Evaluation of traditional Japanese knotweed mulch farming in the Nishi-Awa steep slope-land agriculture system, Japan

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INTRODUCTION

'Steep Slope Land Agriculture System in Nishi Awa' was designated as Globally Important Agricultural Heritage Systems (GIAHS) in 2018.

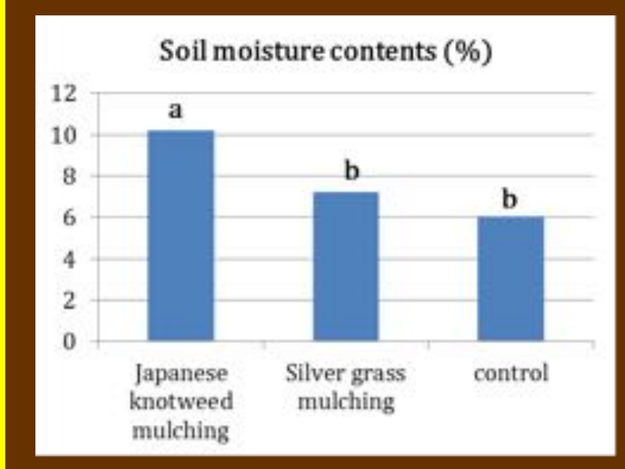
Traditionally, farmers have been performing grass mulching farming in this area. Poaceae plants are commonly used in traditional mulch farming. Farmers have traditionally been using silver grass (Poaceae) for mulch farming. In the Nishi-Awa area, Japanese knotweed (Fallopia japonica), which is not Poaceae but Polygonaceae, has been used solely for traditional eggplant cultivation. However, it is unclear why the Japanese knotweed is being used only for eggplant cultivation. We investigated the 1) yield, 2) quality, 3) suppression of plant diseases, and 4) avoidance of replant disease to identify the effects of Japanese knotweed mulching on eggplant.

MATERIALS AND METHODS

Field experiments were conducted in 2016 and 2017 in the field center of Shizuoka University, Japan. The cultivar Senryo 2 was used for every test. Egg plants were cultivated in plastic pots (diameter 30 cm). We compared grass mulching farming using Japanese knotweed and silver grass mulching and no grass mulching farming (control). We investigated the transition of soil moisture, soil temperature, and height of egg plants; date of flowering and fruiting; plant weight; yield (number, size weight of fruits); and quality of fruits (hardness, sugar content, anthocyanin content).

RESULTS AND DISCUSSION

- ✓ When there is little irrigation, soil moisture content was higher with Japanese knotweed mulching than with silver grass mulching and the control (Fig.1).
- ✓ Both Japanese knotweed and silver grass had good effect on reducing the temperature difference between days and nights (Fig.1).
- ✓ Neither Japanese knotweed nor silver grass had any effect on plant growth and yield of eggplant compared with the control (data not shown).
- ✓ Compared with mulching with silver grass and the control, mulching with Japanese knotweed had a good effect on the quality of eggplant fruits, such as softening of the pericarp and increasing the sugar content of fruits (Fig. 2). We suppose effect of soil moisture, soil temperature and allelochemicals of Japanese knotweed as a factor.
- ✓ Compared with mulching with silver grass and the control, mulching with Japanese knotweed might have a better effect in suppressing diseases in eggplants (data not shown). We will proceed with the verification on systemic acquired resistance of allelochemicals of Japanese knotweed to eggplants in the future.
- ✓ Mulching with Japanese knotweed or silver grass had no effect on the avoidance of replant disease of eggplants (data not shown).



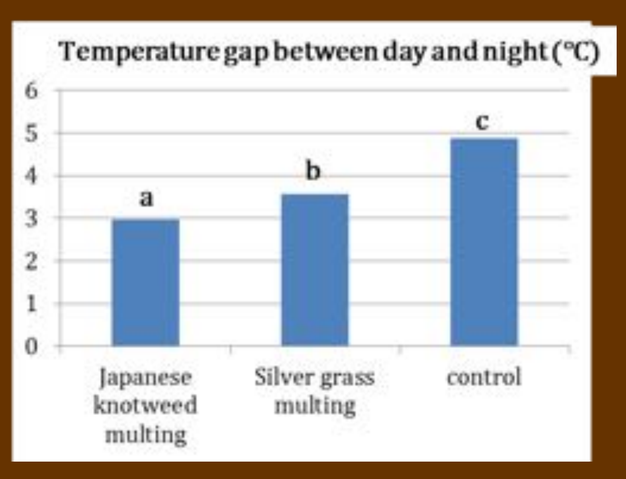
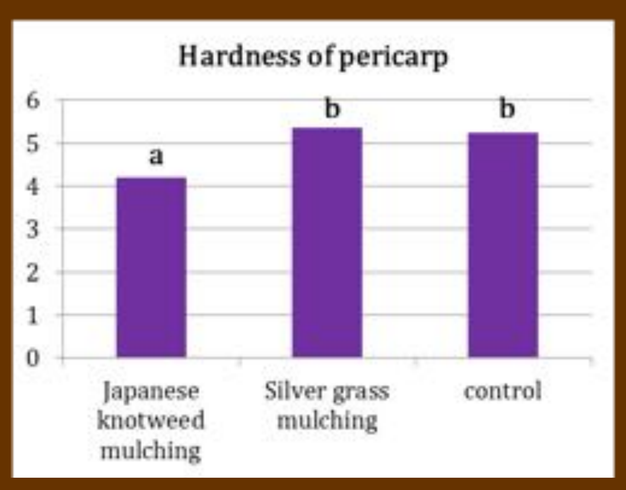


Fig.1 Effects of mulching farming on soil environment.

Different letter indicate significanse by Tukey's multiple range test at 5% level.



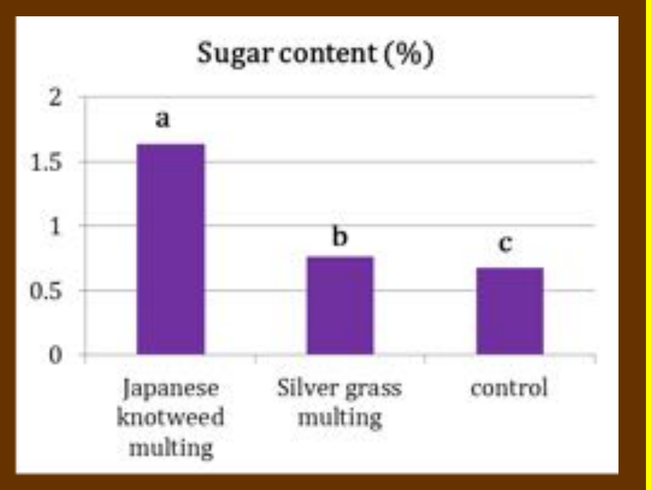


Fig.2 Effects of mulching farming on quality of eggplant fruits.

Different letter indicate significanse by Tukey's multiple range test at 5% level.