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CLIMATE-SMARTAGRICULTUREAND ITS MANAGEMENT

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Abstract

With the increase in the population size, the need for their feed is also increasing. Agriculture play a major role in providing food across the world. Agricultural industries are the largest industries to be known and also help in the economic development of a nation. Agricultural industry face a major challenge related with the global climatic variations.Farmers from all over world face serious problems with changeable weather patterns, smaller growing duration, drought, extreme temperature, amplifiedintroduction to pest and crop diseases. Climate-smart practice will help farmers to adapt and prepare for impacts of climatic variations. The major aim behind climate-smart agriculture is to improve agricultural productivity, making farm more compatible against the climatic variations, and decreasing greenhouse gas emission from the agricultural goods. As climate-smart agriculture techniques comes up with some challenges like- lack of knowledge about it, lack of resources, socio-economic constrains at farm level etc. To overcome all these challenges, government authorities, institutions and major stakeholders should contribute in climate-smart agriculture by proving various educational programs, by helping financially, and also by providing tools. Equipment's should be provided that will help farmers for timely detection of climatic variations and on the basis of that they can opt the suitable crop. In future it can be used to send signals to the farmers after detecting the amount of water required for any crop development.

Key words: Agriculture, Climate, Farmers, Land, Management, Productivity, Smart

Introduction

Agriculture is the largest industry in the world in expression of land usage and is the onlyprovider of human foodstuff with a worldwidecirculation of about 40% of existing land. It play a pivotal role for the economic development of the country[1]. In total, crop food goodscreateabout78% of the world's typical per capita energy requirements, while other sources of food like milk, eggs and meat are another 20%[2]. The rising population's food requisite is consequently the centralrequirement and can be attained only by growing agricultural manufacture. Ecologicaldevelopmentelements are natural and agricultural in nature.Numerousbusinesses'achievement or disappointment has been reliant on their plant organizations' health[3].The scientific community has clearly stated that global temperatures will rise as a result of climate variation, which possess a head-on negative effect associated withagricultural production.As a result, climate-smart agriculture practice is achieving attractiveness around the worldto improve and secure the agricultural sector. Climate-smart farming practiceis a word that refers to a set of activities that are utilized in the field of ecologicalbiology, protection, climate variation, and farming practice in the past.On the other hand, the link amongfarming and climate variation is poorly recognized, especially the given sector's double behaviour (i.e. farming methods play a significant role in the contribution inworldwideanthropogenetic GHG (greenhouse gas)release and are concurrentlysusceptible to climate variation jerks and pressures)[4].Changes in climate turns farmers' lives around.The world's small farmers have serious problems with randomclimatic patterns, smallerrising periods, scarcities, risky temperatures and enlarged exposure to pest and crop disease — especially in the tropically populated regions where there is more dependence on usual resource. Climatesmart agricultural practice can assistplantersto adjust and get ready for the influences to protect their livelihoods and even recover them[5].

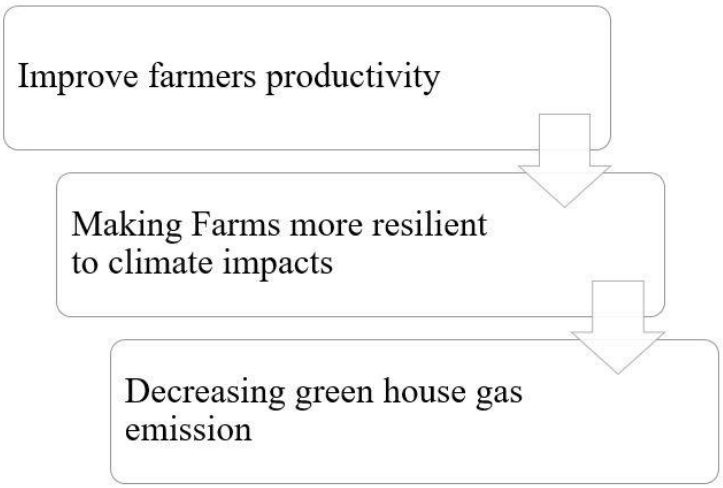

Figure 1: Diagrammatic Representation of Objectives of the Climate-Smart Agriculture practices

From the Figure 1, the three very basic purpose of Climate-smart agriculture (CSA) practices is elaborated and these are (a) Improving the agricultural productivity in order to enhance the income and food security for the farmers, (b) Making farms more tolerable to climate impacts by increasing its adaptive capability at different level i.e., from farmlandto country, and (c)Diminishing greenhouse gases emission associated with the growing crops.In standard, CSA must have a lot to give further than helping to achieve local sustainable growthobjectives. However, CSA policy implementation and effectiveness was hampered by a number of factors. The three foundations of the CSA function at various geo-economics, spatial, and institutional scale. CSA is viewed in a different way by various parties based on their political views, and it is affected by a variety of financing provisions, processes of decision-making, business and trade obstacles. Liable on nativedescriptions, the relative relevance of the CSA pillars varies. The agricultural sector's variety of mitigation and adaptation method at various levels reflects the current divide in the understanding of CSA[4].

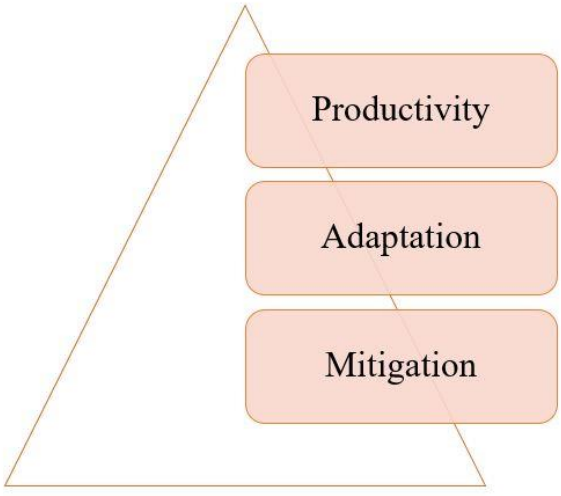

Figure 2: Represents Three Different Pillars Associated With Climate-Smart Agriculture

From the Figure 2, all the different basis interlinked for achieving the Climate- smart agriculture goals are discussed-**Productivity:** CSA aims to increase agriculture and farm incomes sustainably without negative environmental effects on crops, animals, and fish.In turn, this will increase food and food safety. Sustainable intensification is a key concept for increasing productivity.**Adaptation:** The CSA targets to decrease farmers' contact with short-duration risks and strengthen their flexibility by increasing their ability to adjust to shocks and longer-term stresses and thrive.The protection of the services provided by ecosystems to farmers and others

is given special attention. These facilities are necessary to preserve output and to adapt to climate variation.**Mitigation:** CSA decrease or eliminate greenhouse gases (GHG) releases wherever possible and wherever possible.This means that we reduce emissions from food, fiber and fuel for each calorie or kilograms.That is to avoid agricultural deforestation and we manage soil and tree in method which take full advantage of the capacity to act as carbon descend and absorb Carbon dioxide form atmosphere[6].

The macro and micro dimensions of climate-smart agriculture will be addressed. The large-scalecharacteristic will detail strategies and worldwide activities, although the small-scalecharacteristic will detail particular methods and machineries for climate-smart agriculture application. On the macro level, the Global Alliance's goal has been to improve public'snourishment and dietsafety by assisting farmers, civil society organisations, scientists, governments, and businesses, and additionally local and global organisations, to regulatefarming practises, food methods, and societal policies to assist climate variation mitigation and performance[7].

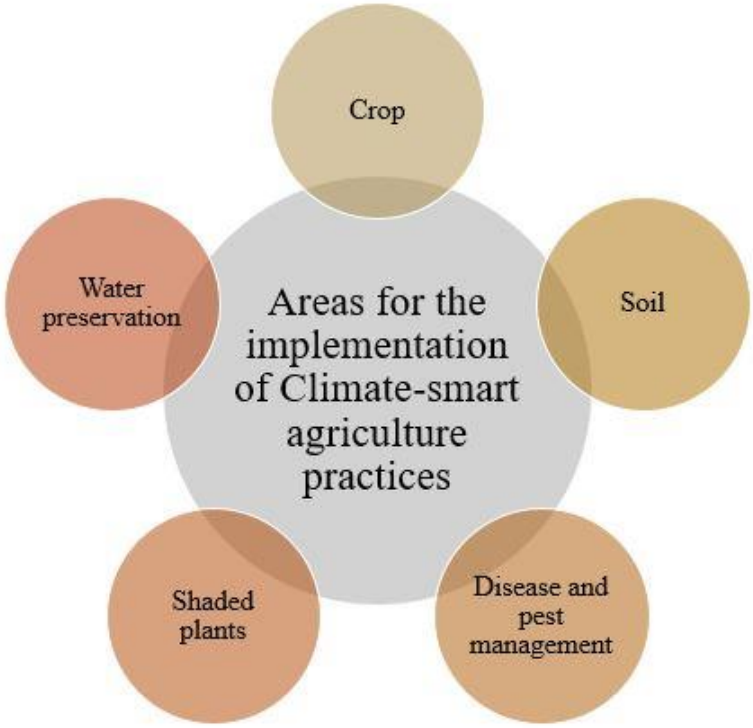

Figure 3: Shows Areas for the Implementation of Climate-Smart Agriculture

Figure 3 illustrates all the major areas where the climate-smart agriculture can be implemented then that are soil, crop, disease and pest management, water preservation and shaded plants -

1. Crop Management:

Climate smart solutions personalized to a specific countryside, rural population, or even distinct farmland can be calculated once climate impacts and risks have been assessed. Collecting and fermentation needunlikemethod depending on the environment in the case of cocoa plant. Easy solar dryers made of wooden structures and plastic pieces can be used to dehydrate beans in the occurrence of substantial rainfall or extreme moisture condition.

2. Soil Management:

Heavy rains, especially on sloping land, be able torinseproductive top-layered soil. Establishingpulverizedprotectionbenefit to keep top soil in place during heavy rainfall, andfavourable for the

drought-prone areas as it support the soil to hold moisture. All activities that enhance soil quality and structure boost efficiency, which is a key aim of climate smart farming. Vigorous soil often act as carbon descend, trapping carbon di-oxide and keeping it away from atmosphere, hence assisting in the battle against climate modification.

3. Pest and Disease management:

Pests and diseases brought on by global warming have the potential to drastically decreaseproduces and unexpectedly wipe out whole farm. Climate smart farmingworking preparegrowers with the information they require to spread on the correct amount of pesticide at the accurate duration of year to fight with new pests. Purchasing pest-tolerant plantlets can also be beneficial. It is advised to the farmers to utilize weeding manually as required in any climate when it comes to weeds, focusing on harmful weeds even thoughseparating the mushy weeds to refill soil and avoid nutrient-enrich top layered soil from eroding.

4. Shaded Plants:

Planting shade trees benefits a farm or community regardless of the climate risk: the correctquantity of plants, of the accurateclass, with the correctextent of covering can assist to defend the farmland from extremepunitive wind, tough shower, and sun. Climate-smart trainings assist in determining the finest tree class to plant, the optimal quantity of vegetation to plant, and a complete shade-tree classification—may contain the usage of trees aswind-barriers and livingboundaries, and too provide shade for harvests that took advantage from it.Planting dissimilarkinds of trees which provide shelter to their leaves at dissimilar times of the time of year, particularly in warmer and drying climate or regions having more rain, is critical to ensuring a continuous canopy, particularly in warmer and dryingweathers or regions with more rain.

5. Water Conservation:

Agriculture utilises 70% of theexistingsource of usable water on the world. According tothe knowledge, theearthstays to warm, scarcities of water—so far known problem in numerousareas—will convertinto a more severe hazard. Climate variation could takealmostabundant water also.Flooding was triggered by a mixture of extended dry episodes, which made the pulverized strong, subsequently by heavy rainfall. Drainage systems and trenches may be built to networkextra water and defend crops from diseases resulted from moisture[5].

Climate smartagriculture is no distinction from sustainability; it combines different sustainable approaches to meet the particular difficulties of the climate in a particular agricultural community. Firstly the measurement of risk associated with climate is done because a farmland that is faced with continued water scarcities will requirediverseplans than one that faces recurrent floods.By taking local ecosystem and crops into account and use of several tools to know the risk associated with climate and vulnerability all over the nation.It makes climate smart agriculture "smart" to find the correctmixture to accomplish climate challenges of a particular farmland—and to constructflexibility to future effects[5].

Problems And Its Solution For The Execution Of Climate Smart Agriculture Practice

Basic strategies of climate-smart agriculture method are more commonly alike to those of the united agriculture management. Most of the mitigation and adaption strategies and practices are alike or more parallel that help to enhance the living behaviour, quality and quantity of waterand benefits of biodiversity.Hence, climate-smart approach will help to add new resources and understandings to combined agricultural management.

Figure 4: Challenges Associated During the Implementation of Climate Smart Farming

From Figure 4, several types of challenges attached during the implication ofclimate smart farmingis explained with two additional challenges are deprivedcorporeal and communalstructure and low volume of biomass.Capitalizing in ecosystem-established methods, emerging technology, and an encouraging atmosphere to improve and promote Climate Smart Farming adoption. Encouraging CSA achievement stories and chances to small-holder growers to raise awareness and raise the profile of Climate-Smart Farming. To promote the implementation of climate smart farming, improvement of policy coordination and reinforcement of local national and regional institutions should be implemented.Smallholders, states, and private sector entrepreneurs would have easier access to capital to create and execute CSAs if creative funding schemes are developed to solve both farming and climate economics. The emphasis should be on enhancing the importance of climate variation adaptation determinations. Adaptation step, effectively evaluated for widespread deployment in a specified area should be amplified, taking into account the nation's background and agro-ecological areas[8].

Literature Review

Alvin Chandra et al.[4]shows the connection among climate variation and agriculture has changed into four major cross-functional programs that are science, economics, management and policy. Scientists show their major attention towards crop originates demonstrating, farming practices, farmland controlling practices and how agricultural practicecan add-on the three supports of climate-smart agriculture (CSA) that are mitigation, food safety and adaption. These CSA's pillar functions at dissimilar geographical economics,official, and three-dimensionalmeasure. It is also recommended that the subject of scales and taken into explanation variations in CSA descriptions by encouraging large communalinvolvement should be resolved. Cross-disciplinary research priorities will help close the apparent science-policy divide. A re-introduce of fundsto smallholder 'on-farmland' and 'off-farmland' authenticities is needed by global science research agenda. This involves rethinking the political and structural aspects of the CSA debate, which can be accomplished in part by cross-disciplinary studies that improve the edge of the communal, administration, and financialmagnitude of study.

Raymond Guiteras[9]stateda boardstatistics method to shows that the climate variation in agriculture of India is probably to be negative commanding the small to moderate duration. The effect of moderate time period that is from 2010-2039 on the production rate is valued to be negative of 4.9-9%. Meanwhile agriculture contribute

approx. 20%GDP in India which denotes that the price of climate variation of 1-1.8% of GDP/year above the moderate course. Moreover, agriculture yield is mainlyessential for the welfare of poor. A rough calculation named "back of the envelope" estimation by means of the result of Ligon et al., that respective %fact of agriculture's Gross Domestic Product expansionupsurgesfeeding of lowermost three scores by 4-6% would indicate that climate variationcanreduceingestingamongst poor belong to India approximately by 18%. In the lackof quick and whole adaption, the significances of extended term climaticvariationcan be additionally more serious, till 25 percent of the yield productivity. From these outcomes, two different questions for upcoming research are developed, one is name all the featureseluding thedissimilarity among the given negative significance for a emergingnation and the slightlyshow positive outcomesfor the U.S and the other one is most important for agriculture system, at what pace the farmers belongs to the developing countries are able to adopt the farming practices in order to meet the demand with the changing climate and what are the schemes and technologies will help farmers to adopt quickly.

John R Porter et al.[10]explains that the productivity and quality of food crop is main part for the welfare of the human and show straight influence by weather and climate. The very basic study about climatic variationon harvestschiefly focussed on the consequences associated with increased in carbon dioxide level, global average temperature, rainfall and nutrition on crop development. Though, crops respond differently with the developing circumstances, possess threshold reactions and are focused to mixture of stress aspects that disturb their development, progress and productivity. Therefore, climate changes and variation in the occurrence of riskyoccasions are essential for crop, its constancy and class. The threshold temperature for any crop growth are observed were not varyprominently for unlikeharvests and are essential to describe for the chief nutrient crop, to contribute climatic forecast creators the happening of harvest critical temperature andtime-baseddetermination.

Sara J Scherr et al.[11]demonstrated that the numerous targets of climate-smart farming, specifically adjustment and mitigation objectives, and developments to living, efficiency, or other bionetworkfacilities, will often require an integrated landscape approach.Characteristics of a climate-smart environment include on-the-farm and climate-smart practices, diversity in agriculture systems as well as landscape use, and farmland usageconnections management to attaininteractions between several goals.Multiple stakeholder forecastingprocedures; supporting supremacyorganizations, comprisingterm of resources; coordinated financial contrivances enabling the subsidy of inventiveness with several interconnected goals; and surveillance and estimationmethods that justify for a range of landscape effects include the implementation of climate-smart landscapes.Circumstances of Sahel,Madagascar, Australia and elsewhere show how various contexts are already being developed in climate-smart landscape initiatives.Although these circumstances show a level of achievement and also learned from them for those which are stillin their initial stages. If appropriatelyfollowed, the outcomes may updateforthcoming stakeholder capacity investments and institutional development in all its dimensions to help climate-smart landscapes.

Campbell et al.[12]explains thatSI (Sustainable Intensification)and CSA are interconnected concepts.In the CSA the focus on climate change adjustment and mitigation results is the main difference.Adaptation and mitigation are crucial for SI.All CSA cases are invariably SI cases.A view of climate Justice requires efforts to support poor farmers most affected by but less affected by climate change to improve food safety and promptfinancialdevelopment in developing countries.Activities to enhance food safety and support agriculturists familiarizeregularly have important mitigation advantages then also haveadvanced start-up charges (e.g. additional labor prices).The identification of conducts to encourage use of smart-climate substitutes is an important concern.Agricultural policy in severalnations isinseparablyrelated to rural financial assistance.Low-income countries are increasingly able to direct production along more sustainable and productive pathways.In identified and encouraging environment-smart performs that enhance country sidepublics, expand small-holder living conditions and jobs and escape adverse community and ethnicinfluenceslike compulsory relocation and terrestrial tenancy harms,enquiryassociates and growthassociates have a major role to perform. Farmedfundingmight be profoundlyenhanced in many developing countries and the CSA and SIobjectivesrequired to be established within this wide-ranging political background.

Leslie Lipper et al.[13]explains that CSA represents an method for converting and revamping farming methods to promote food safetybeneath new climaticvariationsituations. Rain shifts and temperature arrangementsloom agricultural manufacture and upsurge the susceptibility of farm reliant people, most of them poor in the world. Climate change disturbs food markets and risks food supply across the whole population. Bullying can be decreased by enhancing agricultural adaptive capability, resilience and the use of resources in farming system. CSA encouragessynchronizedactivitiesin the direction of climate resistantwaysover four major action regions by agriculturalists, investigators, private ownership, and civilian society and strategy makers:1) establish evidence; (2) increase the efficiency of local institutions; (3) promote coherence between policies on the climate and agriculture. The CSA differs by emphasizing the capability to apply elastic, to the point answersreinforced by newstrategy and capitalengagements, from business-as-usual methodology.

Discussion

In the last few decades, global farming has turn out to beconsiderably more productive. Enhancements in manufacturing methods, as well as harvest and cattle breeding strategies,give rise tosubstantial increase in foodstuff production although only risingfarming land by 10%. Climate variation, on the flip side, is projected to intensify farming's current problems. In the agriculture sector, food safety and climaticvariation are inextricably connected, and there are significant opportunities to turn the area into climate smart methods that resolve equally. Climate variation puts the stability and sustainability of production in jeopardy. Climate variation is predicted to show lower output even more and increase erratic demand. For the sake of maintaining and improving food safety, agricultural production systems must move toward greateroutput and, more importantly, lesserproductionerraticism in the appearance of climate variation and other cultivation and socio-economic bullying. Production processes must turn into more resistant, or skilled of executing well in the appearance of disturbingactions, in order to stabilise performance and profits. More efficient and resilient agriculture necessitates changes in natural resource management (e.g., water, genetic resources,soil minerals, and farmland) as well as increased productivity in the processing of these resources and inputs. By rising carbon sinks and lowering discharge per unit of farmingitem for consumption, transitioning to such systems will provide major mitigation benefits.

CSA practices definedthat comprisevaried on-farm practice like agroforestry,land use, forestry, agronomy,livestock,rustic and feeding, soil and watersupervision, and bio-energy. Avaluation of climate variationsubtletiesassociated with agriculture proposes that three mainstructuresdescribe a climate smart farming: climate smart application at the arena and ranch level; variety of farmland usagethroughland that offerflexibility; and controlling of farmland usageconnectionsonlandscales to attaincommunal, commercial and environmentalinfluences.Several institutional frameworks are needed to incorporate climate smart farmingbackgrounds with the following characteristics (i.e. for successful promotion and maintenance over time, in the light of complex financial, communal, environmental, and weathersituations): multiple stakeholder forecasting, helpfulsite governance and supply tenure, spatially basedsiteasset that promotes climate smart goals, and modifications monitoring to see if communal and weather targets are being encountered at various levels.The high reliance of farming systems on rainfall is one of the main impediments to the growth of sustainable agriculture. Farmers are particularly vulnerable to climate-related threats due to recurrent droughts and the unpredictability of rainfall. As a result, climate information services (CIS) are regarded as uniqueschemes for mitigating weather associated risksAgriculturalists are informed about raindeliveryconfigurations, concentration and regularity, wind tempests, and severe actions thanks to the accessibility of CIS from whicheverethnic knowledge methods or meteorological data.

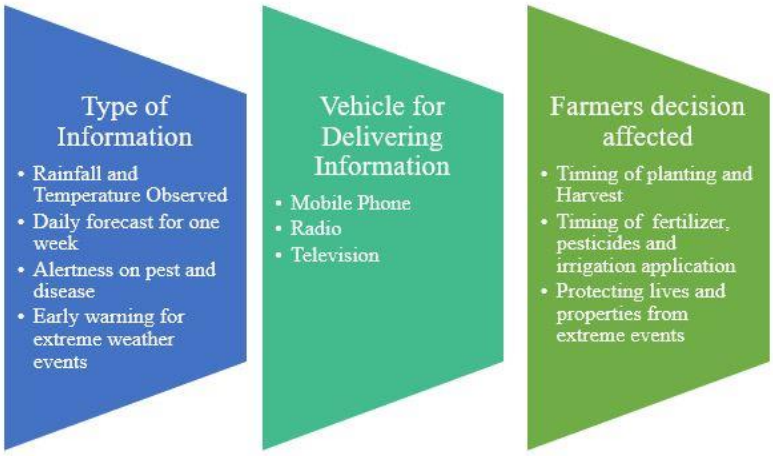

Figure 5: Illustrates Decision of Farmer Affected By the Change of Weather(From Days- Weeks) – On The Basis Of Type of Information, Vehicle for Delivering Information,Received and Framers Decisions on It

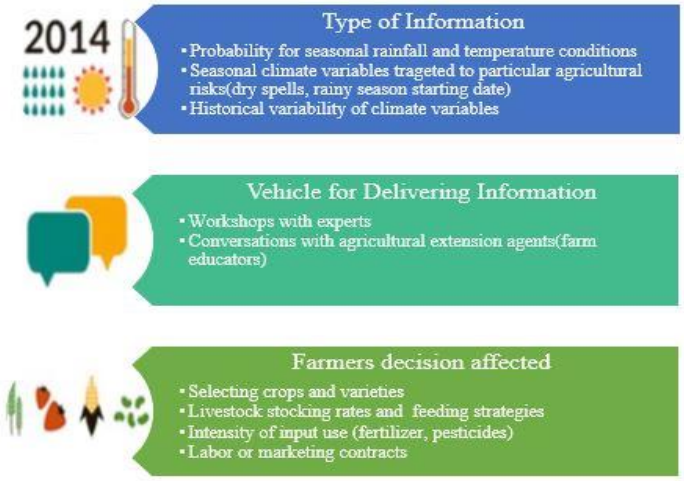

Figure 6: Illustrates Decision of Farmers Affected By the Change of Climate (From Months-Years) - On The Basis Of Type of Information, Vehicle for Delivery Information Received and Farmers Decisions on It

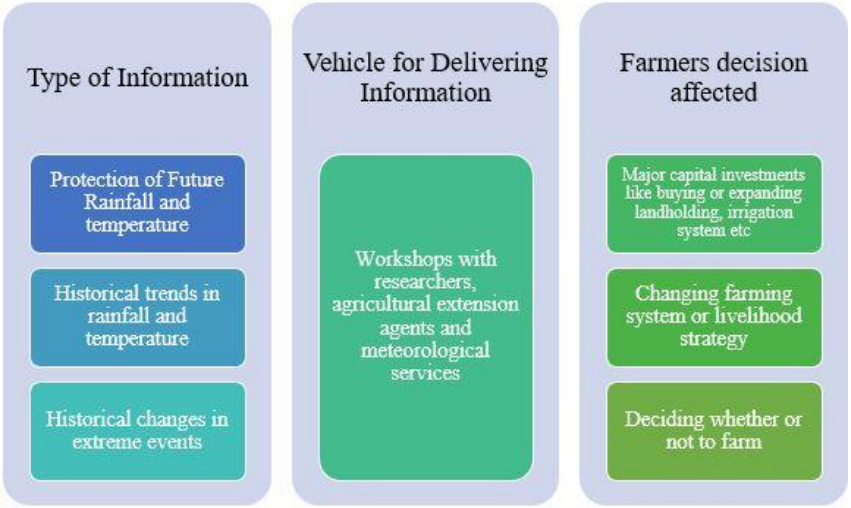

Figure 7: IllustratesDecision of Farmers Affected By the Change of Climate (From Years –Decades) - On The Basis Of Type of Information, Vehicle of Delivery Received and Farmers Decision on It

Figure 5 is a representation of the farmer's decisions based on the type and vehicle of information which is studied in days to weeks while Figure 6 gives the farmers decisions for the type and vehicle of information they received and is studied from months to years. Figure 7 presents the farmer's decisions that are studied from years to decades. Rainforest Alliance will always come in-front for the growth and application of climate smart farming. In 2020 sustainable agriculture quality, climate smart agriculture practice is playing a major role.Knowledge the adaptation to climate variation now—and preparing for future climate tremors—can mean the difference between surviving and perishing for smallholder farmers.

Conclusion

Agriculture is the largest industry to be known till now across the world in terms of farmland use, and it is the only source of human food with a global circulation of around 40% of available land. It is extremely important for the country's economic growth. Climate change would cause global temperatures to increase, which would have a direct negative impact on agricultural development, according to the scientific community.As a result, climate-smart agriculture is becoming increasingly common as a means of improving and securing the agricultural sector around the world. CSA stands for Community Supported Agriculture, and it refers to a range of practises that previously have been utilized in the field of ecologicalenvironmental science, preservation, climate variation, and farming. The three main goals of climate-smart agriculture are outlined as follows: a) Raising agricultural productivity to upsurgewages and food safety for farmers; b) Making farms more resilient to climate impacts by cumulative adaptive capability at various stages, such as farmland to country; and c) Reducing green-house gases emissions associated with agriculture.All the different pillars that are interlinked for achieving the Climate smart agriculture goals are- Productivity, adaption and mitigation. The major areas where the climate-smart agriculture can be implementedare-Crop Management, Soil Management, Pest and disease management etc. Challenges faced during the implementation of climate smart farming are- absence of applied awareness related to this methodology, absence of facts and suitablediagnosticinstrument, shortage of labour supply etc. To overcome these challenges climate-smart agriculture practice is widely and at all scale implemented with an advanced technical ability in a nation and is supported by institutions and several stakeholders and government in search to decrease all the major challenges associated with climate-smart agriculture as agriculture show a chiefpart in economic development of a nation and also comes first under the largest industry till known. It can also be used to detect and provide signals to the farmers so that they provide water for the crop growth.

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