RETASTE Conference Abstracts
Vol. 1 RETASTE-FWS-121
Athens, Greece, 6-8 May, 2021

Suppressive Effect of Plant Diseases Using Coffee Grounds

Mami IRIE and Hikari OBUCHI

Tokyo University of Agriculture, 1-1-1 Sakuragaoka, Setagaya, Tokyo 156-8502, Japan

Abstract

Strawberry fusarium wilt is a disease caused by *Fusarium oxysporum* f.sp. *fragariae* (*F*) and is mentioned as one of the most difficult diseases to control. In soil diseases, chemical control is the most trustable method of disease control in general. Biological agent impacts little on the environment and almost no occurrence of resistant bacteria. Fenton reaction generated hydroxyl radicals, which have high oxidation effect. Therefore, it can use for disinfection and degradation. The purpose of this study is to develop an environmentally friendly biological control technology for soil-borne disease caused by *F*, using coffee grounds as a composting material for the Fenton reaction. Approximately ten million tons of coffee are produced annually in more than fifty countries. Although part of coffee grounds is recycled as compost and animal feed, most of coffee grounds are burned as wastes. In addition, caffeine, tannins, and polyphenols present in coffee materials inhibit plant growth. Regarding the use of coffee grounds as a soil amendment, unlike other food waste, which have a uniform shape and excellent permeability, and are hygienic because they are extracted with hot water. Recently, C. K. Morikawa (2018) showed an Fe-coffee polyphenol catalyst (CGFe) played an important role as in the generation of hydroxyl radicals. And it could control the soil-borne disease caused by *Ralstonia solanacearum*.. In this paper, as verification methods, decomposition test of methylene blue, as an index of harmful substances, confrontation culture test using coffee grounds materials, and *F* microconidia germination test in first fermented coffee grounds (FC) and Fe-composted coffee polyphenol catalyst (FCFe) soil and germination inhibitor were investigated. Decomposition test of methylene blue revealed that the Fenton reaction occurred regardless of the component change due to CGFe and FCFe. Confrontation culture test showed that various coffee grounds materials (Coffee grounds, FC, CGFe, FCFe) had a pathogen-suppressing effect on *F*. The *F* microconidia germination test was suggested that FC and FCFe had germination inhibitory ability and bacteriostatic action on *F*, and it was speculated that the germination inhibitor was derived from a water-soluble component or a microorganism.

Keywords: coffee grounds, biological agent, confrontation culture, Fusarium

References

Morikawa, C. K. (2018). Generation of hydroxyl radicals by Fe-polyphenol-activated CaO2 as a potential treatment for soil-borne diseases. Scientific reports, 8(1), 1-10.