Investigating the Effect of Ozone Layer Depletion on Chlorophyll

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Abstract: **In this communication, the effect. of ozone layer depletion on the chlorophyll of the plants under observation has been studied. Ozone absorbs the specific range of ultraviolet radiation (UV) reaching the earth's surface. Data for two samples was selected for analysis. One set of data used to measure chlorophyll fluorescence before expose to UV termed as number of chlorophyll fluorescence before exposure (NOCFBEX) and second set of data utilized to measure chlorophyll fluorescence solar exposure that is indicated by number of chlorophyll fluorescence solar exposure (NOCFSEX). It has been observed that the process before exposure is quite acceptable, that the chlorophyll is maximum and varying with the number of time of observations. In the second case, the minimum chlorophyll has been exhibited due to the disorder in the chlorophyll nature and the process becomes non-stationary. Quantification of the chlorophyll fluorescence of the leaves of the plant under observations has been interpreted. As a result of UV-B exposure trend equations exhibit the existence of non-stationary and stationary in the leaves**

Index Terms: **Ozone layer depletion, ultraviolet-B effects on chlorophyll**.

1. INTRODUCTION

Leave of plant contains chlorophyll that is used in the study of effect of ultraviolet-B. The chlorophyll fluorescence appeared in green colour and estimated the number of chlorophyll contents. Chlorophyll takes part in the process of photosynthesis to require nourishing the cell and ordering. Stratosphere Ozone exists about nearly 25km to 35km height from the sea level and uses a shield and filter to ultraviolet-B. There is no doubt that UV-B increase on the integrated ecosystem [1] Study of individual species of plant leaves should exhibit complete set of investigation but one of the intriguing results consist of different samples of plants within a given species to produce the consequence of UV-B radiation [2].UV-B is weaker in the field condition than in hot house in situ measurements where the plants were exposed to UV-B lamp [3]. Ozone absorbs almost all solar ultraviolet (UV) radiation of wavelength less than ~320nm and prevents the harmful radiation from arriving at the earth surface

Without the protection of the "Ozone Shield" even a lower living thing organisms like animal, plants etc could not survive, since the harmful solar UV radiation would destroy **Chromosomes** in the cell nucleus The proper amount of UV radiation produced the vitamin D in the human body but excess exposure results in harmful effects such as sunburn and skin cancer. Thus, the amount of stratospheric ozone should change life on earth as we know it would change. There are several human activities that may cause significant changes in the stratospheric ozone; these include NO_x (nitrogen oxide) emission from aircraft, the release of chlorofluoro-methanes (CFM) from aerosol spray cans and refrigerators, and increase of N_2O (nitric oxide) in the stratosphere due to fertilizing fields.

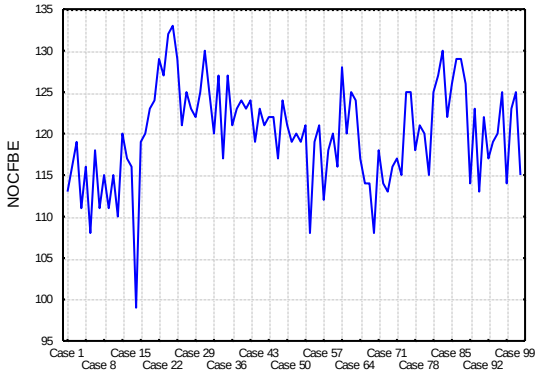

Figure 1.time plot of chlorophyll fluorescence of sample of NOCFBE illustrate stationarity the behavior

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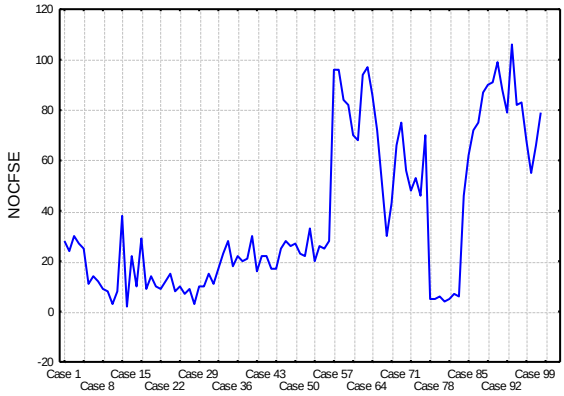

Figure 2.The temporal variation of chlorophyll fluorescence of NOCFSE

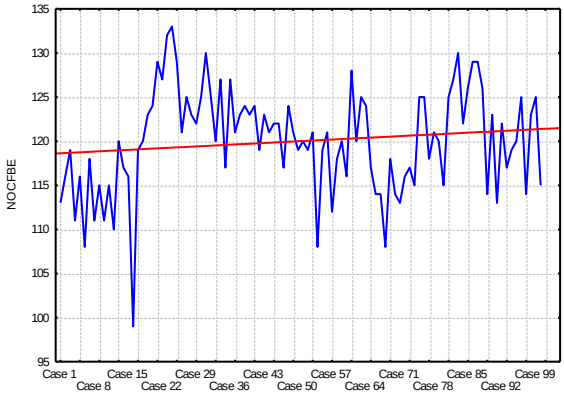

Figure.3 The trend line model showing the stationarity

$$Y_{NOCFBE} = 118.606 + 0.0278 * x$$

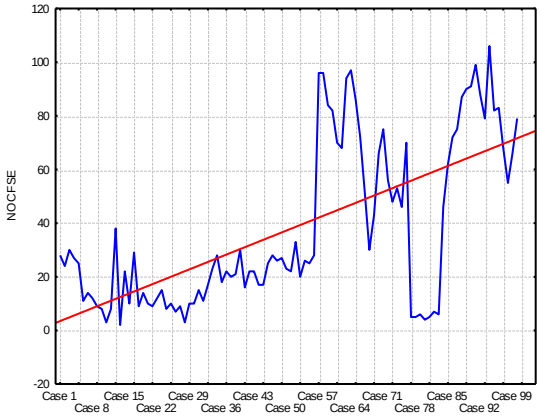

Figure 4.The trend model of non-stationary

$$Y_{NOCFSE} = 2.8048 + 0.6884 * x$$

II PRESENT APPROACH AND RELATED ANALYSIS

Figure no.1 and 2 are the time plot distribution of samples NOCFBE and NOCFSE. The graph no. 3 shows the chlorophyll fluorescence of the fresh plant leaves, which has stationary trend. But these leaves are exposing under the open field of solar radiation and become the non-stationary shown in graph no.4. The behavior of residual relatively changes from stationary to non-stationary and specific set of transformation exist in the data distribution [4].The trend equation of these samples is distinguishable with the slope line value and quantitatively fluctuation of chlorophyll fluorescence of the samples distribution. The Photo-chemical reaction system I and II of photosynthesis depend on specific wavelength of light harvesting pigment that is P-700 and P-680 respectively. It is used to activate the reactant substance that is **sensitizer**, which absorbs the light and makes it available to the system. Spectrum of solar radiation is considered in ultraviolet-B range, which plays major role in photosynthesis process radiation to be effective in photosynthesis process. If reduction in Ozone is found, the UV-B radiation showed pass vertically across it and reaches surface of earth. This gradually increases the UV-radiation on the surface. It can have destructive plant life like chloroplast contents harvesting chlorophyll and aquatic ecosystem. An approximate rule of thumb is that a one percentage (1%) decrease in stratosphere Ozone lost causes two percentage (2%) increase in UV-B [5].Splitting of water in visible light spectrum ranges of quantum energies between 3.1eV to 3.6eV.During the process of photosynthesis into hydrogen (H^+) and hydroxyl (OH^-) ions at chlorophyll stimulates an electron to produced the transition of energy from Photosystem II to Photosystem I and chlorophyll molecules become neutral [6].During this process, hydroxyl ions donates an electron to chlorophyll and made free radical of OH. This will result in production of water and oxygen [7]. Therefore, an electron derived from the hydroxyl ion is transported to the chlorophyll via an electron carrier system as in cyclic photophosphorylation.

$OH^- + \text{Chlorophyll} \rightarrow \text{Chlorophyll} + OH$

$4(OH) \rightarrow 2H_2O + O$

In conclusion, we can say that the ozone plays a major role in splitting of chlorophyll molecules due to UV-B. This effect can calculate in terms of depletion of ozone number density. The ozone acts to part on chlorophyll molecules through the ultraviolet and the effecting of chlorophyll molecules may be calculated in term of depletion of ozone thickness by applying the statistical approaches.

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