INSIGHTS REPORT #10

BIOTEXFUTURE
TRANSITION LAB

ARE ALGAE OUR FUTURE?

EVIDENCE FROM EXPLORATORY FOCUS GROUPS ON CONSUMER PERCEPTIONS OF BIO-BASED PRODUCTS

Dec 2022

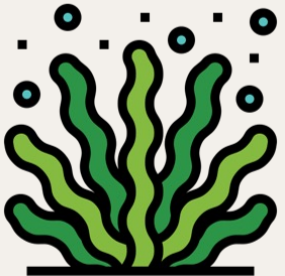
adidas / FAU / University Bayreuth

CONTENT


EXECUTIVE SUMMARY

Introduction:

With our qualitative, exploratory study on consumer perceptions of algae-based textile products, we provide insights into how consumers perceive an algae-based product throughout its life cycle: from pre-production to production and use stage over to its end-of-life. This study serves as a baseline study for further research efforts related to consumer perception of bio-based products and provides highly relevant indicators on how bio-based products can become successful in the mass market and thus contribute to a more sustainable textile industry as well as society at large.



KEY INSIGHTS

What we know now…

Consumers are interested in and curious about algae as a feedstock for textile products.

Algae are mostly associated with food or nature and not with the textile industry.

Consumers expect a connection between the plant and the final product to perceive it as algae and not as plastic.

The most important product attribute of an algae-based textile is durability.

Algae is mostly associated with aquatic features such as water, ocean or the beach.

Algae is viewed more positively than cotton or petroleum when compared to each other.

Consumers want a light, cooling, drying, opaque and soft t-shirt made of algae.

At the end of life, consumers want an incentive to participate in circular activities of algae-based products.


METHODOLOGY

METHODOLOGY

RESEARCH QUESTIONS: *WHAT DO WE WANT TO LEARN?*

1. **What do consumers associate with algae?**
2. **How do consumers perceive the plant algae in terms of sustainability?**
3. **What are consumer expectations towards a textile made of algae?**

APPROACH: *HOW DID WE ACCQUIRE THE DATA?*

Approach 1: **Focus Groups**

Gain qualitative insights from different focus groups in the adidas GreenLab and MakerLab through different forms of interaction* and discussion.

*further explanation on slide 8

Approach 2: **Poster Research**

Gain “quantitative” insights from larger amount of anonymous participants, both consumers as well as adidas employees, by simple opinion request via stickers on posters.

METHODOLOGY

FOCUS GROUPS: HOW DID WE ACQUIRE THE DATA?

FOCUS GROUPS:
Three 1.5hr focus groups were hosted in the GreenLab adidas Flagship Store and one in the adidas MakerLab in adidas HQ Herzogenaurach.
Both environments (GreenLab /MKLB) were chosen to let participants feel comfortable and serve an open discourse.

The purpose of a focus group is to capture expectations, challenges and ideas of the utilization of Algae as a new textile feedstock.

GreenLab adidas Flagship Store

HQ HZO adidas MakerLab

In those interactive open discussions, participants explored the topic of algae, through two tasks answering several questions and issued recommendations for action.

Task 1: Associations

Task 2: Algae as a Resource

Number of participants:

GreenLab
1. Focus Group: 10
2. Focus Group: 12
3. Focus Group: 4

MakerLab
4. Focus Group: 13

The 26 participants of the focus groups in the GreenLab have varying occupations in the field of architecture, childcare and experts in the field of the textile industry. Almost all participants learned about the workshop through the adi club app and some are involved adidas Runners. Most participants were 25-35 years old.

The 13 participants of the MakerLab were all employees of adidas ranging from teams of textile, footwear and material Design to Finance with an age span between 25-40.

METHODOLOGY

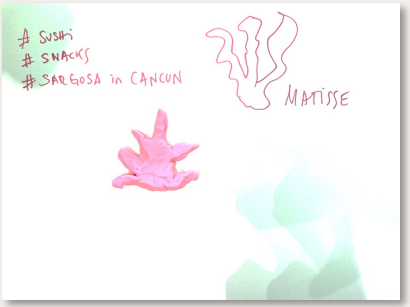
FOCUS GROUPS TASK 1: *ASSOCIATIONS*

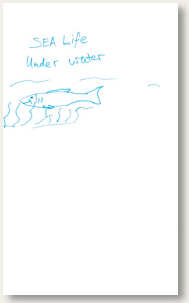
Task 1: Associations

Task 1 served as an icebreaker and introduction to the topic as well as to understand the associations, perceptions and knowledge about Algae. The idea was to evaluate the words, drawings and modeled play dough in terms of themes.

Procedure:
What is the first thing that comes into your mind when you hear Algae?

1. *Write it*
2. *Draw it*
3. *Model it*





METHODOLOGY

FOCUS GROUPS TASK 2: *ALGAE AS A RESOURCE*

Task 2:
Algae as a Resource

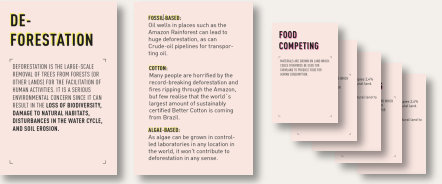
Task 2 explored the knowledge of consumers towards Algae as a resource compared to cotton and petroleum-based materials.

Procedure
Step 1: Participants were asked to place a sticker (colored background) on the poster evaluating the sustainability impact and aspects of algae, cotton and petroleum-based materials.
Step 2: They were given information on the impact in form of material cards and asked to place another set of stickers (white background) to potentially adjust their evaluations on the scales.

Sticker Sets 1 + 2

Step 1 – Handout: Poster

Step 2 – Material cards



METHODOLOGY

POSTER RESEARCH: HOW DID WE ACQUIRE THE DATA?

INTERACTIVE POSTER RESEARCH

Throughout the period of one month, **16.08–16.09.2022,** interactive posters were used as a quantitative surveying instrument for data collection. The aim was to get additional feedback from adidas store visitors & HQ employees to the topic of algae by making the interaction simple and playful as well as create awareness around the topics.

In comparison with other survey methods, posters allow an easier recruitment of participants, lower entry barriers and promote engaging in discussions.

PROCEDURE

We set up six “research posters” posing questions regarding the participants opinion towards algae in the Flagship Store and adidas HQ.

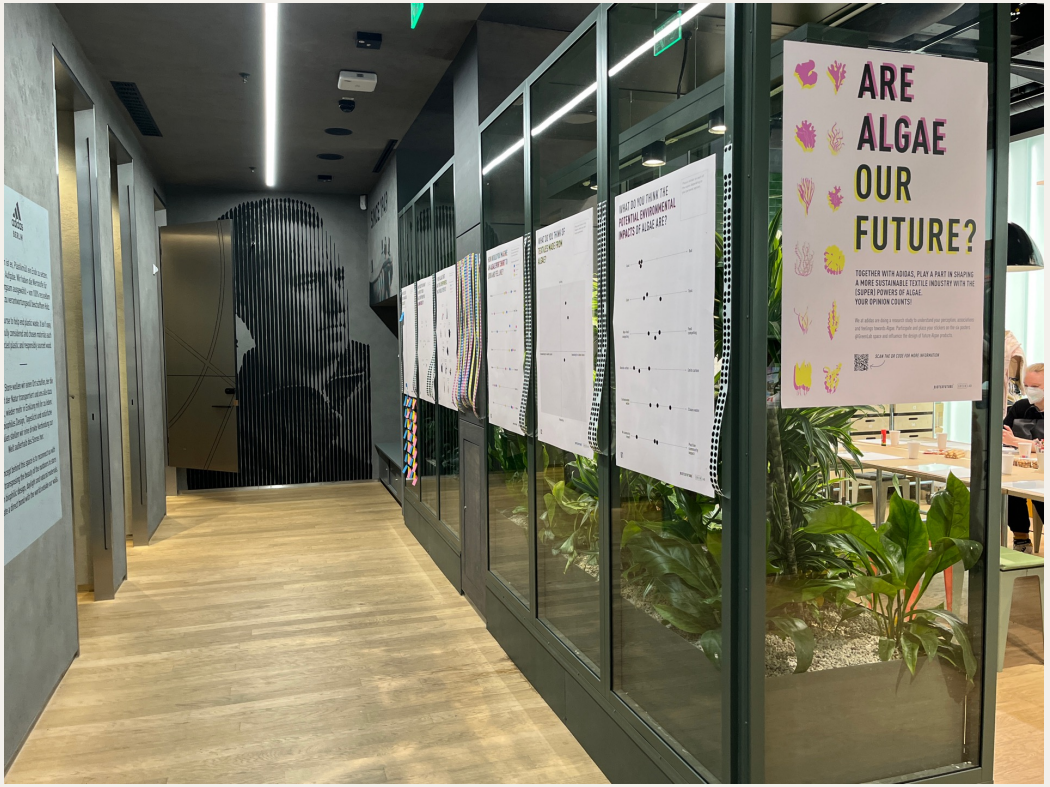
Interactive posters allow participants to respond to research questions by placing stickers on predetermined statements:

QUESTIONS 1-6

1. What do you think the potential environmental impacts of Algae are?
2. What do you think of textiles made from Algae?
3. How would you imagine a sport shirt to look and feel like?
4. If Algae gave you superpowers, what would they be?
5. What would you want to happen to your Algae shirt if you no longer need it?
6. What else do you think Algae could be? (open thoughts)

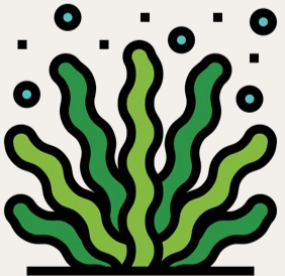
METHODOLOGY

POSTER RESEARCH: HOW DID WE ACQUIRE THE DATA?



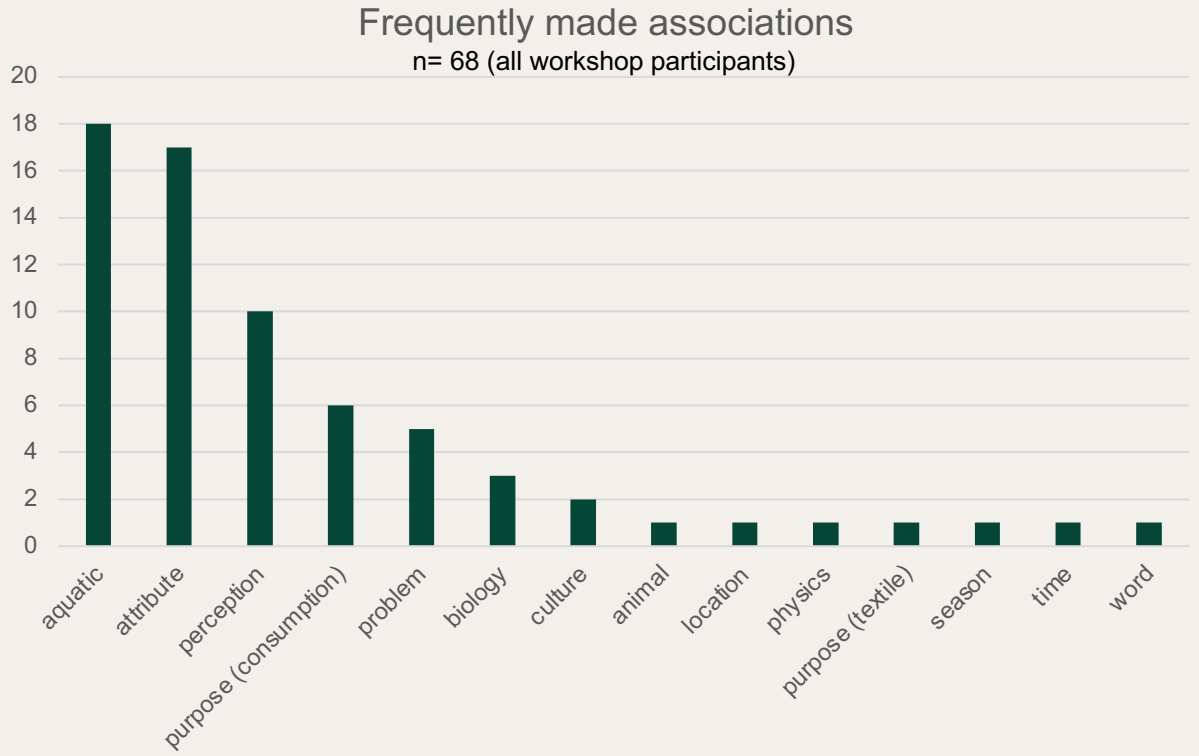
FOCUS GROUP RESULTS

1. RESULTS ASSOCIATIONS



FOCUS GROUPS RESULTS

TASK 1: *ASSOCIATIONS* (1/2)



- **Aquatic** - e.g. water, ocean, beach, aquarium, lakes
- **attribute** – e.g. green plant, long leaves, fast growing
- **perception** – e.g. elegant, soft, slimy, fuzzy, high quantities
- **purpose (consumption)** – e.g. food, wakame salad, sushi
- **problem** – e.g. wastage in pond/lake, problems of water, saragassum in cancun
- **biology** – e.g. photosynthesis, coccoliths
- **culture** – e.g. Matisse, Sci-Fi
- **animal** – e.g. mosquito
- **location** – e.g. Japan
- **physics** – e.g. sun
- **purpose (textile)** – e.g. consistency of a plaster
- **season** – e.g. summer
- **time** – e.g. future
- **word** – e.g. seaweed

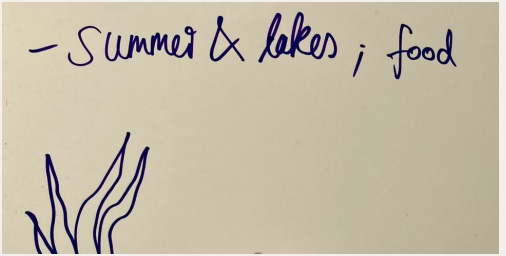
Through the discussions in the focus groups we observed a positive connotation towards Algae in context of the textile industry.

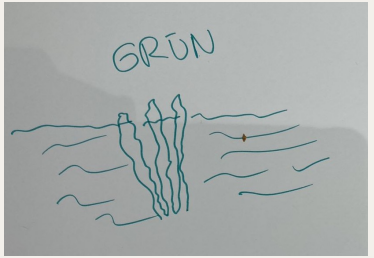
FOCUS GROUPS RESULTS

TASK 1: *ASSOCIATIONS* (2/2)

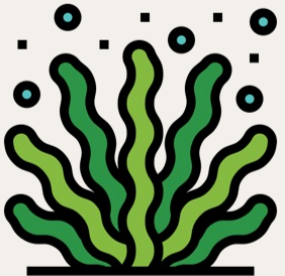
PRACTICAL IMPLICATIONS

- Participants mostly have aquatic associations with algae (e.g. water or beach) or the plant itself (e.g. green or long leaves) which can be considered in marketing and sales strategies as well as design decisions, narrative and visualisations.
- It became clear that consumers often positively associate algae with the food industry. Hence, go to market strategies can be inspired by the “positively perceived” Algae food industry in terms of innovation adoption and consumer acceptance of an algae product.
- In general, there is high interest and curiosity in the topic of Algae as new material which can be understood as a desire for new products made of alternative feedstocks such as Algae.



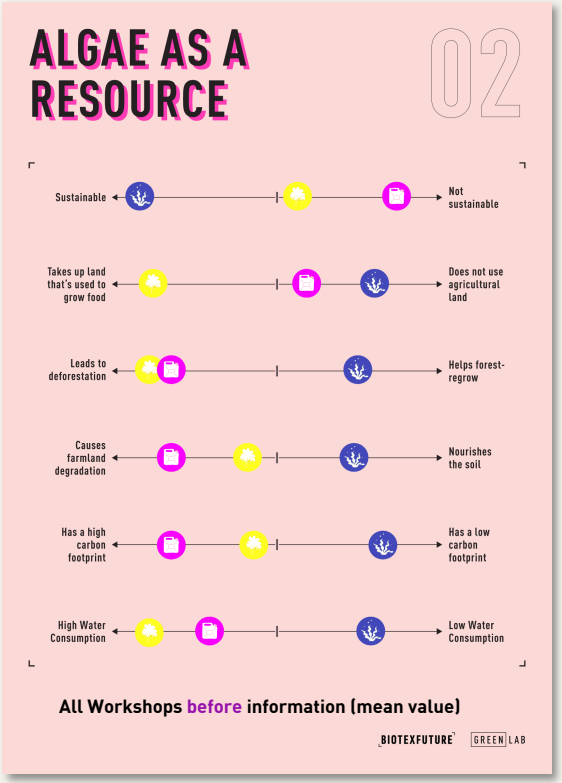


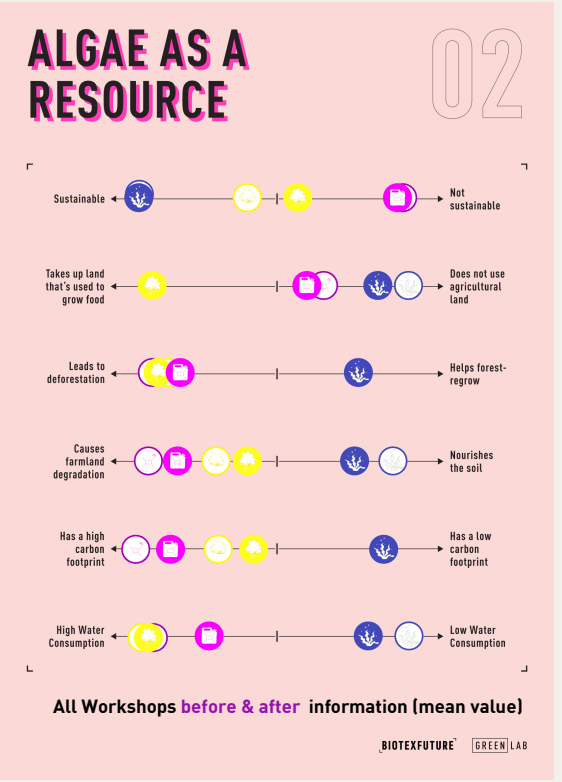
2. RESULTS ALGAE AS A RESOURCE



FOCUS GROUPS RESULTS

TASK 2: *ALGAE AS A RESOURCE* (OVERVIEW)





Key Findings

- Algae as a resources is overall perceived as being the most sustainable resource in comparison to fossil derived materials or cotton.
- Cotton is viewed relatively sustainable at first, after information is given there was a large adjustment towards it being viewed as not sustainable; for petroleum almost no adjustments (viewed negatively before and after).

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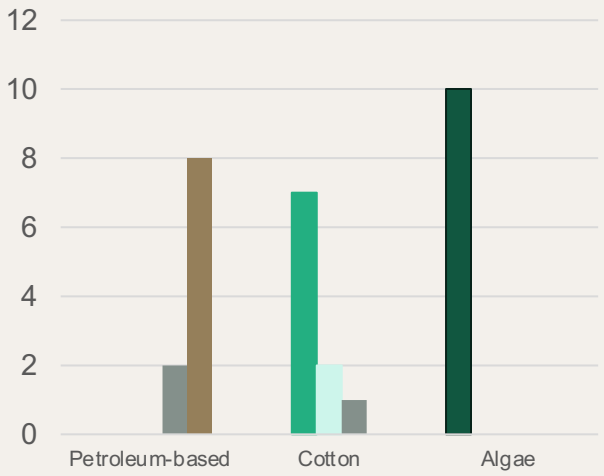
FOCUS GROUPS RESULTS

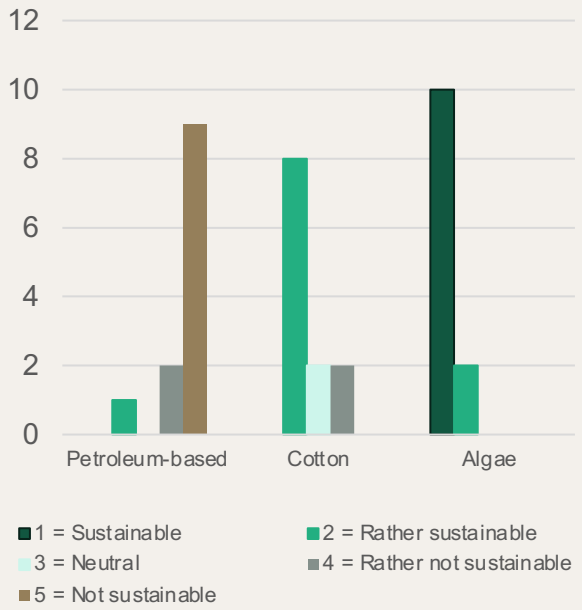
TASK 2: QUESTION 1 – *SUSTAINABLE OR NOT SUSTAINABLE (1/2)*

Focus Group1 (N=10)



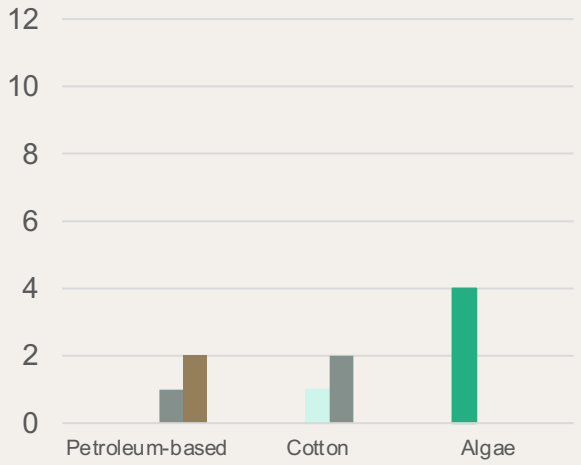
Mean value (P) = 5; (C) = 2; (A) = 1

Focus Group 2 (N=12)



Mean value (P) = 5; (C) = 2,5; (A) = 1

Focus Group 3 (N=4)

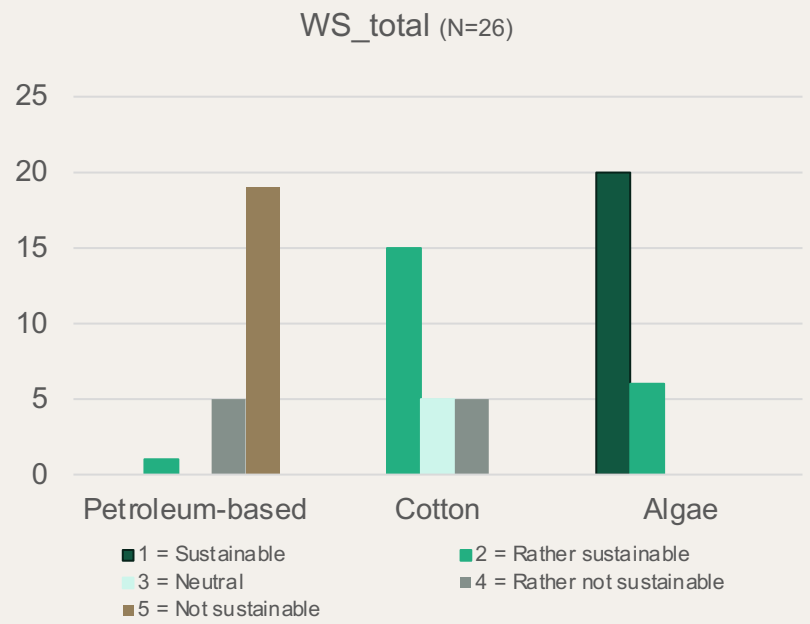


Note: 1 Petroleum & 1 Cotton sticker is missing

Mean value (P) = 5; (C) = 4; (A) = 2

FOCUS GROUPS RESULTS

TASK 2: QUESTION 1 – *SUSTAINABLE OR NOT SUSTAINABLE (2/2)*



Note: 1 Petroleum & 1 Cotton sticker is missing

Mean value (P) = 5; (C) = 3; (A) = 1

FINDINGS

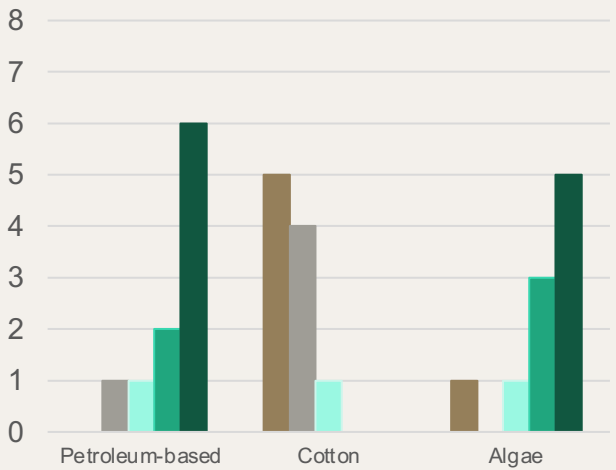
- Algae is perceived as most sustainable before and after providing additional information
- Cotton is viewed more sustainable at first. After providing additional information there was a large adjustment towards it being viewed as less sustainable; petroleaum is rated negatively before and after information

	Before (Mean value)	After (Mean value)
Petroleum	**4,7**	4,8
Cotton	**2,6**	3,5
Algae	1,2	1,2

FOCUS GROUPS RESULTS

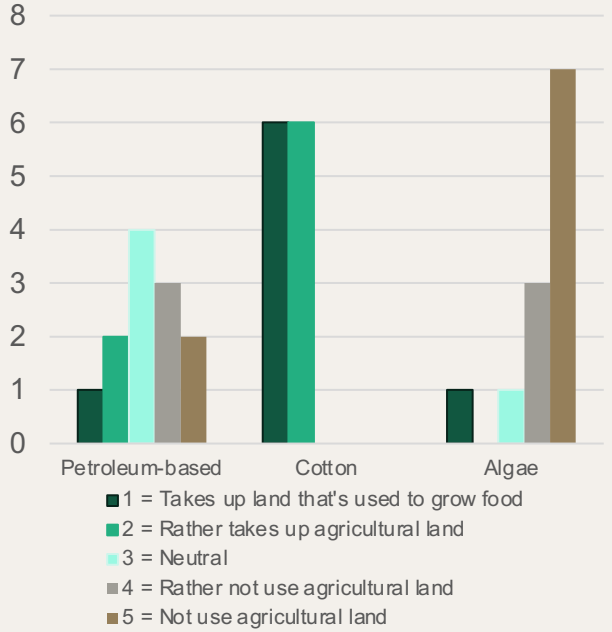
TASK 2: QUESTION 2 – *USE OF AGRICULTURAL LAND VS. NO USE AGRICULTURAL LAND* (1/2)

WS_01 (N=10)



Mean value (P) = 4; (C) = 2; (A) = 4

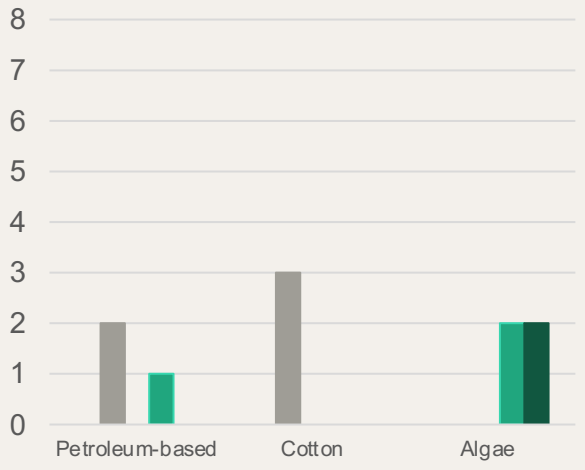
WS_02 (N=12)



Note: 1 Petroleum & 1 Cotton sticker is missing

Mean value (P) = 3; (C) = 1,5; (A) = 4

WS_03 (N=4)

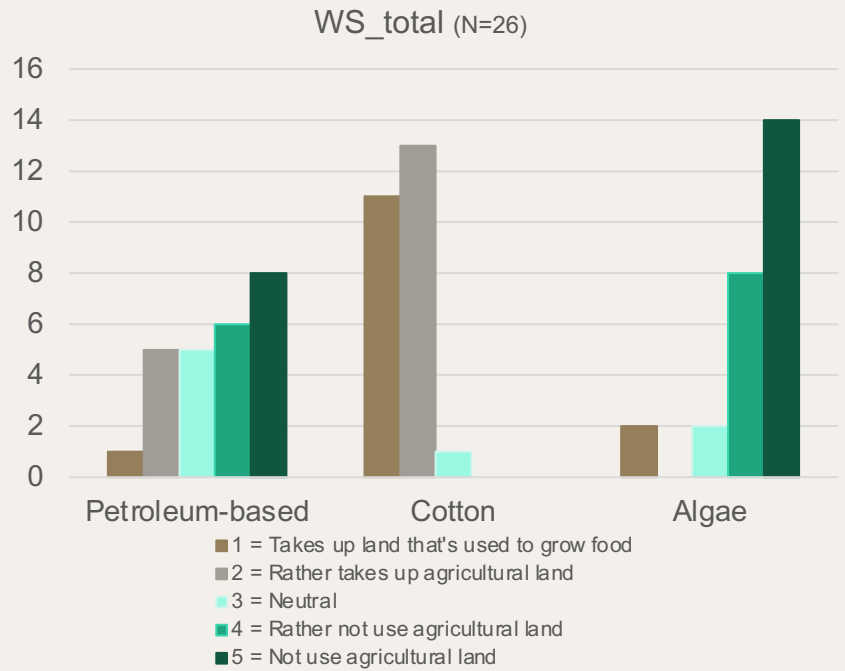


Note: 1 Petroleum & 1 Cotton sticker is missing

Mean value (P) = 3; (C) = 2; (A) = 4,5

FOCUS GROUPS RESULTS

TASK 2: QUESTION 2 – *USE OF AGRICULTURAL LAND VS. NO USE AGRICULTURAL LAND* (2/2)



Note: 1 Petroleum & 1 Cotton sticker is missing

Mean value (P) = 4; (C) = 2; (A) = 4

FINDINGS

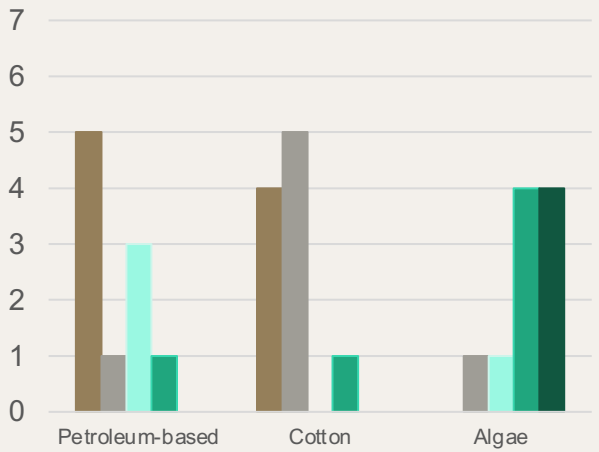
- Algae is viewed more positive after information is given; also for petroleum slight positive change, meaning that petroleum is viewed highly negative in general, cotton no change (consumers are sufficiently informed)
- The results indicate a limited knowledge of consumers in regard to the use of agricultural land

	Before (Mean value)	After (Mean value)
Petroleum	3,6	**3,8**
Cotton	1,6	1,6
Algae	4,2	**4,6**

FOCUS GROUPS RESULTS

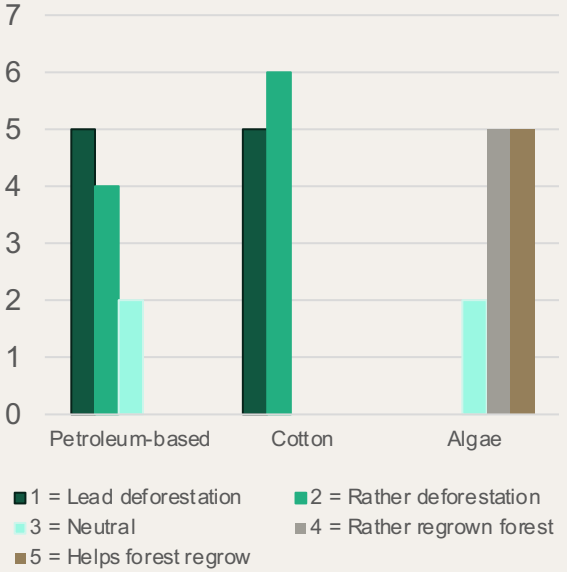
TASK2: QUESTION 3 – *LEAD DEFORESTATION VS HELPS FOREST REGROW* (1/2)

WS_01 (N=10)



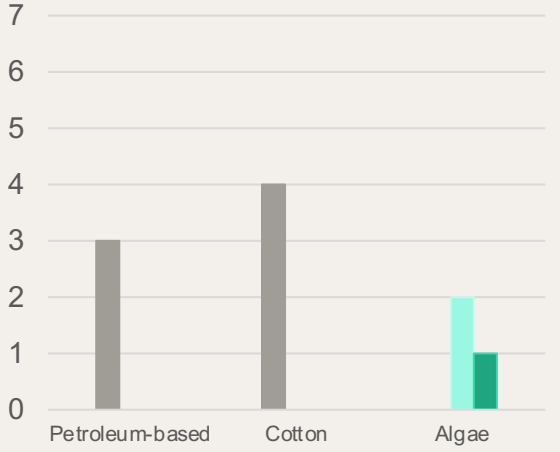
Mean value (P) = 2; (C) = 2; (A) = 4

WS_02 (N=12)



Mean value (P) = 2; (C) = 1,5; (A) = 4

WS_03 (N=4)

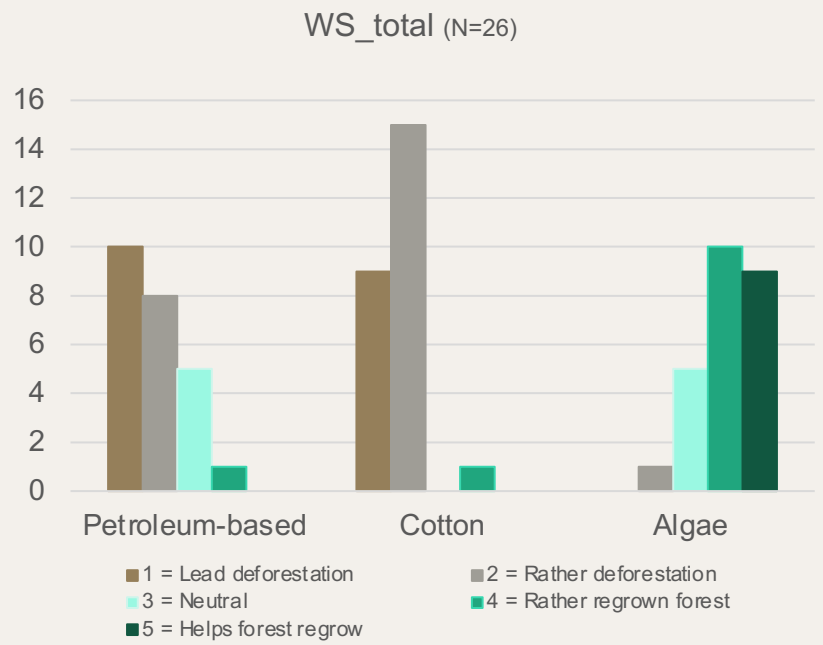


Note: 1 Petroleum sticker is missing

Mean value (P) = 2; (C) = 2; (A) = 3

FOCUS GROUPS RESULTS

TASK2: QUESTION 3 – *LEAD DEFORESTATION VS HELPS FOREST REGROW* (2/2)



Note: 2 Petroleum, 1 Cotton & 1 Algae sticker are missing

Mean value (P) = 2; (C) = 2; (A) = 4

FINDINGS

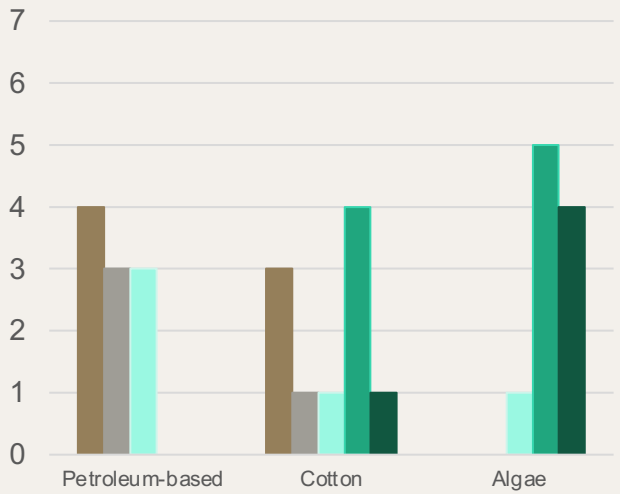
- Consumers have a highly negative picture of petroleum and cotton in regards to it leading to deforestation
- The assessment for algae improves when information is given
- Petroleum is viewed slightly less positive after information
- Cotton does not change → consumers are aware as to how cotton impacts deforestation

	Before (Mean value)	After (Mean value)
Petroleum	**1,9**	1,6
Cotton	1,7	**1,8**
Algae	4,1	**4,5**

FOCUS GROUPS RESULTS

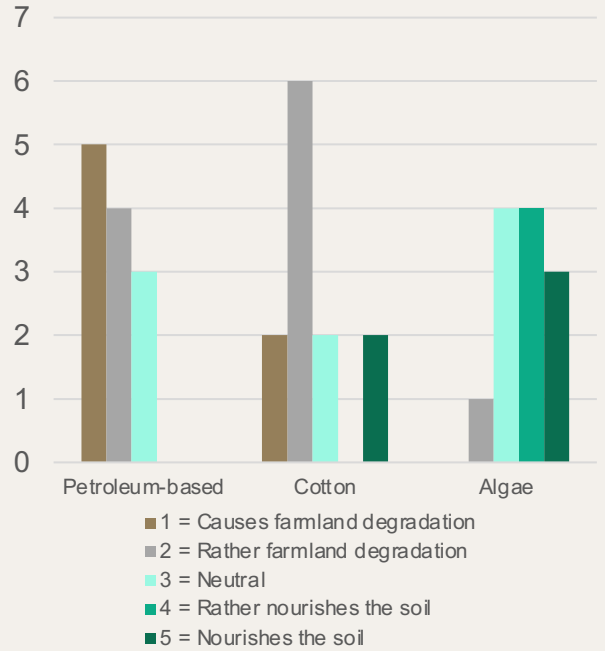
TASK 2: QUESTION 4 – *CAUSES FARMLAND DEGRADATION VS. NOURISHES THE SOIL* (1/2)

WS_01 (N=10)



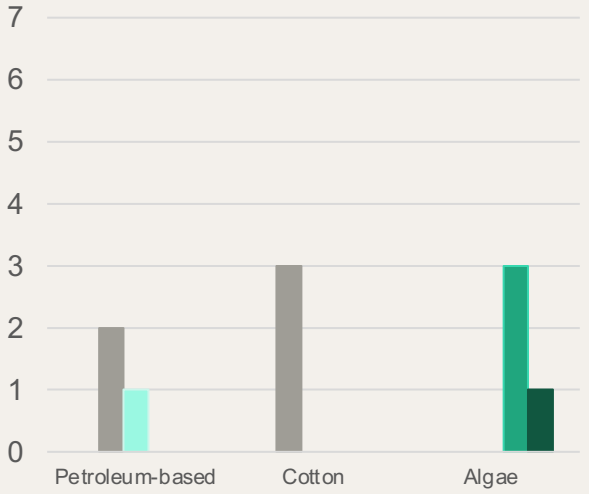
Mean value (P) = 2; (C) = 3; (A) = 4

WS_02 (N=12)



Mean value (P) = 2; (C) = 2,5; (A) = 4

WS_03 (N=4)

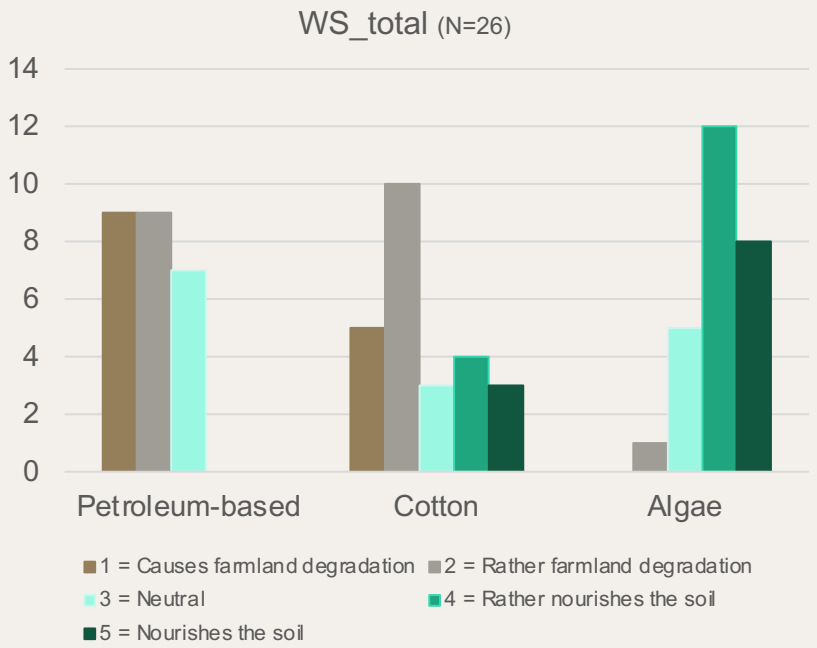


Note: 1 Petroleum & 1 Cotton sticker is missing

Mean value (P) = 2; (C) = 2; (A) = 4

FOCUS GROUPS RESULTS

TASK 2: QUESTION 4 – *CAUSES FARMLAND DEGRADATION VS. NOURISHES THE SOIL* (2/2)



Note: 1 Petroleum & 1 Cotton sticker is missing

Mean value (P) = 2; (C) = 3; (A) = 4

FINDINGS

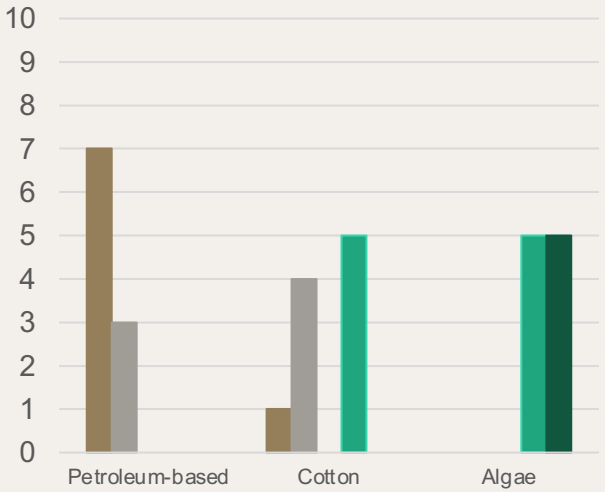
- Petroleum and cotton are viewed negatively before information with an adjustment towards being viewed more negative after information is given
- For cotton, there is a tendency to being viewed negatively; results show a large variance in the answers (from very positive to very negative) → people are not sufficiently informed in this area

	Before (Mean value)	After (Mean value)
Petroleum	**1,9**	1,5
Cotton	**2,6**	2,2
Algae	4,0	**4,4**

FOCUS GROUPS RESULTS

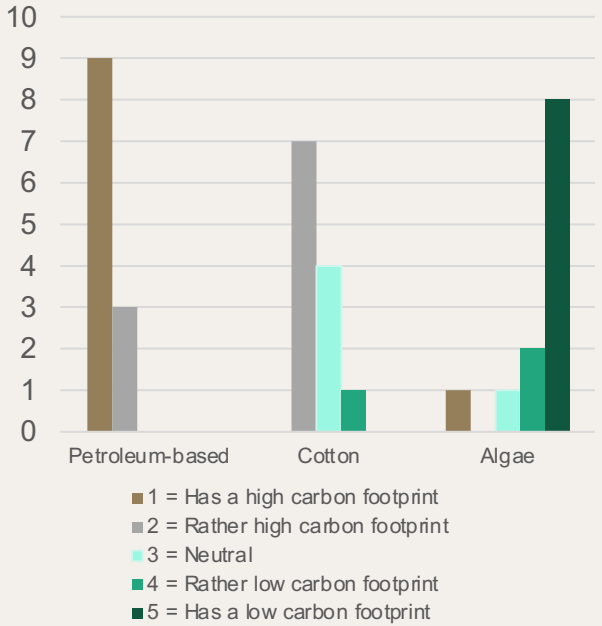
TAKS 2: QUESTION 5 – *HIGH CARBON FOOTPRINT VS. LOW CARBON FOOTPRINT* (1/2)

WS_01 (N=10)



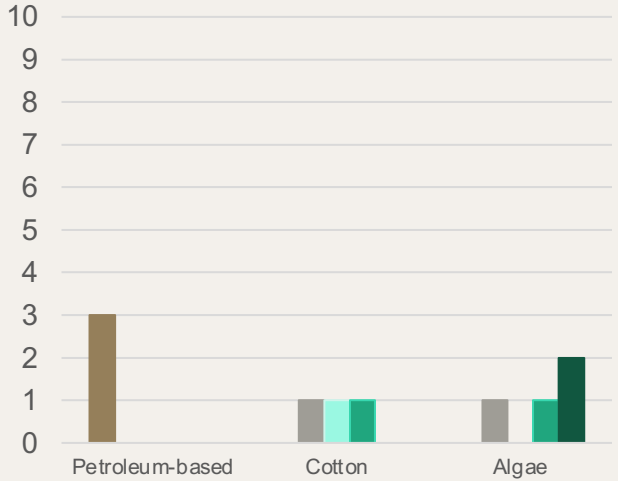
Mean value (P) = 2,5; (C) = 3; (A) = 4,5

WS_02 (N=12)



Mean value (P) = 1; (C) = 2,5; (A) = 4

WS_03 (N=4)

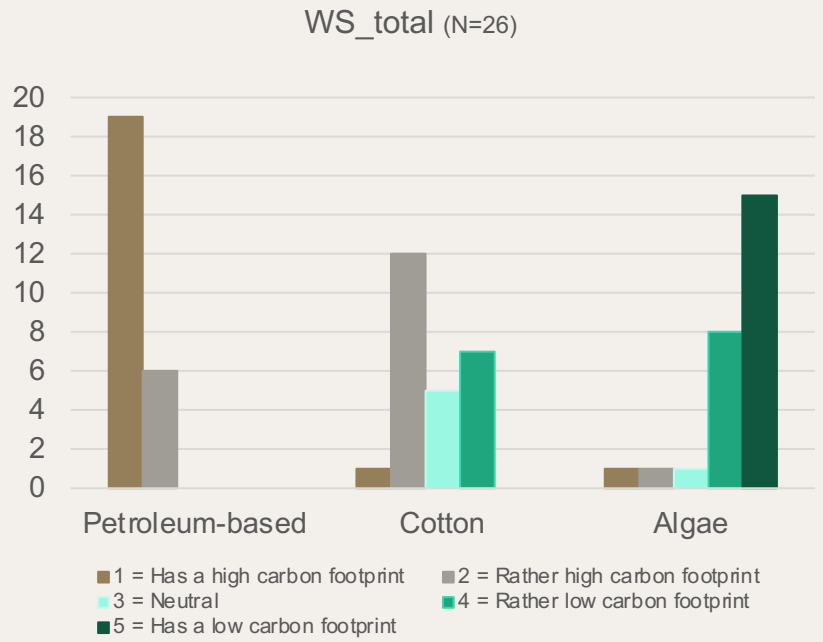


Note: 1 Petroleum & 1 Cotton sticker is missing

Mean value (P) = 1; (C) = 3; (A) = 4

FOCUS GROUPS RESULTS

TAKS 2: QUESTION 5 – *HIGH CARBON FOOTPRINT VS. LOW CARBON FOOTPRINT* (2/2)



Note: 1 Petroleum & 1 Cotton sticker is missing

Mean value (P) = 2; (C) = 3; (A) = 4

FINDINGS

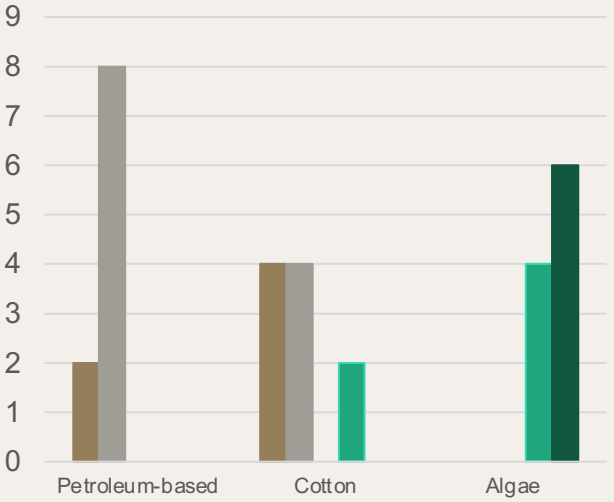
- Participants know about negative carbon footprint of petroleum and cotton before information, slight adjustment towards being viewed as having an even higher carbon footprint after information is given
- Algae is viewed very positively, there are no adjustments between before and after giving information

	Before (Mean value)	After (Mean value)
Petroleum	**1,9**	1,2
Cotton	**2,7**	2,4
Algae	4,3	4,3

FOCUS GROUPS RESULTS

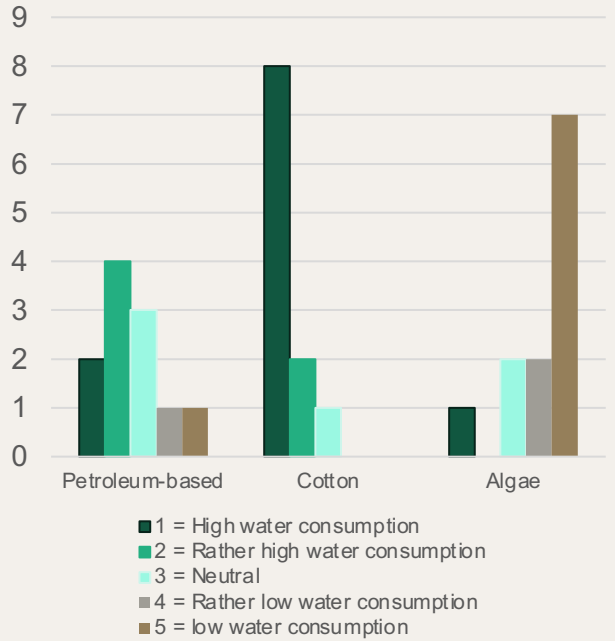
TASK 2: QUESTION 6 – *HIGH WATER CONSUMPTION VS. LOW WATER CONSUMPTION* (1/2)

WS_01 (N=10)



Mean value (P) = 2; (C) = 2; MW (A) = 5

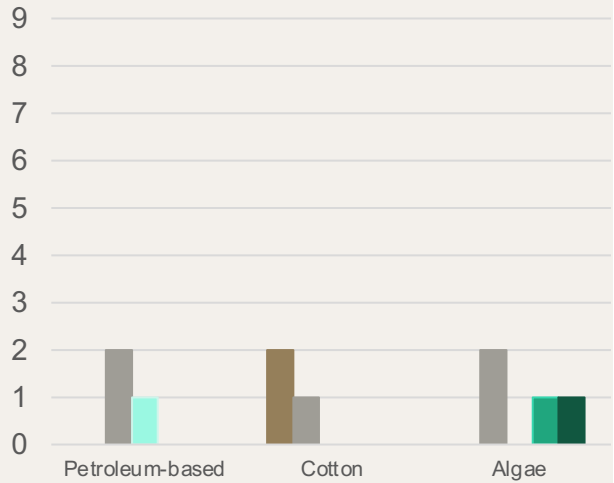
WS_02 (N=12)



Note: 1 Petroleum & 1 Cotton sticker is missing

Mean value (P) = 2,5; (C) = 1; (A) = 4

WS_03 (N=4)

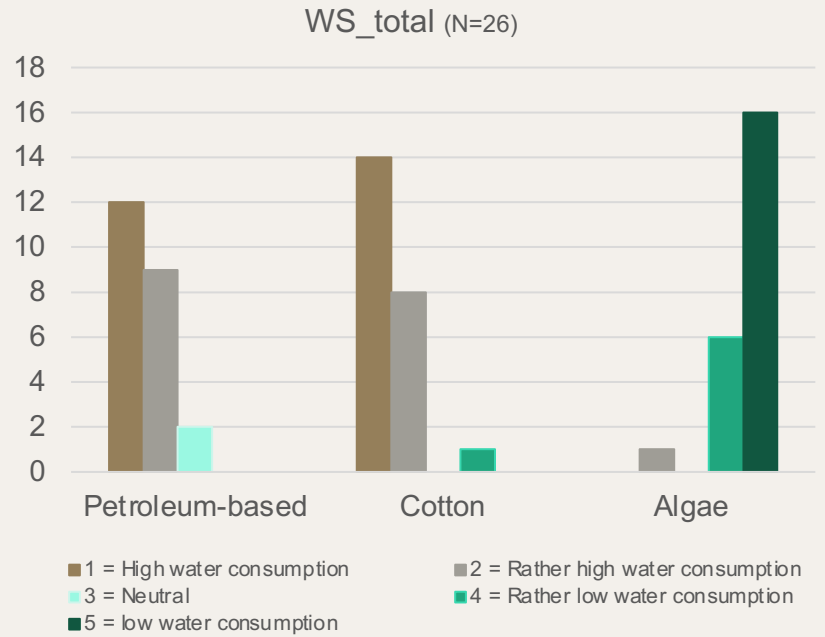


Note: 1 Petroleum & 1 Cotton sticker is missing

Mean value (P) = 2; (C) = 1; (A) = 3

FOCUS GROUPS RESULTS

TASK 2: QUESTION 6 – *HIGH WATER CONSUMPTION VS. LOW WATER CONSUMPTION* (1/2)



Note: 2 Petroleum & 2 Cotton sticker are missing

Mean value (P) = 2; (C) = 2; (A) = 4

FINDINGS

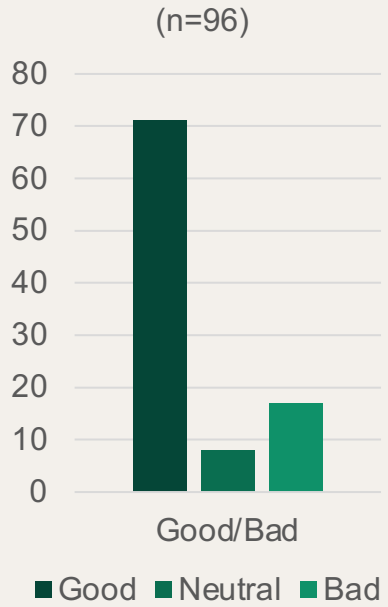
- Algae is viewed as having low water consumption before information is given and improves slightly after information
- Petroleum is viewed as having a high water consumption before and after
- Cotton is perceived as having the highest water consumption

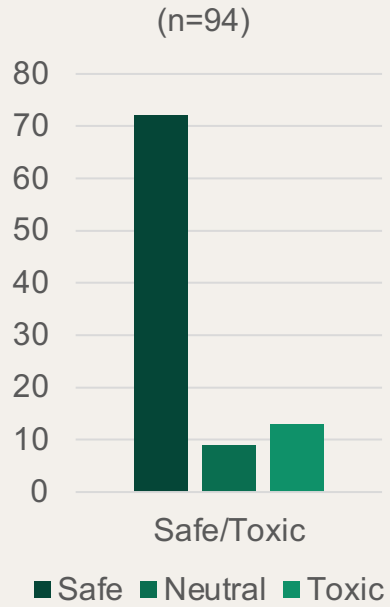
	Before (Mean value)	After (Mean value)
Petroleum	**2,2**	1,6
Cotton	**1,6**	1,5
Algae	4,2	**4,6**

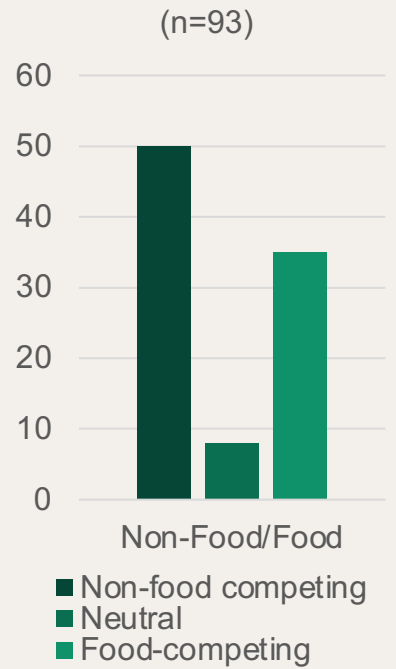

POSTER RESULTS

POSTER RESEARCH RESULTS

1 WHAT DO YOU THINK THE POTENTIAL ENVIRONMENTAL IMPACT OF ALGAE ARE? (1/2)





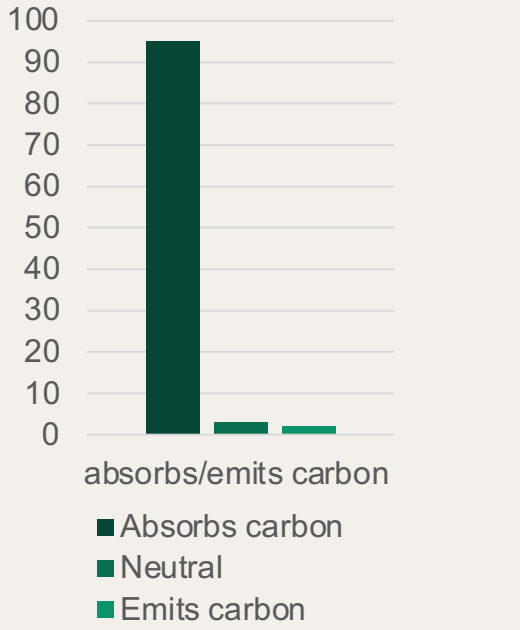


► Algae is viewed as good and safe for the environment.

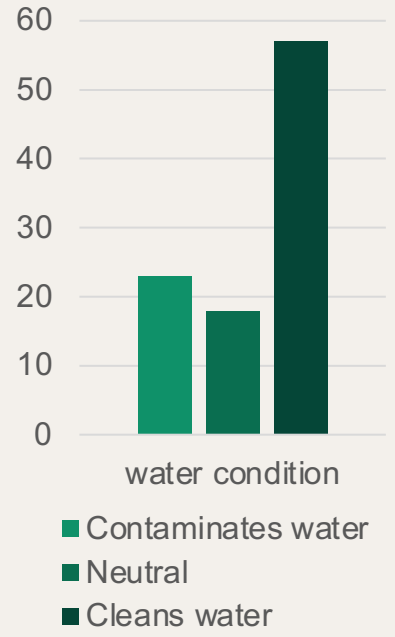
POSTER RESEARCH RESULTS

1 WHAT DO YOU THINK THE POTENTIAL ENVIRONMENTAL IMPACT OF ALGAE ARE? (2/2)

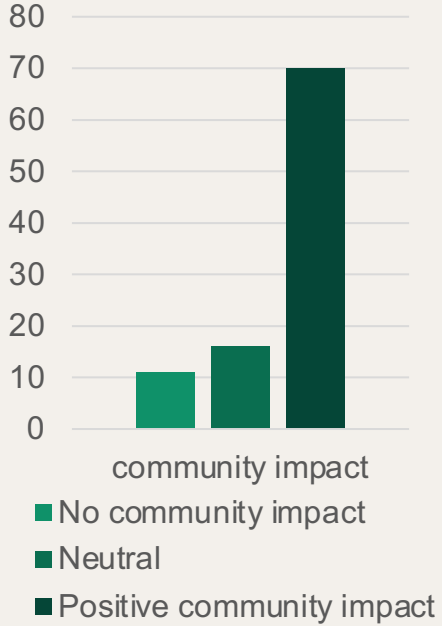
(n=100)



(n=98)



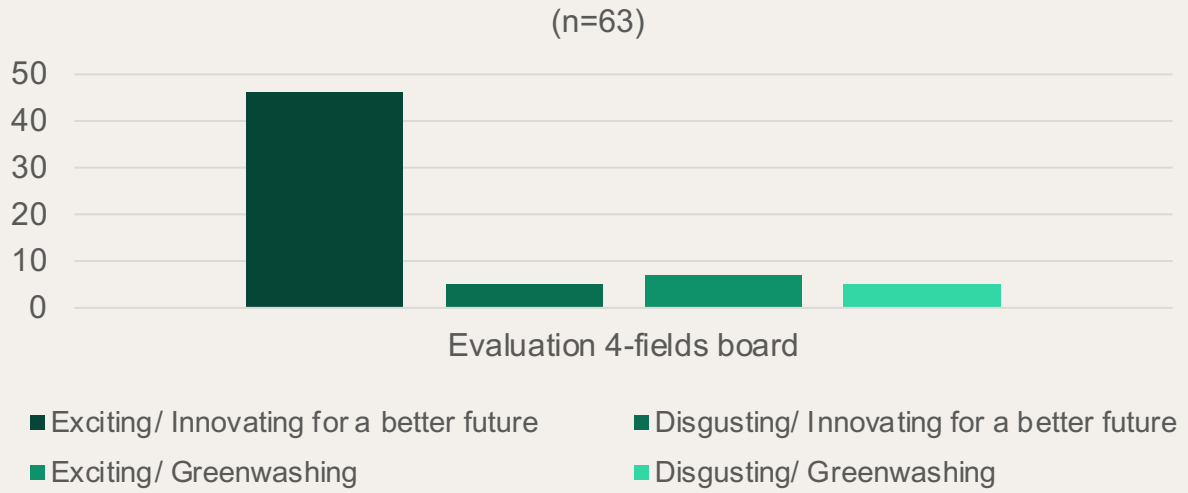
(n=97)



► Algae is seen as carbon-absorbing, water-cleaning and as being able to have a positive community impact.

POSTER RESEARCH RESULTS

2 WHAT DO YOU THINK OF TEXTILES MADE FROM ALGAE?

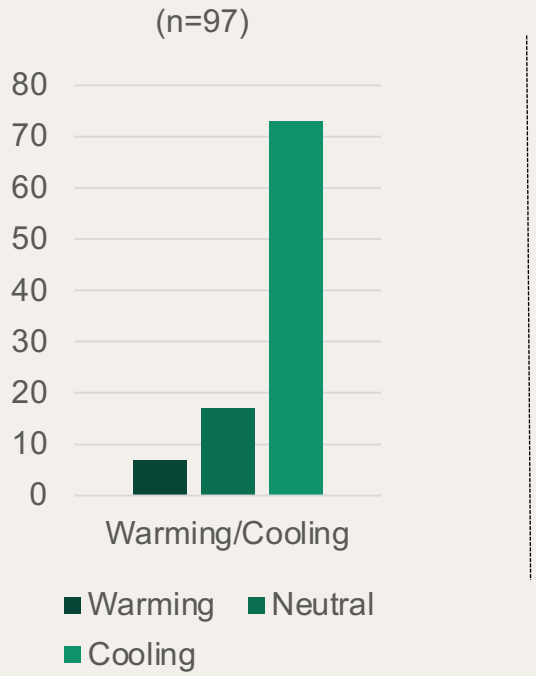


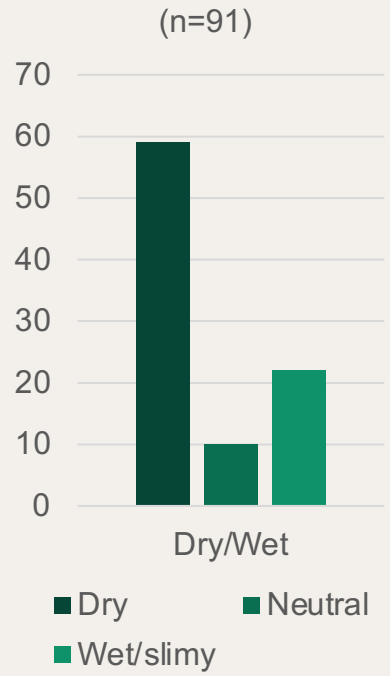
FINDINGS

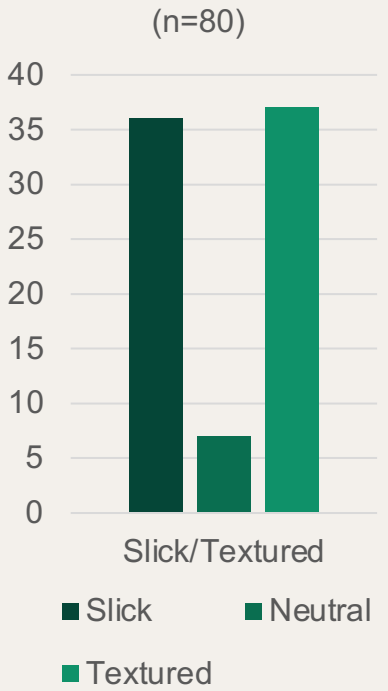
- The majority of people (whether it be from adidas or at the GreenLab) view algae as an innovative idea that is exciting and good for the environment
- Only rarely did people view algae as disgusting, or making products out of algae as greenwashing

POSTER RESEARCH RESULTS

3 HOW WOULD YOU IMAGINE AN ALGAE SPORT SHIRT TO LOOK AND FEEL LIKE? (1/3)







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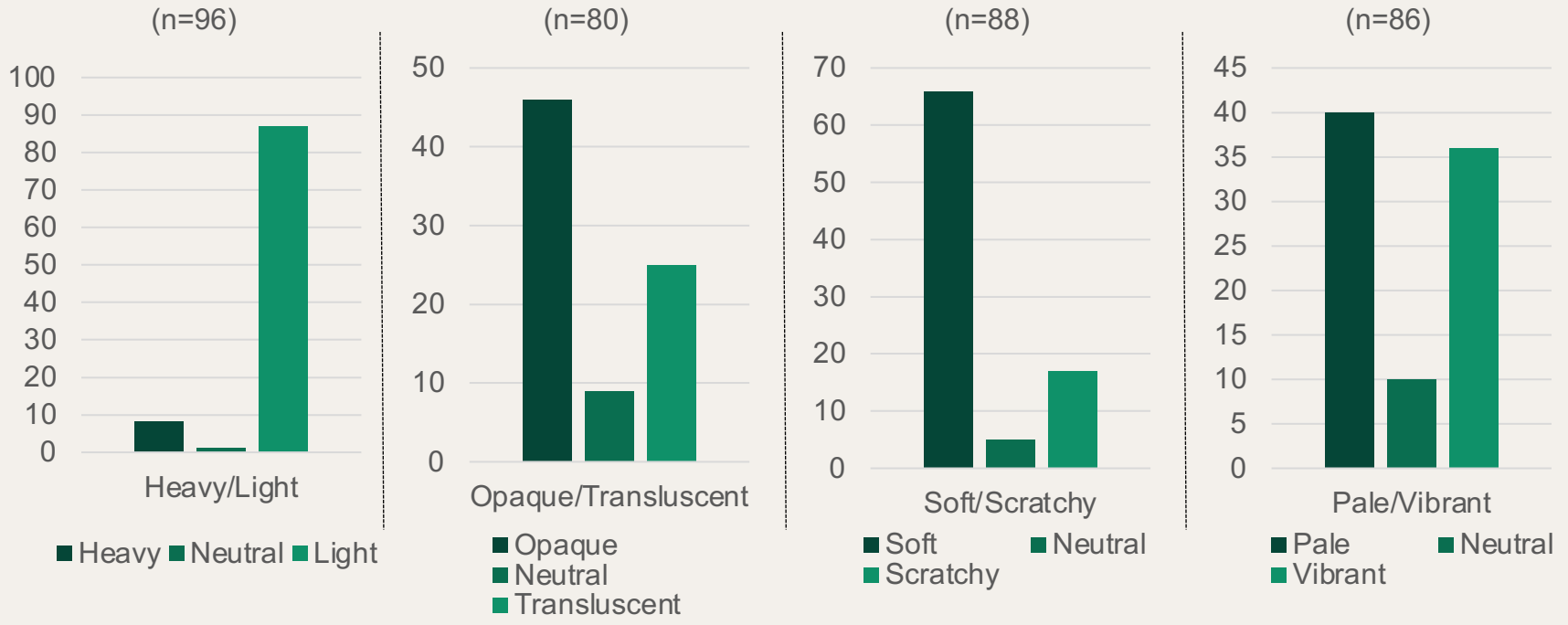
POSTER RESEARCH RESULTS

3 HOW WOULD YOU IMAGINE AN ALGAE SPORT SHIRT TO LOOK AND FEEL LIKE? (2/3)



POSTER RESEARCH IMPLICATIONS

3 HOW WOULD YOU IMAGINE AN ALGAE SPORT SHIRT TO LOOK AND FEEL LIKE? (3/3)

LIGHT-WEIGHT

The vast majority of participants want the t-shirt to be lightweight, e.g., like functional sports wear.

COOLING

Respondents wish the t-shirt to have a cooling texture, while nearly nobody wished the t-shirt to have warming features.

*Note that study was conducted during summer

DRY

Respondents want the t-shirt to be dry/ have sweat-absorbing features.

SOFT

Respondents want the t-shirt to be soft, which places it inbetween a functional and comfortable cotton material.

PALE & VIBRANT

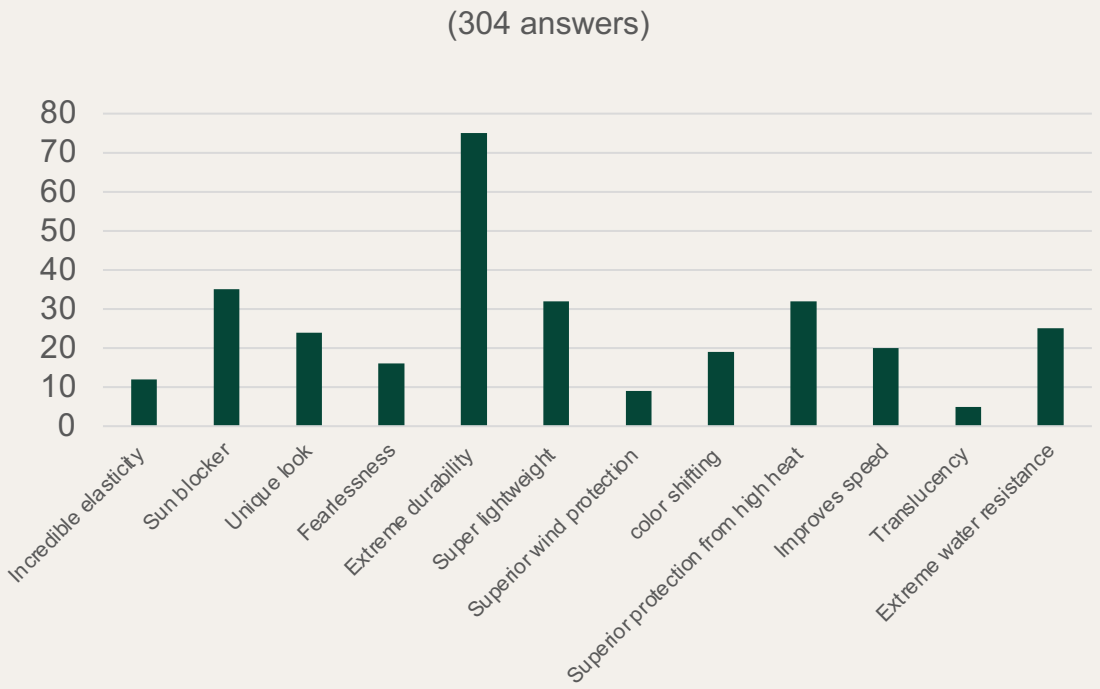
Depending on the focus group, both pale and vibrant colours are desired by consumers.

OPAQUE

Opaque was the dominating feature, while there were also some participants wanting it to be transluscent.

POSTER RESEARCH RESULTS

4 IF YOUR ALGAE SHIRT GAVE YOU SUPERPOWERS, WHAT WOULD THEY BE?

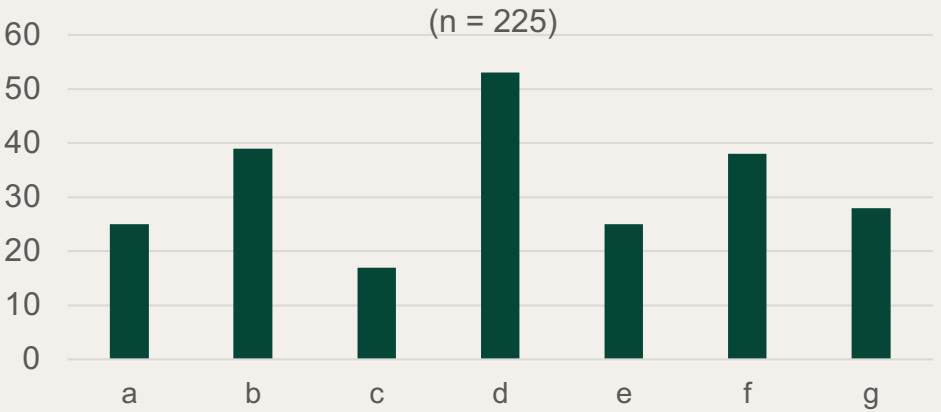


PRACTICAL IMPLICATIONS

- Durability is extremely dominant over all categories and thus needs to be a focus point in both product development and communication measures.
- Superior protection from heat and sun blocker (similar purpose) is the second most mentioned category: people seem to associate the features of an algae-based shirt with those of a functional outdoor shirt (e.g., with cooling features).
- Third most mentioned is a super lightweight quality, which matches the above-mentioned associations with a functional material.

POSTER RESEARCH RESULTS

5 WHAT WOULD YOU WANT TO HAPPEN TO YOUR ALGAE SHIRT WHEN YOU NO LONGER NEED IT?



a - I return it and get a voucher for a new shirt
b - It gets turned into a new tshirt
c - Why would there be an end of life?
d - It should become soil for another product.
e - I do not care. You made it. You figure it out.
f - It returns to the ocean and dissolves.
g - I can grow flowers out of it.

PRACTICAL IMPLICATIONS

- Relatively high rate of people want the product to be returned to the ocean or it to be turned into soil/ a new t-shirt. It implies an interest in a circular customer journey (esp. for employees; “sustainability-literate“ people)

- A clear difference between adidas and the GreenLab (non-adidas employees) could be observed: consumers “outside of adidas” want an incentive; options **a** (voucher) and **e** (I do not care) were selected the most

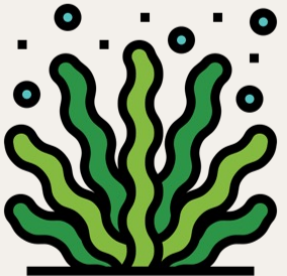

LIMITATIONS

LIMITATIONS AND FURTHER RESEARCH NEEDS

- The focus groups (as well as the hanging of the posters) were performed at an adidas store with an adidas branding, hence a brand bias might naturally occur within the results. Therefore, future studies should focus on verifying the results in a neutral setting, e.g., with undisclosed brand names (BRAND “A”).
- As the research was conducted at one specific point in time and there was a large heatwave in Germany during this period, especially the expected features of a bio-based product might have been biased in a temperature-sense. Consequently, it makes sense to validate these results in a different setting and during a different time of year to draw final conclusions as to how important specific product attributes are.
- Some of the posters were placed within the adidas headquarter in Herzogenaurach: while no differences between the answers could be observed for many categories between Greenlab and Herzogenaurach, especially for the end of life a significant difference could be found: adidas employees are more informed in this regard, as circularity is a highly relevant strategic topic within adidas. Thus, it seems likely that adidas employees selected more “circular“ answers than participants at the Greenlab. Consequently, it would be advisable to create a separate study that focuses on finding an end-of-life solution that neutral participants agree with (e.g., *3 qualitative studies planned in 2023*).
- For the posters, a natural bias might have occurred due to direct comparison between the three categories (algae, cotton, petroleum). Further, posters provide a less anonymous tool for surveying, which might have led to biased and socially influenced answers. To draw final conclusions in this regard, it might therefore be advisable to conduct further experimental studies.
- For some posters, information was given to validate the perception before and after: while it was intended to keep the “information“ as objective as possible, it cannot be excluded that it has influenced consumers in a certain way. Similar to the natural bias due to the direct comparison, further experimental studies should therefore be conducted to verify the effect.

CONCLUSION:

Due to the qualitative and exploratory nature of this study, it was possible to draw first and unseen conclusions on how consumers perceive bio-based products. Nevertheless, especially the methodology that was chosen also leads to limitations, which indicate the need for further research studies on the addressed topics. We consider this study as a baseline research for further qualitative and quantitative studies on the consumer perception of bio-based products and hope to be able to thus shed some light on the importance of e.g., product attributes or end-of-life solutions.



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ARE ALGAE OUR FUTURE?

Please reach out for feedback and questions to:

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und Forschung

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www.biotexfuture.de