



インドネシア・チタルム川流域チヘア灌漑地区における水稻生産特性

本間香貴(京都大学・農学研究科)・本郷千春(千葉大学・CEReS)

Introduction

Rice is the most important crop in Lao PDR. The improvement of rice productivity is strongly needed.

Problem	Solution
The information about growth environment in farmers' fields is limited.	Establishment of simple evaluation method

Plant canopy analyzer (LAI-2200)

Soil fertility can be estimated by LAI growth rate (Hirooka et al., 2014)

Problem	Solution
Plant canopy analyzer is not suitable for wider area.	Establishment of evaluation method by remote sensing

Object

To validate measurements of two remote sensing methods, **MS-720** (Results①) and **SAR** (Results②).

Materials and methods

Study sites:

This study was carried out during the wet season of 2013 at paddy fields located in a suburban area near Vientiane, Lao PDR.



Thirty-three farmers' paddy fields were selected in this area for surveying throughout the growth period.

Measurements:

Portable spectrum radiometer (MS-720); Normalized Difference Vegetation Index (NDVI)

Results①

Plant canopy analyzer (LAI-2200); Leaf Area Index (LAI)

Results②

Synthetic active radiometer (SAR); Backward scattering coefficients(BSC)

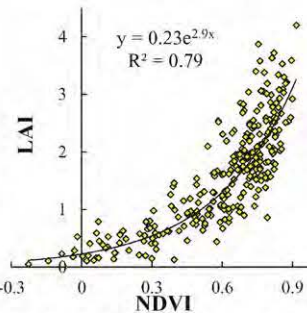


Conclusion

- LAI growth can be approximately estimated by MS-720 ($R^2 = 0.79$, $RMSE = 0.49$)
- Because SAR detected water, weed and soil, LAI and NDVI was not well explained by SAR.
- In some paddy fields, LAI growth rate can be estimated by SAR.

Results① (MS-720)

The measurement was conducted for 4 times before the heading period by using MS-720 and LAI-2200.



Coefficient of determination (R^2) was **0.79** and **RMSE** of the cross-validation test was **0.49**.

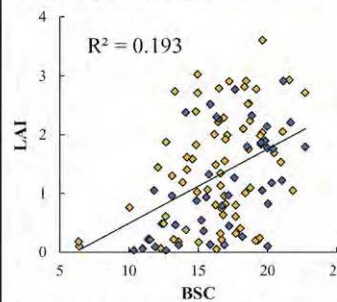
The cross-validation test: partitioning a sample of data into complementary subsets, performing the analysis on half of subset and validating the analysis on the other half of subsets.

Fig.1 The relationship between LAI (LAI-2200) and NDVI (MS-720).

Because LAI in this area is relatively low (Hirooka et al., 2014), LAI growth can be estimated by MS-720.

Results② (SAR)

X-band SAR images from the COSMO-SkyMed system were used in this study. The BSC calculated by SAR were normalized by the values for deep bodies of water such as lakes.



LAI and NDVI were not well explained by the BSC by SAR.

This may be because SAR detected not only rice plants but also **excess water, weeds and soil**.

◆ : BSC increased linearly and transplanting date was almost same.

Fig.2 The relationship between LAI (LAI-2200) and BSC (SAR).

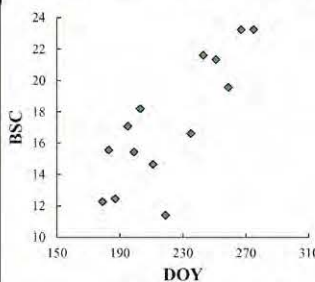


Fig.3 Changes of BSC during the rice growth period.

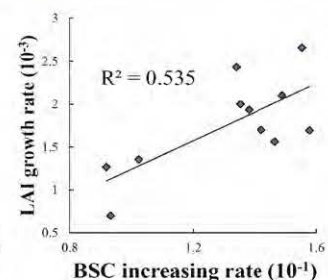


Fig.4 The relationship between LAI growth rate (LAI-2200) and BSC increasing rate (SAR).

The BSC increasing rate was associated with LAI growth rate estimated by LAI-2200.

This result suggests that LAI growth rate can be estimated by using SAR data in some paddy fields.