Improving rainwater resource use efficiency and ecosystem management sustainability in dry area

2013 International Workshop on Dryland Agriculture and Ecosystem Sustainability

2013 年旱地农业与生态系统可持续性国际会议

October 15 – 18, 2013
Lanzhou University, northwest China
Organizers 主办单位

1. Lanzhou University, China 兰州大学
2. United Nations Environment Programme (UNEP) 联合国环境规划署
3. Jomo Kenyatta University of Agriculture and Technology, Kenya 肯尼亚农业大学
4. The University of Sargodha, Pakistan 巴基斯坦萨果达大学

Organising Committee 组委会

1. Honorary Chairs 名誉主席
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   2) Professor Romanus Odhiambo Otieno, Deputy Vice Chancellor of Jomo Kenyatta University of Agriculture and Technology

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Theme, Key Speakers and Activities

1. Theme and Objectives

   The theme of workshop is “improving rainwater resource use efficiency and ecosystem management sustainability in dry area”. Renowned speakers from Kenya, Pakistan, Ethiopia, UNEP and China will be invited to the forum to present current developments on dryland agricultural development and ecosystem sustainability to cope with global climate change, addressing the topic how to improve the productivity and sustainable development of fragile arid and semi-arid agro-ecosystems under climate change. The objectives of forum include as follows:

   1) Potential and significance of dryland agriculture in developing countries
   2) Assessment on the effects of climate change on arid agricultural ecosystem
   3) Collaboration, exploration and demonstration of water-harvesting agriculture
   4) Evaluation on suitable classification of rainfed agriculture in developing countries
   5) Collaborative strategies and technical innovation of in dryland agricultural collaboration

2. Speakers List

1) Mohamed A.S. Abdel-Monem as a corresponding key speaker, Regional Team Leader of Ecosystem Management, UNEP-Regional Office for Africa
2) Professor Muhammad Ashraf, Fellow of TWAS, The University of Sargodha, PAKISTAN
3) Professor Romanus Odhiambo Otieno, Deputy Vice Chancellor of Jomo Kenyatta University of Agriculture and Technology, KENYA
4) Professor Kamau Ngamau, Dean of Faculty of Agriculture, JCUAT, KENYA
5) Professor Fengmin Li, Director of MOE Key Laboratory of Arid and Grassland Ecology, Lanzhou University, CHINA
6) Professor Losenge Turoop, Deputy Dean of Faculty of Agriculture, JCUAT, KENYA
7) Professor Aggrey Bernard Nyende, Faculty of Agriculture, JCUAT, KENYA
8) Professor Qifeng Yang, Deputy Director of Department of Agriculture & and Animal Husbandry of Gansu Province, CHINA
9) Professor Lixin Zhang, Northwest A&F University, Shanxi, CHINA
10) Miss Chunrong Xiong, Farming Technology Extension Station of Gansu, CHINA
11) Professor Hengjia Zhang, Gansu Agricultural University, Gansu, CHINA
12) Professor Xiaogang Li, MOE Key Laboratory Arid and Grassland Ecology, Lanzhou University, CHINA
13) Dr. Patric Thuku Gicheru, Director of KARI National Agricultural Research Labs, KENYA
14) Mr. Lei Zhang, Farming Technology Extension Station of Yuzhong County, Gansu, CHINA
15) Professor Guojun Sun, MOE Key Laboratory, Lanzhou University, CHINA
16) Dr. Rong Zhang, MOE Key Laboratory, Lanzhou University, CHINA
17) Professor Youcai Xiong, MOE Key Laboratory, Lanzhou University, CHINA
18) Professor Chuanyan Zhao, MOE Key Laboratory, Lanzhou University, CHINA
19) Dr. Nudrat Aisha Akram, Government College University, PAKISTAN
20) Mr. Dinka, The Institute of Agricultural Research, ETHIOPIA
21) Miss Asfa Batool, MOE Key Laboratory, Lanzhou University, CHINA / Pakistan
22) Dr Almaz Tadesse, Addis Ababa University, ETHIOPIA
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Objectives of the Workshop

Arid agriculture and ecosystem management under climate change is related to national economic and social development of hot spots and difficult problems, the only way is to build an ecological civilization. While arid climate, infertile soil, high population density and serious shortage of grain production are the biggest practical problems which have been encountered by those developing countries (Kenya is extensively accepted as typical representative among these countries). The serious shortage in agricultural primary biomass production leads to a constraint in livestock development and extension of agricultural industrial structure, which increases the difficulty for seeking fundamental solution to food shortages and hunger reduction. Arid Agroecology, as the characteristics subjects in Lanzhou University, which has achieved great success in the field of northwest China's practice of micro rainwater harvesting technology. Over the past three decades, Lanzhou University conducted a large number of international cooperation and exchange projects, and its collaborative institutions have accumulated a series of effective theoretical and practical bases on the aspects of water-harvesting agriculture, dryland crop cultivation and water-saving technology issues under the background of small farmers operating. The relevant experiences and skills are in full compliance with the actual situation of local place. Then the rainfall amount and accumulated temperature in Kenya are very similar to those of semi-arid regions of Northwest China. The production and management system is mainly a feature of small farmers in both counties. Both of them are the typical countries for the demonstration and promotion of water-harvesting agriculture and water-saving cultivation techniques.
Dryland water-saving agriculture is an effective approach to solve the problems of agriculture and poverty in partial arid countries. This forum aims to enhance academic exchange and collaboration among the agronomists for China, Kenya, Ethiopia and Pakistan within the scheme of arid agriculture and ecosystem sustainability under climate change. It also provides a platform for the scientists to discuss and draft a protocol of China, Kenya and Pakistan Collaboration in dryland agriculture. The protocol will serve as expertise resolution to submit the governments of three countries for reference. We will jointly pay efforts on enhancing mutual understandings on critical issues of agricultural development under climate change, increasing grain production capacity in drought conditions, and accumulating knowledge and experiences for further cooperation. Major objectives of this forum are: 1) the find the enormous potential of dryland agriculture in developing countries; 2) to assess the impact of climate change on arid agro-ecosystem; 3) to pursue the develop and demonstration of water-saving and farming techniques under climate Change; 4) to assess the suitability of rainfed agriculture in developing countries; 5) to discuss the international cooperation and innovation and approaches in dryland agriculture under climate change.

3. Activities (definite schedule will be updated in a separate document)

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<th>Date</th>
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<tr>
<td>October 14</td>
<td>Preparation meeting for workshop</td>
<td>Organizing team</td>
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<tr>
<td>October 15</td>
<td>Registration at Tsuiying Hotel and others</td>
<td>MO Fei, Huili Wang, Tao Tian</td>
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<td>October 16</td>
<td>1) Opening ceremony of workshop  2) Academic presentations (10 presentations)  3) Welcome reception at supper time;  4) Panel meeting with the aim to further revise the protocol of China-Kenya Collaboration in Dryland Agriculture in the evening.</td>
<td>Leaders of Lzu  Professor Muhammad Ashraf  Professor Romanus Odhambo  Representative of UNEP entrusted by Dr. Mahesh  Professor LI Fengmin  Professor XIONG Youcai  Local officials  Organizing team</td>
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<td>October 17</td>
<td>1) Academic presentations (8 presentations) in the morning;  2) Visit Farming Extension Station of Yuzhong County (field excursion to typical dryland agricultural areas of Loess Plateau) in the afternoon (Shitougou, Yuzhong County, Gansu, China)  3) Visit Dingxi Dryland Agricultural Center of Gansu Province and local farmers’ livelihood using rain-harvesting farming technology.  4) Young scientists forum</td>
<td>Local officials and scientists  MO Fei  Asfa Batool  WANG Huili  ZHAO Xuzhe  WANG Jianyong  ZHOU Hong  TIAN Tao  Organizing team</td>
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<td>October 18</td>
<td>1) Panel meeting with the aim to confirm the protocol of collaboration in dryland agriculture and ecology  2) Short visit to experimental station</td>
<td>Organizing team</td>
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<tr>
<td>October 19</td>
<td>Departure</td>
<td>Organizing team</td>
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Collaboration and exchange

Overview on previous exchange and collaboration
Overview on integrated dryland water-saving agricultural system in northwest China
Dr. Mohamed A.S. Abdel-Monem met with LZU delegation in ROA-UNEP

Prof Xiong (left) and his postgraduate (right) introduced dryland water-saving farming technique to Mr. Zhijia Wang in semiarid Loess Plateau, northwest China
2012 Year. A group of photos to indicate the survey on integrated rain-fed agricultural system in northwest China. Left above, micro-field rainwater-harvesting corn field; Right above, corn cob and grain yield investigation; Left below, fresh corn straw process system for animal forage; Right below, local animal husbandry farm.
Collaboration and exchange between LZU with UNEP, JKUAT and University of Sargodha
Lanzhou is the geographic center of China. Lanzhou University is situated at downtown of Lanzhou City, with 70km from Zhongchuan Airport. These three hotels are close to Lanzhou University, only 3 minutes by walk to workshop venue – the Library of Lanzhou University. A taxi from the airport to Lanzhou University will be approximately 150 RMB, including airport and toll charges. The airport shuttle price is 30 RMB. The transport from the airport to downtown is paid by the delegates (30 RMB by shuttle bus and around 150-200 RMB by taxi.
Introduction to the Dingxi Arid Meteorology and Ecological Environment Experimental Site of Institute of Arid Meteorology of CMA

Dingxi Arid Meteorological and Ecological Environment Experimental Site (DAMES) of Institute of Arid Meteorology, invested by China Meteorological Administration (former National Meteorological Bureau) during the national seventh “five-year-plan” and established in 1987, is located in the north of Dingxi County (35°35’N, 104°37’E, 1896.7m elevation) about 110 km east of Lanzhou, the capital of Gansu province. It is flat and covers about 1.5 acres. The soft and thick soil belong to podzolic calcic with somewhat alkaline, and the ground water is under 7m. The main purpose of the DAMES is to study the law of water cycle and energy conversion in the SPAC, make full use of rainwater for crops and assessment of the effect of climatic variation to agriculture in semi-arid area and so on.

At present, the DAMES owns many advanced instruments such as the large weighing lysimeter, pyrometers, net radiometer, pyrometers, the Bowen ratios testing instrument, heat-flux plates, CI-301PS portable photosynthesis system, thermal infrared radiometer CE312, a 16-m meteorological tower with temperature, humidity and wind sensors, 3-D Sonic Anemometer, Open Path CO$_2$/H$_2$O Analyzer, etc.

Many scientific research items have been completed in the DAMES, including “Improvement and Popularization of LG-1 Large Weighing Lysimeter” (IPLW), “An Experimental Research on Rainwater Collection in Rain fed Agriculture Region of Gansu Province” (ERCRA), “An Experimental Research on the Improvement Efficiency of Water Utilization in the Middle of Gansu Province” and so on.

此外，有许多科研项目在定西干旱气象与生态环境试验基地内完成，包括“LG-1 大型蒸表的改进和推广”、“甘肃省旱作农业区雨水收集试验研究”、“甘肃省半干旱地区水量平衡和能量转换规律的试验研究”、“提高甘肃省中部地区水分利用效率的试验研究”，等。
A. Experiment greenhouse
B. Free Air CO2 Enrichment (FACE)
C. Infrared temperature increasing device (ITID)
D. Water experiment field (WEF)
E. Open top chamber (OTC)
F. Large weighing lysimeter
G. CSAT3: Three Dimensional Sonic Anemometer, Campbell Scientific, INC. USA
H. LI-7500 Open Path CO2/H2O Analyzer, Li-cor, USA
Introduction to the Rain-harvesting Agricultural Experimental Station of Shitougou

Rain-harvesting Agricultural Experimental Station of Shitougou is located at Lianda town near Yuzhon County, Gansu Province, China (E 104°05′, N 35°52′). It takes 1 hour by bus from Lanzhou to Shitougou. The area has a medium temperate semiarid climate, with an annual mean air temperature of 6.57 °C, a maximum of 18.9 °C (July) and minimum of −7.8 °C (January). The average elevation is 2004 meters. Ground water is unavailable for plant growth in this region. The total area of Shitougou is 733.3541 ha, field area is 485.2137 ha and the area for Grain to Green is 59.4016 ha.

Whole Plastic Film Mulching on Double Ridges changes the soil water content and temperature so that it is much helpful to drought resistance and water use efficiency. It can increase the yield of corn especially in Semi-arid regions. Shitougou is the demonstration area of efficient rainwater harvesting agriculture in Gansu Province and high yield corn built by the ministry of agriculture. Now, over 90% field was planted corn by Whole Plastic Film Mulching on Double Ridges in Shitougou.

石头沟隶属于兰州市榆中县连搭乡，属于温带半干旱气候区，气温年周期变化，夏季气温高，七月最高，冬季低，十二月份最低，春秋介于两者之间，春温低于秋温。年平均气温6.7°C，最低十二月份，月平均气温−7.8°C，最高七月平均气温18.9°C，全年日照时数2600小时左右。石头沟村距离榆中县城3.5公里，总面积约为11000亩，其中耕地总面积7278亩，退耕还林面积为891亩。

全膜双垄沟播对于半干旱区增温，抑蒸，保墒具有重要的作用。垄沟结合地膜覆盖通过合理的耕作还具有提高作物养分利用率，增加土壤表面积温，活化土壤养分，缓解水土流失，抑制土壤盐碱，改善作物光照条件和提高光合强度，最终促进作物生长发育和实现产量品质的提高。石头沟村是农业部玉米万亩高产创建示范片，国家旱作农业示范区也是榆中县石头沟村田间学校教学基地。石头沟目前90%以上的耕地均以全膜双垄沟的方式种植。
Figure 1 Introduction to the Rain-harvesting Agricultural Experimental Station of Shitougou. A, The geographic map of Shitougou; B, The demonstration area of efficient rainwater harvesting agriculture in Gansu Province; C, The field school; D, The geographical location of Yuzhong County in China; E, The administrative areas of Yuzhong County; F, The demonstration area of high yield corn built by the ministry of agriculture; G, Whole Plastic Film Mulching on Double Ridges.
Lanzhou University

Founded in 1909 and located in Lanzhou, the capital city of Gansu Province, Lanzhou University is one of the key universities under Ministry of Education, China. Currently, it houses 23 schools: School of Chinese Language and Literature, School of Journalism and Communication, School of History and Culture, School of Economics, School of Management, School of Philosophy and Sociology, School of Foreign Languages and Literature, School of Law, School of Politics and Administration, School of Arts, School of Education, School of Mathematics and Statistics, School of Information Science and Engineering, School of Physical Science and Technology, School of Chemistry and Chemical Engineering, School of Life Science, School of Resources and Environment, School of Pastoral Agriculture Science and Technology, School of Atmospheric Science, School of Continuing Education, School of Network Education, School of Higher Vocational Education, School of International Cultural Exchange.

There are 6 National Bases for the Training of Researching and Teaching personnel for Fundamental Disciplines. The University operates an additional 35 institutes along with 1 national key Laboratory of the Applied Organic and 3 key laboratories of Arid and Grassland Ecology, West China Environment, Magnetism and Magnetic Materials of the Ministry of Education, a key laboratory of Grassland Agro-ecosystem of the Ministry of Agriculture. In 1981, Lanzhou University became one of the first universities entitled to enroll Bachelor, Master’s and Doctoral degree candidates; it was also authorized to set up postdoctoral research programs in Physics, Chemistry and Biology. The undergraduate degree program consists of four years of study, while postgraduate and doctoral candidates complete their studies from between 2 and 3 years. In total, the University provides education for over 36,400 students, among whom there are nearly 12,000 formal undergraduate students.

By placing emphasis on basic theoretical research, Lanzhou University has made great achievements in the fields of Organic Chemistry, Cell Biology, Theoretical Physics, Nuclear Physics and Technology, Magnetics, Plant Physiology, Ecology, Basic Mathematics, Mechanics, Natural Geography, Synoptic Dynamics, Inorganic Chemistry, Analytic Chemistry, and others. According to statistics provided by the Scientific Citation Index (SCI) and the Index Scientific Research (ISR), Lanzhou University is one of the top ten universities in contributions to academic publications in international journals frequently cited by ongoing research from around the world. Specifically, in 1992 and 1993, the university ranked third nationally in contributions to academic publications and sixth place in journal citations, thus bringing international attention to the university from academic societies worldwide. In the last decade the University has emphasized studies in the special characteristics and problems of China’s Northwestern Provinces in the fields of Customs, Economy, Society, Science and Culture, Dunhuang Studies, Northwestern History and Geography, Population, Geological Engineering, Glaciation, Plateau Atmosphere, Plant Physiology and Arid Ecology. The importance of these studies has brought high recognition and praise from the Central Government.

At the conference on Asian Higher Education held in Manila, Philippines in 1993, 100 universities were cited for their academic excellence; Lanzhou University ranks sixth among the 26 universities selected from China. In 1995, 13 Chinese universities were selected as the most Prominent universities in China and, once again, Lanzhou University ranked sixth in this category. All of these achievements help make Lanzhou University well-known at home and abroad.

Lanzhou University is active in developing international education exchange and cooperation through the international exchange of post-graduate students, visiting scholars and scientific research cooperation with universities and organizations in more than 30 foreign countries and regions including USA, Japan, UK, France, Germany, Australia, Canada, Russia, Hong Kong and many others.

The current President of Lanzhou University is Professor WANG Cheng.
The United Nations Environment Program (UNEP) is an international institution that coordinates United Nations environmental activities, assisting developing countries in implementing environmentally sound policies and practices. It was founded as a result of the United Nations Conference on the Human Environment in June 1972 and has its headquarters in the Gigiri neighborhood of Nairobi, Kenya. UNEP also has six regional offices and various country offices. Its activities cover a wide range of issues regarding the atmosphere, marine and terrestrial ecosystems, environmental governance and green economy.

It has played a significant role in developing international environmental conventions, promoting environmental science and information and illustrating the way those can be implemented in conjunction with policy, working on the development and implementation of policy with national governments, regional institutions in conjunction with environmental Non-Governmental Organizations (NGOs). UNEP has also been active in funding and implementing environment related development projects. UNEP has aided in the formulation of guidelines and treaties on issues such as the international trade in potentially harmful chemicals, transboundary air pollution, and contamination of international waterways.

The World Meteorological Organization and UNEP established the Intergovernmental Panel on Climate Change (IPCC) in 1988. UNEP is also one of several Implementing Agencies for the Global Environment Facility (GEF) and the Multilateral Fund for the Implementation of the Montreal Protocol, and it is also a member of the United Nations Development Group. The International Cyanide Management Code, a program of best practice for the chemical’s use at gold mining operations, was developed under UNEP’s aegis.

UNEP's current Executive Director is Achim Steiner, who succeeded previous director Klaus Töpfer in 2006. Dr Töpfer served two consecutive terms, beginning in February 1998. On 15 March 2006, the former Secretary-General of the United Nations, Kofi Annan, nominated Achim Steiner, former Director General of the IUCN to the position of Executive Director. The UN General Assembly followed Annan's proposal and elected him. The year 2007 was declared (International) Year of the Dolphin by the United Nations and UNEP. Patron of the Year of the Dolphin was H.S.H. Prince Albert II of Monaco, with Special Ambassador to the cause being Nick Carter, of the Backstreet Boys. 2010 was designated the International Year of Biodiversity and presented an opportunity to enhance knowledge of ecosystems and their services. In 2011 the UN celebrated the International Year of Forests, in 2012, the International Year for Sustainable Energy for All. 2013 has been designated as the International Year of Water Cooperation.

UNEP has sponsored the development of solar loan programs, with attractive return rates, to buffer the initial deployment costs and entice consumers to consider and purchase solar PV systems. The most famous example is the solar loan programs sponsored by UNEP helping 100,000 people finance solar power systems in India. Success in India's solar program has led to similar projects in other parts of the developing world like Tunisia, Morocco, Indonesia and Mexico. In order to ensure full participation of global communities, UNEP works in an inclusive fashion that brings on board different societal cohorts.

UNEP publishes many reports, atlases and newsletters. For instance, the fifth Global Environment Outlook (GEO-5) assessment is a comprehensive report on environment, development and human well-being, providing analysis and information for policy makers and the concerned public. In December 2012, following the Rio+20 Summit, a decision by the General Assembly of the United Nations to 'strengthen and upgrade' the UN Environment Program (UNEP) and establish universal membership of its governing body was confirmed. UNEP's main activities are related to: climate change; including the Territorial Approach to Climate Change (TACC); disasters and conflicts; ecosystem management; environmental governance; environment under review; harmful substances; and resource efficiency.
Jomo Kenyatta University of Agriculture and Technology

Jomo Kenyatta University of Agriculture and Technology is an institution of Higher Education in Kenya. It is located in Juja, 36 kilometers North East of Nairobi, along Nairobi-Thika Highway. The Objectives of the Institution are:

To provide directly or indirectly or in collaboration with other institutions of higher learning, facilities for university education including agriculture, scientific, cultural, technological, and professional education, and integration of teaching, research and effective application of knowledge and skills to the life, work and welfare of citizens of Kenya.

To contribute in the discovery, transmission and preservation, enhancement of knowledge and stimulate the intellectual participation of students in the economic, technological, agricultural, professional and cultural development of Kenya this institute is playing very important role.

To play an effective role in the development of agriculture and technology in conjunction with the industry and to provide extension survives so as to contribute to the social and economic development of Kenya.

To cooperate with the government in the planned development of university education and in particular to examine and approve proposals for new faculties, new departments, new degree courses or new subjects of study proposed to it by any constituent college or other post-secondary institution; to determine who may teach, what may be taught, how it may be taught and when it may be taught at the university.

The university was started in 1981 as Jomo Kenyatta College of Agriculture and Technology (JKCAT), a Middle Level College by the Government of Kenya with the assistance from the Japanese Government. Plans for the establishment of JKCAT started in 1977. In early 1978, the Kenyan president, Jomo Kenyatta, donated two hundred hectares of farmland for the establishment of the college. The first group of students was admitted on 4th May 1981. The new president Daniel Arap Moi formally opened JKCAT on 17th March 1982. The first graduation ceremony was held in April 1984 with Diploma Certificates presented to graduates in agricultural engineering, food technology and horticulture. On 1st September 1988, Daniel Arap Moi, declared JKCAT a constituent College of Kenyatta University through a legal Notice, under the Kenyatta University Act (CAP 210C). The name of JKCAT officially changed to Jomo Kenyatta University College of Agriculture and Technology (JKUCAT). It was finally established as a University through the JKUAT Act, 1994 and inaugurated on 7th December 1994.
The University of Sargodha was established in 2002 by an ordinance of the Government of Pakistan. Formerly, it was called the Government College, Sargodha. Professor Dr. Riaz ul Haq Tariq was the first Vice Chancellor who headed the university from 2002 to 2007 and since 2007, Professor Dr. M. Akram Chaudhary has been heading the university.

The university maintains several campuses in a variety of locations, including Lahore, Bhakkar, Mianwali, Mandi Bahauddin, and Faisalabad, along with a Women's campus only in Faisalabad.

Demont Morency College was established at Shahpur Sadr in 1929; later it was renamed as Govt. College Sargodha, at Shahpur before partition. The College was shifted to Sargodha in 1946. In 1987-88, postgraduate classes were introduced at Govt. College in the disciplines of English, Urdu, Mathematics, Physics, Chemistry, Economics, Islamic Studies, History. In November 2002 the College was renamed as the University of Sargodha.

The University of Sargodha has become a legendary center of higher education, in a short span of time, respected nationally as well as internationally for its brilliant performance in teaching and research activities. The University of Sargodha remains Pakistan’s one of the most attractive universities by recruiters especially in the field of Economics, Business Management, Chemical Industry, IT Industry, Pharmacy, Pharmaceuticals, Social Services, and NGOs. During the last few years, the University has gone through a number of institutional reforms aimed at quality assurance in teaching and research. A number of newly emerging disciplines have been added to make the university education relevant to the future needs of the society. The University of Sargodha has highly qualified, experienced and dedicated faculty, which is imparting quality education and conducting meaningful research in scientific, social, religious and professional fields. The faculty also provides valuable guidance to scholars pursuing research in higher education. The university has more than 700 faculty members, over 16,000 on-campus students and above 350 affiliated colleges, 3 constituent colleges, and 7 sub-campuses.

The University has a strong commitment to provide affordable education to deserving students through highly subsidized fee structure and financial support. A large number of needy and merit scholarships are available to the deserving students which provide a substantial relief to them. The University also caters for the residential needs of the selected students coming from other areas.

A unique feature of the University is its adherence to our ideological and cultural values while maintaining a progressive professional posture. This sounds amalgamation of tradition and modernity facilities, the smooth induction of students coming from a variety of cultural backgrounds, into the academic life of the University.

It is a pleasure to provide them opportunities to get higher education through intellectual, moral and academic training which enables them to face the challenges of modern civilization. Accordingly, the University focuses on the overall personality development of the students through curricular, co-curricular and sports activities.

At present, there are 150 PhD, 151 MPhil teachers. Under their guidance, a large number of MPhil and PhD scholars are engaged in research activities. In the Medical College, 36 FCPS / FRCS along with 2- MRCP and 77 MBBS teachers are imparting medical education to the prospective young
What is going on with us?

The semi-arid and arid regions in Northwest China (especially the area on the Loess Plateau where many experiments have been conducted by Lanzhou University) and in part of East African Plateau in Kenya have obvious common grounds in scheme structure, high efficient development and the sustainability of dryland agriculture. In the last year, a range of pioneering initiatives have been carried on by the Institute of Arid Agro-ecology, Lanzhou University, including mutual high-level visits of China-Kenya agricultural experts, the design and running of joint field trials, and so on. The objectives of these activities are to deepen China-Kenya cooperation in dryland agriculture.

Particularly, the China-Kenya joint field trials propelled by Prof. Youcai Xiong from the Institute of Arid Agro-ecology, Lanzhou University, have been conducted smoothly in KARI-Katumani Centre in last two growing season. Several young researchers from the institute were also involved in this research. The design of field trials consists of multiple tillage and management techniques of dryland agriculture, including 1) comparison in different tillage patterns, 2) comparison between local cultivars and cultivars introduced from China and 3) comparison in different water and nutrition combinations. The fourth one is wheat trial. In each trial, four different water-saving treatments were designed respectively, including transparent film mulching, black film mulching, grass straw mulching and no mulching respectively. The total area of fields is almost 4000 m², consisting of 98 different plots. Each plot is 4.5 m long and 5 m wide in a randomized arrange.
从试验开展伊始至结束，多名在肯工作年轻科学家不畏艰苦、极力推动大田试验顺利开展。大田试验已取得了显著的成果，旱地节水耕作处理已凸显出强大的生命力。初步证实了覆盖抑蒸保温耕作在肯尼亚干旱半干旱地区的可行性。

To ensure the success of field experiments, strict experimental design and normative manipulation had been implemented at the initial stage of the research program. Good progresses have been achieved from the start-up of field trials end, and the significance analytic result approves the feasibility of introducing water-saving farming techniques to Kenya from northwest China.
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