# 23Ba12

## 高電圧パルス放電を用いた土壌酸化の空間分布評価

## Evaluation of spatial distribution of soil oxidation using high voltage pulsed discharge

城下卓[1)]，播磨屋瑛[1)]，高橋克幸[1)2)]，高木浩一[1)2)]，小長谷耕平[3)]
JOSHITA Suguru，HARIMAYA Akira，TAKAHASHI Katsuyuki，TAKAKI Koichi，and OBASE Kohei

岩手大学[1)]，岩手大学次世代アグリイノベーションセンター[2)]，J&T 環境[3)]
Iwate University[1)]，Agri-innovation Center，Iwate University[2)], J&T Kankyo Co., Ltd.[3)]

### INTRODUCTION

In the case of same crop is cultivated continuously on the same land, continuous cropping obstacles occurs. The biotic factors of the continuous cropping obstacles are mainly caused by the increase of specific fungi in the soil. Previously, methyl bromide had been used to prevent continuous cropping obstacles by its sterilization effect. However, methyl bromide has been classified as a Class 1 stratospheric ozone depletion substances, which prohibits its use [1]. In the past, sterilization of the soil using the high voltage pulsed power has been proposed. High voltage pulsed power generates various chemical species and plays an important role in the sterilization effect [2]. In this study, the influence of charging voltage, soil depth, and distance between electrodes on spatial distribution of soil oxidation using high voltage pulsed power generator was investigated.

### EXPERIMENTAL SETUP

A tungsten needle was used as the high-voltage electrode and placed above the soil surface. A stainless-steel disc was used as grounded electrode and placed at the bottom of the soil. The charging voltage was varied from 30 to 45 kV, the soil depth from 20 to 60 mm, and the distance between electrodes from 5 to 10 mm.

### RESULTS

Figure 1 shows the amount of decolorized indigo carmine in the soil as a function of total input energy. The indigo carmine in the soil is oxidized by chemical species generated by pulsed discharges [1]. The amount of decolorization of indigo carmine increases with increasing charging voltage and total input energy. The energy efficiency for decolorization in the case of andosols is higher than that of glass beads. Figure 2 shows the spatial distribution of the number of colonies of the *Ralstonia solanacearum*. The result shows that bacteria in the soil within 10 mm from the center are significantly inactivated, and the inactivation effect is improved near the grounded electrode.

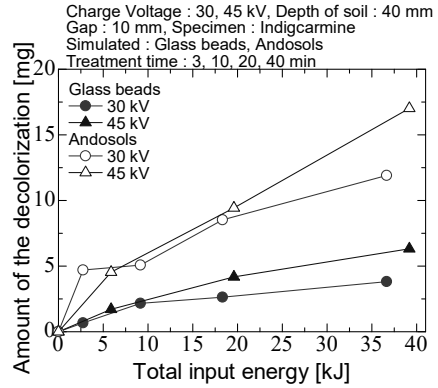


Fig. 1 Amount of decolorization as a function of total input energy into the simulated soils.

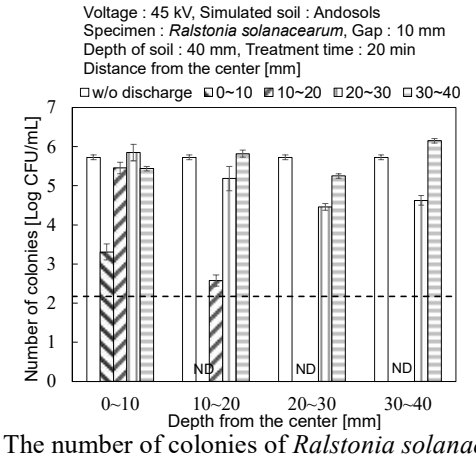


Fig. 2. The number of colonies of *Ralstonia solanacearum* after treatment

This work was partly supported by a Grant-in-Aid for Scientific Research (S: 19H05611)

### REFERENCES

[1] J. B. Ristaino and W. Thomas, The American Phytopathological Society, Vol. 81, No.9, pp.964-977, 1997.
[2] T. Sato et al., Plasma Processes and Polymers, Vol. 5, No.6, pp. 606-614(2008).