Arabian Peninsula Regional Program

Introduction

The Arabian Peninsula is a water-stressed region exhibiting extreme aridity and having limited renewable water resources. Supply of renewable water per capita in the region is amongst the lowest in the world. In most areas of the region the annual precipitation is far below the potential crop requirements for water, hence, with the exception of few areas in Yemen, all crop production areas require irrigation. The Arabian Peninsula Regional Program (APRP), through its office in Dubai, UAE coordinates ICARDA's activities in the seven countries: Bahrain, Emirates, Kuwait, Oman, Qatar, Saudi Arabia and Yemen. Emphasis is placed on strengthening national institutions, enhancing human resource capacity, technology development and transfer, information technology and networking.

Achievements

Partnership for collaborative research on rangeland and irrigated forage

- Two indigenous grass species, *Cenchrus ciliaris* and *Panicum turgidum*, were identified to have higher water productivity than two exotic species, *Medicago sativa* and *Chloris gayana*, in the United Arab Emirates.
- Thirty eight accessions of spineless cactus introduced from Tunisia in 2004 were evaluated at Rumais Research Station in Oman. Significant differences among the accessions in pad regeneration were recorded.
- Seeds of *Cenchrus ciliaris* were multiplied at the Livestock Research Center, Rumais, Sultanate of Oman, for rangeland re-seeding studies. Sixteen sites, of 0.25 ha each, were seeded in December 2004 and are being monitored to assess the effect on range improvements.
- A grazing trial was established in Saudi Arabia in 2004 to define proper carrying capacity of rangelands in the arid environment.
- In Yemen, the effect of different water-harvesting techniques on the potential of four shrubs or rangeland rehabilitation was compared in the Wallan community. Preliminary results showed that range productivity increased from 0.5 t/ha to 1.8 t/ha within a 2-year period. The most dominant range species are *Andropogon greenwayi, Chrysopogon plumulosus, Cenchrus ciliaris,* and *Tetrapogon villosum.*

Partnerships for collaborative research on protected agriculture

- Soil-less growing techniques such as hydroponics were developed by APRP and adopted in many of AP countries for improved water productivity and net profit. Simple hydroponics systems constructed with locally available materials were devel-

oped and tested at the research stations of UAE, Qatar, Oman, Kuwait, Bahrain and Yemen for the production of tomato, cucumber, pepper, and lettuce crops. The techniques were transferred to pilot growers for further on-farm evaluations. The economic assessment in comparison with conventional soil-based growing techniques and its suitability to local grower's conditions showed positive results particularly in overcoming problems of soil salinity and soil-borne diseases. These results drew the attention of growers and the Ministry of Agriculture and Fisheries in Oman, which offered to subsidize by 50% the cost of the structure for willing growers. Further on-farm research on plant density, irrigation management and integrated production and protection management (IPPM) were conducted to improve the adaptability and management of the soil-less system.

- The vertical soil-less production technique for strawberry were evaluated in Kuwait, Oman, Saudi Arabia and Bahrain. The system proved successful for high production, reduced cost (50 to 65%), water saving and high returns on investment. Consequently, growers in Kuwait and Oman have adopted it.
- A participatory approach was used in introducing and establishing greenhouse (GH) structures in Al-Mahweet, Yareem and Al-Turba in Yemen. The effort aimed at increasing farmer's income in the mountain terraces through the application of drip irrigation to ease the problem of water scarcity. The cost benefit analysis of plastic house cultivation revealed that the total cost of these constructions can be recovered in three seasons.
- In Yemen, several dams and water reservoirs were constructed to collect and harvest rain and runoff water. To increase water use efficiency, ICARDA-APRP in collaboration with Agricultural Research and Extension Authority (AREA) in Yemen, conducted on-farm research and demonstration activities at Mikhtan Dam site. These activities included adoption of (1) a modern irrigation technique (bubblers) to irrigate grape vines; and (2) an intensive production system for high quality cash crops under protected agriculture.
- IPPM practices were developed by APRP to provide greenhouse growers with simple applicable techniques for crop protection other than relaying mainly on pesticides, thereby reducing the use of hazardous chemicals. This was in response to the extensive use of chemicals to control diseases and pests which resulted in complex problems of resistance build-up, and health and environmental hazards. IPPM was implemented in all the Arabian Peninsula countries by both research stations and private growers, and as a result the average number of pesticide applications per growing season (4-5 months) of cucumber was reduced from 18-22 sprays to about 2-3 sprays in Yemen. Similar results were obtained on research stations in Bahrain, Qatar, Oman, UAE, and Kuwait.
- Greenhouse cooling systems and certain mechanical methods and bio-rational pesticides were tested for their effects on the control of major pests in cucumber in Oman and Qatar.

Capacity building

- About 151 participants were trained in the areas of GH installation and preparation, intensive production system for high quality cash crops with less water, Integrated Production and Protection Management for production of high quality crops, GH management, forage seed multiplication, collection of indigenous forage species, molecular markers for fingerprinting of date palm, field propagation and management of forage cactus, development of project proposals, scientific writing and data presentation, and information technology.
- To support the adoption of indigenous forage species, 3 Seed Technology Units for research activities on forage seed production and multiplication were established in Oman, Emirates, and Saudi Arabia.

Knowledge exchange and networking

- An Internet-based Expert System for cucumber under protected agriculture was developed and up-loaded on the Internet (**http://www.icarda.org/aprp/IT.htm).**
- A Weather Stations Network for the Arabian Peninsula was established. Eleven automatic weather stations were installed in all the AP countries. The weather stations are connected through telephone lines and linked to ICARDA-APRP Internet website.

Research-for-development on date palm was started.

Current Activities

- A new project proposal on “Technology Transfer for Improvement of Major Production Systems and Enhancement of Rural Development in the Arabian Peninsula” is being developed.
- The Protected Agriculture Project in Taiz, Yemen.
- On-farm evaluation of buffel grass in UAE.

Future Plans

Strengthen research for development on date palm, protected agriculture and on-farm evaluation of forage and rangeland rehabilitation technologies.