GLOBAL WARMING POTENTIAL OF DEFORESTED EARTH SURFACE

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Abstract
Global warming potential (GWP) of deforested area of the earth surface is defined as "product of area of deforestation, duration and photosynthetic efficiency of forest". so far 9 – 10% deforestation has been, duration of deforested area assumed 10 – 20 years, efficiency 0.1% to 25% in general of 168 Wm^-2 absorbed by earth surface, about 85% tree plants are C_3 and photosynthetic efficiency is 3.5%. Global warming potential of CO_2 range from 53.34 to 320.04 MM. Global warming potential deforested area calculated in 2 ways: (i) Minimum GWP is 15, 12 MM and maximum is 8,400 MM, on average basis about 23 times higher than that of CO_2, (ii) Minimum GWP of deforested area is 529.2 and maximum is 1176 MM, on average basis about 5 times greater than that of CO_2. GWP of deforested area is primary global warming potential and of greenhouses is secondary. Patel's theory of 33% average global forests is a solution of global warming problem. Probability of this work is 0.5 of being right.

Key Words: Average, C_3 - Trees, Efficiency, Forest, Photosynthetic, Product, 33%.

Introduction
Global warming potential (GWP) of a greenhouse gas is "product of concentration, life time and radiative forcing in atmosphere". The highest global warming potential is of Carbon- dioxide 320.04 MM and the lowest is of Tetrafluoromettane (CF_4) 0.0000015 MM. MM is a unit of measurement of global warming potentials in honor of Mueller B. and Martin J. who invented digital thermometer in 1973 [1, Patel 2023]. The incoming solar radiation on earth surface is 342 Wm^-2 while outgoing long wave radiation from the earth surface is 235 Wm-2. The earth surface absorbs 168 Wm-2 radiations according to Fairall's lecture NOAA [2, Blackbody]. Plants convert radiant energy into chemical energy and efficiency varies depending on plant species, light quality, and conditions of locality. Photosynthetic efficiencies for agricultural crops range from 0.1% to 25% [3, Noggle & Fritz 1992]. Global forest loss is approximately 10% of global forest area in last 30 years till 2022 [4, FAO 2022]. Another almost similar information is this that global forest lost 444 mha (million hectares) from 1700 to 2021 which is more than 9% and less than 10% of global forest area [5, Ritchi & Roser 2021]. Deforestation is primary cause of rise in global warming because amount of photons (heat) and Carbon – dioxide increase in atmosphere as A consequence of deforestation [6, Patel 2021]. Negative global warming potential is called global cooling potential and positive global warming potential is called global warming potential. Terms negative and positive radiative forcing used for cooling and warming respectively [7, GWPL]. Rounding off of decimal figures into complete figures followed Patel's plan of Decimal clock [8, Patel 2022]. Primary cause of global warming is deforestation its global warming potential compared with Carbon-dioxide herein under.

Material and Method
Global warming potential of deforested area calculated in 2 ways on basis of 2 different references: **(i)** Globally deforested area is equivalent to concentration and duration of deforested area is equivalent to life time of a greenhouse gas in atmosphere of the globe and efficiency of conversion of radiant (light)

energy into chemical energy is equivalent to radiative forcing of a greenhouse gas. "Global warming potential of deforested area is multiplication product of area of deforestation, duration of deforested area, and efficiency to convert light energy into chemical energy of that forest". Photosynthetic efficiency of plants is $0.1 - 25\%$ (3, p.161). Area of deforestation is $9 - 10\%$, duration (life time) of deforested area is $10 - 20$ years, and efficiency $0.168 - 42$ Wm^{-2}. Minimum approximately $10 - 20$ years' time will require for plantation of trees on deforested area to cover 10% loss of forest. This is a rough estimate till exact calculations and data are not available to public. Since, 168 Wm^{-2} radiations are absorbed by surface of the earth out of 342 Wm^{-2} incoming solar radiations. Hence, 0.1 % of 168 is equal $= 0.168$ and 25 % of 168 $= 42$ Wm^{-2}. The minimum negative global warming potential of agricultural fields $= 9 \times 10 \times 0.168 = 15.12$ MM and maximum global warming potential of crops (-GWP) $= 10 \times 20 \times 42 = 8,400$ MM in year of 2022. Ratio of minimum GWP of deforested area and CO_2 is $15.12/53.34 = 0.28$. Means GWP of deforested area is less than 1 and less than CO_2, whereas maximum potential is $8,400 / 320.04 = 26.24$ times higher than that of CO_2. Average of GWP of CO_2 is $53.34 + 320.04 = 373.38 / 2 = 186.69$ MM and of deforested area is $15.12 + 8,400 = 8,415.12 /2 = 4,207.56$ MM. on an average basis $(4207.56 / 186.69 = 22.53)$ 22.53 times higher. Means GWP of deforested area is about 23 times higher than GWP of CO_2. **(ii)** Most of trees (about 85%) and temperate plants are C_3 – plants (C_3 Plants – an overview /science Direct Topics. https://www.sciencedirect.com ›C_3...., and Quaora). Typical photosynthetic efficiency of C_3 plants is 3.5% (photosynthetic efficiency. wikipedia. https://en.m.wikipedia.org). Then 3.5 of 168 Wm^{-2} is equal to 5.88 Wm^{-2}. Minimum GWP of deforested area $= 9 \times 10 \times 5.88 = 529.2$ MM and maximum GWP $= 10 \times 20 \times 5.88 = 1176$ MM. Minimum GWP of deforested area compared with that of Carbon – dioxide. $529.2 /53.34 = 9.92$. Mean GWP of deforested area is 9.92 times higher in round figures about 10 times higher than CO_2. Similarly maximum GWP of deforested area compared with maximum GWP of CO_2 which is $1176 / 320.04 = 3.67$ times higher in round figures about 4 times higher than that of CO_2. Roughly GWP of deforested area is $4 - 10$ times greater than that of CO_2. Average of minimum and maximum GWP of deforested area is $= 529.2 + 1176 = 1,705.2 / 2 = 852.6$ MM and average of GWP of Carbon-dioxide is 186.69 MM or Wm^{-2}. GWP of deforested area compared with that of Carbon-dioxide, $852.6 / 186.69 = 4.56$. Means GWP of deforested area is 4.56 times higher in round figure about 5 times higher than GWP of Carbon-dioxide.

Result and Discussions
Average GWP of deforested area is about 23 folds higher than GWP of carbon-dioxide in first case calculations and about 5 times in second case calculations in status of year 2022. Trees dominate in forests and about 85% plants are C_3 type whose photosynthetic efficiency is 3.5%. Therefore, second calculation is appropriate. Since deforestation as well as reforestation / afforestation works are going on continuously and simultaneously in different countries across the globe, hence availability of exact data is difficult and time taking work due to lack of co-operation and co-ordination among some countries. Therefore, data and result in this paper are tentative estimates. The probability is 0.5 of being right as this work is theoretical. In case amount of radiation (168 Wm-2) absorption on the earth surface, plants photosynthetic efficiency, area of deforestation and programs of reforestation vary calculations and result will vary accordingly. Significance of this work is to understand and control increase in global warming timely. Patel'[s] theory of 33% average global forests is a solution of global warming issue. Deforestation is a main cause of rise in global warming. GWP of deforested area is primary global warming potential and GWP of greenhouse gases is secondary global warming problem in relation of carbon-dioxide. Since the secondary problem is based on primary problem hence if primary problem is

solve secondary problem will automatically solve. This may be exemplified: if trunk of a tree is cut down its branches and leaves will automatically topple down and die.

Conclusion
Global warming potential of deforested area is primary and higher than that of carbon-dioxide. Therefore, reforestation on about 10% of forest area is need of time within 10-20 years.

Acknowledgments

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