

Deliverable achievement report

**D2.1.1 Analyze field performances across farmers
locations**

WP2: Productivity and biodiversity boost via participatory variety selection

WP2- 2022-23 Report

TASK 2.1 Participatory selections of cultivars derived from ancient grains to maximize biodiversity.

1- Analyze of on farm genotypes performances

During season 1 of the project MountainHER from October 2022 to July 2023 a set of eight (08) genotypes of 2 crops (durum wheat and barley), including two checks (Commercial and landrace) as shown in Table 1, were planted at six farms in these countries (Italy, Croatia, Morocco, Tunisia, Algeria, and Lebanon) under various agro-ecological and farmer's practices.

An old variety and a commercial check, potentially more productive, were also added as "local" variety for each site and country.

Table 1: List of barley and durum wheat genotypes

Crop	Pedigree	Name	GID
BARLEY	Zanbaka/H.spont.41-2/4/Arar/H.spont.19-15//Hml/3/H.spont.41-1/Tadmor/5/Zanbakian/7/Lignee527//Bahtim/DL71/3/Api/CM67//Mzq/5/Alanda-01/4/WI2291/3/Api/CM67//L2966-69/6/Lignee527/Chn-01//Arar/Rhn-03		24766
BARLEY	WI3257/4/ALISO/CI3909-2//HB602/3/MOLA/SHYRI//ARUPO*2/JET/5/Atahualpa/IraqiBlack		24781
BARLEY	Chifaa		4395
BARLEY	SLB15-05/4/H.spont.96-3/3/Roho//Alger/Ceres362-1-1/5/Roho/4/Zanbaka/3/ER/Apm//Lignee131		13330
BARLEY	Moroc9-75//WI2291/WI2269/5/SLB15-05/4/H.spont.96-3/3/Roho//Alger/Ceres362-1-1		13336
BARLEY	P.STO/3/LBIRAN/UNA80//LIGNEE640/4/BLLU/5/PETUNIA 1		22761
BARLEY	Local Commercial check		
BARLEY	Local Landrace		
DURUM	Local Commercial check		
DURUM	Local Landrace		
DURUM	Sebatel1/7/Ossl1/Stj5/5/Bidra1/4/BezaizSHF//SD19539/Waha/3/Stj/Mrb3/6/Icajihan1	Sebajihan	800034160
DURUM	Shaba//Geromtel1/Icasyr1	Shabassem	800034166
DURUM	Amedakul1/TriticumdicoccoidesSyriancollection//Loukos	Nachit	800043267
DURUM	Korifla/AegSpeltoidesSyr//Mrb5	Jabal	800018569
DURUM	Icasyr1/3/Gcn//Stj/Mrb3	Zagharin2	800043194
DURUM	F413J.S./3/ARTHUR71/LAHN//BLK2/LAHN/4/QUARMAL	Faraj	800028288

- For Morocco

LOCAL DURUM WHEAT: Oued Zenati (local landrace) and Karim (commercial check).

LOCAL BARLEYS: Rabat 071 (local landrace) and Amalou (commercial check)

- For Algeria

LOCAL DURUM WHEAT: Mohamed ben Bachir (local landrace) and Boutaleb (commercial check).

LOCAL BARLEYS: Tichedrett (local landrace) and Fouara (commercial check).

- For Lebanon

LOCAL DURUM WHEAT: 99310 (Landrace) and Marghertia (commercial check).

LOCAL BARLEYS: ARTA (landrace) and Riha 03 (commercial check).

- For Italy

LOCAL DURUM WHEAT: Cappelli and Dauno III (old varieties) and Nazareno (modern variety)

Sowing rate: 400 seeds/m²

LOCAL BARLEYS: Iuventa and Fandaga, specific varieties for brewing (Sowing rate: 300 seeds/m²).

- For Croatia

LOCAL DURUM WHEAT: AGR1 (local landrace) and AFZG Kaja (commercial check)

LOCAL BARLEYS: AGR2 and BC Sreco.

Planting was done half following the farmer practices and half agro-ecological practices.

For Algeria was unable to receive the project seeds in the first year, and these were replaced by other breeding accessions already available as shown in **Table 2**.

Table 2: List of barley and durum wheat genotypes planted in Algeria

Crop	Pedigree	Name
BARLEY	Local Commercial Check	Fouarra
BARLEY	Local Landrace	Tichdret
BARLEY	Local Commercial	Saida
BARLEY	Local Commercial	Rahma
BARLEY	Local Commercial	Bahia
BARLEY	Lignee527/NK1272//JLB70-063/3/Rhn-03/6/QB813-2/5/Aths/Lignee686/4/Rhn-03/3/Bc/Rhn//Ky63-1294	V15.ICAR
BARLEY	P.STO/3/LBIRAN/UNA80//LIGNEE640/4/BLLU/5/PETUNIA 1	Entry 06
BARLEY	Local Commercial	Souguer
BARLEY	Local Commercial	Raihana 3
DURUM	Local Commercial Check	Boutaleb
DURUM	Local Commercial	OEB
DURUM	Local Landrace	MBB
DURUM	Local Commercial	Bousselam
DURUM	Local Commercial	Megres
DURUM	Icamilmus2/Ammar8/3/Marsyr3//Saadi1989/Chan	R3.ICA
DURUM	Local Commercial	Waha
DURUM	ICARDA	Nachit
DURUM	Local Commercial	Ofanto

Tunisia and Algeria were also affected by the worst drought. As such the trials were completely loss. The status for these farms can be found in **Table 3 & Table 4**.

Table 3: farms trials: 2022-2023 cropping season

Country					
Morocco	Guigou	-	25 th , November 2022	Station Ait Khabbach at 12 km from the site	
Algeria	Takouka -Megres	36°17'40.42"N 5°20'07.48"E	06 th , December 2022	A rain gauge with recording thermometer	Loss due to drought-uncollected data
Tunisia	Kalaat Senan	35°52'30"N 8°19'59"E	07 th , December 2022	Weather station at CTV Kalaat Senan	Loss due to drought-Uncollected data
Lebanon	K Rashaya	-	24 th , December 2022	Weather station at Rashaya Casa.	20/07/2023
Italy	Isi & Spezzina		5 th , Avril 2023	-	20/07/2023

Croatia	-	-	8 th , November 2022	-	uncollected data
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Table 4. List of farmers and agro ecological practices and technical management

Country: Farm locations	Farmer practices	Agro ecological practices
Morocco : Guigou	Cover crop twice (tillage and bed seed preparation)	No till
	Deep fertilizer(18 kg/ha N and 46 kg/ha P)	Deep fertilizer(20 kg/ha N and 60 P and 20 K)
	Broadcast seed (80 kg/ha barley and 100 kg/ha durum wheat)	Seed driller (Zurn D83) 80 kg/ha barley and 100 kg/ha durum wheat)
	N cover fertilization 33 kg/ha at tillering stage	Split N cover fertilization (20 units/ha at tillage and 20 Units/ha at heading stage)
	Manual Weeding (once)	Intercroppings with common vetch
	Manual harvest	Manual harvest
Algeria: Takouka-Megres	Tillage et conventional seeding	Plantation: minimum tillage
	Fertilization : chemical fertilization (DAP + urée 46) at 100 kg/ha	Fertilization: NPK targeted based on soil analysis/ biofertilizers (composte & vermicomposte)
	Rotation: Wheat after vetch	Rotation: Wheat after Vetch
	Weed control: Chemical	Weed control: Mechanical weeding/ herbicide mixtures (minimal use of herbicides)
Tunisia : Kalaat Senan	-	-
Lebanon: K Rashaya	-	-
Italy: Isi & Spezzina	Spezzina field: manuring, plowing and hoeing.	Isi field: manuring,Biochar and hoeing.
	Sowing: (with a Hege row plot seeder (the same one used for fall sowing) and was followed by rolling.	Sowing: (with a Hege row plot seeder (the same one used for fall sowing) and was followed by rolling. Before rolling over the entire Isi field, clover repens (CV Huja) was broadcast sown at a rate of about 25Kg/ha. Afterwards, this field was also rolled.
Croatia:	Spring planting	Pelletized manure
		Spring planting

The seasonal pattern following sowing was characterized by very low rainfall (Italy, Croatia, and Lebanon) to no rainfall (Algeria and Tunisia) immediately after emergence.

In Italy, in the second half of May was characterized by continuous rainfall and low temperatures at heading, resulting in lower-than- expected plant investment and failure to set, especially in the area with traditional tillage.

In Morocco (Guiguou site), a hailstorm occurred just as the grains were beginning to ripen, on 4 June, and destroyed almost all the plots. Only 2 square meters were harvested from each plot to assess the grain, straw and yield components.

The trials tested a both in Tunisia and Algeria have all been declared a complete loss.



Algeria



Lebanon



Morocco



Algeria



Lebanon



Morocco



Tunisia



Tunisia



Italy

Main results

- For Italy

Plant height: was measured before harvesting in order to assess vegetative development.

Yields: Because of the low yields, it is difficult at present to make any predictions about the varieties used, although there are considerable differences between them.

Regarding, durum wheat yields ranged from 20 kg/ha for Dauno III (spring sowing) to 109.44 kg/ha for Cappelli. So, Cappelli was the best-performing variety for spring sowing.

In addition, the varieties Jabal at 84.41 kg/ha and Faraj at 95.43 kg/ha yielded significantly more than 70 kg/ha.

For Barley, in general, autumn sowing seems to give better results, although these are still very low, mainly Fandaga with a yield between 189.60 and 219.42 kg/ha and Luventa with a yield varying between 185.6 and 294.4 kg/ha. Otherwise, the average yield under both practices ranged from 4.92 to 62.32 kg/ha. The Chifaa variety ranked highest under the innovative practices, with a yield of 62.32 kg/ha.

As for the techniques used, innovative and "farmer's", the first gave better results in fall sowing, while the second is better performing with spring sowing.

No diseases were found in any of the plots.

- For Morocco

Data analysis revealed as shown in Table 5 and Table 6:

Durum wheat cultivars "Oued Zenati "cv and "Nachit "cv and barley genotypes "Rabat071 "cv and entry 4 were identified as the most promising genotypes best suited to resilient practices.

For durum wheat, grain yield varied from 770 to 1470 kg/ha under agro-ecological practices and from 410 to 1030 kg/ha with farmers' practices.

The results confirm that the lowest yield was recorded for the Jabal variety (402.50 kg/ha) compared with the two checks tested, Karim (921.60 kg/ha) and Oued Znati (901.80 kg/ha).

Sebajihan showed its performance in terms of grain yield, recording a yield of 1059.70 kg/ha, significantly higher than the two checks, Karim and Oued Znati, within the framework of farmers' practices.

Under agro-ecological practices, Sebajihane achieved a yield of 1032 kg/ha, behind the local Oued Znati control (1441.30 kg/ha) and the Nachit variety (1431.60 kg/ha).

The low yields recorded for Shabassem and Faraj under agro-ecological practices are over 700 kg/ha.

As for the Zagharine 2 variety, it showed a stable yield between 980 and 990 kg/ha, higher than karim (commercial control) under both practices.

Biomass varied from 2 to 3.86 and from 1.25 to 2.68 t/ha under agro-ecological and farmers' practices respectively.

For barley, grain yield varied from 190 to 2480 kg/ha under agro-ecological practices and from 220 to 790 kg/ha under farmers' practices. All the genotypes tested under farmers' practices showed a lower yield than the two checks Rabat 071 (local landrace) at 584 kg/ha and Amalou 843 kg/ha, with the exception of the line: SLB15-05/4/H.spont.96-3/3/Roho//Alger/Ceres362-1-1/5/Roho/4/Zanbaka/3/ER/Apm//Lignee131 with a yield of 756.9 kg/ha.

The performance of genotypes tested under agro-ecological practices on the Guiguou site in relation to grain yield showed that the line: SLB15-05/4/H.spont.96-3/3/Roho//Alger/Ceres362-1-1/5/Roho/4/Zanbaka/3/ER/Apm//Lignee131 presented the best yield with 2454.4 kg/ha followed by the check Rabat 071 and the line: Zanbaka/H.spont.41-2 /4/Arar/H.spont.19-15//Hml/3/H.spont.41-1/Tadmor/5/Zanbakian/7/Lignee527//Bahtim/DL71/3/Api/CM67//Mzq/5/Alanda-01/4/WI2291/3/Api/CM67//L2966-69/6/Lignee527/Chn-01//Arar/Rhn-03, with 1379.3 and 1072.7 kg/ha respectively.

The chifaa genotype and the Moroc9-75//WI2291/WI2269/5/SLB15-05/4/H.spont.96-3/3/Roho//Alger/Ceres362-1-1 line outperformed Amalou (commercial check), which produced a yield of 515.8 kg/ha.

Biomass varied from 0.46 to 3.53 and from 0.68 to 2.61 t/ha under agro-ecological and farmers' practices respectively.

Significant differences between barley and durum wheat genotypes for grain yield, biomass, spikes/m² and thousand kernel weight (Table 6).

- For Lebanon

The data revealed significant differences between barley and durum wheat genotypes for thousand kernel weight (Table 6).

For durum wheat, thousand kernel weight varied from 39.3 to 40.4 under agro-ecological practices and from 42.9 to 49.2 g with farmers' practices.

Effectively, the thousand kernel weight was between 42.9 g and 49.2 g for the Faraj and Sibajihan varieties.

So, Sabajihan had the highest thousand kernel weight under farmers' practices.

Also, under agro-ecological practices, the lowest thousand kernel weight was observed in the Marghertia check (39.3 g).

The Nachit and Zagharin 2 genotypes recorded a thousand kernel weight equal to the 99310 check (local landrace) at 42.4 g.

2. For barley, the thousand grain weight varied from 37.3 to 55.5 g under agro-ecological practices and from 35.7 to 51.4 g with farmers' practices.

So, ARTA (local landrace), had the highest thousand kernel weight, varying between 51.4 and 55.4 g, followed by the genotype:

Moroc9-75//WI2291/WI2269/5/SLB15-05/4/H.Spont.96-3/3/Roho//Alger/Ceres362-1-1 with a yield varying between 50.3 and 48.1 g, under farmers' and innovative practices.

Chifaa had the lowest thousand grain weight under both practices.

The durum wheat cultivars '99310 landrace'cv and 'Marghertia'cv and the barley genotype 'ARTA'cv were identified as the most promising genotypes best adapted to resilient practices.

- For Croatia

The results revealed significant differences between the two types of practices. The agro-ecological practices significantly improved yield and its components. **Table 6**, and the results are not very significant for this season.

Table 5: Grain yield local check and top elite for Agro-ecological and conventional management

		Crops	Durum Wheat		Barley		
Location name	Country	Management	Grain yield check(Kg ha-1)	Grain yield top elite (Kg ha-1)	Grain yield check (Kg ha-1)	Grain yield top elite (Kg ha-1)	Note
Rigoso	Italy	Agro Ecological managment (compo Isi)	97.066	95.428	32.27	62.32	Checks winter planted and elite spring planted
		Farmer Practices (Spezzina)	109.44	75.555	294.4	48.280	
Guigou	Morocco	Agro Ecological managment	1441.3	1431.6	1379.3	2454,4	Hailstorm at maturity time
		Farmer Practices	921.6	1059.7	843	756.9	
Takouka-Megres	Algeria	-	-	-	-	-	Custom issues prevented the planting of the project elites
Kalaat Senan	Tunisia	-	-	-	-	-	Extreme drought event prevented germination and crop establishment
K Rashaya	Lebanon	Agro Ecological managment	-	-	-	-	Good season
		Farmer Practices	-	-	-	-	
	Croatia	Agro Ecological managment					Extreme snow coverage and winter frost affected the performances
		Farmer Practices					

Table 6: Yield and components average for Agro-ecological and conventional management.

Crops		Barley				Durum Wheat			
Country	Management/Traits	Grain yield (t/ha)	Biomass (t/ha)	Spikes/m ²	TKW (g)	Grain yield (t/ha)	Biomass (t/ha)	Spikes/m ²	TKW (g)
Morocco	Agro Ecological management	0.94 ± 0.17	1.65 ± 0.25	156,25 ± 21,92	33,56± 0.92	1.05±0.07	2.68 ±0.16	219.12± 18.42	37.68 ±1.16
	Farmer Practices	0,44± 0.05	1.68 ±0.16	135.12 ±10.82	32.05 ± 0.91	0.74±0.06	2.18 ±0.14	193.62± 17.67	35.86 ±1.01
Lebanon	Agro Ecological management	-	-	-	43.64	-	-	-	41
	Farmer Practices	-	-	-	41.6	-	-	-	45.04
Italy	Agro Ecological management								
	Farmer Practices								
Croatia	Agro Ecological management	0.00972	0.00155	-	-	0.01538	0.00301	-	-
	Farmer Practices	0.00484	0.00098	-	-	0.00924	0.00198	-	-

TKW: Thousand Kernel weight mean ± standar error

Justification of delay

[Delay in receiving data, heterogeneity of data results and 10 days sickness for the lead of task 2.2.1]

Supporting documents

- [Provide description and MEL links to supporting pictures, documents, or others]
- [Eventually, you can provide link to things not reported in MEL, but this is not a preferred strategy]



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