

Improved CO₂ recovery and application equipment to reduce greenhouse gas emissions and increase productivity in greenhouse horticulture by utilizing exhaust gases from heating and cooling equipment

Production

Demonstration

Item: Greenhouse horticulture

GHG emission reduction
Labor productivity enhancement

Outline

Carbon dioxide (CO₂) is applied in greenhouses to increase productivity. We developed equipment that can capture and store CO₂ from exhaust gases generated by nighttime heating and apply it to greenhouses. This method promotes photosynthesis, thereby increasing the yield of horticultural crops such as roses by 30–45%, while reducing greenhouse gas emissions.

Background/effect/note

Typically, fossil fuels are burned to generate CO₂ for application in greenhouses. The use of CO₂ recovery and application equipment to collect and store CO₂ from the exhaust gases generated during heating and apply it in greenhouses reduces both fuel costs and CO₂ emissions (Fig. 1).

Existing CO₂ recovery methods generally involve adjusting the gas pressure or temperature. However, the energy-saving CO₂ recovery and application equipment we developed uses the concentration difference method to recover CO₂ from exhaust gases at a low cost. To apply the captured CO₂ in greenhouses, outside air is input into the device to release the CO₂, which contains few impurities such as nitrogen oxides (Fig. 2). This device can also capture and use exhaust gases from cooling.

The application of CO₂ using this system in the cultivation of roses shortened the time to flowering by 2–6 days, increased the yield by 30–45%, and increased the length and weight of cut flowers (Fig. 3). Effects such as increased yield, have also been observed in other flowering plants.

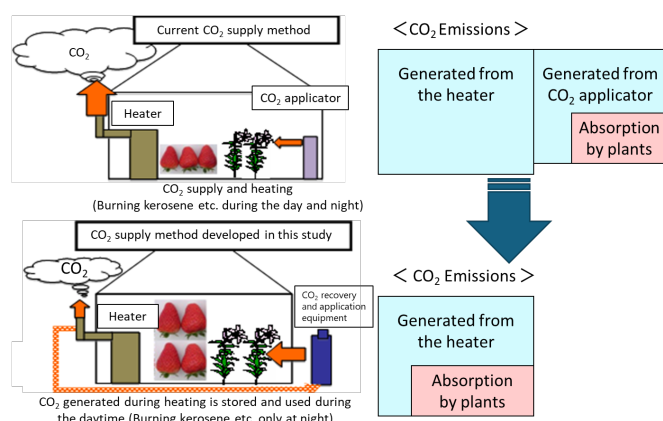
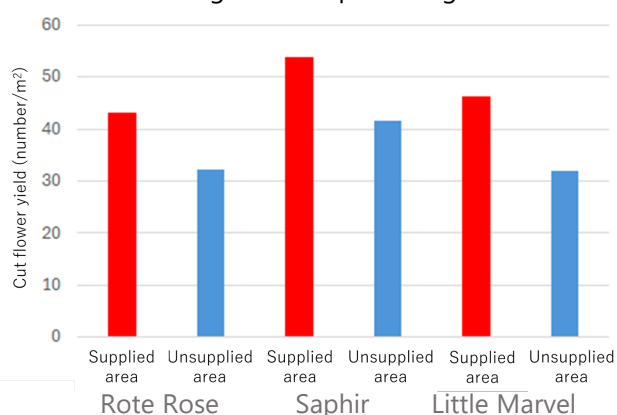


Fig. 1. Conceptual diagram

Fig. 2. The CO₂ recovery and application equipmentFig. 3. Effect of CO₂ application on cut flower yield

Technical details:



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