

Pilot Study Report

Mother Svea's Sunday Best



Synkop Ekonomisk Förening

On behalf of Dalarna County Administration

2013-10-04

**Kent Vickström, tailor
Anders Thuresson, project leader**

Table of Contents

Introduction, objectives and goals	5
The History of Hemp	6
Hemp drive belts important for industry	7
Versatile Hemp	9
Study visit	10
The Museum of Rope Making, Älvängen	10
Wålstedts Spinning Mill, Dala Floda	10
The production chain from seed to textile.....	11
Cultivation	12
Seed and sowing	12
Harvest	12
Lessons from cultivation.....	12
Preliminary study on hemp as a cultivated plant in Dalarna.	12
Industrial Hemp-X in Gävleborg	13
Gotlands Naturfibre AB (Natural Fibres of Gotland Ltd.)	13
Hampa Produkter, Grästorp, Västergötland	14
Preparation and Spinning	15
Vävning	16
Insjöns Väveri, Dalarna (Insjön's Weaving Mill)	16
Klässbols Linneväveri, Värmland (Klässbols Linen Weavers)	16
Design and production of High Fashion	17
Dala Hemp Fashion	17
Dala Hemp Clothes	17
Conclusion	18
Taking this work further	19
This is what we need help with!	19
Appendix 1. Fibre sample from NuMax Fibre Technology Ltd	21
Appendix 2. Samples of hemp fabric dyed by Herdins Färgverk AB.....	23
Appendix 3. Samples of hemp fabric	25



Cover photograph from <http://hempage.de>

The pilot study has been carried out and the report written by:

Kent Vickström, tailor.

Tel: 073-180 81 12

E-post: kenttailor@gmail.com

Anders Thuresson, project leader

Tel: 073-075 46 00

E-post: synkop@thuresson.at

Translated by Eamonn O'Reilly

SYNKOP ek.för.

Herrhagsvägen 43, 1 tr
791 75 FALUN

TELEFON
073-0754600

ORG. NR
769604-6643

PLUSGIRO
28 57 14-2

Introduction, objectives and goals

In this report, industrial hemp is used to mean both *seed and fibre hemp*. Varieties have different uses and are cultivated and managed in different ways. Hemp, *Cannabis Sativa* is an annual herb. Sweden is, at present, dependent on imports of clothing in cotton. Producing these clothes affects the environment and climate negatively. Cotton cultivation consumes much of the world's insecticides and requires large amounts of water and land that are better needed for food production. Transport causes carbon emissions. Working conditions in the whole chain are poor and wages low.

Historically, clothing from hemp, flax, wool and leather have been used in Sweden. In the mid-1900's, Sweden had a large well-developed textile industry. A well-known local example is the woven fabrics and blankets from the Tidstrand factory in Sågmyra, Falun. In its heyday, it employed about 1000 people. Tidstrand's products included blankets for hotels, hospitals and the army. Another example is the CTH millinery in Borlänge where over two hundred employees made headgear.

Fabric made from hemp is comfortable, durable, long-lasting natural material. Fabrics made from hemp are reminiscent of flax products, but are more durable.

The term "linen" describes a weaving technique. "Linen" can be produced from cotton, hemp, flax and other raw materials, though it is routinely described as a product of flax. Microscopic examination and knowledge is required to determine if the fabrics are manufactured from hemp fibre or flax. Historic textiles made of hemp are frequently described as products of flax because of this, thereby hiding part of our textile heritage. Fabrics made from hemp fibre were probably fairly common since hemp provides double the amount of fibre for the work involved compared to flax.

As far as we know, there is currently nobody in Sweden producing fabric of hemp fibre. The fabric that is to be found is imported from China and other countries. Our intention is that the feasibility study will be part of the base information when we investigate how a textile industry based on fibre hemp will be built up in Dalarna.

The study describes the food chain, from seed on the farm to finished products on the market.

The aim of the study is to

1. Collect experience from modern cultivation of industrial hemp.
2. Investigate the resources currently available for fibre production, spinning, dyeing and weaving.
3. Find processing technology for textile fibre with modern, energy efficient and environmentally friendly technologies.
4. Prepare an investigation prior to the establishment of a processing industry for textile fibres.
5. Prepare an investigation on establishing a spinning mill and/or dye in Dalarna.
6. Prepare a basis for the establishment of a company for the production of finished garments.
7. Create contacts and build networks.

The objectives are the feasibility study is to contribute to

1. creating jobs in Dalarna.
2. developing hemp fibres and yarns that can be sold to the textile industry.
3. producing hemp textiles which do not poison or harm the environment.
4. producing hemp textiles that have the lowest possible energy consumption.
5. developing textiles of hemp which meet KRAV standards. (IFOAM)
6. any medical effects of hemp textiles being investigated.
7. the founding of the companies which are lacking for the production of hemp textiles in Dalarna.

The feasibility study covers the whole food chain from agricultural primary production to finished textile products and byproducts. Each business in the food chain would require its own thorough economic analysis for it to be accurate. Thus, it was not appropriate to investigate these economic conditions in the feasibility study, nor to report financial calculations in this report.

The History of Hemp

In Sweden, hemp has been grown for well over 1,000 years. Archaeological findings show that hemp was grown in Jämtland in the 3rd and 4th centuries. During the early Middle Ages hemp was grown in the Mälardalen region of Dalarna and on Gotland. They made fibre for rope, sacks, bed-linen and robes among other things.

Hemp is mentioned in the 12th century Westman Law and Östgöta Act as one of the six major crops (including flax, beans, peas, wheat and rye) . Later hemp is spoken of as a staple crop in the Uppland Act. In the 1500's Gustav Vasa recognized the plant's value as a key raw material to meet the Army's and Navy's major needs of hemp for sails, rope, tents etc.

The warship Vasa sank in 1628 with eleven tons of hemp on board in the form of rope and sails.



Part of the Vasa's anchor cable. Read more here: [The regal warship Vasa](#)

In 1774 "Upon His Royal Majesty and the Realm Commerce Collegium ordered Description of Hemp; its sowing, care and treatment" containing much valuable advice, was published. Hemp cultivation was now an established part of self-sustenance. Sacks, ropes, tents, tarps and gear were manufactured in homes. The army and navy still has great need of hemp products.

Carl Linnaeus (1707-1778) gave hemp the Latin family name Cannabis Sativa , which loosely translated means "useful hemp."

Hemp was important when the Wild West was conquered. Heavy fabrics of hemp are known as "Canvas". Such fabrics were used for different things: The miners wore rugged Levi's jeans of canvas and settlers' wagons were covered with canvas to name but two examples.

In the mid-19th century cotton began to outrive hemp as a textile fibre in Sweden

"On the history of hemp in Jämtland - Härjedalen

The most common textile plant in Jämtland and Härjedalen has been hemp. One might think that the fibre of hemp was coarse and could only be used for rope, sacks and sails, but this is not the case. Most yarns needed to weave robes, tablecloths and sheets could be spun from hemp and provides essentially the same quality as flax. To distinguish flax and hemp from each other requires microscopic examination and much of what we now more or less routinely term as flax, may well be made of hemp. <http://www.jamtli.com/3842.forlag.html>

Hemp produces twice the amount of fibre as flax and this is an important factor when one considers that amount of work involved in extracting the fibre. It was also easier to get hempseed to ripen than flax. One had to secure seed for next year's plants

"I min uppväxt hade de hampodling på Rödön. Brukat till klädfoder. Det skulle sås tjockt. Första året torkas på hamphjäll, andra året beredas."

Per Olsson, född 1865, Rödön

It is known that hemp has been grown in Jämtland for ages thanks to pollen surveys which have been done around the Great Lake area. Tests from the bog of Lokan, not far from Tidbrandsholm on Rödön show high concentrations of hemp pollen as early as the 3rd and 4th centuries A.D. Names like Hampsänkatjärn and such suggest that hemp was well-known. Since then, hemp has been in use as a household fibre all the way into the 19th century.”

From *Kvinnomöda och skaparglädje* by Ulla Oscarsson, Jämtli publishers 2013. See more at: [Jämtli Förlag](#)

Hemp drive belts important for industry

Industrialism started with drive belts made of hemp. When industry was driven by various winches, wind power, water power and later by steam, drive belts of hemp were needed for transmission.



Central driveshaft and looms in Göteborgs Remfabrik. Link: [Remmfabriken](#)

Until 1976 all of the postal service's sacks were made of hard wearing hemp. It was important that the sacks would hold.

Fire hoses were made of hemp which is relatively fireproof. The tall towers at fire stations were for drying these fire hoses, the hose drying tower.



Antique fire hose

During the 1930's, the Ford Motor Company ran a successful pilot plant in Michigan, USA, where they developed new materials and various biomass fuels. One of the foremost raw materials in these experiments was hemp, which grew on Henry Ford's own private property.



"Henry Ford demonstrates the strength of his car "grown" from a combination of hemp and other annual crops, and designed to run on hemp fuel, by smashing with a sledgehammer." (Popular Mechanics, 1941)

In 1937 Henry Ford called a press preview of a new car model. In front of photographers they went loose on the car with a sledgehammer. The body was made of organic plastic produced from hemp fibre, which cause the sledgehammer to bounce. There was hardly a scratch. In addition, the engine ran on ethanol produced from hemp and other crops.

Read more: [Henry Ford's Hemp Plastic Car is 10X Stronger](#)

Link to the YouTube film where they pound the car with a sledgehammer: [Ford's Hemp Plastic Car](#)

For reasons of self-sufficiency the Swedish government provided grants for the cultivation of hemp during WWII. Processing plants were built in Visby and Värmbol, Katrineholm. 25 years later, in 1966, state aid to Swedish hemp processing was abolished.

Possession of industrial hemp is never classified as a narcotics crime, for whatever purpose. Many people believe that "hemp" and "cannabis" are the same things. This is due to lack of knowledge. The drug "cannabis" is produced from the subspecies Cannabis Indica; industrial hemp belongs to the subspecies Cannabis Sativa.

From 1970 to 2003, all cultivation of hemp was banned in Sweden. *"The verdict of the EC-Court, 16 January 2003 in Case C-462/01 , criminal proceedings against Ulf Hammarsten , ECR 2003 I- 781, states that a Member State may not prevent its residents from taking advantage of the support available within the EU system by prohibiting the cultivation of industrial hemp. Since the cultivation of hemp for fibre is eligible for farm support, such cultivation is therefore permissible in Sweden."*

Government Offices: Memorandum 2005/06: FPM101

From 2003 it has been legal for farmers to grow industrial hemp with a THC content of less than 0.2 percent. Drug hemp can contain 5 to 23 % THC (tetrahydrocannabinol). Cultivation is permitted for approved varieties of hemp listed by the Board of Agriculture. The EU collectively determines each year which hemp varieties will be approved for cultivation. The THC content for all the varieties accepted is below 0.20 percent. In 2013, fifty different varieties of hemp have been approved. Those who grow approved varieties are entitled to farm support. Read more in the section on cultivation.



Photo of The Museum of Rope Making, Link: www.repslagarbanan.se

Versatile Hemp

As we can see in the picture above hemp is a versatile annual herb. This is why Carl Linnaeus gave hemp the Latin name of *Cannabis Sativa*. Freely translated, it means "useful hemp."

1. In farming, hemp is a useful plant. It can be grown after other crops and is a good preceding crop for most crops. Fibre hemp provides: bedding for poultry, horses and small animals. Hemp seed provides seed, seedcake, oil and fuel. Seedcake is good fodder.
2. Energy: Hemp supplies oil as a propellant and pellets or briquettes to burn.
3. Medicine: Traditionally, products of hemp have been used as medicine for all sorts of ailments. *Cannabis Indica* is notorious and illegal because of its high levels of THC which is a potent drug. Legal industrial hemp with a TCH content of less than 0.20 percent creates compounds that are anti-inflammatory. Sheets of hemp are said to prevent bedsores.
4. Paper used in bibles and bank notes has historically been made from hemp fibre.
5. Hempseed oil is used in the manufacture of plastics. Hemp fibre reinforces composites.
6. Hemp seeds are the plant kingdom's finest source of essential fatty acids and only soya beans provide more protein. Fatty acids make the skin and eyes glow and they are essential for brain development and purifying blood vessels. Fatty acids are important to the immune system.
7. Hemp provides features such as insulation, panels, sound-proofing, hemp bricks and wallpaper. Rats and mice do not like hemp, so tighten crevices with hemp gear and insulate houses with hemp wool.
8. In the household: shampoo, soap, detergent and soap are but a few examples.
9. Textiles are the obvious product because this report deals with them.

Study visit

The Museum of Rope Making, Älvängen

At this museum, some twenty kilometres from Kungälv, we met Börje Johansson and Bernt Larsson. The Museum of Rope Making is a functioning museum that produces rope on demand. These two gentlemen possess broad knowledge and true understanding of this natural material, hemp. They treated us to a thorough theoretical briefing on hemp and cordage making. This was followed by a guided tour of their exhibition together with practical experiments and a demonstration of the rope walk and the museum complex. Amongst other things, the Museum of Rope Making has produced most of the hemp cordage used on the SS Ostindienfararen. One odd example of what they have made for the ship is the rudder cables made of elk skin. Compare this to the Falun Mine's winding ropes made from ox skin.

The Museum of Rope Making is experimenting, on a minor scale, with hemp grown in Sweden.

They have a permanent exhibition that describes most of what hemp can be used for. They also have a traveling exhibition which is packed into four barrels and shipped on pallets. If needed, the exhibition can be lent out.

The Museum of Rope Making, Link: www.repslagarbanan.se



Bernt Larsson at the rope twiner. Kent Vickström in white.

Wålstedts Spinning Mill, Dala Floda

This family business is well-known in wool yarn circles. All the wool for yarns comes from sheep that have grazed in Sweden. The factory in Dala Floda produces premium wool yarn dyed in place. The yarn is completely colourfast and stands up to the sun's bleaching rays. So fine is the yarn's luster and colour that even Helena Hernmarck, textile artist living in the United States, uses these yarns in her large lavish tapestries. The works of art are woven in Borlänge and adorn, among other places, the UN building in New York.

On our visit, the owners of Wålstedts became interested in hemp fibre. They saw the possibility of spinning hemp fibre and wool to a new outstanding and unique product.

Link: [Wålstedts Textilverkstad AB](http://Wålstedts%20Textilverkstad%20AB)

The production chain from seed to textile

Cultivation by Farmers

- 1) Sow seed as soon as the soil is dry enough to avoid compaction.
- 2) The hemp is harvested and the stalks are bundled by the binder.
- 3) The bundles are stacked in ricks in the field for retting and freeze-drying.
- 4) After retting, the hemp is moved to airy repositories for drying and storage.

Preparation

- 5) Preparation by farmers. The bundles are broken in a breaking machine.
- 6) Coarse combing of crude fibre.
The farmer sorts byproducts from the finer textile fibres. What remains is coarser, crude fibre and splinters (wood substances) used for insulation, bedding, fuel and more.

Spinning

- 7) The coarsely combed hemp is combed and carded to the desired fineness and purity.
- 8) Cottonising to bleach and refine the fibres may be performed.
- 9) Spinning.
- 10) Twining and finishing.
- 11) Dyeing of yarns.

Weaving

- 12) Fabrics of hemp yarn are woven. Various products such as clothing, medical sheets and upholstery fabrics are produced.

Knitting

- 13) Hosiery and socks for diabetics and others who have problems with leg and foot sores.
- 14) Stump Socks for persons with limb prosthetics.

Staining

- 15) Upholstery and clothing fabrics are stained.

Design and Manufacturing

- 16) Various products are designed.
- 17) Production of various textile products.

Sales

- 18) Further investigation is required of which sales channels are appropriate at different stages in the development of production.

Cultivation

Farmers can receive farm support for hemp cultivation. What separates hemp from other crops is that they must cultivate an approved variety. The EU jointly decides each year which hemp varieties are approved. The farmer must apply for payment in advance of each year for that crop. Another condition is that the property must have at least four hectares of farmland. Permission to grow individual plants is normally never given. For approved varieties the THC content is less than 0.20 percent. More information: www.jordbruksverket.se

Seed and sowing

EU-approved seed for all approved varieties can be bought from Bionic Scandinavia. Read more: www.bionic.nu Growing industrial hemp for textiles is a traditional livelihood in Italy. Fibre from hemp is known as "white gold". Textiles that are produced from these fibres have a very good reputation. In the future, suitable seed for industrial hemp might be imported from Italy. Hemp is frost-resistant and can withstand freezing temperatures down to -10 ° C. The heat requirement for seed germination is high. The best soils for growing hemp are well-drained and permeable humus-rich soils with elements of clay. Planting should be done in the spring when the soil is warm enough i.e. 8-10 ° C. Hemp has high nitrogen requirements at the beginning of the growing season. Good preceding crops that have good nitrogen supply e.g. pulses and leguminous plants are recommended. Livestock manure in the spring before sowing can have a decisive effect on hemp development during the growing season. It has been mentioned that hemp can coexist with a legume that delivers nitrogen. As time passes the hemp will grow past and suffocate it. In this manner, a nitrogen dose and a green manure are obtained which increase the humus content of the soil. If hemp gets a good start, it is a very good weed-sanitiser in crop rotation. Hemp as a preceding crop can be considered good when the subsequent crop benefits from both loose and weed-free soil.

Harvest

If you want long fibres for textile production, a binder with a sickle-bar should be used. The hemp is cut off at ground level in order to get sheaves of whole plants that can be stacked in ricks. The ricks are left in the fields for retting and freeze-drying. After that, the material is taken to airy repositories for drying and storage.



Photograph from *Lin och Hampa*, Kåre Fröier 1960

Lessons from cultivation

Preliminary study on hemp as a cultivated plant in Dalarna.

Pilot project with the aim of reintroducing hemp as a cultivated plant, 1 Nov, 2005 until 28 Apr, 2006. The project has engaged three test cultivators who were sponsored with seed. The test growers have committed themselves to keeping a journal and taking part in future field visits. Beyond these three test growers, a further five applied to grow industrial hemp in the 2006 season. In all, about 3.5 ha of industrial hemp were grown through the agency of the project, primarily of the Finola variety.

Summary of their report 2005:

"Efforts to introduce industrial hemp as a commercial crop in Dalarna is a job on several levels simultaneously:

- ▲ a base of curious and courageous farmers must be established and maintained with advice on growing and information on hemp in general.
- ▲ a base of entrepreneurs, who dare and want to refine the crop, must also be established.
- ▲ a new consumer market must be opened up for all the new hemp products that can/will be developed.

One lesson is that the project to reintroduce hemp must be synchronized with the crop year. Of the future bioenergy crops that can be grown on our arable land, industrial hemp seems very interesting compared to other energy crops, not least because of its many uses. Developments in Europe and to some extent in Sweden are fast; new harvesting techniques are tested and new hemp based products are developed. There are more results that the project has not reported."

Industrial Hemp-X in Gävleborg

From the report: "In the Industrial Hemp-X project hemp was grown on 58 ha in the county of Gävleborg. About 12 ha were sown with seed hemp while the rest was sown with fibre/energy hemp. During 2006 about ca 43 ha has been planted, of which around 16 ha was seed hemp. There was cooperation during the 2005 crop year with Råsjö Torv/SÅBI. The economic risk for the farmers was minimised in this way and they were able to grow and get accustomed to hemp. The farmers were given seed and a sales contract to get farm support and to be able to harvest.

The harvest was delayed due to the long snowy winter which gave a yield that was lower than expected. On large areas (> 3 ha) the yield was about 4 ton/ha while smaller fields varied between 0.7 and 5.8 ton/ha. The delay caused a large part of the hemp areal to be left fallow in 2006.

The seed hemp was harvested at the end of 2005 according to plan. The result was very successful with over 1 ton of dried seed per ha. Trial feeding of inter alia, milch cows shows that hemp seedcake can well replace soymeal as concentrated feed.

Fibre preparation trials were made with stalks harvested at different times during the autumn of 2005. The intention was to find methods other than field retting. Laboratory tests showed that hemp is a very good fuel that can be produced locally in the form of pellets or briquettes to be used in boilers of different sizes. The opportunity of producing insulation materials for the construction industry, was observed"

Gotlands Naturfibre AB (Natural Fibres of Gotland Ltd.)

A Leader project which took place 2009 -10. The foremost result is that the company, Gotlands Naturfibre AB, with 13 local participants was started. In 2009, 10 ha were sown, but the establishment was unsuccessful so there was no harvest. In 2010, 30 ha of industrial hemp were cultivated on Gotland.

The conclusion is that the knowledge gained is a basis for creating a profitable hemp industry on Gotland. A company has been started. Through their project they have confirmed that the whole of the hemp plant (fibre, seed and stalks) must be utilised in order for profitable production to be established.

There are activities surrounding hemp in many places in Sweden. Below is an example from Kristianstad.

HEMP BUILDING COURSE
Prova att bygga med hampa!
Kristianstad, Sweden 27-29 Sept. 2013
Hosted by EKOLUTION www.hampvaruhuset.se
3 days of Learning, Practice & Fun
€230 inc Lunch & Refreshments
Contact hampvaruhuset@gmail.com



Hampa Produkter, Grästorps, Västergötland

Roger Olofsson and Tommy Friberg have been running Hampa Produkter i Grästorps since 2003. Read more at their homepage: www.hampaprodukter.se They are part of a Leader project. This year they are growing in all about 8 ha of industrial hemp and over 2 ha of seed hemp. As farmers they have all the machinery they need for sowing and harvesting. They have developed equipment for processing. Seed hemp is harvested around the turn of September–October. On our visit to their fields, they were almost ripe for harvest..

They have equipment for pressing oil and produce hempseed oil and seed-cake which is suitable as concentrated feed. Industrial hemp is retted standing in the field until early spring when it is harvested. This has caused problems when large amounts of wet snow pressed the hemp down so it was hard to gather.

Hampa Produkter sell fiber for insulation, briquettes, bedding for pets and horses, hemp seed, hemp oil and fodder. The hemp fibres they produce is not suitable for textile production. They are too short and impure. When others stopped producing hemp Roger and Göran carried on. They have gradually increased their areal for hemp. Through the years they have gathered great experience and a lot of know-how concerning hemp cultivation.



Roger Olofsson and Kent Vickström in front of a field of hemp. Roger in a shirt and Kent in a cap and coat, all made of hemp.

Preparation and Spinning

Study visit in Kinna where we met Josh Nusenbaum från NuMax Fibre Tecnology Ltd. och Jonas Andersson from their Swedish partner, Kinna Automatic AB. NuMax is an English company, specialised in harvesting and processing equipment for textile fibre production.

See more at www.numax.com

Kinna Atomatic AB develops and sells machinery to the textile industry all over the world. More at: www.kinnaautomatic.com

Among many others, NuMax and Kinna Automatic collaborate with professor Raymond Harwood from De Montfort University in England. Harwood has done research for many years concerning the cultivation of hemp and the products that can be manufactured from it. One of his specialities is fibres for textiles.

NuMax and Kinna Automatic can deliver the equipment needed for textile production based on hemp. They develop and market everything from hemp harvesting machinery to machinery for processing, spinning and weaving hemp to packaging of finished products in the textile industry. Together they offer delivery of hemp processing plants of varying sizes. The simplest version is suitable for local farm cooperatives. It is comparable in size to the cooperative dairies which once were found all over Sweden.

The required space for such a facility is about 500 m². Staff rooms and buffer warehouses for incoming raw material and processed hemp fibre ready for shipping to spinners etc. are also needed. The facility produces fibre for textiles, fibre of lesser quality suitable for insulation or reinforcing in composite material and briquettes which are high-grade fuel. The plant is self-sufficient in fuel for heating and drying of fibre. All the water in the process is recirculated and purified locally. The lower quality fibre and surplus from briquettes is sold and contributes to good economy. The lower quality fibre and surplus from briquettes is sold and contributes to good economy.



The picture shows a plan of how a processing plant for hemp fibre can be laid out. **3-Pod Production Machine Layout** published by permission. NuMax Fibre Technology Ltd .

Fibre samples from NuMax Fibre Technology Ltd are found in *Appendix 1*.

Staining of Yarns/fabrics

Herdins Färgverk AB in Falun has helped us in colouring samples of 100 % hemp textiles. When a company for textile colouring is eventually started, Herdins will be a natural partner to work together with.

Colour samples are to be found in *Appendix 2*.

Samples of three 100 % hemp textiles and two with mixtures with other natural fibres are in *Appendix 3*.

Vävning

Insjöns Väveri, Dalarna (Insjön's Weaving Mill)

The weaving mill was founded 1947 by Ivar Hollstein in Insjön and is still there. Insjöns Väveri is a family business with seven employees. We visited them in the summer of 2013.

Insjöns weaving manufactures quality tablecloths, towels, napkins, runners etc. in flax and cotton. Thanks to still having the old looms, (constructed in the 1920s) they can still weave linen entirely following the old hand-woven originals. Many of the patterns carry centuries of tradition. Insjöns Weaving Mill may in the future consider weaving hemp yarn if they have access to appropriate qualities. Website for Insjöns Weaving: www.vi.dukar.nu



Interior from the loom room at Insjöns Väveri

Klässbols Linneväveri, Värmland (Klässbols Linen Weavers)

The weaving mill is a family owned business with 25 employees.

The art of weaving is kept alive with modern looms. They have quality products used by, among others, the Royal Family and the Nobel Foundation at ceremonial occasions. They buy their linen materials from Belgium and these are colored in Germany. They weave sturdy, beautiful upholstery fabrics for the furniture industry. The upholstery fabrics are designed and styled by famous designers. Since hemp yarn is more durable than linen they are interested in weaving hemp if they can buy good quality yarn. Stefan Johansson, CTO and partner, sees fabrics of hemp as a possible future quality product.

We visited Klässbols Linneväveri in September, 2013.



Chair upholstered in linen fabric Värmland.
Design: Lena Hellström

Website: Klässbols Linneväveri: www.klassbols.se/



Loom at Klässbols Linneväveri

Design and production of High Fashion

Designed textile products have a long history Dalarna. Their roots can be found deep in the folk costumes of the farming community.

All the blankets and woolen fabrics that were woven by Tidstrands in Sågmyra through the years demanded designers and people in many other professions. We want to mention, once more, that about a thousand people worked at the factory.

For over 100 years hats and caps were designed and made at the CTH millinery in Borlänge. In its heyday, two hundred and twenty people worked there.

Today we see Haglöfs which was started in Torsång where backpacks made of durable material were sewn. Nowadays, the well-known company also manufactures clothing and many other items for the leisure sector.

The well-known modern company Papelina has been added the ranks of successful textile companies in Dalarna.

Dala Hemp Fashion

The CTH factory has all the necessary equipment to start production of clothes. We have the promise from the CTH museum that we can locate a newly established production company on their premises. The present CTH which is in the same building is interested in using fabrics of hemp in their production.

It is now possible to start the company, "Dala Hemp Fashion". Initially it will produce collections for an exclusive and discerning clientele.

After an entire working life, Kent Vickström has a unique network in textile Sweden. We will mention some that may be important when Dala Hemp Fashion is started.

We have enjoyed good relations with the Beckmans College of Design in Stockholm for a long time. We also have contact with young designers and designers of fashion from Dalarna, notably, sisters, Klara and Helga Sjons.



Long-sleeved V-necked robe in light quality
It could hardly be more comfortable and so chic. Figurumspielende's robe in fashionable length from Hempro Int.
Material: 55% hemp / 45% ecological cotton (170g / m²) weight 0.26 kg.
Read more at : www.hempro.de

Dala Hemp Clothes

Later the trademark "Dala Hemp Clothes" which is directed to a broader clientele, will be used. This will occur when production capacity is sufficient and the exclusive market is replete.

Conclusion

The experience and knowledge acquired in the preliminary study shows that textiles may well be produced by fibre hemp in Sweden.

1. Since 2003, growing industrial hemp in Sweden, albeit strictly regulated, is allowed.
2. Hemp, Cannabis Sativa, is an annual herb whose parts are raw material for many products.
3. More industrial hemp is being grown in the world. More and more products from hemp are marketed and larger volumes are sold. Products using hemp are becoming increasingly common. Hemp fibre composites are used in many modern cars. The auto industry has historically used hemp.
4. Insulation and other building products from hemp are becoming more common on the Swedish market.
5. EU certified seeds can be bought in Sweden. Using your own seed for hemp cultivation is not allowed in Sweden.
6. Trials of both seed and fibre hemp have been run in several locations in Sweden.
7. A number of Swedish farmers regularly grow seeds and fibre hemp today (2013).
8. For the best economy, all products of the harvested hemp should be used: textile fibres, fibre for insulation, bedding for horses/animals and fuel in various forms.
9. Seed hemp is harvested when the seed is ripe in the autumn. It is sold as seed, oil, seedcake or fuel.
10. For textile fibres, hemp is retted in the field in sheaves placed in ricks on the ground and later dried and stored at the farm. The first steps in the textile fibre production can take place in the courtyard to reduce volumes to be transported to the processing plant. This needs to be investigated further. The farmer retains byproducts for sale or for use in its own operations.
11. When fibres are produced for other purposes, the hemp often left standing and then harvested in winter. The entire process usually takes place on the farm.
12. Historic forms of hemp processing are labor intensive and cause ecological impact.
13. Internationally, both older forms of processing and modern methods are used.
14. Modern processing of industrial hemp for textile fibre can be done in closed systems that do not harm the environment. These methods produce their own fuel for heating and fibre drying.
15. Modern machinery for processing and spinning of hemp fibre are available.
16. At present, there is no processing industry for hemp textiles in Sweden. This activity can be run locally or regionally in order to minimize transport. A processing industry can be started in Dalarna when enough farmers have been contracted.
17. Today, there is no company that spins hemp yarn in Sweden. Such businesses can be started in Dalarna. Both hemp and flax fibre can be spun in the same spinning mill. Today no flax is spun in Sweden. Ideally, a spinning and a processing mill could be co-located.
18. Fabrics made from hemp are very durable. This is an advantage when hemp is used in upholstery fabrics.
19. Clothes made of hemp are comfortable to wear and feel cool in the heat and warm when it is cold. They can be made with many techniques and dyed in any color.
In Appendix 2 there are samples of hemp coloured by Herdins Färgverk AB in Falun.
In Appendix 3 there are hemp fabrics in various qualities.
20. Yarns and fabrics need to be dyed. Therefore, a company that does this should be started in Dalarna.

Taking this work further

Further investigatory work and establishing the whole chain of production, as described in the feasibility study, requires several companies being started. Obviously, the authors themselves cannot create these companies. The premise is that cooperation must therefore be established between firms, authorities and organizations with an interest in the matter. A development company is central to the work and ought to be formed first. Further work should be done to decide the legal forms for the various companies. Working names for them are suggested below. Their respective functions have been mentioned, even if the names have not been used earlier.

1. A development company: Dala Industrihampa is formed. Its main task is research and analysis to lay the ground for establishing the enterprises below.
2. Process industry: Dala Hampaberedning. A key function which is lacking in Sweden.
3. Textile industry: Dala Hampaspinneri. The second key function missing in Sweden.
4. Textile industry: Dala Textilfärgning. Third key function: Yarns and/or fabrics need to be coloured and sometimes treated in other ways.
5. Textile industry: Dala Hemp Fashion creates collections for an exclusive and discerning clientele.
6. A development company: Dala Medicinal Fibre. To investigate if textiles made of hemp such as sheets and stockings have positive medical effects. Experiences from the former USSR indicate that hemp sheets lessen the risk of bedsores. Stockings made of hemp are said to lessen the risk of varicose ulcers in diabetics and other groups at risk. Medicinal textiles appear to be an important future niche product. Cederroths in Falun is a possible partner in this enterprise.
7. Textile industry: The trademark Dala Hemp Clothes is to be introduced later. When the market for exclusive early users is satisfied by Dala Hemp Fashion, rational production, directed to larger series, will be started for a lower price segment.

This is what we need help with!

The authors of this report see themselves as having important roles in the above mentioned companies. Obviously, the continuing work is completely dependent on financing and support from the various companies, authorities and organisations that have an interest in these matters. Company coaches and mentors can be mentioned as important in this connection.

In order to go forward with this giant project we estimate that at least three full-time positions need to be financed for at least a year.

This is where we need help!



Picture from the Museum of Rope making.
Link: www.repslagarbanan.se

Appendix 1. Fibre sample from NuMax Fibre Technology Ltd

This hemp fibre has been prepared by a method that NuMax Fibre Technology Ltd and Kinna Automatic AB have developed together.

Read more at www.numax.com or www.kinnaautomatic.com



Appendix 2. Samples of hemp fabric dyed by Herdins Färgverk AB

The four cloth samples below have been dyed in different colours by Herdins Färgverk AB, Falun October 2013.

These imported cloth samples are 100 % hemp. Compare with the sample of natural hemp.

Link: www.herdins.se

Färgad HAMPA

Ofärgad HAMPA



Appendix 3. Samples of hemp fabric

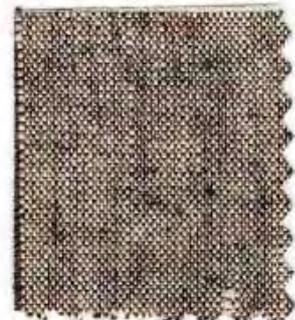
The samples to the left are of 100 % pure hemp.
The samples to the right are hemp blended with other fibres.



100% HAMPA



20% BOMULL
80% HAMPA



ULL o HAMPA



100% HAMPA



100% HAMPA

