

Sentinel-1 Backscatter Analysis of Ratoon Rice Crops: Example from Ratooning Practice in the Philippines

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Introduction

Ratooning is a common rice crop management practice where the plant is left to regrow from post-harvest stubble, providing a low-input second crop. There is rising interest and use of rice ratooning in Asia to increase productivity on the same amount of land hence an accurate ratoon rice detection is important for monitoring rice production and productivity. Synthetic Aperture Radar (SAR) time series have been widely used for rice crop monitoring but there is little research on detecting ratoon rice practice in rice cropping systems. Hence, this study aims to (1) investigate the temporal SAR backscatter signatures of ratoon rice crops compared to those of the main rice crop and (2) determine if the ratoon rice signature is consistent in irrigated and rainfed rice systems.

Data and Method

Farmers' interviews and field surveys were conducted in four provinces of the Philippines, where rice ratooning was reported in the dry, wet, and very wet growing seasons of 2018-19. Four bands of backscatter information (VV, VH, VH/VV, and the radar vegetation index (RVI)) were obtained from the multi-temporal Sentinel-1A and B data with a six-day repeat cycle. We determined which band and which period of the season showed significant differences between the main rice and ratoon rice crops.

Results

Our results show that ratoon rice significantly differed from the main rice crop during the peak of the growing season in the VH, VH/VV, and RVI bands. We also found that the signature of ratoon rice was the same (no significant difference) for irrigated and rainfed rice systems.

Conclusion

These findings suggest that Sentinel-1 time series data is suitable for detecting ratoon rice in lowland irrigated and rainfed rice systems. Given the increased interest in rice ratooning, detecting ratoon rice and its expansion is important for monitoring rice management practices and rice production.

Keywords

Ratoon rice, time series, Synthetic Aperture Radar (SAR), second harvest, Philippines.