Forestry Tour of the Czech Republic

University of Alberta, Dept. of Renewable Resources, Edmonton, Alberta
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Itinerary of Destinations
April 29- Arrive in Prague

April 30- Kostelec

May 1- Kostelec

May 2- Pisek

May 3- Plzen

May 4- Sokolov

May 5- Plzen

May 6- Ceske Zleby

May 7- N. Hrady

May 8- Ceske Krumlov

May 9- M. Krumlov

May 10- Lanzhot

May 11- Zidlochovice

May 12- Krtiny

May 13- Caslav

May 14- Dobruska

May 15- Opocno

May 16 to 20- Sightseeing in Prague
Introduction

Three students from the University of Alberta, along with students and professors from Laval University and Vancouver Island University went to the Czech Republic to study how forests are managed. The tour started on April 29th in Prague where we met our Czech host, Professor Ivo Kupka of the Czech University of Life Sciences. After we left Prague we toured the country for 16 days learning about the forest practices of the Czech Republic. One of the first things that we learned was that the most common harvesting method is shelter wood, which was a surprise coming from the Boreal forest where we use clear cut as our main system. We were told that forestry production of logs makes up less than 1% of the Gross Domestic Product in the Czech Republic, and is currently decreasing. This does not include wood processing or account for any monetary value of ecosystem services provided by forests or watersheds. Some of these ecosystem services include filtering groundwater, improving air quality, and soil preventing erosion. We also learned that the Norway spruce is the most common tree in the Czech Republic. The lime tree (*Tilia cordata* L.) is the national tree of the Czech Republic. It produces high quality timber and grows relatively quickly. Throughout the tour we learned about the various forest regions of the Czech Republic, forest reclamation, and witnessed timber production from the cutting of the timber to its processing into lumber in the sawmill. This paper will discuss major items and will provide background on the Czech Republic.

Basic Information about the Czech Republic

History of forest ownership in the Czech Republic

The First Czech Republic existed from 1918 to 1939 during which most forests were privately owned. After WW II ended in 1945, 60% of forests became state owned. This number increased to 90% in 1948 with nationalization of forests under communist socialist rule. By 1990, one year after the end of the Socialist Era, 96% of forests were state owned. In 2005, this number decreased back to 60% when the government attempted to repatriate many forest areas to the families that owned them before they were nationalized by the socialists.
Social issues in Czech forest management

There is a pronounced division in the Czech Republic between foresters and environmentalists. Foresters in the Czech Republic follow the needs of society in terms of which forests to harvest and when, as well as what species to replant in certain areas. Czech environmentalists adhere to certain fundamental principles that they deem to be important for reasons that seem illogical to the foresters. In 1996 the Czech Republic introduced one of the strictest Forests Acts in Europe. This act includes clauses such as environmentalists having the right to veto the regional plan if not agreed upon. One example of this is when the foresters want to plant non-native Douglas fir for its high value, but the environmentalists only want native species such as Norway spruce planted. If no compromise is made, the environmentalists are able to use their veto power to prevent the planting of Douglas fir trees.

In the National Forests of České Žleby, which have a mix of Norway spruce \((Picea abies)\) and Beech \((Fagus sylvatica)\) trees, there is an area affected by a species of Coleopteran bark beetle. Foresters urged that the area be cut down and that action be taken to contain the beetle outbreak, whereas the environmentalists insisted on containment measures that would not disturb the protected habitat areas. The result was the death of many of the trees in the protected areas and a subsequent beetle population explosion that spread to more forested areas.

Figure 1. Log traps for attracting and killing bark beetles using chemical attractants and insecticides and a picture of a bark beetle.
These are just a few specific examples of the contentions between environmentalists and foresters. The foresters feel that the environmentalists are so uncompromisingly fundamental and unchangeable in their thinking that they have given them the nickname “The Green Talibans.” We are unaware if the Czech environmentalists have a similar epithet for their forester counterparts.

**Similarities and differences in forest practices in Alberta versus the Czech Republic**

In the Czech Republic forests are managed on a much smaller scale than in Alberta. To put this into perspective, the largest clear cut in the Czech Republic was 1 ha, and in Alberta clear cuts can range anywhere from <1 ha to 300 ha. The reasons for these differences are largely due to the amount of forest area available to harvest as well as the other available natural resources. Canada has 234.5 million ha of productive forest, whereas the Czech Republic has 2.6 million ha. In the Czech Republic no harvesting debris is left in the harvest area because it is used for other purposes; one example is to generate electricity. Current practices in Canada rarely take debris from the cut block and it is referred to as coarse woody debris. Tree planting in the Czech Republic is very different than in Alberta. Beech can be planted at densities of up to 10,000 stems per hectare (SPH), and Norway spruce up to 5,000 SPH, whereas in Alberta Lodgepole Pine is planted at a density of 1,200 SPH, and White spruce at 1,100 – 1,600SPH. The way that our seedlings are grown is different as well. In Alberta we mostly grow container stock and in the Czech Republic they grow bare root.

**The Tour**

**Kostelec**

*Day 1:* We began with a tour of the university castle in Kostelec that has been used for forestry education since 1935. Nearby is a forest area of 7,000 ha used by the Czech University of Life Sciences for forestry education. These forests, which are mostly Norway spruce (*Picea abies*), are organized in such a way
that students can learn first-hand about the practices of timber harvesting. The university also owns a nursery that is close to the castle, this nursery is used not only for foresters, but also for the public.

Seeds planted in the nursery are local in origin and are selected from the highest quality trees. Specialized private companies professionally store the seeds before contract workers sow them in the nursery. The same workers come back on an annual basis, which leads to more efficient production for the nursery.

Figure 2. Seedlings were initially grown in a protected greenhouse where they received ample water, nutrients, and protection from the sun. After the seedlings reach a certain size, they are taken from the greenhouse to be transplanted outside using a small tractor into long rows.

The main species planted were beech, oak and Norway spruce, but several other tree species are also planted. The seeds are germinated in a greenhouse and after they reach a certain age, they are transplanted outside using a small tractor. The nursery utilizes irrigation equipment to water the seedlings and is surrounded by a fence to keep animals from eating the seedlings and people from stealing the seedlings. After the seedlings reach a certain age, they are sold to tree planting companies for reforestation and landscaping.

Day 2: We toured an arboretum and then walked through a typical beech forest with the Vice Dean.

Figure 3. The typical beech forest.
**Pisek**  
**Day 3:** In Pisek, we were given a tour of the Pisek Forestry College, a school for students of approximately age 15, who will go on to become professional foresters. Students spend a great deal of time in the forest learning hands on forestry management practices. Field dormitories accommodate students when they participate in field exercises.

![Figure 4](image1.jpg)  
**Figure 4.** A collection of cones from various species of conifers found in the Czech Republic and a cross section of a tree, showing distinct growth ring patterns. These are used as teaching tools in the classroom.

In the forests near the forestry college, we saw some research plots containing Douglas fir, Norway spruce, beech, Scots pine, and several other tree species. Czech foresters would like to grow more Douglas fir because they grow exceptionally well in many areas of the Czech Republic, and have no adverse effects. However, since it is a non-native species, the environmentalists are vehemently opposed to this idea.

It was explained to us that a game fence might be erected in order to stop the game from eating or chewing on the seedlings. Alternatively, in areas where fences are not used, a deer repellent chemical is sprayed on the leaders and lateral branches of the trees that deters herbivory.
Figure 5. A game fence surrounding a reforestation plot, which keeps out animals that would otherwise make the seedlings and small trees into a meal. On unfenced plots, deer repellent prevents herbivory on vulnerable trees.

Day 4: An interesting thing we saw was the largest oak tree (*Quercus robur* L.) in the Czech Republic, which is over 500 years old. This tree would likely have made good lumber at one point, but it has been protected because of its historical significance.

Figure 6. The oldest oak tree (*Quercus robur*) in the Czech Republic. Damage from lightening can be seen in the top of the first photo.
Safronka and Plzen

Near the town of Safronka, an old, disused resin oven can be found. Historically, resin was important for sealing the hulls of newly constructed wooden ships. The resin industry was important in this area and it was collected by burning Scots pine (Pinus sylvestris L) wood debris, branches and tops of trees in a low oxygen environment at high temperatures. The holes on either side of the oven could be blocked to regulate the temperature and oxygen levels, and the hole in the middle was used to collect the resin itself.

Figure 7. An old resin oven that had been repaired due to its historical significance. The left and right holes near the bottom could be plugged for regulating air flow and temperature. The large middle hole was used for collecting the resin.

Historically, forestry has been very important in the manufacturing of beer. The city of Plzen is world renowned for its high quality beer. The forestry connection to the beer is that it was stored in the large networks of beer cellars of the Plzen brewery in massive oak barrels. The barrels also had a resin coating on the inside to
seal them so that they won’t leak. These barrels were so massive that a person could stand upright in them to clean them from time to time. The gargantuan barrel size, combined with the sheer number of barrels lining the nine kilometers of beer cellars beneath the Plzen brewery meant a large demand for wood for constructing and maintaining such a large number of barrels.

_Sokolov Mining area and forest land reclamation._

![Figure 8](image_url)

**Figure 8.** An image of the coal mine. The photo on the right shows an old mining area that has been reclaimed. A lake has been made in the center, a mix of broadleaf and coniferous trees have been planted around it, and hiking trails have been constructed.

**Day 5:** This mine was once an underground mine, but after the second world war it was converted to an open pit mine. The sediment that created the coal was once fresh water, its source was from a lake. There was tectonic movement that sealed off the lakes from the river. There are two coal seams in this area, one is 30 m thick, and the other is 55 m thick with 60 m of clay between them. There is approximately 180-200 m of clay and clay stone over burden on the seams that needs to be removed. Large excavators can remove 8-9 million m³ annually, approximately 4 million m³ is used for power plants. The coal that is excavated from the site is owned by the state. After all of the coal is removed, the area will be re-contoured and turned into a recreational lake.
Day 6: Day off in Plzen

National park forests of České Žleby

Day 7: We visited the national park forests of České Žleby which, as mentioned, has a mix of Norway spruce (*Picea abies*) and Beech (*Fagus sylvatica*) trees, which are approximately 60-80 years old. The park is divided into several zones of varying degrees of protection as natural areas. Zone 1 areas, which are 13% of the park, are a no touch zone. As previously mentioned, this zone has experienced damage from spruce beetle (*Ips typographus*) and much debate has taken place between environmentalists and foresters on how to deal with this problem. Zone 2 areas, 66% of the park, allow some logging, which has facilitated somewhat better management of the beetle problem in the eyes of the foresters. Zone 3 areas, 12% of the park, are human habitation areas, which are permitted to experience relatively high impact.

One approach taken to control the beetles was to use decoy trap logs covered in specific insecticides such as the chemical VASTAK to control the beetles. This has had limited success as not all of the beetles infect the trap logs. The no touch areas have lots of debris on the ground and are also most affected by beetle damage. Foresters were not allowed to harvest the infected trees, and so these areas served to increase the beetle population, which could then repeatedly migrate to adjacent zone 2 and 3 areas. When trees die from beetle infestation and fall down, adjacent uninfected trees become vulnerable to windfall, and so more trees are lost. An example is a windstorm in 2007, which brought down many trees for this reason. Overall, one third of felled trees in the Czech Republic are brought down as a result of windfall, which incurs significant financial losses to the forestry industry. In the photos one can see the dead standing trees that have lost all their bark after they died from beetle attack. Next to them are live standing trees that still have their bark.
Virgin Forests near Zofin

Day 8: The virgin forests near Zofin were very hard to travel through before human constructed roads were common in the area. Since the area was hard to reach, it was not colonized by Bohemians until approximately the 10th century C.E. For the same reason, these forests were the northern limit of the Roman Empire at the height of its greatest territorial size. This forest was also part of the border of the Iron Curtain during the Socialist era. The natural forest species composition is approximately 50% beech, 30% silver fir, and 20% other broadleaf species, however Norway spruce are most common in the present day.

Until the 19th century, forest management was focused on managing for firewood, but in the 20th century, the focus shifted to timber harvesting. Roughly 0.8% of the forest area is harvested each year, allowing for a sustainable yield. No artificial regeneration took place in these forests until 1736, whereupon only local seeds were used for regeneration.

Traditionally, wood from this particular region is of such quality that it has been used for violin making, shipbuilding in 18th century Holland, and building docks in ports, such as Hamburg in Germany. Firewood from these forests is burned for heating structures, as well as fueling the local glass making industry and beechwood is used to produce the carbonate potash needed for glass making.
In the past, groups such as the shipbuilders in Holland would send their own people to scout out the best trees for harvesting and in some cases even harvest and transport the trees themselves. Small streams and rivers were used to float logs to areas where they could be assembled into larger rafts and taken downstream to seaports. In some cases, the same men who were woodcutters were also raftsmen.

Another feature of note in this area is a 5,000 ha fenced area for raising and hunting red deer. Hunting of ungulates in the Czech Republic is quite different from hunting in North America. In North America, game roam free and are mostly left to fend for themselves. In the Czech Republic and much of Europe, game such as ungulates is actively managed by humans. In other words, the animals are provided with food from feeding stations. This helps them survive the winter and also put on weight.

Figure 10. A hunting stand in a beach forest in the Czech Republic. Such structures are common on the Czech landscape. Feeding stations, such as the one depicted in the second photo help nourish game animals through the winter months.

Tree planters near České Blato nature reservation

We were also able to witness tree planting take place in the forest near the peat lands by České Blato. In the Czech Republic, bare root spruce are planted roughly every 1.5 to 2 m. In autumn, the planting site is inspected and deer repellant is applied to the terminal leaders of the seedlings.
A tool called a mattock is used to dig the hole where the tree is planted. It is essentially a combination of a pick axe and an axe. In the 1950s, these tools were used in Canada for tree planting, but today, the tree planting shovel is widely used (mattocks are still used in parts of the U.S.). This particular group of tree planters was from Romania. Unfortunately, tree planters in Europe don’t get paid very much by Canadian standards. Under the planting contracts, companies are typically paid about two crowns per tree and the workers are lucky if they receive half of this amount per tree planted. This amounts to about $15-20 per day for a 10-12 hour work day.

![Romanian tree planters planting spruce trees using transect lines and mattocks](image)

**Figure 11.** Romanian tree planters planting spruce trees using transect lines and mattocks near the České Blato nature reservation.

Companies that harvest the trees in an area are also responsible for replanting. Tree planting contracts are usually given to the lowest bidder, which can mean that the workers are not paid very much and/or that they are inexperienced and not very knowledgeable about forestry. One problem that can occur is if inexperienced tree planters leave seedlings exposed to the sun and the wind for too long before planting them root tissues can desiccate, killing the seedlings before they are even planted. This was not an issue for the Romanian tree planters, who used buckets of water to keep the roots of the spruce trees moist as they were planting them.
**Day 9:** Day off in Chesky Krumlov.

**Moravsky Krumlov - Oak forests.**

**Day 10:** The oak forest that we visited is approximately 27,000 ha however, only 3,500 ha are forested. The oak trees grow predominately on south facing slopes with sandy soils that only receive around 500 mm of precipitation annually. Harvesting the oak stands is usually done with the clear-cut system due to the fact that oaks regenerate mainly by acorns and to a less extent by coppice. The stands can be thinned up to four times, which in most cases is need because the initial density is close to 50,000 stems per ha. Having such a high density is ideal in some ways, as it puts the trees into competition mode so they grow straight. Thinning cost approximately 15,000 crowns per ha, and artificial regeneration costs somewhere close to 40,000 CZK($2,000 cdn) per ha. However, since oak is regenerated by coppice or acorn there is no cost for artificial regeneration. It takes a long time to thin out an oak stand, since everything is done by hand. One worker can thin up to 1.5 ha per month. Spring is the best time to thin the oak stands. Ideally, this would occur every five years, but since it is so expensive, it only happens every seven to eight years.

The oak stands that we visited had two different species, *Quercus petraea* (sessile Oak) and *Quercus robur* (English Oak). The method with which the forest stands were maintained did not differ between the two species. After a stand is harvested seed trees may be left to regenerate the stand with acorns, but since oak is shade intolerant, new trees do not grow well under the shade of the wolf tree. Another issue to be aware of is the infestation of insects. Gypsy moth and the Nun moth have infected the oak forests and have detrimental effects on its growth and production.
Figure 12. The photo on the left shows how there are no trees growing under the wolf trees. The picture on the right shows the two different species of oak that grow in this area left *Quercus robur* (left) *Quercus sessile* (right).

**Soutok- Floodplain Forest Management.**

*Day 11:* The Lichtenstein family owned the floodplain land for nearly 500 years. This area is susceptible to flooding, but there have been dams put in place to reduce the hazard. The flooding hazard is not such a concern for the foresters because flooding means the trees with have abundant water. Flooding, however, is not ideal for the animals in the area, as it is difficult for young animals to swim. There are small sand banks that serve as refuge for the animals during floods. The floodplain area is normally planted with 99% deciduous and 1% conifers, with oak occupying about 49% of the deciduous. There are many species of broadleaves in this area, such as ash, linden, horse chestnut, and wild cherry.

**Pheasantry near Zidlochovice showcasing avian game management in relation to forestry practices**

*Day 12:* We visited a pheasantry game management farm near the town of Zidlochovice, where the countryside is quite flat, making it ideal for farming. The climate is relatively warm and there are relatively low amounts of precipitation compared to other regions of the country. The soils are somewhat sandy, but they are rich with nutrients. Although most of the area is used for agriculture, the floodplains in this area are forested since they are not ideal for farming. There is comparatively more agricultural land than forested land (15%
forested, compared to the national average of 33%). The trees found in this area are pine, oak, ash, poplar, and several other broadleaf species make up a small composition of the forest.

This particular game farm contains eight pheasantry capable of producing 140,000 to 150,000 birds per year. About 50% of these escape into the wild and roughly 60,000 are hunted each year. The ratio of breeding males to females is kept at about 1 male for every 15 females. In nature, it is approximately 1 to 6. Eight thousand females produce 20 to 40 eggs each and roughly 70% of these eggs hatch. Baby chicks are raised in heated barns and gradually acclimatized to outside temperatures before spending time in outdoor pens. They live in these pens for six weeks before having their wings clipped, so that they are less likely to escape, and are then released into much larger enclosures in the forest. At all stages of their lives, the pheasants are fed by humans.

![Figure 13](image1.png)

**Figure 13.** Outdoor enclosures facilitate the maturation of pheasants before they are released into larger enclosures in the forest.

The method of hunting the pheasants in this intensive agroforestry system is somewhat different than hunting birds in western Canada. A group of shooters lines up in front of a line of spruce trees near the edge of the forest. Another group of people chase the pheasants towards the line of trees. When the pheasants fly up and over the line of spruce trees, they are shot by the line of shooters, who pay as much as 20 euros per bird they shoot for the privilege, in addition to the costs of food and lodging at the pheasantry. The dead birds are
retrieved by trained dogs and the meat from the shot birds can be purchased by the hunters for an additional two to three euros.

**Figure 14.** Pheasant chicks are kept in warm barns at 35° C and slowly acclimatized over time down to outdoor temperatures (first photo). When they are more mature, they are moved to the smaller outdoor enclosures. The second photo shows one area of pheasant hunting grounds. It consists of a paved road where the shooters stand and a line of spruce trees over which the pheasants fly above so that they can be shot. The third photo shows an outdoor enclosure for raising the pheasants.

*Krtiny – Beech forests and exotic species.*

**Day 13:** In the Czech Republic they are allowed only to clear cut up to 1 ha at a time, however, they are allowed to make these small clear cuts next to one another consecutively, (with adjacent blocks harvested once the first strip is regenerated [after about 7 years]) making it look like a large cut block. An advantage to having
a larger cut block is that the damage caused by game is more spread out. This area we viewed was cable harvested.

The next site that we visited was a very productive site of Douglas fir. Since the site was so rich in nutrients the trees grew extremely fast, which worried the foresters because it would cause deformation. The foresters were also worried about the color of the Douglas fir, they were unsure of what was causing the discoloration. Some hypothesized it could be the amount of nutrients in the site, or just the tree growth stage.

![Young Douglas fir stand. Foresters were wary about the abnormal color of the bark.](image)

**Figure 15.** Young Douglas fir stand. Foresters were wary about the abnormal color of the bark.

**Timber harvesting in shelter wood systems and the lumber mill in Čáslav**

**Day 14:** We witnessed Czech harvesting practices first-hand near the town of Čáslav, which were being carried out by a European forestry company called LESS. LESS has forestry operations all over Europe in Russia, Poland, Ukraine, France, Germany, and the Czech Republic. When a company such as LESS purchases logging rights from a government, it is purchasing the wood on the site, which it then processes and sells. This particular forest stand is made up of Norway spruce and is approximately 100+ years old (Figure 16 below, top left picture). A shelter wood system is being used where only the higher quality, more mature trees are harvested. A processor head is used to cut and process the wood at stump. LESS does the processing at stump
to reduce the amount of slash near the road. However, all of the slash is eventually removed from the site. After the trees have been processed a forwarder transports the logs to the roadside. Picker trucks are normally used to haul the wood to the mill in town. In the Czech Republic, it can take up to a week for harvested logs to travel from the logging site to the sawmill, due to the nature of the shelter wood harvesting system, whereas in Canada, it typically takes only a few days.

Figure 16. The Norway spruce stand of approximately 100+ year of age near Čáslav. Note the lack of debris in the understory in the first photo. The second photo shows the processor working. The third (bottom left) photo shows the forwarder moving logs from the cut block to the log decks. The four photo shows the log decks.
LESS Sawmill in Čáslav

We also had the opportunity to tour the sawmill in the town of Čáslav, which is also operated by the LESS company. This particular sawmill specializes in conifer logs greater than 35 cm in diameter and is capable of 350,000 m³ of lumber production annually. The logs are brought to the mill by truck and stacked by the large tractor with a log clamp attachment. This same tractor also feeds the logs onto a conveyor for processing in the mill. All of the tractor operators have attended a technical school, after which that have three months of on the job training operating the tractors.

![Figure 17](image)

**Figure 17.** The front end loader piles the logs outside the mill and also moves them onto the production line for processing.

From the conveyor, the bark is stripped off of the logs and the log dimensions are measured using lasers, after which they pass through a metal detector. The bark from the trees is sent to the heating station portion of the mill where it is burned to heat the building. Some of the bark is also used for mulching material around homes. Logs that contain metal are sold to smaller sawmills that are better equipped to handle the problem.
Figure 18. Inside the mill, the bark stripping machine is visible in the foreground on the left side. Logs then move along the conveyor and pass through the metal detector and the laser measurement device. Outside the mill, piles of bark are stockpiled before being burned to heat and power the sawmill.

In the saw repair room, we learned about the large, sharp blades that are used to cut the wood. It is very important to keep the saw blades sharp, and so they are sharpened eight times over the life of each blade.

Blades are sharpened every 12 – 18 hours or operation and if a blade breaks, it can be repaired by welding.

Figure 19. Saw blades are large, flexible, and sharp. In the second photo, a green baseball cap and pair of sunglasses is visible sitting on the lower part to help show the size of the sawblade.

From here, we went onto the production floor and witnessed the logs being processed. The debarked logs are brought into the mill again from outside and a computer determines the best way to cut the logs, based
on customer specifications. Lasers show where the log will be cut before it goes through the saws. After cutting, wood is sorted by size and quality. Deformed and poor quality pieces are removed by workers who monitor the conveyor machines that move the logs. Workers pile much of the wood by hand as it comes off of the conveyors.

Figure 20. Lumber is moved along conveyors to the piling station at the rear of the sawmill. Workers pile much of the wood by hand as it comes off of the conveyors.

Sawdust from the mill is sold to pulp mills for making paper Stacked lumber is stored outside in the stocking area where is dried out before it is shipped to the customer.

Figure 21. Sawdust from the mill is sold to pulp mills for making paper Stacked lumber is stored outside in the stocking area where is dried out before it is shipped to the customer.
**Destne – research plot in mountain forests.**

**Day 15:** Here we saw a number of forestry research plots. The first plots were originally set up to try to determine how different species of trees interacted with one another and what their effects on the soil are when grown together. Today, the site is also being used to collect data on litter fall, which affects the organic matter composition of the soil. The soils in this area are lacustrine soils that resulted from the buildup of sediment on the bottoms of ancient lakes.

The next plot was set up to study the effects of snow and ice damage that commonly removes the top several feet of the trees. Snow and ice damage have a detrimental effect on the trees because it can kill the tree or deform it permanently so it cannot be used for lumber. This particular region has a unique combination of snow and moisture from winds that causes the loss of treetops from snow and ice damage. It is not a common phenomenon in the rest of the Czech Republic. This research plot also focuses on studying the effects of pollution from nitrous oxide emissions from power plants and factories in Germany. The amount of rainfall that reaches the understory is also recorded at this site.

Seed collection is also done somewhat differently in the Czech Republic compared to Canada. In Canada, we use helicopters to collect seeds from treetops as it is more economically feasible because labour is more costly. However, since labour is much less costly in the Czech Republic, it is more economical for specialized workers to climb the trees to collect seed cones.

**Opocno – Forestry Research Station.**

**Day 16:** The Opocno forestry research station was founded in 1951 to conduct research on different progeny sites and provenances. Different progeny and provenance tree seeds are grown next to each for comparison; some are grown in the ground and some in containers. The outdoor plants are grown to see the different physiological quality of the seedlings. The research station is testing for tolerances to acids and changes and developments towards air pollution. The overall goal is to try to select the best seeds which show the most tolerance and best quality wood.
Figure 22. The first photo shows beech trees being grown in containers inside a green house in Opocno. The second (top right) photo shows the difference between the seedlings from difference provenances. The third photo shows the outdoor research area.

The next site we visited was a game forest managed specifically for hunting. It is 286 ha in size, with cut lines and openings cut just for the wildlife to feed. These lines and openings make it ideal for hunters to hunt the animals. This area is not open for the public, and in order to hunt in this game farm you must be a member.
**Figure 23.** The first photo shows the lines that are cut in the game forest for ideal hunting. The second photo shows some game in an opening that has been cut for feeding and ideal hunting.

**Days 17-20:** We spent time on our own to view Prague and its surrounding towns.

**Figure 24:** Chris Haseltine in front of the John Lennon Wall in downtown Prague. Owen Clarke and Danielle Kjosness at the Czech University of Life Sciences in Prague.
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