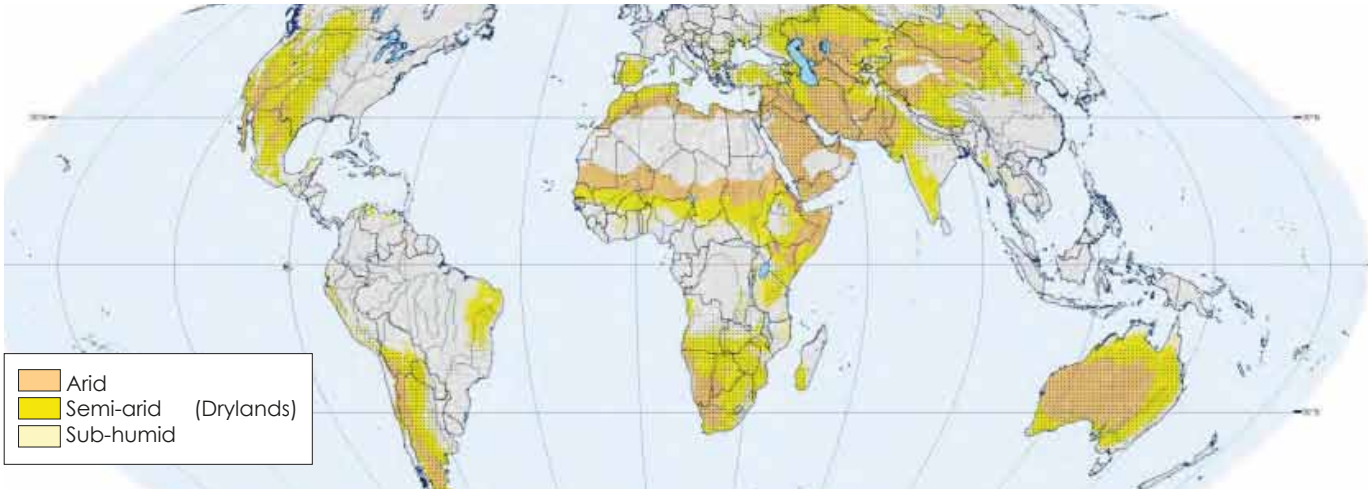
RESEARCH PROGRAM ON Dryland Systems
CGIAR

Program Update Issue 1

News from the CGIAR Research Program on Dryland Systems



The world's dry areas

The backdrop of limited dryland resources: a development challenge

The case for increased investment in agricultural research to improve livelihoods in drylands agriculture

Poverty, food insecurity, natural resource degradation and climate change are global challenges; but they impact most severely on rural communities living in the world's dry areas. Addressing these challenges requires a combination of innovative science, integrated approaches to research-for-development and effective partnerships.

The dry areas of the developing world occupy some three billion hectares, or 41% of the earth's land area, and are home to 2.5 billion people – 30% of the world's population. Some 16% of this population lives in chronic poverty. People living here and the decision makers in countries with significant drylands agricultural systems face a specific set of constraints that are not experienced by other low-income countries.

Challenges for drylands people and communities

Drylands communities struggle to provide productive livelihoods and food security for their families. On a daily basis, millions are farming on poor soils with chronic water scarcity and degraded land, in addition to low-potential crop varieties. For planners, these problems are compounded by the demographic challenge of rapid population growth, high urbanization, large youth populations, and the world's highest unemployment rates.

A combination of factors makes it more difficult for these populations to have their voice heard. They are more sparse, more mobile, more remote from markets and consequently distant from the priorities of decision-makers. Overall, this makes it more difficult for drylands issues to be placed at the top of national, regional and international political agendas.

This particular situation requires many developing countries with dry areas to increasingly rely on imported grain and other foodstuffs to meet their basic food requirements. In West Asia and North Africa, for example, are the world's largest importers of cereals.

Countries in the dry areas have also witnessed proportionately greater rises in food prices than the rest of the world during recent commodity price shocks. As a result their poor communities have suffered proportionately more. Increased dependence on imported food and higher food prices constitute threats to food security and livelihoods, and puts these regions' vulnerable populations at particular risk.

Bright Spots

In spite of these changes, a growing number of 'bright spots' for food production and food security are emerging across the dry areas. Here, smallholder farmers are applying new combinations of integrated practices and technologies, including the development valued-added products, have increased both the productivity and income of rural communities. As a result, these communities have better livelihood opportunities – and for those living in the lowest-potential lands, reduced vulnerability.

Welcome to Amman

Dryland Systems Launch & planning kicks-off today

The CGIAR Research Program on Dryland Systems is pleased to welcome some 200 researchers, farmer and civil society organizations, development and extension specialists from around the world, to its Launch Meeting in Amman, Jordan, on May 21-23.

Participants hail from a range of partner countries and organizations, including national agricultural research systems, advanced research institutes, development agencies and CGIAR centers. Day 1 includes a scene-setting strategic session on May 21. Days 2 and 3 concentrate on planning and team building, where the regional teams will finalize workplans and synergies between regions and research themes.

These solutions are the product of an integrated approach to farming and rural development. This concept has developed over a number of years by many actors. It is now taking shape as a strategic focus that will be put into action at global level through initiatives such as the CGIAR Research Program on Dryland Agricultural Production Systems.

Dr. Mahmoud Solh, Director General of ICARDA, the lead center for Dryland Systems program, has worked with partner countries on agricultural research in dry areas for more than three decades. He explains that this 'integrated agro-ecosystem' approach is the fruit of the efforts of many players. "The program's conceptual approach grows out of the experience and achievements of a number of organizations and science programs, including national programs and CGIAR Centers. As the program's lead center, ICARDA, as an example, brings 36 years' expertise of working closely with more than 40 drylands countries," he says.

New raised-bed wheat planting in Egypt (2011, 2012 trials) produced average 30% increased grain yields, 25% irrigation water saving and 72% better water use efficiency.

The integrated agro-ecosystems approach

Simply put, the integrated agro-ecosystems approach proposes a combination of farming practices, strategies and technologies that rural communities can use to improve their food security and income. For people living on the most marginal lands – the program aims to provide ways to reduce their vulnerability to drought and changing climate patterns.

Climate change brings more temperature extremes, and with them, disease and pests to areas where they were not previously a problem. Yellow rust, a chronic disease of wheat, threatens vast areas of Africa, Asia and the Middle East. New rust-resistant wheat varieties combine with surveillance practices to help countries maintain good yields.

Building on past achievements, Mahmoud Solh feels that there are now real opportunities for the program to multiply across the drylands. "Target areas for improving food security can be broken into two sections; increasing resilience and sustainable intensification. One example comes from Egypt where strategies like raised-bed farming for wheat have improved productivity by 20% while using 20% less water. In rangeland areas, herders are being encouraged to decrease and diversify their stock and to produce value-added products such as yoghurt and cheese that command high market prices – and more direct income for families," he says.

The Dryland Systems research for development partnership

The program involves a broad range of partners including more than 60 national agricultural research systems, advanced research institutions, development agencies, civil society partners and the private sector.

- Regional agricultural development, research and capacity building organizations: GFAR, AARINENA, APAARI, CACAARI, FARA, ASARECA and CORAF.
- International research centers and programs: Nine CGIAR Centers (Bioversity International, CIAT, CIP, ICARDA, ICRAF, ICRISAT, ILRI, IWMI, WorldFish), the CGIAR Challenge Program for Sub-Saharan Africa.

The Program is led by the International Center for Agricultural Research in the Dry Areas (ICARDA).

Technology, practice and policy packages - testing and scaling-up

The Dryland Systems program takes this thinking one step further. Its research strategy is to combine and test different packages of technologies, policy options and farming practices in the program's different target regions and action research sites, to see which are best adapted for widespread use. "The regional research teams will assess which combinations of technology and policy packages, perform best under which specific conditions and work to scale these up in similar agro-ecosystems," says Dryland Systems Program Director, Bill Payne.

Practices to save labor and energy cost: Conservation agriculture (zero tillage, residue retention and appropriate rotations) reduces the cost of farming and conserves water and fertility in soil. A women's group learns about new practices at a farmer field school in Tanzania.

The Dryland Systems research process is a partnership between researchers, national agricultural and rural development agencies, and civil society organizations with links to communities. "Together, we will identify and develop resilient, diversified and more productive combinations of crop, livestock, rangeland, aquatic and agroforestry systems. These will increase productivity, reduce hunger and malnutrition, and improve quality of life for drylands rural communities," he explains.

Income and nutrition: Sheep and goats provide resilience to communities in dry areas – for the production and sale of wool, milk, cheese, youghurt, or meat.

Who feeds the world? Women do

The gender and youth dimension of Dryland Systems' research.

Especially in dry areas, where changing climate patterns have a severe impact on people's livelihoods and shape local economic activities, women are increasingly taking the lead in farm management and food production. If they are to be effective over the long term, development programs need to be sure that women are at the center of the strategies.

In areas affected by male out-migration, women provide labor that is crucial for the survival of dryland production systems. Because of this, more women are becoming the de facto household heads in many rural communities, and responsible for food preparation and high-value fruit and vegetable production. Research also reveals that they provide a valuable role in passing on information on farming practices and indigenous knowledge to future generations of farmers.

For smalholder production, women are increasingly taking the lead in farm management and food production.

Despite the critical roles that women play in dryland areas to ensure the proper functioning of food production systems, women in many locations still have limited control over resources, limited decision-making powers, and inadequate access to new opportunities and information. This is why the Dryland Systems program has made women and young populations a priority target and flagged them as a key success factor for it to achieve larger-scale results.

The objective of the program's gender strategy is to ensure that the knowledge generated will have positive impact on both women and men and will not inadvertently disadvantage women or other vulnerable groups. Including gender in the research portfolio also increases the potential for overall impact. Leaving it out will exclude a significant part of the population.

Dryland Systems Program - Regional targets

In the coming six years, the program aims to improve the income and lives of:

- **20 million people in East and Southern Africa**, and mitigate land degradation on 600,000 km^2.
- **500,000 people in Central Asia and the Caucasus**, and mitigate land degradation on 2,900 km^2.
- **23 million people in the West African Sahel and Dry Savannas** region and mitigate land degradation on over 200,000km^2.
- **65 million people in South Asia**, and mitigate land degradation on 465,000 km^2.
- **1.1 million people in North Africa and West Asia** living on 18,600km^2

Moving the program into action

Conversation with Bill Payne, Director of the CGIAR Research Program on Dryland Systems

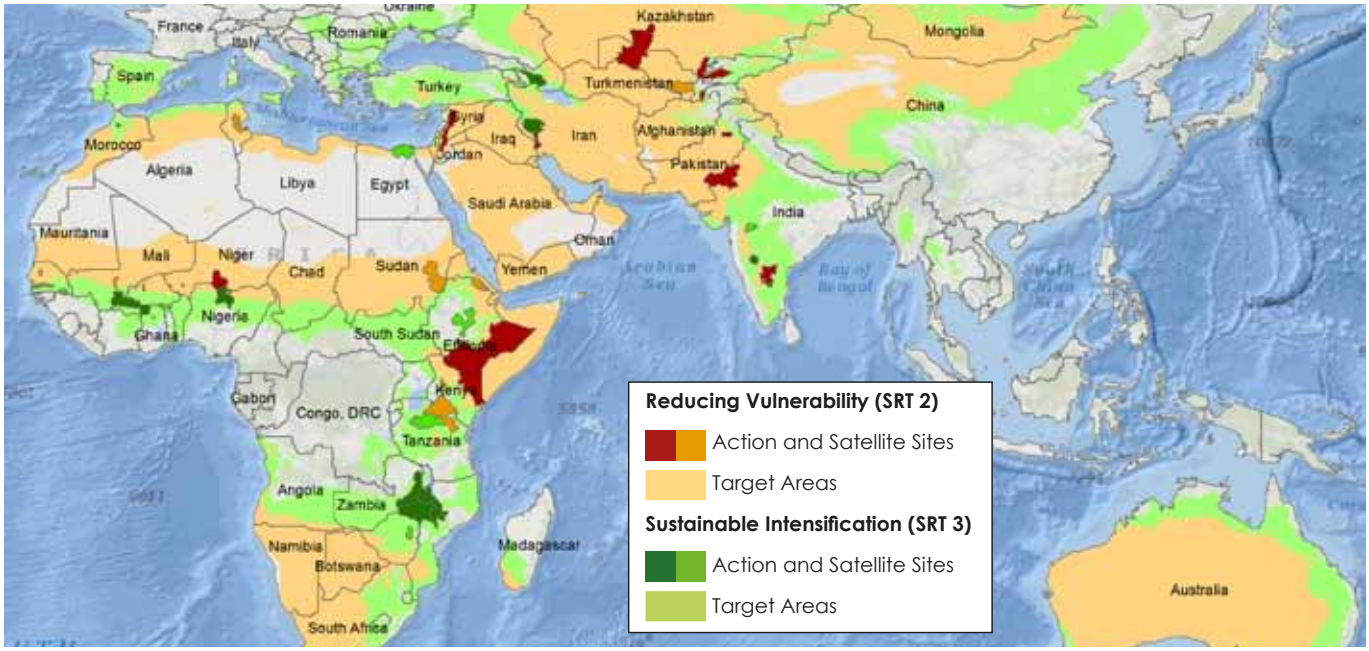
What do you hope to achieve at the launch meeting?
The meeting is an important opportunity for partners involved in last year's inception phase, from the five target regions, to plan together. Day 1 sets the scene with a number of leaders providing food for thought and debate. In days 2 and 3 we drill down, into the specifics of the program for the coming three years – workplans, outcome targets and setting framework for work on capacity building, learning together and understanding how we can best transfer useful knowledge and information between the regions, and with others.

What is unique about the Dryland Systems program?
What is new and exciting about the Dryland Systems program is its sheer scale and scope and the opportunity we have to use a multidisciplinary systems research approach.

This allows us to get results at two levels: addressing global research themes, looking at the details of what is common to all dryland systems in specific regions. This helps us better understand and address communities' production constraints. If we can use this new understanding to increase food security and improve livelihoods in these marginalized areas of the world, we will have accomplished something profound and historic. My view is that, through sound science and the new partnerships we are building, we can meet our impact goals, which are realistic.

What happens next?
Our research teams will now test, validate and propose a series of integrated technology and policy packages – including improved plant and animal varieties, sustainable land and water management techniques, or integrated disease and pest management. Using 'innovation platforms', they will then engage stakeholders in target regions to understand what interventions can work best where, and how to best encourage their adoption.

What outcomes are you targeting?
At this stage, our immediate goal is ensure that the program is well-managed with clear workplans and intermediate results and strong relationships between the partners. This sets the stage for the longer term goal of helping achieve better food productivity, higher incomes and improved food security – ultimately for tens of millions of people living in dry areas of the developing world. For medium term results, we expect that these efforts will reduce environmental degradation across 11 billion hectares and boost agricultural productivity – by 10-20% in low-potential or marginal lands, and 20-30% in high-potential areas.



Dryland Systems Program - Target Areas, Action Sites

A solid foundation: recap of the program's Inception Phase

With the launch of the Dryland Systems program, the work starts now for the regional research teams and their national and local partners. In reality the program's detailed activity began in early 2012, with its intense research inception phase. This involved research priority setting and site characterization in the target areas of the West African Sahel and the Dry Savannas, East and Southern Africa, North Africa and West Asia, Central Asia and the Caucasus and South Asia. Several hundred partners were involved in these five regional workshops.

Central Asia inception workshop team, one of the five regional meetings

The inception phase sparked new relationships and learning between partners. It generated some 800 pages of characterization data and research planning. Site characterizations cover socio-economic and biophysical conditions, using data on climate, soil, land use, poverty, market linkages and major constraints affecting these farming systems, and potential opportunities to raise productivity and farmer income. The Dryland Systems Inception Report, summarizes these findings.

The inception phase builds on the scientific consultations that developed the Dryland Systems research proposal, beginning in 2010. This involved several dozen scientists and development specialists from a range of research organizations and national partners.

Read the Dryland Systems Research Proposal and Inception Report:
http://drylandsystems.org | www.icarda.org/dryland_systems/teaser

Approaches to improve drylands production systems:

Crop improvement

- Improved crops for dryland conditions (e.g. wheat, barley, lentil, chickpea, maize, and sorghum) that resist drought, temperature extremes, and diseases or pests caused by harsh or changing climate conditions.
- Synthetic wheat - Dryland researchers have developed synthetic wheat varieties that can produce 2.5 tons per ha with just 220 mm of water.
- Drought-tolerant chickpea - A drought-tolerant variety of chick pea released in Turkey has a yield advantage of 300 kg/ha over other varieties, generating an additional $165 million in 2007.

Production systems improvement

- ***Crop-livestock integrated systems*** – the introduction and better management of cattle, sheep, and goats and the feed systems they require for added resilience in communities for the production and sale of wool,milk, cheese, yoghurt or meat.
- ***Conservation agriculture*** – which combines 'zero tillage,' crop rotation, and the retention of crop residue for improved soil structure, carbon sequestration, water retention, and reduced labor costs. Recent trials have generated significant yield increases in Morocco: a 50% rise in bread wheat yields, a 100% rise in durum wheat yields, and a 50% rise in canola yields. Further field trial results and farmer experience, show increased farmer incomes from wheat by up to US$200/ha in Syria and up to US$300/ha in Iraq.
- ***Raised-bed planting technology*** - In Egypt during the past two seasons raised bed planting has resulted in yield increases of 20% - using 20% less water.
- ***Genetic improvement of livestock*** - In Afghanistan and Pakistan improved livestock breeds have generated 80 to 200% increases in meat and milk production in recent trials, with a 71% rate of return on investment.

Natural Resource Management

- ***Water-harvesting*** at different scales to better address water scarcity and the increasing frequency of extreme rainfall events.
- ***Supplemental irrigation*** that allows farmers to plant and manage crops at the optimal time, regardless of climate vagaries.
- ***Deficit irrigation*** – while deficit irrigation may lead to slight yield decreases, this practice can significantly improve water productivity in dry areas, achieving up to 50% water savings.

Policies

- The study and crafting of policies that encourage the uptake, education and financing of new approaches.