

## How far south can Haskap/ *Lonicera caerulea* be grown?

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Many gardeners and farmers are interested in trying Haskap in warmer parts of Canada, USA and around the world. Experienced gardeners in the north are all too familiar with the idea that they might not be able to grow all the fruits they see in the nursery catalogs or at big box stores. But growers in warmer regions are usually not familiar with the concept that they might be south of an optimum growing region.

### Symptoms

The following are common problems associated with growing plants south their optimum range, and certainly can apply to Haskap:

1. Plants wake up from dormancy and bloom too early when temperatures get above freezing for a week or so. Sometimes this can happen in mid or late winter. If no bees are around, flowers won't get pollinated. Or if the plant leafs out and it gets cold again, they can be frost damaged. While Haskap has frost tolerance to open flowers it has considerably less tolerance for being fully leafed out and actively growing and then having a few weeks of freezing temperatures. The plants could survive but just won't be productive.
2. Being accustomed to a shorter growing season, plants attempt to go dormant much earlier. It can be quite disheartening to have plants drop their leaves earlier than all other plants by a month or more. Haskap leaves turn yellow then brown when they go dormant. Even in Saskatchewan, many of the Russian varieties look poorly for most of August. Maybe they'd look bad in July farther south. Some of our breeding lines look great in Saskatchewan going into fall. But we

average only 100 frost free days. I don't know what they'd look like with an extra 20 or 30 or 50 days of a growing season.

3. They may be more susceptible to diseases, especially in a warmer more humid environment. For Haskap, mildew can be a major problem, but some varieties have resistance. Botrytis attacking leaves and shoots can also be a problem with some germplasm in warmer areas. Oddly enough, botrytis does not seem to be a problem on fruit while on the bush. It can be a problem postharvest, especially if some berries are damaged.
4. Farther south usually means hotter summers and more direct sunlight and possibly more sun scorching of leaves. Under extreme heat some plants may just shut down, although that has not been reported yet specifically for haskap.
5. As one goes south, there tends to be more plant species and often northern species don't compete as well. Northern species tend to be shorter and slower growing and may have more problems with competition.

Visitors from nurseries in Oregon and Ohio, who have tested many varieties, have reported that haskap has more scorch and mildew problems in their regions than at our research farm in Saskatoon. In U of SK program we are using mildew and scorch resistant germplasm in breeding. But that is resistance for our climate. Will it hold up going further south? Testing will be occurring in 2014 of some selections we consider highly resistant in a few USA locations. (Note: there is an article with pictures on our website about mildew and scorch on Haskap <http://www.fruit.usask.ca>)

## Natural Range of *Lonicera caerulea*

It seems reasonable to expect that a new crop like Haskap can be grown within its natural range. Since 2007, I have extensively travelled Canada visiting every province and most northern highways collecting *Lonicera caerulea* from the wild (see Figure 1). Plants were much more common in hardiness zones 1 & 2 and became increasingly hard to find as I travelled south. In zones 3 & 4 they were much less common, but in zones 5 & 6 they were quite rare. B.C. province is the only Canadian province where they have never been found.

For USDA hardiness zone map see:

[http://upload.wikimedia.org/wikipedia/commons/b/bf/USDA\\_Hardiness\\_zone\\_map.jpg](http://upload.wikimedia.org/wikipedia/commons/b/bf/USDA_Hardiness_zone_map.jpg)

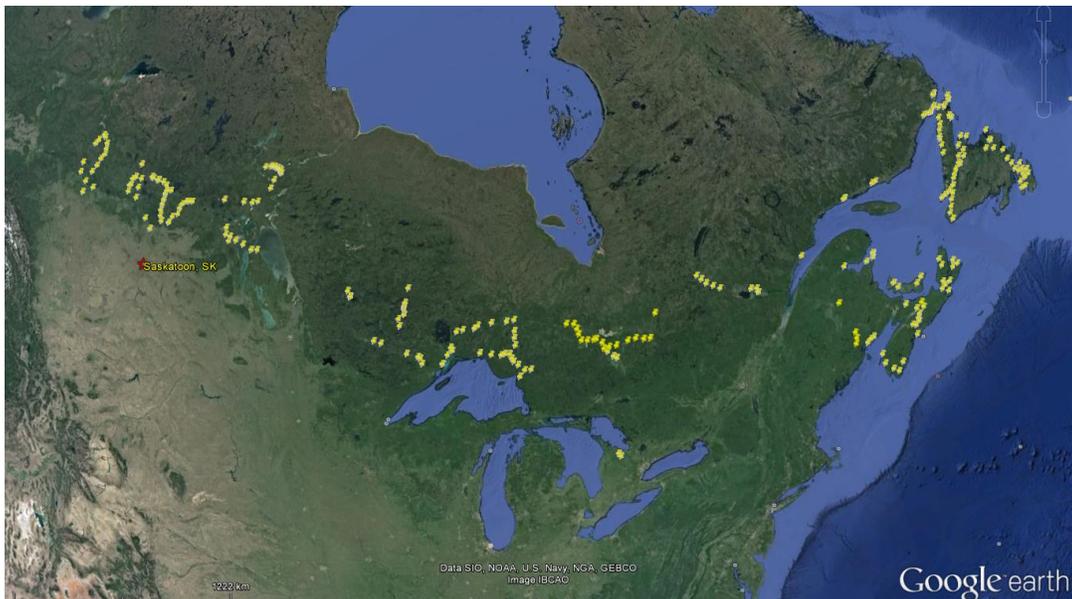


Figure 1. Locations where wild *Lonicera caerulea* plants were gathered by the University of Saskatchewan Fruit Program. Most were found in hardiness zones 1 & 2, but a few were found in Zones 5 & 6. Many of the above yellow markers are indicative of the northern-most paved highways of Canada, likely Haskap is growing farther north but was not easily accessible. Many places were investigated south of those areas without finding Haskap. The northern locations often had many plants in any location but southern locations often had only a few plants.

One of the warmest places in the world where Haskap can be found in abundance in the wild is south/central Hokkaido, Japan. They

have lows around -25°C/-12°F which would be Hardiness Zone 5B. Germplasm from this region may have the greatest potential for extending the southern range of Haskap.

## **Breeding for the South**

Perhaps with breeder's efforts or trying different cultural practices, plants can be adapted to grow a zone or two further from its natural range. In North America, there are two Haskap breeding programs that I am very familiar with: my program at the University of Saskatchewan and Maxine Thompson's program at Corvallis, Oregon.

Maxine is breeding almost exclusively with germplasm she obtained from Hokkaido. She has learned through experience that Russian varieties do very poorly in Oregon. She has been breeding Haskap since 1999 has gone through several generations of improvements. Testing of her advanced selections is happening from Alaska to San Diego to Ohio to Saskatoon. Any varieties she releases will likely have southern potential, but may also have potential as late ripening varieties in the North. I have tested many of her advanced selections in Saskatoon and find that they all survive our winters and that they tend to bloom a week or two later and ripen later than most of our selections. Currently, Maxine is investigating or getting Plant Patents or Plant Breeders Rights before naming and releasing new varieties. She is interested in working with USA nurseries who could get involved in testing and filing for Plant Patents.

The U. of Sask. program has been breeding Haskap since 2002 with a goal of creating early, mid and late ripening types. Maxine gave us germplasm from her program to use in breeding, and additional germplasm was obtained from Hokkaido during a visit to Japan in 2008. We are also using germplasm from Russia, Kurile Islands, Canada, and other places. Likely, varieties that are late blooming and late ripening from our program have longer dormancy

requirements and might be suitable farther south. Perhaps there will be a synergistic effect when wild Canadian plants native to zone 6 are hybridized with southern Hokkaido plants?

Plants from Oregon and Saskatchewan breeding programs are being tested in warmer locations, but such tests began fairly recently. It will be a few years before we have a greater understanding of what the North American southern growing range will be.

Another breeding program in North America is Berries Unlimited in Arkansas. Their breeder is from Russia, presumably using Russian varieties for breeding. But all I know about them is from their website.

### **Imports**

There are a few nurseries importing varieties into Canada and the USA. Some nurseries are very good about explaining where their varieties were developed. Some nurseries aren't so good with the details. There are at least 12 programs in Europe and Asia, with most being in Russia. There is only 1 program in Japan and it was recently started in 2008. (There was another Japanese program cancelled a decade ago).

We have tested about 35 Russian varieties and all were early bloomers, but there are many more varieties than that in Russia. I have come to suspect that most breeders in Russia deliberately bred for early harvesting because that's what the average gardener or grower wanted. Russians have been gathering wild *Lonicera caerulea* and breeding with it for several decades earlier than the North American breeders. Perhaps in their collections they have germplasm suitable for breeding for southern adaptation. A change in selection criteria could result in southern adapted varieties coming from Russia. I participated in a Russian / International web Haskap conference in 2011 and at that conference there was no mention of late blooming or southern-adapted varieties being developed.

One Green World/Northwood Nursery (Owner: Jim Gilbert, a NAFEX member) obtained seeds from Hokkaido and made selections that are being sold. Perhaps other companies have done this too? If the varieties are from Hokkaido, or descended from Hokkaido germplasm it is more likely that they might be grown farther south.

### **Evolution gives us hope?**

We know from fossil records that the world was once a much warmer place. Large expanses that are now the temperate regions of the world used to be frost free year round. It is theorized that meteorites that killed the dinosaurs also shifted the earth's axis and caused much of the tropical plants to disappear suddenly when they experienced freezing temperatures for the first time. As plant evolution progressed, plants which were adapted to northern regions and mountain tops were more successful in colonizing southern locations while plants from the tropics were far less capable of moving north. At least we know it is possible for northern plants to move south, but how long might it take if we deliberately breed to do this?

Evolution takes thousands or hundreds of thousands of years and breeding can only do so much (except in the movies). In Horticulture there is a history of adapting plants to go further north but no history of going south. We are treading into a new area when trying to breed Haskap for southern adaptation and I don't know of any good fruit examples. Strawberries are an example of breeding never solving the problem of southern adaptation. California and Florida strawberry growers buy plants grown in the North or in Mountains and the plants produce for up to a year but after that they won't produce. So strawberries in deeper south are treated as an annual crop. It seems impractical to do such a thing for a bush fruit. Perhaps Haskap could be grown in pots that after harvest are put in a cooler to mimic winter?

It is encouraging that some *Lonicera* species are adapted to southern locations. But these are ornamental species with horribly alkaline and inedible berries and are not being used in breeding. It is my hope that by breeding together the more southern versions of edible Haskap from different regions will result in somewhat more southern adaptation.

### **Other Considerations**

While I have mainly discussed north and south, warm and cold, there are many other factors involved in plant growing like water, humidity, soil texture, nutrients, pH, salinity and wind to name a few. Haskap has some drought resistance since it fruits early in the season and often stops growing by mid-June. But it has a shallow root system that could be an advantage for wet areas but a disadvantage in dry areas. This means that Haskap could perform quite differently in western zone 5 growing regions than zone 5 in the Great Plains or zone 5 in the east. Being grown a bit farther south than the normal range might not be too bad if other conditions are favourable. But what if multiple factors are a bit out of whack? Haskap needs to be tested in a wide range of conditions and possibly bred in many locations too.

### **A Guess and a recommendation**

Assuming good care and reasonable soil conditions, I'd guess that zones 1 to 4 will be able to grow virtually any type of haskap. Zones 5 and 6 might get away with some hybrids but it would be best to plant more late blooming types. Zones 7 and warmer should restrict themselves to '**late blooming Japanese types**' until some breeding breakthroughs are made. Note: there are early blooming Japanese Haskap, so even Japanese types need more testing in the south.

As Haskap is a new crop it is highly recommended to do trials of smaller numbers before planting large numbers of plants for commercial production. Try several varieties to see what is best in your location. It may take a year or three to determine if any

particular haskap variety is adapted to your region and blooms at the right time of the year. There is likely to be a transition zone where haskap produces some years and not others.

Likely, by the end of 2015, the U of SK fruit breeding program will have complete data on its trials in southern British Columbia. We also have some late bloomers in the works that may be on the market by 2015 or 2016. Perhaps by then Maxine will have new varieties on the market too. Meanwhile, we appreciate the feedback we receive from growers in southern locations, and we look forward to more of it as this crop gains popularity throughout North America.