

Northern climate and apple varieties as a source for innovation: agricultural productivity and sustainability in northern apple production for ice cider, a sweet dessert wine in Umeå, Sweden

A desire to live in Northern Sweden, ambitious attitudes towards producing high quality products, and curiosity of wines has been leading causes to the establishment of EIP-AGRI Operational Group “Commercial productive apple growing in a northern climate – innovation for new climate resilient agriculture in northern Europe” in Umeå, Northern Sweden.

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Figure 1 - Brännland Iscider cidery under aurora borealis. Photo: Johan Gunséus for Brännland Iscider (creative commons).

Northern rural areas of Europe face challenges in making living from traditional agriculture, limited number of commercially cultivated species, and generally harsh climate conditions. The story of the EIP-AGRI Operational group “Commercial productive apple growing in a northern climate – innovation for new climate resilient agriculture in northern Europe” in Umeå, region of Västerbotten, Sweden, started well before its establishment from a vision of a man who desired to live in Northern Sweden. With the desire to live in the region, an entrepreneur Andreas Sundgren, established Brännland Iscider in the village of Vännäsby near Umeå in 2010 and started to make ice cider in a basement in Brännland, Umeå in 2011. Since the beginning of Brännland Iscider, the aim has been to produce a drink that would be known all over the world, a vision to create the best sweet wine in the world. The first two years of the company were full of learning through trials.

Whereas the first aim was to produce cider, a simpler product than ice cider, through new discoveries in trials during the first two years it became clear that northern Swedish apples were best suited for ice cider production. An observation of having two local assets - access to both cold weather and Swedish high acidity dessert apples suitable for production of naturally sweet cider – paved the way for starting successful ice cider production in the region. Through combining these two local assets, Brännland Iscider became a winemaker instead of a cider maker. The international networks of Brännland Iscider including winemaking experts, ice cider production experts and apple growing experts have paved the way to create a unique wine made from apples. Now the ice cider, a sweet dessert wine, made from apples in Northern Sweden is among the best ones in the world and it is also the first Swedish wine ever served at Nobel banquet in 2022. The future vision has been levelled up in the EIP-AGRI operational group to involve wider stakeholder population especially farmers, regional governments, academia, and business – both in Sweden and at international level. EIP-AGRI Operational Groups aim to solve identified problems in agriculture and primary production. They also aim to share the invented innovations to general use for other stakeholders. The groups consist of at least of two partners: enterprises in agriculture, forestry, processing of agricultural products and other bioeconomy enterprises related to these, and experts / organisations relevant to solving the problem such as researchers, advisors, other enterprises, associations. The funding for EIP-AGRI operational groups is applied from responsible national authorities in each country in European Union.

Establishing a new branch of climate resilient sustainable agriculture

Trial apple orchards preceded the establishment of the EIP-AGRI Operational Group. Before the establishment of the EIP-AGRI Operational Group, Brännland Iscider had established trial apple production areas near Umeå, Northern Sweden. The first experimental apple orchard was established with 250 trees in one hundred kilometers north of Umeå in 2014. The second experimental orchard was planted in 2016 and it consisted of 1200 apple trees located in Röbäcksdalen near Umeå. In the experimental orchards, all the cold-hardy apple varieties that were available were used.

In 2019, EIP-AGRI Operational Group “Commercial productive apple growing in a northern climate – innovation for new climate resilient agriculture in northern Europe” received funding to run the project between years 2020 and 2023. Due to delays caused by covid-19 in getting apple trees, the project duration is extended and it will run until August 2024. Out of the total project budget 10.7 million SEK, 85% was funded with EIP-Agri funds. The rest of the funding came from Brännland Iscider and from the apple growing partners included in the project. After the start of the operational group in 2020, more than 12000 apple trees have been planted in total in 10 hectares in plots with an aim of commercial viability in collaboration with local growers, both farmers and those aspiring to become farmers. The northernmost regions of Sweden – Jämtland, Norrbotten, Västerbotten and Västernorrland – have been used for these apple planting areas. A comparison apple cultivation area has been planted in Skåne, southern Sweden, using northern apple varieties. In total about 80 different apple varieties have been used in establishment of these apple cultivation areas. To reach the aims of the operational group, different organizations – enterprises, regional government, farmers’ association, and individual experts – were involved in the group.

The Swedish enterprises included in the operational group are the ice cider producer Brännland Iscider, technology development company Boreal Orchards, and fruit and vegetable wholesaler and one of Sweden’s biggest apple growers Elsanta. Also one international company, European expert in northern apple varieties Blomqvist Plantskola Oy from Lepplax, Finland, is involved in the operational group. Besides enterprises, the regional government of Norrbotten, the national farmers’ association LRF Västerbotten, and one individual gardener with long experience in northern apples are involved in the group. Each involved organisation is represented by an individual person in the operational group. All the involved individuals bring diverse agronomical, horticultural, commercial, technological, research and farming expertise in the operational group. As a result of the operational group, farmers have received an opportunity to diversify economically and environmentally their production in the region. Overall, the project contributes to climate resilient food security, developing novel foods for consumers, economic and environmental resilience of farmers, region and local communities.



Scan the QR code or click the link to watch a video to learn about the story of the operational group: Brännland Iscider. 2023. [This is the beginning of the story.](#))

Farming practices benefit from local northern strengths

Apple cultivation as such is not profitable in Sweden. However, the apple growers connected to Brännland Iscider and the project can charge a much higher premium for their fruit through selling apples to Brännland Iscider and other potential value enhancing operations with the ambition of producing a premium product like ice cider from the apples. An apt comparison can be made with the best grape growers in an established wine region selling their grapes to the top wineries in the same region.

Profitability of apple cultivation is also sought for instance through leaning the cultivation efforts with benefiting from local strengths such as existing local knowledge on growing apples in northern climates, favourable microclimate pockets, and cold harsh winters.

As the conditions for apple growing in northern Sweden are different from those in southern Sweden, cultivation solutions also need to be locally adapted. As commercial level apple cultivation is new in northern climates, adapting apple cultivation to northern conditions has included experimenting with apple orchard management practices and learning by growing apples in practice. While experimenting with combining traditional cultivation methods with conventional ones, a wide range of apple varieties, optimising land use, different planting arrangements, different management options, decreasing transportation, and decreasing water use has taken place. Through experimenting, the optimal plantation depth and age of seedlings has been established. It has been noticed that apple seedlings need to be two-year-old to cope well during the first growing seasons and they also produce apples earlier than smaller seedlings. One of the experimental practices is dry farming, i.e. applying no irrigation, external nutrient inputs or pesticides, is tested in the management of apple orchards in favourable microclimate pockets. The project inspires farmers to go beyond business as usual and traditional agriculture in the area. Each farmer also finds their own way of managing their apple orchard – the whole idea is to learn new things for future and do observations to do things better in terms of growing apples with high sugar content suitable for ice cider production in the Northern Europe.

As sugar is crucial in producing apple cider, the aim is to produce apples with high sugar content instead of focusing on tonnage only. Besides the high sugar content, apples full of flavour are aimed at to be produced instead of producing apples with similar qualities in colour, size and shape. The southern apple varieties that Brännland Iscider work with are Ingrid Marie, Aroma, Cox Orange and Mutsu.

In the north the varieties are much more varied and will be more varied in future as the planted apple trees of all the chosen cold hardy varieties will start to bear more fruit.



Figure 2 - Apples. Photo: Johan Gunséus for Brännland Iscider.

Ice cider production process at Brännland Iscider

Cryoconcentration

Cold climate is the key for ice cider production. Cryoconcentration of ice cider is done with using the natural cold season present in the area. After the apples have been picked in autumn, they are placed in a cold storage until the weather gets cold, typically until the end of November. The apples are pressed and the juice is frozen in tanks outside the winery. Besides natural cold being the key for producing ice cider, it also facilitates more thorough and sustainable use of apples as the raw material. When the apple juice gets frozen, water gets frozen first and remaining liquid becomes relatively sweeter naturally concentrated apple juice. In this cryoconcentration process sugar acts as an antifreeze agent. As the concentrated apple juice is heavier than water, it drops at the bottom of the tank. Once the entrepreneurs consider the concentration being sufficient, they brink a tank inside to thaw a bit before tapping the juice in another tank through a valve at the bottom of the tank. After tapping the new tank, full of cryoconcentrated apple juice, is taken outside to refreeze and reconcentrate. This process is done as many times as needed which may vary from year to year. At Brännland Iscider, annual raw must capacity is currently about 120000 liters.

Fermentation

At Brännland Iscider, the starting ice cider must have a sugar content between 35° and 40° brix. After cryoconcentration, the concentrated apple juice is placed in fermentation tanks together with yeast. Ice ciders are not shaped before their nature as representations of different varieties and different sugar concentrations is seen. Each ice cider tank is let to ferment on their own based on the guidelines defined by the entrepreneurs' experience as winemakers. After fermentation is deemed to be at its best, racking, pumping the wine of the solid matter accumulated at the bottom of the fermentation tank takes place.

Filtering, blending and bottling

After racking, wine is filtered. A part of the filtered wine is left in the steel tanks to be bottled within the coming months, and a part, the most deepest and darkest wines are aged in oak barrels. Blending process is done through smelling, tasting and discussing the qualities of the wines. As the final step, the wine is bottled with machinery requiring manual labour in the bottling process. Each 0.5 liters of Brännland Ice Cider is made of four kilos of apples. Brännland Iscider has three main bottlings of ice wine, each with unique characteristics and aimed at different consumers.

Currently Brännland Iscider purchases 140 tonnes of apples from apple growers in Skåne and northern apple varieties have been planted also in Österlen in Skåne in collaboration with a local partner in the region. Whereas the expression of wines made from southern apples is different from the wines made from the northern apple varieties, both have their unique qualities which can complement each other. Although only small quantities of ice cider has been produced from apples in their own northern apple plantations, the expression of this northern ice cider has been noted to be fundamentally unique compared to those produced from southern apple varieties.



Scan the QR code to watch a video on the ice cider production process or click the link: [Brännland Iscider. 2023. The Ice Cider Year – Wine making in the far North](#)

Ice cider production process at Brännland Iscider

Innovation of ice cider, cidre de glace, made from apples has its roots in Canada in late 1900s and the denomination of ice cider quality was established in 2005 in Quebec, Canada. Yet, production of ice cider was started in Canada, actual ice wine making was started in Germany in late 1700s and early 1800s. In 1970s the ice wine making method was taken to North America, and especially to Canada due to climatic conditions of warm summers and cold winters. In 1978 the first ice wine made out of grapes was produced in Canada. In early 1990s the first developments towards producing ice cider were taken with first observations that ice wine making can be successfully implemented with apples. In 1999 the first bottle of ice cider was sold in Canada under the official designation of ice cider. The development of ice cider production has been rapid ever since with several producers specialising in ice cider in Canada and the US. Currently there are a number of ice cider producers in Europe but less than five working in adherence to the Canadian ice cider appellation.

Table 1. Brännland Iscider denomination of quality for ice cider

Ice Cider is a sweet wine produced through the fermentation of apple juice that holds a sugar content of at least 30° brix before fermentation. Concentration of sugar is to be done using naturally occurring cold.

Alcohol content in the finished product must be between 7 and 13 percent by volume and residual sugar must be at least 130gr/L.

In addition:

Starting juice must be constituted of 100%, unconcentrated natural apple juice from Swedish grown apples.

No addition of preservatives.

No addition of flavors or coloring.

No addition of alcohol.

Chaptalization (addition of sugar) is not allowed.

Adapted from: Brännland Iscider. 2018b. What is ice cider? - And the start of a standard for ice cider in Europe. Available at: <https://www.brannlandcider.se/en/blog/2018/04/20/what-is-ice-cider-and-the-start-of-a-standard-for-ice-cider-in-europe/> [Accessed 24 May 2024].

As a trailblazer for ice cider production in Europe, Brännland Iscider has been active in developing an ice cider standard for Europe since the company's early years. Since 2013, Brännland Iscider has had its own definition of quality for ice cider (table 1) which mainly follows the Canadian ice cider standard. As there was no common European standard for ice cider and they were the only ice cider producer in Europe in year 2013, Brännland Iscider made its own ice cider definition based on what they considered being the correct ice cider production procedure. The definition was followed with a few exceptions, such as lower residual sugar requirement g/L, the ice cider definition developed by ice cider producers and related authorities in Quebec, Canada, the original ice cider development area in the world. Whereas the definition made it easier to communicate with the consumers about the quality of the ice cider, it also signalled a view on developing common ice cider production standard for Europe. Yet the definition that Brännland Iscider uses is not official yet, it gives consumers and other ice cider producers a signal of rules which are followed by Brännland Iscider in their production and what they consider as a ground for joint ice cider standard for Europe.

In the ice cider definition, naturally occurring cold is the common denominator for ice cider production. In the international appellation for the production of ice cider, two methods of concentration of sugar in the apple juice are outlined: cryoextraction and cryoconcentration. In Brännland Iscider cryoconcentration of apple juice is done by repeated cycle of freezing and tapping of the apple juice. In cryoextraction apples are let to stay in trees until the juice in them is concentrated enough for ice cider production. Cryoextraction is not done by Brännland Iscider as yet.



Figure 3 - Apples flowering. Photo: Johan Gunséus for Brännland Iscider.

What may the future hold?

Brännland Iscider has been steadily increasing its production capacity over these years. Besides ice cider, Brännland Iscider has produced a mulled apple ice wine since 2017.

The company has gone from producing 8000 bottles in 2012-2013 to around 100.000 bottles in 2023-2024 with a large part of the production being sold to export with the main markets being France, the United Kingdom, Spain and Switzerland. Besides ice cider production, Brännland Iscider has also partnered with a Swedish world renowned glass designer to design an ice cider glass specifically for their product which is one step in a journey to extend the ice cider experience into a whole.

What comes to sourcing apples in future, Brännland Iscider will continue collaborating with apple growers both in southern and northern Sweden. At the same time, the company plans to own a larger proportion of its apple cultivation areas. In terms of expression and quality in future, the aim is to move from vin d'effort, taste of the winemaker to produce an attractive consumer-friendly wine, to vin d'terroir, sense of place expressing unique flavour of ice cider made from apples from different apple production areas stemming from specific local growing conditions such as climate, soil and topography. The unique local characteristics will be realised through more site-specific bottlings in future. The aim is also to collect wild yeast from apples produced in the region for fermenting ice ciders.

A stronger link to benefiting from local natural habitats is also planned which is an interesting development also from northern agroforestry perspective. Under changing climate, choosing apple varieties to fit also in future climatic conditions is an important ongoing task while selecting apple varieties for future.

Whereas Brännland Iscider and its operations have been the focal point of the operational group “Commercial productive apple growing in a northern climate – innovation for new climate resilient agriculture in northern Europe”, the long-term goal of the operational group is to contribute to climate resilient sustainable agriculture and to create favourable partnerships between farmers and food processing companies to develop further products in local, regional and global markets. The project and its spinoffs continuously search for further collaboration with academia and other partners. If you are interested to learn more about the operational group “Commercial productive apple growing in a northern climate – innovation for new climate resilient agriculture in northern Europe”:

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About FOREST4EU project

The article has been produced in FOREST4EU project as a part of capacity building materials directed to stakeholders across Europe. Whereas innovations developed in the operational groups are typically available locally, FOREST4EU project aims at transferring knowledge and best practices on forestry and agroforestry to stakeholders and operational groups across Europe.

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Further information

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