

After collecting all the data it was possible to answer the Subquestions and the research question.

- In what ways are willows used as a biobased building material?

Willows are perfect as a bio-based building material because it offers great potential for creating a sustainable structures like a seating area around the campus. Willows are already used as a building material in various ways, such as in the form of structures, woven willow objects and bio-composites. These applications are not only aesthetically attractive, but also contribute to a sustainable and environmentally friendly environment.

- What are the advantages of using willows in the outdoor environment?

Using willows in the outdoor environment has several advantages. Willows are fast-growing and easy-to-maintain trees that contribute to improved air quality, biodiversity and erosion control. In addition, willows in outdoor areas can add visual and ecological value, which fits within the philosophy of biobased design.

- In what ways can willows be used in and around the HZ garden in Vlissingen?

In the context of the HZ garden in Vlissingen, willow wood can be used in various ways. From seating areas and benches to green fencing and shade structures, willows offer versatile options for creating a comfortable, sustainable and aesthetic outdoor space. By using willows in and around the garden of the campus, not only can the environment be stimulated, but an inviting space can also be created for students and employees.

What is needed to create a biobased seating area around the Hogeschool Zeeland?

There are only a few things needed to create a biobased seating area. These things are:

- An location on the campus
- Willow branches
- A few strong people to build
- Gardening tools

Recommendations

Based on the findings in this study, it is recommended to integrate willows into the design of the seating around the Zeeland University of Applied Sciences. Specific recommendations are:

Use of willow wood for seating furniture: It is advisable to make seating areas, such as benches or chairs, from willow wood or woven willow branches. This not only offers an aesthetic and organic appearance, but also contributes to the principle of biobased and sustainable materials.

Sustainable garden furniture and shade structures: Consider using willows to create shade structures such as pergolas or canopies, which give the outdoor space the campus a natural appearance, while at the same time providing functional benefits for the users of the garden.

Promoting biodiversity through willow hedges: Planting willow hedges or using woven willows for partitions can contribute to improving biodiversity on campus. This not only provides visual value, but also strengthens the ecological function of the garden by creating shelters for animals and contributing to air quality.

Educational integration: It may be interesting to actively involve students in the design and realization of these biobased elements. This can serve as a learning experience about sustainability, biobased materials and the benefits of green management.

Introduction & objective

Introduction

The outdoor areas of the Zeeland University of Applied Sciences (HZ) are slowly becoming greener. A food garden has been created based on permaculture principles, a jeu de boules court has been created with olive trees and planters and there is a walking path around the school. Yet the schoolyard is not yet the playground of the future.

The site is still largely paved with paving stones, the buildings are bare on the outside and the outside seating areas are made of metal. This must change to encourage sitting outside and exercising, because being outside has many benefits with regard to studying and health (Grandlife, 2022).

Greening the outdoor environment takes place with circular, preferably bio-based or geo-based materials. In this way, HZ makes the possibilities of biobased applications visible in its outdoor environment.



P1 campus Vlissingen

Objective

This research discovers the possibilities for working with willows as biobased building material. The objective is to find out why willows are a good building material (or why not). By making a willow hut the researcher will experience how hard it is to build with willows. Having a willow hut at the HZ could inspire other people to create their own seating area or use this one to sit outside.

Research question

What is needed to create a biobased seating area around the Hogeschool Zeeland?

- In what ways are willows used as a biobased building material?
- What are the advantages of using willows in the outdoor environment?
- In what ways can willows be used in and around the HZ garden in Vlissingen?

Methodology

Deskresearch

Desk research, also known as literature research, is a research method that uses secondary data instead of primary data, which means that no new data is collected through surveys or experiments, for example. Desk research is used extensively in the initial phase of the research.

participatory action research

The researcher worked in the HZ garden during his project. The materials used in this garden are circular and biobased. By working in the garden, students learn how circular and biobased materials are used. In this way, knowledge is gained that supports this research.

Interview

During the research, various people were interviewed to collect data that supports the research. The people that were interviewed have an affinity with biobased construction. The planned interviews were semi-structured. This means that predetermined questions are used, but there is room for asking follow-up questions. The interviewer has a guideline, but can also respond to the answers of the respondents to delve deeper into certain topics (jouw scriptiecoach, 2024).

Observations

Most of the people that were interviewed have build a structure with willows. These structures are observed and measured. By comparing these structures, the researcher can decide which aspects are good or bad. This will support the decision on how to make your own willow structure.

Results



Good:	Improvement:	Good:	Improvement:	Good:	Improvement:
- height	- bigger - more branches - new branches woven horizontally	-height -Amount of branches - size	- New branches woven horizontally	- Woven branches - Size - Amount of branches	-remove dead branches - more pruning - sides more vertical

topic	Sub-topic	subject	result
Living willow branches	harvesting	season	Int1 autumn, when it is wet and the leaves are falling. Int2 whole year, but before the winter is best to grow. Int3 at the start of the winter so the ground is wet. Int 4 in the autumn. Int 5 in the autumn when the ground is getting wetter.
		Leaves on branch	Int1 no, because all the energy is needed for rooting Int2 doesn't matter, the leaves will fall off eventually Int3 leave a few on top, so the energy of the leaves will go to the roots. This creates a balance. Int 4 it is better to take these off. Int 5 the leaves will fall in a few weeks, so it doesn't matter
		Small cuts to create wounds	Int1 this is not necessary because a willow grows fast. Int2 it is always helpful to stimulate rooting, so yes. Int3 I never did this and it was always a success. Int4 I have no experience in doing this. Int5 this will help the rooting process, if you give much water.
		Rooting in water	Int1 willows don't need to grow roots in water before planting, they even grow upside down in the ground Int2 when it is a dry season then yes, but in the winter it is not necessary Int3 I put them in the ground after cutting and it worked almost every time. Int4 I have no experience in this Int5 to create a higher success rate it would be better
	planting	surface	Int1 willows will grow on every type of ground Int2 loose soil is best, but I think it even grows in sand Int3 normal soil, if it is not good soil then use some compost. Int4 every type of soil is good. Int5 I only planted in normal soil.
		Depth	Int1 30-40 cm. Int2 around 40 cm. Int3 I normally dig to 50 cm with bigger branches. Int4 somewhere around 40 cm. Int5 1/3 of the total length of the branch .
		temperature	Int1 that doesn't matter. Int2 don't plant when it is freezing, but if they are in the ground already it is fine. Int3 because you plant them deep you don't have to worry that the roots will freeze. Int4 it does not freeze hard in the Netherlands, so nothing to worry about. Int5 if you planted around a month before you should be okay.
		Success rate	Int1 around 8/10 if you plant in the autumn. Int2 I think 75% if you have normal ground and give water. Int3 in my garden it was 50/50, but I didn't grow roots and planted in April. Int4 I would say that 10% will die. Int5 somewhere between 8/10 and 9/10.

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