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Farmers' Agreement to Apply and Willingness to Pay for Climate-Smart Agricultural Technologies at the Farm Level

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ABSTRACT

Climate-Smart Agriculture (CSA) technologies are introduced to increase agricultural productivity and improve farmers' adaptation to climate change. Several factors influence the extent to which farmers in a particular location adopt CSA technologies. Due to the importance of financial issues, this study aimed to analyze farmers' agreement to apply and pay for these technologies in Iran. Accordingly, the study population was farmers at Aq Qala County in the north of Iran (N= 5,447). The sample size was estimated using the Bartlett Table (n= 119), and participants were selected through a simple random sampling method. The list of appropriate CSA technologies was prepared using a relevant article and adjusted to the local condition by the agricultural experts' comments in the research area. Results indicated that farmers' agreement is mainly higher than their willingness to pay for CSA technology. Specifically, they prefer to pay for technologies with low cost and short-term benefits (e.g., minimum tillage, cover crops method, concentrate feeding for livestock, and crop insurance). Results of this study have practical implications for agricultural agencies in climate change adaptation planning at local level in that farmers should be trained to use low cost practices when they apply CSA practices. Moreover, allocating subsidies to some CSA technologies could be another suggestion to improve climate change management in Iran.

Keywords: Climate change, Farmer resilience, Farmers subsidy, Flood management.

INTRODUCTION

Climate change poses a severe threat to the agricultural sector in various societies, profoundly affecting food security and farmers' livelihood. In recent years, many farmers all over the world are affected by climate change (Daneshvar *et al*., 2019). This phenomenon has a wide range of different manifestations, including floods, droughts, strong winds, and global warming. Due to these manifestations' direct effects on the agricultural sector and its various consequences, such as changes in biodiversity, changes in crop timing, reduced consumption efficiency, and the spread of pests and diseases, several studies have focused on this issue (Brida *et al*., 2013; Falco *et al*., 2019; Huong *et al*., 2019; Loboguerrero *et al*., 2019). Despite all these effects, agricultural systems have to adapt to these changes to ensure food security and farmers' livelihoods (Assefa and Ademe, 2015). Climate-Smart Agriculture (CSA) is an adaptive approach to adjust the agricultural sector to climate change. CSA contains several technologies, practices, and services that could be helpful at the farm level for the farmers affected by climate change. Hence, preparing information about the nature of CSA technologies and farmers' preferences could assist the governments and stakeholders in designing climate change management programs. Accordingly, in this study, we seek to identify CSA technologies according to the literature and

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local experts' opinions and survey farmers' preferences about the available technologies in the north of Iran. Due to the severe effects of climate change in the north of Iran, it seems that CSA practices could be useful for farmers in this area. Historical and predictive studies show that climate change in the north of Iran, especially in the form of flood spreading, causes extensive damage to the agricultural sector (Vaghefi *et al*., 2019). One of the most affected counties in this area is Aq Qala in the Golestan Province. Based on the available reports, more than five thousand hectares of agricultural land were seriously damaged in this county in the latest flood. According to the Deputy on Coordination of Economic Affairs and Resource Development of the Golestan Governorate, the estimated financial damage to these lands is more than 138 Million Dollars (Golestan Province Governor's Office, 2019).

As shown in Figure 1, CSA targets the following three objectives to pursue agricultural adaptation to climate change: (i) Increasing productivity; (ii) Promoting resilience to climate stress; and (iii) Reducing greenhouse gas emissions from agriculture (Davies *et al*., 2019; Makate *et al*., 2019; Taylor, 2018).

CSA combines traditional and modern practices, techniques, and services that fit a particular region to manage the interaction between agriculture and climate (CIAT, 2014). Therefore, any intervention that leads to climate management at farm level and achieving any CSA objectives could be considered a CSA practice (Altieri and Nicholls, 2017; Mittal, 2012). For instance, Rappin *et al*. (2019) considered the agroforestry system as a CSA practice, since this system provides firewood for household consumption, timber for income generation, and carbon sequestration (about 4.07 Mg C ha^{-1}). Similarly, Khatri-Chhetri *et al*. (2017), Blaser *et al*. (2018), and Garrity *et al*. (2010) also referred to agroforestry as CSA practice. Implementing conservation agriculture is also a CSA practice. Thierfelder *et al*. (2017) argue about how climate-smart is conservation agriculture. However, they concluded that conservation agriculture, in some instances, might increase the costs for herbicides or labor due

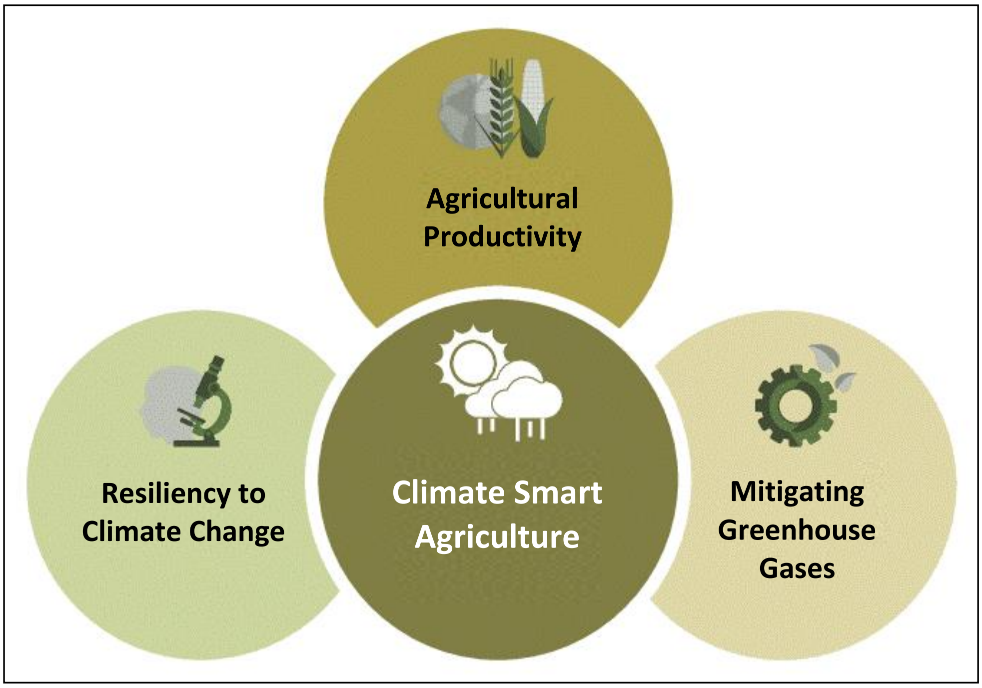

Figure 1. The goals of climate smart agriculture (Davies *et al*., 2019).

to increased weed pressure. Nevertheless, it still can increase productivity and profitability over time due to significantly higher infiltration, moisture retention, and early planting. Diversifying cropping practices that could improve crop productivity, income from crops, and food security is another CSA practice mentioned in several studies (Makate *et al*., 2016; Verkaart *et al*., 2019; Kimaro *et al*., 2016). Crop diversity could also increase resilience and biodiversity on the farm, improve soil fertility, and control pests and diseases. Accordingly, it could be considered as a significant CSA practice.

CSA practices are not necessarily modern, complicated, or expensive. Previous studies showed that, sometimes, simple actions could help farmers adapt to climate change and be in line with CSA. For instance, changes in crop sowing dates (Zimmermann *et al.,* 2017), reduction in the tillage (Abegunde *et al*., 2020; Amadu *et al.,* 2020), and management of the farm wastes (Gebremariam and Tesfaye, 2018; Wekesah *et al*., 2019) are simple measures that can result in higher yields in the condition of climate change.

Theoretical Background

As mentioned in the previous section, several CSA practices are defined in the previous studies to cover CSA objectives. This study considered the practices defined by Khatri-Chhetri *et al.* (2017). They considered the options and technologies that cover at least one of the CSA pillars (increasing productivity, promoting resilience to climate stress, and reducing greenhouse gas emissions). Accordingly, Khatri-Chhetri *et al.* (2017) divided CSA practices into six categories: (i) Water-smart technologies, (ii) Energy-smart technologies, (iii) Nutrient-smart technologies, (iv) Carbon-smart technologies, (v) Weather-smart technologies, and (vi) Knowledge-smart technologies (Figure 2).

The way climate change affects agricultural

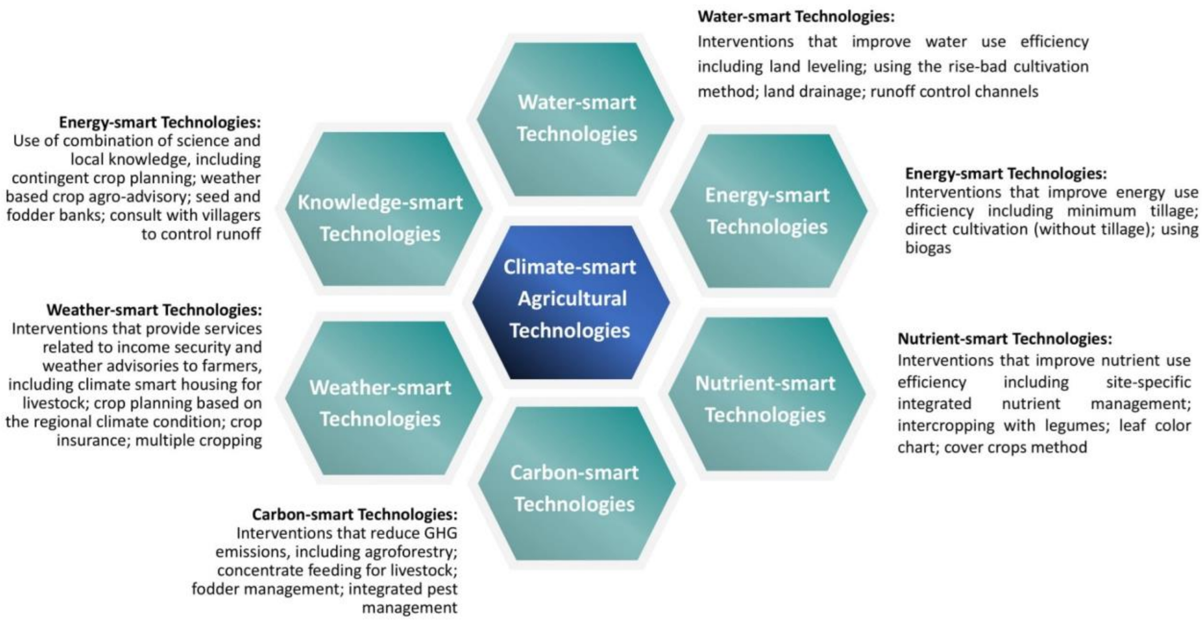

Figure 2. Climate smart agricultural technologies (Khatri-Chhetri *et al.,* 2017).

sector may have several consequences such as farmers' vulnerability, reduced agricultural productivity, and adverse effects on food security. Accordingly, governments and several agencies continually seek to manage climate change impacts on the agricultural sectors (Khatri-Chhetri *et al*., 2017). Nevertheless, it should be considered that getting positive results in this field strongly depends on the farmers. CSA is an explicit example of climate change management that directly depends on the farmers' agreement.

Since one of the crucial determinants of the farmers' agreement to apply any technology or approach is financial issues, we investigated farmers' agreement to apply and be willing to pay for CSA technologies in Aq Qala County in the north of Iran. In other words, this study seeks to investigate farmers' priorities for using CSA technologies to shed light on farmers' viewpoints about CSA technologies, especially regarding financial issues that could help the Iranian government make profitable decisions. Various prioritization approaches could be used to study farmers' preferences, includes expert judgment, simulation models, participatory appraisal and hybrid methods, household and key informant surveys (Khatri-Chhetri *et al*., 2017; Claessens *et al*., 2012). Based on the study objective, we used household and key informant surveys. Accordingly, we formulated three research questions as follows:

To what extent do farmers agree to use CSA technologies?

How much are farmers willing to pay for CSA technologies?

Is there any significant difference between farmers' agreement to apply CSA technologies and their willingness to pay for CSA technologies?

MATERIALS AND METHODS

A historical review of the meteorological data in Iran confirms climate change in recent decades and the continuation of this trend (Shahbazi *et al.*, 2010; Keshavarz, 2019; Zobeidi *et al.*, 2020). Iran's climate diversity has led to climate change in various anomalies such as land subsidence, lake drying, floods, droughts, etc. While some provinces of the country are experiencing drought, several regions face floods, both of which indicate diversity and climate change in Iran (Vaghefi

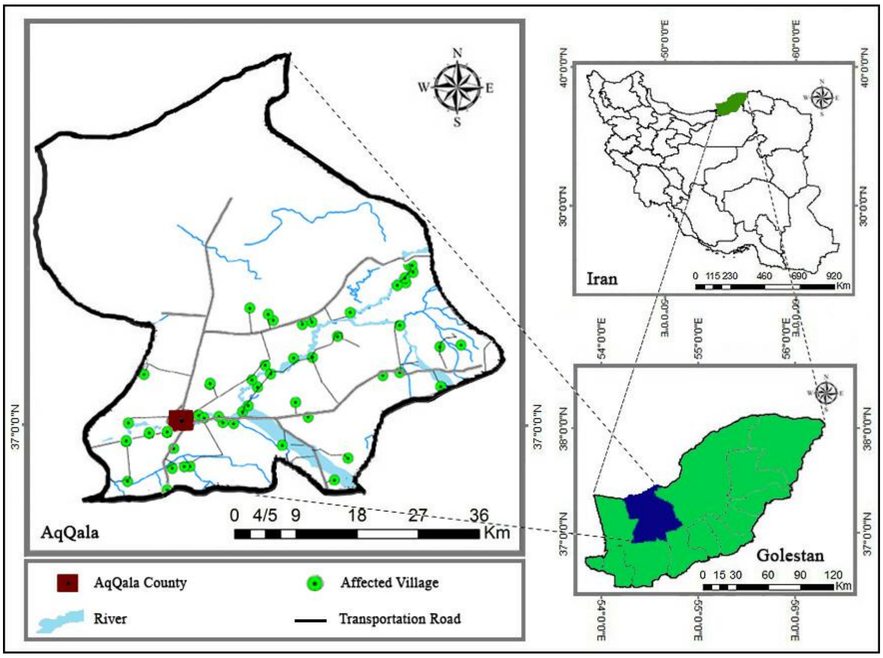

Figure 3. Map of study area showing Aq Qala County and villages affected by flood.

Table 1. Selected climate-smart options to assess farmers' preferences.

Technology	Adaptation/mitigation potential
Water-smart	**Interventions that improve water use efficiency**
• Land leveling	• Leveling the field ensures uniform distribution of water in the field and reduces water loss (also improves nutrient use efficiency)
• Using the raised-bed cultivation method	• Makes furrow in the farm to control the runoff
• Land drainage	• Removal of excess water (flood) through water control structure
• Runoff control channels	• Digging channels around the farm to prevent flooding
Energy-smart	**Interventions that improve energy use efficiency**
• Minimum tillage	• Reduces amount of energy use in land preparation. In long-run, it also improves water infiltration and organic matter retention into the soil
• Direct cultivation (Without tillage)	• Using machines to plant seeds in the proper depth, without tillage. This method of seed cultivation eliminates the need for plowing and reduces the amount of energy use in land preparation.
• Using biogas	• Converting livestock waste to biofuels to reduce greenhouse gases
Nutrient-smart	**Interventions that improve nutrient use efficiency**
• Site-specific integrated nutrient management	• Optimum supply of soil nutrients over time and space matching the requirements of crops with the right product, rate, time and place.
• Intercropping with legumes	• Cultivation of legumes with other main crops in alternate rows or mixed. This practice improves nitrogen supply and soil quality.
• Leaf color chart	• Quantify the required amount of nitrogen use based on greenness of crops. Mostly used for split dose application in rice but also applicable for maize and wheat crops to detect nitrogen deficiency
• Cover crops method	• Reduces evaporation of soil water (also adds nutrients and organic matter into the soil)
Carbon-smart	**Interventions that reduce GHG emissions**
• Agroforestry	• Promotes carbon sequestration and sustainable land use
• Concentrate feeding for livestock	• Reduces nutrient losses and livestock requires lower amount of feed. Enteric fermentation processes within the cow are a major source of GHGs that could be managed by an appropriate feeding strategy.
• Fodder management	• Promote carbon sequestration and sustainable land use
• Integrated pest management	• Reduces use of chemicals
Weather-smart	**Interventions that provide services related to income security and weather advisories to farmers**
• Climate smart housing for livestock	• Protection of livestock from extreme climatic events (e.g. cold stresses/ flood)
• Crop planning based on the regional climate condition	• Considering climate condition in selection of crops to increase the resilience toward climate change
• Crop insurance	• Crop-specific insurance to compensate income loss due to vagaries of weather
• Multiple cropping	• Growing two or more crops in the same piece of land during one growing season to compensate income loss due to vagaries of weather
Knowledge-smart	**Use of combination of science and local knowledge**
• Contingent crop planning	• Climatic risk management plan to cope with major weather related contingencies like drought, flood, heat/cold stresses during
• Weather based crop agro-advisory	• Climate information based value added agro-advisories to the farmers
• Seed and fodder banks	• Conservation of seeds of crops and fodders to manage climatic risks
• Consult with villagers to control runoff	• Using local knowledge and experience to control the runoff

Note: These options directly or indirectly contribute to CSA pillars (improve productivity, enhance resilience, and reduce GHGs emission). Any option that could improve at least one pillar could be considered as CSA option.

Table 2. Converted rated scale to five point ranking scale.

Rating scale	Level of willingness to pay	Ranking scale
0-20	Very low	1
20-40	Low	2
40-60	Medium	3
60-80	High	4
80-100	Very high	5

et al., 2019). Based on the available statistics, from 1954 to 2018, 24 severe floods occurred in Iran, of which three occurred in Golestan Province (on 12 May 1972, 11 August 2001, 10 August 2017). All these floods caused significant damage, especially in the agricultural sectors (Saatsaz 2019). Moreover, on 17 March 2019, Golestan Province faced severe flood, which caused severe damage, especially in the agriculture sector. Aq Qala is a county located in this province and is also affected seriously. Accordingly, we considered Aq Qala as a region vulnerable to climate change. This county contains 80 villages, of which42 were significantly damaged in the last flood on 17 March 2019, (Figure 3). Accordingly, our research population consisted of all farmers affected by the flood in Aq Qala County (N= 5,447). We determined sample size (n= 119) using the Bartlett sampling table (Bartlett *et al*., 2001). Samples were selected through a random sampling method using the list of farmers affected by flood in the study area. (We accessed the list of farmers living in the study area through Agricultural Jihad Consulting Services Centers, AqQala, Golestan, Iran.)

Our survey instrument included a list of CSA technologies grouped into six categories based on the study of Khatri-Chhetri *et al.* (2017). We adjusted these technologies to local conditions using key informants' opinion in agricultural agencies; eventually, 23 CSA technologies were selected for analysis (Table 1).

We collected farmers' opinion through two steps in the instrument. First, we asked farmers to express their opinion about each CSA technology using a five-point Likert scale (Strongly disagree= 1, Disagree= 2, Neutral=3, Agree= 4, and Strongly agree= 5). This part led us to the first research question response. Then, we asked farmers to suppose a payment schedule and determine how much money they are ready to pay for each technology. Therefore, they rated all 23 CSA technology using pseudo money (0 to 100). Thus, we could evaluate their response to the second research question.

To respond to the third research question, we needed data to compare farmers' agreement to apply and willingness to pay for CSA technologies. Accordingly, we converted the responses to the second part of the survey to a five-point scale as shown in the Table 2.

RESULTS AND DISCUSSION

Participants' Profile

Participants were aged from 18 to 74, with the mean age of approximately 47 years (Std= 14.29). Male farmers constituted 90.8% of the sample. In terms of education, results indicated that 10.9% of participants were illiterate, most of them (70.6%) had a high school education, and the rest (18.5%) had university education. Smallholder farming was the main type of agricultural production system, and most farmers had small-scale farms; the average farm size was 5.53 ha (Std= 6.54).

Farmers' Agreement to Apply CSA Technologies

To respond to the first research question, we analyzed farmers' answers using descriptive statistics. Our findings indicated that, in general, the mean of farmers' agreement to apply CSA technologies scored 3.72 out of five. Among all 23 CSA technologies, the "nutrient-smart technologies" had the highest score and, therefore, the first rank among the CSA categories (Table 3), suggesting that farmers were more agreeable to apply these technologies.

Table 3. Farmers' agreement to apply climate-smart options.

Technology		Mean	Std.	CV	Rank
Water-smart	Land leveling	4.50	1.02	0.22	1
	Land drainage	4.30	1.13	0.26	2
	Runoff control channels	3.93	1.30	0.33	3
	Using the rise-bad cultivation method	3.58	1.25	0.34	4
	Total	**4.07**	**1.17**	**0.28**	**2**
Energy-smart	Minimum tillage	4.49	0.96	0.21	1
	Using biogas	3.00	0.89	0.29	2
	Direct cultivation (Without tillage)	2.92	1.40	0.48	3
	Total	**3.47**	**1.08**	**0.31**	**3**
Nutrient-smart	Over crops method	4.76	0.57	0.12	1
	Site specific integrated nutrient management	4.24	1.13	0.26	2
	Leaf color chart	4.08	1.09	0.26	3
	Intercropping with legumes	3.76	1.34	0.35	4
	Total	**4.21**	**1.03**	**0.24**	**1**
Carbon-smart	Integrated pest management	3.19	0.62	0.19	1
	Fodder management	3.45	1.03	0.30	2
	Concentrate feeding for livestock	3.35	1.41	0.42	3
	Agroforestry	3.22	1.42	0.44	4
	Total	**3.30**	**1.12**	**0.34**	**5**
Weather-smart	Crop insurance	4.35	1.04	0.24	1
	Crop planning based on the regional climate condition	3.45	1.13	0.32	2
	Climate smart housing for livestock	3.63	1.37	0.37	3
	Multiple cropping	3.52	1.36	0.38	4
	Total	**3.73**	**1.22**	**0.32**	**4**
Knowledge-smart	Consult with villagers to control runoff	4.16	1.12	0.26	1
	Contingent crop planning	3.39	1.54	0.45	2
	Weather based crop agro-advisory	3.31	1.57	0.47	3
	Seed and fodder banks	3.32	1.61	0.48	4
	Total	**3.54**	**1.46**	**0.41**	**6**

Farmers' Willingness to Pay for CSA Technologies

Based on our findings, the mean of farmers' willingness to pay for CSA technologies was 42.35 out of 100. Similar to the previous part, the category of "nutrient-smart technologies" had the highest score (54.47 out of 100) and the first rank among all 5 categories of CSA technologies. Detailed information on farmers' willingness to pay for CSA technologies is provided in Table 4.

Comparison of Farmers' Agreement to Apply with Farmers' Willingness to Pay for CSA Technologies

To compare farmers' agreement to apply with farmers' willingness to pay for CSA technologies, the paired sample t-test was used. Firstly, the assumptions of this test were examined. The results of the normality test of farmers' agreement to apply CSA technologies (0.71> 0.05) and their willingness to pay for CSA technologies (0.52> 0.05) confirmed that the data was normal. Then, the result of the paired sample t-test indicated that farmers' agreement to apply and willingness to pay for CSA technologies was significantly different (Table 5). According to Table 5, the mean score of farmers' agreement to apply CSA technologies is higher than their willingness to pay for these technologies.

Due to the significant difference between farmers' agreement to apply and their willingness to pay for CSA technologies, we provided more details in Figure 4, which shows that the mean scores of farmers' agreement to apply CSA technologies in all categories are higher than the mean scores of

Table 4. Farmers' preference to pay for climate smart options.

Technology		Mean	Std.	CV	Rank
Water-smart	Land drainage	49.86	43.54	0.87	1
	Land leveling	47.40	42.70	0.90	2
	Runoff control channels	39.00	41.12	1.05	3
	Using the rise-bad cultivation method	17.70	30.73	1.73	4
	Total	**38.49**	**39.52**	**1.02**	**5**
Energy-smart	Minimum tillage	79.76	31.12	0.39	1
	Direct cultivation (without tillage)	21.56	35.25	1.63	2
	Using biogas	7.87	20.20	2.56	3
	Total	**36.39**	**31.74**	**0.87**	**3**
Nutrient-smart	Cover crops method	81.52	32.43	0.39	1
	Site specific integrated nutrient management	51.12	39.76	0.77	2
	Leaf color chart	49.23	41.17	0.83	3
	Intercropping with legumes	44.04	44.18	1.00	4
	Total	**56.47**	**39.39**	**0.69**	**1**
Carbon-smart	Concentrate feeding for livestock	29.44	39.25	1.33	1
	Agroforestry	27.82	38.56	1.38	2
	Fodder management	29.16	42.09	1.44	3
	Integrated pest management	5.82	20.47	3.51	4
	Total	**23.06**	**35.09**	**1.52**	**6**
Weather-smart	Crop insurance	70.60	40.47	0.57	1
	Climate smart housing for livestock	46.68	41.23	0.88	2
	Multiple cropping	40.01	41.96	1.04	3
	Crop planning based on the regional climate condition	30.34	41.30	1.36	4
	Total	**46.90**	**41.24**	**0.87**	**4**
Knowledge-smart	Consult with villagers to control runoff	69.45	37.35	0.53	1
	Contingent crop planning	48.37	42.19	0.87	2
	Weather based crop agro-advisory	45.13	41.82	0.92	3
	Seed and fodder banks	47.15	44.41	0.94	4
	Total	**52.52**	**41.45**	**0.78**	**2**

Table 5. Comparing farmers' agreement to apply and willingness to pay for CSA technologies using paired sample t-test.

Parameter	Mean	Std deviation	Std error mean	t Value	Sig 2-tailed (P value)
Agreement to apply Willingness to pay	3.72 2.62	0.491	0.450	24.41	0.001

farmers' willingness to pay for CSA technologies.

CONCLUSIONS

This study focused on the farmers as the end-users of CSA technologies and tried to provide an insight into their agreement to apply and willingness to pay for available technologies. The results indicated a significant difference between farmers' agreement to use and willingness to pay for CSA technologies. The higher agreement could result from constant exposure to climate change and the coercion to mitigate its effects. In Aq Qala, farmers experience destructive floods almost every year. Therefore, it is quite normal to be agreed to apply useful technologies. However, the critical point is the lower willingness to pay for these technologies, which could limit their use. Farmers' livelihood in the study area is strongly dependent on agriculture, and their income is significantly affected by climate change (Motieelangeroudi *et al*., 2011). Accordingly, they seek to maintain

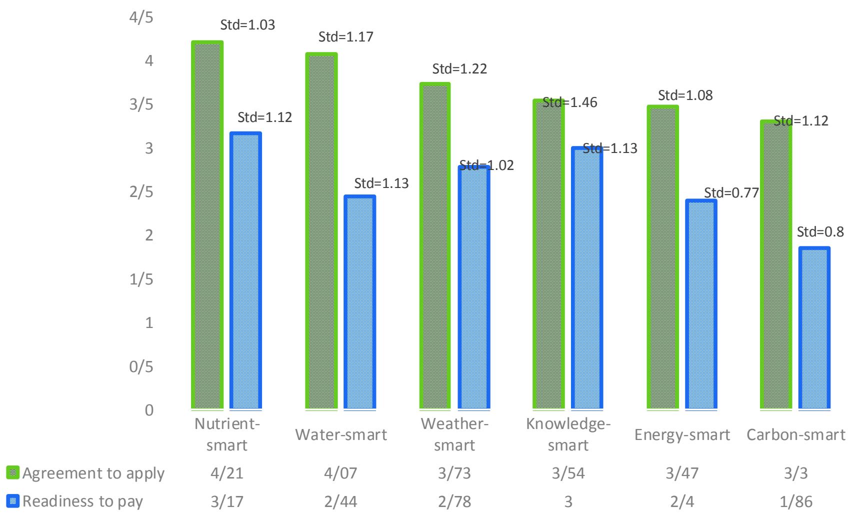

Figure 4. Comparing the mean of farmers' agreement to apply and willingness to pay for CSA technologies.

their financial resources. Moreover, farmers' limited information about CSA technologies' foreseen benefits also leads to lower willingness to pay for these technologies. Consequently, policies and programs to promote CSA practices should consider information and financial assistance for the farmers. Due to the complicated nature of CSA practices, a wide range of simple practices with observable benefits and complicated practices with indirect and unobservable benefits can be considered as CSA practices. Moreover, the cost of CSA practices is varied; many low-cost and high-cost practices could contribute to CSA realization. All these factors can affect farmers' agreement to apply or willingness to pay for CSA practices. For instance, plant nutrient-smart technologies with direct and observable benefits obtained the highest score in the agreement to apply and willingness to pay. Due to the direct impact of plant nutrients on the quantity of agricultural products, farmers' willingness to use nutrients is highlighted in several studies (e.g., Kiełbasa *et al*., 2018; Cardona, 2018). Nevertheless, raising the price and limited access to nutrition may attract farmers to nutrient-smart technologies that emphasize nutrient use efficiency. These results imply that, in some cases, farmers' situation is favorable to adopt CSA technologies, but they need to be informed. Thus, adaptation programs should focus on identifying simple CSA technologies that have observable benefits according to the farmers' situation, and providing information about these kinds of CSA technologies for the farmers.

In contrast, carbon-smart technologies scored the lowest among the six categories of CSA technologies. These technologies are primarily time-consuming and have indirect and unobservable benefits. For example, using concentrate is a feeding strategy that could reduce CH_4 produced in the livestock intestines, thus reducing greenhouse gas emissions (Lovett *et al*., 2005; Ahmed *et al*., 2021). The benefits of such practices may be unclear for farmers and would decrease the willingness to pay or even agreement to apply these kinds of CSA practices. However, these technologies are essential in climate change management. Therefore, thoughtful and deliberate policies are required to deal with the challenges related to these kinds of CSA technologies. Governments' policies should emphasize on the explanatory training as well as clarifying the benefits of these technologies.

In high-cost CSA technologies (e.g. land drainage and land leveling), farmers indicated a low level of willingness to pay and agreement to apply. However, these kinds of high-cost technologies have direct and observable benefits. Due to farmers' livelihood condition, they cannot be expected to implement high-cost CSA technologies without government support. Accordingly, allocating financial support in this group of CSA technologies could be a potential for the governments to both manage climate change and satisfy farmers with government accountability.

Generally, our results imply that farmers prefer CSA technologies that are low cost and have short-term and observable benefits (e.g., minimum tillage, cover crops, and crop insurance). Nevertheless, all CSA practices, whether with a direct or indirect impact, short-term or long-term benefits, are crucial for the climate change management in various areas. Therefore, governments have to focus on prudent policy responses to cover farmers' needs and concerns to adopt CSA technologies. This study provided information for key stakeholders to make conscious decisions according to farmers' circumstances. However, further studies are required to provide sufficient information about farmers' willingness to adopt CSA technologies.

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میزان موافقت با به‌کارگیری و میزان تمایل کشاورزان به پرداخت هزینه تکنولوژی های کشاورزی اقلیم هوشمند در سطح مزرعه

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چکیده

تکنولوژی‌های کشاورزی اقلیم هوشمند برای ارتقای بهره‌وری و سازگاری کشاورزان با تغییرات اقلیمی معرفی‌شده‌اند که عوامل متعددی در به‌کارگیری این تکنولوژی‌ها توسط کشاورزان در مناطق مختلف اثرگذار است. بنابر اهمیت مسائل مالی، این مطالعه علاوه بر بررسی میزان موافقت کشاورزان برای به‌کارگیری این تکنولوژی‌ها، میزان تمایل آن‌ها برای پرداخت هزینه‌های مربوط به این تکنولوژی‌ها در ایران را نیز موردتوجه قرار داده است. بر این اساس، جامعه آماری این پژوهش، کشاورزان شهرستان آق‌قلا در شمال ایران بودند (N=5447). حجم نمونه با استفاده از جدول بارتلت برآورد شده (n=119) و افراد نمونه با استفاده از روش نمونه‌گیری تصادفی ساده انتخاب شدند. تکنولوژی‌های اقلیم هوشمندی که در این مطالعه موردبررسی قرارگرفته است، از منابع موجود استخراج‌شده و با نظر کارشناسان کشاورزی مستقر در منطقه، بومی‌سازی گردیده است. نتایج نشان داد که به‌طورکلی، میزان موافقت کشاورزان با به‌کارگیری کشاورزی اقلیم هوشمند بیشتر از میزان تمایل آن‌ها برای پرداخت هزینه‌های مربوط به این تکنولوژی‌ها است؛ نتایج همچنین نشان داد که کشاورزان ترجیح می‌دهند برای آن دسته از تکنولوژی‌هایی که هزینه کمتر و بازدهی سریع‌تری دارند، هزینه پرداخت کنند (از قبیل

خاکورزی حفاظت‌شده، کشت گیاهان پوششی، استفاده از کنسانتره برای تغذیه دام و بیمه محصولات زراعی). نتایج این مطالعه دستاوردهای کاربردی برای متولیان بخش کشاورزی در برنامه‌های مدیریت تغییرات اقلیمی دارد، در این راستا پیشنهاد می‌شود که آموزش‌های کاربردی‌تری در خصوص تکنولوژی‌های کم‌هزینه برای کشاورزان در نظر گرفته شود. همچنین تخصیص یارانه‌هایی برای تکنولوژی‌های پرهزینه اما مفید در مدیریت تغییرات اقلیم از دیگر پیشنهادهای این مطالعه است.