"Prolonged midseason drainage" in paddy fields for maintaining agricultural production and decreasing greenhouse gas emissions

Production | Implementation | Item: Paddy rice | GHG emission reduction

Outline

Prolonging midseason drainage* (Fig. 1) of paddy fields by a week longer than usual reduces methane (CH_4) emissions by approximately 30% on average without negatively impacting rice yield and quality.

*Midseason drainage around the peak of the rice tillering stage generally for 1-2 weeks to improve rice yield and quality.

Background/effect/note

Methane is a greenhouse gas with the second-largest impact on global warming after carbon dioxide. Methane emissions from paddy soils account for approximately 10% of the global anthropogenic methane emissions. Thus, the reduction of methane emissions is an urgent issue.

The effect of reducing methane emissions from paddy fields by prolonging the midseason drainage period was verified with the cooperation of the agricultural experimental institutes in the eight prefectures at nine locations nationwide in Japan (Fig. 2). Prolonging the midseason drainage by one week reduced average methane emissions from paddy fields by approximately 30% without impacting the yield and protein content of rice (Fig. 3).

Note: As the amount of cadmium absorbed by rice plants may increase in areas with high concentrations of cadmium in the paddy soil, this method is not recommended for such areas. For arsenic in the paddy soil, prolonging mid-season drainage is expected to decrease the absorption of arsenic by rice.

Fig. 1. Paddy field under midseason drainage

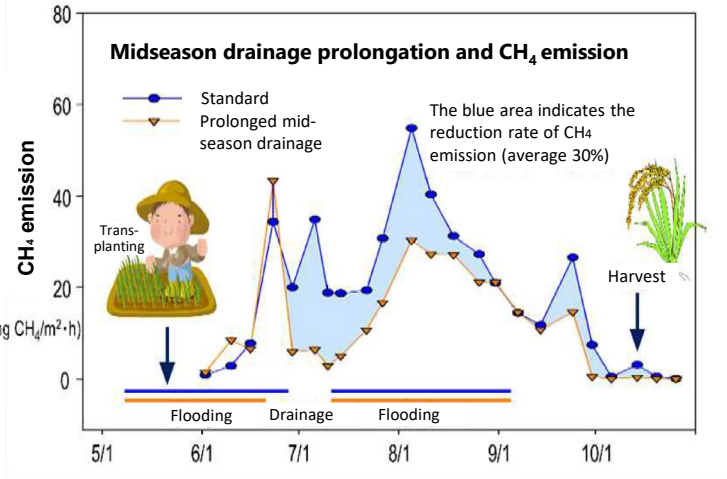

Fig. 2. CH_4 emissions and the effect of prolonged midseason drainage in Fukushima prefecture (example)

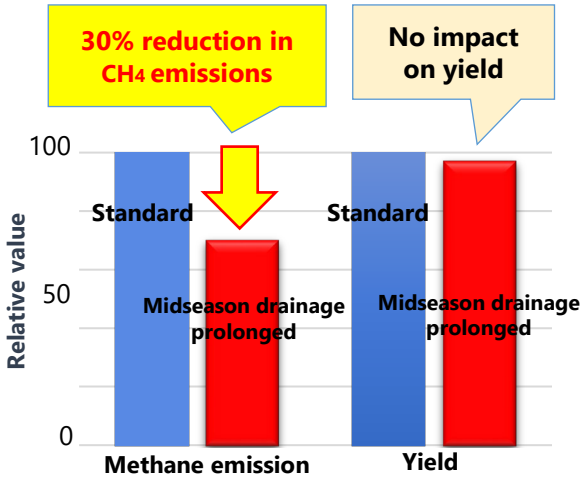

Fig. 3. CH_4 emissions and impacts on rice yield

Technical Details:

https://www.naro.affrc.go.jp/archive/niaes/sinfo/result/result29/result29_02.html (Japanese)
https://www.naro.go.jp/english/laboratory/niaes/files/fftc-marco_book2019_107.pdf (English)

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