

**TOWARDS HIGHER WHEAT PRODUCTIVITY IN GEZIRA:
THE ROLE OF EFFICIENT INPUT DELIVERY SYSTEMS
AND APPROPRIATE TECHNOLOGY DESIGNS**

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ABSTRACT

Results of recent on-farm research indicate that wheat yields can be more than doubled if efficient production practices are used in Gezira. However, adoption of the new technology package has been slow and a wide gap between potential and farmers' yields continue to exist. The present study showed that lack of access to the recommended practices, rather than economic inefficiency was the reason for low adoption and slow productivity growth. Results of this research indicate the importance of liberalizing the input procurement and distribution systems in Gezira for faster adoption and increased efficiency. Moreover, variations in farmers' circumstances were found to significantly influence optimal input use, and, hence, the technical efficiency of the recommended practices. The study, therefore, emphasized the need for defining recommendation domains in Gezira to allow for efficient testing of relevant technologies and reformulation of the research recommendations to fit the particular needs of the different target groups of farmers in the scheme.

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B. TOWARDS HIGHER WHEAT PRODUCTIVITY IN GEZIRA : THE ROLE OF EFFICIENT INPUT DELIVERY SYSTEMS AND APPROPRIATE TECHNOLOGY DESIGN

FOLLOWED FROM FINDING OF THE DRC STUDY, THAT:

A. SUDAN IS EXPANDING WHEAT PRODUCTION UNDER INEFFICIENT PRACTICES

. INSPITE OF THE LARGE SCALE DEMONSTRATION OF THE NEW PACKAGE, RATES OF ADOPTION AND PRODUCTIVITY GROWTH HAVE BEEN SLOW

- i. VERY LOW GAINS IN WHEAT YIELD LAST 4 YEARS AVERAGE IS ONLY 6% HIGHER THAN THE 20 YEARS AVERAGE, COMPARED TO
- ii. THE SUBSTANTIAL EXPANSION IN AREA 136% OVER SAME PERIOD

B. DIFFERENT ADOPTION RATES WERE ALSO OBSERVED FOR DIFFERENT COMPONENTS OF THE NEW TECHNOLOGY

OBJECTIVES OF STUDY

- . ANALYZE REASONS FOR FAILURE TO ADOPT RECOMMENDED PRACTICES
- . EXAMINE SOURCES OF VARIATION IN ADOPTION PATTERNS
- . IDENTIFY OBSTACLES AND CHALLENGES TO FUTURE RESEARCH FOR HIGHER PRODUCTIVITY.

RESULTS

1. LIMITED ACCESS DUE TO INSTITUTIONAL AND INFRASTRUCTURAL CONSTRAINTS SUCH AS CONTROLLED FACTOR MARKETS AND LACK OF ADEQUATE WATER SUPPLIES, NOT ECONOMIC EFFICIENCY, WAS THE REASON FOR LOW ADOPTION

2. PRACTICES FOR WHICH INPUTS ARE BOUGHT FROM PRIVATE MARKETS SUCH AS THE MECHANICAL COMPONENTS OF THE NEW PACKAGE, WERE ADOPTED FASTER THAN PRACTICES FOR WHICH INPUT SUPPLIES ARE CONTROLLED BY THE GOVERNMENT SUCH AS FERTILIZERS.

3. SIGNIFICANT INTERACTIONS EXIST BETWEEN VARIATIONS IN FARMERS CONDITIONS AND THE TECHNICAL EFFICIENCY OR OPTIMALITY OF THE RECOMMENDED PRACTICES.
E.G. FARM LOCATION IN THE SCHEME INFLUENCES ACCESS TO IRRIGATION WATER AS WELL AS MANY OTHER AGRO-CLIMATIC CIRCUMSTANCES OF THE FARMER.

· OPTIMAL LEVELS OF NITROGEN AND PHOSPHOROUS VARY FROM ONE LOCATION TO ANOTHER
ETC.

Table 4. The effect of farm location and seasonal weather fluctuations on wheat yields in Gezira (3-way ANOVA).

	South	Center	North	Average
1. 1989 season:				
Head	1.53	1.18	1.57	1.36
Tail	0.90	1.17	1.35	1.13
Average	1.44	1.18	1.37	1.3
2. 1991 season:				
Head	1.16	0.99	0.75	0.97
Tail	0.72	0.89	0.64	0.96
Average	1.16	0.92	0.66	0.96
Average	1.42	1.17	0.77	1.18
Number of farmers ^a	107	168	36	311
				<u>F-Value</u>
<u>Main effects</u>				14.2***
1. Location				.95
2. SITE				27.6***
3. Year				38.5***
<u>2-way Interactions</u>				8.1**
Explained				10.8**

*, ** and *** indicates significance at 10, 5 & 1 percent respectively.

^a Global 2000 farmers in 1990 (783) were not included as no information was recorded on the farm location on Abu XX (site).

Table 5. Least squares estimates of the intercept and slope effects of farmers' circumstances on wheat yield.

Source of variation	Intercept effect	Slope effects		
		Level of nitrogen	Level of phosphorus	Number of irrigation
1. Location:				
South	1.47***	-.03***	-.02***	--
Center	1.35***	-.04***	.01**	--
North	-2.82***	.07***	.01	--
2. Site:				
Head	.31**	** (a)	--	.05**
Tail	-.31	+ ** (a)	--	-.05**
3. Year:				
1989	0.15***	--	--	--
1990	-.15	--	--	--

*** significant at 1%.
 (a) parameter estimates have values less than 0.005 and thus cannot round to two decimal places.

CONCLUSIONS;

1. IT IS NECESSARY FOR SUDAN TO LIBERALIZE ITS FACTOR MARKETS IN ORDER TO PROMOTE EFFICIENT DELIVERIES OF INPUTS CRITICAL TO FASTER ADOPTION AND HIGHER PRODUCTIVITY IN GEZIRA.

2. INVESTMENTS IN
 - A IMPROVED SUPPLY AND DISTRIBUTION OF IRRIGATION WATER
- UPGRADE THE IRRIGATION INFRASTRUCTURE CAPACITY -
THE LIMITING FACTOR

 - B. EFFICIENT UTILIZATION OF WATER - WATER MANAGEMENT AND IRRIGATION PRACTICES AT FARM LEVEL

NEEDED FOR ADEQUATE DELIVERIES OF WATER AND INCREASED PRODUCTIVITY

3. NEED TO CLASSIFY GEZIRA FARMERS INTO TARGET GROUPS FOR EFFICIENT TESTING AND REFORMULATION OF RELEVANT RESEARCH RECOMMENDATIONS TO FIT THE PARTICULAR NEEDS OF THE DIFFERENT FARMING GROUPS
 - A. DESIGN THE APPROPRIATE TECHNOLOGY PACKAGE
(CONDITIONAL)

 - B. REALIZE THE TRUE POTENTIAL FOR WHEAT

C. MULTI-MARKET ANALYSIS OF SUDAN'S WHEAT POLICIES

- . **CONSIDERS DEMAND FORCES IN MAKING THE WHEAT GAP**

- . **SIMULATE AND COMPARE SUPPLY AND DEMAND POLICIES
AND VARIOUS COMBINATIONS OF THEM**

- > **DEMAND MANAGEMENT IS EQUALLY IMPORTANT, AND MAY BE
THE MOST FEASIBLE OPTION FOR BRIDGING THE WHEAT GAP**

- **LIFTING CONSUMER SUBSIDIES**

- **LIBERALIZATION OF WHEAT TRADE
REMOVE QUOTA ON IMPORTS, ETC.**

MULTI-MARKET ANALYSIS OF SUDAN'S WHEAT POLICIES:
IMPLICATIONS FOR FISCAL DEFICITS, SELF-SUFFICIENCY
AND THE EXTERNAL BALANCE

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ABSTRACT

Highly subsidized bread prices financed partially through wheat aid and over valued currency, have stimulated rapid growth in wheat consumption in Sudan at the expense of other staple grains such as sorghum and millet. Due to inefficient production methods and the resultant low wheat yields, domestic supply has lagged behind demand. Faced by serious foreign exchange shortages, severe internal and external imbalances and reduced availability of food aid, Sudan could not sustain dependence on external sources to bridge the growing wheat gap. Given the political difficulties associated with managing demand,, the government has chosen to promote local production. Research results which have shown high potential gains in wheat yield under improved crop management was another factor behind choosing the supply strategy.

A dynamic multi-market model was developed and used to evaluate alternative supply promoting and demand control strategies. Competition with alternative productive uses of the country's scarce agricultural resources , as well as substitution between wheat and other cereal grains in consumption were analyzed. Impacts of the various policies on net exports, food security and the budget are measured and compared. Policy analysis results indicate the significant contribution of production efficiency, reduced consumer subsidies and elimination of relative price distortions, to higher self-sufficiency and lower internal and external deficits.

Key Words:

Sudan, wheat policy, multi-market

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