle Atlantic, upper midwest, and northeast states, with scattered production across the northern half of the country. New York was the leading currant producer, and approximately 500 acres (200 ha) of commercial *Ribes* fields were located in the INIW at that time. Red and white currants dominated the U.S. market with little gooseberry or black currant production. White currants are color variants of red currants and were bred from the same species. Gooseberries were grown, to a limited degree, in Oregon, Michigan, Washington, and Colorado (Shoemaker, 1955). Canadians favored black currants, which made up approximately half that country's production. Red currants and gooseberries each made up about 25 % of the Canadian market (Shoemaker, 1955).

Commercial production of currants and gooseberries continued and expanded in Europe through the 1900s. Germany, Poland, and Russia are the leading gooseberry producers. Poland and Germany also lead in the production of red and white currants. Black currants are the primary *Ribes* crop grown worldwide with major production in Russia, Britain, and other European countries. According to the United Nations' Food and Agriculture Organization (FAO), 463,515 tons (421,378 t) of currants and 156,854 tons (142,595 t) of gooseberries were produced on 245,532 acres (99,406 ha) in Europe and the Baltic states during 1998 (FAO, 2000). The FAO statistical database contained no record of currant or gooseberry production in North America for the period 1990–98.

Disaster came to the North American *Ribes* industry because of an imported disease. Several times between 1898 and 1910, foresters accidentally introduced WPBR to North America on infected North American white pine seedlings (*Pinus* L.) grown in and imported from Europe (Detwiler, 1933). Ironically, the disease does little damage to *Ribes*. However, it causes cankers that girdle and kill eastern and western white pines (*Pinus strobus* L. and *P. monticola* Dougl. Ex D. Don) and other five-needled pines. By the late 1920s, millions of pines had been killed by the disease and state and federal efforts were underway to restrict or eliminate *Ribes* production and to eradicate native *Ribes* species. Blister rust control efforts virtually eliminated commercial currant and gooseberry production in the United States.

Eradication efforts in the INIW proved ineffective and efforts turned to breeding pines resistant to the disease (Carlson, 1978). With the development of rust-resistant strains of pines, the U.S. federal government no longer restricts *Ribes* production, although direct importation of *Ribes* from foreign countries other than Canada is prohibited. New Hampshire and North Carolina ban all *Ribes* production and 13 other states restrict production. Within the INIW, Montana prohibits black currant production but allows production of red currants, white currants, and gooseberries. None of the other states in the region have regulations that apply specifically to *Ribes*.

Large-scale *Ribes* production in the INIW, while feasible, has yet to be developed. Small-scale production has increased during the past decade and it is becoming increasingly common to find currants and gooseberries for sale at farmers markets and through market gardeners.

Climatic and soil requirements

Topography and climate vary tremendously throughout the INIW. Average minimum winter temperatures range from 0 to –40 °F (–20 to –40 °C) and precipitation from less than 10 to more than 60 inches (25 to 150 cm) per year. Within this diverse region are many locations suitable for commercial *Ribes* production.

Cultivated currants and gooseberries are adapted to cool, moist sites and favor deep, well-drained soils rich in organic matter and with pH values between 5.5 and 7.0 (Barney, 1996a). Many cultivars are hardy to between –22 and –31 °F (–30 and –35 °C) (Harmat et al., 1990), providing a distinct advantage for fruit growers in this mountainous region. *Ribes*' cold hardiness is probably greater than the previously cited research indicates, as currants and gooseberries are grown in regions where winter temperatures of –40 °F (–40 °C) or less are common. The plants are less tolerant of heat. Harmat et al. (1990) noted foliar injury at 86 °F (30 °C) although the author has successfully grown currants and gooseberries in an area with occasional summer temperatures greater than 100 °F (38 °C) and frequent days with temperatures at or above 86 °F. Adequate soil moisture apparently reduces heat stress problems. Intense sunlight combined with high temperatures can cause the berries to sunscald. Production requires 160 to 200 growing degree days (41 °F or 5 °C base temperature) and a 120 to 140-d frost-free growing season (Harmat et al., 1990). Yields are best in full sun, but partial shade from trees, mountains, or other topographic features may be desirable at sites with clear days and temperatures frequently above 95 °F (35 °C). Establishing fields on north-facing slopes can help reduce heat stress and retard bloom in the spring. Currants bloom early in spring and the flowers are susceptible to frost damage.

Opportunities

With many farm commodities currently providing poor economic returns, interest in high-value specialty crops is increasing. Strong consumer demand for fruit products and dietary supplements provide opportunities for currant and gooseberry commercialization. Currants and gooseberries are excellent sources of vitamins A, B, and C. Some black currant cultivars contain vitamin C concentrations four times greater than those found in citrus (*Citrus* L.) fruit (Westwood, 1993). The berries also provide pectins, fructose, and various mineral elements. The seeds of black currants contain essential fatty acids, including gamma-linolenic acid (Brennan, 1990). Black currant leaves and buds are rich in phenolic compounds and have been used in herbal medicines for centuries.

In Russia, black currant leaves are also used to make a tea resembling green tea in flavor.

Black currants dominate the European *Ribes* market. Although their strong flavor makes fresh berries rather unpalatable, juice, jams, syrups, and wines are popular products. Approximately 75% of the berries are used for juice (Brennan, 1990). Black currants are also used to color yogurt and other dairy products. Red currants can also be used for juice and are often processed into jellies and syrups. White currants are made into baby food in some European countries (Harmat et al., 1990). The large seeds limit fresh consumption, but there are niche markets for fresh red and white currants to be used in garnishes and other culinary applications. Gooseberries are generally used for jams, jellies, pastries, and deserts. Their resemblance to grapes in taste, texture, and size may allow them to substitute for table grapes in niche markets, and gooseberries are also sold canned for use in pastry fillings and other dessert applications.

Dale (1992) reported strong demand in Canada for black currant products and estimated that more than 20,000 acres (8,100 ha) of black currants would be needed to capture 1% of the North American juice market. Estimates place today's commercial *Ribes* production in North America at less than 500 acres (200 ha) (Barney, 1996b), representing small-scale operations across the northern U.S. and southern Canada.

Active *Ribes* breeding programs and the free flow of scientific information throughout the world may help give impetus to reestablishing a currant and gooseberry industry in North America. Whereas early breeders focused on fruit size, today the emphasis in on pest and disease resistance, fruit quality, and suitability for mechanical harvesting. In gooseberries, development of thornless cultivars is also a priority.

Risks

Currant and gooseberry production, like all farming, carries inherent risks. Factors limiting commercial development include labor, marketing, diseases, and pests. Lack of production and marketing technical support are also challenges.

Planting and establishment practices for currants and gooseberries are similar to those for blueberries. Fewer nurseries carry commercial quantities of *Ribes*, however, and the cost of planting stock can be higher per unit than for blueberries. Quarantines on the importation of *Ribes* into the United States can also make it difficult for growers to obtain new and desirable cultivars. Trellises are not required, but protection from deer, birds, and other vertebrate pest may be needed in some areas.

Inadequate labor to grow and harvest currants and gooseberries may seriously hinder expansion of *Ribes* production in the INIW. Most currant and gooseberry production systems require substantial pruning labor each year, comparable to raspberry (*Rubus idaeus* L.) production but more than would be required for blueberries (*Vaccinium corymbsum* L.). Pruning, however, can take place over several months, reducing the need for many field workers. Hand harvesting both currants and gooseberries is labor intensive. Harmat et al. (1990) estimated that 65 to 70% of the total labor in producing *Ribes* goes into hand harvesting. Unlike raspberries, ripe currants and

Table 1. Promising commercial currant and gooseberry cultivars for the U.S. inland northwest and intermountain west.

	Disease resistance[z]			
	Powdery mildew	Blister rust	Harvest[y]	Use[x]
Black currants[w]				
Ben Tirran	R	R	H, M	All
Titania	R	I	H, M	All
Red currants[v]				
Minnesota 71	MS	R	H, M	All
Rovada	MS	R	H, M	All
Rondom	MS	R	H, M	All
Rotet	MS	R	H, M	All
Wilder	R	R	H, M	All
White currants[v]				
White Currant 1301	R	R	H, M	All
White Imperial	MS	R	H, M	All
Gooseberries[v]				
Captivator	MS	R	H, M	All
Oregon Champion	MS	R	H, M	All
Poorman	MS	R	H, M	All
Pixwell	MS	R	H, M	All
Shefford	MS	R	H, M	All
Speedwell	MS	R	H, M	All

[z]Disease resistance: MS = modeartely resistant = foliage moderately susceptible but fruit usually acceptable; R = resistant = foliage shows few or no symptoms most years; I = immune = symptoms have not been observed.
[y]Harvest: H = suitable for hand harvest; M = suitable for mechanical harvesting.
[x]Use: All = suitable for all home and commercial uses.
[w]Black currants: 'Titania' is reportedly immune to white pine blister rust. 'Ben Nevis' and 'Swedish Black' develop few blister rust lesions compared with other black currant cultivars, but are somewhat susceptible.
[v]Red and white currants and gooseberries can be infected by white pine blister rust under severe conditions. In the author's Idaho field trials, blister rust symptoms have not been observed on the cultivars listed in this table.

gooseberries can hang on the canes and maintain acceptable market quality for a week or more, providing a relatively long harvest window. Where suitable markets exist or can be developed, U-pick operations significantly reduce labor costs. White currants provide the greatest yields with about 9 ton / acre (20 $t \cdot ha^{-1}$), followed by red currants at 4.5 to 7 ton / acre (10 to 16 $t \cdot ha^{-1}$) and gooseberries at 4.5 ton / acre (10 $t \cdot ha^{-1}$) (Childers, 1978; Harmat et al., 1990). Black currants produce the lowest yields at about 2 ton / acre (4.5 $t \cdot ha^{-1}$) (Harmat et al., 1990) although newer cultivars appear likely to increase yields significantly. A person can hand harvest about 8.8 lb (4 kg) of black currants, 17.6 lb (8 kg) of red or white currants, and 22 lb (10 kg) of gooseberries per hour (Harmat et al., 1990). Hand-held pneumatic or electric shakers can speed up hand harvesting. For grower-picked fruit, hand-harvesting costs may be prohibitive for all but small operations. Costs would be particularly high in areas throughout the region where migrant farm workers are not traditionally found.

For large-scale production, European farmers use over-row mechanical harvesters. Because imported over-row *Ribes* harvesters cost in the $100,000 range, joint purchase of a harvester by a collective of growers might be required to meet equipment acquisition and maintenance cost limitations. Smaller harvesters designed for blueberries and built in North America might be adapted to currants and gooseberries. Cultivar selection and field layout are important decisions in reducing harvest labor. Cultivars with long, easily picked fruit clusters (strigs) make hand harvest faster and easier and reduce damage to berries. Growers planning to use mechanical harvesters must allow adequate row spacing for the machines and room at the ends of rows to turn equipment around.

Marketing presents another challenge for U.S. *Ribes* producers. Residents of the U.S. are generally unfamiliar with currants or gooseberries, and producers face the task of introducing essentially new and novel fruit. Today's refrigeration and transportation technologies allow traditional and exotic fruit to be imported from throughout the world, creating stiff competition for consumer dollars. Where consumers are familiar with currants and gooseberries, the association may be negative. For decades, forestry crews throughout various parts of North America worked to eradicate *Ribes* and save pines. Particularly in traditional logging areas, consumer education will be an important aspect of marketing. On the positive side, currants and gooseberries lend themselves to many value-added products that are suited to specialty and niche markets.

Powdery mildew [*Sphaerotheca mors-uvae* (Schw.) Berk.] causes the most damage of any disease in the region discussed in this paper. The fungus attacks the stems, leaves, and fruit of *Ribes*. Serious infections stunt or kill the canes and render fruit inedible. Black currants are generally more susceptible to the disease than red and white currants. Gooseberries with North American species in their genetic backgrounds are more resistant to powdery mildew than are cultivars derived solely from European species. Pesticide registrations for *Ribes* crops are extremely limited and chemical control of powdery mildew is largely restricted to sulfur sprays. Fortunately, mildew-resistant or tolerant cultivars are available for all *Ribes* crops (Table 1).

WPBR is a minor biological problem for *Ribes* growers. Infected currants and gooseberries seldom suffer more than premature defoliation. Infected pines, however, often die. Logging has historically been a major contributor to INIW economies and may be threatened by increased *Ribes* introduction and cultivation. Pines can only be infected by basidiospores from *Ribes*. Because basidiospores usually travel about 1 mile (1.6 km) or less, isolation of currant and gooseberry fields from five-needled pines should reduce the likelihood of infecting trees (Detwiler, 1933; Skilling, 1975). Aeciospores produced by pines, however, can reportedly travel several hundred miles to infect currants and gooseberries (Skilling, 1975). *Ribes* can also be infected by urediospores formed on other nearby *Ribes*. Both native *Ribes* species and cultivated currants and gooseberries can serve as bridges, allowing the pathogen to infect pines over a wide geographic range. At least 28 species of native *Ribes* are found within the area discussed in this paper (Hitchcock and Cronquist, 1973; Welsh and Moore, 1973). These species vary in their susceptibility to WPBR.

Black currants derived solely from *R. nigrum* L. are the most WPBR-susceptible cultivated *Ribes*, but other crops can become infected. The red currant cultivar 'Viking,' once thought to be immune to rust, can develop rust symptoms in laboratory tests (Zambino, 2000). Selection of blister rust-resistance is a high priority for *Ribes* breeders in North America. The Canadian cultivars 'Consort,' 'Crusader,' and 'Coronet' possess the *Cr* gene derived from *R. ussuriense* and are immune to WPBR. They are moderately to very susceptible to powdery mildew, however, and their fruit quality is poor compared with many other black currant cultivars. 'Titania,' from Sweden, also has the *Cr* gene and is resistant to mildew. The fruit quality is better than the Canadian cultivars, but still does not meet world market juice standards. Suggested WPBR-resistant cultivars of black, red, and white currants and gooseberries are listed in Table 1.

Widespread planting of WPBR resistant white pines has reduced risks to the logging industry. However, noncommercial but environmentally important pine species in the region, including whitebark pine (*Pinus albicaulis* Engelm.), limber pine (*P. flexilis* James) and bristlecone pine (*P. aristata* Engelm.) are also susceptible to WPBR. White pine blister rust is endemic on native pine and *Ribes* species throughout the INIW. Several strains of WPBR may exist in different parts of North America. The most serious threat currant and gooseberry production poses may be the potential of introducing virulent strains to different locations. Crossing existing strains may also produce new, more virulent types that could overcome the resistance displayed by certain pine populations.

The basidiospores that infect pines form only on *Ribes* leaves. Once currants or gooseberries are defoliated, they are reportedly no longer contagious. Plants to be shipped from one region to another should be dormant and free of leaves. Proper site and cultivar selection combined with importation of inspected *Ribes* nursery stock will reduce the threat that cultivated currants and gooseberries pose for pines.

Worldwide, reversion disease is the most serious disease on black currants (Trajkovski and Anderson, 1992). Although the causal organism has not been isolated, it appears to be a virus or virus-like pathogen that is spread by the gall mite (*Cecidophyopsis ribis* Nalepa). The mite vector spreads rapidly through plantations and infected plants decline over two to four years. There are no treatments and infected plants must be destroyed. Breeding programs are underway in Europe to develop black currant cultivars resistant to the disease and / or vector. Neither reversion disease nor the mite that vectors it are known to exist in North America and aggressive quarantine programs should reduce the threat of importing them. The absence of the disease and vector provide North American growers an advantage over their European counterparts.

Several pests can cause serious damage to cultivated *Ribes* in the INIW (DeAngelis et al., 1999). Most serious are imported currant worm (*Nematus ribesii* Scopoli), currant fruit fly or gooseberry maggot (*Epochra canadensis* Loew.), and gooseberry fruitworm (*Zophodia convolutella* Hübner). The imported currant worm feeds on leaves and moderate infestations can quickly defoliate bushes. This pest, however, is easily controlled with several insecticides registered for *Ribes*. Currant fruit fly and gooseberry fruit worm are more difficult to control than the imported currant worm, but both cultural controls and pesticides are available. Currant aphid (*Cryptomyzus ribis* L.) is another common but easily controlled pest in the region.

Fewer pesticides are registered for *Ribes* in the U.S. than for blueberries, raspberries, and other small fruit crops grown on larger scales. With pesticide development and registration costs increasing, and social and legislative pressures to reduce pesticide use also increasing, the lack of chemical controls is unlikely to improve. The impetus, therefore, is on the development of cultural practices and cultivars that control pests and diseases without pesticide inputs. Disease-resistant cultivars are available for all *Ribes* crops. An advantage to this situation is the potential suitability of currants and gooseberries for the growing organic food market.

Results and discussion

Climate, topography, and soils in selected regions of the INIW are favorable for commercial production of currants and gooseberries. Cold hardiness and early ripening make *Ribes* viable alternatives where winters are too cold or growing seasons too short and cool for grapes or other berry or tree fruit crops. Challenges growers face include labor, marketing, diseases, and pests. Careful site and cultivar selection reduce production problems. Labor requirements can be reduced through efficient field layout and the use of hand-held shakers or over-row mechanical harvesters. U-pick operations may be feasible in certain areas, particularly when *Ribes* are part of a diversified fruit farm. Currants and gooseberries are nutritious and easily made into many value-added products. Initial marketing efforts should probably focus on local sales and / or specialty and niche markets. Consumer education about currants and gooseberries will be an important part of marketing.

Literature cited

Barney, D. 1996a. Currants, gooseberries, and jostaberries. J. Small Fruit Viticult. 4(1 / 2):107–142.

Barney, D. 1996b. *Ribes* production in North America: Past, present, and future. HortScience 31(5):774–776.

Brennan, R. 1990. Currants and gooseberries (*Ribes*), p. 457–488. In: J. Moore and J. Ballington (eds.). Genetic resources for temperate fruit and nut crops. Intl. Soc. Hort. Sci. Wageningen, The Netherlands.

Brennan, R. 1996. Currants and gooseberries, p. 191–295 In: J. Janick and J.N. Moore (eds.). Fruit breeding. vol. 2. Vine and small fruit crops. Wiley, New York.

Bunyard. 1917. The history and development of the red currant. J. Roy. Hort. Soc. p. 260–270.

Carlson, C. 1978. Noneffectiveness of *Ribes* eradication as a control of white pine blister rust in Yellowstone National Park. Rpt. 78-18. USDA For. Serv. N. Reg., Missoula, Mt.

Childers, N. 1978. Modern fruit science. Horticultural Publ., Rutgers Univ., New Brunswick, N.J.

Dale, A. 1992. Black currant potential in North America, p. 23–26. In K. Hummer (ed.). Proceedings for the *Ribes* risk assessment workshop. USDA–ARS Natl. Clonal Germplasm Repository, Corvallis, Ore.

DeAngelis, J., T. Miller, F. Niederholzer, J. Olsen, M. Shenk, P. VanBuskirk, C. Baird, J. Barbour, L. Sandvol, and A. Antonelli. 1999. Pacific Northwest insect control handbook. Oregon State Univ., Corvallis.

Detwiler, S. 1933. Black currant spreads white pine blister rust. USDA Misc. Publ. 27.

Food and Agriculture Organization. 2000. FAOSTAT statistical data base. Food and Agr. Org. United Nations. 14 Feb. 2000. <http: / / apps.fao.org / >.

Harmat, L., A. Porpaczy, D. Himelrick, and G. Galletta. 1990. Currant and gooseberry management, p. 245–272. In: G. Galletta and D. Himelrick (eds.). Small fruit crop management. Prentice Hall, Englewood Cliffs, N.J.

Hedrick, U. 1925. The small fruits of New York. Rpt. N.Y. State Agr. Expt. Sta.

Hitchcock, C. and A. Cronquist. 1973. Flora of the Pacific Northwest. Univ. of Wash. Press, Seattle.

Shoemaker, J. 1955. Small fruit culture. 3rd ed. McGraw Hill, Toronto.

Skilling, D. 1975. White pine blister rust *Cronartium ribicola* J.C. Fisher. USDA Agr. Hdbk. 470:62–65.

Trajkovski, V. and M. Anderson. 1992. Breeding blackcurrants for resistance to powdery mildew, gall mite and reversion disease, p. 5–16. In: K. Hummer (ed.). Proceedings for the *Ribes* risk assessment workshop. USDA–ARS Natl. Clonal Germplasm Repository, Corvallis.

Welsh, S. and G. Moore. 1973. Utah plants. Brigham Young Univ. Press, Provo, Utah.

Westwood, M. 1993. Temperate zone pomology. 3rd ed. Timber Press, Portland, Ore.

Zambino, P. 2000. Assessing *Ribes* for blister rust resistance using controlled inoculations. HortTechnology 10(3):544–545.