CHAPTER 6

Crop Rotational Challenge of Change in the Gezira

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6.1 INTRODUCTION

Throughout the history of the Gezira Scheme, the utilization of land and water to produce rotational crops has witnessed profound changes that ranged from the adoption of simple and open rotations to more complex and diversified ones. Several factors and objectives were considered, which include the following:

1. Control of pests, diseases and weeds;
2. Restoration of soil fertility;
3. Maximum utilization of land;
4. Maximum utilization of water;
5. Diversification of crops;
6. Integration of livestock; and
7. Increasing the tenants income.

To comply with set of plans and targeted objectives, the rotation observed over time has both various shapes and crop intensities, which are summarized as follows for the different periods:

1) 1925/26 - 1930/31
   A six course rotation with 66.6% cropping intensity
   Cotton, Dura/Lubia, Fallow, Cotton, Dura/Lubia, Fallow

2) 1931/32 - 1932/33
   A six course rotation with 33.3% cropping intensity
   Cotton, Fallow, Fallow, Cotton, Fallow, Fallow.

3) 1933/34 - 1960/61
   An eight course rotation with 50% cropping intensity
   Cotton, Fallow, Dura, F/Lubia, Fallow, Cotton, Fallow, Fallow.

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4) 1961/62 - 1974/75
An eight course rotation with 75% cropping intensity
Cotton, Wheat, Fallow, Cotton, Lubia, G/Nuts/Dura, Dura, Fallow

5) 1975/76 - 1990/91
A four course rotation with 86% cropping intensity for Gezira, and Managil 100%

6) 1991/1992
A 5 course rotation with 80% cropping intensity
Cotton, Wheat, G.Nuts/Dura, Fodder, Fallow.

A comparison between the 3, 4, and 5 course rotations is shown in Table 6.1.

Since the establishment of the Managil Scheme, a 3 course rotation was adopted with 100% cropping intensity; while the Gezira followed a 4 course rotation with 75% cropping intensity, with the whole cropping intensity being 86%.

Due to the deterioration of land productivity in Managil, a comparison with the Gezira 4 course rotation was thought to be suitable to relieve the land and also water utilization to match with Gezira. Hence, the crop intensity has dropped to 75% for the whole scheme.

The change to a 4 course rotation did not achieve its targeted goals. This is mainly due to various agro, socio-economical problems, and other factors namely:

1. The decline in the relative importance of cotton;
2. The drought conditions during the eighties;
3. The growing demand for animal production has stimulated the tenants to care more for their animals; and
4. The attention of the Government to food crops and the slogan of self-sufficiency became a major political aim.

These factors led to the adoption of the 5 course rotation and its implementation faster than originally planned. This was a sound solution for the critical situation that faced agricultural production in the Gezira. The main worries expressed by the concerned parties was that the 5-course rotation might create problems regarding water supply, weeds and cropping pattern.

6.2 IRRIGATION AND ROTATIONAL CROPPING

The irrigation system of the Gezira scheme, with its 30 million cubic meters per day canal capacity, is designed to supply water at one time for 50% of a gross area of 2.12 million acres to which 1.16 is located in the old Gezira and 0.96 in the Managil extension.

To ensure the timely and adequate delivery of water to the field crops, certain negations, measures and practices need to be strictly adhered to for the proper operation of the system and the normal growth and development of the crops. These include:

1. A balanced rotation of crops which is well distributed in time and space;

2. As the system is designed for night-storage, water should be allowed into the fields during the day hours so that a commendable storage level is built during the night;

3. The sowing dates and field operations schedules should be adhered to and programmed to allow for the termination of the irrigation cycle for summer crops by the end of October in order to avoid the competition between crops when water demand is at its peak;

4. The CWR is calculated at 30 cubic meters per feddan per day, which amounts to 420 cubic meters per feddan fortnightly and this should govern the organization of the indenting system; and

5. The F.O.P. are designed to deliver 5000 cubic meters of water per day, which is sufficient to irrigate 12 acres per day and a crop number of 90 acres in 7.5 days. Accordingly, the on and off of the FOP should be organized to match the 14-day irrigation cycle.

Theoretically, the design should perform in a satisfactory way, but the various and continuous agro, socio, economic and institutional problems, and constraints that prevailed and accumulated over the years, led to a reasonable decline in the water use efficiency in the cropping intensity and in the land productivity. The impact of this on the 5-course rotation, which is now under implementation, will be dealt with by comparing the land utilization and water requirements for the 3,4 and 5-course rotations adopted in the schemes and a similar comparison for 5 scenarios of the 5-course rotation

A comparison between the land utilization and water requirement for the three rotational regimes (Table 6.1) gives:

1. Managil 3 course + Gezira 4 Course rotations with a cropping intensity of 86%.

2. The scheme 4 course rotation with a cropping intensity of 75%.

To improve productivity, the cropping intensity has been decreased from 86% to 75%. As land utilization was decreased, water requirements also decreased.

6.3 THE FIVE COURSE ROTATION

The five course rotation will increase the cropping intensity from 75% to 80% in the whole scheme. This will increase the water requirement inevitably, as the land utility has increased by 5%, so the scheme increase from 1.59 to 1.69 million feddans.

The fodder crop may be adjusted from fully grown in summer, or having half grown in the summer and another half during winter.

The water requirements are always based on the full utilization of 50% of the gross area. This is not what is happening as Table 6.2 shows that the cropping intensity in actuality is less than the attainable intensity. An increase in cropping intensity is only possible with increased areas of a crop like sorghum, a summer crop which is dependent on rainfall rather than irrigation water for its development. From this, a conclusion may be considered that the 5 course rotation will not necessarily worsen the situation; on the contrary it might improve (or likely to improve) the extent of land utilization. This depends mainly on the size of the fodder area and its sowing date, as well as the length of the crop period. Scenarios are many that could be utilized for the success of the 5 course rotation.

6.4 RECOMMENDATIONS

1. With the recent implementation of the 5-course rotation, close and intensive coordination is needed between ARC, SGB and the MOI to improve water use efficiency.

2. Since the proper adoption of the 5-course rotation by the tenants will be slow and erratic, feedback from the field administration is essential for the final evaluation of the experience and for future plans.

3. ARC and SGB should work together to establish a system in which the types and areas of fodder crops and their sowing and harvest times are clearly specified and adhered to.

4. There is always a need for training to improve knowledge and create the general awareness among field inspectors, and irrigation engineers about the impact of water on crops and vice versa.

5. Since farmers generally compete for water, rather than cooperate, training at this level is of paramount importance for the benefit of the whole system.

6. Extension and the media should concentrate at this stage on acquainting the end users about the appropriate water management aspects and its benefits for them.

7. As the failure or success of any system is determined by the available resources and facilities, special attention should be given to this area regarding SGB, MOI and ARC staff.

Table 6.1. Land and Water Utilization Under 3 Rotational Regimes Area in '000 acres.

	COTTON	WHEAT	GN/ DURA	FODDER	FALLOW	SUM	WIN.	LAND USED	GROSS AREA	% INTENSITY
1. GEZIRA 4-COURSE + MANAGIL 3-COURSE ROTATIONS										
GEZIRA	290	290	290	-	290	580	580	870	1160	75
MANAG.	320	320	320	-	-	640	640	960	960	100
SCHEME	610	610	610	-	290	1220	1220	1830	2120	86
2. SCHEME 4-COURSE ROTATION										
GEZIRA	290	290	290	-	290	580	580	870	1160	75
MANAG.	240	240	240	-	240	480	480	720	960	75
SCHEME	530	530	530	-	530	1060	1060	1590	2120	75
3. SCHEME 5-COURSE ROTATION										
GEZIRA	232	232	232	232	232	696	464	928	1160	80
MANAG.	192	192	192	192	192	576	384	768	960	80
SCHEME	424	424	424	424	424	1272	848	1696	2120	80

Table 6.2. The Five Course Rotation Production Scenarios Area in '000 Acres.

SCEN.	COTTON	WHEAT	G/NUT	FODDER		FALLOW	SEASON		LAND USED	GROSS AREA	% INTEN SITY
				SUM	WIN.		SUM	WIN.			
1	424	424	424	212	-	424	1060	848	1484	2120	70
2	424	424	424	-	212	424	848	1060	1484	2120	70
3	424	424	424	424	-	424	1272	848	1696	2120	80
4	424	424	424	-	424	424	848	1272	1696	2120	80
5	424	424	424	424	424	424	1272	1272	1696	2120	80