Landform condition and land improvement affect floristic composition in rice paddy fields, central Japan

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Paddy field agroecosystem has been associated with high biodiversity, but mechanisms affecting the floristic diversity are not clear. The present study aimed to clarify the importance of landscape-scale variables (i.e. landform condition and land improvement) on the floristic composition of in-field floristic diversity to conserve paddy weed species. The study was carried out in a rural area, 40 km northeast of Tokyo, Japan. 145 10 m² plots were established at cultivated paddies. Plots under five landform conditions and six intensities of land improvements were compared to the scores of 1-3 axes of DCA analysis and species attributes.

Landform condition and land improvement were significantly related to the scores in DCA axes 1 and 3, and DCA axis 1, respectively. Numbers of species in several species attributes showed significant difference in different conditions in each landscape-scale variables. Such species attributes mostly had significant relationships to the scores in DCA axis 1 and/or axis 3. These results suggest that the two landscape-scale variables are important factors explaining the variation of in-field floristic diversity. Representative species in each landform condition included more threatened species than those in each land improvement. Plots under narrow valley floor and old river channel have representative species that were categorized as threatened species. The only two threatened species in land improvement are recorded in non-improved plots. The two species were also represented in plots under old river channel.

From a conservation viewpoint, agricultural practices in field scales should be made by taking these two landscape-scale variables into account. Especially, non-improved plots under old river channel have the highest vulnerability for conservation. It might be less important for land improvement taken into account, considering the shortage of threatened species represented in non-improved plots. Yet, several species had higher occurrence in moderately improved plots, as well as non-improved plots, implying the need for further researches clarifying the relationship between land improvement and persistence of species. Estimation of the floristic pattern in paddy fields in terms of landform condition and land improvement could be a useful tool to maintain floristic diversity in rice paddy fields.