

2. Research Activities (Apr.2000-Mar.2001)

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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 2000 for five years. The title of COE program is 'Basic studies toward establishing sustainable biological production systems required for combating desertification in dry land'.

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 research cooperation section and the joint research 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 and one assistant researcher. The Visiting division has two visiting professors and one associate professor from Japan and, two visiting professors from abroad. In addition, two foreign researcher (visiting professor) and four 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. Eight office staff (three 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 2000, a total of five themes were adopted:

Scientific Research (B)	: 2,
Scientific Research (C)	: 1,
JSPS Fellows	: 2,

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

Scholarship Contribution	: 6,
Entrusted Research	: 1,
Joint Researches with private enterprises	: 2.

Joint-Use Research, Education, Publication

During the fiscal year of 2000, 55 Joint-Use Researchers (Teachers from national and private

universities) were attached to the Center. The number of students as of March 2001 is 76 (9 Ph.D. Students, 38 Master Students, 24 Undergraduate Students, 2 Trainees and 3 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 10th seminar of Joint Research was held on December 6, 2000 at Tottori Prefectural Kenmin Bunka Kaikan. Six research activities of subdivision were introduced. Two keynote lectures and twenty poster presentations were performed.

The international symposium was held on December 5, 2000 at Tottori Prefectural Kenmin Bunka Kaikan. It was funded by the program of (COE) funded by the Ministry of Education, Culture, Sports, Science and Technology.

(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 staff in the subdivision consists of Dr. Kamichika (Professor) and Ms. Yonehara (Associate Clerk, also assigned for the Subdivision of Water Resources). The organization of laboratory was thin because of a vacant post for associate professor. However, besides their own studies, Dr. Okada and Dr. Nakamoto (COE researcher of Arid Land Research Center) supported our laboratory.

There were one Doctoral students, six Master's students, three undergraduate students, and one foreign research students in the fiscal year of 1999. Mr. Gu (Chinese student studying in Japan), the 3rd year doctoral student, obtained the doctor's degree from the United Graduate School of Agricultural Science, Tottori University on March 2001, and will continue the study in this laboratory as a foreign researcher since April 2001. Mr. Usijima, the 2nd year master's students, started work for the Hokuriku agricultural office. Also, Mr. Kato entered the graduate school of Tsukuba University. Ms. Yogi, the first year of master's course, was employed as a staff of Okinawa prefecture, and leaved school on September. Ms. Matsuki entered the master's course of Tottori University. Dr. He, foreign research student of China, was employed as a staff of Chinese academy of agricultural science, and leaved school on June 30.

In the fiscal year of 2000, the following researches have been conducted in Japan.

(1) MICROCLIMATE: Energy balance, water balance, and CO₂ flux have been observed in a thin sorghum field in the Arid Research Center, and estimation of evapotranspiration with the plant growth have been examined. The simultaneous measurement of atmospheric and soil CO₂ concentration was conducted under the various mulching conditions in a field and the characteristic of diurnal change in CO₂ concentration with respect to the weather condition was examined. Also, the effect of paper mulching on the soil moisture was examined.

Dr. Hayakawa (Faculty of Agriculture, Yamaguchi University), Dr. Otsuki (the research institute of Kyushu University, Forest), Dr. Ito (Faculty of Agriculture, Gifu University), and Dr. Nakamoto 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. Honda (the Center of Environmental

Remote Sensing, Chiba University), Dr. Ishiguro (Faculty of Agriculture, Kagoshima University), and other researchers. In this laboratory, the cooperative research with a private corporation entitled “The development of monitoring system for the vegetation in north China using the NOAA/AVHRR data” was conducted.

(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 (Graduate School of Humanities and Sciences, Ochanomizu University) and Dr. Okada cooperated in this study.

(4) MEASUREMENT OF NATURAL ENERGY: The observations of meteorology and electric power by solar radiation have been studied in Inner Mongolia, China as a cooperative study with Dr. Hayashi (Faculty of Engineering, Tottori University).

Overseas research in the fiscal year of 2000 was as follows: Prof. Kamichika visited Inner Mongolia, China with Dr. Okada from September 19 to 26, 2000. Also, Prof. Kamichika visited China from March 8 to 12.

Subdivision of Water Resources

Staff and students: The staff consists of Dr. Yano, T. (Professor), Dr. Kitamura, Y. (Associate Professor), Ms. Yonehara, A. (Associate Secretary, also assigned for the Subdivision of Natural Environment), two Ph.D. students (one from China), nine Master's students (one from Zimbabwe), and four undergraduate students (two 4th grade and two 3rd grade).

Ms. Imamura, T., Mr. Ohigashi, N. and Mr. Sasami, I., second year students of the Master's Course (MS), completed the course. Mr. Ohigashi went on to the Doctoral Course. Mr. Sasami joined to an agricultural high school as a part-time teacher. Ms. Imamura is now seeking employment. Mr. Nishio, T., an undergraduate student (4th grade), joined to an agricultural high school as a part-time teacher after his graduation.

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 continued research on reclamation of saline soils. Regarding the research on water management method for reuse of drainage water in agricultural lands equipped with subsurface drainage system under arid and semi-arid climate that we have conducted, the financial support of Monbusho Grant-in Aid for Scientific Research C(2) was approved for four years from this fiscal year. In respect of a research on the development of technology for the rehabilitation of soils with salt accumulation in the Central Asia which had been conducted as a main theme of the subdivision until 1998 fiscal year, a variety of analyses were carried out based on the observed field data and the results were presented in several papers including international symposium.

Prof. Yano was also assigned as a professor of the special office for establishing the Research Institute for Humanity and Nature (provisional name) this fiscal year. He made two round trips between Tottori and Tokyo almost every week, and contributed to the establishment of the institute and the formulation of research projects. The research project on “Impact of Global Warming on Agro-Ecosystem in Arid Land” proposed by him was adopted, and the one-year feasibility study for the research will be carried out in Israel as one of the five key research themes in the next fiscal year.

Overseas Research: Overseas research in the fiscal year of 2000 were as follows:

Related to the above mentioned research program of the Research Institute for Humanity and Nature

(provisional name), Prof. Yano visited Israel in March, 2001, to coordinate the research program with Israeli counterpart researchers. In line with the Scientific Research C(2), Dr. Kitamura visited Pakistan to conduct field survey to clarify the basic concept of subsurface drainage systems and the present state of groundwater control in the Indus River Basin in March, 2001. He also visited Ghana as a short-term JICA expert to conduct technical cooperation in operation and maintenance (O&M) for the Small-Scale Irrigated Agriculture Promotion Project in Ghana during October-November, 2000.

Cooperative researches have been conducted with the following researchers: Prof. Nishiyama, S. (Fac. of Agric., Yamaguchi Univ.), Dr. Odani, H. (Univ. of Shiga Prefecture) and Dr. Aota, T. (Fac. of Agric., Niigata Univ.), Prof. Wakatsuki, T. (Fac. of Life and Environmental Science, Shimane Univ.) and Prof. Murakami, M. (Kochi University of Technology), Prof. Chikushi, J. (Biotron Institute, Kyushu Univ.), Dr. Takeuchi, S. (Fac. of Engineering, Kyushu Kyoritsu University). One new research project was started with Prof. Shimada, Y. (Graduate School of Letters, Nagoya Univ.). 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 consists of Dr. Inanaga, S. (Professor), Dr. Sugimoto, Y. (Associate Professor) and Ms. Fukunaga, M. (Associate Clerk, also assigned for 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 on salt stress, differences in drought tolerance among wheat and sorghum varieties, control of parasitic weed by inducing suicidal germination (Monbusho Grant-in-Aid B). 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.), Morita, S. (Univ. of Tokyo), Yoneyama, K. (Utsunomiya Univ.), Nakajima, H. (Tottori Univ.) and Tamura, J. (Tottori Univ.). In addition, Dr. Ma, Y. and Ms. Qiman Younusi from China joined this subdivision as a JSPS postdoctoral fellow and a foreign researcher, respectively.

Studies abroad: Dr. Inanaga visited Tunisia to deliver a lecture entitled "Research activities to combat desertification in Japan" at a Japan-Tunisia joint seminar. The Chinese Academy of Sciences invited Prof. Inanaga to the symposium "Rehabilitation of Grassland and Control of Desertification in Dry Area" as a committee member. Ms. An, P., a Ph.D. student, delivered a seminar under the title "Plant indicator for assessment of desertification in rangeland." Four students in this subdivision also attended this symposium. Moreover, Dr. Inanaga visited ICARDA in Syria and discussed JICA-ICARDA joint project. Soil and Water Conservation Institute, Chinese Academy of Sciences and Ministry of Water Resources, and Shijiazhuang Agricultural Modernization Institute, Chinese Academy of Sciences, awarded titles of visiting professor and honourable professor to Dr. Inanaga. Dr. Sugimoto attended the 27th Annual Meeting of the Plant Growth Regulation Society of America to deliver a presentation on the "Involvement of ethylene biosynthesis in germination of root parasitic weed *Striga hermonthica*." Drs. Inanaga and Sugimoto visited Soil and Water Conservation Institute, China, and discussed Japan-China Joint Project.

Students: There were two Ph.D. students (one 2nd grade from China and one 1st grade), eight MSc students (three 2nd grade and five 1st grade, one of whom is from Sudan), three undergraduate students (one 4th grade and two 3rd grade). The undergraduate student is continuing his study up to MSc level at this subdivision. Two MSc graduates were employed by private sector companies.

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 the committee for establishing Institute of Earth Environmental Sciences under the Ministry of Education,

Science, Culture and Sports, a member of desertification division under the committee for planning research projects on global environmental issues, Environmental Agency, an expert of international division under the committee of irrigation and drainage, the Ministry of Agriculture, Forestry and Fisheries, JICA advisory committee for the Middle East and so on. Overseas Environmental Cooperation, Japan, appointed Drs. Inanaga and Sugimoto as committee members of investigation for technologies to combat desertification.

Subdivision of Plant Production

The subdivision is composed of Dr. Hamamura, K. (Professor), Dr. Toyama, M. (Associate Professor), Ms. Fukunaga, M. (Associate Clerk), 7 students in the master course, 3 senior and 2 junior students (Undergraduates) and 1 research student from China since October. Two master course students retired.

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 waste water treated with photosynthetic bacteria on Komatsuna growth and soil properties, the effects of VA mycorrhizae inoculation to improve drought tolerance of cowpea and pea, response of lettuce to growing season and salt in irrigated water, the advantages of sub-surface irrigation method, cultivation of pineapple using pumice with fertigation, propagation of a few *Sedum* species, the compensation effects of soy bean plants after insect damage, cultivation of spinach by fertigation, change in sugar content during harvesting period of Baker's garlic, effects of water cutting to the quality of melon fruit, shape of root nodules of pigeon pea, water channel gene homolog collection from the root of *Salicornia* (cooperative study), and response of several plant species against low and high pH.

Dr. Toyama undertook several field experiments in Mongol on the use of water holding substances and forestation in desert areas. Special emphasis was laid on the effect of these substances on desert afforestation and on water saving cultivation with encouraging results. He also visited China, Morocco and United States to study on the same subject.

The graduate students found their jobs as instructors in school, a researcher in a seed company, as a salesman of electronic devices and others.

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, 4 Master's, and 4 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.

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. Salinity effects on the growth of *Populus alba* and *Casuarina equisetifolia* are investigated.

Studies on the ecological characteristics of salt tolerant plants and soil improvement in salt accumulated areas along the Yellow River in China, which were started in 1999, are in progress with a financial support of the Nippon Life Insurance Foundation.

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, were 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.

Studies on the effect of aridity on the vegetation in eastern China started in 2000. In February, We invited Mr. Zou xue zhong, director of The Liaoning Academy of Forestry, and discussed about vegetation and afforestation in Liaoning Province.

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.

In March, we held a seminar entitled "Revegetation in Turkey" by Professor Kyozeu Chiba (Okayama University), who is now visiting professor of ALRC.

Dr. Tamai visited China in August to research ecological characteristics of salt tolerant plants and soil improvement in Inner Mongolia. Dr. Yamanaka visited Inner Mongolia of China to research ecological characteristics of plants in semi-arid areas in August and September.

Subdivision of Land Conservation

The main studies in this subdivision were on the dynamic movement of moisture and salt in soil and measures to control soil salinity problems. Degradation of soil due to irrigation was also studied in order to promote research on the mechanism and control of desertification under arid conditions. The subdivision is led by Dr. T. Yamamoto (Professor), with staff members Dr. M. Inoue (Associate Professor), Dr. G. Wen (JSPS fellowship for foreign researcher), N. Hamamoto (Associate clerk) and ten students. Three students are enrolled in the doctoral course at the United Graduate School of Agricultural Sciences, four as master course students and three as undergraduate students in the Faculty of Agriculture.

The main domestic research titles are (1) Soil degradation mechanism and efficient irrigation schedules in arid land and (2) Soil improvement by using recycle materials in irrigated fields of arid region (final year). The project was supported by Monbusho Scientific Research Fund. (3) Effect of water pollution on clogging of emitters and filters of microirrigation system. The project has been supported by Ministry of Agriculture, Forestry and Fisheries since 1992. (4) Effect of artificial zeolite on soil salinity improvement (final year). The project has been cooperated by Kimura Chemical Plants Co. since 1996. (5) Mechanism of water erosion, soil moisture and salinity movement using three dimensional soil water erosion monitoring system. The system was introduced into Arid Land Dome in 1998.

Joint researches with other universities are as follows: (1) Studies on arid farm land conservation, with Drs. M. Fukada (Yamaguchi Univ.), T. Nishimura (Tokyo Univ. of Agric. and Tec.) and O. Kitani (Nihon Univ.). (2) Studies of surface condition analysis in arid land using remote sensing technique, with Drs. S. Torii (Kyoto Univ.) and Fujimura (Tottori Univ.). (3) Studies on salt accumulation and leach using automated monitoring system, with Drs. Y. Kihara (Shimane Univ.), T. Morii (Niigata Univ.), S. Yamamoto (Tottori Univ.), N. Toride (Saga Univ.). (4) Free subject on arid land studies, with Drs. K. Kosugi (Kyoto Univ.), R. Hara (Daitobunka Univ.), H. Cho (Saga Univ.), U. Takeshita (Okayama Univ.), Y. Ishida (Akita Prefecture Univ.), Y. Mori (Shimane Univ.) and K. Takahashi (Tottori Univ.).

The annual meeting of Soil Physics section of JSIDRE under the title of "Problems to be studied to soil degradation in arid land" was held on Dec. 4th, 2000 in the Arid Land Research Center. The meeting was organized and chaired by our subdivision, 54 researchers participated. Eighteen posters and six oral

lectures were presented.

Dr. Yamamoto visited the Institute of Soil, Water and Environmental Sciences, Volcani Center, ARO in Israel during July 3-8 and collected valuable information on the effect of microirrigation on degradation of soil and water in Israel, met Miss M. Arai who is a student in our division and was visiting Israel as an exchange student, and discussed with her on the measurement of soil aggregation of salinity soils. Dr. Yamamoto also attended the 2000 ASAE meeting in Milwaukee, USA during July 9-12 and presented the research entitled 'Preventing Algae Clogging of Filter and Emitter in Microirrigation System'.

Dr. Inoue visited the large scale irrigation projects in the Inner Mongolia Region and in Gansu Province in order to investigate combating desertification and to attend the Japan and China Joint Seminar from 27 Aug. to 7 Sep. and the result of investigation was submitted to Journal of JSIDRE. He also attended the meeting at Beijing in order to get hold of views and problems in future on rural maintenance and water use development of agriculture supported by Japan and China Joint Program. 'New simultaneous estimation of soil water and solute transport parameters by inverse method using a sand column with four electrode sensors' presented at the General Assembly of European Geophysical Society in the Hague (Netherlands) was submitted in 'Advances in Water Resources' published by ELSEVIER. He presented 'An automatically operated system of measuring soil water flux, downward flow from root zone', with Dr. Dirksen, COE foreign researcher at the Annual Meeting of JSIDRE in Aug. 2000.

Dr. Wen attended the 2000 ASA-CSSA-SSSA Annual meeting in Minneapolis, USA during Nov. 4-18 and presented 'N Recovery from Regular and Coated Fertilizers for Peanut Production in a Sand Soil in Tottori Sand Dune', and the 4th Decennial National Irrigation Symposium in Phoenix, USA. Master course students Mr. Hatanaka and Mr. Yuya also attended these conferences and were impressed a great deal by the international research activity.

Mr. FK Amu-Mensah and Mr. JS Wei, who were the third grade in the doctoral course, presented their Ph. D. researches "Application of Tank Irrigation in Promoting Agriculture in Low Rainfall Areas of Ghana" on Sept, 2000, and "Effect of Topography on Plant Growth of Air-seeding on Desert Control in China" on March, 2001, respectively.

4) Division of Arid Land Science

Foreign Visiting Researchers

The 14th foreign visiting associate professor, Dr. Ahmed, Nafisa Elmahi (Crop Protection Center, Agricultural Research Corporation, Sudan), arrived on October 1, 1999 and stayed for one year until September 30, 2000. She conducted her study on 'Basic studies on control of root parasitic weeds in semi-arid regions'. Besides her own research, she taught students with great zeal, and gave seminars in ALRC. Furthermore, she participated Research Meeting in U.S.A. and gave her presentation.

The 15th foreign visiting professor, Dr. Velupillai Rasiah (Queensland Government, Dep. 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 16th foreign visiting professor, Dr. Li Xin (Xinjiang Institute of Ecology and Geography, the Chinese Academy of Sciences, China), arrived on October 1, 2000 and stayed for six months until March 31, 2001. He conducted his study on 'water and solute transport modeling in the soil following irrigation'. Besides his own research, he taught students with great zeal, and gave seminars in ALRC. Furthermore he gave a lecture as an invited lecturer at the international symposium held on December, 2000.

Internal Researchers

As internal visiting professors to ALRC, Professor Ishi, Hiroyuki (Graduate School of Frontier Sciences, The University of Tokyo), Professor Chiba, Kyozo (Faculty of Agriculture, Okayama Univ.), Associate Professor Honda, Yoshiaki (Center for Environmental Remote Sensing, Chiba Univ.) took their posts on April 1, 1999 and had conducted joint researches until March 31, 2001.

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

Foreign Researchers

The COE foreign visiting researcher, Professor Aydin Mehmet (University of Mustafa Kemal, Turkey) arrived on April 1, 2000 and stayed for one year until May 31, 1999. He conducted 'effect of soil salinity on crop evapotranspiration'.

After that, the COE foreign visiting researcher, Professor Alexander Lux (Comenius University, Slovakia) arrived on August 1, 2000 and stayed for eight months until March 31, 2001. He conducted 'Analysis of morphological characteristic of drought tolerant crops'.

Besides their own researches, they taught students with great zeal, and gave a lecture held on December, 2000.

Internal Researchers

Dr. Okada, S., Dr. Yamada, M., Dr. Nakamoto, K. and Tomemori, H. conducted 'Basic studies toward establishing sustainable biological production systems required for combating desertification in dry land'.

(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. Maeda, K.) in this section.

Joint-Use Section

Joint-Use Section is the administrative section which deals with the general affairs for the management of the ALRC.

There are two clerks (Chief Clerk : Mr. Sakane, M. and Clerks : Mr. Masano K.) and five associate clerks (Ms. Yamada, E., Ms. Matsuoka, M., Ms. Yonehara, A. <Division of Arid Land Environment>, Ms. Fukunaga, M. <Division of Biological Production>, Ms. Hamamoto, N. <Division of Afforestation and Land Conservation>) in this section.

The chief clerk, Mr. Taniguchi, K. moved to the Finance Division of the Headquarters.

Technical Section

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

Outline of Research Activities

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