

Earthworm

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1. Purpose

We examined whether terrestrial earthworms can survive and grow in not only an original condition but also different conditions.

2. Experiment

▽Experiment▽

We prepared tanks with different conditions as shown in the table. We put three terrestrial earthworms *Eisenia fetida* into each of the tanks and reared them for a month. Also, we washed all the earthworms and applied the same moist filter-paper for 2 days before and after the experiments. We were able to clear the earthworms' guts and set their water content to equal. After that we weighted the earthworms from each of the conditions.

	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩
condition	W	W	W	W	S+W	S+W	S+W	S+W	S	S
aerator	○	○	×	×	○	○	×	×	△	△
feed	○	×	○	×	○	×	○	×	○	×

※W...water S...soil



▽Result▽

The results are shown in the table. The earthworms in ③ and ⑦ died at the beginning of this experiment. The weights of the earthworms without feed decreased, and those with feed increased. When they were reared in soil + water, the growth rate was highest, in soil, it was second highest, and in water, it was lowest.

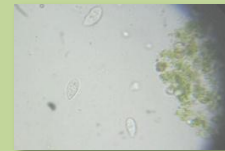
	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩
weight[g](before)	0.44	0.43	0.41	0.44	0.43	0.43	0.44	0.44	0.43	0.43
weight[g](after)	0.48※	0.28	0※	0.32	1.02	0.31	0※	0.39	0.76	0.15※
growth rate[%]		-34.9		-27.3	137.2	-27.9		-11.4	76.74	

※1 died

※3 died

※3 died

※2 died



▽First consideration▽

It is assumed that microbes are a related cause for all of earthworms in ③ and ⑦ dying. We found many microbes in tanks with feed, and we were not able to put microbes in tanks without feed. So it is assumed that in tanks with feed, O₂ was used by microbes and the amount of O₂ became less than a viable amount of O₂, and all earthworms died.

▽Second consideration▽

We think that there are two reasons why the earthworms in water + soil became the biggest, whereas the earthworms in water became the smallest in our study.

The first reason is that the earthworms in water + soil and in soil could eat easier than those in water. Earthworms could fix their body in soil. Moreover cabbages stay in the place on soil. So we think the earthworms in water + soil and in soil became bigger because of the presence of soil.

The second reason is the feed distribution. In the soil situation, we mixed soil with feed to prevent them from drying. But, in the water + soil situation, feed was concentrated on the surface of the soil where the earthworms were. Earthworms couldn't distinguish feed from soil. Then, they ate feed with soil and water but digested only feed. Therefore earthworms in water + soil ate more feed than earthworms in soil. So earthworms in water + soil became bigger than earthworms in soil.

3. Inspection experiment

▽Inspection experiment▽

We changed proportion of feed in the soil by changing the amount of feed. And, we checked how it affected the increasing rate of earthworms' weight. We prepared different condition tanks as shown in the table.

	a	b	c	d	e	f
condition	W	W	S+W	S+W	S	S
aerator	○	○	○	○	△	△
proportion of feed	1/3	2/3	1/3	2/3	1/3	2/3

▽Result & Consideration▽

The more feed there is, the higher the growth rate of earthworms' weight becomes. But, most of the feed in tanks with a small amount was left uneaten. So we thought that the density of feed related to the growth rate of earthworms' weight.

	a	b	c	d	e	f
weight[g](before)	0.45	0.45	0.45	0.45	0.45	0.45
weight[g](after)	0.47	0.53	0.62	0.69	0.47	0.65
growth rate[%]	4.44	17.8	37.8	53.3	4.44	44.4

3. Conclusion

The growth rate of the earthworm becomes highest in soil + water, second highest in soil and lowest in water. When there is an aerator, the more feed there is, the higher the growth rate becomes. Thus, in our study, the environment that an earthworm can grow biggest is one that has an aerator in the environment of the soil + water, and has more feed.