

Estimation and Diagraming of Taste of Rice Based on UAV Remote Sensing

*Akira Hama¹, Kei Tanaka², Atsushi Mochizuki³, Yasuo Tsuruoka³, Akihiko Kondoh⁴

1. Graduate School of Science, Chiba University · JSPH Research Fellow, 2. Japan Map Center, 3. CHIBA Prefectural Agriculture and Forestry Research Center, 4. Center for Environmental Remote Sensing, Chiba University

Introduction

Sustainable agriculture is one of the most important issue in Japan due to the aging of farmers and lack of successors. In these situations, Unmanned Aerial Vehicle (UAV) remote sensing is an important issue and technique related to smart/precision agriculture, improvement of quantity and quality of rice. The objective of this study was to explore methods for estimation of protein content (PC) of brown rice and diagraming of taste based on UAV remote sensing and meteorological observation data

Methods and Materials

Field measurement

UAV remote sensing datasets for three rice varieties (Koshihikari, Fusaotome, Fusakogane) acquired in two locations (Chiba, Saitama) were analyzed. Observation equipment were an electric-powered Multicopter (enRoute Zion QC630, enRoute Zion Pro800, 3DR SOLO) and digital camera (near-infrared camera: BIZWORKS Yubaflex).

Data processing

Ortho photographs were generated using the SfM/MVS technique. The images taken with Yubaflex, after conversion to radiance, were used to create the ortho mosaic images using SfM / MVS software. After that, we calculated normalized difference vegetation index (NDVI).

Other data

The daily average temperature from 1 km mesh agricultural weather data (NARO) were analyzed for estimation and diagraming of taste of rice.

Conclusions

(1) As a result of examination of the optimum observation time of protein estimation, NDVI at heading stage was most correlated with PC. NDVI at 30th day after heading stage was second highest correlated with PC. Both observation times had small impact of fluctuation of the growing stage due to the difference of rice planting time.

(2) Amylose is strongly affected by varieties and temperature during grain filling stage. On the other hand, proteins are strongly affected by nitrogen conditions. By correlating the average temperature at the grain filling stage with the estimated PC, it was possible to make diagram of the taste of rice.

Keywords: Drone, Photosynthesis, Sustainability

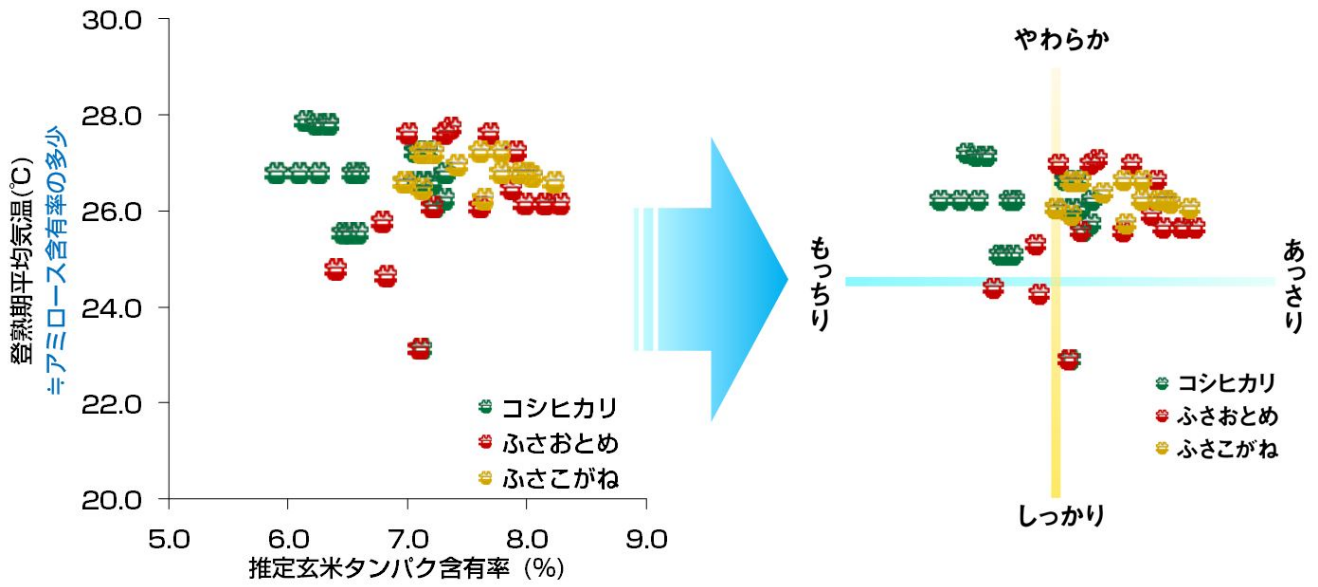


Fig.1 米の味のグラフ化