

(様式5)

指導教員 承認印	主	副	副
			

2019年06月20日

Year Month Day

学位（博士）論文要旨  
(Doctoral thesis abstract)

論文提出者 Ph. D. Candidate	生物システム応用科学府生物機能システム科学専攻 博士後期課程 <u>第3</u> 専修グループ(Department Course) 平成 <u>28</u> 年度入学(Your Entrance Fiscal Year) 氏名 <u>王跃巍</u>  (Your Name(Family, First) and Seal)				
主指導教員 氏名 Chief Advisor's Name	豊田剛己	副指導教員 氏名 Vice Advisor's Name	<u>橋本洋平</u>	副指導教員 氏名 Vice Advisor's Name	
論文題目 Title	Application of biogas digestate with rice straw mitigates nitrate leaching potential and suppresses root-knot nematode ( <i>Meloidogyne incognita</i> )				

論文要旨 (和文要旨(2000字程度)または英文要旨(500words))

※欧文・和文どちらでもよい。但し、和文の場合は英訳を付すこと。

Write a summary in Japanese (2000 characters) or in English (500words).

If the abstract is written in Japanese, needed to translate into English.

Biogas production from organic matter has increased in recent years, and, thus, the application of digestate, byproducts of anaerobic digestion, to soil as biofertilizers has become more common. This study consisted of the following seven treatments: i) control without any fertilizer (CONT), ii) chemical fertilizer (CF), iii) wet biogas digestate deriving from pig manure (WBD), iv, v) dry biogas digestate deriving from a mixture of pig manure and rice straw at an initial C/N ratio of 20 and 30 (DBD20 and DBD30), respectively, vi, vii) DBD20 mixed with a low and high amount of rice straw to adjust its C/N ratio to 16 (Mix1) and 30 (Mix2), respectively. The objectives of this study were a) to investigate the effect of application of biogas digestate on root knot nematode, soybean cyst nematode and potato rot nematode (four treatments were set up i-iv), b) to mitigate nitrate leaching risk in the soil applied with dry biogas digestate (seven treatments were set up i-vii), and c) estimate the nematicidal activity of biogas digestate on root-knot nematodes (RKN) *Meloidogyne incognita* (seven treatments were set up i-vii). The application rate of CF and digestates was adjusted to 200 mg N kg<sup>-1</sup> soil based on their inorganic nitrogen contents. Nematode preliminary suppressive experiment showed that, the density of root knot nematodes of soil enumerated with real-time PCR assays showed that DBD30 treatment significantly reduced the number of root-knot nematodes by 77.3% after 30 days incubation period while the control treatment by 12.1%. Then plant growth parameters (plant height, root weight) of tomato were significantly promoted by the application of DBD30 in addition to a suppressive effect on gall formation. Rice straw mixed with dry biogas digestate experiment showed that, nitrate contents readily increased in all the treatments with incubation, except for Mix2, and were consistently lower in Mix2 and Mix1 during most of the incubation periods. Results of RKN densities showed that the application of dry biogas digestate, in particular Mix2, reduced the RKN density in soil, compared with CF. Furthermore, garden balsam was grown as a test plant for RKN using the soils after 90 days of incubation and the results showed that gall index was significantly lower in Mix2, Mix1, and DBD30 than in CF. Characterization of bacteria communities in this study area using next generation sequencing (NGS) points out that the bacteria population structure is significantly influenced by rice

straw amount. These results suggest that the application of wet and dry digestate failed to suppress soybean cyst nematode and potato rot nematode in soil, but significantly reduce the number of root-knot nematodes compare to CONT in soil, and dry digestate mixed with rice straw might have a lower nitrate leaching potential and a nematicidal property.

(英訳) ※和文要旨の場合(300 words)

If the abstract is written in Japanese, needed to translate into English.(300 words)