

## 2. Research Activities (Apr.2001-Mar.2002)

### 2.1 Outline of Activities

#### (1) Center

Arid Land Research Center (ALRC) is an independent department of Tottori University and at the same time is a National Joint-use Research Institute of the Ministry of Education, Culture, Sports, Science and Technology. The mission of the ALRC is to conduct research on desertification and to develop sustainable agricultural practices in arid and semi-arid areas. The door is open to all teachers of national universities who are engaged in this field of study.

The program of the Center of Excellence (COE) funded by the Ministry of Education, Culture, Sports, Science and Technology began in 1995. The title of COE program is 'Basic studies toward establishing sustainable biological production systems required for combating desertification in dry land.'

2001 is the first year that we started for the Core University Program (by JSPS) focusing on combating desertification and developmental utilization in inner area of China between Arid Land Research Center, Tottori University and Water and Soil Conservation Research Institute, CAS in China.

#### Organization, Management, and Funding Subsidies

ALRC is managed by the Director, a Conference composed of professors and associate professors, a Board of Management composed of members from outside as well as professors of ALRC, the five research divisions, two office sections (the international research cooperation section and the joint-use section) and the technical section. In practice the Conference and the Board of Management operate our Center.

The five divisions are:

- 1) Arid Land Environment: Natural Environment, Water Resources
- 2) Biological Production: Plant Ecophysiology, Plant Production
- 3) Afforestation and Land Conservation: Revegetation and Grassland Development, Land Conservation
- 4) Comprehensive Measures to Combat Desertification
- 5) Arid Land Sciences (Visiting)

The three full-time divisions from 1) to 3) each have two professors and two associate professors. The full-time division of 4) has one professor. The Visiting division has two visiting professors and one associate professor from Japan and, three visiting professors from abroad. In addition, two foreign researcher (visiting professor) and three part-time researchers are stationed at ALRC through the COE program (one program of the Center of Excellence funded by the Ministry of Education, Culture, Sports, Science and Technology) beginning in the 1995 fiscal year. Nine office staff (four clerks and five associate clerks), four technical officers and two research support technicians support the research and education.

With regard to the funding, subsidies for scientific study in the fiscal year of 2001, a total of five themes were adopted:

Scientific Research (B)	: 3,
Scientific Research (C)	: 1,
Encouragement of Young Scientists (B)	: 1,

With regard to other research funding, a total eleven themes were accepted :

Scholarship Contribution	: 3,
Entrusted Research	: 1,
Joint Researches with private enterprises	: 0,

#### Joint-Use Research, Education, Publication

During the fiscal year of 2001, 50 Joint-Use Researchers (Teachers from national and private universities) were attached to the Center. The number of students as of January 2002 is 67 (10 Ph.D. Students, 30 Master Students, 23 Undergraduate Students, 2 Trainees and 2 Foreign Research Students).

Seminars were often held by a large number of internal and external experts. The foreign visiting professors periodically give seminars.

Annual report has been published since the establishment of ALRC, which provides a brief overview of the activities in its various divisions and also summarizes our research and education.

The 11th seminar of Joint Research was held on December 6, 2001 at Arid Land Research Center, Tottori University. Six research activities of subdivision were introduced. Twenty-three poster presentations were performed.

'Japan-China Joint Seminar on Combating Desertification and Developmental Utilization in Inner China' was held on November 14, 2001 at Arid Land Research Center, Tottori University. The planning to combat desertification and developmental utilization was discussed.

## **(2) Divisions**

### **1) Division of Arid Land Environment**

#### **Subdivision of Natural Environment**

Subdivision of Natural Environment conducts research on evaluation of the natural environment and the exploitation of natural resources and energy for the development of arid and semi-arid areas from the point-of-view of meteorology and climatology.

The organization of laboratory was thin because of a vacant post for associate professor in 2000, however, new associate professor, Kimura R. became a member of our laboratory in 2001. It is delightful news that we could invite such a hopeful young colleague. He was a student of our laboratory and awarded the degree of Master of Agriculture at Graduate School of Agriculture, Tottori University. He obtained the doctor's degree from the Graduate School of Science, Tohoku University. He successively held COE researcher at research institute for bioresources, Okayama University and Research Associates at Faculty of Science, Ryukyu University and received a prize of the society of agricultural meteorology of Japan about the study for evaluating the evapotranspiration using a simulation model. In April 2002, he became an associate professor at Arid Land Research Center, Tottori University.

The staff in the subdivision consists of Dr. Kamichika M. (Professor), Dr. Kimura, R. (Associate Professor), and Ms. Yonehara, A. (Associate Clerk, also assigned for the Subdivision of Water Resources). There were one Doctoral student, five master's students and four undergraduate students in the fiscal year of 2001. Mr. Kawai, who obtained the master's degree from the Chiba University, entered our laboratory as the first year doctoral student. Mr. Okatsu joined to the ALRC as a Research Support Technician after his completing master's course. Mr. Ogasawara, second year student of the master's course, completed the course and found employment. Mr. Miura is now seeking employment. Mr. Sakamoto and Mr. Sasaki entered the master's course of Tottori University.

In the fiscal year of 2001, the following researches have been conducted in Japan.

(1) MICROCLIMATE: Heat, water and CO<sub>2</sub> balance were observed in the upland rice field in Arid Land Research Center. Simulation model for the evapotranspiration considering the LAI and spectral reflectance was developed. CO<sub>2</sub> concentration in the sandy soil around the rainfall was observed for making clear the behavior of water and air. The relationship between the irrigation water and movement of solute, and the effect of water retentivity under the paper mulching were studied. Dr. Ibaraki, Y., Dr. Yamamoto, H. (Faculty of Agriculture, Yamaguchi University), Dr. Tang, C. (Graduate School of Science

and Technology, Chiba University) and Dr. Nakamoto, K. (COE researcher, ALRC) have continued the joint research of this subdivision 'Researches on modification of microclimate of agricultural fields in arid lands'.

(2) REMOTE SENSING: Under theme 'Analysis of Arid Land Surface Conditions by Remote Sensing' for joint research, cooperative works have been still continued with Dr. Ishiguro, E. (Faculty of Agriculture, Kagoshima University), Dr. Matsuoka, N. (Faculty of Horticulture, Chiba University) and so on. 2001 was the first year that we started for the Core University Program between ALRC and the Institute of Soil and Water Conservation, Chinese Academy of Sciences. We, including Dr. Okada, S. (COE researcher, ALRC) began to analyze satellite data for preventing desertification on the Loess Plateau in connection with this program and field survey has been conducted in China.

(3) WIND EROSION: Wind erosion has been investigated by measuring sand movement every month in the Tottori Sand Dune and studying the relationship with wind which has been measured automatically by two of wind speed and direction detect systems in a sand dune. Dr. Kawamura, T. et al. (Graduate School of Humanities and Sciences, Ochanomizu University) cooperated in this study.

(4) MEASUREMENT OF NATURAL ENERGY: The electric power by solar radiation and wind have been studied as a cooperative study with Dr. Hayashi, T. (Faculty of Engineering, Tottori University). Study on the recycling use of agricultural water resources was conducted using the method of distillation.

Overseas research in the fiscal year of 2001 was as follows: In 2001 we started for the Core University Program focusing on combating desertification and development in inner China. Prof. Kamichika and Assoc. Prof. Kimura visited the Institute of Soil and Water Conservation, Chinese Academy of Sciences, to discuss this Japan-China Joint Project from July 8 to 16, 2001 and from Aug. 5 to 17, 2001. They visited Loess Plateau (Shaanxi Province, China) and conducted field survey.

### **Subdivision of Water Resources**

*Staff and students:* The staff consists of Dr. Yano, T. (Professor), Ms. Yonehara, A. (Associate Secretary, also assigned for the Subdivision of Natural Environment), three Doctoral, six Master's, and 3 undergraduate students (4th grade). Dr. Kitamura, Y. (Associate Professor) was promoted to a professor of Faculty of Agriculture, Tottori University on July 1, 2001. An associate professor to replace Dr. Kitamura is in the process of selection.

Ms. Itani, R. and Mr. Mizufune, H., second year students of the Master's Course (MS), completed the course and joined to Universe Information System Co. and Rui Architecture Co., respectively. Ms. Itou, M. is now seeking employment. Mr. Kageyama, H. entered Faculty of Agriculture as a research student. Mr. Chiwaya, R. who was a government scholarship student returned to Zimbabwe and was reinstated in his former office of Department of Agricultural Technical and Extension Services. Among three undergraduate students (4th grade), Mr. Takahashi, Y. and Ms. Matsuoka, Y. entered the Master's Course. Mr. Yamamoto, T. is temporarily absent from school for an economical reason.

*Research:* Research has been conducted in Japan and abroad on efficient water and soil management for water saving irrigation and saline water irrigation from the view point of protecting lands from desertification and for the sustainable agricultural utilization of arid lands.

Studies in Japan: Our efforts in Japan have been made to carry out research themes on water and soil management for water saving irrigation and saline water irrigation based on a simulation approach as well as an experimental approach. Research on the measurement of stem flow through herbaceous plants and arboreal plants was also conducted to establish the measurement technology for the stem heat balance method and the heat pulse method. Furthermore we conducted researches on water management method for reuse of drainage water in agricultural lands equipped with subsurface drainage system under arid and semi-arid climate.

Overseas Research: A research on 'Crop productivity change following climate change and soil environment change' was commenced related to a research project on 'Impact of climate change on

agricultural production in arid areas' of the Research Institute for Humanity and Nature which was newly established in Kyoto as an Inter-University Research Institute of Ministry of Education, Culture, Sports, Science, and Technology. This research project is supposed to be conducted for five years from 2002 fiscal year mainly in a semi-arid area with the Mediterranean Sea climate in the Republic of Turkey. In line with this research, Dr. Yano visited Turkey in January to conduct field survey on water resources and agriculture in Seyhan and Ceyhan Rivers basins.

Cooperative researches have been conducted with the following researchers: Prof. Nishiyama, S. (Faculty of Agriculture, Yamaguchi University), Prof. Wakatsuki, T. (Faculty of Life and Environmental Science, Shimane University), Prof. Murakami, M. (Kochi University of Technology), Chikushi, J. (Biotron Institute, Kyushu University), Prof. Shimada, Y. (Graduate School of Letters, Nagoya University), Dr. Odani, H. (School of Environmental Science, University of Shiga Prefecture), Dr. Takeuchi, S. (Faculty of Engineering, Kyushu Kyoritsu University) and Dr. Aoda, T. (Faculty of Agriculture, Niigata University). One new research project was started with Dr. Watanabe, T. (Research Institute for Humanity and Nature). The titles for these research projects are listed in the joint research section of this Annual Report.

## 2) Division of Biological Production

### Subdivision of Plant Ecophysiology

*Staff:* The staff consisted of Dr. Inanaga, S. (Professor), Dr. Sugimoto, Y. (Associate Professor) and Ms. Fukunaga, M. (Associate Clerk, also assigned to the Subdivision of Plant Production).

*Studies in Japan:* Research projects undertaken domestically were development of plant production system using sea water, physiological response of soybean, tomato and melon to salt stress, differences in the response to soil moisture depletion among cultivars of wheat and sorghum, control of parasitic weed by inducing suicidal germination (Monbusho Grant-in-Aid B) and physiological responses of cultured plant cells to salinity stress. Joint researches have been conducted with Drs. Abe, J. (Univ. of Tokyo), Tanimoto, E. (Nagoya City Univ.), Shimotashiro, T. (Kagoshima Univ.), Kobata, T. (Shimane Univ.), Takahashi, H. (Yamaguchi Univ.), Murota, K. (Tokai Univ.), Yoneyama, K. (Utsunomiya Univ.) and Nakajima, H. (Tottori Univ.). In addition, Dr. Ma, Y. from China joined this subdivision as a JSPS postdoctoral fellow.

*Studies abroad:* Drs. Inanaga and Sugimoto visited China for promoting the Japan-China joint project. Dr. Inanaga visited the Chinese Academy of Sciences and the Institute of Soil and Water Conservation (CAS) as a Japanese Coordinator of the JSPS Core University Program, focusing on combating of desertification and enhancement of rural development in inland of China. He visited China with Dr. Sugimoto to conduct joint-research. Moreover, Dr. Inanaga attended a 'Technical Workshop on the Ecological Reconstruction of Northwest China,' and acted as a chairman at the session. Institute of Soil and Water Conservation (CAS), and Shijiazhuang Agricultural Modernization Institute (CAS), awarded titles of Visiting Professor and Honourable Professor to Dr. Inanaga. Dr. Sugimoto visited Nantes, France, to attend the 7th International Parasitic Weed Symposium, where he delivered a plenary lecture entitled 'Progress in understanding the mode of action of germination stimulants'. Dr. Sugimoto is now on a sabbatical leave at the University of Sheffield, UK, studying 'The ecophysiology of parasitic weeds'.

*Students:* There were two Ph.D. students (one 3rd grade from China and one 1st grade), six M.Sc. students (five 2nd grade and one 1st grade), four undergraduate students (two 4th and two 3rd grades). The Ph.D. student, who graduated in March 2002, is currently engaged in research as a postdoctoral fellow at a National Institute for Environmental Studies. Four M.Sc. students and an undergraduate student are continuing their studies up to Ph.D. and M.Sc. levels, respectively, in this subdivision. Another undergraduate is already employed by a private sector company.

*Additional assignments:* Dr. Inanaga was acting as a councilor of the Japanese Society of Sand Dune

Research and the Japanese Association for Arid Land Studies. He was also assigned as a member of desertification division under the committee for planning research projects on global environmental issues, the Ministry of the Environment, an expert of the Committee of Policy on Food, Agriculture and Rural Community, the Ministry of Agriculture, Forestry and Fisheries, JICA advisory committee for the Middle East, the president of the committee to activate Tottori Sand Dune and the executive committee of the New Discovery of Tottori Sand Dune, special lecturer for the University of the Air Foundation and etc. Dr. Sugimoto was acting as a councilor of Japan Society for Bioscience, Biotechnology and Agrochemistry, Chu-shikoku branch

### **Subdivision of Plant Production**

The subdivision is composed of Dr. Kunio Hamamura (Professor), Dr. Masao Toyama (Associate Professor), Ms. Mitsue Fukunaga (Associate Clerk), 3 students in the master course, Mr. Xiangjun Li, Mr. Hiroyuki Nishiyama, and Mr. Wenjun Han, 3 senior students (Undergraduates), Mr. Takashi Muroi, Ms. Kayo Wakiji and Mr. Nobuhiro Mutakami, 1 doctoral course student, Mr. Gamaan R. Shamas from Oman.

The research is focused on crop production problems pertaining to arid and semi-arid lands, and an additional attention is put on Xerophyte and Halophyte studies. Crop production systems under dry conditions were studied with emphasis put on crop tolerance against water deficiency and salinity. The major subjects studied were the effects of VA fungi on pea growth under water deficit conditions, the compensation effects of soy bean plants after insect damage, the ecology of drought and salt tolerant plants in arid areas, the effects of plant residue on the vegetable production, effects of VA mycorrhizae to improve drought tolerance of cowpea, the response of *Salicornia* plants to extremely high salt concentrations and the root nodule formation of pigeon pea under different fertilization.

Dr. Hamamura attended the 6th International Conference on Desert Technology in Urumqi, China. He visited the Institute of Soil and Water Conservation, North-west Sci. and Tech. University of Agriculture and Forestry, Yangling, China, with which Arid Land Research Center, Tottori University started the exchange program to study on combating desertification in Inland China. Dr. Toyama undertook several field experiments in China and Mongol on the use of water holding substances in desert areas. Special emphasis was laid on the effect of these substances on desert afforestation and on water saving cultivation with encouraging results.

## **3) Division of Afforestation and Land Conservation**

### **Subdivision of Revegetation and Grassland Development**

The present staff of this subdivision consists of Dr. Tamai, S. (Professor), Dr. Yamanaka, N. (Associate professor), Mrs. Hamamoto, N. (Associate Clerk, also assigned for the Subdivision of Land Conservation), 1 Doctor's, 6 Master's, and 3 undergraduate students. Our research focuses on afforestation in semi-arid areas, especially on the plant communities and their specific characteristics. The research mainly includes: (1) the distribution of plants in semi-arid land and its specific characteristics, (2) the maintenance mechanisms of plant communities in arid areas, (3) the relationships between water and nutrient dynamics, and the growth of trees, (4) the dynamics of plants on sand dunes, (5) the salt tolerance of woody plants.

The most important research in this subdivision is the prevention of desertification and afforestation in semi-arid areas by native plants and we are analyzing vegetation of China mainly.

Studies on the effect of aridity on the vegetation in eastern China, funded by Nippon Life Insurance Foundation, are in progress in cooperation with Liaoning Academy of Forestry Science. In June, Dr. Tamai and Dr. Yamanaka visited Liaoning province and researched the vegetation structure of secondary forests. In August, Dr. Yamanaka visited Liaoning province again and researched regeneration mechanisms of

natural *Quercus* forests.

Dr. Yamanaka also visited Xaanxi Province of China in July and August and researched on the revegetation of Loess Plateau.

While the distribution and growth of trees in semi-arid areas mainly depend upon water conditions of the soil, nutrients connected with water also play an important role on the growth of trees. Then research on water and the nutrients dynamics of trees and in the soil with the growth of trees has been conducted. This investigation aims to clear the dynamics of nutrients in the soil with changing soil water potential using six large scale lysimeters in vinyl houses.

Salinity of the soil in semi-arid land sometimes becomes a hazard for the germination, establishment and growth of trees. Studies on the ecology and ecophysiology of salt tolerant trees are in progress. In 2001, Salinity effects on the growth of *Populus alba* and *Tamarix chinensis*, were mainly investigated.

Dr. Tamai visited Thailand in December to research vegetation structure and regeneration of Mangrove forests.

Studies on afforestation of hardwood in pine forests damaged by pine wilt disease on coastal sand dunes, funded by Monbusho Grant-in-Aid for scientific Research, are also in progress. Ecological researches of plants on sand dunes and studies on growth and reproductive characteristics of woody plants in arid areas have also been conducted.

Cooperative research on the drought stress tolerance of trees was conducted with the scientists for joint research of the Center. And a number of trainees from abroad were taken on.

### **Subdivision of Land Conservation**

The main studies in this subdivision were on the dynamic movement of moisture and salt in the soil under arid land conditions and on the mechanism of soil water erosion and collapse of aggregate structure were also studied in order to promote research on the mechanism and control of desertification. The staff is made up of Dr. Yamamoto, T. (Professor), Dr. Inoue, M. (Associate Professor), Mrs. Hamamoto, N. (Associate Clerk assigned to the entire Division) and nine students. Three students are enrolled in the doctoral course at the United Graduate School of Agricultural Sciences, three as master course students and three as undergraduate students in the Faculty of Agriculture.

The main domestic research titles are (1) Studies on solute dynamic transport during salt accumulation and leaching, and determination of effective soil management method in arid land supported by Monbukagakusho Grant-in-Aid for Scientific Research B(2), (2) Studies on evaluation and standardization of the soil hydraulic and solute transport properties in situ supported by Monbukagakusho Grant-in-Aid for Scientific Research B(1) , (3)Effect of water pollution on clogging of emitters and filters of micro-irrigation system supported by Ministry of Agriculture, Forestry and Fisheries since 1992, (4)Mechanism of soil erosion and salinization using the three dimensional soil water erosion analyzing system, monitoring system for water flow and solute transport and desertification mechanism analysis system introduced in Arid Land Dome since 1998.

As joint research with other divisions in universities, the staff carried out (1)Studies on farm land conservation in arid land, with, Dr. Nishimura, T. (Tokyo Univ. of Agric. and Tec.), Dr. Roy, K. (Nihon Univ.) and Dr. Tanigawa, T. (Osaka Prefecture Univ.), (2)Studies on analysis of surface conditions in arid land by remote sensing, together with Dr. Fujimura, N. (Tottori Univ.), (3)Studies on salt accumulation and leaching using the monitoring system for water flow and solute transport, together with Dr. Kihara, Y. (Shimane Univ.), Dr. Morii, T. (Niigata Univ.), and Dr. Yamanaka, T.(Tsukuba Univ.). (4)Free subject on arid land studies, together with Dr. Fukada, M. (Yamaguchi Univ.), Dr. Hara, R. (Daitobunka Univ.), Dr. Cho, H. (Saga Univ.), Dr. Takeshita, U. (Okayama Univ.), Dr. Ishikawa, Y. (Akita Prefecture Univ.), Dr. Kamiya, K. (Gifu Univ.), Dr. Fujimaki, H. (Tsukuba Univ.) , Dr.Kosugi, K.( Kyoto Univ.) and Dr. Yamada, T. (Tottori Univ.)

The 40th annual meeting of Soil Physics Section of JSIDRE in 2001, was held under the title of “Field

research on soil degradation in arid land” on Dec. 5th, 2001 in the Arid Land Research Center. The meeting was organized and chaired by our subdivision, 50 researchers participated. A special lecture and eight oral lectures were presented.

Dr. Yamamoto visited at the Tropical Research Institute in Mareeba of Queensland Province and at the Muresk Agricultural Facility of Curtin Univ. in Perth of West Australia during June 12-22 and to discuss on further joint research of ‘Mechanism analysis of degradation for soil and water due to microirrigation in arid lands’. These Provinces have excellent advanced technology in order to export agricultural productions for the world. However, soil degradation due to acid- and aluminums- damage spreads in the ferralsols areas of these Provinces which amounted to a few tens million hectares by effects of artificial reason such as irrigation activity and removal of vegetation from soil surfaces.

Dr. Inoue visited the Soil and Water Conservation Institute of the Chinese Academy of Sciences on 8-16 July and 1-10 Aug. 2001, based on the Core University Program of ‘Studies on combating desertification and development in the inland region of China’. He attended the annual meeting of ASA, CSSA, SSSA and visited Salinity Laboratory, USDA, USA on 20-30 Oct. 2001. Study on evaluation and standardization of the soil hydraulic and solute transport properties in-situ was supported by Monbusho Scientific Research Fund for 2001 to 2004. The measuring accuracy of soil water and salt concentration by time domain reflectometry (TDR) method was discussed. The experimental result was presented at the 48th annual meeting of Sand Dune Research. He also made experiments on vegetable yield and quality by controlled soil water matric head using underground suction gauge (UNSUC). The result was published in an International Journal, ‘Agricultural Water Management’. Other research projects on development of four-electrode sensor and a flux meter are still on-going. He contributed actively to the events such as open Arid Land Research Center to the public, and publications of annual report and general outline of ALRC.

#### **4) Division of Arid Land Science**

##### **Foreign Visiting Researchers**

The 15<sup>th</sup> foreign visiting professor, Dr. Velupillai Rasiah (Queensland Government, Dept. of Natural Resources, Australia), arrived on October 1, 2000 and stayed for one year until September 28, 2001. He conducted his study on ‘sustainable irrigation schedules for degraded arid lands’. Besides his own research, he taught students with great zeal, and attended the Japanese Society of Irrigation, Drainage and Reclamation Engineering (JSIDRE). Furthermore, he gave seminars in ALRC. He visited the faculty of environmental science and technology and Research Institute for Bioresources, Okayama University and collected material on his study.

The 17<sup>th</sup> foreign visiting associate professor, Dr. Ali, Mohamed Elfatih (El-Obeid Agricultural Research Station, Agricultural Research Corporation, Sudan), arrived on April 1, 2001 and stayed for one year until March 31, 2002. He conducted his study on ‘studies on growth response of crops under dry and saline conditions’. Besides his own research, he taught students with great zeal, and attended the JIRCAS International Symposium. Furthermore, he gave seminars in ALRC. He visited University of Tokyo and Kyoto University and collected material on his study.

The 18<sup>th</sup> foreign visiting professor, Dr. Berliner, Pedro Reuven (Wylar Dept. of Dryland Agriculture, Jacob Blaustein Institute for Desert Research, Ben-Gurion University of the Negev, Israel), arrived on October 1, 2001 and stayed for one year until September 20, 2002. He conducted his study on ‘effect of water quality, irrigation frequency and alternating water sources on the productivity and water efficiency of halophytes’. Besides his own research, he taught students with great zeal, and visited Research Institute for Humanity and Nature and gave his seminar. Furthermore, he gave seminars in ALRC. He visited Nagoya University and Kyoto University, and collected material on his study.

The 19<sup>th</sup> foreign visiting professor, Dr. Keren, Rami (Institute of Soil, Water and Environmental

Sciences, Volcani Center, Agricultural Research Organization, Israel), arrived on October 16, 2001 and stayed for eleven months until August 31, 2002. He conducted his study on 'soil structure and soil hydraulic properties'. Besides his own research, he taught students with great zeal, and attended the 7<sup>th</sup> World Congress on Biosensors in Kyoto. Furthermore, he gave seminars in ALRC. He visited Kyushu University and Kyoto University and collected material on his study.

### **Internal Researchers**

As internal visiting professors to ALRC, Professor Nakano, Yoshisuke (Faculty of Agriculture, Graduate School, Kyushu University), Professor Miyazaki, Tsuyoshi (Graduate School of Agricultural and Life Sciences, The University of Tokyo), Associate Professor Morita, Shigenori (Graduate School of Agricultural and Life Sciences, The University of Tokyo) took their posts on April 1, 2001 and had conducted joint researches.

## **5) Researchers under COE, Center of Excellence program (COE Researchers)**

### **Foreign Researchers**

The COE foreign visiting researcher, Associate Professor Wen, Guang (University of Saskatchewan, Canada) arrived on April 1, 2001 and stayed for one year until March 31, 2002. He conducted 'soil improvement by using recycling materials for sustainable agriculture production in arid region'.

After that, the COE foreign visiting researcher, Associate Professor Ali, Abdelbagi Mukhtar (Agricultural Research Corporation, Sudan) arrived on June 1, 2001 and stayed for ten months until March 31, 2002. He conducted 'basic study on improving plant production under semi-arid conditions'.

Besides their own researches, they taught students with great zeal, and gave a lecture held on December 2001.

### **Internal Researchers**

Dr. Okada, S., Dr. Yamada, M. and Dr. Nakamoto, K. conducted 'Researches on the Establishment of Plant Production System using Sea Water in the Coastal Arid Areas' based on their specialized knowledge.

## **(3) Administration**

From April 9, 1998, Administration office changed to belong to Research Support Dept. of the Headquarters, Tottori University. And two sections, Research Cooperation Section and Joint-Use Section, were placed.

### **Research Cooperation Section**

Research Cooperation Section is the administrative section that deals with the affairs related to the joint research of the ALRC.

There is one clerk (specialist: Mr. Maeta, S) in this section.

### **Joint-Use Section**

Research Cooperation Section is the administrative section that deals with the general affairs for the management of the ALRC.

There are three clerks (Chief Clerk: Mr. Nagamura Y. and Clerks: Mr. Masano, K. and Ms. Ohtsuka, Y.) and five associate clerks (Mr. Tomemori, H., Ms. Takahashi, K., Ms. Yonehara, A. <Division of Arid Land Environment>, Ms. Fukunaga, M. <Division of Biological Production> and Ms. Hamamoto, N. <Division of Afforestation and Land Conservation>) in this section.

### **Technical Section**



*Outline of Research Activities*

The Technical Section is taking charge of the maintenance management of the experimental facilities and equipments and assistance on joint use of ALRC.

There are four technical officials (Mr. Ueyama, I., Mr. Shimizu, T., Ms. Kano, Y. and Ms. Hama, T.) and two research support technicians (Mr. Kodani, S. and Mr. Takata, T.) in this section.