

<b>D. Technology Transfer and Extension Policies</b>			
Use the village as a centre for providing agricultural services and finance Earmark 15% of the posts approved annually for employing new agricultural graduates to those coming from the villages chosen as centers	MFNE, MAF, MAR and other related parties	Complete the study on Dec. implementation in 3 years	Jan. 2008

## **1.2 Action Plan for Improved Crop Varieties**

### **1.2.1 About the Technology**

One of the main focuses of national and international research for adaptation to climate change has been the development of crop varieties that can cope with heat, drought, flood and other extremes and thus help farmers adapt to the changes while sustaining and increasing agricultural production and productivity. Historically, crop scientists and farmers have identified and selected several adapted crop varieties with desirable traits that allow them to achieve optimum yields while withstanding stresses, such as drought, heat, and water-logging. Ecological, economic and cultural factors are always considered in variety selection and release. However, the outreach of the improved varieties is still limited.

In Sudan sorghum is the most widely produced and consumed cereal crop. Climatic change has seriously affected the traditional rain-fed sorghum growing areas which constitute more than 50 per cent of the national sorghum production area. Despite the recent climatic changes productivity and sustainability of sorghum production in low rainfall regions can be increased. During the last few decades the Agriculture Research Corporation (ARC) has released short maturing, drought-tolerant, open-pollinated sorghum varieties (table 4) with high yield and grain market preferred qualities that demonstrated adaptable performance under unfavorable environmental conditions (Elzein et al, 2009). Generally, the economic benefit of new varieties is well known in India where it increased the production in some states to 4.04 million pounds.

**Table 4. Target area and mean grain yield (kg/ha) of the improved crop varieties**

Variety	(Target area(Rainfall mm	(yield (kg/ha
Bashayer	300-450	2436
Butana	300-450	2194
Yarwasha	300-450	1825
W. Ahmed	450-600	3221
AG8	190-800	888

**Source: Elzeinet al, 2009**

### **1.2.2 Target for technology transfer and diffusion**

From the Part one of the Sudan Technology Needs Assessment it was clearly stated that agriculture is one of the winning sectors for the TNA; and two technologies were selected for this sector, namely: Improved Crop Varieties and Zero Tillage (conservative agriculture). According to the vulnerability Assessment Report (HCENR, 2012), the main food grain production is largely carried out under rain-fed conditions (75 per cent). As the majority of Sudanese farmers rely on rain-fed agriculture, lack of irrigation makes these areas particularly vulnerable to the impact of climate change on their agricultural activities. The average yield of the existing varieties is low due to the depressing consequences of climate change. Lack of adequate, high quality seeds of improved varieties was identified as one of the bottlenecks to improved productivity. Based on this, the rain-fed sector is targeted to improve crop varieties technology transfer and diffusion to improve farmers' access to seeds of researcher-developed varieties. The target set in this report is to cover the sector with improved crop varieties, including high yielding, early maturing, drought-tolerant and heat-resistant crops by the end of 2012. Target groups are farmers, stakeholders, service providers, seed producers, women and farmer groups.

### 1.2.3 Technology diffusion barriers and measures

#### Barriers to improved crop varieties in the Sudan

Economic and financial	Non economical and financial
High cost of local production	Limited availability of improved seeds varieties
High price of seeds/seedlings	Farmers awareness about existing technologies
Absence of financial facilities	Limited producers
Difficulty making profit	Farmer's perception of technology
Absence of related infrastructure	Lack of technical know-how
Limited availability of financial resources	Cultural/social difficulties
	Limited use of seeds

Adoption of improved crop varieties is essential in order to maintain a balance between development and environmental objectives. To accelerate and to guarantee steady transfer and diffusion of improved crop varieties, a number of measures and studies are recommended. For improved crop varieties, measures for the transfer, diffusion and adoption were identified through stakeholder consultations and the national team. These measures were classified into two main groups, namely economic and financial measures and non-financial measures. The level of coverage of this technology is low and constrained mainly by high costs and the unavailability of seeds of the sought varieties, particularly to small holder farmers in the country. Currently there is no commercial incentive to invest in these technologies. Collaboration between the private and public sectors hold the key to accessing and facilitating the deployment of these technologies.

The economic and financial measures that are necessarily considered to offset the economic and financial barriers for the improved crop varieties include provision of financial assistants to the farmers and producers of the improved crop varieties like subsidies and soft loans. In this variable it is important to consider measures for the compensation of Research & Development expenditures as an incentive for sake of enhancing research for better achievements.

As far as the customers are concerned, the prices of the improved crop varieties should be within their reach. Since most of the small scale farmers are poor, soft loans should not be linked with collaterals which are not satisfactory for provision of soft loans. Moreover, provision of related infrastructure would enhance and expand the adoption of improved crop varieties.

To overcome the non-financial measures for improved crop varieties it is necessary to:

- \* Establish a network of experts
- \* Develop policies to encourage and support researchers to invest in improved seeds and seedling
- \* Capacity building of extension agencies to increase the providers of improved crop varieties
- \* Raising awareness of the people for sake of eradicating cultural and social beliefs hindering adoption of improved crop varieties.

Resolving all the barriers (financial and economic; and non-financial and economic) for improved crop varieties will expand the use of seeds by the majority of farmers. This will result in increased agricultural productivity and food security enhancement.

#### **1.2.4 Proposed Action Plan for Improved Crop Varieties**

Prospective goals of the action plan for improved crop varieties are:

- \* Generate awareness and improve farmers' access to seed developed varieties that reduce climatic risks and improve crop productivity
- \* Scaling up the dissemination of new varieties through facilitation of seed multiplication of the improved varieties
- \* Involve financial institutions to encourage private sector investments in seed production
- \* Development of improved crop varieties to with resilience to drought, heat and pests
- \* Encouraging/promoting adoption of currently existing varieties that overcome climate related stresses

**Table 5. Proposed Action Plan for Improved Crop Varieties**

Actions/ activities	Implementing Period (years)	Outputs and Performance Indicators	Responsible Implementing Organization	Supporting Organization	Cost <sup>1</sup> US\$	Funding Source
Production and distribution of bulletins and brochures on varietal characteristics range of adaptation and limitations, and their suitability to areas	2	Number of bulletins and brochures produced and distributed, and area covered	MOA (State), ARC, Extension Dept., IFAD project	Farmers Trade Union  Private sector	20,000	FMoF, MoA
Introduction, promoting and demonstrating currently existing crop varieties that overcome climate related stresses	5	Sites and numbers of demonstration plots set and varieties introduced	C B O , MOA (State) Extension Dept., IFAD project	Agric bank, Farmers Trade Union  Private sector	200,000	FMoF, MoA
Development of an efficient seed production and supply systems to ensure rapid access to quality seeds from different sources Facilitate seed multiplication by many partners through promoting the role of local farmers and private sector in the provision of seeds of improved varieties	5	Seed multiplication farm set: location and quantity local farmers and private companies providing seeds ,type of varieties and quantity	C B O , - M O A , I - F A D Seed Development project, Private sector, N-GOs	Agric. bank, Farmers Trade Union	30,000	FMoF, MoA
Providing information and training about seed multiplication methods and regulations	2	Number, type of trainings and attendants	C B O , MOA (State), ARC, Extension Dept., IFAD project	Farmers Trade Union  Private sector	20,000	FMoF, MoA
Enhance /Orient plant breeding research capabilities to develop improved varieties (endure climatic stress	5	Breeding program designed and varieties developed	C B O , A R C , Extension Dept., IFAD project	Agric. bank, Farmers Trade Union  Private sector	200,000	FMoF, MoA

In-situ and ex-situ conservation of genetic resources of the local types	3	Number and types of accessions and types of local material collected and conserved	C B O A R C , (genetic resources (unit	MOA, Framers ,Trade Union  CIGAR(ICRI-(SAT	50,000	FMoF, MoA
Encourage farmers' participation in plant breeding stages	3	Varieties developed through farmers' participation in breeding program	C B O , MOA (State), ARC, Extens ion Dept. IFAD project	Framers Trade ,Union  Private sector	30,000	FMoF, MoA
Training of future plant breeders	5	Plant breeders trained (area and (number	A R C , IFAD Seed Development project	CIGAR (ICRI-SAT) centers, Universities	500,000	FMoF, MoA