Reimagining the Leek waste

By Grigoryeva Iulianiya, 10428357
I.grigoryeva2@newcastle.ac.uk
OME, HBBE

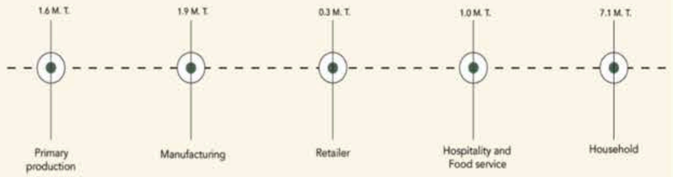
The Hub for Biotechnology in the Built Environment
Newcastle University

Background

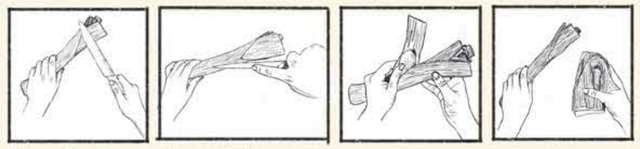
Food waste is contributing 8% to global greenhouse emissions gas emissions annually. United Kingdom contributing to the global problem of Food waste:

• Food surplus and waste is estimated at 3.6 million tonnes a year, or 7.2% of all food harvested.

The graph shows the numbers of food waste on each production stage in UK.



Leek is the common vegetable, consumed by each household on daily basics in the UK. It accounted for 10% of all outdoor vegetable grown in the UK. The traditional preparation method of leek causes 6 millions of leek ended up in land field, adding to major problem of food waste.



The tradional preparation method

Aims

- To create the possibility of the circular methodology of creating the leek material, which potentially be adopted within the similar food waste category.
- Explore the possibility of the leek as bio-material for domestic use.
- Use weaving methodology for creating the bio-material.
- Collect the public feedback on appropriation of the leek material in the household.

Methodology

1. Used the classical preparation method of straw for weaving
2. Select the optimum time of the rehydration of the dry leek
3. Based on rehydration level, analyse the elasticity performance of the the leek
4. Use three methods of the weaving on prepared leek: flat leek on flat leek, flat leek on rope, rope on rope.
5. Run the expirement on the strength of three different methods of the weaving
6. Held the workshop to present the leek material to public to gather feedback on use of it in domestic setting

① Classical preparation method

Methodology is based on precedence of weaving with natural straw. The leek waste has been collected cleaned and places in dry place for a week to dry completely, which prevents leek material from mould in the future. However, completely dry condition of the leek, causes the layers to lose all the elasticity and makes it more vulnerable to snapping or breakages. Therefore, the rehydration in clean water is required to enable the elasticity of leek layer before weaving starts.

② ③ Rehydration & Elasticity

The rehydration in clean water is required to enable the elasticity of leek layer before weaving starts. In experiment there were three level of rehydration time: 10 min, 20 min, 40 min, in water 35c (10c above the room temperature water). After rehydration, the three batches of leek samples has been folded and roller in the same way which allowed to conclude the correlation between rehydration time and elasticity performance of the leek samples. The experiment will be concluded based on result of ability to fold, breakage level, preserving the shape, mobility of the shape.

④ Three methods of weaving

The photographs shows the three different methods of weaving used in research. Weaving is not a technique usually associated with architecture. However the weaving methodology has a great potential influencing the performance of material.

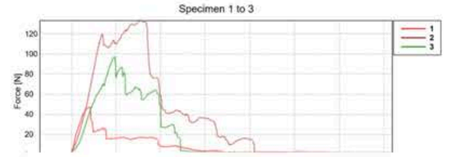
⑤ Strength expirement

Instron Applications Laboratory

ISO 13934-1:2013 Textiles – Tensile properties of fabrics – Part 1: Determination of maximum force and elongation at maximum force using the strip method

Gauge Length	20 mm
Rate 1	100.00 mm/min
Preload	True
Rate	10.00 mm/min
State of Test Specimens	moist
Width	47.000 mm
Deviations from Procedure	None

Specimen 1 to 3

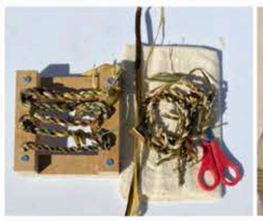


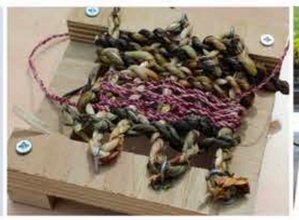
	Load at Break (Standard) [N]	Tensile strain (Extension) at Break (Standard) [%]	Maximum Load [N]	Tensile strain (Extension) at Maximum Load [%]
1	1.92	491.09	47.9	42.31
2	2.04	752.23	133	156.59
3	2.29	398.88	97.1	96.43
Mean	2.08	547.40	92.8	98.44
Standard deviation	0.189	183.28	42.9	57.16
Coefficient of variation	9.08	33.48	46.2	58.07

The expirement has been held in HBBE workshop. The aim of it was to analyse the correlation between strength and different weaving method. Each sample has been tested with strip method to determine the maximum force and elogance at maximum force. The samples had similar moist conditions, however there is a slight variation in the size of each sample. As the result the second variation of weaving proved to be the strongest and most flexible out of three. See the results in graph.

⑥ Public workshop

The successful key of domestic usage is the complexity of the creation of material, the leek preparation process, and actual public reflection on the appropriation of the material in the household. The last experiment will be held with collaboration of Great North Museum and OME/BioDwelling network, through public workshop. The workshop will consist of simplified context of research, explains the process of creating the bio-material, inviting the public to participate in hands-on experience of weaving leek and discussion about the possible usage of material in household.





Conclusions

- Research has successfully established the circular method of creating Vonfabric. All the leeks used during research has been regrown and planted during the public workshop, which could be harvested later on in the year.
- The methodology could be potentially applied on similar food waste. Proven by small expirement during public workshop. Rhubarb has been weaved into leek material.
- The correlation between weaving method and performance qualities of the bio-material has been proven by strength expirement. The more complex the weave method the more density and strength the bio-material will have.
- The expirements conclude: the biomaterial from vegetables has high performance level, making it suitable and authentic for interior environment. It could be applied in in the following ways: garden furniture, wallpaper, small house accessories.
- The workshop has been publicly held with different group ages. Both of the workshop had positive feedback, high level engaging with material and research.