

Dyeing diversity

Emmy Voksepp

– Exploring interrelations between plant dyeing techniques, design methods and biodegradable materials in textile design



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Degree Project

Bachelor in Fine Arts in Textile Design

Titel

Dyeing Diversity

- Exploring interrelations between plant dyeing techniques, design methods and biodegradable materials in textile design

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1.1 Representative images of work



Result of plant dyed color samples, pigment from red cabbage.
Material that is used: polyvinyl alcohol (PVA), polylactic acid (PLA) and flax.



Result of two textile example depth through color. The beige focus on the color of the textile material in combination with plant dyeing techniques to reach depth, structure, transparency and shape. The blue focus on plant dyeing, depth and shape.



Result textile example depth through color. Focus on the color of the textile material in combination with plant dyeing techniques to reach depth, structure, transparency and shape



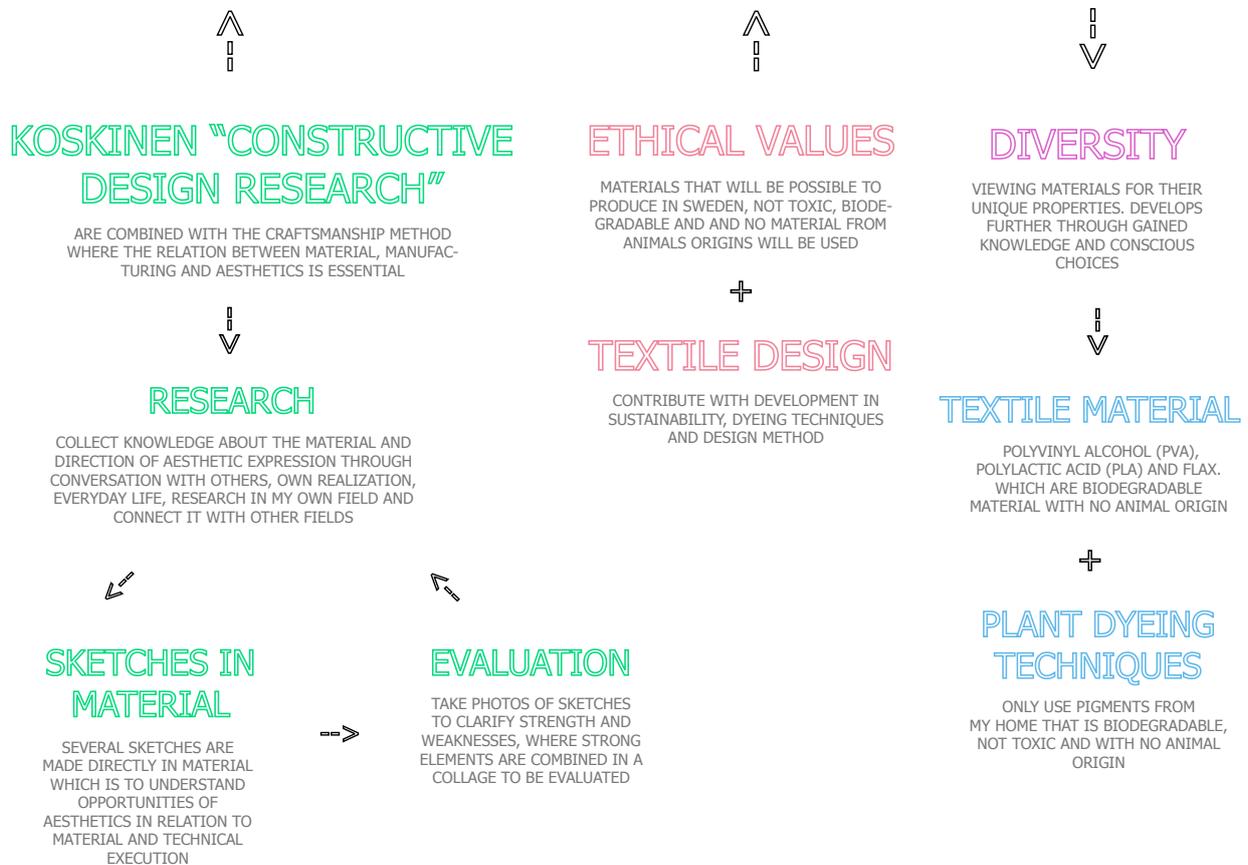




Result textile example depth through color. Focus on plant dyeing, depth and shape.



TEXTETHICAL DESIGN METHOD



Result design method. Textethical design method where the colored text are general guide lines and grey text are personal values applied in the method

1.2 Abstract

This work explores the expressive potential of plant dyeing techniques in relation to weaving by proposing a method in regard to non-toxic containment, biodegradable materials and ethical values. Textile design and ethical values have been combined to create an “*Textethical Design Method*”. The personal ethical values that have been used in this project are based on a “*diversity perspective*”. This consist of openness in material choices that wish to expand the view of quality in relation to textile material. This also by connecting and evolving the expression through knowledge between the material selections, production and aesthetics.

This project wish to focus on finding plant dyes that have equal strength in colors as the artificial made pigment and therefore are uncharacteristic for the earth tones that plant dyeing techniques often are associated with. Textile techniques that will be used are plant dyeing on a multiplied layered weaved surface to investigate depth through colour and three-dimensional shape. The project strives to contribute with development in design methods, sustainability and broader the field of plant dyeing techniques.

1.3 Keywords

Textethical design method, textile material, plant dyeing, speciesism, structure, diversity, biodegradable, ethical values

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2 Introduction to the field

2.1 Introduction

Textile fibres are divided into two groups that are natural and manufactured, where both groups are a result of and reflection of its time technical achievement. The properties of natural fibres are often highly valued based on presumptions that they are “*natural*” where it takes no account in materials and finishing processes that reflect upon existing social conditions, such as ethical and environmental. In the working method of craftsmanship the material are closely linked to technique and the developing of expression, where conscious material choices shapes the aesthetics. This is seen in the textile artist Hicks (2006) work “*Weaving as a metaphor*”, a project that shows how unconventional material choices in combination with weaving also creates possibilities in creating artistic experimental expressions.

A topical input, made by the designer and materialogist Lee (2015), in the material discussion is the need in the design field to create design that takes in account ethical and moral consideration. This is a need consumers developed after the recession in 2008 to re-connect with their ethical values with their life-style. The methods for future designers are an innovative attitude where material development is incorporate with the final aesthetics (Lee 2015). Ethical values have its origins from the society that has shaped them. Where our society is founded on laws that speaks to establish order through hierarchies. The central hierarchy opinion is that the human species ability to think and express themselves are greater than other animals and therefore gives humans unquestionable power to rule, which the jurist Grotius (2012) refers to in his texts. The animal rights advocate Dunayer (2004) has discussed how this relation affects the relation between the human species and other species. That it have developed a “*speciesism*” approach to our surroundings. A term Dunayer (2004) explains as it being “*Speciesist to exclude any non-human being from equal moral consideration for any reason*”. Where she refer other species than the human species as non-humans, such as other animals than the human species. This hierarchical approach is found, as previously told, in textile design field need to divide and differentiate textile materials.

Society is often reflected and mirrored through design. For instance in the textile artist Lundin (2014) added her personal ethical values in the project “*Färgningsmanifestet - the expanded field of composting*” where natural non-toxic pigment from her food compost where used to dye textile fabric. Or in other design field the conceptual design duo Dunne & Raby’s are found with their work “*Design noir: the secret life of electronic objects*”, (Spiller 2002). The duo works with a socio-cultural context where the objects quality enhances by the relation between itself and the beholder. This also occurs in fashion where the designers Helen Storey’s project “*Say Goodbye*” questioning the fashion industry’s ideals of fast fashion by using biodegradable material on clothing that disappears in contact with water, (Teunissen 2014).

This is a design approach that the professor of sustainable development Jackson (2011) talks about, and supports, in the article “*Societal transformation for a sustainable economy*”. It mainly expresses a need to re-define needs and expectation in how we see goods and products, both the economical and ethical values. Which also means a need to incorporate this in the aesthetic development in the textile design field where one approach could be by starting with conscious material choices.

2.2 Motive and idea discussion

This project has emerged from the mindset that design is and will always be a tool for designers to understand, discuss and reflect upon the world but also an opportunity to be inspired to execute concrete changes in our society by starting in their own design field. The conceptual design duo Dunne & Raby (Spiller, 2002), open up relevant discussions in both a socio-cultural, consumption reflective and textile development context. Meanwhile the work of the Swedish textile designer Lundin (2014) advocates a concrete design method that execute a more palpable hands-on change with an ethical perspective.

This project will combine textile design and ethical values in a “*Textethical design method*” to work as a tool to both find alternative expressions and sustainable contribution within the textile design field.

The function of the method is to personalize it with your own ethical values, where I choose to work from a “*diversity perspective*” which becomes the foundation of my own design project. Here are ethics and aesthetics decisions intertwined not apart, as designer and materialologist Lee (2015) suggests. The textethical design method central point are that the user infuses their own ethical values into their design work. My personal ethical values that have been used in this project are based on a diversity perspective and focus on textile materials. This consists of openness and consciousness in material choices that wish to expand the view of quality in relation to textile material. Where the guiding lines are that all material will have equal consideration based to their own unique properties. The material will be non-toxic, biodegradable and be able to be produced in Sweden. Where also all material from animal origin is excluded. Those frames have been set to work against the society Grotuis (2012) describes and that Dunayer (2006) explains the consequences of. Consequences that are visible in the textile design field by the unreflective way material from animals are used where animal are looked upon as a product for humans needs and that they do not exist for their own purpose. By using my diversity perspective my project can work against this hierarchy system that are also visible in the preconceived notions of what presumptions of natural and manufactured fibres. And therefore combine materials that usually are not combining whit each other to create possibilities to alternative expressions. To the benefit this approach the craftsmanship method as Hicks (2006) uses will be applied, which means to connecting and evolving the expression through knowledge between the material selections, production and aesthetics.

This project places itself in-between the fashion designer Storey (Teunissen, 2014) whom starts critical social discussions and the designer and materialologist Lee (2015) whom work with concrete solutions to improve the unsustainable way materials are used within the design field. Where the focus lays in conscious material choices and the relation between material, manufacturing and aesthetics, with its foundation in ethical values such as in Lee (2015) and Jackson (2011) work. The textile techniques that will be used are plant dyeing on a multiplied layered weaved surface to investigate depth through colour and three-dimensional shape. Where the wish is to find plant dyes that have equal strength in colours as the artificial made pigment. This work explores the expressive potential of plant dyeing techniques in relation to weaving by proposing a method in regard to non-toxic containment, biodegradable materials, ethical values and where all material from animals are excluded.

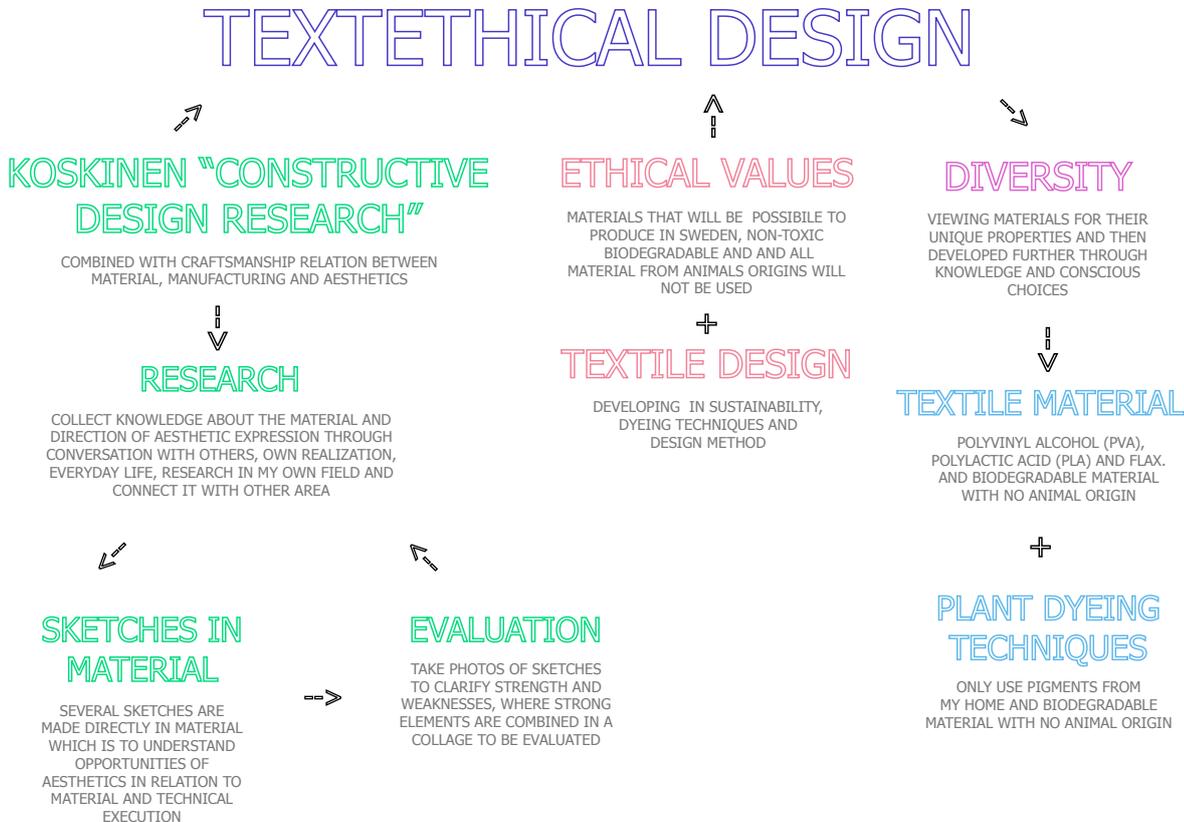
2.3 Aim

The work aims to explore the expressive potential of plant dyeing techniques in the field of textile design, by proposing a method based non-toxic containment, biodegradable materials and alternative ethical values.

3 Method & development

3.1 Design method & design experiments

The textethical design method has its general base in the professor in design research and methodology Koskinen (2011) “*constructive design research*” which integrated design and research. Here is knowledge gained through practical development and consequences during the sketching process. The focus lies in creating an item and this indirectly means constructing knowledge. This is a similar method used in craftsmanship as textile artist Hicks (2006) shows in her project “*Weaving as a metaphore*” whom combine construction, aesthetics and alternative material. Which is shown by using unconventional material choices in combination with weaving that creates possibilities in creating artistic experimental expressions. What the textethical design method adding is the users infuses their own ethical values in their design process, where my work is based on a diversity perspective. In graph 1 the general method have colored text and personal interpretations are grey. The textethical desgin method consists of three steps with the same destination as constructive design research. These three are research, sketches in material and evaluation and then continued in these three steps. This have been developed further to strengthen my diversity perspective. Which implies that the research includes collect knowledge about the material and direction of aesthetic expression through conversation with others, own realization, everyday life, research in the textile design field and connect it with other areas. To understand possibilities of the aesthetic expression



Graph 1, Textethical design method where the colored text are general guide lines and grey text are personal values applied in the method

several sketches in the material are made to understand how it react in different circumstances in relation between material, manufacturing and expression. In evaluation photos are taken of the sketches to clarify strengths and weaknesses, where strong elements are combined in a collage to understand what should be developed further. To promote development three selections will be made during key occasions of the design process. In creating of three-dimensional structure the PhD student De Miguel's (2014) in artificial intelligence applied to urban environments method in "Fluid cast" is used. This method links together the material and the aesthetic expression by not using molds to create shapes. Instead it let the shape take the form it wishes to have by let the relation between the material and the liquid bath it have been immersed in create the form.

3.2 Development

Textile material

The textile material polyvinyl alcohol (PVA), polylactic acid (PLA) and flax where chosen after a research based on a diversity perspective where made in my the pre-studies. These three are chosen due to their biodegradable properties. The PVA were elected due for its possibilities to obtain color pigment that usually do not attach to textile material and also for its possibilities to create three-dimensional shape. PVA is a material that is spun into a thread and starts to dissolve immediately in contact with hot water. Colder temperatures slow down the process and the beneficial middle stage can be preserved as a way to attach colour pigments and create three-dimensional shapes, see figure 1. Spun PLA thread reacts to ambient



Figure 1, three-dimensional hand weaved shape created during pre-study with material polyvinyl alcohol (PVA), mono-filament and viscose bast fibers

temperatures and decay during longer time, it has also a shimmering appearance and colour pigment do not easy attach to the fibre. Flax is a steady fibre that is beneficial in creating three-dimensional shape. It is also historically a fibre that have been cultivated and used in creating of textiles in Sweden since medieval times due to the climate.

In the beginning of the pre-study the understanding that PVA and PLA are not able to contain colour pigment in a regular dyeing process where gained. But also that PVA cannot hold a three-dimensional shape without toxic containment. During the project the realization came that PVA contains colour pigments in its melted middle stage, both by itself and in combination with other textile fibres such as PLA. To investigate these possibilities further the diversity perspective where used to se material for their unique properties and how they could be combined to create color pigment in relation to weave. Which started a view on plant dye pigments in an untraditional way that they could be anything that has a visible colour in itself due to the PVA materials properties to obtain pigment, such as red cabbage color baths in figure 2. An investigation where made where PVA where combined with weaving which shows that with help of the weaves weft and warp system three-dimensional shapes and fixate colour pigment could be made without additional toxic substance. The PVA material got an important aesthetic role both in container pigment and creates three-dimensional shapes. The PLA works reflects light and create an effect of shine due to its incapability to attract colour pigment. The flax is an important part in creating the skeleton and shape for the three-dimensional structures.



Figure 2, colour pigment red cabbage, oven dried and crushed into pigment. From left with citric acid, nothing added, with bicarbonate

Plant dyeing

The colour pigment that is used will come from my own home such as Lundin (2014) worked in her project. Where the wish is to find plant dyes that have equal strength in colours as the artificial made pigment. The colour pigments that were used are based on diversity perspective where turmeric, spirulina algae, blueberries, red cabbage and black currant juice, figure 3.

The work started to create a color circle and through that find possibilities to mix new colors. During experiments knowledge were gained that by changing the pH value in the water with citric acid, apple cider vinegar or bicarbonate blueberries and red cabbage created different colors, such as in figure 2. This gave the project another direction where the traditional color circle were excluded for the possibilities for only using one pigment and gain multiplied colours instead. This decision were also based on that the cabbage created strong colors that are uncharacteristic for the earth tones that plant dyeing often are associated with.

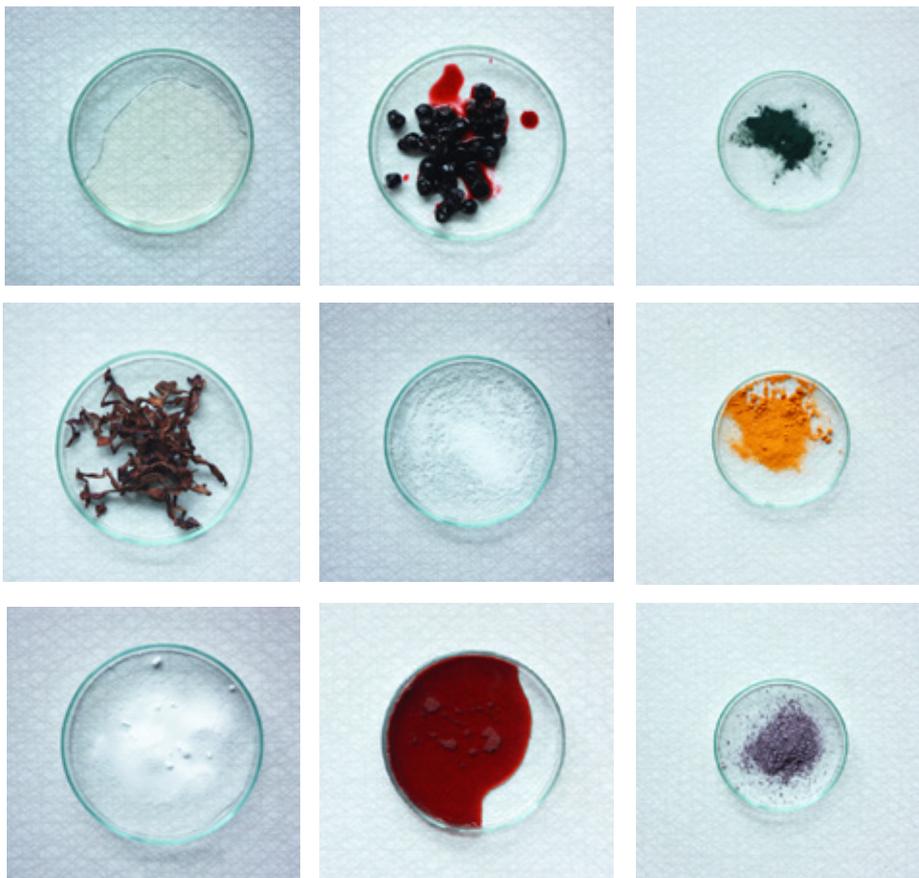


Figure 3, top row left; apple cider vinegar, blueberries, spirulina algae, second row from left; burnt-dried red cabbage, citric acid, turmeric, third row from left: baking soda, black currant juice, pigments from not burnt red cabbage

During the pre-study different dyeing techniques were used, figure 4, and those three that will continue to investigate is colour pigment paste on fabric, 2 hours in hot water with sea salt and 24 hours in cold water with sea salt. This created a dyed fabric samples library of over a hundred samples. In this samples both bleached and unbleached flax were used due to get a clearer picture of how the pigment fasten on a white surface. However bleached flax were removed due to the extra steps it needed to bleach the fibre. This dyed textile samples will be documented by photographs now and a year from now in the same studio, with the same equipment to see how the colours changes during time, annex 1.

Weaving

The weave bindings that is selected are weaves in multiplied layers of the reason for their ability to maintain colour pigments (in relation to PVA, PLA and flax), three-dimensional shape, creating an aesthetically investigation in depth through colour and weaves, figure 4. Knowledge that have been gained during the pre-study. The shaft weave machine with unbleached flax warp is used with eight shafts. Where experiments have been made in two and four weave layers with pockets based on a plain weave. It were also tried to mimic a weave by using two single jersey knit fabrics and sewing them together in a square pattern to get the warp and weft effect to create three-dimensional shapes. Single jersey knit fabrics was deselected during the process to instead focus on incorporated more PVA in a weaved structure to contain colour pigment, which where made by using four layers. Where the weft is PVA in layer one, layer two is PVA and PLA, layer three PVA and PLA and layer four PVA.



Figure 4, pre-study in shape and dyeing techniques where different dyeing methods tested and possibilities to create shape

Textethical design method with an diversity perspective

This textethical design method combine textile design and ethical values and therefore them both shape the aesthetic expression. Main textile technique that is plant dyeing that will be applied on a woven textile. Three dyeing methods will be used and they are paste on, 2 hours in hot water with sea salt and 24 hours in cold water with sea salt, graph 2. The weave bindings that is selected are weaves in multiplied layers of the reason for their ability to maintain colour pigments (in relation to PVA, PLA and flax), three-dimensional shape, creating an aesthetically investigation in depth through colour and weaves. The material that will be used are non-toxic, biodegradable and with no animal origins. This limitations where made to enable a more thorough research. During the project three selections are made in order to evaluate and take the work forward. Selections that are visible in graph 2 and also explained further with key photos and text.

First selection

Colour pigment were chosen in my apartment to create a colour circle. During dyeing it where shown that multiply colors can be created by changing pH value. Which worked with the pigments blueberries and red cabbage, figure 5. PVA also absorb color pigment in a fragile expression with strong colors that is commonly not associated with plant dyeing.

Different double weaves were created, where floats where used to create depth with multiplied layered weaved surface to see how colors and three-dimensional shape can enhance it. The warp is unbleached flax



Figure 5, red cabbage from left oven dried och crushed into colour pigment

METHOD	FIRST SELECTION	SECOND SELECTION	THIRD SELECTION
PASTE ON	X	X	
2 HOURS IN HOT WATER	X		
24 HOURS IN COLD WATER	X	X	
PASTE ON + EXPERIMENTAL			X

COLOR PIGMENT	FIRST SELECTION	SECOND SELECTION	THIRD SELECTION
BLACK CURRANT JUICE	X		
BLACK CURRANT JUICE + BICARBONATE	X		
BLACK CURRANT JUICE + APPLE CIDER VINEGAR	X		
BLUEBERRIES	X	X	
BLUEBERRIES + BICARBONATE	X	X	
BLUEBERRIES + APPLE CIDER VINEGAR	X	CITRIC ACID INSTEAD	
RED CABBAGE, NOT BURNT	X	X	X
RED CABBAGE, NOT BURNT + BICARBONATE	X	X	X
RED CABBAGE, NOT BURNT + APPLE CIDER VINEGAR	X	CITRIC ACID INSTEAD	X
RED CABBAGE, BURNT	X		
RED CABBAGE, BURNT + BICARBONATE	X		
RED CABBAGE, BURNT + APPLE CIDER VINEGAR	X		
SPIRULINA ALGAE	X		
TURMERIC	X		

Graph 2, method and colour pigment selections. Three dyeing methods will be used where the wish is to find plant dyes that have equal strength in colours as the artificial made pigment.

and weft PVA and PLA. The PVA changes the materials appearance when in contact with water. If the fabric only briefly comes in contact with water the appearance of the material will be maintained until it comes in contact with water again. If it is dyed in several hours the PVA disappears so instead of a structural effect it instead creates lesser weft threads with loops in warp direction, figure 6. Something that also be done by changed settings on the weaving machine, so the effect did not feel relevant. The weave where exposed to water so the weave and the liquid together could create the textiles shape. During tryouts the realization came that the result became to flat with nor the depth or three-dimensionality that were pursued. This lead to that the woven test pieces should be made in a bigger scale and enlarge the pockets to see if it creates a better shape.

It were experimented to combine weave structure, dyeing techniques and PVA single knit jersey fabric. The softness of the colors from the knitted fabric with the combination of the visible weave created an textile feeling, but it is lacking three-dimensionality, figure 6.



Figure 6, top line from left rep weave before dyed, rep weave and single knit jersey dyed with red cabbage and bicarbonate, rep weave with red cabbage, bicarbonate, apple cider vinegar. Bottom line from left double weave not in contact with water and after briefly contact with water, double weave with colour pigment blueberries in cold water for 24 hours.

Second selection

The method paste on fabric suited best on PVA and PLA, thereby it were chosen to continue with. Also method 24 hours in cold water with sea salt where chosen du to it worked best on flax. The PLA properties that it do not attach to colour pigment creates an shining effect in the fabric. The ultimate method for colour pigment not burne red cabbage, now referred as red cabbage, the method cold water with sea salt but in a shorter time in water. Only contact with water started the dyeing process and the pigment sank into the fibre. The method 24 hours in cold water with sea salt worked best color pigment blueberry on flax.

Colour pigment that is used to continue with is red cabbage and blueberries, figure 7. Due to possibilities to extract different colours through changing pH value. Also apple cider vinegar where exchanged to citric acid due to the clear colours it presented which where similar to artificial pigment. Which both finding are aesthetically interesting, both the hue that is more related to artificial dyeing and possibilities to grade same pigments into each other. Noticed that bicarbonate made the fabric more sensitive to that the color disappears if it takes to long to dry or if it is paste on wet fabric. To use it you need to mix it carefully with the color pigment and water. Citric acid you could both ad after and before. In water it do not get so intense pink, but if you ad it on wet fabric it becomes pink in an instance.



Figure 7, from upper left red cabbage with paste on method, purple no added, green bicarbonate and pink citric acid. Down left 24 hours in cold water with blueberries with no added, bicarbonate and citric acid. Figure to left red cabbage on PVA

Knitted fabrics are removed to make a more thorough investigation in developing depth with weave. By only using one technique make its possible to reach a higher development but also because the weave supports best to wish to create depth and three-dimensional shape. The two layer double weave needs bigger pockets to ad more PVA to contain color pigment better. The strength with the blue textile is its structure that it is three-dimensional, but lacking expression. The pink textiles strength are its strong detailed expression and weakness is its flatness and lack of three-dimensionality. Therefore these two will be worked further with, figure 8. In the development of the weave the three-dimensional structure where not achieved by going up in scale. So the working method to create shape in weave will be reviewed and changes will be made.



Figure 8, top two layer double dyed with red cabbage and bicarbonate and with paste on method, bottom rep weave and red cabbage with citric acid inside knitted PVA.

Third selection

The dyeing technique method to continue to work with is paste on and experimental where water is stroked on fabric by hand to get a more controlled amount of water but in combination with paste on color pigment method. Due to this is the best way to preserve the strong colour expression from red cabbage and are also the reason that colour pigment red cabbage are choosed to work further with.

During the closely work with the material the understanding came from my documented pictures that it is two ways to work with colors. The first one is to enhance the current colors of the textile material by plant dyeing techniques to show depth, structure and transparency. Where the colors pink and purple in combination with the materials colors strengthened this expression. The second is to focus on the plant dyeing pigments and create depth and shape. Where intense blue and green colors with details of pink



Figure 9 experimental method with color pigment red cabbage

where best suited. The common expression where the feeling of a stop motion frame of the vivid and fragile movement of a sudden wind passing by, figure 9. Experiments were made to developed the weave moulding techniques. Early me as a designer only had influence of the shape during the selection of material and weave bindings. When it came to adding water to the fabric and the changes it created I did not interfered with. But during the previously selections the realization came that the “*Fluid cast*” moulding technique needed to be interpreted into a weave textile context to be used successfully. So I started to insert objects into the woven pockets to create shapes, figure 10.

In this way three-dimensional shape could be created instead of my early tryouts which where the shape itself was not three-dimensional and only became three-dimensional when they where shaped around something else. Shape wehere now developed by only using water and a moulding techniques with plastic to create a more flexible and organic vivid wind expression, figure 11. And also to enable colors to be used to enhance the structure and depth of the weave. The weave that were created where in four layer where the layer 1 and 4 is PVA and layer 2 and 3 are both PVA and PLA, se annex 2.



Figure 10, shape created through moulding



Figure 11 to left stages in molding technique before and after fabric are inserted with plastic to create shapes

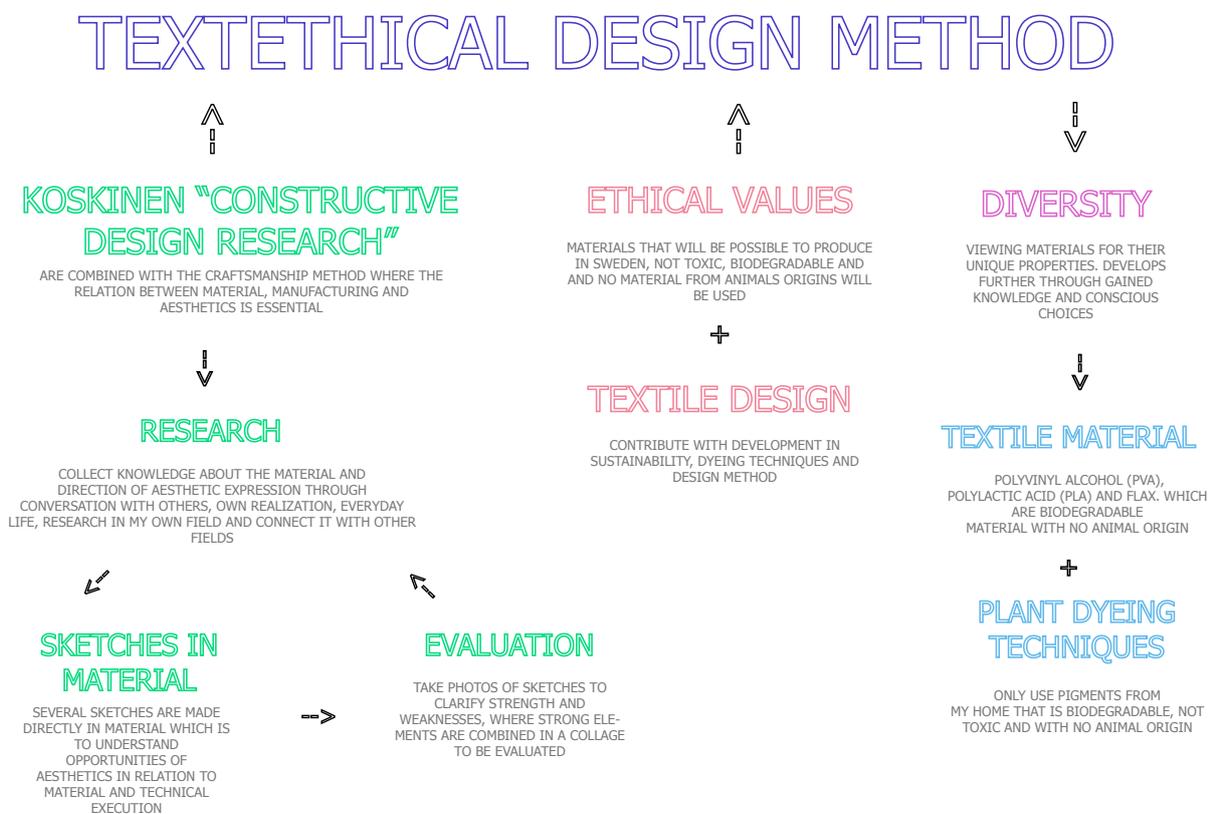
4 Result, presentation, conclusions & discussion

4.1 Result

The result are shown in three levels that are linked together. Where the foundation lies in the development of the textethical design method and how it is implemented in the plant dyeing research in how to create colors that are uncharacteristic for that textile area. This knowledge are then applied and further developed in two different textile examples where plant dyeing are used on a multiplied layer woven surface to investigate depth through colour and three-dimensional shape.

Textethical design method

The general textethical design method were created and used as a tool to bring my ethical values together with the aesthetics expression, graph 1. Because the purpose with the textethical design method is for the user to add their own ethical values in result of their design work. My work where based on the ethical values that had its foundation in a diversity perspective. The general design method wishes the user to bring together material, production and aesthetics. This by making conscious choices based on knowledge



Graph 1, Result design method. Textethical design method where the colored text are general guide lines and grey text are personal values applied in the method

that has been gained through exploring the relation between those steps in interactive sketches. Where a further development on the moulding technique were made to make it possible to shape the weave three-dimensionally. My ethical values are based on an diversity perspective where material are viewed for their unique properties and qualities and developed further through knowledge and conscious choices. Materials that are used needed to be possible to produce in Sweden, non-toxic, biodegradable and all material from animal origin are excluded.

Plant dyed color samples

Instead of create the traditional color circle the choice where made to instead work further with the different color possibilities one color pigment could give by changing the waters pH value. This due to that cabbage created strong colors that are uncharacteristic for the earth tones that plant dyeing often are associated with, figure 12. But also that those colors where able to create because of of the combination of color pigment and textile material PVA, PLA and flax. Red cabbage ambient color is purple but can also create the colors blue and green when bicarbonate is added and pink with citric acid. The bicarbonate needs to get stirred carefully in water otherwise the color pigment applied on textiles disappear, it is also needed to dry rapidly otherwise the color also vanish. The citric acid are a good at attach color and are not sensitive to long drying process or if it is not thoroughly blended. Instead it is advantage that citric acid can be applied on the textile material afterwards when the material is wet.

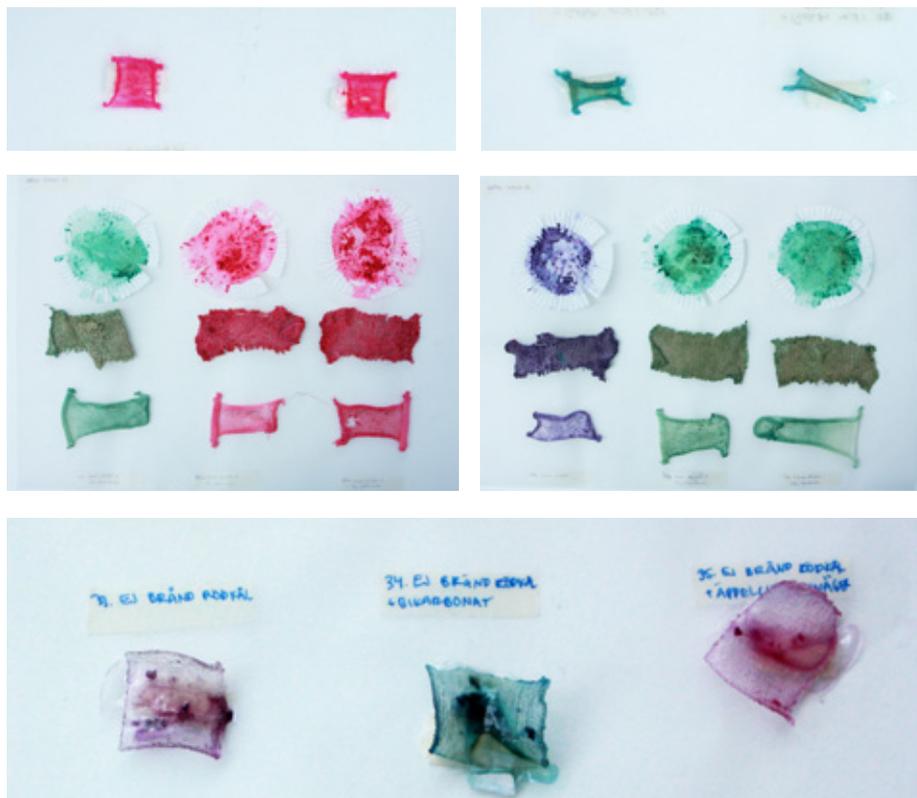


Figure 12, **Result plant dyed color samples.** Colored fabric samples with color pigment from red cabbage on textile the materials polyvinyl alcohol (PVA), polylactic acid (PLA) and flax.

Textile examples

The textile techniques that have been used are plant dyeing on a multiplied layered weaved surface to investigate depth through colour and three-dimensional shape figure 13. Where the wish is to find plant dyes that have equal strength in colours as the artificial made pigment. This work explores the expressive potential of plant dyeing techniques in relation to weaving by proposing a method in regard to non-toxic containment, biodegradable materials and ethical values where two textile examples were created. The first focus on the color of the textile material in combination with plant dyeing techniques to reach depth, structure, transparency and shape. The second one focus on plant dyeing technique in the center to create depth and shape. The common expression where the feeling of a stop motion frame of the vivid and fragile movement of a sudden wind passing by.



Figure 13, Result textile example depth through color. To left focus on the color of the textile material in combination with plant dyeing techniques to reach depth, structure, transparency and shape. To right focus on plant dyeing, depth and shape.

4.2 Presentation

The presentation consist of showing a textethical design method, plant dyed fabric samples, two textile examples and a poster that explains how the pigment from red cabbage where obtained figure 15. They wish to show the expressive potential of plant dyeing techniques in the field of textile design, by proposing a method based non-toxic containment, biodegradable materials and alternative ethical values. A textethical design method that encourage other designers to add their own ethical values and then create their own perspective to build their work upon.

This will be shown on an exhibition where key element of the process will be shown in a process movie “*Dyeing Diversity*” (2015), selected plant dyed fabric samples will be hung up with a chart of the design method, figure 14. The color pigment that will be shown are red cabbage, in dried and in powder and also dyed color baths of the pigments. To connect those together the two textile examples will also be shown and sketches that support the design process.



Figure 14 the exhibition

färgpigment: rödkål

color pigment: red cabbage



Figure 15 informative poster about how to obtain color pigment from red cabbage

4.3 Conclusion & discussion

The artistic development was beneficial to my textile expression due to the alternative tools that were created from the “*textethical design method*” that took its general inspiration from Koskinen (2011) method “*constructive design research*”. The development of text ethical design method have had its focus in being a tool for me to combine my ethical values and aesthetic expression in my design work. This means that this method can be further developed in its general stage and that also can include other design fields.

My own ethical values were interpreted in the method in an “*diversity perspective*” and strengthens the aesthetics. This because it had evolved through collected knowledge in choice of material, development of plant dye techniques and shaft weave. This is in a similar way as textile artist Hicks (2006) relate to her work in a craftsmanship way where the relation between material, textile technique and aesthetics are important for the expression. The diversity perspective created also an alternative way in finding different colour pigment hues from the same source, such as in red cabbage, by changing the pH value. This colour pigment were also uncharacteristic for plant dyeing and more commonly connected to synthetic dyeing techniques and were able to attach to the textile material due to research about the fibers PVA, PLA and flax. The weave where the color pigment were added where in four layers, with top and bottom layer consist of mainly PVA to encapsulate colour pigment. The different layers also enable to create three-dimensional structures, contain color pigment and thereby contributes to creating the aesthetic expression. Which means that parts of the fabric were exposed to water in various amount both the shape and three-dimensional structure that creates depth by the relation of distance and the different colours. During the designprocess the realisation came that De Miguel (2014) method of shaping structures needed to be developed further to be suited for textile parameters. This due to textile material that where developed had so many different component such as weave binding, finishing techniques, material and in which amount the different material where used. This method to create a moulding technique for weave textile material could be developed further and by doing that deepen in the aesthetic expression the relation between color, shape and three-dimensionality.

In a sustainability perspective using water in dyeing techniques always is problematic when it is a limited resource. Where the down side is that changed pH value in the natural habitat can in a big scale cause acidification. The benefit with my project are that less water than usually are used and it need not to be clean drinking water. The color pigments where chosed in a diversity perspective which is its strength due to earth’s resources are limited and it is a way to mimic how nature itself recover from changes in its enviroment. If color pigments where only used from one specific group it would lead to an unbalanced nature. It is also complicated to only use pigments to dye with that are eatable and farmed on land because to reach the diversity perspective they would be collect both from the ocean because three quarters of earth are ocean and it is possible to farm in different sea levels and grow material from bacteria which is more an infintive resource. A limitation to only work with edible pigments were made to deepen the investigation but I am aware in an ethical perspective on the complexity that the limitation brings. This two areas, ocean and growing bacteria, are colour pigments that is wished to gain more expertise with further research.

Reflections that have been made in conversation with others during the development of my work is that textile material are generally interpreted through its quality and the quality is interpreted to personal taste in what a textile is. Where quality or taste are seldom discussed nor questioned in an ethical perspective, something that designer and materialogist Lee (2015) inquire for in the design fields by designers connecting development of material with theend creation and ethical values. Something that should not be forgotten and also appreciated is that personal taste is also the foundation of a designers work, it is

how we both consciously and initiative made decisions that shape our aesthetic expression. What a diversity perspective wishes to do is questioning and challenging your expression by encouraging you to make conscious choices that challenge and develop your expression instead of being limited by it.

This notion of personal taste is also based on how we talk about textiles, such as when the experienced textile artist Lundin (2014) make a contradictory statement about sustainability in the field. She claims cotton is not a sustainable textile fibre and it is instead preferable to use natural fibres such as silk, flax and wool. When someone who are familiar within the area know that cotton is also a natural fibre and the problematic about that material is the need for water and toxins during production. But a person not versed in the subject falls into ignorance and receive misleading information that praise natural fibres, which flows into that assumption that natural fibres are preferable without knowing which is and which is not a natural fibre and creates and confusion in conscious material choices. Although manufactured materials such as PLA and PVA are possible to degrade in nature. But the hybrid lyocell which is manufactured from cellulose, which is classified as a natural fibre, are more sustainable in its production than natural material.

The measurement of quality in a textile in my diversity perspective is open to more variables than its high resistance over time or in presumptions that “*natural*” fibres often are more highly valued than the manufactured. Its offer an openness to how material are viewed to see possibilities to find alternative expressions in textile material that is both changeable and have a shorter lifespan, all depending on expression and need. Which values this textethical working method consists of depends on how the person who use it wishes the world to look like and chooses not to be limited by the present. My interpretation of the method is consciousness through knowledge by combining aesthetics, production and textile material in an ethical view that taking into account diversity mindset that do not use material from animal origin, a further development of animal rights advocate Dunayer (2004) mindset. It strives to contribute with sustainability approach through a diversity mindset in the textile material, develop plant dyeing techniques, design method that combine textile design and ethical values. The importance lays in, what professor of sustainable development Jackson (2011) have discussed, that creators make personal intentional choices based in how the create things, consume and recycle based on their own ethical values. Where the importance is to design after conscious choices and knowledge, because to understand the world is one tool to strive for the changes you wish to see within it. Create what you want to see in the world.

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6. Annexes

Annex 1

Material library of plant dyed textile samples

Photos taken 2015-06-09



Light meter: 11.4

Flash: 5

Textile sample placement: left corner with 10,5 cm in bottom and left corner

Photo editing adjustments: information in RAW files

Colored fabric samples and umbrella: stored together in a box in the basement and opened again in a year during the next shooting

White foam board: standard size, buy new at next photo shoot

Color recipes

Color pigment

- *Black currant juice* - liquid form
- *Blueberries* - crushing the entire berry
- *Blueberries powder* - blueberries was dried in the oven at 40 degrees for 24 hours and crushed to powder
- *Not burned red cabbage* - red cabbage was cut into smaller pieces, dried in the oven at 40 degrees for 24 hours and crushed to powder
- *Burned red cabbage* - red cabbage was cut into smaller pieces, dried in the oven at 150 degrees for 45 minutes and crushed to powder
- *Spirulina alga* - powder
- *Turmeric* - powder

Changes of pH value

- *bicarbonate* - powder
- *apple cider vinegar* - liquid form
- *citric acid* - powder

Material weight

PVA: 1,8 g

FLAX: 0,8 g

PLA: 0,4 g

Paste on method

11 march 2015

1. 1 teaspoon blueberries + 1 ml bicarbonate + 1 teaspoon cold water
2. 1 teaspoon blueberries + ½ teaspoon apple cider vinegar + 1 teaspoon cold water
3. 1 ml spirulina + 1 ml recipe 2 + 2 ml cold water
4. 1 ml turmeric + ½ teaspoon recipe 1 + ½ teaspoon cold water
5. 1 ml turmeric + 1 teaspoon cold water
6. ½ ml spirulina + ½ ml bicarbonate + 2 teaspoon cold water
7. ½ ml spirulina + ½ ml apple cider vinegar + 2 teaspoon cold water
8. ¼ ml not burned red cabbage + 2 teaspoon cold water
9. ¼ ml not burned red cabbage + ¼ ml bicarbonate + 2 teaspoon cold water
10. ¼ ml not burned red cabbage + ¼ ml apple cider vinegar + 2 teaspoon cold water
11. ¼ ml burned red cabbage + 2 teaspoon cold water
12. ¼ ml burned red cabbage + ¼ ml bicarbonate + 2 teaspoon cold water
13. ¼ ml burned red cabbage + ¼ ml apple cider vinegar + 2 teaspoon cold water

24 march 2015

64. 2 teaspoon blueberries
65. 1 ml black currant juice + 2 teaspoon cold water
66. 1 ml black currant juice + 2 teaspoon cold water + 1 ml bicarbonate

67. 1 ml black currant juice + 2 teaspoon cold water + 1 ml apple cider vinegar
68. ½ ml spirulina + 2 teaspoon cold water

8 april 2015

98. 1 ml blueberrie powder + 0,4 g bicarbonat + 10 ml cold water
99. 1 ml blueberrie powder + 0,8 g bicarbonat + 10 ml cold water
100. 1 ml blueberrie powder + 1,2 g bicarbonat + 10 ml cold water
102. 1 ml blueberrie powder + 0,4 g bicarbonat + 10 ml cold water
103. 1 ml not burned red cabbage + 10 ml cold water
104. 1 ml not burned red cabbage + 2 g citric acid + 10 ml cold water
105. 1 ml not burned red cabbage + 3 g citric acid + 10 ml cold water
107. 1 ml blueberrie powder + 10 ml cold water
108. 1 ml blueberrie powder + 0,4 g citric acid + 10 ml cold water
109. 1 ml blueberrie powder + 1 g citric acid + 10 ml cold water
110. 1 ml blueberrie powder + 4 g citric acid + 10 ml cold water

Hot water in 2 hours

14 march 2015

Basic recipe

Borås pH value: 6

3 g PVA, PLA, flax fabric

10 cl boiling water

3 ml sea salt

14. 1 ml tumeric, pH value 5
15. ½ ml spirulina, pH value 6
16. 1 teaspoon black currant juice, pH value 3
17. 1 teaspoon black currant juice + 1 ml bicarbonate, pH 8
18. 1 teaspoon black currant juice + 1 ml apple cider vinegar, pH 3
19. ½ ml not burned red cabbage, pH 6
20. ½ ml not burned red cabbage + 1 ml bicarbonate, pH 8
21. ½ ml not burned red cabbage + 1 ml apple cider vinegar, pH 4
22. ½ ml burned red cabbage, pH 6
23. ½ ml burned red cabbage + 1 ml bicarbonate, pH 8
24. ½ ml burned red cabbage + 1 ml apple cider vinegar, pH 4
25. 2 teaspoon blueberries, pH 4
26. 2 teaspoon blueberries + 1 ml bicarbonate, pH 7
27. 2 teaspoon blueberries + 1 ml apple cider vinegar, pH 4

2 hours in cold water

15 march 2015

Basic recipe

10 cl cold water

1,8 g PVA fabric

1 ml sea salt

28. 1 ml tumeric
29. 1 ml spirulina
30. 1 ml black currant juice
31. 1 ml black currant juice + ½ ml bicarbonate
32. 1 ml black currant juice + 1 ml apple cider vinegar
33. ½ ml not burned red cabbage
34. ½ ml not burned red cabbage + ½ ml bicarbonate
35. ½ ml not burned red cabbage + ½ ml apple cider vinegar
36. ½ ml burned red cabbage
37. ½ ml burned red cabbage + ½ ml bicarbonate
38. ½ ml burned red cabbage + ½ ml apple cider vinegar
39. 1 teaspoon blueberries
40. 1 teaspoon blueberries + ½ ml bicarbonate
41. 1 teaspoon blueberries ½ ml apple cider vinegar
42. 35 + 36
43. 40 + 41

24 hours in cold water

15 march 2015

Basic recipe

20 cl cold water

1,2 g PLA and flax fabric

2 ml sea salt

44. Same recipe as 14
45. Same recipe as 15
46. Same recipe as 16
47. Same recipe as 17
48. Same recipe as 18
49. Same recipe as 19
50. Same recipe as 20
51. Same recipe as 21
52. Same recipe as 22
53. Same recipe as 23
54. Same recipe as 24
55. Same recipe as 25
56. Same recipe as 26
57. Same recipe as 27

8 april 2015

Basic recipe

20 cl cold water

3 g PVA, PLA and flax fabric

1 ml sea salt

- 76. 1 ml not burned red cabagge + 0,4 g bicarbonate
- 77. 1 ml not burned red cabagge + 0,8 g bicarbonate
- 78. 1 ml not burned red cabagge + 1,2 g bicarbonate
- 79. 1 ml not burned red cabagge + 1,6 g bicarbonate
- 80. 1 ml not burned red cabagge + 0,4 g apple cider vinegar
- 81. 1 ml not burned red cabagge + 0,8 g apple cider vinegar
- 82. 1 ml not burned red cabagge + 1,2 g apple cider vinegar
- 83. 1 ml not burned red cabagge + 1,6 g apple cider vinegar
- 84. 1 ml not burned red cabagge
- 85. With blueberries otherwise the same recipe as 76
- 86. With blueberries otherwise the same recipe as 77
- 87. With blueberries otherwise the same recipe as 78
- 88. With blueberries otherwise the same recipe as 79
- 89. With blueberries otherwise the same recipe as 80
- 90. With blueberries otherwise the same recipe as 81
- 91. With blueberries otherwise the same recipe as 82
- 92. With blueberries otherwise the same recipe as 83
- 93. With blueberries otherwise the same recipe as 84

8 april 2015

Basic recipe

140 ml cold water

1,7 g fabric

1 ml sea salt

- 94. 1 ml not burned red cabagge + 0,2 g citric acid
- 95. 1 ml not burned red cabagge + 0,5 g citric acid
- 96. 1 ml not burned red cabagge + 0,8 g citric acid
- 97. 1 ml not burned red cabagge + 1 g citric acid
- 116. 1 ml red cabbage +4 g bicarbonate
- 117. 1 ml red cabbage +6 g bicarbonate
- 118. 1 ml red cabbage +12 g bicarbonate
- 119. 1 ml red cabbage +4 g citric acid
- 120. 1 ml red cabbage +6 g citric acid
- 121. 1 ml red cabbage +8 g citric acid



Recipe 1, 26, 56 blueberries + bicarbonate



Recipe 2, 27, 57 blueberries + apple cider vinegar



Recipe 5, 14, 44 turmeric



Recipe 6, 7 spirulina



Recipe 8, 19, 4 + not burned red cabbage



Recipe 9, 20, 50 not burned red cabbage + bicarbonate



Recipe 10, 21, 51 not burned red cabbage + apple cider vinegar



Recipe 11, 22, 52 + burned red cabbage



Recipe 12, 23, 53 + burned red cabbage + bicarbonate



Recipe 13, 24, 54 + burned red cabbage + apple cider vinegar



Recipe 64, 25, 55 blueberries



Recipe 65, 16, 46 black currant juice



Recipe 66, 17, 47 black currant juice + bicarbonate



Recipe 67, 18, 48 black currant juice + apple cider vinegar



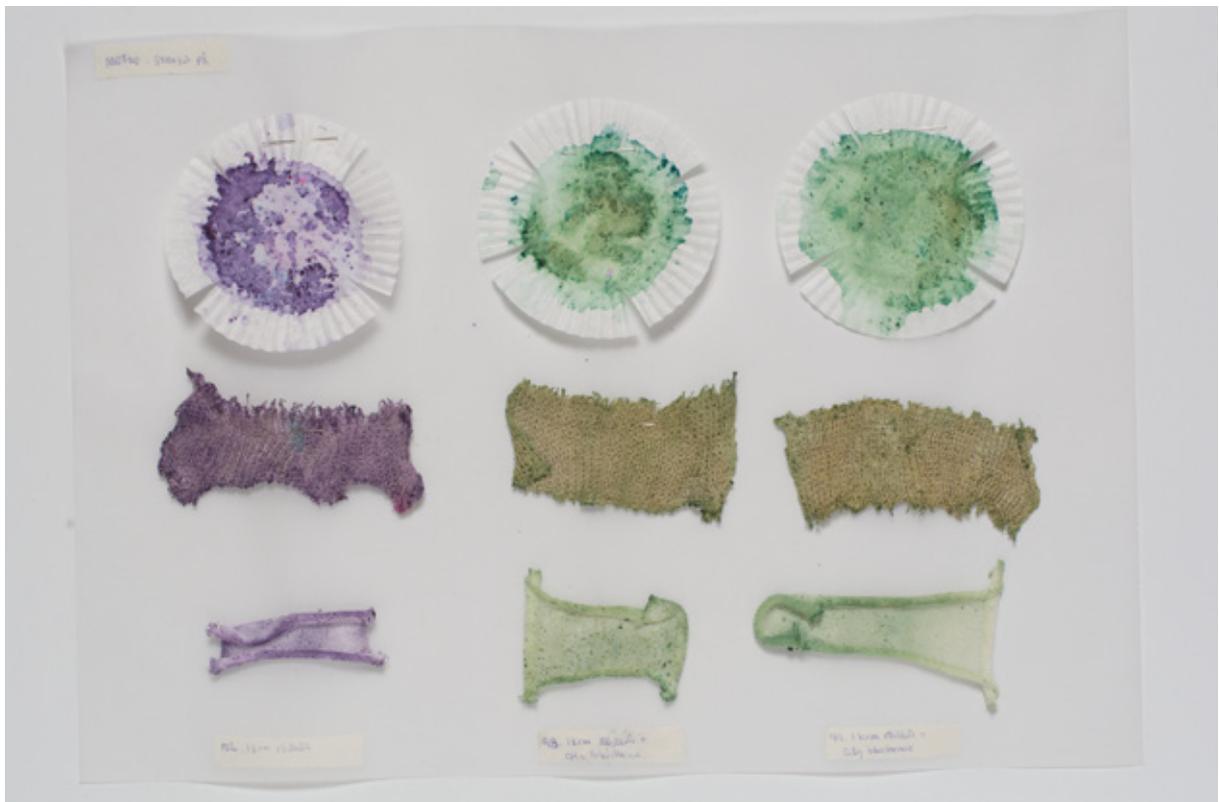
Recipe 68, 15, 45 spirulina



Recipe 1+2, 3+2, 1+2



Recipe 29, 28, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43 only on PVA fabric



Recipe 102, 98, 99 not burned red cabbage



Recipe 100, 103, 104 not burned red cabbage



Recipe 105, 107, 108 not burned red cabbage and blueberries



Recipe 111, 112, 115 blueberries



Blue color: blueberries with bicarbonate, red color: blueberries with citric acid



Recipe 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91 fabric PVA with not burned red cabbage and blueberries



Recipe 92, 93, 94, 95, 96, 97, 116, 117, 118, 119, 120, 121 fabric PVA with not burned red cabbage



Recipe 76, 77, 78, 79, 80, 81 not burned red cabbage



Blueberries and red cabbage



Recipe 94, 95, 96, 97 not burned red cabbage



Recipe 88, 89, 90, 91, 92, 93 blueberries

Annex 2

Four layer shaft weave binding

MATERIAL

Weft: polyvinyl alcohol (PVA) and polylactic acid (PLA)

Warp: flax

WEAVE BINDING

Weavbinding: 1 - 1496 plain weave

Weavbinding: 1497 - 1506 panama

Pocket size: 28 cm

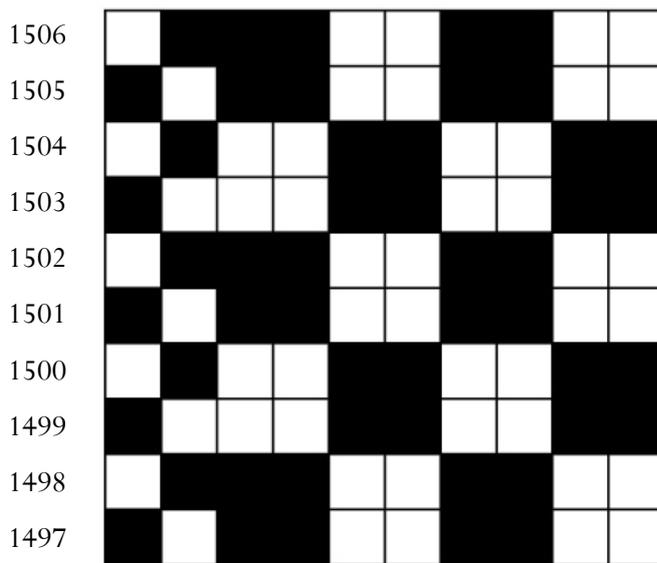
MACHINE SETTINGS

Shafts: 10

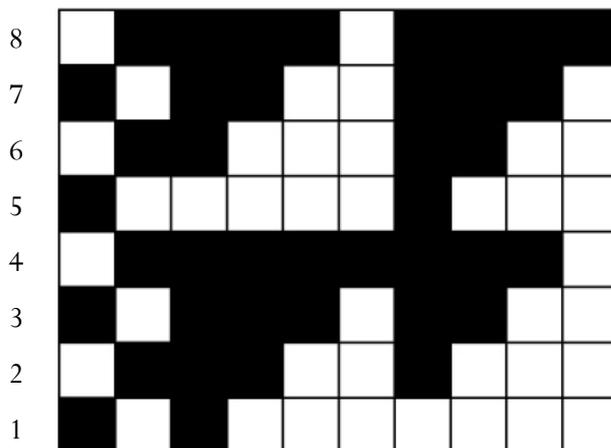
Factor: 1

Weft per cm: 65

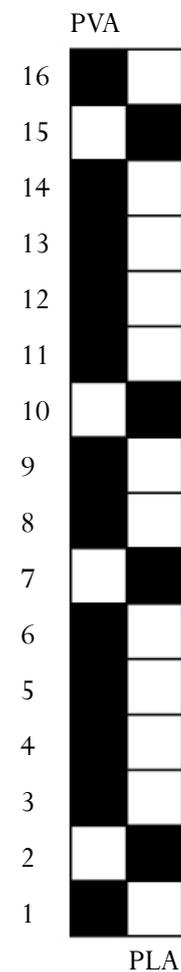
Weave binding



REPEATED 186 TIMES



Color switch





Scanned fabric sample



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