

## Focus on effect of fertilizers on soil and growth of crops

Yuki SAKODA, Shimon TAKAHASHI, Shunsuke KATAYAMA, Saki OGAWA, Nanako MURAKOSO, Tomoe INOUE

### Abstract

Previous research saying that more and more fertilizer are used in the world, but the amount of the crop is decreasing. And also, there are some differences about nutrient using each kind of fertilizer. However, there is no certain proof which tell us the reasons of these situations. Our study will show you how fertilizer affect on the soil properties and nutrition of crops by some experiments and find the answer of our question.

### The back ground of our theme decision

#### Organic fertilizers

- good for our body
- good for the environment
- taste good



#### Chemical fertilizers

- bad for our body
- bad for the environment
- regard efficiency as importance



**BUT!!**

Many farmers aren't growing crops with organic fertilizers

#### The question

Is a chemical fertilizer bad as people think

#### The purpose

Is to concern the truth of the image and make better

#### A leading study

From FAOSTAT America

The amount of fertilization is increasing  
The amount of crops is decreasing

It is said that this result is due to the impact of chemical fertilizers on the nature of soil.

⇒ The cause of a bad image of chemical fertilizers

### The novelty of this study

The image that chemical fertilizers have a bad effect on the soil has not proved to be true yet.

⇒ make it clear

Find good points of chemical fertilizers while people have a good image on fertilizers nowadays.

### Method of investigation

In this case, we do our research by focusing on soil.

The method of evolving soil.

biological evaluation

→ the amount of breathing of soil microbes

<Experiment condition>

We grew *komatsuna* for a month under these 8 conditions

- Baked soil (no microbe)
- Black soil (containing microbe) nothing added
- only organic
- only chemical
- both organic and chemical(mixed)

### The amount of soil breathing

#### Purpose

compare the rough number of microbes in soil after growing *komatsuna*

#### Precondition

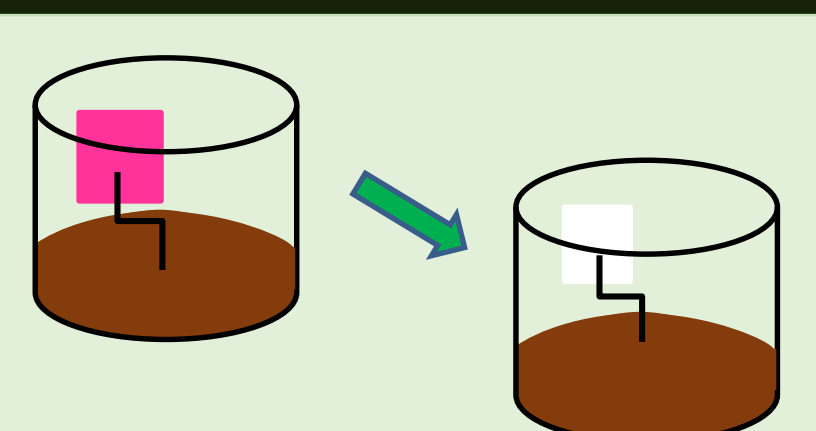
Soil microbes are necessity for making the soil fertile

We can say that the more microbes are in soil, the richer the soil become rich

Black soil and organic fertilizers have already had microbes

#### Method of experiment

Put filter paper soaked in NaOH(0.01mol/L) into an airtight container



Measure the time of neutralization of NaOH and CO<sub>2</sub> (paper changes into white color from red color) (keep the temperature of soil on 23°C)

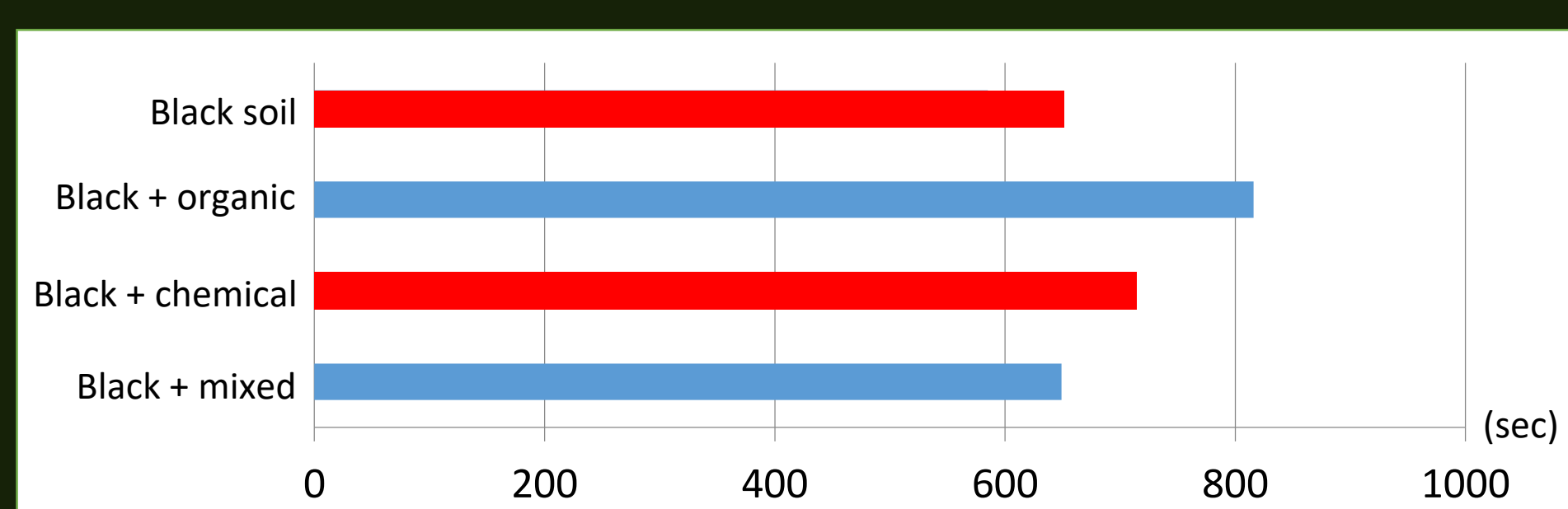


Figure1

We couldn't find a big effect on the work of microbes caused by fertilizers.

### Experiment of measuring pH, EC, NO<sub>3</sub><sup>-</sup>

#### purpose

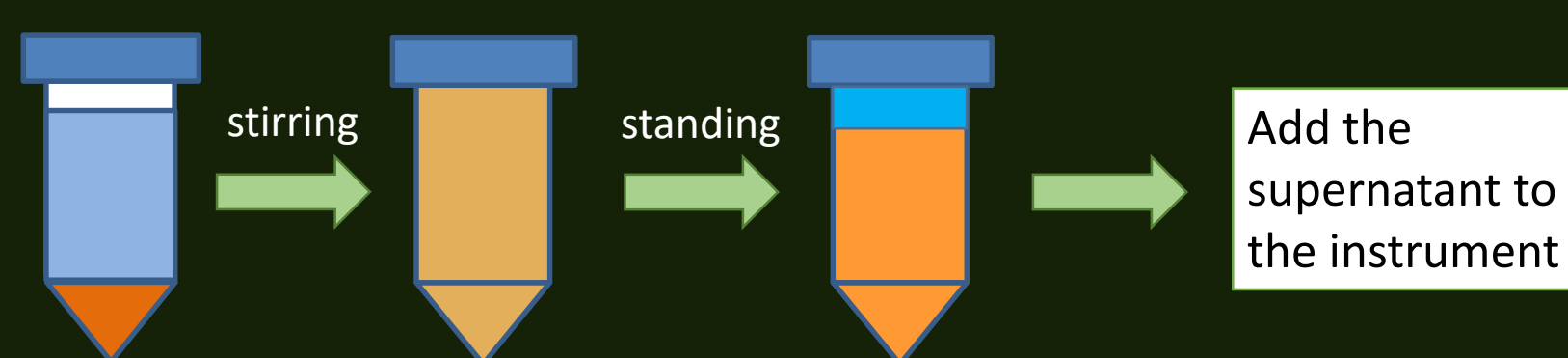
Judge the influence on soil caused by the difference of fertilizers.

#### assumption

- pH : has something to do with the growth rate
- EC : we can learn how much fertilizers are penetrating
- NO<sub>3</sub><sup>-</sup> : we can learn how much the ingredients of fertilizers are resolving by soil microbes

In this experiment , we used a simple measuring instrument.

1. Gather soil(4g) and distilled water (10ml (EC, NO<sub>3</sub><sup>-</sup> ...20ml) )to lidded container.
  2. Mix it 1minute and leave it 30minutes (EC, NO<sub>3</sub><sup>-</sup> ...1hour)
  3. Scoop the clear layer at the top and measure them. (EC, NO<sub>3</sub><sup>-</sup> ...filter the clear layer through filter paper)
- mix → leave → put the clear layer to the apparatus



#### Result and consideration

conditions	pH (before growing)	pH (after growing)
Black soil	6.06	5.88
Black + chemical fertilizer	5.71	6.35
Black + organic fertilizer	6.22	6.40
Black + mixed fertilizer	5.83	6.08
Baked soil	5.68	5.91
Baked + chemical fertilizer	5.48	5.88
Baked + organic fertilizer	6.31	6.39
Baked + mixed fertilizer	5.89	6.11

Figure2

We can identify the effect that fertilizing can bring pH to neutrality though it has a difference of time.

conditions	EC(ms/cm)	EC(after the growth)(ms/cm)
Black soil	0.04	0.08
Black + organic fertilizer	0.24	0.28
Black + chemical fertilizer	1.09	1.21
Black + mixed fertilizer	0.81	0.77
Baked soil	0.08	0.12
Baked + organic fertilizer	0.24	0.29
Baked + chemical fertilizer	0.81	0.87
Baked + mixed fertilizer	0.83	0.98

Figure3

The figure of the condition " no fertilizer " is especially small. It is clear that the amount of nutrition in soil is small. ⇒ fertilize more

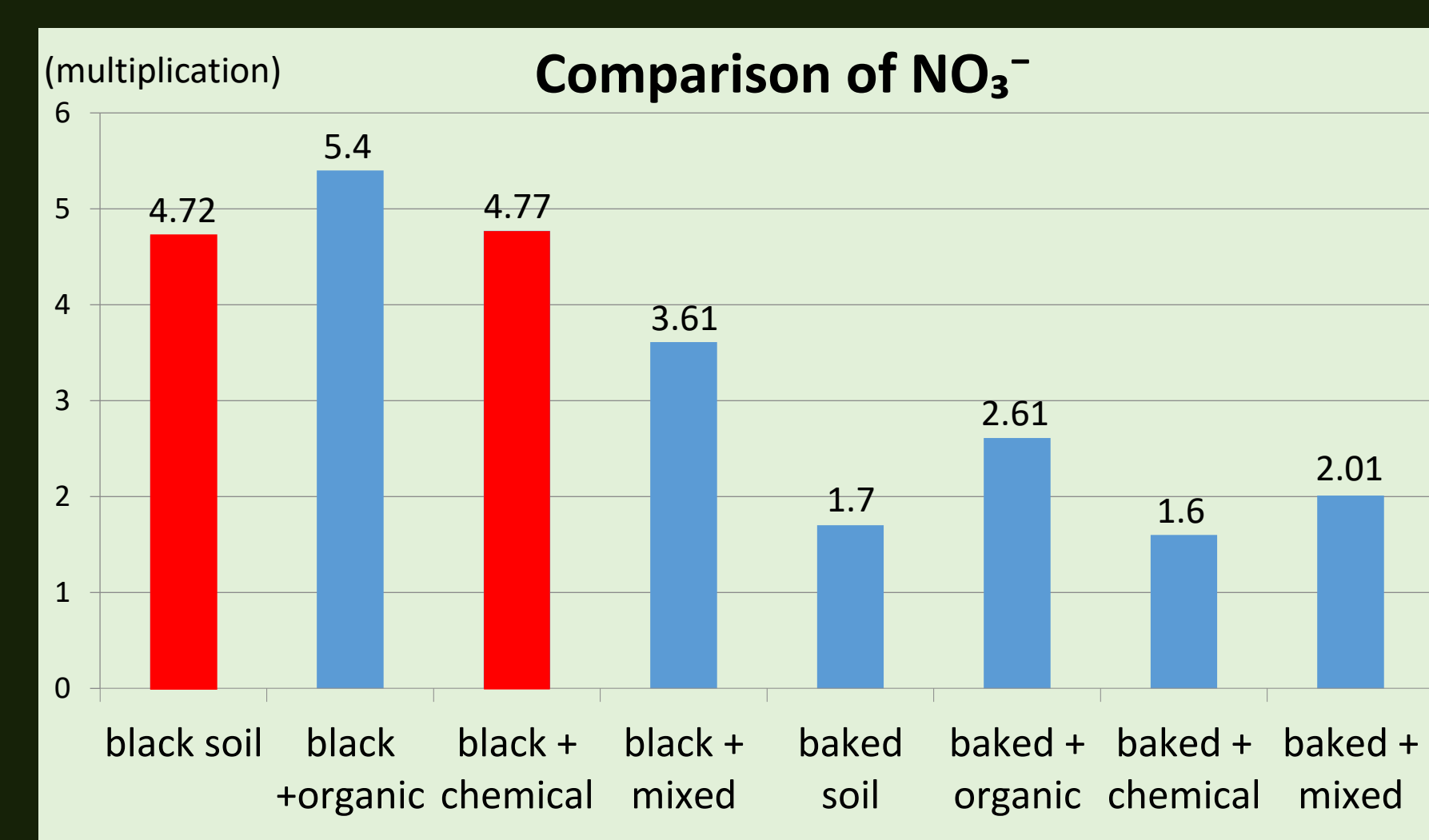


Figure4

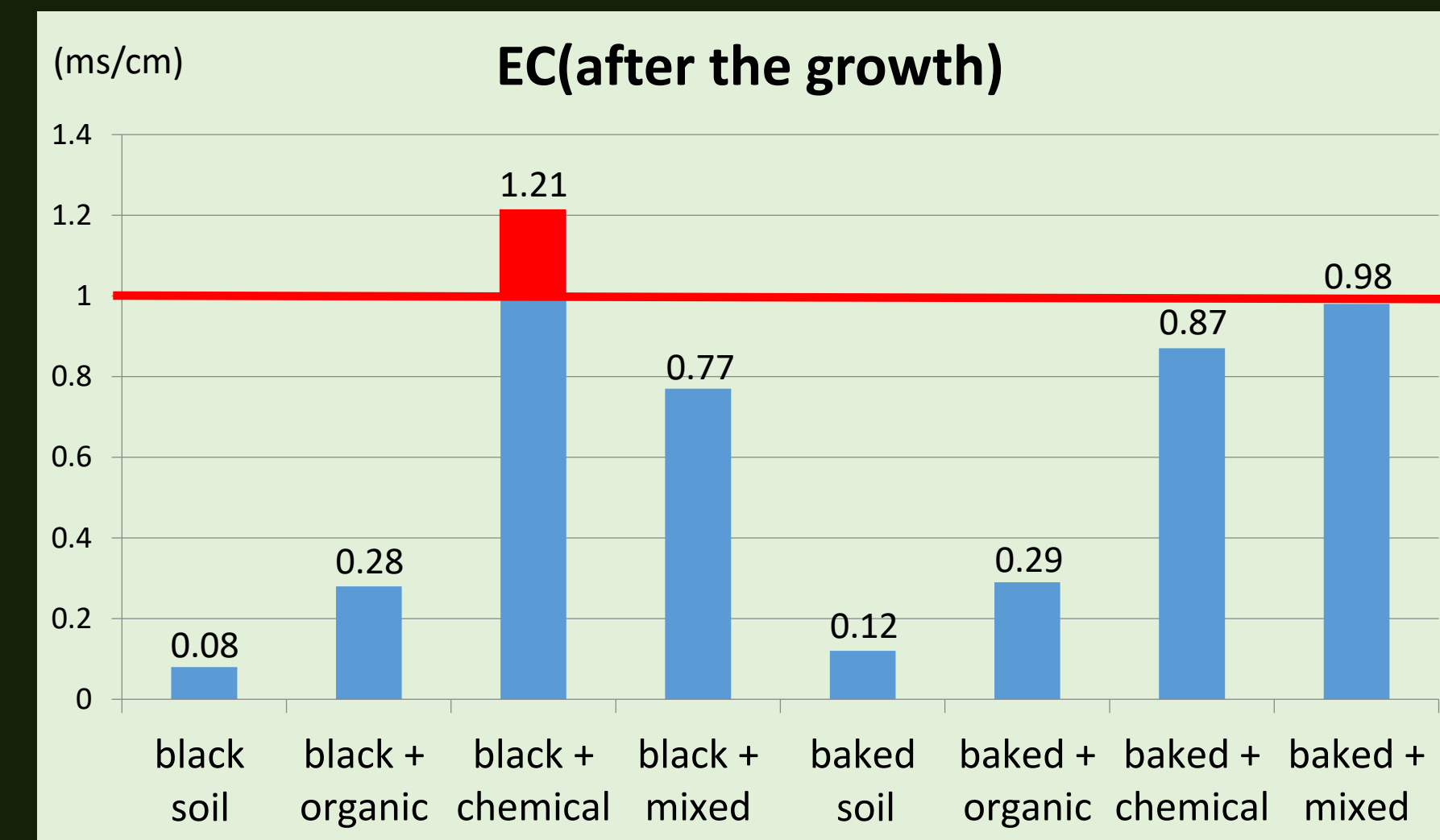


Figure5

It is said that the chemical fertilizer has no effect on microbes in the soil.

### Conclusion

< Measurement of pH, EC >

⇒ In spite of fertilizers, it has a good effect on the soil.

<The experiment of the amount of breathing and measurement of EC and NO<sub>3</sub><sup>-</sup> >

⇒ It isn't correct that chemical fertilizers have bad effect on microbes as people think.

### Our next goal

To research the effect on the crops (growth speed, composition, and soil hardness).

To research the effect on our health.



### <Acknowledgement>

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### <References>

Incorporated foundation the Japan soil association  
2006 the Japan soil fertilizer conference board of soil education  
FAOSTAT  
[http://www.fao.org/faostat/en/#data/RF/visualize\(2017,10,25\)](http://www.fao.org/faostat/en/#data/RF/visualize(2017,10,25))  
Johnshita Tsuyoshi, The problems of chemical fertilizer