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Climate Change Is a Real Fact confronting to Agricultural Productivity

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Abstract

Human activities contribute to climate change by causing changes in Earth's atmosphere in the amounts of greenhouse gases, aerosols (small particles), and cloudiness. There may be a vigorous growth of some crops in raised CO_2 conditions, but there is a trade-off because as temperature raises seed production may drop. Droughts and floods linked with rising temperature will likely affect some of the increased growth. Most of the crops till now eliminated and failure has been noticed. Shifting and endangering of the marginal crops is increasing rapidly which a big challenge and threats towards food security. Such changes could result in subsequent crop damage. So, with rising temperature diversity of herbivorous insects and their influence on plants increases generally. Greenhouse gases and aerosols affect climate by altering incoming solar radiation and out-going infrared (thermal) radiation that are part of Earth's energy balance. Changing the atmospheric abundance or properties of these gases and particles can lead to a warming or cooling of the climate system.

Keywords: Climate Change; Maize; Soybean; yield; GHG; Aerosols

Introduction

A significant change in the Earth's climate is occurring slowly and gradually and influencing life on the planet earth. Climate can be defined as "expected weather". When changes in the expected weather occur, we call these climate changes. They can be defined by the differences between average weather conditions at two separate times. Climate may change in different ways, over different time scales and at different geographical scales. In recent times, scientists have become interested in global warming, due to mankind's impact on the climate system, through the enhancement of the natural greenhouse effect. The Earth is currently getting warmer because people are adding heat-trapping greenhouse gases to the atmosphere. The term "global warming" refers to warmer temperatures, while "climate change" refers to the broader set of changes that go along with warmer temperatures, including changes in weather patterns, the oceans, ice and snow, and ecosystems around the world Imran et al. [1]. Climate refers to the average weather conditions in a place over many years (usually at least 30 years, to account for the range of natural variations from one year to the next). For example, the climate in Swat Pakistan (Especially upper swat) is cold and snowy in the winter, while Peshawar Pakistan climate is hot and humid.

The climate in one area, like the Swat or Peshawar, is called a regional climate. The regional climates have great importance in respect of agricultural productivity, food security, and livelihood. Recent studies have showed that plants and crop responded positively to reginal climate and showed ameliorating effect in term of grain yield, plant height, thousand grain weight, dry matter portioning, biological yield, oil yield, and quality of the crops Imran, Imran and Asad , Naveed, Khan, Baqa, Iqbal et al. 2-14]. The average climate around the world is called global climate. When scientists talk about global climate change, they're talking a pattern of changes happening around the world over many years. One of the most important trends that scientists look at is the average temperature of the Earth, which has been increasing for many years (Figures 1 & 2). Climate is the long-term statistical expression of short-term weather.

Ancient Expansion of Climate Science

The history of the scientific discovery of climate change began in the early 19*th* century when ice ages and other natural changes in pale climate were first suspected and the natural greenhouse effect first identified. In the late 19th century, scientists first argued that human emissions of greenhouse gases could change the climate. Many other theories of climate change were advanced, involving forces from volcanism to solar variation. In the 1960s, the warming effect of carbon dioxide gas became increasingly convincing. Some scientists also pointed out that human activity that generated atmospheric aerosols

(*e.g.,* "pollution") could have cooling effects as well. During the 1970s, scientific opinion increasingly favored the warming viewpoint. By the 1990s, as a result of improving fidelity of computer models and observational work confirming the Milankovitch theory of the ice ages, a consensus position formed: greenhouse gases were deeply involved in most climate changes and human caused emissions were bringing discernible global warming. Since the 1990s, scientific research on climate change has included multiple disciplines and has expanded. Research has expanded our understanding of causal relations, links with historic data and ability to model climate change numerically.

Research during this period has been summarized in the Assessment Reports by the Intergovernmental Panel on Climate Change. Climate change is a significant and lasting change in the statistical distribution of weather patterns over periods ranging from decades to millions of years. It may be a change in average weather conditions, or in the distribution of weather around the average conditions (such as more or fewer extreme weather events). Climate change is caused by factors that include oceanic processes (such as oceanic circulation), biotic processes, variations in solar radiation received by Earth, plate tectonics and volcanic eruptions, and human-induced alterations of the natural world. The latter effect is currently causing global warming, and "climate change" is often used to describe human-specific impacts.

Greenhouse Gases Effect and Global Warming

The Sun powers Earth's climate, radiating energy at very short wavelengths, predominately in the visible or near-visible (e.g., ultraviolet) part of the spectrum. Roughly one-third of the solar energy that reaches the top of Earth's atmosphere is reflected directly back to space. The remaining two-thirds are absorbed by the surface and, to a lesser extent, by the atmosphere. To balance the absorbed incoming energy, the Earth must, on average, radiate the same amount of energy back to space. Because the Earth is much colder than the Sun, it radiates at much longer wavelengths, primarily in the infrared part of the spectrum. Much of this thermal radiation emitted by the land and ocean is absorbed by the atmosphere, including clouds, and reradiated back to Earth. This is called the greenhouse effect Barnola, Samreen, Anwar, Khan, Imran et al. [3,6,11,12,15].

The glass walls in a greenhouse reduce air flow and increase the temperature of the air inside. Analogously, but through a different physical process, the Earth's greenhouse effect warms the surface of the planet. Without the natural greenhouse effect, the average temperature at Earth's surface would be below the freezing point of water. Thus, Earth's natural greenhouse effect makes life as we know it possible Battle, Imran, Barnola, Imran, Bender et al. [16-19].

It is wisely said that to solve a problem, first you must know and understand the problem. The findings revealed that they have had a hazy picture about the climate change and had many biases on the subject largely due to the news emanating from the local and international knowledge source. Climate change has happened in the past also and is a normal and natural process occurring in a cyclical manner due to changes in the planetary movements. As per the Milankovitch Cycle, there are three planetary movements viz., Obliquity, eccentricity, axial precession, and apsidal precession, which cause a major shift in the climate over a period of 41000, 100000, 26,000 and 112000 years, respectively (see Wikipedia for basic knowledge). But the current climate change is not normal and natural process, rather it is largely anthropogenic in nature Barnola, Imran, Imran, Asad, Imran and Asad, Naveed et al. [19-25].

Research over the past one century by scientific communities across the world has indicated that the alarming increase in the amount of different greenhouse gases (GHGs), which include carbon-di-oxide, methane, nitrous oxide, and water vapor in the atmosphere, has buttressed warming of the planet. It has also been discovered that there is a proportional change in the global temperature and GHGs released in the atmosphere and has caused the planet to warm by 1o Celsius in the last one century and is still continuing Ackremate and Stokes, Adskin, Barnett [26-28]. Among the GHGs, the share of carbon-di-oxide in global warming is highest due to its higher proportional release. The greenhouse effect caused by such gases, is though important to keep the planet congenial for living, as in the absence of 'normal warming' earth will become a cold planet. The excess of anything is detrimental so is the case with GHGs. The CO_2 levels today stands at 402 ppm and is further increasing at an alarming rate. Figure 1 explains how the release of CO_2 by various anthropogenic activities determines its concentration levels in the atmosphere. Figure 3 shows the rate of increment of different GHGs since 0 AD.

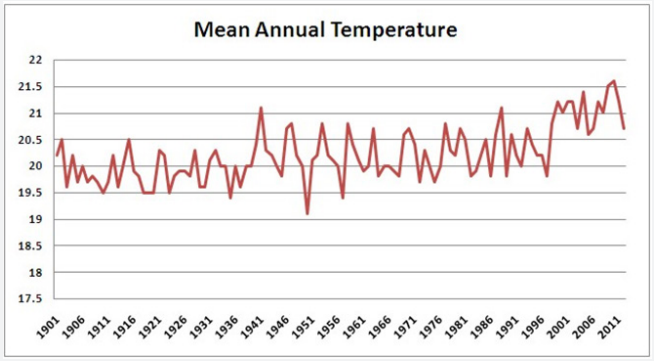

Figure 1: Increasing trends in Mean annual temperature (source, Pakistan Meteorological Department).

Difference between weather and climate, climate change and climate variability

a. Weather: The condition of the atmosphere at a particular place and time. Some familiar characteristics of the weather include wind, temperature, humidity, atmospheric pressure, cloudiness, and precipitation. Weather can change from hour to hour, day to day, and season to season.

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b. Climate: The average weather conditions in a particular location or region at a particular time of the year. Climate is usually measured over a period of 30 years or more.

c. Climate change: A significant change in the Earth's climate. The Earth is currently getting warmer because people are adding heat-trapping greenhouse gases to the atmosphere. The term "global warming" refers to warmer temperatures, while "climate change" refers to the broader set of changes that go along with warmer temperatures, including changes in weather patterns, the oceans, ice and snow, and ecosystems around the world Battle, Imran, Barnola, Imran, Bender et al. [2,15,17,18,29,30].

d. Climate variability and Global warming: An increase in temperature near the surface of the Earth. Global warming has occurred in the distant past as the result of natural causes. However, the term is most often used to refer to recent and ongoing warming caused by people's activities. Global warming leads to a bigger set of changes referred to as global climate change.

e. Weather vs. Climate: It is normal for the weather to change on a daily or even hourly basis. But when the average pattern over many years changes, it is a sign of climate change.

How climate change will affect Agricultural productivity

The global warming caused by climate change is likely to affect crops throughout the growth and development stages due to increased temperature, moisture stress, heat waves, the possible emergence of new major insect-pests and disease etc (Imran, Imran, Imran and Asad, Naveed, Imran Khan, Baqa, Iqbal, Islam, Iqbal et al. [5,3,31-35])Mungbean has high nutritive value, and due to this, has advantage over the other pulses known as king of the pulse crop. The seed contains 24.20% protein content, 1.30% fat, and 60.4% carbohydrates; calcium (Ca) is 118 and phosphorus (P) is 340 mg per 100 g of seed. Pulses are known as poor man's meat and cheap source vegetable protein containing 20–25% protein. Its production is very low in many regions due to miss management of the inputs. Therefore, if farmers implement more number of tillage practices as compared to conventional, so the nutrients demand will be fulfilled by the leached and adsorbed nutrients, away from root zone by pulverizing the soil with more number of, whereas the productivity of the soil will also increase with soft soil, promote root density, and will result in more number of nodules having more nitrogen fixation.

Effects on germination

Crop seeds germinate in a particular range of temperature. Increase in soil temperature by global warming will adversely affect germination and therefore crop stand (Khan, Baja, Iqbal, Islam,Iqbal et al, Samreen, Anwar, Khan, Imran et al [1,6,9,11,13,36])For example, groundnut which is a major crop of Saurashtra has an optimum temperature of 25-30oC for germination. Increase in temperature beyond this range during the sowing time will adversely affect crop germination (Imran, Imran and Asad, Naveed, Imran Khan, Baqa, Iqbal, et al. [3,4,6,7,12,37,38].

Canola cultivars positively responded to sulphur fertilization in term of seed yield and oil quality. Oscar cultivar increased seed yield 53% as compared to control plots. Sulphur @ 45 kg ha–1 increased seed yield, biological yield, and quality of rapeseed. Number of days to flowering (76), number of pods plant–1 372), number of seeds pod–1 (24), plant height (173 cm), biological yield (15547 kg ha–1), seed yield (2209 kg ha–1), index (19%), glucosinolate (µmol g–1) content (31.03 µmol g–1) and oil content (45.81%) was significantly with sulphur treated @ 45 kg ha–1 applied plots as compared to delayed flowering (78 days), shortest (151 cm), pods formation (298 pods), seed pod–1 (21), biological yield (11090 kg ha–1), seed yield (1436 kg ha–1), and oil content (42.62%) in control plots. Among cultivars "Oscar" ranked first in growth stages and attain more plant height (164 cm), and examined substantial number of pods plant–1 (359), seeds pod–1 (24), seed yield (2005 kg ha–1), biological yield (14298 kg ha–1), harvest index 17%, and oil content 46.29%) as compared to other sowed cultivars. On the basis of the result it is recommended that cultivar "Oscar" treated with sulphur @ 45 kg ha–1 should be applied for higher yield and quality of rapeseed under agro-climatic condition of swat valley.

Effects on growth and development

Temperature higher than the optimum range adversely affects growth and development of plants due to harmful effects on plant metabolic activities. The rate of photosynthesis may get more sluggish as the temperature increases due to closure of stomata. Besides, higher temperature enhances the rate of evapo-tranpiration causing moisture stress in plants under rain-fed situations. Also at higher temperature the dry matter accumulation becomes less.shoot cutting duration after date of sowing (ADS), (no cutting, 30 days ADS, 40 days ADS, 50 days ADS and 60 days ADS) were used in the experiment with the test cultivar Dunked. From the results it is observed that rapeseed cultivar positively responded for days to flowering, days to maturity, number of branches plant-1, H.I %, number of seeds pod-1, seed weight (g), biological yield (kg ha-1), seed yield (kg ha-1) and oil yield (kg ha-1) to bio char levels maximum seeds pod-1 (23 seeds), thousand seed weight (3.59 g), biological yield (10310 kg ha-1), seed yield 1169 kg ha-1) and oil yield (600 kg ha-1) was observed in plot treated with 10 ton bio char ha-1. Whereas minimum seeds pod-1 (15 seeds), thousand seed weight (2.41 g), biological yield (6725 kg ha-1), seed yield (923 kg ha-1) and oil yield (401 kg ha-1) was recorded in control plot.

Similarly highest seeds pod-1(22), thousand seed weight (3.3 g), seed yield (1099 kg ha-1) was noted in no shoot cutting plot followed by shoot cutting after 60 days of sowing ADS plots while promising biological yield (9025 kg ha-1), and oil yield

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(568 kg ha-1) was recorded in shoot cutting after 50 days ADS and after 60 days ADS of sowing. On the basis of the result it was concluded that shoot cutting with 10 ton biochar ha-1 produced highest seed and oil yield with green chop and recommended for higher seed, oil and biological yield in the agro- climatic condition of swat valley.

Effects on reproduction

Higher temperature has harmful effects on flowering, pollination, fruit setting, and maturation. Higher temperatures may increase flower and fruit dropping in some crops, and cause stigma and pollens to dry (Imran, Imran and Asad, Naveed, Imran, Khan,et al. [1,5,6,12,24,39]. The anthelmintic activity was very significant against the tested earthworms. Leaf extracts of *Iphionagrantioides* and *P.argutaat* dose of 100 /ml caused death of the worms in 3.33 ±0.57 and 2.16±0.28 minutes, respectively, which is similar to the effect produced by commercial anthelmintic drug, Piperazine Citrate. indicated that both the plants have significant antilice potential by showing 100% lice mortality in case of *Iphionagrantioides* leaf followed by its flower (96.67%) and of *Plucheaargutaby* causing93.33 % lice mortality. *Iphionagrantioides* showed excellent insecticidal (90%) activity against *Callosobruchusanalis,Rhyzoperthadominica,Sitophilusoryzae* and *Triboliumcasteneum*. *Plucheaargutaleaf* exhibited significant activity against all the tested insect species.

The results also depicted excellent effect of both the plants by inhibiting growth of *Lemna minor*. Plant extracts of the plants displayed significant cytotoxicity against brine shrimps. The LD 50 values for all the crude extracts of *Iphiona grantioides* and *Pluchea arguta subsp. glabra* were found to be 34.65, 242.83, 6.21, 29.92 ug/ml and 0.02, 0.03 and 84.66 ug/ml respectively. The present studies showed that ethanolic extracts of *Iphionagrantioides* and *Plucheaargurasubsp. glabrarevealed* significant potential regarding anthelmintic, antilice,insecticidal cytotoxic and phytotoxic activity and these plants could be exploited for herbal drugs exploration for the health care of mankind.

Effects on crop duration

The increase in temperature will speed the maturity, so cutting the total duration of the crop. It will result in lower dry matter accumulation and lower yield. The effect of nitrogen on days to flowering was significant. With increase in nitrogen level significant delayed were noted in days to flowering. Plots treated with different decapitation stresses delay days to flowering as compared to plots. The interaction between nitrogen levels and decapitation stress on days to flowering were also found significant with 100 kg nitrogen level and 5 cm decapitation stress shows maximum (111) days to flowering. This might be due to maximum nitrogen enhances vegetative growth and delayed reproductive phase. This statement are supported by Ahmadi and Bahrani (2009) who's reported the effect of nitrogen levels and concluded that highest N level enhanced plant height, number of branches plant-1and maximum days to flowering.

Effects on crop productivity

Lower plant stand due to poor germination, low dry matter accumulation, adverse effects on flowering and fruiting, reduced crop duration caused by an increase in temperature will ultimately reduce the crop yield. Still, in case of C3 plants the enhanced level of CO_2 may result in higher rate of photosynthesis and increase yield. But such effects of CO_2 fertilization may get negated due to higher temperature and moisture stress caused by climate change (Imran, Barnola, Imran, Imran and Asad, Imran and Asad, et al. [1,5,28,11,40-44]) A study have been reported that regional climate is very important for an ideal crop growth and production. Table 1&2 shows five different crop average yield grown and different elevation and topography with different rainfall pattern and temperature. Difference in the average temperature of a locality have significant effect on crop growth, yield and productivity.

Table 1: The averages yield data (kg k-1) of different vegetables in Madyan, Behrain and Kalam.

Vegetables	Union Councils			Mean (kg)
	Madyan	Behrain	Kalam	
Tomato	936.0kg	996.6kg	1026.8kg	986.46
Cucumber	1049.7kg	1093.8kg	1124.8kg	1089.43
FrenchBean	784.6kg	719.8kg	740.0kg	748.13
Squashes	878.6kg	894.3kg	888.3 kg	887.06
Peas	456.8kg	482.1kg	462.8 kg	467.23

Table 2: The Area (Kanals) covered by each crop in Madyan, Behrain and Kalam

Vegetables	Area in kanals			Total area
	Madyan	Behrain	Kalam	
Tomato	38	137	10	185
Cucumber	17	44	42	103
FrenchBean	54	136	35	225
Squashes	01	39	22	62
Peas	09	04	12	25
Total	119	360	121	600

Relationship Of Carbon and Water Cycle With Climate Change

Water and Carbon Cycles

Cycling of carbon and water are central to supporting life on earth and an understanding of these cycles underpins some of the most difficult international challenges of our times. Both these cycles are included in the core content elements of the specifications for A Level geography to be first taught from 2016. Whether we consider climate change, water security or flood risk hazard an understanding of physical process is central to analysis of the geographical consequences of environmental change. Both cycles are typically understood

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within the framework of a systems approach which is a central concept to much physical geographical enquiry. The concept of a global cycle integrates across scales. Systems theory allows us to conceptualise the main stores and pathways at a global scale. The systems framework also allows for more detailed (process detail) and local knowledge to be nested within the wider conceptual framework. Local studies on aspects of hydrology or carbon cycling can be understood as part of a broader attempt to understand in detail the nature of water and carbon cycling.

Global environmental challenges frequently excite student interest in physical geography but it can be difficult for students to see how they can conduct relevant investigations of fieldwork given the large scale and complexity of the issues. By embedding their knowledge within systems framework students can understand how measurements and understanding derived from their own fieldwork and local studies contribute to the wider project of elucidating the cycling of water and carbon at the global scale. This capacity to link scales means that the study of biogeochemical cycles is intrinsically geographical so that students can understand how processes operate in, and impact upon particular places and how they are distributed in space.

The Water Cycle

Water is present in three phases on earth, as liquid water, as ice and as atmospheric moisture. At the global scale there are stores of water in all three phases. Liquid water dominates with about 98% of water in liquid form; predominantly in the oceans (Table 1) Water is cycled between these stores by a range of key processes as identified in (Figure 2). The mean residence times for various stores vary both with the size of the store (larger stores take longer to turn over) and with the rate of the processes which move water between stores (for example surface runoff is relatively rapid but groundwater flows are much slower so that groundwater residence times can be high).

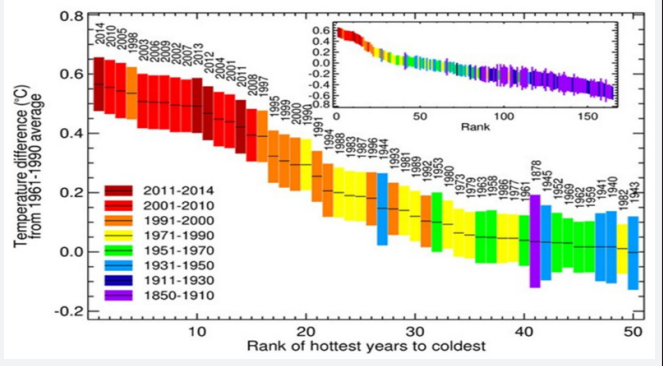

Figure 2: Average temperature difference from 1961 to 1990 (source, Pakistan Meteorological Department).

The Carbon Cycle

Cycling of the element carbon is intimately associated with life on earth. Carbon is present in carbon based molecules that are integral to all living creatures, as carbon dioxide and methane in the atmosphere, in carbonate rocks in the lithosphere and as organic molecules in soils and sediments which are derived from formerly living material. Major carbon stores include the ocean, ocean sediments, soils, bedrock, vegetation and the atmosphere. Atmospheric carbon has become a major policy focus because of the role of carbon dioxide and methane as greenhouse gasses. The magnitude of the major stores and the way in which they are connected by key processes is illustrated in (Figure 3) which is taken from the Inter-governmental Panel on Climate Change (IPCC). This diagram indicates significant anthropogenic perturbations of the carbon cycle since 1750AD. About 90% of anthropogenic carbon release comes from combustion of fossil fuels with the remainder driven by land use change. Of the anthropogenic CO_2 released to the atmosphere about 24% is absorbed by the oceans and 26% is taken up by plants. Global CO_2 concentrations have increased from less than 320 ppm in 1960 to around 400 ppm at present (see Earth System Research Laboratory website.

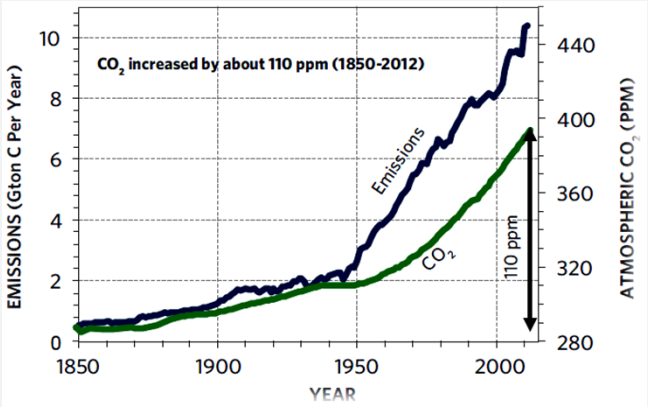

Figure 3: Relationship of global carbon emissions and Co_2 concentrations on earth (data from CDIAc and from Etheridge et al., 1998).

Carbon is a ubiquitous element on Earth. Most of the Earth's carbon is stored in rocks, but this carbon is essentially inert on the 100's to 1000's year timescales of interest to humans.

The rest of the carbon is stored as CO_2 (carbon dioxide) in the atmosphere (2%), as biomass in land plants and soils (5%), as fossil fuels in a variety of geologic reservoirs (8%) and as a collection of ions in the ocean (85%). These are the "active" reservoirs of carbon of interest in this website. The Earth is warmed by the Sun. This warmth is returned from Earth to the atmosphere in the form of heat radiation. Many gases in the atmosphere, including CO_2, absorb the Earth's heat energy and radiate in all directions. The energy radiated downward warms the surface and lower atmosphere. Adding more CO_2 to the atmosphere means more heat radiation is captured by the atmosphere and radiated back to Earth. Methane, CH4, is another very important greenhouse gas that is part of the carbon cycle. This website addresses only CO_2. Humans add CO_2 to the Atmosphere, Nature removes about half of it.

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In the 1990's, humans added 8.0×10^{15} grams of carbon (10^{15} grams of carbon = 1 PgC) to the atmosphere each year, primarily by burning fossil fuels (6.4 PgC/yr) and clearing land in the tropics (1.6 PgC/yr). The ocean took up 28% of this carbon, and the land absorbed 32%. Only 40% remained in the atmosphere to cause climate warming. Natural processes are significantly damping the rate of carbon accumulation in the atmosphere. From 2000-2008, humans added 9.1 PgC to the atmosphere each year, 7.7 PgC/yr from fossil fuels and 1.4 PgC/yr from land use change. There is some evidence that a larger fraction of these recent emissions has remained in the atmosphere (45%). Future climate warming depends on both the CO_2 source from human emissions and the CO_2 sink from natural sinks in the ocean and the terrestrial biosphere.

Carbon Cycle

The Basics Carbon is transferred between CO_2 and living or dead organic material by the very basic photosynthesis / respiration reaction (shown here in simplified form).

$$CO_2+H_2O+energy <=> CH_2O + O_2$$

When this reaction proceeds to the right, it is the fixation of carbon to organic matter by plants via photosynthesis; and when it proceeds to the left, it is respiration or combustion of that organic matter. Fossil fuels are the remnants of dead organic matter that lived millions of years ago.

The Global Carbon Cycle

The carbon cycle is a complex system of biological, chemical and physical processes. A schematic from the IPCC AR4 report is shown here. The schematic shows the major reservoirs of carbon in gigatons of carbon, GtC (1 GtC = 1 PgC: Petagram of Carbon) and the major fluxes in GtC/yr. The numbers shown are the best estimates for the 1990's.

Climate change impacting the water cycle?

Climate change increases our risk of both heavy rains and extreme droughts. But why - and how? Science has shown that climate change touches every corner of our planet's ecosystem, and the water cycle is no exception. Because the processes involved are highly dependent on temperature, changes in one have consequences on the other. Specifically, as global temperatures have steadily increased at their fastest rates in millions of years, it's directly affected things like water vapor concentrations, clouds, precipitation patterns, and stream flow patterns, which are all related to the water cycle (Lal, Trembert et al. [45,46] So how does climate change impact the water cycle? We've created an info graphic below that illustrates what's going on, but we'll describe it here too.

Put simply, water evaporates from the land and sea, which eventually returns to Earth as rain and snow. Climate change intensifies this cycle because as air temperatures increase, more water evaporates into the air. Warmer air can hold more water vapor, which can lead to more intense rainstorms, causing major problems like extreme flooding in coastal communities around the world. But it doesn't end there. At the same time that some areas are experiencing stronger storms, others are experiencing more dry air and even drought. Like we mentioned above, as temperatures rise, evaporation increases and soils dry out. Then when rain does come, much of the water runs off the hard ground into rivers and streams, and the soil remains dry.

For each plant variety, there is an optimal temperature for vegetative growth, with growth dropping off as temperatures increase or decrease. Similarly, there is a range of temperatures at which a plant will produce seed. Outside of this range, the plant will not reproduce. As the graphs show, corn will fail to reproduce at temperatures above 95°F and soybean above 102°F (Figures 4 & 5).

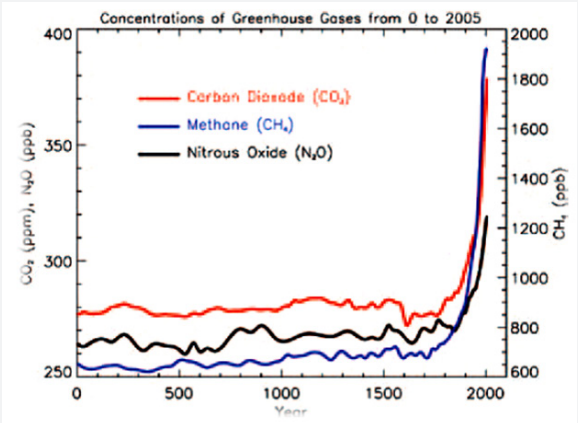

Figure 4: Concentration levels of different greenhouse gases: A trend over the past (Source: U.S. Global Climate Research Program, National Research Council of The National Academies of Sciences, 2011).

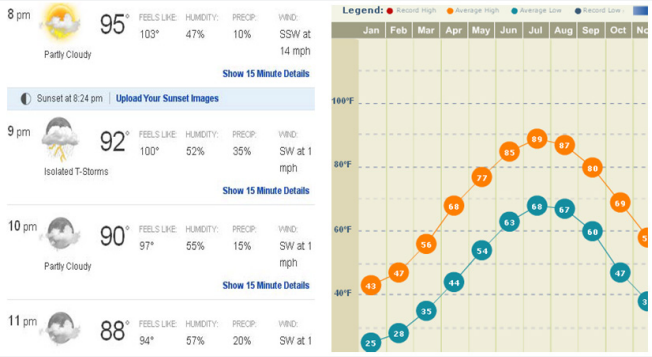

Figure 5: Schematic view of the weather and Climate difference.

Anthropogenic Activities Leading to Climate Change

Human activities contribute to climate change by causing changes in Earth's atmosphere in the amounts of greenhouse gases, aerosols (small particles), and cloudiness. The largest known contribution comes from the burning of fossil fuels, which releases carbon dioxide gas to the atmosphere. Greenhouse gases and aerosols affect climate by altering incoming solar

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radiation and out-going infrared (thermal) radiation that are part of Earth's energy balance lock wood et al. [47]. Changing the atmospheric abundance or properties of these gases and particles can lead to a warming or cooling of the climate system. Since the start of the industrial era about et al. [48], the overall effect of human activities on climate has been a warming influence. The human impact on climate during this era greatly exceeds that due to known changes in natural processes, such as solar changes and volcanic eruptions (Figure 6).

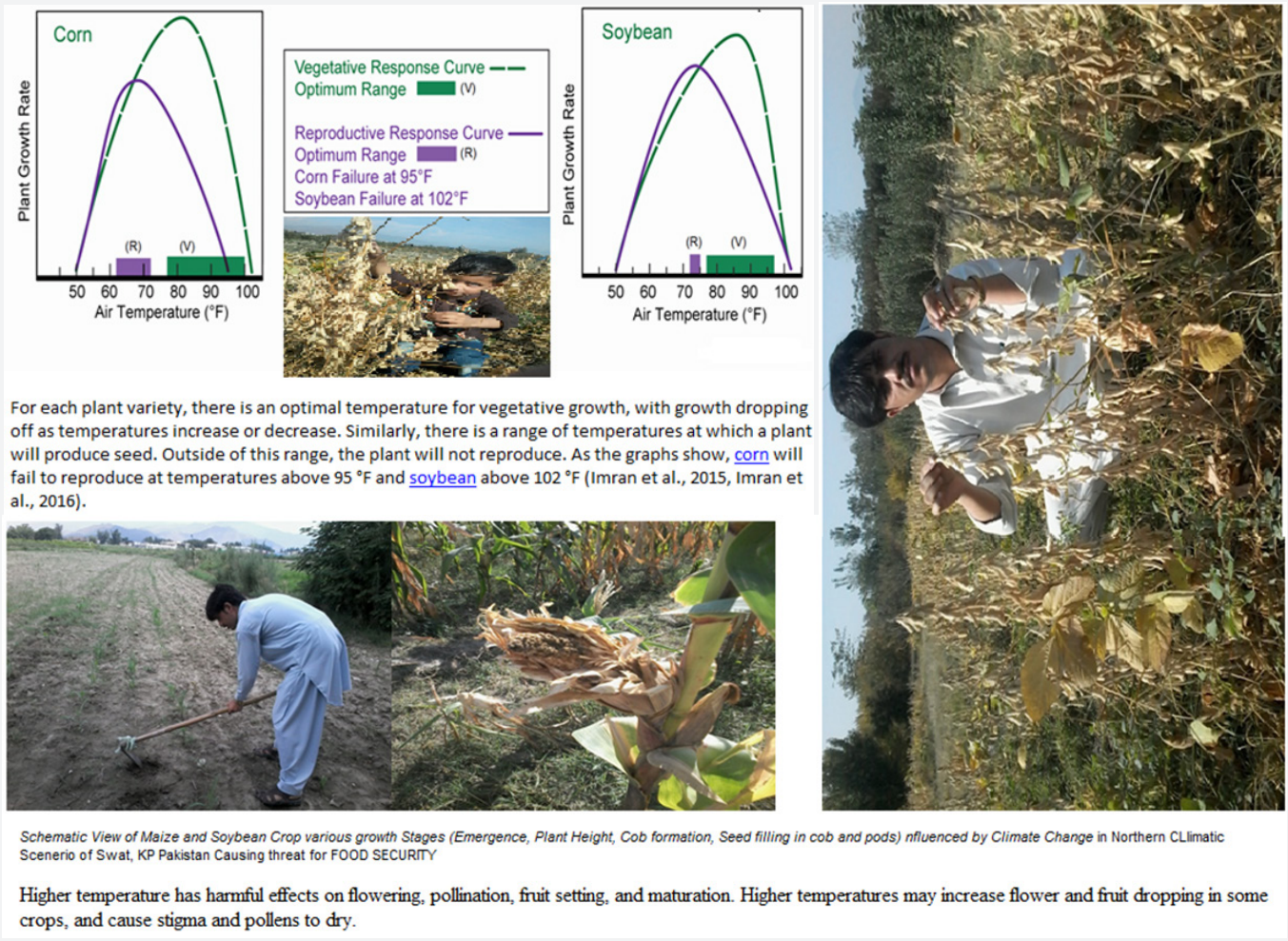

Figure 6: Then when rain does come, much of the water runs off the hard ground into rivers and streams, and the soil remains dry.

However, human activities, primarily the burning of fossil fuels and clearing of forests, have greatly intensified the natural greenhouse effect, causing global warming Marengo [49] .The two most abundant gases in the atmosphere, nitrogen (comprising 78% of the dry atmosphere) and oxygen (comprising 21%), exert almost no greenhouse effect. Instead, the green house effect comes from molecules that are more complex and much less common. Water vapor is the most important greenhouse gas, and carbon dioxide (CO_2) is the second-most important one. Methane, nitrous oxide, ozone and several other gases present in the atmosphere in small amounts also contribute to the greenhouse effect. In the humid equatorial regions, where there is so much water vapor in the air that the greenhouse effect is very large, adding a small additional amount of CO_2 or water vapor has only a small direct impact on downward infrared radiation. However, in the cold, dry Polar Regions, the effect of a small increase in CO_2 Shaw et al. [50].

Conclusion

The effect of climate change is not limited to water availability and uneven rainfall distribution only but it also intensify floods leads to dampen soil, cause storms and also increase the air temperature which increase the risk of drought and affects various agronomic crop yields and thus the food security and worsens the human living environments. Therefore, a well-coordinated program is necessary to create awareness among different sections of the society including the policy makers, general public, organizations, industrialists and farmers

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to sustain the food security and the environment in the days to come where climate change has to be experienced round the world.

References

1. Imran (2015) Effect of Germination on Proximate Composition of Two Maize Cultivars. J Bio Agric and H care 5(3):123-128.
2. Imran(2015) Influence of Nitrogen Levels and Decapitation Stress on Biological Potential of Rapeseed (Brassica Napus L) under Water Deficit Condition of Swat-Pakistan. J N Sci Res 4(3): 296-301.
3. Imran, Asad Ali Khan, Inamullah Inam, Fayaz Ahmad (2016) Yield and yield attributes of Mungbean cultivars as affected by phosphorous levels under different tillage systems, Cogent Food & Agriculture Vigna radiata L 2(1): 1151-1182.
4. Imran, Asad Ali Khan AA,Russ Agricult Sci (2017).
5. Naveed, Muhammad Ibrar, Inayat Khattak, Imtiaz Khan, Imran (2016), Anthelmintic Antilice Insecticidal, Cytotoxic and Phytotoxic Potential of Ethanolic Extracts of Two Wild Medicinal Plants *Iphiona grantioides* and Plucheaarguta. J Woulfenia (23) 11: 13-25.
6. Khan AZ, Imran, Asim Muhammad, Aiman Khalil (2016) Impact of fertilizer priming on seed germination behavior and vigor of maize. Pure and Applied Biology 5(4): 744-751.
7. Baqa, Amir Zaman Khan, Inamullah, Imran (2015) Influence Of Farm Yard Manure And Phosphorus Application On Yield And Yield Components Of Wheat. J Pure & Applied biology 4(4): 458-464.
8. Iqbal MT Jan, Imran, Zar M AA, Khan S (2015) Growth and phenology of maize as affected by integrated management of compost and fertilizers Nitrogen J Pure & Applied biology 5(1):58-63.
9. Islam M, Shazma Anwar, Saqib Bashir (2015) Growth and Yield Components of Wheat Varieties As Affected By Dual Purpose Practices. J Pure & Applied biology. 4(4): 491-496
10. Iqbal, Muhammad Tariq Jan, Inamullah, Imran (2015) Integrated management of compost type and fertilizer-N in Maize. N In Maize. J Pure & Applied biology 4(4): 453-457.
11. Samreen, Muhammad Ibrar, Lalbadshah, Shahida Naveed, Imran et al. (2016) Ethnobotanical study of subtropical hills of Darazinda, Takht-e-Suleman range F.R D.I. Khan, Pakistan. Pure and Applied Biology 5(1): 149-164.
12. Anwar, Israeel, Babar Iqbal, Asad Ali Khan, Imran, et al. (2016) Nitrogen and phosphorus fertilization of improved varieties for enhancing phenological traits of wheat. Pure and Applied Biology 5(3): 511-519.
13. Khan A A, Khan I uallah, Shah I R, Arshad (2015) Effect of potash application on growth, yield and yield components of spring maize hybrids. Pure and Applied Biology 4 (2):195-203.
14. Imran AA Khan, IU Khan S, Naveed (2016) Weeds density and late sown maize productivity influenced by compost application and seed rates under temperate environment.Pak J Weed Sci. Res 22(1): 169-181.
15. Barnola JM, D Raynaud, YS Korotkevich, C Lorius (1987) Vostokice core provides 160,000-year record of atmospheric CO_2. Nature 329: 408-414.
16. Battle M (1996) Atmospheric gas concentrations over the pastcentury measured in air from firmat South Pole. Nature 383: 231-235.
17. Imran, Shahida Naveed, Asad Ali Khan, Inayat Khattak (2015) Impact Of Phosphorus Levels And Seed Rates On Growth And Yield Of Late Sown Maize On High Elevation In Swat, Pakistan. Pakistan J Agric Res 28(4): 406-413.
18. Bender M (1996) Variability in the O-2/N-2 ratio of southernhemisphere air, 1991-1994: Implications for the carbon cycle. GlobalBiogeochem. Cycles 1: 9-21.
19. Berger A, MF Loutre, H Gallée (1998) Sensitivity of the LLNclimate model to the astronomical and CO_2 forcings over the last 200kyr. Clim Dyn 14: 615-629.
20. Imran AA Khan, I Ullah, H zada, F Ahmad, ST Shah et al. (2015) Yield and yield attributes of rapeseed cultivars as influence by sulfur level under swat valley conditions. J Pure & Applied biology 4 (3).
21. Imran I, Hussain I, khattak A, Rehman F, Ahmad (2015) Roots nodulation, yield and yield contributing parameters of mungbean cultivars as influenced by different phosphorous level inswat-Pakistan. J Pure & Applied biology 4 (4): 557-567.
22. Asad A K, Imran Fawad Ali Shah Inamullah, Laiq Zada Muhammad Naeem Muhammad Nouman Khan (2015) Phenological Traits of Rice as Influenced by Seedling Age and Numberof Seedling per Hill under Temperate Region. J Bio Agric and H care 5(3): 143-145.
23. Imran, Asad Ali Khan, Kashif Akhtar, Sajjad Zaheer (2015) Rice Seedling Characteristics of Various Genotypes Influenced by Different Sowing Dates in Swat-Pakistan. J Environ and E. Science 5(1): 2224-3216.
24. Iqbal, Bashir Ahmad, Imran, Asad Ali Khan, Shazma Anwar, Asad Ali (2016). Effect of phosphorus, sulphur and different irrigation levels on phenological traits of Triticale. Pure and Applied Biology 5(2): 303-310.
25. Imran, Zada H, Naveed S, Khattak I ,Ahmad S (2016) Variable Rates Of Phosphorous Application Influenced Phenological Traits Of Green Gram Vignaradiata L 1(3): 000113.
26. Ackerman T, G Stokes (2003) The Atmospheric Radiation Measurement Program. Phys. Today 56: 38-44.
27. Adkins JF, Hai Cheng, Edward A Boyle, Ellen RM Druffel, R Lawrence Edwards (1998) Deep-sea coral evidence for rapid change inventilation of the deep North Atlantic 15,400 years ago. Science, 280,725–728.
28. Barnett TP, Hasselmann K, Chelliah M, Delworth T, Hegerl G et al. (1999) Detection and attribution of recent climatechange: A status report. Bull. Am Meteorol Soc 80(12): 2631-2660.
29. Imran AA Khan, Inamullah, Luqman (2015) Weeding stages and their effect on yield and yield components of rice in upper Swat Pakistan. Pak J Weed Sci Res 21(4): 555-563.
30. Imran, Asad ali khan, Inamullah, Hayat Zada (2015) Phenological Characteristics of Brassica Napus L. as Influenced by Biochar Application and Shoot Cutting Duration (Days). Civi and Environ Res 4(3): 296-301.
31. Imran I, Khattak I, Hussain A, Rehman S, Anwar F, Ahmad (2015) Growth and Yield of Maize Hybrids as effected by different Sowing Dates in Swat Pakistan. J Pure & Applied biology 5 (1):114 -120.
32. Imran, Asad Ali Khan, Fayaz Ahmad (2017) Phenology of Various Rice Genotypes as Affected by Different Transplanting Dates under Cold Climatic Region of Khyber Pakhtunkhwa-Pakistan. J Environ 5(3):119-112.
33. Imran, Asad Ali Khan, Fayaz Ahmad, Irfanullah (2015) Influence of Hydrated Calcium Sulphate (CaSO4.2H2O) and Nitrogen Levels on Water Infiltration Rate and Maize Varieties Productivity in Rainfed Area of Swat, Pakistan. Chem and Envrn Res 7(3): 15-17.
34. Imran(2015) Influence of Nitrogen Levels and Decapitation Stress on Biological Potential of Rapeseed (Brassica Napus L) under Water Deficit Condition of Swat-Pakistan. J N Sci Res 4(3): 296-301.
35. Iqbal A, Amanullah, Ali A, Iqbal M, Ikramullah, et al. (2017) Integrated use of phosphorus and organic matter improve fodder yield of moth

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bean (Vigna aconitifolia (Jacq.) under irrigated and dryland conditions of Pakistan. Journal of AgriSearch 4(1): 10-15.

36. Iqbal, Mohammad Tariq Jan, Zar Muhammad, Asad Ali Khan, Shazma Anwar, et al. (2016) Phenological traits of Maize influenced by integrated management of compost and fertilizer Nitrogen. J Pure Applied biology 5(1): 58-63.

37. Imran, Muhammad Uzair, Fazal Maula, Marco Vacirca Khan (2015) Introduction and promotion of off-season vegetables production under natural environment in hilly area of upper swat-Pakistan. J Bio Agric 5 (11): 491-496.

38. Imran Asad Ali Khan, Fayaz Ahmad, Irfanullah (2015) Nitrogen Levels, Tillage Practices and Irrigation Timing Influenced Yield, Components And Oil Contents Of Canola. CivI and Environ Res7(3): 1-8.

39. Imran, Asad Ali Khan, Irfanullah (2014) Production potential of rapeseed As influenced by different nitrogen levels and decapitation stress under the rainfed agro-climatic condition of swat Pakistan, J Glob. In novo 2(3): 112-115.

40. Imran, Asad Ali Khan (2015) Grain Yield and Phenology of Maize Cultivars Influenced by Various Phosphorus Sources Food Sci and Quality Management.

41. Imran, asad ali khan (2015) Biochar Application and Shoot Cutting Duration (Days) Influenced Growth, Yield and Yield Contributing Parameters of Brassica Napus L J Bio Agric and H. care 5 (5): 1-6.

42. Imran, Asad Ali Khan (2015) Influence of Compost Application and Seed Rates on Production Potential of Late Sown Maize on High Elevation in Swat-Pakistan. J Environ and E Science 5(5): 36-40.

43. Imran, Fazal Maula, Muhammad Uzair, Hayat Zada (2015) Farmers Income Enhancement through Off-Season Vegetables Production under Natural Environment in Swat-Pakistan J Environ and E Science 5(5): 58-64.

44. Imran, Asad Ali Khan, Hayat Zada, Fayaz Ahmad and Irfanullah (2015) Graine Yield and Yield Components of Wheat Cultivar"Siran 2010" As Affected By Phosphorous Levels under Rain fed Condition. J N Sci Res 4(4): 491-496.

45. Lal R (2001) Potential of Desertification Control to Sequester Carbon and Mitigate the Greenhouse Effect. Climatic Change 51(1): 35-72.

46. Trenberth KE, Smith L, Qian T, Dai A, Fasullo J (2007) Estimates of the Global Water Budget and its Annual Cycle Using Observational and Model Data. J. Hydrometeor 8: 758-769.

47. Lockwood J, Atmospheric Moisture, Holden J (2012) An introduction to Physical Geography and the Environment Pearson, Harlow PP. 875.

48. Abbot CG (1910) The solar constant of radiation. Smithsonian InstitutionAnnual Report PP. 319.

49. Marengo J (2006) On the hydrological cycle of the Amazon Basin: a historical review and current state of the art Revista Brasileira de Meteorologia 21(3): 1-19.

50. Shaw EM, Beven KJ, Chappell N, Lamb R (2010) Hydrology in Practice. CRC Press London.

DOI: 10.19080/IJESNR.2017.03.555613

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