

تقرير حول مشروع التجارب في حقول
المزارعين في القمع والسعد والدرس والطحس.
"تأثير المواقع اللبنانية على استجابة الحبوب"

Lebanese Republic
Agriculture Research Institute
Department of Plant Breeding and Improvement

الجمهورية اللبنانية
مكتب وزير الدولة لشؤون التنمية الإدارية
مركز مشاريع ودراسات القطاع العام

ARI / ICARDA

Collaborative Project

Final Report 2000-2001

Winter Rainfed Crops
Cereals and Grain Legumes

Results of

On-Farm Verification Trials

Prepared by

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(C.P.S.P.S.)

1. Introduction

As part of the on-going collaborative project between the Lebanese Agricultural Research Institute (LARI) and the International Center for Agricultural Research in the Dry Areas (ICARDA), work continued for the season of 2000-2001 and different varieties of Wheat, Barley, Lentils and Chickpeas were tested in 5 locations (Table 1) based on the agreement made by the project coordinator and ICARDA breeders.

As agreed by the project coordinator and the ICARDA wheat breeders, the wheat trials in both Central and North Bekaa locations were subjected to supplementary irrigation since this is the normal practice of wheat growers in those areas . Everything else was grown under rainfed conditions.

Finally the overall amount of rainfall for the 2000- 2001 season was 450 mm in Tel Amara and 422 mm in Kfardan/laat.

Table 1. Information about the planting Locations.

Location Name	Elevation	Av. Rainfall Mm	Crops tested	Previous Crop	Planting dates
Central Bekaa Tel mara	905 m	600	Wheat, Chickpeas	vicia	17/11/2000
North Bekaa IAAT	1020 m	350	Wheat, Barley, Chickpeas, Lentils	sugarbeet	15/12/2000
West Bekaa Jeb Jannin Sawiri	1000 m 1100 m	700 500	Wheat, Chickpeas Barley, Lentils	Sugarbeet Snake cucumber	16/11/2000 16/11/2000
North Lebanon Arida (Akkar)	Coastal	1000-1200	Wheat, Chickpeas	Potato	9/11/2000
South Lebanon Mayfadoun	300- 400 m	800	Wheat, Barley, Chickpeas, Lentils	Wheat/Vegetables	8/11/2000

2. Materials and Methods

2.1. Experimental Design

Randomized Complete Block design with 3 replications.

Plot size : 8 m²

Row Length: 5 meter

Row spacing: 20 cm

Rows per plot: 8

Method of planting : Oyjord planter, Wintersteiger

2.2. Fertilization

<u>Location Name</u>	<u>Time</u>	<u>Fertilizer and Rate Applied</u>		<u>Pure Units</u>
Tel-Amara	Planting	Wh	17-17-17 20 kg/dn	34 kg/ha N,P,K
		Ch	SP 30 kg/dn	54 kg/ha P
	February	Wh	NH ₄ NO ₃ 20 kg/dn	65 kg/ha N
Iaat	Planting	Wh	17-17-17 20 kg/dn	34 kg/ha N,P,K
		Ba	17-17-17 20 kg/dn	34 kg/ha N,P,K
		Ch	SP 30 kg/dn	54 kg/ha P
		Ln	SP 30 kg/dn	54 kg/ha P
	February	Wh	NH ₄ NO ₃ 20 kg/dn	65 kg/ha N
		Ba	NH ₄ NO ₃ 20 kg/dn	65 kg/ha N
Mayfadoun	Planting	Wh	17-17-17 20 kg/dn	34 kg/ha N,P,K
		Ba	17-17-17 20 kg/dn	34 kg/ha N,P,K
		Ch	SP 30 kg/dn	54 kg/ha P
		Ln	SP 30 kg/dn	54 kg/ha P
	February	Wh	NH ₄ NO ₃ 20 kg/dn	65 kg/ha N
		Ba	NH ₄ NO ₃ 20 kg/dn	65 kg/ha N
Al-Arida	Planting	Wh	17-17-17 20 kg/dn	34 kg/ha N,P,K
		CH	SP 30 kg/dn	54 kg/ha P
	February	Wh	NH ₄ NO ₃ 20 kg/dn	65 kg/ha N
Jeb Jannin	Planting	Wh	17-17-17 20 kg/dn	34 kg/ha N,P,K
		CH	SP 30 kg/dn	54 kg/ha P
	February	Wh	NH ₄ NO ₃ 20 kg/dn	65 kg/ha N
Sawiri	Planting	Ba	17-17-17 20 kg/dn	34 kg/ha N,P,K
		Ln	SP 30 kg/dn	54 kg/ha P
	February	Ba	NH ₄ NO ₃ 20 kg/dn	65 kg/ha N

Wh = Wheat SP = Superphosphate Ba = Barley Ch = Chickpea Ln = Lentil

2.3. Herbicides

Lentils and Chickpeas: - Pre-emergence : Kerb (1 kg/ha) + Bladex (1 kg/ha)
- Handweeding in early spring

Wheat and Barley: - U46 (MCPA+2,4-D) , 1 liter/ha.

2.4 Harvested Area:

Whole Plot , 8 m²

3. Troubleshooting

The problems that encountered our experiments were the following:

- All the chickpea trials did not produce reliable data and were eaten up by people even in protected farmers land.
- The farmer who provided the land for the Mayfadoun Location in the South changed his mind and plowed the land one month after we planted all the varieties of all crops in that location. The varieties were then planted again in another location but no reliable results were obtained because of the very late planting and poor rainfall in the south .

4. Results

4.1 Bread Wheat

Among the tested bread wheat genotypes, only 2 genotypes (Seri 82/Vee'S'/Snb'S' and Seri 82/Shuha'S') significantly outyielded the released variety Tannour (Memouf 22) and in one location namely Tel Amara in central Bekaa. As for seed size however, most of the genotypes were significantly better than "Tannour" and in most of the locations except for the local landrace "Braiiji" (Tables 2-5).

As expected , the local landrace always ranked the last and gave the lowest grain yields in all locations. Attila 417 and Seri 82/Shuha "S" gave the best grain size in all of the locations.

Table 2. Results of the Tel Amara Location in Central Bekaa, (with suppl. Irrigation)

Genotype	Rank	Av. Grain Yield Kg/dunum ± Std. Dev.	1000 KW grs. ± Std. Dev.	Days to heading	Days to Maturit y	Plant Height (cm)
Tannour ©	5	421 ± 22	31.4 ± 0.2	115	157	80
Local Landrace (Braiiji)	6	242 ± 16	33.4 ± 1.3 *	125	162	100
Attila 417	3	455 ± 17	36.9 ± 0.8 *	111	153	95
Seri 82/Vee'S'/Snb'S'	2	491 ± 64 *	35.4 ± 0.7 *	112	155	75
Tevee'S'/Vee'S'/Pvn'S'	3	455 ± 44	31.6 ± 0.4	118	161	90
Seri 82 / Shuha'S'	1	515 ± 64 *	36.4 ± 1.6 *	113	160	95
Cham 2 ? Vee'S'	4	431 ± 38	29.6 ± 1.6	119	159	105
F-Value		13.4 **	21 **			
CV		9.8 %	3.2 %			
LSD		42	1.06			
Location Average		430	33.5	116	158	91

* Significantly better than the check "Tannour"

** Highly significant at the 1% probability level

Table 3. Results of the Arida Location in Akkar, North Lebanon

Genotype	Rank	Av. Grain Yield Kg/dunum ± Std. Dev.	1000 KW grs. ± Std. Dev.	Days to heading	Days to maturity	Plant Height (cm)
Tannour ©	2	439 ± 56	38.0 ± 1.2	102	139	70
Local Landrace (Braiiji)	-	-	27.0 ± 0.3	121	159	120
Attila 417	5	284 ± 94	46.2 ± 0.7 *	97	163	100
Seri 82/Vee'S'/Snb'S'	4	328 ± 21	47.1 ± 1.4 *	97	165	95
Tevee'S'/Vee'S'/Pvn'S'	1	449 ± 11	39.0 ± 0.3 *	106	173	90
Seri 82 / Shuha'S'	4	328 ± 50	42.0 ± 0.5 *	97	163	90
Cham 2 ? Vee'S'	3	379 ± 8	38.0 ± 1.1	102	167	110
F-Value		30.4 **	163 **			
CV		14.75 %	2.25 %			
LSD		46.7	0.89			
Location Average		368	39.6	103	161	96

* Significantly better than the check "Tannour"

** Highly significant at the 1% probability level

Table 4. Results of the Jeb Jannin Location in West Bekaa.

Genotype	Rank	Av. Grain Yield Kg/dunum ± Std. Dev.	1000 KW grs. ± Std. Dev.	Days to heading	Days to maturity	Plant Height (cm)
Tannour ©	3	875 ± 88	39.7 ± 1.0	120	171	90
Local Landrace (Braiiji)	7	174 ± 35	36.1 ± 1.2	130	174	110
Attila 417	6	818 ± 77	49.7 ± 1.4 *	117	169	105
Seri 82/Vee'S'/Snb'S'	5	862 ± 131	48.3 ± 2.1 *	117	171	100
Tevee'S'/Vee'S'/Pvn'S'	1	906 ± 42	47.0 ± 6.3 *	128	176	95
Seri 82 / Shuha'S'	2	883 ± 128	48.6 ± 2.6 *	118	173	95
Cham 2 ? Vee'S'	4	864 ± 64	42.9 ± 0.6 *	124	174	100
F-Value		26.8 **	10.1 **			
CV		11.5 %	6.3 %			
LSD		88.2	2.8			
Location Average		769	44.6	122	173	99

* Significantly better than the check "Tannour"

** Highly significant at the 1% probability level

Table 5. Results of the Iaat Location in North Bekaa, (with suppl. Irrigation)

Genotype	Rank	Av. Grain Yield Kg/dunum ± Std. Dev.	1000 KW grs. ± Std. Dev.	Days to heading	Days to maturity	Plant Height (cm)
Tannour ©	1	498 ± 67	36.9 ± 1.4	123	168	80
Local Landrace (Braiiji)	7	249 ± 56	32.9 ± 2.2	137	173	105
Attila 417	6	291 ± 87	40.1 ± 3.4 *	121	168	75
Seri 82/Vee'S'/Snb'S'	5	312 ± 77	39.4 ± 3.4	121	168	80
Tevee'S'/Vee'S'/Pvn'S'	2	470 ± 104	36.6 ± 3.1	131	170	75
Seri 82 / Shuha'S'	3	440 ± 115	42.6 ± 2.7 *	122	168	80
Cham 2 ? Vee'S'	4	410 ± 114	35.1 ± 0.6	130	169	90
F-Value		3.36	4.7 **			
CV		24 %	6.9 %			
LSD		91	2.6			
Location Average		381	37.7	126	169	84

* Significantly better than the check "Tannour"

** Highly significant at the 1% probability level

4.2 Durum Wheat

In durum wheat, non of the tested genotypes could significantly outyield the released check "Masarra" in Bekaa except for the coastal location in Akkar. Masarra seems to be more suitable under low to moderate rainfall conditions (Tables 6-9).

Lahn/hcn gave the highest seed size in all locations and was significantly better than Masarra. The best durum grain yields and grain size were observed in W.Bekaa in Jeb Jannin . The location averages for grain yield and seed size were 737 kg/dn and 48.8 grams , respectively.

Table 6. Results of the Tel Amara Location in Central Bekaa, (with suppl. Irrigation)

Genotype	Rank	Av. Grain Yield Kg/dunum ± Std. Dev.	1000 KW grs. ± Std. Dev.	Days to heading	Days to maturity	Plant Height (cm)
Massara ©	1	454 ± 5	37.0 ± 0.9	112	155	95
Local Landrace Haurani)	3	411 ± 20	40.9 ± 1.8 *	115	157	115
Cham / Brachua	2	429 ± 21	41.6 ± 1.3 *	118	161	100
Mrb/snipe/mgh/3Rufan7	2	429 ± 47	36.4 ± 0.4	112	159	100
Lahn / hcn	4	392 ± 30	40.0 ± 1.1 *	120	157	90
Bcrch 1	5	373 ± 30	35.7 ± 1.4	125	155	80
Mrb 3 / Mnal	3	411 ± 30	43.1 ± 0.9 *	113	156	85
F-Value		2.53	17.6 **			
CV		6.9 %	3.0 %			
LSD		29	1.2			
Location Averages		414	39.2	116	157	95

* Significantly better than the check "Massara"

** Highly significant at the 1% probability level

Table 7. Results of the Akkar location in North Lebanon.

Genotype	Rank	Av. Grain Yield Kg/dunum ± Std. Dev.	1000 KW grs. ± Std. Dev.	Days to heading	Days to maturity	Plant Height (cm)
Massara ©	5	232 ± 69	39.0 ± 1.1	106	143	105
Local Landrace Haurani)	7	91 ± 24	30.0 ± 0.3	110	147	120
Cham / Brachua	6	228 ± 28	33.0 ± 1.1	111	148	110
Mrb/snipe/mgh/3Rufan7	4	303 ± 91 *	40.0 ± 0.7 *	113	150	105
Lahn / hcn	3	306 ± 37 *	40.0 ± 0.4 *	110	147	90
Bcrch 1	2	322 ± 63 *	35.0 ± 1.1	108	143	95
Mrb 3 / Mnal	1	326 ± 68 *	40.0 ± 1.7 *	112	149	105
F-Value		6.08 **	45 **			
CV		22.8 %	2.72 %			
LSD		59	1.0			
Location Averages		258	36.7	110	147	104

* Significantly better than the check "Massara"

** Highly significant at the 1% probability level

Table 8. Results of the Jeb Jannin Location in West Bekaa.

Genotype	Rank	Av. Grain Yield Kg/dunum ± Std. Dev.	1000 KW grs. ± Std. Dev.	Days to heading	Days to maturity	Plant Height (cm)
Massara ©	2	800 ± 176	46.3 ± 1.0	117	169	105
Local Landrace (Haurani)	7	621 ± 213	46.8 ± 0.8	119	171	120
Cham / Brachua	5	731 ± 90	51.5 ± 10	126	172	105
Mrb/snipe/mgh/3Rufan7	4	739 ± 134	51.5 ± 5.3	118	165	100
Lahn / hcn	6	706 ± 49	52.7 ± 1.0 *	126	171	95
Berch 1	1	808 ± 116	49.5 ± 6.4	128	174	100
Mrb 3 / Mnal	3	754 ± 59	42.4 ± 10	120	172	105
F-Value		0.68	1.0			
CV		17.9 %	13.2 %			
LSD		132	6.4			
Location Averages		737	48.7	116	157	95

* Significantly better than the check "Massara"

** Highly significant at the 1% probability level

Table 9. Results of the Iaat Location in North Bekaa, (with suppl. Irrigation)

Genotype	Rank	Av. Grain Yield Kg/dunum ± Std. Dev.	1000 KW grs. ± Std. Dev.	Days to heading	Days to maturity	Plant Height (cm)
Massara ©	4	458 ± 132	41.0 ± 2.0	124	170	95
Local Landrace (Haurani)	7	326 ± 36	42.1 ± 4.5	121	167	95
Cham / Brachua	2	502 ± 99	41.6 ± 3.1	126	168	85
Mrb/snipe/mgh/3Rufan7	5	447 ± 88	43.7 ± 4.3	121	169	75
Lahn / Hcn	3	497 ± 60	48.5 ± 6.5 *	126	173	75
Berch 1	1	515 ± 115	40.5 ± 1.6	125	173	90
Mrb 3 / Mnal	6	412 ± 71	43.6 ± 2.6	120	172	85
F-Value		1.5	1.5			
CV		20 %	9 %			
LSD		91	3.8			
Location Averages		451	43	123	170	86

* Significantly better than the check "Massara"

** Highly significant at the 1% probability level

4.3 Barley

Barley in Iaat and Sawiri was grown under rainfed conditions. In Sawiri, non of the tested genotypes could significantly outyield the check Rihane both in their grain and biological yields. However, the genotype “ICB 93-112300 AP” ranked first and performed better than Rihane in Sawiri. Under drier conditions such as in Iaat , it significantly outyielded Rihane (Tables 10 and 11).

Table 10. Results of the Sawiri Location in West Bekaa.

Genotype	Rank	Av. Grain Yield Kg/dunum ± Std. Dev.	Av. Biol. Yield Kg/dunum ± Std. Dev.	Days to heading	Days to maturity	Plant Height (cm)
Rihane 03 (6R Check)	2	428 ± 25	971 ± 188	116	160	90
Litani (2R Check)	6	371 ± 38	924 ± 123	114	161	75
Orge Pays (Landrace)	5	390 ± 17	923 ± 127	115	159	85
Alanda 01	4	409 ± 82	907 ± 105	116	158	70
ICB 93-112300AP	1	442 ± 48	825 ± 106	113	156	65
Alanda//Lignee 527/Arar	3	412 ± 120	939 ± 162	114	158	80
ER/Apm/Lignee 13/3/...	7	368 ± 117	858 ± 207	116	157	75
W12197/con ICB 77	8	341 ± 70	876 ± 150	117	160	80
F-Value		0.62	0.3			
CV		18 %	16.6 %			
LSD		74	150			
Location Average		395	903	115	159	78

** Highly significant at the 1% probability level

Table 11 . Results of the Iaat Location in North Bekaa.

Genotype	Rank	Av. Grain Yield Kg/dunum ± Std. Dev.	Av. Biol. Yield Kg/dunum ± Std. Dev.	Days to heading	Days to maturity	Plant Height (cm)
Rihane 03 (6R Check)	7	158 ± 17	607 ± 41	111	152	65
Litani (2R Check)	5	172 ± 26	621 ± 53	110	150	60
Orge Pays (Landrace)	1	193 ± 15 *	660 ± 95	113	149	55
Alanda 01	6	166 ± 8	575 ± 25	109	151	60
ICB 93-112300AP	2	191 ± 14 *	643 ± 21	109	147	60
Alanda//Lignee 527/Arar	3	185 ± 6 *	605 ± 33	110	150	60
ER/Apm/Lignee 13/3/...	4	177 ± 17 *	625 ± 65	111	148	50
W12197/con ICB 77	8	126 ± 31	628 ± 94	113	150	45
F-Value		4.18 **	0.55			
CV		10.9%	9.7 %			
LSD		18.6	60			
Location Average		171	620	111	150	57

** Highly significant at the 1% probability level

* Significantly better than the Check (Rihane)

4.4 Lentils

In Lentils, the better performance of FLIP 90-41 was clear in both locations where it ranked first and significantly outyielded the check “Talia-2”.

FLIP 95-36 seems to be also promising because it ranked second in both locations although it showed no significant yield increase over the check. ILL 5883 had poor performance in both of the two tested locations (Tables 12 and 13).

Table 12. Results of the Sawiri Location in West Bekaa.

Genotype	Rank	Av. Grain Yield Kg/dunum ± Std. Dev.	Av. Biol. Yield Kg/dunum ± Std. Dev.	Days to Flowering	Days to Maturity	Plant Height (cm)
Talia-2 (Check)	3	162 ± 30	423 ± 47	104	148	25
Flip 90-41	1	197 ± 23 *	466 ± 8	104	148	25
ILL 5883	6	110 ± 26	347 ± 35	107	149	26
Flip 95-36	2	183 ± 23	463 ± 6	105	148	26
Flip 92-28	4	157 ± 40	412 ± 122	104	148	24
Leb. Local	5	112 ± 15	380 ± 62	112	154	28
F-Value		5.25 **	1.76			
CV		17.7 %	14.7 %			
LSD		27.2	61			
Location Average		154	415	106	149	26

** Highly significant at the 1% probability level

* Significantly better than the Check (Talia-2)

Table 13. Results of the Iaat Location in North Bekaa.

Genotype	Rank	Av. Grain Yield Kg/dunum ± Std. Dev.	Av. Biol. Yield Kg/dunum ± Std. Dev.	Days to Flowering	Days to Maturity	Plant Height (cm)
Talia-2 (Check)	4	202 ± 6	550 ± 21	99	128	30
Flip 90-41	1	233 ± 11 *	578 ± 22	98	126	27
ILL 5883	5	182 ± 3	473 ± 15	101	139	28
Flip 95-36	2	213 ± 18	531 ± 72	100	136	26
Flip 92-28	3	203 ± 26	548 ± 64	100	136	30
Leb. Local	6	105 ± 10	443 ± 45	106	145	26
F-Value		28.1 **	3.78			
CV		7.7 %	8.8 %			
LSD		14.6	45.8			
Location Average		190	521	101	135	28

** Highly significant at the 1% probability level

* Significantly better than the Check (Talia-2)

4.5 Locations Performance

From Figures 1 and 2, it is apparent that best grain yields for cereals and best kernel weights were obtained in the West Bekaa location namely Jeb Jannin which is a high rainfall area. One can also see that wheat yields in Central and North Bekaa were comparable, this is because wheat in both locations received supplementary irrigations and also because the amounts of rainfall received in both locations were exceptionally very close during this season.

FIGURE 1. Location Averages for Grain Yield (kg/dn)

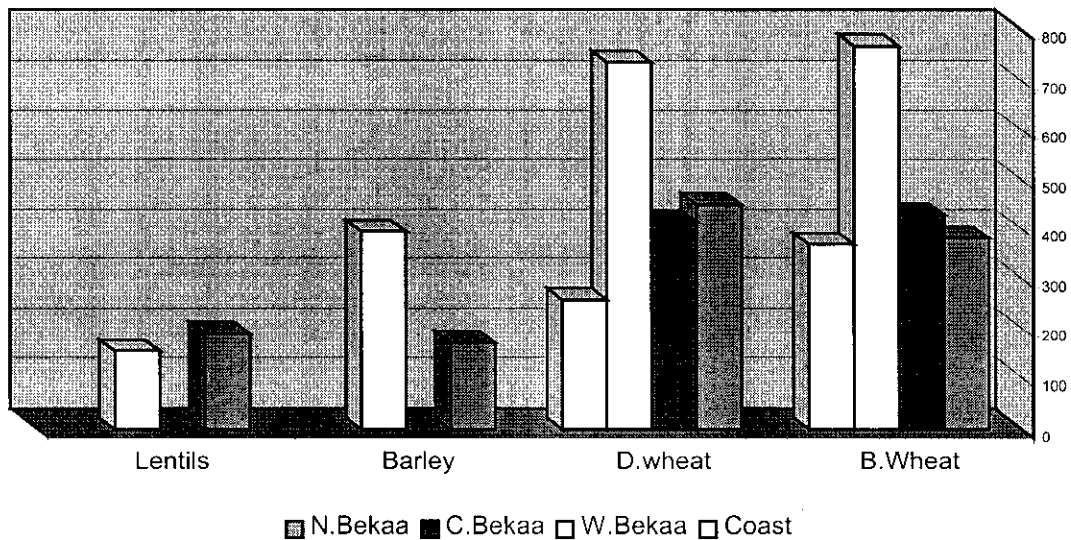
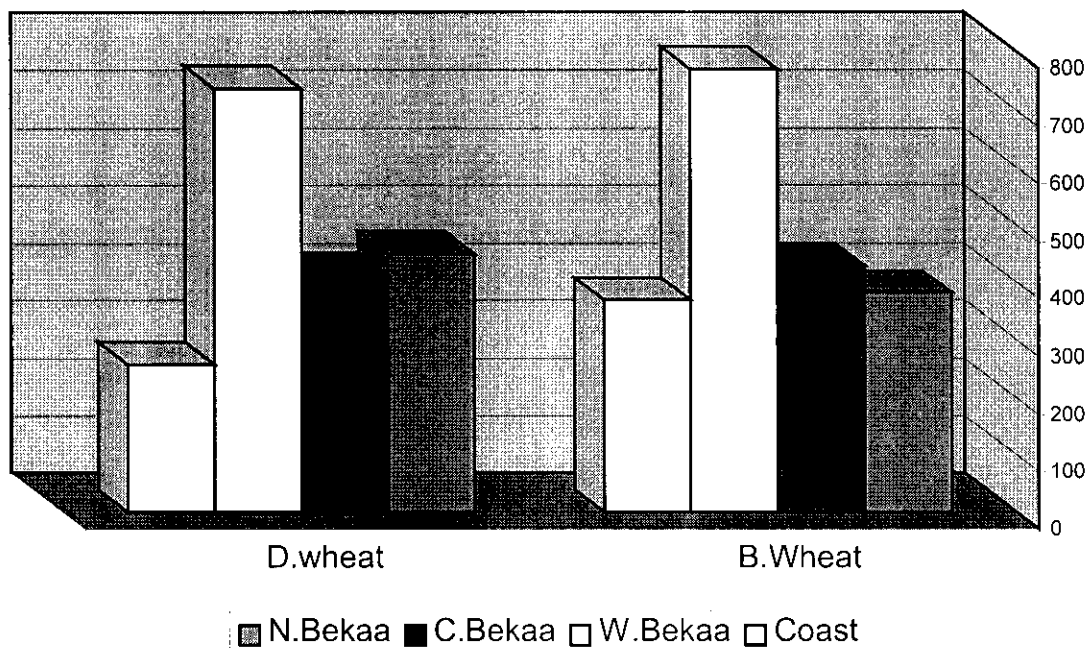


FIGURE 2. Location Averages for 1000 KWT (grs.)



ACKNOWLEDGEMENTS

At the end , I would like to thank ICARDA and in particular the Germplasm Program for their financial support of the project activities.

I would also like to thank all the staff from LARI and from ICARDA Terbol station for their involvement in this project.

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August 2, 2001