



**MOUNTAIN
HER**

Deliverable achievement report

**D4.3.1- Cooperatives express their preferences for
practices and cultivars**

Description of completion

Introduction and Methods:

Within the MountainHer project and under the work package four, the transition to agro-ecological practices and adoption of new cultivars were assessed related to two surveys: S2 on farmers preferences for variety (Annex 1- Preferences for varieties) targeting the traits related to yield, quality, precocity, tolerance to drought, heat, diseases and pests in the highlight of climate change and S3 (Annex -2-Preference for practices) targeting all production chain from seed bed preparation, sowing, seeds availability, type of fertilization, harvesting and yield, with farmer cooperative members and farmers based on gender disaggregation approach. Only Preferences for varieties will be presented here. The S3 survey with regards to practices is ongoing and will be analysed at a later stage. The S2 with regards to trait preferences study was carried out in six countries and a summary of the number of respondents is shown in Figure 1. Farmers were asked as individuals or in groups to select their preferred varieties and narrate the underlying reasons for that.

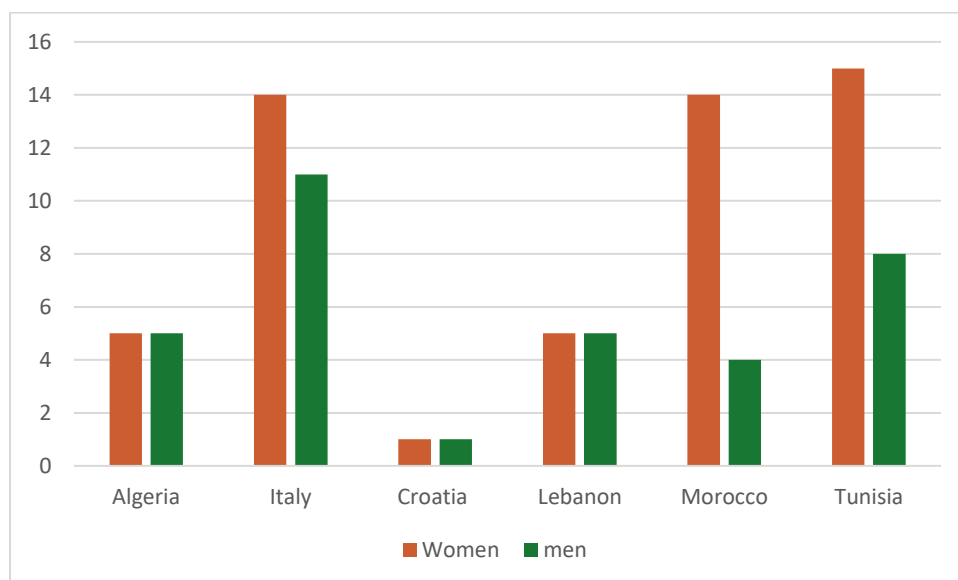


Figure 1: summary of the number of respondents based on gender carried out in six countries.

Sex-disaggregated trait and practice analysis across and within countries

Tunisia

The S2 survey was conducted in Tunisia with nine men and sixteen women scoring the traits on a scale from 1 to 5 on both durum wheat and barley within a participatory evaluation of the project entry sets. Evaluation differed extremely between crops and gender (Table 1, table2). For barley, the top characteristics related to grain and straw yield, and tolerance to drought are common preferred traits equally for men and women whereas for durum wheat other characteristics such as tolerance to drought, diseases, and pests are figured in the top list for men as they experienced crop failure from drought, diseases and pests; for women, grain and straw yield followed by the quality of flour and

semoulina are figured in the top list. Women showed more interest in grain color and the quality of the semoulina for the processing (Figure 2; 3).

Figure 2 : Trait preference for durum wheat varieties grown under MountainHER trials in Tunisia

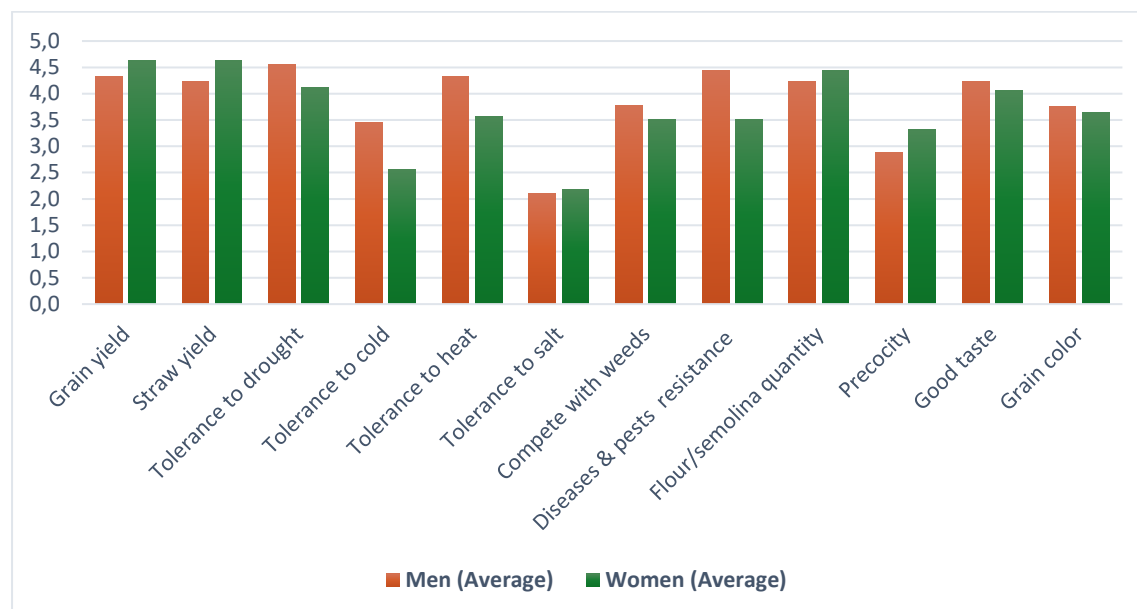
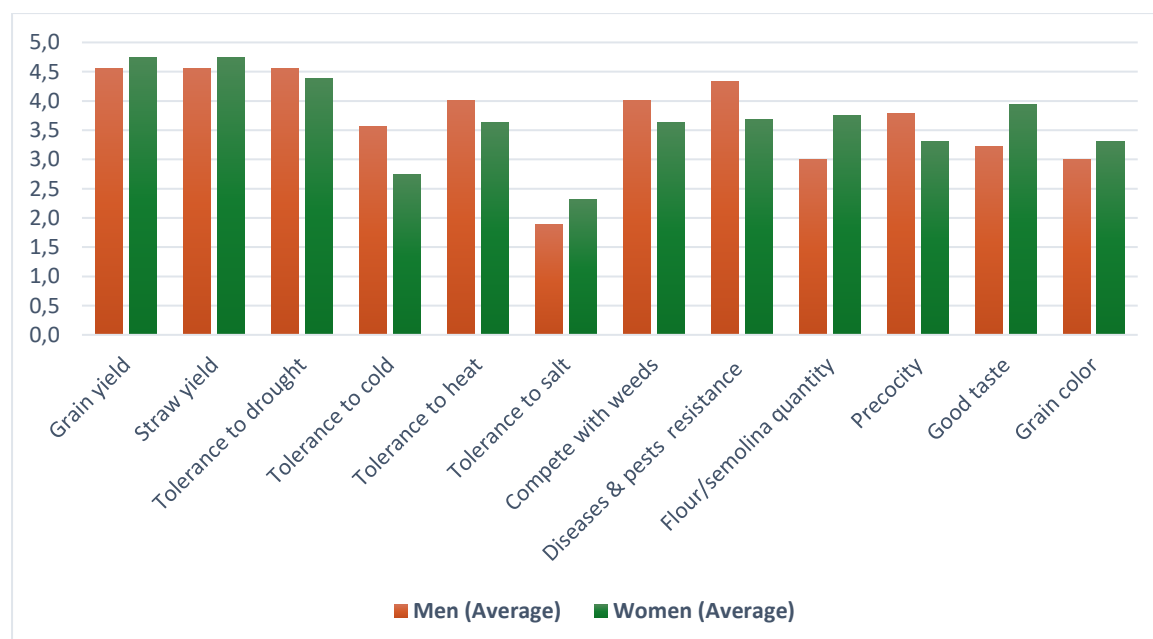


Figure 3 : Trait preference for barley varieties grown under MountainHER trials in Tunisia



For the MountainHer sets, the selection was highly diverse between gender and crops too. For women farmers, three durum wheat entries (Sebajihan, Nachit, and entry 10) and four barley entries (Entries 4, 5, 6, and 7) outperformed from the set of twelve entries; Entries 5 and 6 represents black and naked barley respectively. For men selection, four durum wheat entries (The commercial check, Jabal, and

the entries 9 and 11) and three barley entries (Entries 7, 10, and 11) outperformed based on men farmers selection with only one common entry (7) with women's selection (Table 1,2) with divergent preference to trait (Figure 1,2).

The S3 survey was not carried out on time due to the drought season and eventually crop failure.

Pedigree	Men (Average)	Women (Average)
Maali	2.2	2.0
Chili	1.2	1.7
Sebajihan	3.1	2.3
Shabasseem	2.9	3.0
Nachit	3.0	2.3
Jabal	3.2	3.5
Zagharin2	2.4	3.3
Faraj	1.6	1.3
Ghzael/Icaqinzen	2.1	2.7
180500 87	3.6	2.5
Kenzera//ITAig:90724/Durex	2.6	3.3
Farkassem/Sisseem	2.0	2.7

Table 1: women and men trait preference scores (1 to 5) toward durum wheat varieties grown under MountainHER trials in Tunisia.

Pedigree	Men (Average)	Women (Average)
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	3.4	3.0
WI3257/4/ALISO/CI3909-2//HB602/3/MOLA/SHYRI//ARUPO*2/JET/5/Atahualpa/IraqiBlack	1.0	1.0
Chifaa	1.5	2.5
SLB15-05/4/H.spont.96-3/3/Roho//Alger/Ceres362-1-1/5/Roho/4/Zanbaka/3/ER/Apm//Lignee131	4.1	3.0
Moroc9-75//WI2291/WI2269/5/SLB15-05/4/H.spont.96-3/3/Roho//Alger/Ceres362-1-1	4.0	2.5
P.STO/3/LBIRAN/UNA80//LIGNEE640/4/BLLU/5/PETUNIA 1	3.1	3.3
80.5162/MSEL//GLORIA-BAR/IAR.H.485/6/ATACO/BERMEJO//HIGO/3/CALI92/ROBUST/4/PETUNIA 1/5/PETUNIA 1/CHINIA/3/ATACO/BERMEJO//HIGO/6/ZIGZIG/3/M9846//CCXX14.ARZ3/PACO	3.8	3.0
DATCHA//MSEL/ND21117	2.2	1.7
UC 1047 / 11HB44	2.4	3.3
UC 1266 // L94/BCD-TTA/3/UC1280	4.2	4.3
Rihane -Check	2.3	3.5
Djebali- Check	1.2	3.0

Table 2: women and men trait preference scores (1 to 5) toward barley varieties grown under MountainHER trials in Tunisia.

Lebanon

The S2 survey conducted in Lebanon with five men and five women scored the traits on a scale from 1 to 5 on both durum wheat and barley. Evaluation differed also for crop and gender (Table 3). For men, characteristics related to grain color and taste were highly scored followed by tolerance to cold; this can be explained by the multiple dishes prepared from durum wheat in the mountains and the freeze that can affect the crop in April. For barley, tolerance to cold, drought, and heat are highly scored followed the extreme climatic events in the last five years resulted in yield decrease. For women, grain color, grain yield and good taste were highly scored for durum wheat whereas for barley, the score differed drastically from men; women took into consideration the processing of barley and scored flour and color of grain in the second and third rank, keeping at the first rank the resistance to diseases and pests characteristic (Table 4). For the MountainHer set, the S2 survey was carried with 5 men and 5 women and select a subset to be disseminated with ten famers (half men, half women). The local durum wheat commercial check Zagharin was appreciated by farmers due spike and grain size plus grain color. Together for 5 men and 5 women farmers, the entries Sebajihan, Shabassemn and Jabal were selected at the on-station trials based on traits related to yield such as big biomass, size of spike and grain, and the grain color for processing especially for durum wheat. The main traits for barley selection are straw and grain yield as barley is mostly used for feed in Lebanon. The S2 survey will be carried out at on-farm the next season with few farmers as last season the event of participatory on-farm selection was not accomplished due to the critical situation.

	AVERAGE (1 -5)	Score %	Rank	Mean characteristics
DURUM WHEAT	4.8	96	1	Good taste
	4.6	92	2	Color of the grains
	4.4	88	3	Tolerance to cold
	4.4	88	4	Quantity of flour/semolina produced
	4.2	84	5	Tolerance to heat
BARLEY	4.5	90	1	Tolerance to cold
	4.25	85	2	Tolerance to drought
	4.25	85	3	Tolerance to heat
	4.25	85	4	Good Taste
	4	80	5	Color of the grains: Yellow Golden

Table 3: men trait preference toward durum wheat and barley varieties grown under MountainHer trials in Lebanon.

	AVERAGE (1 -5)	Score %	Rank	Mean characteristics
DURUM WHEAT	4	80	1	Color of the grains: Red
	3.6	72	2	Grain yield
	3.6	72	3	Good taste
	3.5	70	4	Quantity of flour/semolina produced
	3.2	64	5	Straw yield

	3.2	64	6	Resistance to diseases and pests
BARLEY	4	80	1	Resistance to diseases and pests
	4	80	2	Quantity of flour/semolina produced
	3.75	75	3	Color of the grains: Yellow
	3.5	70	4	Tolerance to cold
	3.33	66.6	5	Good taste

Table 4: women trait preference toward durum wheat and barley varieties grown under MountainHer trials in Lebanon.

The participatory on-farm evaluation was not carried out due to the escalation of the situation and the S2 survey will be carried out by repeating 1 to 2 on-farm the season 2024-2025 in order to update the final report with scoring and ranking the varieties based on the traits.

Results of practices for S3 survey did not show clear variation unless for the labor force in land and seed bed preparation dominated by men and manual harvesting dominated by women and youth in mountains.

- Tillage: All farmers from both gender practice tillage with ploughing rails at depth varying from 20 to 30 cm depth.
- Seed bed preparation: 100% of farmers prepare the bed seed, 50-50 ratio were applying by ploughing rails and followed by rolling.
- Phosphorous-Potassium fertilization: 100% of farmers fertilize with Phosphorous and Potassium manually, both at same rate: 50 Kg/ha.
- Organic fertilization: Exclusively women farmers relay on organic fertilizer.
- Sowing Operation: Both gender sow manually at seed rate 200 kg/ha.
- Weeding Operation: Both gender use chemical herbicides using back sprayers using the active ingredient 2-4D.
- Nitrogen fertilization: Both gender do not use nitrogen fertilization.
- Diseases and fungus protection: Both gender do not use pest control techniques.
- Harvesting operation: Men hire labours either men or women to harvest their crops manually, and women famers harvest in person with her sons manually.
- Yield: Reported grain yield by surveyed farmers varied from 2 to 2.5 t/ha for both barley and durum wheat.

As for straw yields: 50% of men farmers reported the straw yield of durum wheat 5 t/ha and 100 % of women farmers reported 2.5 t/ha. While for barley, the reported straw yield was same for both gender of 2.5 t/ha.

- Decision taking: Both gender takes the decision independently.
- Crop rotation: Both gender practice crop rotation.
- Irrigation: Both gender do not irrigate their crops.
- Recycling equipment: Both gender do not have recycling equipment.

- Hired labors: Men hire labors in equal genders while women farmers don't need labors except for tillage, they choose men to do the job as they are renting the equipment belonging to men.

Algeria

The S2 survey conducted in Algeria with six men and five women on durum wheat and on barley scored the traits on a scale from 1 to 5. For Algerian farmers, two common characteristics grain and straw yield were common for both gender prioritizing the trait of ability to compete with weeds for men and precocity for women (Table 5, table 6). Women are prioritizing precocity as it is an important trait related to climate change and rain shortage and might be a potential in shortening the cycle for farmers in arid areas; and might be an opportunity for farmers to grow summer season in semi-arid or irrigated areas where farmers can generate more income from the same land. For both genders, high yield and good adaptation were the preferred traits for durum wheat selection; Both men and women had a strong preference for local varieties, indicating their deep attachment to the country's ancient cultivars. For barley, potential of productivity was mainly the preferred trait plus the obligation for use from the cooperative of cereals and dried vegetables (CCLS).

Table 5: men trait preference toward durum wheat varieties grown under MountainHer trials at Algeria.

	Varieties	Score	Rank	Main characteristics
DURUM WHEAT	Ofanto	5	1	Grain yield and color, quality and diseases tolerance
	Oued El Bared	4.5	2	Precocity and good adaptation
	Boussellam	4.5	3	Colors and form of spikes, precocity
	Waha	4.5	4	Colors and form of spikes and grain quality
	Mohamed Ben Bachir (local landrace) & Megres	4	5	Grain yield and quality, precocity and high,
BARLEY	El Fouara (local check)	4.5	1	Precocity, good density, tolerance and good grain yield
	Tichedrett (local landrace)	4.5	2	Grain and straw yields, tolerance and density
	Rahma & El Bahia	4.5	3	Precocity and good quality grain
	Saida	4	4	precocity
	Sougeur	4	5	Grain and straw yields, tolerance and density

Table 6: women trait preference toward durum wheat varieties grown under MountainHer trials at Algeria.

Morocco

The results of S3 survey showed referred varieties characteristics for men farmers such as grain yield, spike size for durum wheat; whereas straw yield and suitability for early defoliation are the main characteristics required for barley varieties. For both species gender, the availability of seed in the local market and the price suitability are the most relevant criteria in farmer's choice. Men's scoring revealed that Zagharin, Oued Zenati (Local landrace) and Faraj grown under MountainHer trials secured the top three positions as the preferred varieties for farmers; Rabat 071 is representing the local landrace, P.STO and Amalou (local commercial check) were the most appreciated varieties for barley (Table 7, table 8).

Interviewed women emphasized on the grain quality as the most relevant traits to rank the durum wheat varieties. For barley, preference traits were more or less similar to those announced by men especially straw and fodder yield. Consequently, women durum wheat scoring was different, making Oued Zenati (local landrace), Jabal and Nachit in the first, second and third rank respectively. However, men and women were unanimous for Rabat 071(local landrace) and PSTO as the first and second barley chosen varieties (Table 8). From the subset of the second year, the top five genotypes planted in the second year of project were ranked and the selection was based on the preferred traits like big spike, big grain, grain color, and grain quality and the two varieties Jabal and Zagharin were ranked second and third respectively. A field day was organised including MountainHER women farmers' cooperative "El Amal" and other women farmers selected the five Top entries from the set of durum wheat based on spike size, grain size and color (Table 9).

	Varieties	Score %	Rank	Mean characteristics
DURUM WHEAT	Zagharin	86.25	1	Big spikes and big grain and straw
	Oued Zenati (Check)	83.75	2	Landrace, straw and big grain, number of tiller and straw yield
	Faraj	45.00	3	Long cycle, dense spike grain color
	Jabal	38.75	4	Big spike
	Karim (commercial Check)	22.50	5	Good grain yield
BARLEY	Rabat 071	98.75	1	Long cycle, Spike, straw production and yield
	P.STO	70.00	2	Grain and straw yields
	Amalou	62.50	3	Big spike
	Zanbaka	36.25	4	Spike color (black) and grain
	SLB 15	33.75	5	Spikes

Table 7: men scoring of the five Top durum wheat and barley varieties grown under mountainHer trials in Morocco.

	Varieties	Score %	Rank	Mean characteristics
DURUM WHEAT	Oued Znati	52.50	1	Grain color and straw
	Jabal	38.75	2	Grain color and straw yield
	Nachit	36.25	3	Straw yield and grain size
	Zagharin	27.50	4	Big spike and grain

	Faraj	7.50	5	Grain yield
BARLEY	Rabat 071	48.75	1	Long straw, soil covering
	P.STO	36.25	2	Grain and straw yields
	Zanbaka	28.75	3	Black spike and grain
	Amalou	25.00	4	Spike and big grain
	SLB 15	23.75	5	Straw yield

Table 8: women scoring of the five Top durum wheat and barley varieties grown under MountainHer trials in Morocco.

	Rank	MountainHer durum wheat entries	Traits	SOURCE21
	1	MountainHer 2	Big spikes- Spike color- big grain	IDYT44-21
	2	MountainHer 4	Spike color- big grain	JABAL
DURUM WHEAT	3	MountainHer 5	Grain quality (even less productive)	ZAGHARINE
	4	MountainHer 7	Straw and grain quality	PDYTM21-1887
	5	MountainHer 9	Big grains	PDYTM21-1514

Table 9: women ranking the five Top durum wheat entries grown under MountainHer trials in Morocco.

The results of S2 survey were interesting and showed diversity between both gender highlighting that hired labors are essentially male for tillage, fertilization, chemical weeding and harvest in case of cereals. Women labors are hired for specific operations such as manual weeding, and early fodder cutting of barley. The following results were extracted from

The area sown by cereals is generally quite small. It is less than 2.5 ha for 60% of farmers and ranges between 4 and 8 ha in the 40% remaining farmers. Farmers do not practice certified organic farming.

A summary of technical operations for S3 is as follows from the surveyed farmers in the mountains:

- Tillage: 100% of farmers practice tillage; 60% uses deep tillage (disk plow) and 40% use cover crop.
- Seed bed preparation: All farmers prepare the bed seed using cover crops.
- Phosphorous-Potassium fertilization: 60% of farmers use deep fertilizers composed principally of Phosphorous and Potassium at the rate of 1 to 2 q/ha.
- Organic fertilization: 60% of farmers use sheep manure as organic fertilizer before sowing.
- Sowing Operation: All farmers sow manually durum wheat and barley seeds at seed rate varying between 1 to 2 q/ha.

- Weeding Operation: 70% of farmers use chemical herbicides against dicotyledonous. Exclusively Printazol (2,4-D + MCPA) at dose of 0.5 to 1 l/ha. Herbicide is back sprayed in 80% of case and only 20% use mechanical tools.
- Nitrogen fertilization: 60% of farmers practice cover N fertilization using Ammonium nitrates 33% and Urea 46% at jointing stage. The average rate is 1.2 q/ha.
- Harvesting operation: All farmers hire combine to harvest their crops.
- Yield: Reported grain yield by surveyed farmers varied from 20 to 25 q/ha for both barley and durum wheat. An average 93 and 118 bales of straw were reported for barley and durum wheat respectively.

Croatia

The S2 survey conducted in Croatia with one man and one woman scored the traits on a scale from 1 to 5 on both durum wheat and barley. The lack of survey is mostly related that in Croatia the farmers are growing berries and was not easy to find cereals farmers. Even though, the variation was high between the interviewed man and woman. The interviewed man was highly interested in grain yield and resistance to diseases and pests for both durum wheat and barley whereas the woman gave priority for ability to compete with weeds, and resistance to diseases and pests and to heat for durum wheat (Table 10). The interviewed was not interested with our list of traits and mentioned malting barley and resistance to lodging are two traits mentioned by the woman farmer. The varieties Zagharin, Sebajihan, and Jabal from the MountainHER durum wheat set were the top three based on the preferred traits already mentioned earlier.

	Man		Woman	
Mean characteristics	Durum Wheat Score	Barley Score	Durum Wheat Score	Barley Score
Grain yield	5	5	4	4
Straw yield	1	1	2	2
Tolerance to drought	4	4	3	3
Tolerance to cold	4	3	4	3
Tolerance to heat	4	4	5	3
Tolerance to salt	3	3	4	4
Ability to compete with weeds	3	4	5	4
Resistance to diseases and pests	5	5	5	4
Quantity of flour/semolina produced	2	2	2	3
Precocity	2	2	3	2
Good taste	2	2	3	3
Color of the grains	1	1	2	2

Table 10: women versus men trait preference toward durum wheat and barley varieties grown within MountainHer trials in Croatia.

Italy

The Rigoso cooperative is a bit “special” case. Farming had been abandoned long time ago, and thanks to the project for resuming it. One survey was carried out with a women farmer that does not cultivate cereals; she is doing only potatoes, leeks, tomatoes, small fruits, and has some bees for honey. The preference to trait survey gave some insights of the preferred trait among Italians (Table 11).

Twenty-five respondents were coming from the surroundings of Rigoso: 14 women and 11 men were surveyed at on-farm trials. All respondents were asked to evaluate the entries under traditional and agro-ecological management, when signing up to the field visits. 22 of the 25 participants were not farm owners, although some of them do own some land. Three farmers were owners of a farm. What is interesting is that many of the respondents declared that they were interested in beginning to cultivate, and among them exactly 8 men and 7 women. The following tables show the results of the evaluations of the experimental plots, divided according to the gender of the participants (Table 12). They were asked to express a synthetic evaluation from 1 (min) to 10 (max) for each plot. It is important to remember that participants were mostly not farmers (the phenomenon of mountain abandonment has resulted in a shrinking of the number of farmers operating in the area), and therefore the field visit participant’s evaluation was not based on either cultivation experiences or professional preferences, but only on their own personal perception and on the general information received in the beginning by the project team’s agronomists, who briefly explained which key characteristics should be observed to evaluate a cultivation. Nevertheless, the interest and involvement were high. The woman farmer scored the traits and mentioned her preference to the old variety Senatore Cappelli meeting processors’ standards in term of good taste and healthy ancient variety.

	AVERAGE (1 -5)	Score %	Rank	Mean characteristics
DURUM WHEAT/ ORZO	5	100	1	Tolerance to cold
	5	100	2	Tolerance to diseases and pests
	5	100	3	Ability to compete with weeds
	5	100	4	Good Taste
	5	100	5	Quantity of flour/semolina produced
	3	100	6	Grain yield
	3	100	7	Tolerance to heat

Table 11: trait preference toward durum wheat and Orzo varieties grown within MountainHer trials in Italy.

Code	Species	Variety	Management	Average, female voters	Average, male voters	Rank, female voters	Rank, male voters
1	Durum	Faraj	Agroecology	8.00	7.45	1	1
2	Durum	Cappelli	Agroecology	7.86	6.18	3	8
3	Durum	Zagharine	Agroecology	7.57	6.82	6	4
4	Durum	Nachit	Agroecology	7.46	7.27	7	2
5	Barley	n. 4	Agroecology	6.57	4.82	10	13
6	Barley	n. 8	Agroecology	6.29	3.91	13	16
7	Barley	Chifaa	Agroecology	6.64	6.80	9	5
8	Barley	Fandaga	Agroecology	6.86	6.27	8	7
9	Durum	Faraj	Traditional	5.79	4.36	16	15
10	Durum	Cappelli	Traditional	6.07	5.27	15	10
11	Durum	Zagharine	Traditional	6.50	4.80	12	14
12	Durum	Nachit	Traditional	6.29	5.00	13	12
13	Barley	n. 4	Traditional	7.71	6.91	5	3
14	Barley	n. 8	Traditional	7.86	6.00	3	9
15	Barley	Chifaa	Traditional	8.00	6.40	1	6
16	Barley	Fandaga	Traditional	6.57	5.27	10	10
	All barley			7.06	5.80		
	All Durum			6.94	5.90		
			All Agroecology	7.16	6.19		
			All Traditional	6.85	5.50		

Table 12: Score of Italian women and men (1 to 10) of durum wheat and barley under the traditional and agro-ecological management.

Conclusion

We found similarities for trait preference and variety selection from countries. For example, the durum wheat variety Jabal was selected by farmers from three countries: Lebanon, Morocco, and Tunisia. The durum wheat variety Nachit were common for Morocco and Tunisia, also the durum wheat Sebahian was common for both Lebanon and Tunisia giving insights on the performant varieties and genotypes used in the panel of the project. Croatia is having similarity with the selection of Zagharin and Sebahian with Lebanon and Tunisia. This similarity in trait preference is linked with grain yield, grain size and grain color and linked with wide adaptation of the varieties and genotypes. Both men and women farmers from mountains showed wide variation for variety trait preference. Both genders showed sympathy for landraces when interviewing them marking their deep attachment to ancient cultivars and being a storytelling for each specific souk market for each mountain with eventually linked with premium prices. Wide variation differed between men and women and recently climate change is drastically affecting the production resulting in crop failure within the project implementation to some partners. From here, both genders started to prioritize the agronomic traits related to climate change such as precocity, tolerance to drought and heat. women farmers are showing more interest in grain size and color linked to darker color for the processing phase having in their unconsciousness the healthy and nutritious side passing from generation to generation.

This study will give insights on trait preference and will increase the adoption, cultivation and use selected by farmers with a participatory approach within the community. Moreover, the on-farm trials

participatory evaluation was recognised by farmers to get familiar with new germplasm with new traits meeting their demands and can easily adopted and registered.

The agro-ecological management was highly appreciated by Italian voters in the mountain giving opportunity of the management to be widely adopted.

Challenges faced: Most of the countries did not score the varieties in the field and performances after harvest and household plus the agro-ecological practices because of climate event or delay in seed movement, and drought occurrence. The expected time for executing the ongoing activities is summer 2025 and data will be updated with practices and varieties on M35.



**MOUNTAIN
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