VanToai, T., Major, D., McDonald, M., Schepers, J., Tarpley, L. (ed.): **Digital Imaging and Spectral Techniques: Applications to Precision Agriculture and Crop Physiology.** – ASA, CSSA, and SSSA, Madison 2003. ISBN 0-89118-152-0. 253 pp., USD 85.00.

Imaging techniques in plant science and in precision agriculture lag behind the dramatic expansion of the same technology in medical science and practice. The delay in our field cannot be explained by financial limitation because the cost of the imaging detectors as well as the cost of computers has declined dramatically and the resolving and computing power of the hardware substantially increased during the recent years. Rather, the limitation is due to an insufficient communication between researchers and engineers working in the field of plant science.

This book contributes to elimination of the communication barrier by presenting state-of-the-art as perceived by 50 crop scientists from USA, 6 from Germany, and 2 from both Australia and Turkey. By applying mostly well-established techniques, the authors were able to address important problems of precision agriculture.

The book is organized in four sections. Section 1, Digital Imaging Techniques brings five reports on application of standard routines of image analysis to assess growth, seed quality, root production and mortality, canopy area, and nutrient deficiency. Section 2 is dedicated to Magnetic Resonance Imaging Techniques with its two reports focused on root development. Section 3 presents one review and seven reports on Reflectance Techniques. The first two reports are on application of principal component analysis of multidimensional spectral data and on mixing of distinct spectral contributions in integrated, full canopy spectral signatures. The next four reports focus on detection of nutrient deficiencies by various spectral features. Dominantly, nitrogen deficiency is studied using the known correlation with the chlorophyll content. In the last report of Section 3, the reflectance is measured using radio-controlled model aircraft. Fluorescence imaging techniques are represented in Section 4 by two reports. First, the feasibility of measuring sun-induced chlorophyll fluorescence is assessed. The experimental technique relies on measuring spectral features in and close to the 762 nm Frauenhofer line of oxygen absorption. The multispectral fluorescence emission is used in the last report as a marker of stress in soybean exposed to elevated O_3 and CO_2 levels.

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