Results of the Baseline Farming Systems Survey Conducted in Ninevah Governorate, Iraq (August 2005) [1]

The survey was conducted in July/August 2005, for the ICARDA-Iraq-Australia Project funded by ACIAR) on "Better crop germplasm and management for improved production of wheat, barley and pulse and forage legumes in Iraq".

Introduction

The baseline survey was developed and conducted by the MOA and the University of Mosul socio-economists, which characterized the dryland environment and farming systems in Ninevah Governorate.

Methodology

Sampling Approach and Size: A stratified sampling approach was used to select sample farms by taking rainfall zones and supplemental irrigation systems as non-overlapping strata. Within each stratum, a number of locations were selected for the survey. The farm sample was 80 farmers in the high rainfall area (HRA, ≥450 m), distributed equally among Alqush, Zamar, Shekhan, and Faydah locations. Likewise, three locations were selected in the moderate rainfall area (MRA, 350-450 mm) with a total sample size of 61 farmers distributed equally across Hamdania, Bashiqa and Telkeif. For the low-rainfall area (LRA, 200-350mm), total sample size was 60 distributed equally among Mahalabiya, Tel-Abta, and Al-Hadhar. Three locations of Rabeaa, Namroud and Homeidat were selected for the supplemental irrigation systems (SI) with a total sample size of 60 farmers. The total sample size was 261 farmers.

Results and discussion

Education level: Results of the farm survey indicated that 49% of farmers have an elementary education (6 years of schooling). Nearly 10% have secondary education, and about 15% have high-school education. About 7% of farmers in the sample farms have a university degree. Only 19% of the farmers are illiterate.

Household size: Average family size for over all sample farms was found to be 12 persons, among which 4 persons are working in agriculture. The household size varies among different areas: average family size is 9 persons for the high rainfall zone, 15 persons for the MRA, 12 persons for the LRA, and 12 persons for farmers operating under supplemental irrigation production systems.

Farm size: The overall farm size average is 139 ha. It varies considerably among different agro-ecologies with an average farm size of 64 ha for HRA, 83 ha for MRA, 316 ha for LRA and 127 ha for SI farmers. Average farm size varies greatly among farmers in the same rainfall zone, with the highest variation being observed in the areas

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under SI. Farmers tend to plant larger areas in the LRA given its low productivity compared to other higher-potential areas (MRA, HRA). Average number of plots per farm is estimated at 7 for the whole sample. It varies from 5 plots per farm in the HRA to 13 plots per farm for the MRA. Supplemental irrigation has the lowest number of 4 plots per farm.

Land tenure: Three types of land tenure were identified in the project area: privately owned land, rented land (from government or individuals) and share-cropped land. Privately owned land is the predominant land tenure form in the HRA, where nearly 80% of the land is privately owned. Share cropping is the second most important land tenure for the HRA, accounting for 15% of the crop area. Only 5% of the land in the HRA is rented.

For the MRA, most of the land (57%) is under share cropping. Nearly 37% of the cropped area in the MRA is privately owned. Only 6% of the land in the MRA is rented.

In the LRA, half of the land (50%) is rented. Share cropping accounts for 32%, and nearly 18% of the cropped land in the LRA is privately owned.

Privately owned land is the most important land tenure in the SI area, accounting for 55% of the land. The average farm size for this type is 118 ha. The second most important type of land tenure for the SI is share cropping, accounting for 36% of the land. Only 9% of the cropped area under the SI system is rented.

Overall, the average farm size is the largest (325 ha) for the LRA, followed by the SI system (126 ha), HRA (72 ha) and MRA (70 ha). Privately owned land is the most important type of land tenure in the HRA and SI system. Rented land is more important in the LRA. Share cropping is most important land tenure for the MRA, and relatively important for the SI system and the LRA. These results are summarized in Table 1.

Table 1: The importance of land tenure types in each agro-climatic zone

Land tenure	HRA	MRA	LRA	SI
Owned	***	**	*	***
Rented	*	*	***	*
Share cropping	**	***	**	**

Importance in terms of the percentage of land under each type: ***=1st most important type of land tenure, **=2nd most important type of land tenure, *=3rd most important type of land tenure

Soil characteristics: Farmers' perceptions on various indicators of soil characteristics were surveyed (Table 2). They considered that soil depth is predominantly medium for both HRA and MRA and varies between medium and shallow in the LRA. The majority of farmers perceive soil type as medium and deep (to a lesser extent) in SI areas.

In terms of soil fertility, farmers of the HRA perceive their lands as of medium (71%) to high (25%) fertility. The majority of farmers in the MRA (97%) perceive their land fertility to be medium. Farmers of the LRA perceive their lands as being of medium

(56%) to poor (42%) fertility. Farmers of the SI system consider their lands to be of medium (67%) to high (33%) fertility.

Farmer opinions on soil texture vary from one area to another. Farmers in the HRA perceive the texture of their soils as clay (38%), mixed (46%) or other combinations (17%). Farmers of the MRA consider the texture of their soils to be clay (39%), mixed (26%) or a combination of clay and mixed (33%). In the LRA, some farmers (15%) indicated that the texture of their soils is sandy, or a combination of mixed and sandy (20%), whilst others perceive the soil texture as clay (25%), mixed (25%), or a combination of the two (13%). In the SI system, farmers consider the soil texture as mixed (78%) or clay (18%).

Table 2 Farmer's Perceptions on Soil Characteristics

Soil characteristics*	**HRA**	**MRA**	**LRA**	**SI**
Soil type	Medium	Medium	Medium & Shallow	Medium & Deep
Soil fertility	Medium	Medium	Medium & Poor	Medium & Fertile
Soil texture	Mixed & Clay	Mixed & Clay	Clay, Mixed & Sandy	Mixed & Clay

* Soil type = shallow, medium, deep; Soil fertility = fertile, medium, poor; Soil texture = clay, mixed, sandy combined

Type of enterprise: Two types of enterprises exist in the project area. These are plant production alone and mixed crop and livestock production systems. In the HRA, most farmers (89%) are growing crops only, whereas 11% of the farmers grow crops and raise livestock, with a similar pattern applying for the SI system. The percentage of farmers of mixed enterprises is higher in the MRA (22%) and the LRA (38%).

Share cropping arrangements: Under the share cropping system, production costs are paid for in full by the tenant, who will in return receive roughly 60% of the crop production. The land owner receives about 40%, of total crop output. This is the opportunity cost for land rent. The actual proportional allocation of a crop output (returns) between land owners and tenants can vary from one production system to another.

Crop Rotations: Wheat fallow, wheat/wheat, and wheat/chickpea are the three most important rotations in the HRA, which is a wheat-based system. In the MRA, which is a mixture of wheat-based and barley-based systems, wheat/wheat, barley/barley, wheat/fallow, and a combination of other rotations are the main rotations used by farmers. In the LRA, which is a barley-based system, dominant rotations are barley/barley and barley/fallow. Wheat/wheat, wheat/fallow, and barley/fallow are widely used rotations under the SI systems.

In summary, it is evident that continuous cropping and fallowing are the most widely used systems used in cereal production (wheat and barley) under the rainfed conditions in Ninevah province. The use of food legumes (chickpea and lentil) in wheat rotations is still limited, and the use of forage legumes in barley rotations is rare. There is tremendous scope to expand the use of food- and forage-legume in rotations with wheat and barley, respectively, as an essential development to increase cereal production on a sustainable basis.

Responsibilities: Responses from sample farms indicated that 84% of the farm activities are carried out by men. Female members of the household contribute 12%, and children contribute 4%, to agricultural activities.

Crop varieties: Most of the HRA area is planted with local durum wheat varieties (74%), only 18% of the area is devoted to improved durum wheat varieties. In the MRA zone, nearly 90% of the cropped area is allocated to wheat production (50% durum wheat with 29% local varieties and 21% improved varieties) and 40% bread wheat with 18% local and 22% improved vrieties. Ten percent of the HRA is under barley. About 95% of the cropped area in the LRA is allocated for barley using the local Aswad variety, and 5% for growing local durum wheat. Most of the cropped area under the SI system is planted with improved durum wheat (92%) and 6% with local durum wheat varieties. Only 2% is allocated for local bread wheat varieties (Table 3)

Table 3: **Type and intensity of crop varieties (% of area)** (with L=Local, and I=Improved variety)

Type	**HRA**	**MRA**	**LRA**	**SI**
Durum-wheat	92.5	49.9	5	98
L	74.2	29	5	6
I	18.3	21	-	92
Bread-wheat	7.5	39.8	-	2
L	3.2	18.1	-	2
I	4.3	21.7	-	-
Barley	-	10.5	95	-
L	-	10	95	-
I	-	0.5	-	-

Land preparation: Although the number of plowings varies from one zone to another, there is a clear tendency by farmers towards undertaking two plowings. In the HRA, for example, nearly 45% of wheat farmers plow their land two times; some 36% of the farmers plow their land four times. Likewise, about 74% of the farmers in the MRA plough wheat fields twice. All wheat farmers in the LRA plow their lands two times. Similarly, about 82% of wheat producers under the SI system plough their land twice. All barley farmers in the MRA plow their fields two times. However, under LRA, about 55% of the farmers plow barley fields twice and 45% of barley farmers plough land only one time.

Seed and fertilizers sources: The main source of seed for all varieties is farmers' own seed. The formal seed sector (government) is not considered by farmers as an important

source of seed supply, especially in recent years. However, there are some cases where state seed enterprises provide up to 25% of wheat variety seeds. Another important point is that exchange of seeds among farmers does not appear to be an important source of seeds in the project area. Given the importance of own-farm seed production, it is essential to train farmers and enhance their local capacity for quality seed production.

The main source of fertilizer is the government which represents about 74 %,free market sources representing 26%. Most farmers indicated that poor availability (57%) or high prices (98%) are problems or constraints in acquiring fertilizer.

Abandoned varieties: There are considerable numbers of farmers who have abandoned the use of some crop varieties. Such information, if supplemented by reasons of abandonment, will have important research implications in incorporating farmers' criteria among the selection traits of crop improvement research. Incorporation of farmers' desired traits may increase the adoption and wide dissemination of improved crop varieties. Results of the survey reveal that Abu Ghraib is the wheat variety that farmers have abandoned most. Nearly 75 farmers indicated that they have stopped planting this variety, mainly in the MRA and under SI systems. This may be attributed to the substitution of improved durum wheat varieties and seed unavailability in recent years. Mexibak is another bread wheat variety that has been abandoned by some 19 farmers due mainly to its deterioration in grain yield and its sensitivity to rust diseases. Among improved wheat varieties, Um Rabee and Sham-3 appeared to be disadopted by some farmers, especially under the SI system, perhaps because of availability of better, improved durum wheat varieties. Rihan-03 is the only barley improved variety which has been grown less, disadopted by 17 farmers in the LRA, due to farmers' preferences which favor a two-raw black seed local variety.

Supplemental irrigation: About 52% of the farmers depend on surface water as a source for supplemental irrigation, 47% on groundwater, while 2% using these two sources at the same time. In regard to constraints to SI, most farmers mentioned poor availability of spare parts for sprayers (40%), fuel and oil (50%) and power (89%), whilst about 49% indicated that skilled labor is available but expensive.

Marketing: The main constraints faced in marketing processes were the distance between farm and market (18%), the complicated process (31%) and lack of market information (6%).

Income Sources: The major source of income for the farmers in all zones was from crop production which represents about 74%, income from livestock enterprise was the second source (15%), and 11% of farmers mentioned that their income was from mixed crop - livestock enterprises.

Livestock: Farmers in the project area raise two types of livestock, small ruminants and cattle, with the average flock sizes differing among the zones. For small ruminants, SI farmers have the highest flock size (278 head), followed by LRA (221), MRA (95) and

HRA (46). For cattle, MRA had the largest herds of cattle (5 head), followed by SI (4 head), with HRA and LRA (2 head) .

Livestock feed sources: Five main sources of livestock feed were identified: wheat bran, agro-industries byproduct, barley, stubble, and natural pastures. Barley is the most important source providing 34% of livestock feed, followed by stubble grazing providing 26%, and natural pastures and wheat represent a similar 19% importance.

The comparative importance of feedstuffs in HRA was 34% for barley, 24% for wheat bran, 23% for natural pastures and 20% for stubble grazing. For MRA, barley is the main source providing 35% of feedstuffs followed by stubble grazing at 30%, natural pastures 17%, wheat bran 17%, and agro-industries byproducts 1%. For LRA, 31% of livestock feed is barley, 27% is wheat bran, 25% stubble grazing and 16% natural pastures. The main source under SI is stubble grazing with 33%, barley with 32%, natural pastures 25% and wheat bran 9%.

General constraints: The general constraints faced by agricultural producers were the distribution of rainfall amount (among locations and seasons), mentioned by 34% of farmers, markets (27%), prices and policies (28%) and disputes (12%).

Wheat grain yields: Table 4 summarizes durum and bread wheat yields across zones for some common varieties. The SI zone had the highest grain yields for all varieties. In addition to the differences in productivity among zones, there are differences among varieties in the same zone. For durum wheat, generally the variety Sham had the highest level of productivity, with up to 3100 kg/ha under SI. As an average of productivity across three common zones, the improved varieties gave higher yields than the local variety by 12% for Waha, 37% for Um Rabee and 43% for Sham. For bread wheat, improved varieties gave the highest yields of 3000 kg/ha in the SI zone.

Table 4: Grain yield according to varieties and zones

Varieties	**HRA**	**MRA**	**LRA**	**SI**
	Grain Yield (Kg/Ha)			
Durum Wheat				
Waha	891	960	-	2211
Sham	1173	906	-	3100
Um Rabee	1007	1074	-	2888
Local	656	1011	120	1950
Bread Wheat				
Improved	978	696	-	3000
Abu-Graib (local)	490	1098	600	2667