

Symposium on Forest and Peatland Fire 2025:

Cooperation between Universitas Palangka Raya (UPR) & Japan International Cooperation Agency (JICA)

Session 1: Finding from JICA forest and peatland project 2023-25

Result of three-aspect verifications under the JICA

- Fire fighting performance
- Environmental evaluation

February, 18, 2025



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0. Outline



February 18, 2025

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■ Background

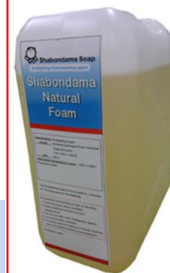


Soap-based firefighting agents are effective against peat fires

- A small amount is needed to extinguish fires compared to water
- No effect on vegetation recovery

Subject

- Burning time was not sufficient
- Not quantitative vegetation recovery



Fire extinguishing performance

Environmental evaluation

Economical aspect

▶ **【Purpose】** The effectiveness of this product was verified from three perspectives

■ Our efforts so far

June

Kick off meeting



August to September

Basic experiments



May

Training in Japan



August

Demonstration test
Panel discussion



March, 2023~

2024

2025

Today

2

0. Outline

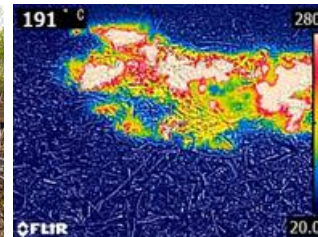
1. Fire extinguishing performance test

- Materials and Methods
- Results - ①Amount of water
- Results - ②Extinguishing time
- Results - ③Reburning

2. Environmental evaluation test

- Materials and Methods
- Results - ①Toxicity test
- Results - ②Effects on ferns test

3. Demonstration in Indonesia (2024)



1. Fire Extinguishing Performance test



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■ Materials and Methods

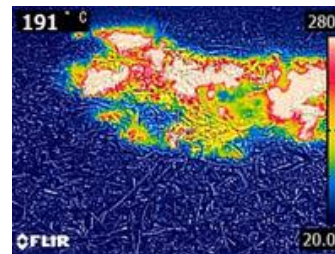
• Fire extinguishing test



packed dried peat soil



top view of the
peat soil in burning



the temperature was checked
using thermal imaging camera

- Dried peat soil packed in 1.5 m × 1.5 m were burned for 24 hours.
- Water or 1% Soap-based firefighting agent solution (SOAP) were sprayed using a backpack-type water tank until the peat surface temperature was below 50°C. Additional firefighting activities were conducted if the peats were reignited.
- The amount of water and time required for firefighting activities were measured.₄

1. Fire Extinguishing Performance test



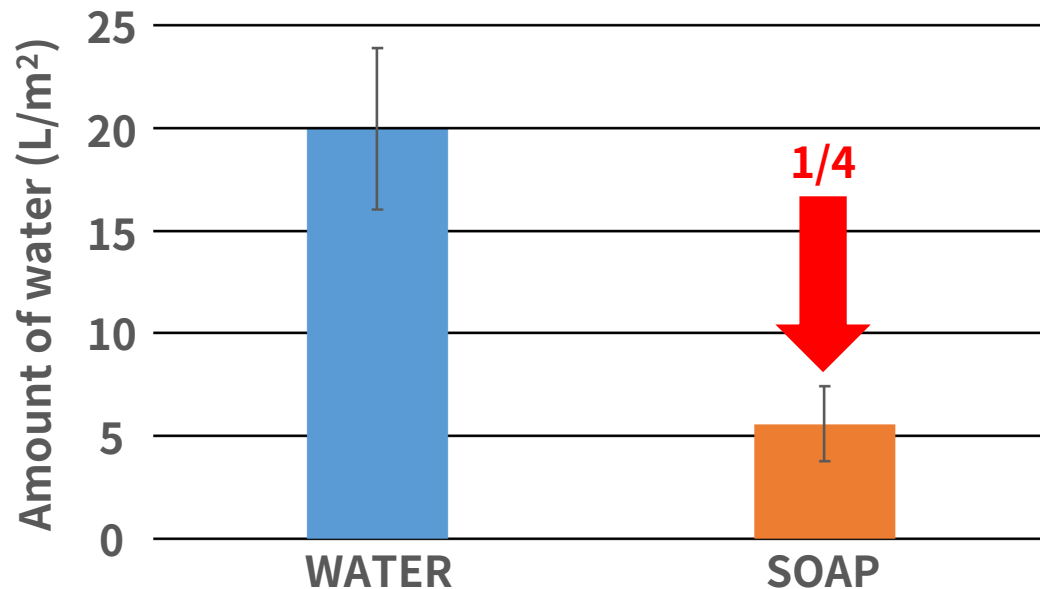
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■ Results - ① Amount of water

- Comparison of amount of water by using WATER or 1% SOAP



SOAP reduced the amount of water demanded for extinguishing peat fire to approximately one-fourth compared to water¹⁾.

1) T. Kanyama, K. Kusin, A. Jaya, S. Dohong, K. Uezu, T. Kawahara.

Evaluation of the Extinguishing Efficiency of Eco-Friendly Soap-Based Media Against Prolonged Simulated Peat Fires. Doi: 10.20944/preprints202502.0935.v1

1. Fire Extinguishing Performance test



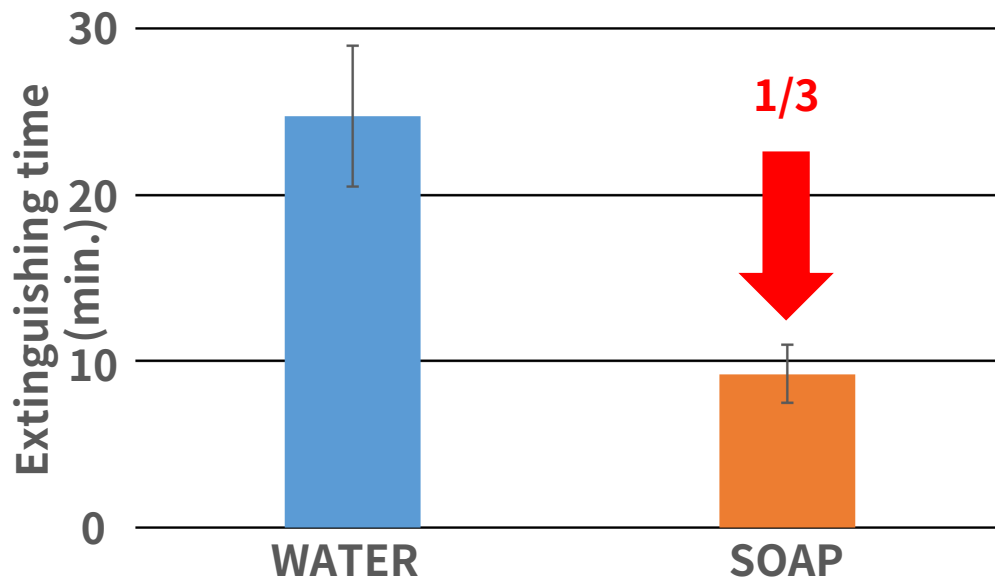
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■ Results - ② Extinguishing time

- Comparison of extinguishing time by using water or 1% SOAP



SOAP reduced the extinguishing time demanded for extinguishing peat fire to approximately one-third compared to water¹⁾.

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1. Fire Extinguishing Performance test

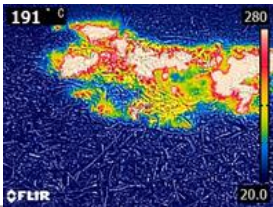
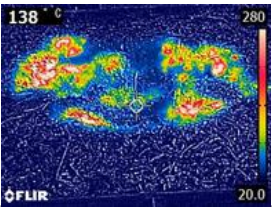
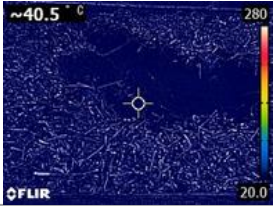
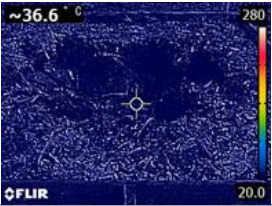
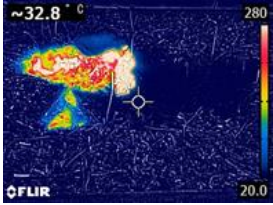


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■ Results - ③ Reburning

	Water	SOAP
Before extinguishing		
After extinguishing		
About 20 hours after		No reburning

SOAP prevented peat soil from reburning after fire extinguishing.

2. Environmental Evaluation test



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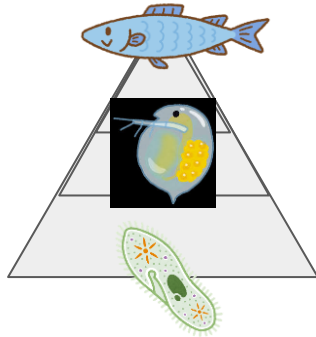


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■ Materials and Methods (Experiments in Laboratory)

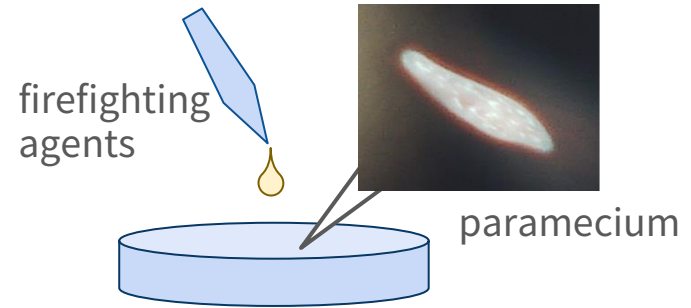
① Toxicity test

• Materials (Paramecium)



- Paramecium is an unicellular organism, so the effect of chemical substances appear at the cellular level.
- Paramecium plays an important role in the food chain, and its toxicity has a significant impact on environmental effects.

• Methods



- A drop of 1% SOAP or 1% synthetic firefighting agent was placed on top of the paramecium in the petri dish.
- The movement of paramecium was observed with a video camera after dropping.

2. Environmental Evaluation test



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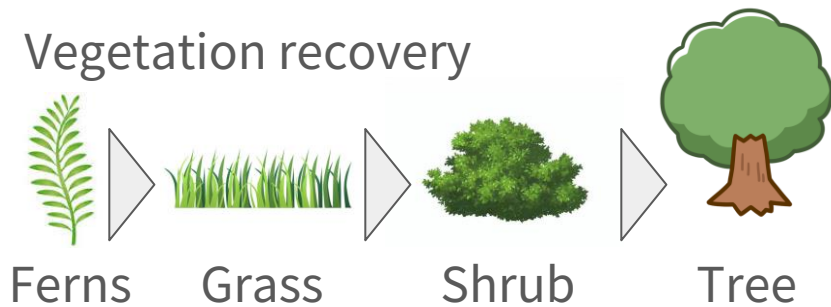
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■ Materials and Methods (Experiments in Laboratory)

② Effects on ferns test

• Materials (Fern)

Vegetation recovery



- Ferns grow quickly and appear and grow up first in vegetation recovery after forest and peat fires.
- The toxicity on ferns may indicate an effect on the recovery of vegetation.

• Methods



- Water, 1% SOAP or 1% Synthetic were sprayed onto the ferns.
- The ferns were observed and the number of days until the ferns died was counted.

2. Environmental Evaluation test



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■ Results - ① Toxicity test



2. Environmental Evaluation test












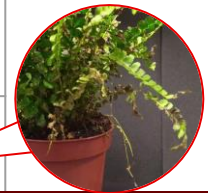
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■ Results - ② Effects on ferns test

	Water	SOAP	Synthetic
Before spraying			
Immediately after spraying			
14 days after spraying			



The leaves were a little dead

2. Environmental Evaluation test



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■ Results - ② Effects on ferns test 14 days after spraying



2. Environmental Evaluation test

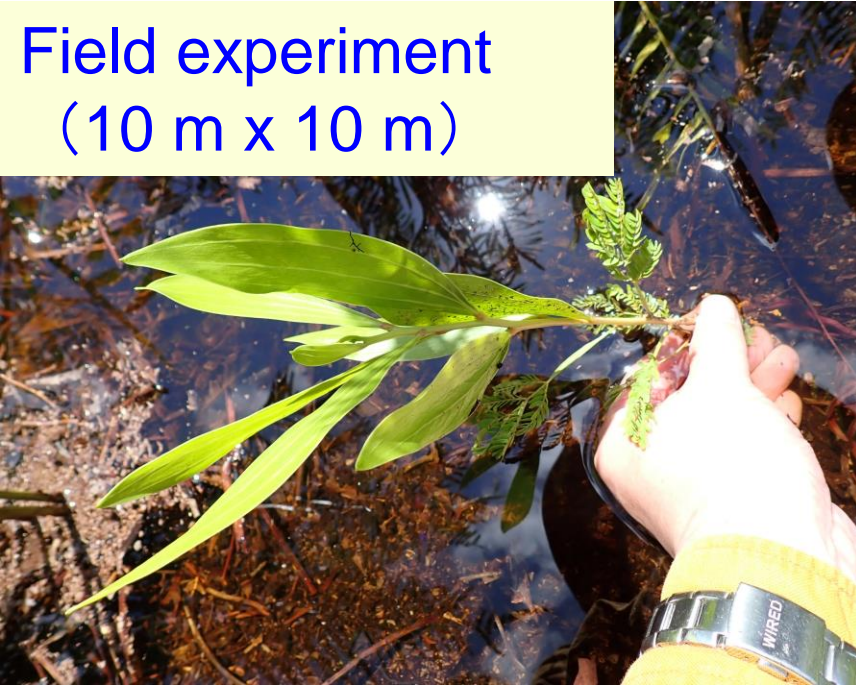


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Field experiment
(10 m x 10 m)



Actual field monitoring of tree
component in the ecosystem
→ **Reported in Session 2**



3. Demonstration in Indonesia (2024)

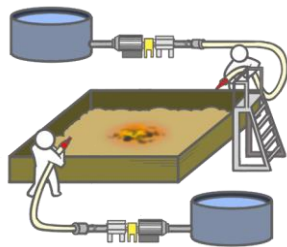
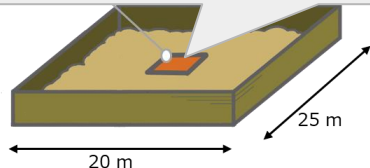


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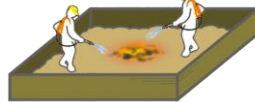
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Methods

Ignition agents were placed within 15 m × 15 m



pumps and hoses



backpack-type water tank

- A 20 m x 25 m area of peat soil was burned for 30 minutes.
- First, 1% SOAP were sprayed using pumps and hoses.
- Second, 1% SOAP were sprayed using a backpack-type water tank.

The scene of fire extinguishing



47 participants



The peat soil was burned



Fire extinguishing



Lines in the photo indicate an area for experiment

3. Demonstration in Indonesia (2024)



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■ Photographs



Firefighters



Small scale permeability test



Mixing of SOAP into water



2nd firefighting using a backpack-type water tank



The panel discussion on extinguishing of peat fire was also held

●Comments from participants of demonstration test

- Extremely Effective during the dry season when water is scarce.
- Effective in actual fire situation because of less water amount and time.
- Eco-friendly and User-friendly.
- SOAP was easily solved into water.
- No smell and marks were left.
- A novel innovation for fire extinguishing.

■ SOAP was effective for extinguishing peat fire.

- SOAP reduced both the amount of water and demanded time.

■ SOAP did not have any adverse effect on environment.

- SOAP was not harmful to paramecium whereas synthetic foam burst the bodies of paramecia.
- SOAP was not harmful to ferns whereas synthetic foam caused the leaves to die.

■ SOAP was well received by local firefighters in Indonesia.