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Survey on Climate Change Awareness and Adoption of Farmers



Hydropolitics Association
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PRELIMINARY REPORT

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Preliminary Report : Survey on Climate Change Awareness and Adaptation of Farmers

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About Preliminary Report :

As Hydropolitics Association, we also study on water resources management under the climate change effects and adaptation¹ measures.

Recently we decided to start a study on climate change effects of Turkish Agriculture sector taking into consideration that “ *NGO’s should act to raise public awareness of the climate change effects* ” in the Adaptation Strategy and Action Plan of Climate Change in Turkey.

Central Association of the Irrigation Cooperatives and Hydropolitics Association started a joint project on “ Climate Change Awareness in Agricultural Sector and Adaptation Strategy”

In this project we made a farmers survey with participation more than 200 trained ,well-educated farmers in the Symposium held by Hydropolitics Association and Central Association of the Irrigation Cooperatives in Antalya on 29 November 2015

We think that a richer set of statistics will be helpful to raise awareness in Agricultural Sector. Statistical survey analyses have carried out by Applied Research Center of Hydropolitics Association. Preliminary work results are presented in this report . Prior to cross statistical analyses completion the results will be published as a Final Report .

I hope that this study, which aims to raising awareness and setting an example to other projects required in this field , will contribute to the development of agricultural sector adaptation capacity. I would like to thank all irrigation cooperatives for the support they have provided.

Hoping that that this study will be beneficial for Turkish Agricultural Sector and Farmers

Dursun Yıldız

President

30 March 2016

¹ Adaptation: Adapting to the impacts of climate change. In the narrow sense, harmony with/adjustment to new and changing environments. In the broad sense, reducing the vulnerability level against climate change and variability that are real or envisaged to occur in natural and human systems; or adjustments that aim to benefit from its opportunities.



Farmers are filling survey form in the Symposium -30 November 2016








ANKETİN AMACI :

Bu anket Su Politikaları Derneği Uygulamalı Araştırma Merkezi ile Türkiye Sulama Kooperatifleri Merkez Birliği'nin İKLİM DEĞİŞİMİNİN TARIMSAL ALANA ETKİLERİ PROJESİ kapsamında yapılmaktadır.

Bu anketten elde edilecek olan sonuçlar Su kullanıcı örgütlerinin üyelerinin, tüm çiftçilerin ve tarım sektörünün iklim değişiminden en az etkilenmesini sağlamak amacıyla kullanılacaktır.



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Aşağıda verilen sorulara size en uygun gelen cevabı kale içersine (cep) işaret koyarak veriniz.

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- İklim Değişikliği tüm dünyada bir sorundur.

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Hiç Kabulmüyorum	Kabulmüyorum	No Kabuluyorum	Kabuluyorum	Çok Kabuluyorum
- Ormanların azalması yasadışı yollarla iklimi etkilemektedir.

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Hiç Kabulmüyorum	Kabulmüyorum	No Kabuluyorum	Kabuluyorum	Çok Kabuluyorum
- Aşırı hava koşullarında (çok soğuk-çok sıcak havalarda) tarımsal üretim büyük risk altındadır.

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- İklim değişikliği tohum, gübre, su, elektrik, mazot maliyetlerini artırırken elde edilen geliri düşürmektedir.

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Hiç Kabulmüyorum	Kabulmüyorum	No Kabuluyorum	Kabuluyorum	Çok Kabuluyorum
- Yağış ve soğukluk değişimleri ekim ve hasat dönemlerinde de değişikliğe gitmemize neden olmaktadır.

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- İklimdeki değişiklikler biki yeşillenmesi ve çile, hayvan yemi üretiminde değişikliğe gitmemize neden olmaktadır.

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CHAPTER 1

Climate Change and Adaptation

Potential risk and necessary adaptation to impacts of the climate change of Turkey

According to the Intergovernmental Panel on Climate Change (IPCC)² report of 2007, future climate change could irreversibly endanger sustainable development especially in the Mediterranean Basin, where Turkey is also located. Generally speaking, in Turkey, statistical records show a visible increase in average and minimal air temperatures with particular reference to the southern and southeastern regions³.

Therefore climate change impact might be devastated Turkey's Agriculture, Environment and Natural Life.

Climate Change Projections for Turkey

There is some substantial climate simulation studies focused on Turkey and its surrounding region in recent years. Regional climate change simulation based on the IPCC A2 scenario over Eastern Mediterranean for the last 30 year of the twenty first century has been investigated by Öno1 and Semazzi (2009) and some of the highlights from this study have been reported in First National Communication of Turkey on Climate Change (2007). In this study, the highest seasonal temperature increase for entire Turkey has been reported for the summer, 4.3 °C. In addition, very distinctive change in future precipitation of winter season has been noted for the Black Sea region (increase) and the Mediterranean region (decrease) of Turkey (Öno1 and Semazzi, 2009). The similar pattern change in precipitation produced by climate projections has also been reported by Gao and Giorgi (2008). Besides, sensitivity simulations (Bozkurt and Sen, 2011) have been carried out to understand climatic effects of surrounding seas of Turkey.

They indicated that warmer summer and autumn sea surface temperatures of the surrounding seas of Turkey probably enhance the formation of the flash floods and extreme precipitation events. Also, the significant warming trend of summer temperatures during the last two decades over Turkey has been determined in the model simulation by Öno1 (2011).

² The IPCC established by the United Nations Environment Program (UNEP) and the World Meteorological Organization (WMO) scientifically assesses the current state in climate change as well as its potential environmental and socio-economic impacts.

³ National Activities of Turkey on Climate Change, Turkish Ministry of Environment and Forestry, Ankara 2010, p. 3

The Environmental and Socio-Economical Impact of Global Climate Change in Turkey⁴

Some climate change impacts related with agricultural production is given in the Climate Change and Completed Works Report⁵ (2008) as follows;

- Agricultural production potential may change (This changing trend may be downward or upward in different regions different seasons, different crops.
- Ecosystems and agricultural productions may be damaged by increasing pests and diseases
- Water resources problems in arid and semi arid zones in Turkey will increase and irrigation and drinking water demand may be higher than before
- Randomly changing characteristics of the climate is the most important negative pressures on water resources .Mediterranean climate is very sensitive to change with atmospheric anomalies. It changes randomly and creates long drought period. Therefore if drought risk increases this may create stronger climate change effects on agricultural sector.
- Arid and semi arid zones may expand ,intensity of summer drought may be stronger and period of summer drought may be longer. This may lead to stronger deforestation and erosion
- Low level agricultural land and coastal plains may be flooded depending on the sea level rise

Integrating Climate Change Adaptation into the Agriculture and Food Security Policies

Today, it is already known that the agriculture sector is not only a victim of climate change but also one of the reasons of this phenomenon. The destructive impacts of climate change on agriculture should be dealt through the development, food security⁴, environmental, biodiversity and sustainability of the ecosystem services.

Adaptation to the impacts of climate change should be one of the primary strategies of production oriented policies in the agriculture sector in Turkey. For this reason, it is necessary that the action plans and national and regional development strategies regarding the aforesaid sector are revised and/or adaptation strategies specific to the sector are prepared. Indeed, many current policies which are carried out for the activation of the agricultural structure in Turkey contain the necessary activities which will support the direct or indirect adaptation to the impacts of the climate change⁵.

In order to adapt to the impacts of the climate change on agriculture sector, certain issues such as notably food security, production, consumption, price, insurance systems, farmer support and market policies, productivity and competition, drought and desertification, conservation of biodiversity, plant and animal health, production of plant and animal husbandry should be dealt with together. In addition to this, by the integration of the issues that have been mentioned above with current legal and institutional arrangements, the strategic plans, various policies and programs, it is aimed to provide sustainable use of natural resources in

⁴ İklim Değişikliği ve Yapılan Çalışmalar T.C. ÇEVRE VE ORMAN BAKANLIĞI EKİM -2008

⁵ Ibid.

agriculture and to create an organized and competitive structure for adapting to the impacts of climate change.

Agriculture Sector and Food Security

Agriculture in Turkey heavily depends on climatic conditions, the adverse effects of which can only be minimized by developing hydraulic structures. State Hydraulic Works (DSİ) contributes to the development of agriculture in which 35% of Turkey's population is employed by investing mostly in development of irrigation sector. As the production and consequently the income of our farmers increases because of irrigation development, there are further inputs to agro-industries. Because of this, water resources development has a crucial role to play in the socioeconomic development of Turkey.

As said, climate change will lead to shifts in water cycle and temperatures; and to seasonal alterations. These changes will inevitably have direct impacts on the agriculture sector that is directly linked to and controlled by these systems. As a result of changes in temperature and precipitation patterns, impacted area from agricultural pests will expand and number of species concerned will increase. Climate change will affect production, production sites and stockbreeding activities. The volume and frequency of these changes as well as the possibility of increased occurrence will lead to a higher risk of reduction in agricultural yield. All these are directly related to food safety.

Impact of climate change on agriculture sector is pivotal for food safety because in Turkey agriculture is the priority sector for socio-economic reasons and it is where the population's food supply mostly comes from. As a result of impacts of climate change, amount of water for agriculture will diminish, quality of water will decrease, biodiversity and ecosystem services will be lost, sustainable agricultural production patterns will change, pastures will degrade, stockbreeding activities will be affected and farmers will find themselves incapacitated in terms of adaptation to climate change; and all these will eventually risk food security.

Climate change in Turkey is expected to lead to increasingly negative impacts on water and soil resources and rural development that are vital for food production and food safety. For example, in the Gediz and the Greater Menderes Basins in the Aegean coastline, a 50% reduction in surface waters is expected towards the end of this century, leading to severe water shortages in agriculture, settlement areas and industry. Also, as a result of increasing temperatures and waning water resources in the Mediterranean Region, Tourism sector is expected to be negatively affected.

These are the long-term impacts of climate change. Turkey is already striving to protect its vulnerable coastal regions and water resources and trying to adapt its agricultural activities to the existing climatic conditions

As shown in Table 1 Agricultural sector is considered as one of the most susceptible sector that will be effected by climate change in Turkey⁶

⁶Turkey's National Climate Change Adaptation Strategy and Action Plan

Table 1 The Impacts of Climate Change and Susceptible Sector/Regions in Turkey.

Impacts	Intensity	Susceptible regions	Susceptible Sectors /Themes
Modification of river / basin regimes	Low	All regions	Ecosystem services and biodiversity
Diminishing surface waters	Medium	Western Anatolian region	Agriculture, water distribution infrastructure
Scarcity of exceeding usage water	High	Istanbul, Ankara, Aydın, Nevşehir, Bursa	Urban areas
	Medium	Afyon, Izmir, Kayseri, Muğla, Manisa	Agriculture, Industry, energy
Floods	Medium	Black Sea and South-eastern Anatolian Regions	The survival of the agricultural farmer, human health
Soil loss / salinity	Low	Mediterranean, Black Sea and Aegean Regions	Tourism, ecosystem services, biodiversity, marine products
Soil loss / loss of quality of soil	Medium	South-western Anatolia	The survival of the agricultural farmer, human health, shallow lakes and wetlands
Coastal Erosion	Low	Black Sea Region	Fishing, unemployment
Degradation of marine ecosystems	Low	Mediterranean, Black Sea and Aegean Regions	Ecosystem services and biodiversity
Forest fires	Medium	Western Anatolia	Tourism, agriculture
Migration of species to other areas in order to survive	Low	Mediterranean region	Tourism, agriculture, food security
Decreasing agricultural productivity	Medium	Mediterranean and Aegean coastal areas	Agriculture (employment), food security
Lowering Hydro – Energetic potential	Low	Mediterranean region	Energy, industry
Lowering production of sea products	Low	Mediterranean region	Agriculture, food security, water distribution networks

There are some objectives and purpose in the Turkey’s National Climate Change Adaptation Strategy and Action Plan. Some of them related with agricultural sector are given below ;

Objective 5.2. Increasing the awareness of the civil society on the effects of climate change on the agriculture sector and on the adaptation approaches⁷

As Turkey’s one of the major objectives, it has been stipulated in the National Climate Change Strategy Document that “With the aim of ensuring effective coordination activities for adapting to and combating climate change, to establish a coordination mechanism which could develop a decision making mechanism based on transparent, participatory and scientific

⁷ Turkey’s National Climate Change Adaptation Strategy and Action Plan

-analytic studies in line with the governance principle,” and “to adopt a sound information management system in order to ensure the information flow and dissemination within an integrated system”. This objective applies to all the sectors.

The Meteorological Early Warning System (MEUS) was developed by the General Directorate of Meteorology in order to identify areas prone to forest fire risks and the data obtained from this system is being shared with the General Directorate of Forestry, affiliated institution of the Ministry of Forestry and Water Works.

The Ministry of Food, Agriculture and Livestock carries out education and awareness raising activities targeting farmers on the effects of climate change on agriculture and livelihoods. Awareness raising and education activities, which are directly related to climate change, are performed in accordance with the provisions of Regulation on Good Agricultural Practices. In order to ensure the effective use of water resources; education programs aiming to promote the adoption of modern irrigation techniques and plant irrigation methods are provided to farmers. The farmers are also encouraged to be members of cooperatives so as to increase their knowledge. In the local level, these activities are performed by provincial directorates of Ministry of Food, Agriculture and Livestock and occasionally, various broadcasting companies and channels also contribute to the informing and awareness raising campaigns about the impact of climate change on agricultural sector.

Non-participatory adaptation efforts to climate change in the agricultural sector shall only pave the way for an increase in the negative effects experienced by already fragile parties. Although the awareness raising activities carried out by NGOs in Turkey have increased recently, the NGOs working in this field are not efficient. A great proportion of the NGOs are involved in mitigation activities whereas those working in the field of climate change adaptation have been active in the field of ecosystem services management yet the number of these NGOs is still insufficient. The important fact is that when it comes to struggling against the climate change, most of the NGOs perceive the issue from “mitigation” point of view; therefore they should be informed about the “adaptation”.

Regarding the adaptation, it is stated in the National Climate Change Strategy that in the mid/long term (1-3 years) “in order to prevent the increase in the amount of sodium and salinization of the irrigated parts of the earth where the temperature and hence the evaporation shall increase, projects including measures such as soil cultivation, drainage, irrigation and mulching must be developed and the farmers must be educated in that sense”.

During the preparation of National Climate Change Adaptation Strategy, especially during the activities held in the local level (Participatory Vulnerability Analysis held in various cities as well as the climate arena activity) through the participation of NGOs which are working in the agricultural sector, the consultation with the stakeholders has been realized efficiently.

In National Climate Change Strategy, it is emphasized that i) particularly for the implementation of TAKEP in the village level, to develop and expand the activities of the irrigation associations and cooperatives, ii) to raise the awareness of unions and cooperatives and increase their capacity in adaptation to climate change; iii) to inform the local

shareholders in the agricultural sector about the alternative products; iv) to develop projects so as to take measures against salinization in the irrigated regions where temperature and hence evaporation shall increase due to climate change and to provide education to farmers in that sense. Moreover, all the segments of the society must be able to access information on climate and early warning system.

It is aimed that continuous education shall be provided to NGOs who are members of Provincial Drought Damage Assessment Commissions, Provincial Crisis Centers and Provincial Drought Assessment Commissions, associations, cooperatives and local administrators on the impacts of climate change and adaptation methods.

PURPOSE 3. Sustainable Planning of Water Utilization in Agriculture⁸

One of the primary sectors which will be mostly affected by the inadequacy in water supply across the country is agricultural sector. In Turkey, the adaptation precautions about the impacts of the climate change will only be successful with effective management of water resources in basin and field base within the framework of agricultural production policies. In order to ameliorate the water management in basin base in agricultural sector, it is important to develop agricultural support policies, to develop hard infrastructure services (channel excavation for floods, alternative water collection mechanisms etc.) to reduce the transmission losses, to realize consciousness raising activities on water harvesting in the upper basins and water saving. Effective adaptation to the climate change may be realized with the help of proper irrigation methods, plantation of durable plant types and varieties, measures for preventing soil moisture and utilization qualified water for modern irrigation.

Some of these precautions may reach the solution in short term; however, certain precautions will be realized for mid and long term. When the agricultural sector is taken into consideration about the impacts of the climate change, in the short term, it has been aimed that the institutional effectiveness of certain institutions such as the Ministry of Food, Agriculture and Livestock, the General Directorate of State Hydraulic Works and the General Directorate of Meteorology which are the most important actors in water management. In addition to this, the expectations in mid and long term will be higher policies such as an effective water code in the base of participant platforms, the integration of adaptation strategy and higher policies of the agricultural sector within the framework of macroeconomic growth and macro targets about the climate change.

As of today, 75% of the water amount which is consumed as 46 billion m³ annually is used for agricultural irrigation purposes. The total of the cultivated areas is 28 million hectares; the irrigable areas are approximately 25.8 million hectares. In Turkey, it has been envisaged that the areas of 8.5 million hectares in total which can be irrigated technically and economically with current water potential will be equipped with irrigation facilities until 2023. The main

⁸ Turkey's National Climate Change Adaptation Strategy and Action Plan

purpose of this activity has been determined as decreasing the 75% consumption rate of irrigation water to 65% with the help of modern irrigation techniques. It has been also planned that 72 billion m³ water is annually used in agriculture.

Most of the water which is used for irrigation in agriculture is provided from dams and reservoirs while 35% of it is obtained from ground water resources. However, some of these projects have not been implemented with efficient consideration on environmental impacts; they have caused the losses of valuable ecosystems and certain problems such as soil salinity, leakage and spread of agriculture based chemicals because of over-irrigation.

The peak utilization area of ground water is irrigation activities in agriculture in Turkey. It is necessary to strengthen the control mechanisms (the control of illegal wells etc.) about the utilization of ground water in agricultural irrigation in institutional and administrative context. Today, approximately 60% of the total potential of ground water which is consumed is used for irrigation and industry.



CHAPTER II

Irrigation Cooperatives

IRRIGATION COOPERATIVES ORGANISATIONAL STRUCTURE

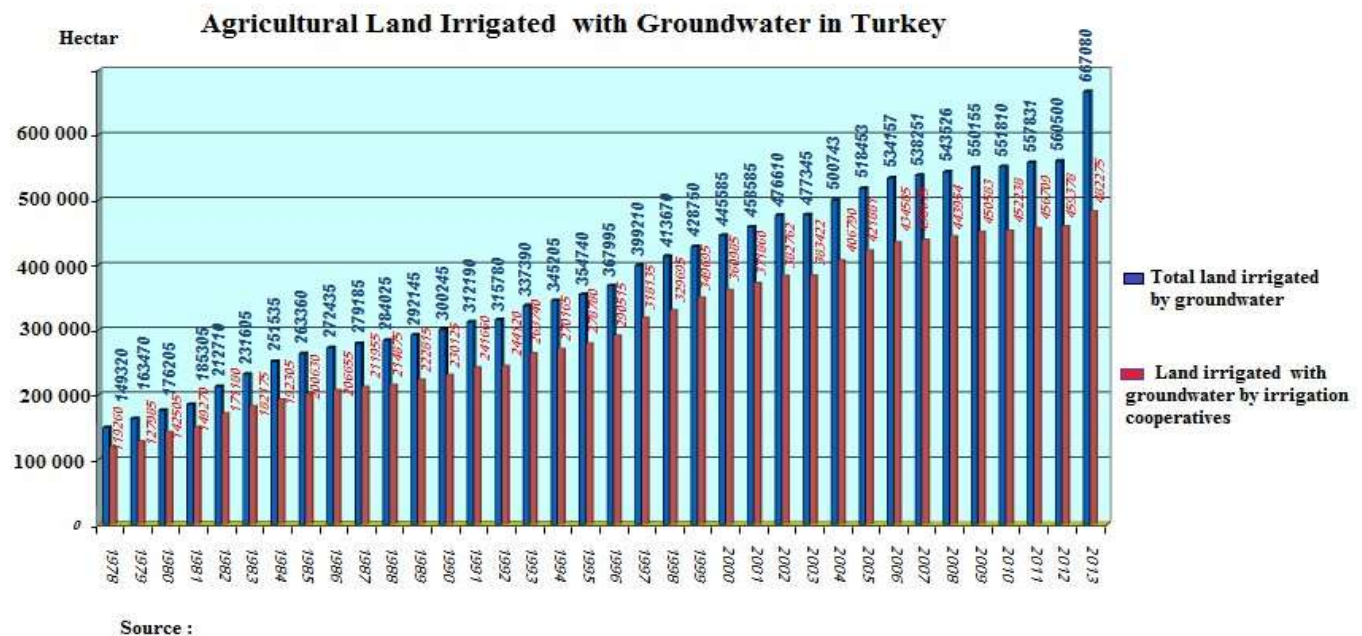


Turkish Irrigation Cooperatives Central Union (TÜS-KOOPBİR), have been representing 27 Regional Unions established for 2,500 Irrigation Cooperatives covering approximately 800,000 hectares area of 300,000 cooperative members of farmers (together with the families total population is about 1.800.000). Out of 700,000 hectares, 500,000 hectares have already been irrigated by groundwater wells while remaining 200,000 hectares have been irrigated by small dams. 95% of these areas have surface irrigation methods as only 5% of them have pressurized irrigation methods. On the other hand, we also have 160,000 hectares area having groundwater wells but not having completed electrification units, not having pumps and on - farm irrigation development.

As is known, groundwater resources are strategic and safe resources for the countries because in groundwater resources there is no need for spending time and money to reserve the water, there is no evaporation loss, there is no purification cost, and there is almost no possibility for nuclear pollution. Having semi-arid/arid climate, Turkey needs irrigation so much for agriculture and uses these strategic resources in certain areas which have limited possibilities to use surface water. In Turkey, out of 13.7 billion m³ groundwater resources, 12.8 billion m³ is used for drinking-potable-industry-irrigation needs. 55% of above mentioned 12.8 billion m³ resources (7 billion m³) is used for groundwater well irrigation by the irrigation cooperatives under TÜS-KOOPBİR.

Therefore, water saving and efficient use of the water in groundwater well sourced irrigations are crucially important. Recent global climate changes and desertification/drought threats to Turkey increase the importance of the water efficiency in the groundwater well irrigation

networks. On the other hand, taking the water from the wells to the surface and conveying it to the farmers' lands require energy and it is becoming costly day by day for the farmers. It is clear that to use water saving irrigation methods (center pivot, linear moving, constant sprinklers, portable sprinklers, drip, etc) will decrease electricity energy costs as well. But, electricity energy will be still most important input for farmers. Then, the logical way for the cooperatives is to produce their own energy.



Irrigation cooperatives have played very important role to develop groundwater irrigation effectively since 1970.

It is known 273 622 pcs documented, about 180 000 undocumented groundwater well. In order to efficiently run these wells irrigation cooperatives undertook a mission. Since the beginning of 1970 Groundwater cooperatives reached 482 275 hectares of irrigated area. This development is seen in the above graph. This graph demonstrates the importance of cooperatives in agricultural irrigation. 73% of irrigated land is irrigated with groundwater irrigation cooperatives in our country.

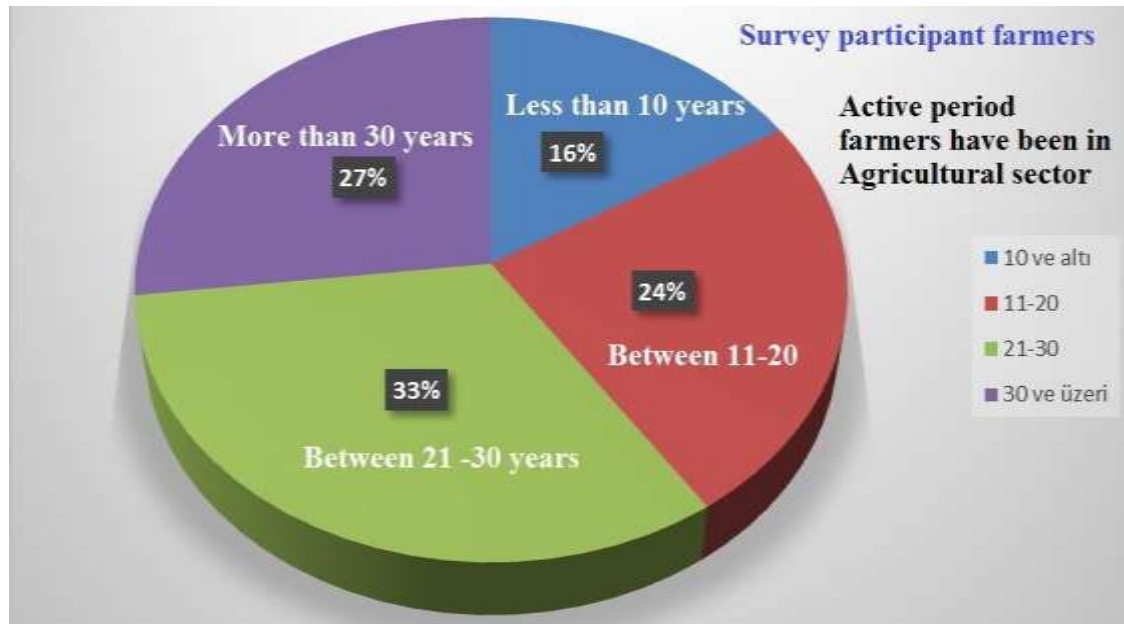


CHAPTER III

Some Results of the Survey

Hydropolitics Association by contribution of Irrigation cooperative started to project (Climate Change Awareness and Adaptation of Farmers) in Antalya symposium organized by Irrigation cooperative between November 29 to December 3, 2015,

This questionnaires distributed in Antalya symposium and were completed by more than 200 irrigation cooperatives manager and members attending the symposium.



Profile of the Survey Participants:

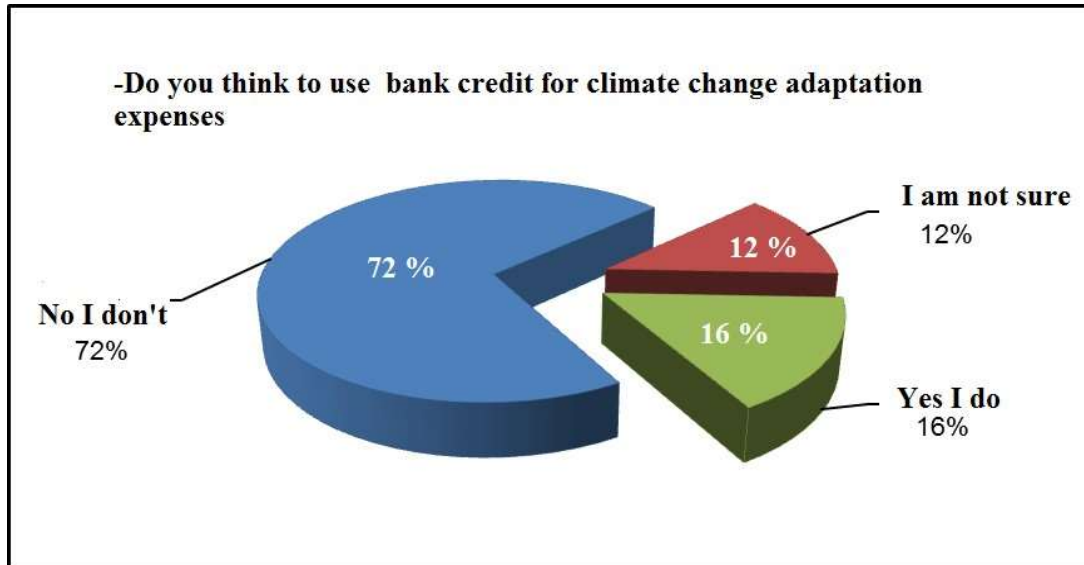
Survey attended by more than 200 farmer, %56 of them graduates from primary and secondary schools, 44% of participants have mastered and graduated from high school and University. and %60 of participants do farming from 20 years and more than. The average size of agricultural land of participant is 110 acres approximately 2 times more than average of Turkey.

Survey Results ;

- 92% of farmers accept that climate change is a problem for world.
- 93% of the farmers told climate change directly impact on deforestation. Only 54% of farmers purchased agricultural insurance against natural disasters.
- 90% of farmers believe to need support and education from government and relevant agencies in seed varieties according to the climate change.
- only 10% of farmers be on support from government and relevant agencies in seed varieties according to the climate change.

- 86% of farmers surveyed agree to cultivation of the product according to the climate change and use of seed varieties, and it only applies from 50% of participants.
- 82% participants have irrigation system in the field.
- %60 of farmers believe that use effective and efficient water on the region.
- 30% of farmers told that have sufficient information on keep damp soil.
- 71% of farmers believe applying the appropriate irrigation methods to minimize water loss.
- 82% of farmers declare doesn't implement the timing and regulation of planting activities
- 40% of famers indicate that have knowledge to mix harmful gasses on air when use animal manure. and 30% say haven't information about in this case.
- 47% of farmer told that applied simple measures for rapid harvest and post-harvest activities.
- 96% of farmers said that need work to improve quality of deteriorating soil in general and 56% of them said that we did do.
- 62% of farmers believe that increase income of agricultural product by planting more mixed. 59 % of farmer believe that by planting more mixed .they can increase their own income
- 65% of farmers told that have information about local seed production and seed bank and 25% of them want to get information.
- 61% of farmers surveyed told that have information about improving the soil's water retention capacity by increasing the plant's root depth and 22% of them want to get information.
- Only 4% of the farmers surveyed stated that fully use animal manure , Only 48% of chemical manure, The other 48% stated that they use both (chemical and animal manure).
- According to survey 62% participant use 50 kg and under 50 kg manure for an acre
- 32% use 50-100 kg, and 5% use 100-150 kg.
- According to survey 33% farmer for the production of different products do agricultural practices, 24% think but didn't do agriculture practices, 8% say didn't think about that and 35% want to get information.
- 73% of farmers that changed product says the climate change is reason to the product change.
- 71% of farmers believe will take technical measures for adapt climate change as soon as possible
- 33% of the farmers thinking it would be too costly to the producer of the proposed measures to adapt to climate change, 35% of them say we haven't any idea but we want to get information,22% said will be get low cost and 10% think doesn't bring cost.
- 80% of farmers said they will change own production if adaptation of climate change forced to change production,
- 72% of farmers said if given the credit support to adapt climate change would not use this credit, 16% said we'll use and 12% said we are undecided.
- Farmers irrigation cooperatives give information to the farmers 66% says so.
- Only 33% of farmers said we did research on adaptation to climate change.
- 80% of farmers said in last 5 years increase the temperature in area that they operate, and 60% said decrease precipitation.

- 80% of farmers believe to increase of pests and diseases in agricultural activities in last 10 years and 60% believe to increase of Weeds.
- 16% farmers think measures to be taken about climate change the inform of government is sufficient.



Summary Results

Climate Change Awareness

The vast majority of participant(93%) accept that climate change is problem of worldwide and agriculture production is under the risk.

Precipitation and temperatures

70% of farmers said in last 5 years increase the temperature, pests and diseases in area that they cultivate.

Adaptation to Climate Change

86% of farmers agree to cultivation of the product according to the climate change and use of seed varieties, and it only applies from 50% of participants.

72% of farmers said if given the credit support to adapt climate change would not use this credit, 16% said we'll use and 12% said we are undecided.

80% of farmers said they will change own production if adaptation of climate change forced to change production,

Need to information and Routing Support

90% of farmer believe to need support and education from government and relevant agencies in seed varieties according to the climate change. only 10% of farmers be on support from government and relevant agencies in seed varieties according to the climate change.16% farmers think measures to be taken about climate change the inform of government is sufficient.

33% of the farmers thinking it would be too costly to the producer of the proposed measures to adapt to climate change, 35% of them say we haven't any idea but we want to get information,22% said will be get low cost and 10% think doesn't bring cost.

Efficient Use of Water

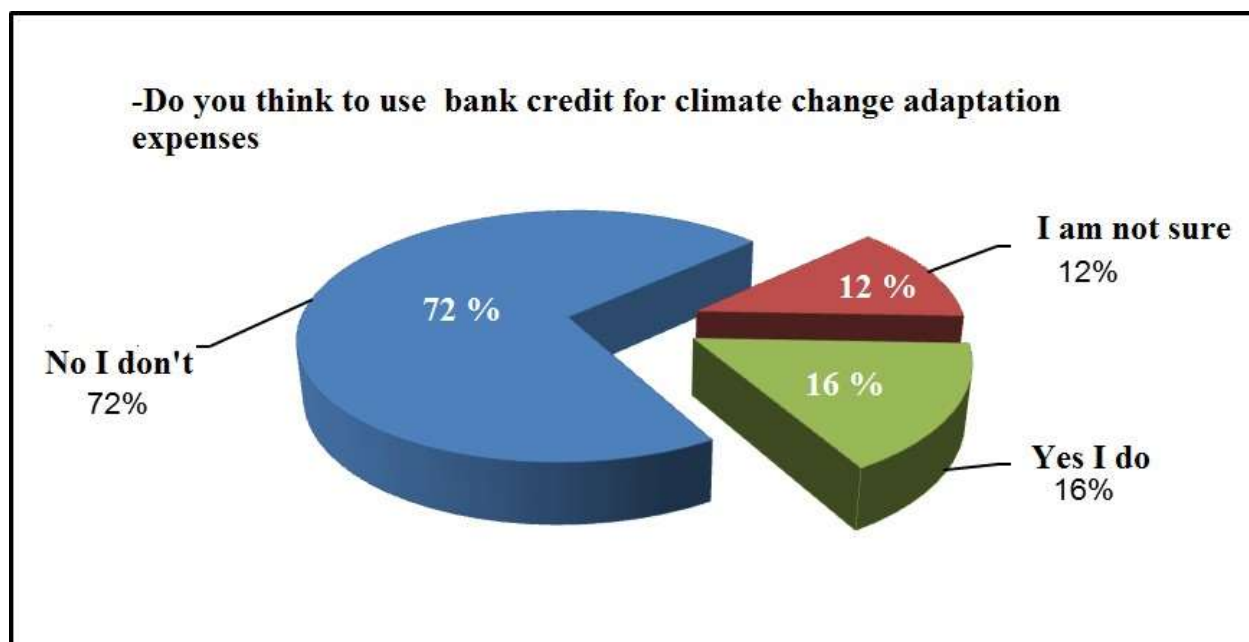
%60 of farmers believe that use effective and efficient water on the region. 71% of farmers believe applying the appropriate irrigation methods to minimize water loss.

30% of farmers told that have sufficient information on keep damp soil

61% of farmers surveyed told that have information about improving the soil's water retention capacity by increasing the plant's root depth and 22% of them want to get information.

Protection of Soil Quality

96% of farmer said that need work to improve quality of deteriorating soil. and 56% of them said that we did do.



CHAPTER IV

General Evaluation

Planning on the impacts of climate change and managing risks that arise from these impacts in fact means supporting farmers in their sustainable economic growth. Strategies developed for adapting to the impacts of climate change draws more attention to risks and reference to the possible benefits of climate change is not adequately realized. However in certain sectors and in the agriculture sector in particular awareness has started to rise lately on the possible benefits of adapting to climate change.

Public awareness should be raised for promotion of climate friendly consumption patterns through joint efforts of all sectors of society such as public, private sector, university, and nongovernmental organizations

When we consider the results of survey in general we can obtain key findings given below;

Farmers attended the survey are highly educated in which about half of them are graduated from high school and university. The average size of agricultural land of participants is approximately 2 times average of Turkey.

Farmers are aware of impact of climate change on agricultural products in general. They stated that air temperature is getting higher and precipitation is lower in their own land region.

Survey results shows that farmers don't know about the measures against climate change but they want to know about the adaptation measures, if necessary they can change the crops to adapt the climate change, moreover they don't want to use ant credit to adaptation measures.

It is also clear that farmers are in the progress of using water more efficient and want to improve their own soil quality.

Survey results also shows that farmers mostly use chemical fertilizers. Only 4% of the farmers use totally organic fertilizers. 62% of the farmers stated that they use fertilizer less than 50 kg per thousand square meters when 32% of farmers use fertilizers between 50-100 kg per thousand square meters

Study on survey continue by [using compare rules to Cross-Tabulate Results](#) in Applied Research Center of HPA. Final Report of the survey will be published including all results with more detailed evaluation in soon.

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