Recycling paper with cellulose decomposition by hay bacillus

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Introduction

In this research, we confirmed that the decomposition of cellulose (Bacillus Subtilis) with hay bacillus is possible, because we had a shape change on paper decomposing. In addition, we reached the conclusion that there is a limit to the decomposition, because a big shape change was not seen in the paper one week later from the second application.

Purpose

We'll decompose the papers which can't be recycled or can only be partially recycled with hay bacillus and use the decomposed product as compost. In addition, hay bacillus is safe because it exists in the natural world.

Hypothesis

Hay bacillus can decompose cellulose, so we can consider that it can do the same for paper. The decomposition may be obstructed by ink and chemicals included in the paper.

Methods

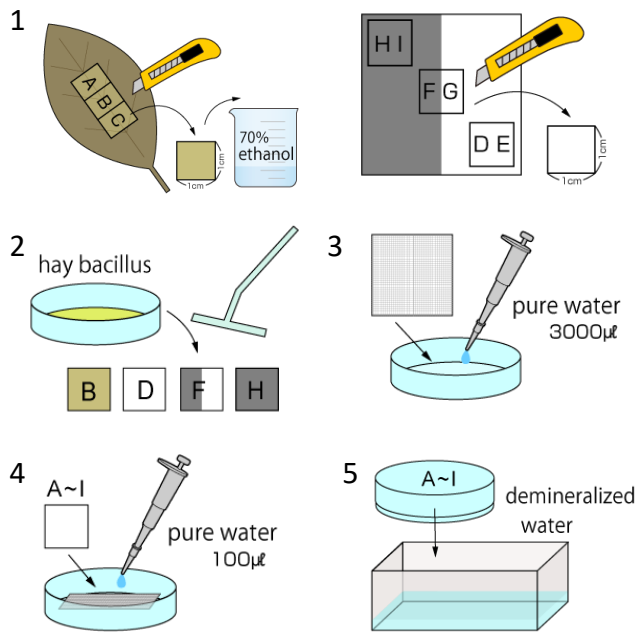

Table 1: Survey target

	with hay bacillus	without hay bacillus
Leaf(untreated)		A
Leaf(sterilized)	B	C
Paper(No ink)	D	E
Paper(Half of ink)	F	G
Paper(Full of ink)	H	I

※"Without hay bacillus" means that we did not apply hay bacillus in the experiment

Leaf results

No change was observed even when observed with a microscope, so it was unknown whether it was decomposed. B got less moldy compared to A and C.

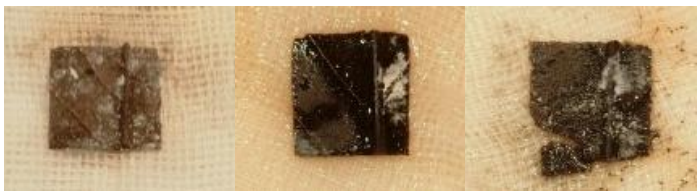

figure A figure B figure C

Newspaper results

The following changes were seen in "D· F · H". "E▪G▪I" had little change from before the experiment. There was no big difference depending on the amount of ink.

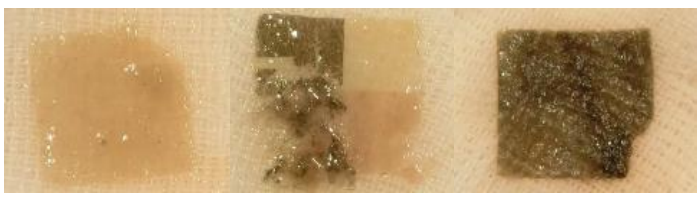

figure D figure F figure H

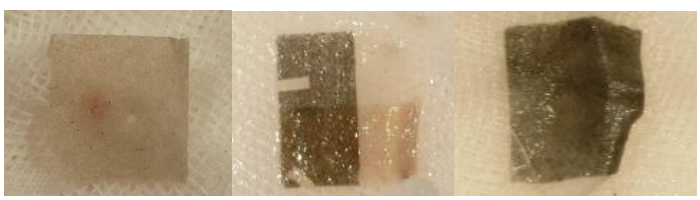

figure E figure G figure I

Examination

We think that hay bacillus have strong breeding so other bacteria prevented proliferation from B.
Due to its changing shape, the structure of fiber (cellulose) is decomposed and what remains is lignin. Also, the ink doesn't prevent hay bacillus from decomposing the subjects.

Improvement

- We should use some stereo microscopes and keep the same brightness
- The way of sterilizing leaves and keeping them sterile aseptically
- Make the samples of the experiment the same thickness
- make the level of decomposition clear

Future Research

- The reasons why paper doesn't decompose with first the application of hay bacillus
- The way of promoting leaf decomposition
- Decomposition product use for compost
- Effects of other bacteria