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ACIAR - ICARDA Iraq Project

Iraqi Socio-Economic Team

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Better Crop Germplasm and Management for
Improved Production of Wheat, Barley and
Pulse and Forage Legumes in Iraq

Socio-Economic Components

Objectives of socio-economic component

- Economic evaluation of the performance of technologies being developed and tested by the project.
- **Monitoring the adoption process (rate of adoption, degree of adoption and intensity of adoption) of introduced technologies.**
- Monitoring and evaluation of the effectiveness of technology transfer mechanisms adopted by the project.
- **Economic evaluation, at the farm, community, and national levels, of the impact of the technologies being developed and promoted by the project..**

Socio-economic components

Objectives	Outputs
1.	1.1 Constraints/limitations in rainfed crop production identified through diagnostic study of farmers' existing practices.
	1.4 Potential constraints to adoption identified
	1.6 Assessment of potential adoption and impact
3.	3.1 Specific production constraints, identified under Output 1.1, for which there are no available technologies are identified and prioritized
4.	4.3 Enhanced capabilities in evaluating adoption and impact of improved technologies

2006/07 Socio-economic Workplan

Activity	2005 / 2006	2006 / 2007
1.1 Baseline information	<ul style="list-style-type: none"> -Data collection -Data analysis -Results discussion - Constraints identified 	Finalization of baseline report and publishing
1.4 Constraints to adoption	<ul style="list-style-type: none"> -Constraints identified - Yield and agronomic performance - Enterprise budgeting 	<ul style="list-style-type: none"> -Yield and agronomic performance - Enterprise budgeting - Risk analysis - WUE/WP indicator - Emerging constraints and farmer opinion
1.6 Adoption and impact assessment		<ul style="list-style-type: none"> -Emerging constraints and farmers opinion -Impact assessment
3.1 Production constraints	<ul style="list-style-type: none"> - Baseline information (1.1) 	Monitoring results
4.3 Capacity in adoption and impact assessment	<ul style="list-style-type: none"> - Questionnaire - Visits to ICARDA for baseline data analysis 	<ul style="list-style-type: none"> -Training (impact assessment workshop at ICARDA 5-9, Nov., 2006) - Visits to jointly analysis risk and WUE components

Baseline Survey

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.

**Sample Farms
Distribution
among
Agro-
ecological/
Rainfall
Zones in
Ninevah
Province**

Area	No. of observation	%
HRA	80	30.7
Alqosh	20	25
Zamar	20	25
Shekhan	20	25
faydah	20	25
MRA	61	23.4
hamdaneia	20	32.8
Bashiqa	21	34.4
telkeif	20	32.8
LRA	60	23
Mahalebiye	20	33.3
Tel-abta	20	33.3
Al-hadhar	20	33
SI	60	23
Rabaaa	20	33.3
Namroud	20	33.3
Homeidat	20	33.3
Total	261	100

Importance of land tenure types

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

Importance in terms of the percentage of land under each type

*** =1st important type of land tenure

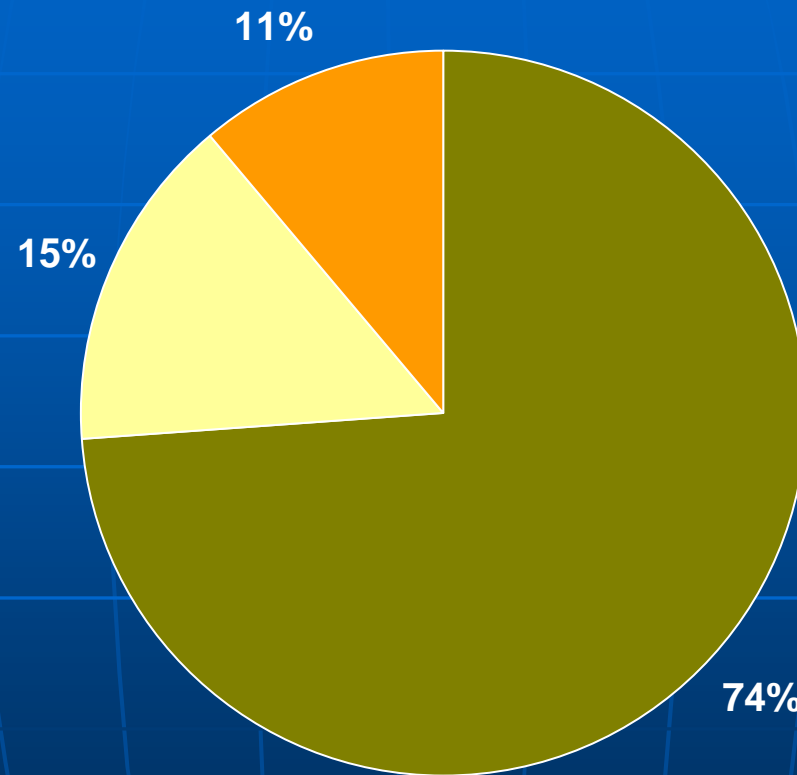
** =2nd important type of land tenure

* =3rd important type of land tenure

Type of Enterprise

Enterprise type	HRA	MRA	LRA	SI
Plant	89	78	61	88
Mixed	11	22	38	12
Total	100	100	100	100

Sources of farmer income



■ plant

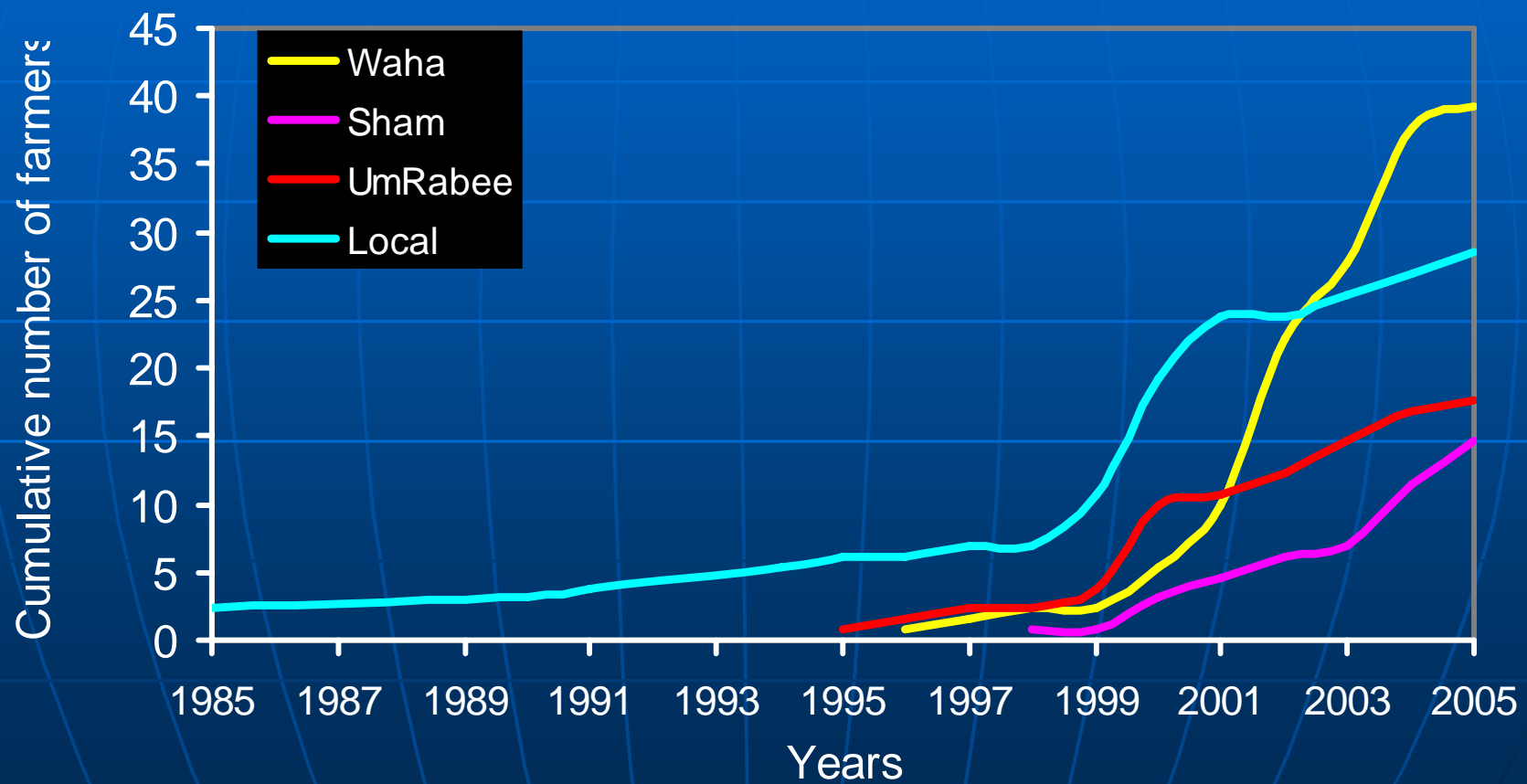
■ livestock

■ off-farm

Type and intensity of crop varieties (% of area)

Type	HRA	MRA	LRA	SI
D-wheat	93	50	5	98
L	80	58	100	6
I	20	42	-	94
B-wheat	8	40	-	2
L	43	46	-	100
I	57	55	-	-
Barley	-	11	95	-
L	-	95	100	-
I	-	5	-	-

Adoption Path of Durum Wheat Varieties



Type and Importance of Crop Rotations

HRA	MRA	LRA	SI
Wheat/fallow	Wheat/wheat Barley/barley	Barley/fallow Barley/Barley	Wheat/wheat
Wheat/wheat	Wheat/fallow Wheat/others	Barley/fallow	Wheat/fallow Barley/fallow
Wheat/chickpea	Combination		

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

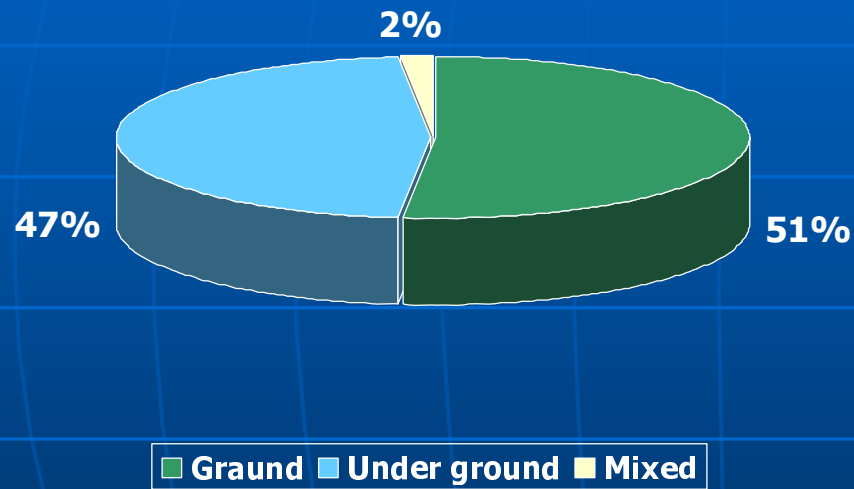
Soil type = shallow, medium, deep

Soil fertility = fertile, medium, poor

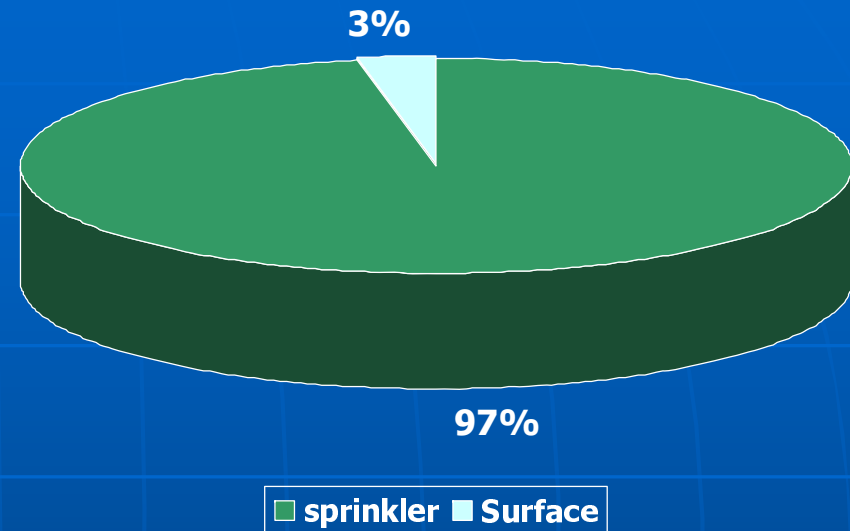
Soil texture = clay, mixed, sandy combined

Supplemental Irrigation

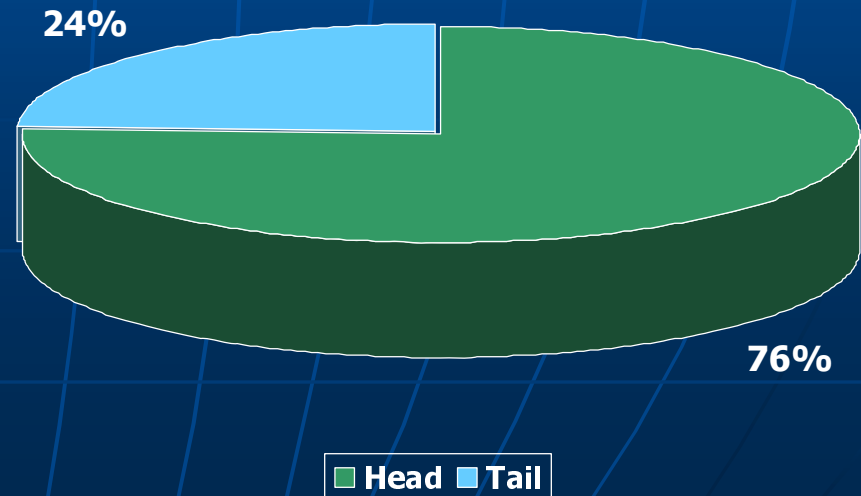
Water Source for S.I



Irrigation Method



Farm Location to the Water



Average flock size (head) and sources of Livestock feed (%) according to Zone

Zone	Average flock size (head)		Sources of feed (%)				
	small ruminants	cattle/cow	Wheat bran	Agro industries bi-products	barley	Stabl grazing	Natural pastures
HR	46	2	24	0	34	20	23
MR	95	5	17	1	35	30	17
LR	221	2	27	1	31	26	16
SI	278	4	9	0	32	33	25
Total			20	1	34	26	20

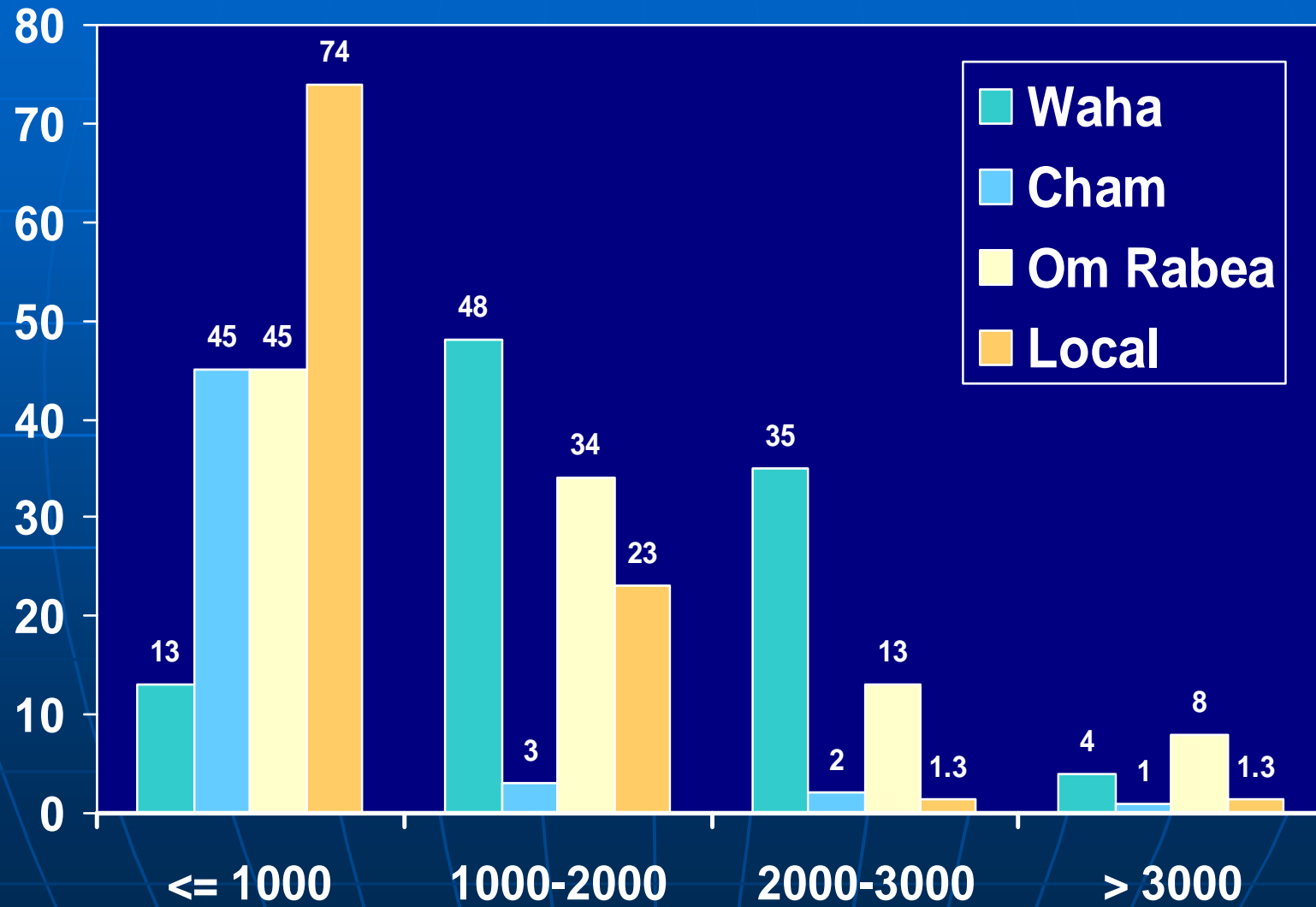
Farmers Perceptions of the Sensitivity of Varieties to Pests (Insect & Diseases)

	Infection		
	Low %	Moderate %	High %
Local durum	22	41	37
Om rabea	27	18	56
Cham	24	24	53
Waha	63	17	21
Abu graib	11	44	44

**Grain &
Straw
Yield of
durum
wheat
according
to
varieties
& Zone**

Varieties	Zone	Grain Yield (kg/ha)	Straw Yield (kg/ha)
Local durum wheat	H.R	656	179
	M.R	1011	298
	L.R	120	24
	S.I	1950	186
Waha	H.R	891	229
	M.R	960	213
	L.R	–	–
	S.I	2211	247
Cham	H.R	1173	273
	M.R	906	243
	L.R	–	–
	S.I	3100	193
Om Rabea	H.R	1007	228
	M.R	1074	251
	L.R	–	–
	S.I	2888	253

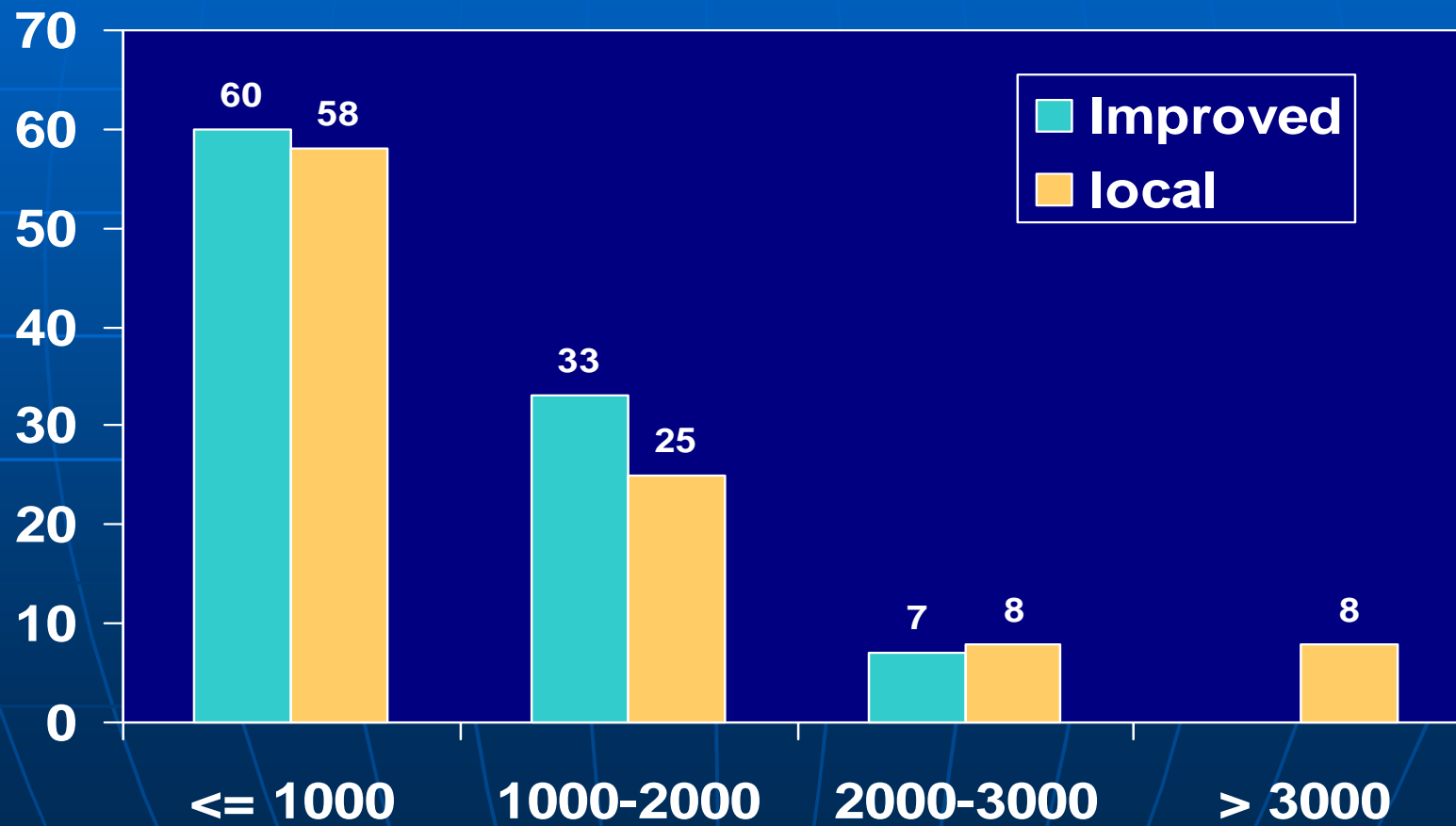
Intervals of Yield (Durum Wheat)



Average Yield of Bread Wheat according to Varieties & Zone

Variety	Zone	Yield (kg/ha)
Improved	H.R	978
	M.R	696
	L.R	—
	S.I	3000
Abu-Ghraib (local)	H.R	490
	M.R	1098
	L.R	600
	S.I	2667

Intervals of Yield (Bread Wheat)



Constraints

Constraints According to Baseline Survey

Constraints		%
Electricity	Not Available	98
Price of Fertilizer	High Prices	98
Availability of Fertilizer	Not Available	62
Availability of Spare Parts	Not Available	60
Availability of Skilled Labor in supplementary irrigation	Not Available	13
Availability of Fuel and Oil	Not Available	69
Availability of spare Parts	Not Available	36
Availability of Extension Services	Not Available	32
Availability of Herbicides	Not available or expensive	22
Sensitivity of Varieties to Pests	High	42
Availability of Sprayers in insect-pest-desease control	Not Available	13
Cost of renting machinery services	High	5

Constraints According to Baseline Survey - cont.

Constraints		%
Distance between farm and markets	So far	18
Availability of market information	Not Available	10
Taxes	High	7
Marketing process	complicated	27
Prices of products	Low	27
Market conditions	Not accepted	69
Competition	High	10
General Constraints		
Rainfall amount distribution	fluctuating	34
Processes of Markets	Complicated	27
Public Policies	unstable	28
Local Disputes	hard	12

Results of Demonstrations (2005/2006)

Yield of durum wheat (kg/ha) – (summary)

Zone	Practice	Cham1	Om Rabea	Cham3	Caronia	Cham5
SI	Demo.	1305	1807	1867	1468	
	Control	1263	1363	1760	1218	
HRA	Demo.	883		1145	1191	
	Control	761		894	858	
MRA	Demo.		1740		1637	1411
	Control		1459		1590	1249

Yield of Bread wheat varieties (kg/ha) – (summary)

Zone	Practice	Adnania	Cham4	Cham6	Tel Afar3	IPA99	Abu Graib
SI	Demo.	1759	1383	1763	2042		1583
	Control	1637	1199	1587	1836		1348
HRA	Demo.		884	1003			989
	Control		753	962			875
MRA	Demo.	1217		1460	1380	1103	1252
	Control	1111		1360	1277	1064	1165

Barley yield (kg/ha) – (Summary)

Zone	Practice	Furat	Rihan	Jazeera	Local	Zanbaka	Tadmor
MRA	Demo.	1867	1753	1595	1453		
	Control	1375	1578	1452	1360		
LRA	Demo.				823	997	752
	Control				824	773	812

Results of Demonstrations (2006/2007)

Performance of Wheat Varieties according to Tillage Systems by Rainfall Zones (kg/ha)

Zone	Varieties	Control	chisel	Zero tillage
SI	Tellafer 3	840	842	1031
	Adnania	721	987	929
	Om Rabea	643	1068	1177
	Cham 3	645	1248	1101
HRA	Abo Ghraib	1053	1561	779
	Cham 6	1061	1469	1179
	Cham 3	1102	1497	1085
	Karoneia	972	1342	1222
MRA	Abo ghraib	903	1045	896
	Cham 6	852	1011	827
	Tellafer 3	604	745	620
	Om Rabea	537	643	561

NR of Wheat Varieties according to Tillage Systems by Rainfall Zones (000 I.D)

Zone	Varieties	Control	chisel	Zero tillage
SI	Tellafer 3	277	263	366
	Adnania	213	341	542
	Om Rabea	161	376	432
	Cham 3	235	473	394
HRA	Abo Ghraib	427	522	448
	Cham 6	446	666	456
	Cham 3	362	592	536
	Karoneia	387	569	314
MRA	Abo ghraib	53	104	93
	Cham 6	138	268	172
	Tellafer 3	153	239	166
	Om Rabea	94	155	206

Performance of Barley Varieties according to Tillage Systems & Rainfall Zones

location	Variety	Control	chisel	Zero tillage
MRA	Rihan 3	696	783	619
	Jazeera 1	667	744	613
LRA	Local Black	140	171	251
	Zanbaka	204	168	263

Net revenue of Barley Varieties according to Tillage Systems & Rainfall Zones

location	Variety	Control	chisel	Zero tillage
MRA	Rihan 3	36	666	916
	Jazeera 1	26	55	53
LRA	Local Black	-3.2	4	22
	Zanbaka	15	4	25

Pulses Yield, Average Revenue, average Cost and Average Net Revenue – HRA

location	Variety	Yield (kg/ha)	Average Revenue (000 I.D/ha)	Average Cost (000 I.D/ha)	Net Revenue (I.D/ha)
Alqush	Filip 97	400	430	118	312
	Dejla	440	473	119	354
	IPA 510	1400	1505	100.3	1405
	Ghap 4	1040	1118	100	1018
	Local	0			
	Dejla – spring	600	645	64	581
	Ghap 4 - spring	800	860	65	795
	IPA 510 spring	750	753	65	687
	IPA 510 2-T	600	645	77	568
	Local - spring	0			
Al-Shykhan	Akwadlji	112		459	
	ILB	148		459	

Forage Legumes Yield, and average Cost – LRA

location	Variety	Yield	Average Cost (000 I.D./ha)
Hatra	IPA 2001	Grazed	72.6
Tel Abta	Beqia + Local Black	Grazed	110.8
Mahlabeia	Beqia 2001	Damaged totally	56

- In the rainfed areas, in addition to the productivity per land unit, we need to know the productivity per unit of water

Rainfall Information

- **Good crop establishment requires about 50mm of rainfall in Autumn (October + November + December)**
- **Grain filling requires a total of 120-150mm of rainfall in Spring (March + April)**
- **For a season to be classified as a drought season, the amount of spring rainfall (March + April + May) would be less than 60mm.**

	2005/2006		2006/2007		1997/98-2006/07	
	%	Mean	%	Mean	%	Mean
Autumn rainfall						
< 50mm	59	37	4	44	29	28
>= 50mm	41	76	96	115	71	122
Spring rainfall						
< 120mm	62	86	100	66	82.5	51
>= 120mm	38	174	0	0	17.5	166
Drought						
< 60mm	0	0	25.5	43	43	28
>= 60mm	100	120	74.5	85	57	112

-Low moisture availability during grain filling-

- this could be related to late planting

-A possible solution is early planting which can be facilitated by zero tillage

Water productivity according to crop, zone and practice

crop	zone	Treat.	W.P
Wheat	S.I	Control	0.37
		Chisell	0.46
		No tillage	0.41
	H.R	Control	0.23
		Chisell	0.31
		No tillage	0.29
	M.R	Control	0.28
		Chisell	0.31
		No tillage	0.25
Barley	M.R	Control	0.29
		Chisell	0.34
		No tillage	0.23
	L.R	Control	0.2
		Chisell	0.21
		No tillage	0.12

Water Productivity (kg/M³)

Rainfed area = 0.45

S. Irrigation = 0.59

2007/08 Socio-economic Workplan

Activity	Timetable
Final Production of the Baseline Report	Sept. /Nov. 2008
Economic Analysis to the Results of The Three Seasons (2005/06, 2006/07, 2007/08)	
Adoption & Impact assessment :	
* Questionnaire drafting - Pre-testing / finalization	March 2008
* Data Collection (farm survey)	June – July 2008
* Data Entry & Analysis	Aug. – Sept. 2008

Activity	Timetable
Results Presentation & Reporting :	By November 2008
- Adoption Indicators	
- Constraints to adoption	
- Impact Indicators	
Sources of Inefficiency in Crop Production Under Different Rainfall Zones	
Water Productivity (WP) (environmental indicators)	
Risk analysis	
Effect of new technologies on the distribution of farmers income	
Effect of new technologies on the demand of production inputs (seed, fertilizer, machinery and labor services,...)	

The Importance of Adoption Studies (Why Do We Need Adoption Studies?)

1. Better Understanding of Farming Systems and Farming Communities.
2. Identifying Constraints (Technical, socioeconomic, Policy) that hinder the wide adoption of introduced technologies and Working on Solutions.
3. Improving Technology Adoption and diffusion.
4. Improving the Feedback Mechanism.
5. Providing information for impact studies.

Indicators of Adoption

1. Adoption Rate: % of farmers

To a large extent, the rate of adoption of a new technology is subject to:

- its profitability,
- The degree of risk and uncertainty associated with it,
- capital requirements,
- agricultural policies,
- Socioeconomic characteristics of farmers.

2. Degree of Adoption measured by the proportion of land under the new crop cultivars or new practices .

3. Intensity of Adoption: Quantity of modern inputs used.

Sampling Approach for Adoption Studies

Cross-sectional data from two groups of farmers:

1. Participants in Demonstrations:

Farmers that hosted demonstrations of the technology under consideration.

2. Non- Participants (Reference Farmers):

These farmers did not host any demonstrations, and therefore served as the control group which provided background information concerning the farmers' knowledge and perceptions about the technologies.

Criteria for Grouping Sample Farmers

- 1. Type of practices.**
- 2. Crop / Varieties**
- 3. Rainfall Zone.**
- 4. Type of Enterprise (crop, livestock, mixed).**
- 5. Type of land tenure.**

Future Research

- Policy research: There is a need to analyze the policy effects on the uptake and impact of the project output.
 - .How type land tenure affect on the uptake of new technologies
 - .Enabling policy options to get the uptake and impact of the project output.
- How the improved technologies introduced by the project will enhance the adaptive capacity of rural communities to weather variability and climate changes.
- Adoption and impact studies:
 - .There is time lag between the output and adoption.
 - .Document the adoption and impact after project termination (Ex-Post)
- Village based seed enterprise requires policy and institutional arrangements that need to be fully assessed and recommended.
- Under S.I, WUE still low, we need to identify sources of inefficiency and the factors affecting farmer's demand for irrigation water

Thank you

Yield of durum wheat (kg/ha) according to zone, location and variety

Zone	Practice	Location	Cham1	Um Rabee	Cham3	Caronia	Cham5
SI	Demo.	Nimroud	1800	2200	2968	1440	
		Humaidat	783	1291	1070	1155	
		Rabea	1332	1931	1564	1809	
	Control	Nimroud	1840	2200	2966	1736	
		Humaidat	499	918	864	831	
		Rabea	1450	970	1450	1088	
HRA	Demo.	Al-Qush	800		1000	1100	
		Al-Shikhan	480		940	980	
		Rabea	1368		1494	1494	
	Control	Al-Qush	800		900	1000	
		Al-Shikhan	440		720	800	
		Rabea	1044		1062	774	
MRA	Demo.	Telkaif		2040		2060	1850
		Hamdania		1350		900	664
		Baashiqa		1830		1950	1720
	Control	Telkaif		2000		1860	1830
		Hamdania		856		1260	576
		Baashiqa		1520		1650	1340

Yield of Bread wheat (kg/ha) according to zone, location and variety

Zone	Practice	Location	Adnania	Cham4	Cham6	Tel Afar3	IPA99	Abu Graib
SI	Demo.	Nimroud	1750	1625	1675	2938		1500
		Humaidat	1638	1430	1842	1691		1744
		Rabea	1889	1094	1771	1498		1504
	Control	Nimroud	2500	1650	1650	2915		1500
		Humaidat	1412	1248	1510	1594		1544
		Rabea	1000	700	1600	1000		1000
HRA	Demo.	Al-Qush		900	850			900
		Shikhan		600	880			768
		Rabea		1152	1280			1300
	Control	Al-Qush		800	900			800
		Al-Shikhan		580	960			780
		Rabea		880	1026			1044
MRA	Demo.	Telkaif	1840		1820	2060	1550	2030
		Hamdania	592		1240	810	548	476
		Baashiqa	1220		1320	1270	1210	1250
	Control	Telkaif	1720		1750	2020	1620	1980
		Hamdania	592		1240	810	548	466
		Baashiqa	1020		1090	1000	1025	1050

Barley yield (kg/ha) according to zone, location and variety

Zone	Practice	Location	Furat	Rihan	Jazeera	Local	Zanbaka	Tadmor
MRA	Demo.	Telkaif	1960	2200	2160	2120		
		Hamdania	1120	1400	1016	1040		
		Baashiqa	1620	1660	1610	1200		
	Control	Telkaif	1920	2140	2080	2100		
		Hamdania	976	1274	976	960		
		Baashiqa	1230	1320	1300	1020		
LRA	Demo.	Hatra				930	980	790
		Tel Abta				715	1014	714
	Control	Hatra				868	740	960
		Tel Abta				780	806	663