

Author: [ADVANCED](#)Volume Page Keyword: 
[TOP](#) > [Available Issues](#) > [Table of Contents](#) > [Abstract](#)

ONLINE ISSN : 1349-1008

PRINT ISSN : 1343-943X

Plant Production Science

Vol. 9 (2006) , No. 3 312-322


[\[PDF \(587K\)\]](#) [\[References\]](#)

Remote Assessment of Wheat Canopies under Various Cultivation Conditions Using Polarized Reflectance

[Michio Shibayama](#)¹⁾ and [Yoshiaki Watanabe](#)²⁾

1) National Institute for Agro-Environmental Sciences

2) National Institute of Crop Science

(Received: July 22, 2005)

Abstract: The polarization of light reflected from crop canopies gives information on the canopy structure, such as the distribution of leaf inclinations. In order to verify those findings and to put the technique to practical use, we conducted two experiments in wheat fields. In the first experiment, the reflectance and polarized reflectance at 660 nm in the canopies of wheat plants, sown in both narrow and wide rows, and at two levels of topdressing, were measured periodically with a spectropolarimeter. We also probed the leaf orientation geometry of the plants using a 3-D digitizer and a plant canopy analyzer (LAI-2000). In the second experiment, we observed the polarization of light reflected from wheat planted in plots fertilized with basal dressing, and topdressing at the jointing and booting stages. Polarization showed a seasonal change with an upward convex clearly indicating the heading time. This pattern was not found by conventional band reflectance. Using polarization, it was possible to detect the differences in row width and fertilization conditions during the booting stage. The mean leaf inclination angle (MLI) detected with the 3-D digitizer and the mean tip angle (MTA) detected with the LAI-2000 were relatively closely correlated with the polarization than the reflectance at 660 nm and normalized difference vegetation index (NDVI) that was derived from the reflectance at 660 nm and 830 nm. Topdressing at the jointing stage was well detected by polarization obtained at the heading stage. Polarization measurements are useful in practical terms for remote detection of changes in stand geometry induced by cultivation management such as topdressing.

Keywords: [Booting stage](#), [Jointing stage](#), [Leaf inclination angle](#), [Solar zenith angle](#)



[\[PDF \(587K\)\]](#) [\[References\]](#)

Download Meta of Article [\[Help\]](#)

[RIS](#)

[BibTeX](#)

To cite this article:

Michio Shibayama and Yoshiaki Watanabe: "Remote Assessment of Wheat Canopies under Various Cultivation Conditions Using Polarized Reflectance". *Plant Production Science*, Vol. **9**, pp.312-322 (2006) .

doi:10.1626/pps.9.312

JOI JST.JSTAGE/pps/9.312

Copyright (c) 2006 by The Crop Science Society of Japan



[Japan Science and Technology Information Aggregator, Electronic](#)

