

FACT SHEET

Integrating Gender into the Use of Conservation Agriculture in Crop-Livestock Systems (CLCA) Project in Tunisia

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Our project Conservation Agriculture in Crop-Livestock Systems (CLCA) aims to develop context-specific processes to promote the large-scale adoption of conservation agriculture in integrated crop-livestock systems in the drylands. Conservation agriculture (CA) or *zira3a ilhafitha* is built on a set of interlocking soil and water conservation practices. The core principles are no or limited tillage, permanent cover, and crop rotation and diversification (legume/cereal) (Farnworth and Badstue 2017).

CA involves new ways of working with the agricultural system and its interventions have impacts on labor needs and labor allocation, investment decisions on mechanization and herbicide use, crop selection, and residue management (Farnworth et al. 2016). The willingness to adopt CA and the perception of impacts differ according to gender because the expectations and concerns are not the same for both. In addition, we are used to seeing different agricultural tasks for women

and men. For example, women are more likely to remove weeds and men are more likely to use mechanization.

CLCA was conducted in four regions that are part of northern Tunisia: Beja, Kef, Siliana, and Zaghouan (Table 1). Our current document analyzes the results of 14 focus groups and 5 interviews conducted in these regions and provides an overview of subsequent intervention in Tunisia.

Table 1. Focus groups in the four regions segregated by class and gender

Gender	Response type	Region	Low-income		Middle class	
			Number of activities	Number of participants	Number of activities	Number of participants
Women	Focus groups	Beja	1	11	1	13
		Kef	1	5	1	9
		Siliana	1	8	1	8
		Zaghouan	1	5	1	7
Men	Focus groups and interviews	Beja	1	11	3	3
		Kef	1	7	1	8
		Siliana	1	6	2	2
		Zaghouan	1	11	1	8
Total			8	64	11	58

Source: Data collected by authors.

Our study was based on two social distinctions: gender (women and men) and class (low-income and middle).

The distinction between classes was based on several factors (Table 2). In order to be able to best characterize each class for each region we contacted four leaders (one for each region).

Table 2. Class distinctions by region

Region	Class	Average land size	Livestock number and type	Feeding type	Cropping type and resource use (machinery, type of farming, crops, input)
Beja	Low-income	<20 ha	Fewer than 5 cows Fewer than 30 sheep	They buy their feed needs because they don't have land or have a small area of land	They generally grow wheat or sunflowers
	Middle class	20 ha < < 25 ha	More than 5 cows 30–100 sheep	They dedicate around 20% of their land to grow fodder In case of need they buy feed	Diversification of production Produce fodder Use fertilizers
Kef	Low-income	<5 ha	Fewer than 5 cows Fewer than 20–50 sheep	Grazing + purchase of feed if no Grazing	No machines owned Family labor They grow the same things over and over again
	Middle class	5 ha < < 20 ha if not irrigated 5 ha < < 10 ha if irrigated	More than 5 cows 50–100 sheep	Buying feed	Better situation with more area + size of livestock = are more likely to try new things
Siliana	Low-income	<1 ha Depends also on the nature and characteristics of the soil (flat, in the forest, on a slope etc.)	Fewer than 4 cows Fewer than 20 sheep Raising of poultry	Don't have land, they rent land for grazing	Small areas, sometimes gardens Can only have livestock without land Family workforce
	Middle class	1 ha < < 5 ha if not irrigated 1 ha < < 10 ha if irrigated	More than 4 cows 20–50 sheep	Graze on their own land	Diversification of production They have better resources Paid labor
Zaghouan	Low-income	<5 ha	Fewer than 5 cows Fewer than 10–15 sheep	Most have livestock but no land for grazing. So they organize together to rent land for grazing. They buy the feed when they need it, and don't have enough money to buy it to have in stock	Small area with limited resources = keep the same practices and do not want to invest in new things Use less or no fertilizers No machines owned
	Middle class	5 ha < < 10 ha	More than 5 cows 15–50 sheep	A better financial situation, can buy feed or graze	More involved in agriculture More contact with the agricultural sector and participate in training

Source: Information collected by authors from regional leaders.

As our activities have been segregated by gender, class, and region, the presentation of the results will follow the same approach.

One of the concerns we had was the impact of the new practices on farmers and their livelihoods. We asked women and men what the benefits were of adopting CA, and what were the drawbacks, both for themselves and

members of the opposite sex, resulting from minimum tillage, permanent cover, and crop rotation. The responses were as follows:

Benefits of conservation agriculture

Men and women mentioned the same benefits of conservation agriculture (Table 3).

Table 3. Benefits of conservation agriculture for women and men

	Region	Class	Benefits of CA for women			Benefits of CA for men			
			Improvement in soil quality, prevention of erosion/ increase in yield and reduction of costs	Save time and effort (no grazing, no need for labor)	I don't know/ there are no benefits	Improvement of soil quality, prevention of erosion/ increase in yield and reduction of costs	Provide the direct seeder for free	Save time and effort (no grazing, no need for labor)	I don't know/ there are no benefits
Responses from men	Beja	Low-income				1			
		Middle class			1	4			
	Kef	Low-income		1		2			
		Middle class	1		1	3			
	Siliana	Low-income	1	1		7		1	
		Middle class		1	1	6		2	
	Zaghouan	Low-income			1				1
		Middle class	1			2			
Responses from women	Beja	Low-income	2			2			
		Middle class	2			3			
	Kef	Low-income	1			2			
		Middle class							
	Siliana	Low-income	1			2	1		
		Middle class				2			
	Zaghouan	Low-income		1		1	1		
		Middle class	1			1			

Source: Data collected by authors.

Note: CA = conservation agriculture.

Responses from low-income women

The benefits for women of adopting CA practices were not seen in the same way in the different regions. In Beja, low-income women spoke about the state of the land and how no-tillage and not using fertilizers prevents erosion and how the residues are beneficial to the land. As one participant expressed: "As for the remains of weeds, they are very beneficial for the land, so when they remain and are not picked up, they decompose and become fertilizer, and when we rest the land and cultivate it year after year, its yield improves, but the one who ploughs it always contributes to the drift like a cow that is always being milked and exhausted with milking." In Kef, the concern was more material: the gain of the cost of ploughing. "Since CA does not depend on any ploughing, we will gain the cost of ploughing," said one participant of a focus group. For the women of Siliana, crop diversification has allowed them a better profit and better conservation of the land, as explained in this intervention: "And they (the people in charge of the project) planted chickpeas for us and it worked. It was a new experience because we hadn't grown chickpeas before that day, and in fact growing chickpeas is much more profitable than growing wheat, plus chickpeas are a legume family. It is nutritious and beneficial to the land, and in this way, we benefit from it and contribute to the repair, nutrition, and preservation of the surface of the land." In Zaghuan, women only mentioned the decrease in their workload and effort due to the use of an automatic seeder (see Devkota et al. 2021 for more information).

Moving on to the benefits of CA for men, in Beja, Kef, and Siliana low-income women mentioned the same advantages: the gain of the cost of ploughing and the improvement in the condition of the land, which is a kind of a long-term investment. As expressed by one woman participating in the focus group in Kef: "The most important thing that can be earned is the prize of ploughing. You know that today we plough the land and push it back two or three times, and then the last time we press the soil after planting the seeds... Imagine how much the ploughing will cost! More important than the profit of the ploughing price, the farmer preserves his soil... When the plot is sloping, which is the case of most of the land here, the high level of water in the valley due to rain will cause soil erosion and thus the fertility of the land will decrease from year to year until the day it becomes a barren land unfit for agriculture." While in Zaghuan, women only talked about cost savings: "The project provided a free seeder for my husband, in addition to free weed treatment. All of these costs were saved by my husband through his conservation farming experience."

Responses from low-income men

The benefits of CA practices for women as seen by low-income men were only mentioned in Kef and Siliana. Men in Siliana talked about saving time and effort because women have fewer tasks due to CA (no sowing, no weeding, etc.) and consequently spend less time on the farm, and they also spoke of a better gain due to the improvement in the quality of the fodder given to livestock: "One of the most important benefits of adopting CA for women is the saving of time and effort, because her life has become easier without giving up her work and daily activities... in addition women are now earning more money, especially by raising livestock, thanks to the improved quality of fodder provided to the animals." In Kef, men spoke about improving production, reducing expenses, and how mechanization saves time and effort, and all this is for the good of the whole family.

When asked about the benefits to men, men in all four regions spoke of savings in labor costs and reduced expenses, as in the following example: "CA allows men to control their expenses... because they will save the price of ploughing, and remember that renting tractors for ploughing has become expensive because of the high price of fuel. It (CA) also reduces labor costs," said one participant in the Beja focus group. In addition to cost savings, the farmers of Siliana talked about land improvement and prevention of erosion. "There are many benefits to adopting CA, the most important of which is soil improvement. Because by applying CA, the land is less vulnerable to erosion," reported a farmer from Siliana.

Responses from middle-class women

Only the middle-class women of Beja and Zaghuan enumerated the benefits of CA for women. In Beja, women mentioned the gain of ploughing costs and the gain of working days on their own farm, which allows them to work on other farms and earn more money: "In my opinion, we earn the cost of ploughing and earn a working day, and I can go and work on another farmer's property and earn 10 dinars," explained one participant. In Zaghuan, women see that CA improves soil quality and hence yields: "As for the benefits of CA for women, they are the same as the benefits of land. CA helps to improve the type of land and thus improves production, which is good for women," said a woman in the focus group maintained in Zaghuan.

The benefits of CA for men, in the opinion of middle-class women in Beja and Siliana, are the reduction in costs (cost of ploughing), the increase in yield, and the improvement of the soil due to crop rotation, not using fertilizers, and

not ploughing. One farmer said: "No-till will improve the soil and protect it from erosion. It's also a great advantage. We shouldn't only consider what we temporarily earn as a benefit. There are also long-term benefits and advantages. The soil is the farmer's capital that he has to maintain." In Zaghouan, the women reported only cost reduction: "For men, their only concern is financial profit and reducing expenses, and I think CA is useful for reducing expenses, especially ploughing expenses," reported one participant.

Responses from middle-class men

When we asked men about the benefits of CA practices for women, men in Zaghouan reported that CA improves soil conditions, thus improving family farm income and benefiting women: "In my opinion CA is beneficial to the whole family because it improves the condition of the land, increases productivity and thus provides a stable income for the family, which is beneficial for women," claimed a participant in the Zaghouan meeting. In Siliana, men said

that the improved yield generated by CA improves the nutritional value of the food given to the livestock, and as a result the woman will have to feed the animals less often, which saves time and effort.

Men in all regions reported benefiting from reduced costs due to CA, such as ploughing costs, input purchases, and labor costs: "Adopting CA reduces the cost of maintaining farm equipment and purchasing fertilizers and inputs... Today fertilizers have become very expensive... and their price is increasing day by day... because their price is linked to the world market as they are imported," said a farmer from Kef. In Beja, Siliana, and Zaghouan, they also mentioned the benefits of permanent cover, such as the preservation of soil humidity, the improvement of the condition of the soil and its fertility, and the reduction of erosion risks. As one participant at the Zaghouan focus group said: "...CA and permanent vegetation cover contribute to land cohesion and protection against erosion."

Figure 1. Seeds of forage mixtures.



Drawbacks of conservation agriculture

The concerns related to conservation agriculture were not quite the same for men and women (Table 4).

Table 4. Drawbacks of conservation agriculture for women and men

	Region	Class	Drawbacks of CA for women				Drawbacks of CA for men				
			Due to permanent coverage: inability to graze and therefore the need to buy expensive fodder	Due to no-tillage: reduction of the workforce	Due to crop rotation: more costs	More effort (grazing far away)	Due to permanent coverage: inability to graze and therefore the need to buy expensive fodder	Due to no-tillage: reduction of the workforce	Marketing problem of legumes/ failure of late cereal cultivation	The large size of the direct seeder and its non-availability	Bad communication from responsible persons/ lack of necessary tools
Responses from men	Beja	Low-income	1					1			
		Middle class	1			1		1	2	1	1
	Kef	Low-income	1								
		Middle class		1	1			1			
	Siliana	Low-income				1		1			
		Middle class						1		2	
	Zaghuan	Low-income									
		Middle class	1		1						
Responses from women	Beja	Low-income	1			1	1				
		Middle class									
	Kef	Low-income									
		Middle class	1				1	1	1		
	Siliana	Low-income						3			
		Middle class				1	1			1	
	Zaghuan	Low-income					1				
		Middle class	1	1						1	

Source: Data collected by authors.

Note: CA = conservation agriculture.

Responses from low-income women

Only women in Beja reported experiencing any disadvantages of CA: the increase in livestock expenses due to the restriction of grazing. “As for me, I don’t allow my sheep to graze in the soil after harvest to preserve the vegetation, and I have to buy fodder to compensate for this, and it costs me a lot of money, for example, one bale of hay was enough for me for a week, and now with the use of CA, it doesn’t exceed 4 days,” reported one of the women.

According to the women of Beja and Zaghuan, the men have faced problems in feeding their livestock because they are not allowed to graze on their own land, which has led them to buy more feed and thus spend more money. A participant in the Beja focus group said: “...by adopting CA, the use of fodder is increased and consequently food prices rise, which puts pressure on men.” While in Siliana, they talked about the loss of employment, as one participant explained: “Before automatic seeding, men used to cultivate and fertilize manually. Today, it is the machines that are doing the work, which has contributed to the exodus of young people from the region as agriculture does not provide work and there are no other jobs...”

Responses from low-income men

Disadvantages of CA practices for women were noted by low-income men. In Beja, men have noticed that because of these practices, women, who are responsible for raising livestock, have less fodder production, leading to an increase in the purchase of animal feed and ultimately an increase in the cost of livestock. And in Siliana they evoked the problem of grazing: the woman has to go far to graze her livestock, which means more time and more effort. “I also think that CA has no drawbacks, except perhaps the woman will have to go further for grazing in order not to graze on her land and leave it covered with vegetation,” said one participant.

Regarding the drawbacks of CA for themselves, men in Beja talked about job loss and increased unemployment: “We must not forget that we have a problem of unemployment in our country... and therefore the adoption of CA will deepen this problem, especially for men because they are the ones who work in the sowing of cereals and harvesting in general,” said a low-income farmer. Men in the other regions did not report any disadvantages.

Responses from middle-class women

For the women in Kef, the conservation of the vegetation cover generated more expenses for the feeding of the

animals: “The most important disadvantage of adopting CA is the conservation of plant cover, which will prevent farmers from grazing on their land and so they will have to buy fodder, and as you know, fodder prices are constantly rising,” said one woman participating in the focus group. As for the women in Siliana, their main preoccupation was the fact of going a long way to graze, especially considering their responsibilities and loads: agricultural activity, housework, taking care of the children, etc. Whereas in Zaghuan, women complained of the opposite: the reduction in agricultural work: “If we adopt CA, women will lose some jobs such as planting and harvesting wheat. By adopting automatic seeders in agriculture, farmers will give up on female labor, and women will lose days of work in the fields and the working day is equal to 10 dinars,” stated a middle-class woman in Zaghuan.

When women were asked about the disadvantages experienced by men, in Siliana and in Zaghuan they talked about the non-availability of automatic seeders: “In my opinion, one of the drawbacks of CA is the lack of availability of direct seeders. I think we only have one farmer who owns one...,” testified an attendee from the Siliana focus group. The increase in feeding expenses was cited in Siliana and Kef, as reflected in this participant’s response: “One of the most important drawbacks of CA is the conservation of vegetation cover, as most farmers are highly dependent on grazing on their land and cannot easily give up this habit due to high fodder prices, and even if a farmer decides not to graze, it is difficult to prevent his neighbor from grazing on his land.” While the loss of men’s jobs and the reduction of their agricultural tasks were only discussed in Kef.

Responses from middle-class men

In Beja, since livestock activities are generally linked to women, men found that the disadvantages of CA for women are that when women cannot graze their animals on the surrounding land, they have to go further, rent land (to graze them), or buy more food. In Zaghuan, they talked about the loss of women’s employment due to the preservation of plant coverage and the use of automatic seeders, which are not always available. A farmer said: “It is the women who remove the weeds for 10 dinars a day, and if we adopt CA, the women will not collect the weeds, and the number of their working days will decrease and then the family income will decrease too.”

Men from Beja, Kef, and Siliana see that because of CA there are job losses for men, tractor owners, and workers. “We are a country suffering from high unemployment and this new technology will lead to more unemployment,” said

a farmer from Kef. Similarly, an interviewee from Siliana said: “Reducing the number of ploughing hours is not a good thing for farmers who rent their tractors and work at ploughing lands of other farmers because they will lose part of their working days.” Also, in Siliana, a farmer reported the lack of availability of direct seeder: “I’m the only one with a direct seeder, so I can’t meet the needs of all the farmers here. As a result, most farmers have abandoned the adoption of CA.”

Q: For participants in the focus group discussion who have experience in conservation agriculture, what are the impacts of conservation agriculture on livestock production? And how can we overcome the negative impacts?

Conservation agriculture is closely linked to livestock production, so it was evident that a direct and specific question should be asked about the impact of the practice of conservation agriculture on livestock production and how negative impacts can be overcome. Table 5 gives an overview of the answers.

Table 5. Impacts of conservation agriculture on livestock

	Region	Class	Prevents grazing, which makes it difficult to feed cattle and increases spending on fodder	Increase in number of newborns and better quality of fodder for milk and meat production	Availability of fodder for livestock ensuring better income	Financial inability to cultivate	Grow legumes that provide fodder and fertilize the land	Grazing (mobility) is good for animal health
Responses from men	Beja	Low-income	1					
		Middle class	3					1
	Kef	Low-income	2					
		Middle class	2					
	Siliana	Low-income		3				
		Middle class			3			
Responses from women	Zaghuan	Low-income						
		Middle class				1		
	Beja	Low-income	1		1		2	
		Middle class	1		1			
	Kef	Low-income						
		Middle class	2					
	Siliana	Low-income	1					
		Middle class	1		1			
	Zaghuan	Low-income	1					
		Middle class	1					

Source: Data collected by authors.

Responses from low-income women

According to one of the participants in Beja, conservation agriculture ensures the continuity of income generation, since improvement in the state of the land allows for regular production of fodder, while the opposite is true for others. According to these participants resting the land does not generate income, and for this reason they claim that they need help and support: “The state must support us and encourage us to adopt this agriculture and provide a clear program, because we cannot provide automatic agriculture by ourselves, it costs us a lot. The authorities must encourage and support us to improve our land. We provide food for us and for everyone. Our role is very important and we cannot do it by ourselves. Our abilities are limited.” In Siliana, they observe that conservation agriculture creates both the problem and its remedy. As they see it, conservation of the vegetation cover prevents grazing, thus creating a decrease in the amount of food, while crop rotation, between legumes and fodder, is very beneficial because it ensures the continuity and richness of the fodder and hence the reduction of costs and expenses. In Zaghuan, they find it inconvenient not to be able to graze because their purchasing power is low, and they take advantage of the summer to reduce their food expenses by relying on grazing.

Responses from low-income men

For both Beja and Kef participants, preventing grazing will only increase their fodder purchases and thus their expenses. The only solution, according to them, is to be supported by the state or by organizations to obtain fodder. In contrast, participants in Siliana said that through conservation agriculture, and in particular the cultivation of fodder legumes, they have provided their cattle with a richer and more nutritious diet, which has improved the quality and quantity of milk production as well as meat production: “With the discovery of this type of fodder, our method of breeding has improved considerably because this plant is very rich and nutritious for the animals... it has had a positive and notable impact on the growth and weight gain of the animals.”

Responses from middle-class women

In Beja, middle-class women spoke of the constraint of the small areas of land they have and their dependence on its production to feed livestock, and the fact that they cannot comply with the grazing prevention. In Kef, women also expressed the same concerns, as they already have difficulties providing food for their livestock, sometimes being forced to sell them. This makes it particularly difficult

not to graze livestock because of the lack of fodder support or the lack of assistance to grow fodder by providing seeds, for example. In Siliana and Zaghuan, they see grazing as the solution, to reduce the cost of feeding livestock, and its restriction will increase expenses due to the increase in the quantities required and also due to the increase in the price: “The farmer in general produces fodder in order to reduce his purchases... and therefore when he is prevented from grazing his livestock on his land, it affects him negatively, which pushes him to increase his expenses... We have to find a solution, support the farmer with fodder, for example, so that he commits himself not to graze his animals,” said a farmer from Siliana.

Responses from middle-class men

Like the majority of the respondents cited above, middle-class farmers in Zaghuan and Kef do not appreciate the prevention of grazing, given the costs involved (increased feed costs), and ask for help and support with fodder. In Beja, they mentioned the same problems and also talked about the fact that not grazing animals can cause disease due to lack of mobility. But there are still those who believe in conservation agriculture and are calling for it to become an integrated national project, and suggesting either assistance and support for forage, or the leasing of land for pasture. Farmers in Siliana have testified that fodder yield is even more important, allowing them to do without grazing: “... However, I believe that the fodder produced and its large quantity can make the farmer no longer dependent on grazing on his land after the harvest...” To achieve this, according to these farmers, all that is needed is to follow an integrated technical package, practice a well-studied crop rotation, and select well the type of fodder to be cultivated.

Q: What recommendations would you make so that conservation agriculture can be more beneficial to this community?

For those who were dissatisfied with the conservation farming practices or encountered difficulties, we asked them to share their recommendations with us. They were asked to give us recommendations for men separately from recommendations for women (Table 6).

Table 6. Recommendations for programs related to conservation agriculture

	Region	Class	For women					For men				
			Support with the purchase of livestock	Support with free fodder	Support with training sessions	Grants and loans	Supporting the marketing of agri-cultural products	Integrate the cultivation of fodder crops	Support with the purchase of livestock	Integrate the cultivation of fodder crops	Support with herbicides for weeding	Adopt crop rotation to eliminate disease and enrich the soil
Responses from men	Beja	Low-income										
		Middle class	2		1	1	1			1		
	Kef	Low-income	1		1				1			
		Middle class		2					1	1	1	
	Siliana	Low-income										
		Middle class			2			1		1		
	Zaghouan	Low-income			1							
		Middle class							1			
Responses from women	Beja	Low-income										
		Middle class										
	Kef	Low-income	1									
		Middle class								1		
	Siliana	Low-income										
		Middle class			1	1						
	Zaghouan	Low-income	1	1	1				1			
		Middle class							1	1		1

Source: Data collected by authors.

Responses from low-income women

In order to make conservation agriculture more beneficial to women, in Beja, women have asked the government to subsidize or give them free fodder (so that they do not have to graze). "I believe the state should support us by giving free fodder to feed our animals so that we don't have to overgraze the land and remove vegetation, especially in the summer," said one of the participants. They also suggested that the state should encourage and support those who respect these practices. In Kef, the women insisted that if something is to benefit women, it must be specific to them only, otherwise men will not let them participate or benefit from it. In Siliana, they asked for a direct seeder because of the difficulties they had before, as well as durum wheat

seeds. For the women of Zaghouan, they asked for training on conservation agriculture: its particularities, how to practice it, etc. One of them said, "We don't know exactly what conservation agriculture is," and another added, "The most important program that can be done is training women farmers on conservation agriculture, we are hearing about this technique for the first time and we don't know what it is and how to apply it."

For men to benefit more from conservation agriculture, according to the women of Kef, they need to be supported by providing them with a direct seeder: "Conservation agriculture can be more beneficial for men if they are supported by a direct seeder. My husband had great difficulty in getting a seeder from Jendouba (a neighboring

governorate).” In addition, they talked about training so that the men can better understand conservation agriculture. In Beja, the women said that the men usually work far from the village and that, in any case, they have always practiced conservation agriculture because of the nature of their land. In Zaghuan, they mentioned the need to support them with fodder and to create livestock projects (given the complementarity between conservation agriculture and livestock).

Responses from low-income men

When asked how conservation agriculture can be more beneficial for women, low-income men in Kef and Zaghuan responded that women should have projects just for them, working on their areas of interest, and they also talked about organizing training sessions and awareness days for them. While in Siliana, they talked about the problem of extension agents and their absence: “Here, we lack agricultural advice. In the past, the extension agents visited every household and guided women on new agricultural methods and techniques. New staff would have to be hired to meet the needs of farmers, especially women farmers,” according to one farmer. And they also mentioned the importance of providing them with automatic seeder. For the low-income men in Beja, “The application of conservation agriculture will only be beneficial if it is applied by large farmers with large areas of land, either by men or women.”

When asked about measures to increase the benefits to men of conservation agriculture, low-income men in the four regions all spoke of the importance of training and raising awareness on the matter. “The most important thing we can recommend is to train and educate the farmer. Maybe you have a better idea than what we have and you know the type of agriculture that can succeed here... So, I suggest you start our training, especially on how this is profitable for us,” said a farmer from Beja. “As for conservation agriculture, it is a new type of agriculture and we don’t know much about it. I propose that the Ministry of Agriculture undertake an integrated project in which there are training sessions for a number of farmers,” said a farmer from Kef. In Siliana, they also spoke of the importance of the state getting really involved by encouraging the practice and providing facilities for administrative procedures such as the rental of automatic seeders. “The most important thing that can be done to make conservation agriculture more beneficial for men and women is to sensitize government agencies to the importance of it. The government does not try to make conservation agriculture projects work, and on top of that, unfortunately, it does not encourage farmers,” testified a farmer from Siliana.

Responses from middle-class women

According to middle-class women in Beja, for conservation agriculture to be more beneficial, more fodder must be grown. While in Kef, Siliana, and Zaghuan, the women said that they had no role in cereal and fodder crops. In Kef, they suggested the creation of more interesting projects for women, such as breeding. In Siliana, they asked that women should be trained to benefit from and contribute to conservation agriculture: “I also think that women are not involved in cereal cultivation here... But in my opinion, since you want women to have a role in field crops, you have to start with their monitoring and training in the field,” explained one woman.

When asked how conservation agriculture can be more beneficial to men, the women of Beja answer that more fodder crops need to be grown. Participants in the Kef focus group felt that more crop rotation is needed. “One of the most important programs that can be adopted in conservation agriculture is the adoption of a diversified and beneficial crop rotation based on the inclusion of fodder crops, so we can provide food for the animals,” said one woman. In Siliana and Zaghuan, they asked for more training to better understand the concept of conservation agriculture and asked for the involvement of farmers in the region itself: “The most important thing is that the farmer is involved at every stage of the project... Sometimes they bring us planned projects that do not correspond to the reality of the region.”

Responses from middle-class men

Middle-class men in Beja expressed the wish that conservation agriculture, for the benefit of women, be associated with small projects such as livestock breeding: “Conservation agriculture can be more beneficial for women if they are included in real and profitable development projects: For example, women can be supported by small projects such as livestock breeding or milk production.” They also talked about involving them even more in the process. In Kef and Zaghuan, participants asked for support with fodder so that farmers can meet their expenses, given the small area they own. In Siliana, they highlighted the importance of creating projects dedicated to women only, as well as holding training sessions and involving them in the process. One farmer among the participants said: “Therefore, I think the best thing to do is to dedicate programs only for women on conservation agriculture, ... in which women are trained on conservation agriculture and its importance. In my opinion, in general, if women are convinced of a technology, they will not easily give up on its adoption and implementation.”

The middle-class men interviewed in Beja hope that the agriculture office will support them by providing them with direct seeders. They also hope for a change in the mentality of the farmers so that they can organize themselves into a cooperative (being a cooperative facilitates the practice of conservation agriculture): “In my opinion, the solution is to create a cooperative that brings together many farmers so that we can supply each other with agricultural products, but the problem is the mentality of the farmers in the region. I don’t think the farmers will agree with each other.” In Kef, they believe that this practice should be trialed with large farmers, because they have the resources and a large area of

agricultural land, and then middle-class and low-income farmers can decide whether to adopt it or not. In Siliana and Zaghuan, participants want the state to support them with inputs or at least to subsidize them.

Q. What are your recommendations for an integrated conservation agriculture project with livestock? Please explain.

Because livestock farming is directly affected by this practice, we asked the interviewees to give us specific recommendations for the integration of conservation agriculture and livestock farming (Table 7).

Table 7. Recommendations for an integrated conservation agriculture project with livestock

	Region	Class	Support farmers with breeding projects	Forage cultivation and feed supply	Training farmers	Financing and obtaining loans	Provide inputs (medicines, seeds, etc.)	Work directly with the farmer or through the cooperative society and adopt a framework
Responses from men	Beja	Low-income	1		1			
		Middle class	3	3				
	Kef	Low-income	2					
		Middle class	1	2				
	Siliana	Low-income	3		1	1		1
		Middle class		3				
	Zaghuan	Low-income	2					
		Middle class	1	2				
Responses from women	Beja	Low-income		1				
		Middle class		1	4			
	Kef	Low-income		1			3	
		Middle class		3		1	1	
	Siliana	Low-income		1				
		Middle class	3	1				
	Zaghuan	Low-income	1	1				
		Middle class	1	2				

Source: Data collected by authors.

Responses from low-income women

In Beja, Siliana, and Zaghuan, low-income women asked for incentives, training, and encouragement for farmers to diversify fodder production and practice crop rotation in order to have regular and rich production, because green fodder is more nutritious than mixed fodder. “The idea of diversifying fodder is good and necessary and has great nutritional value for animals. Adopting crop rotation and crop diversification allows us to have a variety of forage throughout the year,” said a participant from Beja. While farmers in Kef have asked for fodder supplies because of the difficulties of growing legumes due to the need for labor, the lack of cereals, and their high price when available, etc.

Responses from low-income men

In Zaghuan as well as in Kef and Siliana, participants requested the design of a livestock project and the donation of animals, considering the complementarity between livestock breeding and conservation agriculture. In Siliana, they also mentioned the importance of training and sensitizing farmers to the need to change and abandon traditional practices (for example, growing only barley or wheat). So they spoke of the importance of follow-up to ensure the success of the integrated conservation agriculture project with livestock. In Beja, participants also believe in the importance of training, but ask to be involved: “In my opinion, before the project is implemented, farmers must be trained to ensure the success of the projects... we get bored and have suffered from projects that are carried out without farmers’ input... We are the ones who are present on our land... This is why farmers must be involved in the choice of projects.”

Responses from middle-class women

In Beja, middle-class women recommended training on breeding and the composition of animal feed. They also talked about the need to grow fodder. In Kef, the complementarity between livestock production and conservation agriculture led them to encourage the production of legumes and fodder (both to enrich the land and to feed livestock). In Siliana, they wanted a livestock project that would help them buy livestock and provide them with fodder seeds. In Zaghuan, they believe in group work; they asked for support for SMSAs (Mutual Agricultural Service Companies, which were created following the law of 18 October 2005 governing the restructuring of professional agricultural organizations) and sensitization of farmers to their role in providing animal feed; and they also highlighted the importance of integrating legumes and fodder plants into the crop

rotation. As one of the participants said: “My view is to increase support for cooperative societies and educate farmers on their value and importance in providing fodder, supporting farmers, and facilitating the adoption of conservation agriculture.”

Responses from middle-class men

Middle-class men in Beja find that to integrate conservation agriculture with livestock, it is necessary to grow fodder, and rotate crops to ensure a balanced feed composition for their livestock. In Kef, they want to strengthen the purchasing power of farmers by helping them to buy livestock and grow fodder. In Siliana, the farmers talked about soybean, its nutritional value, and its power to solve the problem of lack of pasture: “So I am proposing a program that introduces soybean cultivation in Tunisia. It would be very profitable, because it is the best feed for livestock, it is very rich in protein... and the livestock like it very much... and so growing soybeans will be very profitable.” In Zaghuan, they recommended fodder cultivation and diversification of activities to ensure both the improvement of the land situation and the feeding of livestock.

Ongoing Activities

In North African countries during this second year, the CLCA team made extensive efforts to advance the project commitment of reaching 40 percent women and 20 percent youth as part of the target group.

In Tunisia, several activities were implemented during this second year to maintain the integration of women and young farmers into the CLCA project based on their needs while also achieving the objectives of the project for wider adoption of CLCA approaches. These activities were divided into five key components:

Partnership with women farmers’ associations

The project targeted an important site in Oued Sbahiya region, which is located in northeastern Zaghuan, where livestock production (sheep and goats) is essential for the livelihood of the farming communities. Over 70 households inhabit the area, with an average of five persons per family. This extensive farming is dominated by ruminant livestock (especially small ruminants), which are mainly reared by women farmers. To increase forage and livestock production, diversify rotation systems, and enhance soil fertility, 14 women farmers (influencers, most of whom are active farmers) were selected from this site and involved in on-farm trials of CLCA systems, specifically the adoption

of forage mixtures (vetch/oats). All of them are members of a women farmers' association called "Women's Group for Agricultural Development/Oued Sbahiya (Groupement Féminin de Développement Agricole—GFDA)," which is now a new partner of the CLCA project with about 79 permanent members.

A training session on forage mixtures was organized for 8 men and 17 members of the women's group (GFDA) in Oued Sbahiya (<https://hdl.handle.net/20.500.11766.1/c0318c>). The objective of the training was to raise awareness, promote, and educate women farmers on the benefits of planting this cereal/legume mixture. After the training, 14 women farmers asked for seeds and we provided them with planting material to cultivate forage mixtures of vetch/oat seeds from the GFDA for sowing areas varying between 0.5 ha and 1 ha. As the women of the GFDA have asked us to expand our work in the region, we will double the number of women beneficiaries next year in Oued Sbahiya.

As part of the capacity building activities and based on global assessment of the major animal diseases/health issues hampering integration of crops and livestock in the different farming communities/project targets areas (<https://hdl.handle.net/20.500.11766/10824>) and to pave the way for extending the project activities in accordance with the scaling road map in Tunisia, an animal health training was carried out on February 24, 2020, at a community based organization in Oued Sbahiya for their members (<https://hdl.handle.net/20.500.11766.1/117cc9>). Twenty-six men and thirty women attended this training. The purpose was to initiate a "community conversation of Oued Sbahiya" on animal health, where we identified animal health issues as a major constraint for profitable crop-livestock integration. The training was developed to provide women farmers and young farmers with evaluation methods, knowledge, and specific technical skills to avoid the major animal diseases for better crop-livestock integration under CLCA systems. Animal health is here presented as a novel entry point for profitable crop-livestock integration systems.

To conclude, two kinds of women-related groups have become significant partners of our out-scaling plans: (1) women-only groups, and (2) gender-inclusive farmer groups. During this second year, two women's groups have been involved with the CLCA project in Oued Sbahiya (one formal and one informal). Furthermore, two gender-inclusive farmer groups are involved in El Fahs (SMSA Melyen), Chouarnia (SMSA Ettouen), and next year the project will target three more GFDA's at sites in Kef. In year three, the project will ensure the strengthening of

leadership by these women's associations by involving them actively in dissemination and through field days.

Capacity building activities

Thirteen CapDev events were implemented, where a total of 430 participants consisting of local farmers, extension staff, local authority, experts, researchers, policy-makers, and students were provided with skills and information concerning: (1) CA practices including crop residue management, (2) direct seeder use, (3) best agricultural practices under CLCA systems, (4) best agroecological practices under the CLCA package, (5) forage crops and mixtures, (6) animal health for profitable integrated crop-livestock systems, and (7) the procedures and steps involved in organizing a smallholder farmers' association (SMSA). From this total, at least 30 percent (122) of the participants were women, achieving one of the targets of this project: to promote gender inclusiveness.

The knowledge management coordinator made extensive efforts to recruit women through persistent requests for the Tunisian National Institute of Field Crops (INGC), the Office of Livestock and Pastures (OEP), and farmer groups to recruit and invite women participants to the training events. Another issue was tailoring the training to specific women's needs. This included addressing requests on the part of women for the planting of forage seeds, which required training. Animal health was another training event that was based on issues raised during the aforementioned community conversation on animal health and findings from focus group discussions.

In 2021 in Tunisia, digital trainings in the form of radio programs and sms messages on four topics (animal health, benefits of joining farmers' groups, conservation agriculture and feed and forages) were delivered to over 800 farmers (half of which were women). Pre-existing studies revealed a large gender gap in phone ownership to the detriment of women; as such the project distributed 150 phones to women farmers and provided training on their use along with the a training on using phone-embedded radios for listening in to the radio-aired messages. These activities are especially important in light of recurring lockdowns in Tunisia and limited phone ownership for women (Najjar and Baruah 2020).

Individual degrees for students (defended and ongoing)

Fourteen female students out of fifteen in total studying for individual degrees [MSc (5), PhD (2), ESP (8)] were involved in the different CLCA topics. The students were recruited

Figure 2. Training under CLCA project on feed and forage activities with rural women in Tunisia.



Photo: Zied Ldoudi

Figure 3. Phone distribution event for women farmers in Kef region.



Photo: Zied Ldoudi

Figure 4. Women-led on-farm trials in semi-arid Tunisia using hand-held seeder for forage seeds.



Photo: Zied Ldoudi

through existing partnerships between ICARDA, the Tunisian National Agricultural Research Institute (INRAT), and ITGC and local universities.

On-farm trials

In Tunisia, CLCA was directly implemented by 92 farmers (70 men, 22 women) over 1,450 ha between October and December 2019 at the different project sites. The 22 pioneer women farmers have been involved in on-farm trials and demonstration plots under CLCA systems in the different target areas.

INGC and OEP partners have a regional focal point at each CLCA site, and the project has requested that they recruit influential women and men farmers. An additional 14 women farmers from the GFDA Oued Sbaihya were recruited through another ICARDA project. This project was focused on feeding of livestock (the mainstay of livelihoods in the region) and this region, like many others, had a shortage of feed that the project has contributed to addressing.

Enhancing seed quality and forage production through entrepreneurship and farmers' associations

The CLCA team in Tunisia is engaged in generating business models for livestock-based small machinery. This is particularly in the area of forage seed treatment and cleaning machines as well as the feed grinders.

Over 1,000 households (members of farmers' associations—SMSA) will benefit directly from the four mobile seed cleaning and treatment units, which are operated by male youth. Almost 1,080 beneficiaries (members of farmers' associations) including young farmers and women are now benefiting from the six mobile grinders, which have been placed with young entrepreneurs and farmers' associations engaged directly with the CLCA project.

Small machinery can be an ideal solution for smallholder farmers to improve their incomes, and this represents an opportunity for improved livelihoods in traditional small-scale farming. It can lead to reducing costs and thus increasing income. The use of these tools can reduce

the labor time spent on seed cleaning and treatment and feed-farming operations, hence freeing up more time for small-scale farmers, especially women farmers because these tasks are usually done manually by them.

In 2021 the CLCA team plans to monitor and coach the six farmers' associations on the use of CLCA-streamlined machinery to assess and evaluate how these small machines are managed in an economically sustainable way. More than 1,500 farmers, including more than 40 percent young farmers and women, will be involved. Sex as well as age-disaggregated data will be provided and protocols on how to ease women's labor will be developed.

Agricultural engineers from the national system in Algeria as well as the Rural Women's Unit were trained on conducting women's focus groups during the first year of the project. This second year, a focus group was held with

16 women farmers in Setif to understand gender roles and needs in integrated livestock-crop production, as well as understanding the impacts and costs of adopting CA and the means to mitigate them. These women farmers will be directly integrated into CLCA component activities during the third year of the project.

As in Tunisia, several events were offered to about 695 participants (farmers, extension agents, local authority, researcher, decision-makers) in Algeria covering the different CLCA topics. Out of this total, 175 participants were women.

Student involvement and exposure is important to generate awareness and leadership for the next generation of agricultural workers. In Algeria, a total of 15 female students out of 22 studying for individual degrees were involved during this second year.

Figure 5. SMSA Female Group discussing forage seed production.



Photo: Zied Ldoudi

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