Acknowledgements

I am most grateful to my supervisor Prof. Tekehisa OIKAWA, Institute of Biological Sciences, University of Tsukuba for his patient guidance and continued encouragement during the course of the graduate study at University of Tsukuba.

I owe gratitude to Dr. Nobuko SAIGUSA, National Institute for Resources and Environment, for her help in my familiarizing the eddy correlation measurement sensors and her many valuable suggestions and advices during the measurements.

I appreciate many instructions and comments from Dr. Michiaki SUGITA, Institute of Geoscience, University of Tsukuba, and Dr. Yoshinobu HARAZONO, National Institute of Agro-Environmental Sciences in the processes of the measurement preparation, especially the field deployment of measuring sensors.

I am very much indebted to Prof. Richard S.J. WEISBURD, Institute of Biological Sciences, University of Tsukuba, who have given generously of his time to revise and review the manuscript and have made many valuable suggestions for its improvement.

I express many thanks to Dr. Shigero MARIKO, Institute of Biological Sciences, University of Tsukuba, and Dr. Jun ASANUMA, Institute of Geoscience, University of Tsukuba for reviewing the manuscript and their insightful suggestions contribute to the improvement of this dissertation.

Particular thanks are due to Prof. Fujio KIMURA, Institute of Geoscience, University of Tsukuba and director of the Environmental Research Center, and Dr. Noriko NIIMURA, the Environmental Research Center, who gave me permission to use the facility and experimental field of the ERC to conduct measurements.

I acknowledge greatly help and encouragement from the staff and students of the Environmental Research Center, University of Tsukuba during the experiment period.

Mr. Tetsuyuki USAMI, Doctoral Program in Biological Sciences, University of
Tsukuba, gave me many suggestions about leaf-level flux measurements using the LI-6400 Portable Photosynthesis System. Mr. LEE Jaeseok, Doctoral Program in Biological Sciences, University of Tsukuba, gave me much help during the preparation of the measurements, especially making of type-T thermocouple thermometers and the control unit for infrared gas analyzer. Mr. Katsuki TANAGA, Master Program in Biological Sciences, University of Tsukuba, offered help in the vegetation investigation. They deserve my profound appreciation.

I also acknowledge assistance in various forms during my graduate study from all members of the Ecolab of Institute of Biological Sciences, University of Tsukuba, especially Mr. Akihiko ITO, Mr. LEE Gilzae and Ms. Tomoko YOKOYAMA, Doctoral Program in Biological Sciences, University of Tsukuba; and Mr. KUBO, Mr. SAKAYI and Mr. Seiji SHIMODA, Master Program in Biological Sciences, University of Tsukuba.

Many thanks are due to the Environmental Research Center (ERC), University of Tsukuba for access to its routine meteorological observation data, and to Dr. Atsushi HIGUCHI for his kind permission for using his data of albedo and soil water content, which are very useful in interpreting dynamics of the grassland canopy.

I extend my appreciation to Dr. TANG Yanhong, National Institute for Environmental Sciences, for providing some useful ideas and insights to deepen my understanding of canopy-level and leaf-level photosynthesis. I express my thanks to my former schoolmate and colleague, Dr. QIU Guoyu of National Institute for Environmental Sciences, with whom I have the good chance of discussing and clarifying some problems related to the flux measurements.

This research is supported by a Grant-in-Aid from the Ministry of Education, Science and Culture, Japan to T. O. (10308024).

Finally, I gratefully acknowledge the scholarship offered by the Ministry of Education of Japan (Monbusho) that makes me have an opportunity to study in University of Tsukuba.