

The influence of electromagnetic waves on the germination of plants that are used to repel animals

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Summary

- ① The germination of plants is repressed while exposed to electromagnetic waves that are used to repel animals.
- ② The germination of plants resumes after electromagnetic waves are stopped.
⇒ The electromagnetic waves **don't kill the seeds but stop the germination temporarily.**

Introduction

Background

- Some animals devastate crops.
⇒ **Electromagnetic waves are used to repel them.**
 - It is known that electromagnetic waves affect plants.
⇒ The influence depends on its frequency : **Good influence or Bad influence**
- (e.g.) Wi-Fi router...Represses the germination of garden cresses.
2.45GHz microwave...Promotes the germination of spinaches.

➔ The electromagnetic waves used to protect plants might badly affect germination.

Purpose

- To clarify whether electromagnetic waves repress the germination of plants.
- To investigate how electromagnetic waves influence the germination.

Methods

- The seeds...Oats (*Avena sativa*) and White radish sprouts (*Raphanus sativus* L.)
- ※We used dark germinators to reduce the influence of light.
- Condition...In the incubator at 18°C
⇒ We observed them in the same incubator in order to make them grow under **much the same condition**. So **the results of our experiments are attributed to electromagnetic waves.**
- Period...For one week

《Experiment①》

Do electromagnetic waves affect the germination?

⇒ We observed the number of germinated seeds under the condition with electromagnetic waves and that without electromagnetic waves.



Figure 1 Experimental device

We cut off electromagnetic waves with **iron**. A stainless net or an aluminum box couldn't cut them off, but an iron box could prominently block them.

《Experiment②》

Do the seeds resume germinating when electromagnetic waves are stopped?

⇒ We investigated how electromagnetic waves influence the germination.
Did the seeds **die**, or **stop germinating temporarily**?

Results

《Experiment①》

The number of germinated seeds was **lower** under the condition **with electromagnetic waves**.

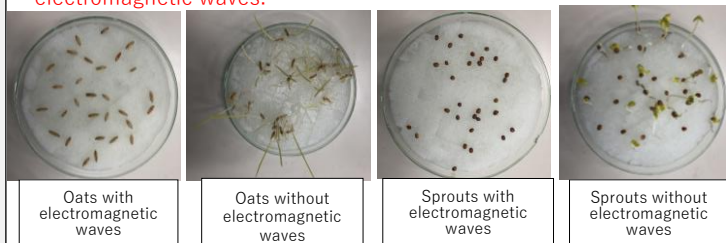


Figure 2 The seeds after the experiment

Table 1 Experiment① Days and the number of germinated seeds

	Day1	Day2	Day3	Day4	Day5	Day6	Day7	
Oats	0	0	0	0	3	3	3	Yellow...With electromagnetic waves
Oats	0	30	30	30	30	30	30	White...Without electromagnetic waves
Sprouts	0	0	1	1	1	1	1	
Sprouts	0	21	23	23	23	23	23	

Oats

- Three of the seeds germinated under the condition with electromagnetic waves, but they didn't grow after the germination.
- All of the seeds germinated under the condition without electromagnetic waves.

White radish sprouts

- One of the seeds germinated under the condition with electromagnetic waves, but it didn't grow after the germination.
- 23 of the seeds germinated under the condition without electromagnetic waves.

⇒ **Electromagnetic waves repressed the germination of plants.**

《Experiment②》

The germination resumed after electromagnetic waves were stopped.



Figure 3 The seeds one week later

Table 2 Experiment② Days and the number of germinated plants

	Day1	Day2	Day3	Day4	Day5	Day6	Day7
Oats	3	3	3	3	5	10	10
Sprouts	1	1	1	2	5	7	8

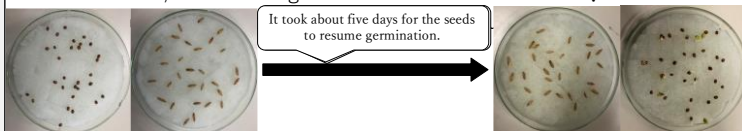
Ten oat seeds resumed germinating.

Eight sprout seeds resumed germinating.

⇒ Despite some seeds losing the ability to germinate, **about 30% of the seeds resumed germination after electromagnetic waves were stopped.**

Discussion

- While the seeds are exposed to electromagnetic waves, the germination is at rest.
The germination resumes after electromagnetic waves are stopped.
- It took some time for the exposed seeds to resume germination.
⇒ Electromagnetic waves inhibited the seeds from generating proper matters, or let them generate abnormal substances.



References

Hideya Saito et al. (2007) Effects of 2.45GHz Microwave on the plant growth rate - Promotion of germination, root elongation, and synthesis of the chlorophyll - TECHNICAL REPORT OF IEICE SPS2006-16, p7-14