

Fruit Trees and Carbon Sequestration

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SUMMARY

Recently climate change and global warming is considered most important alarm globally owing to enormous release of GHGs (Greenhouse gases) to the environment. Carbon dioxide (CO₂) is a major contributing gas to the greenhouse effect. Therefore, Carbon sequestration is a usual way for the taking away of carbon from the environment by storing it in the biosphere. The fruit tree orchards could play an important role in the carbon (C) cycle of terrestrial ecosystems and contribute to C sequestration. The woody fruit trees plantation can not only help in food and nutritional security but also can provide a cheapest removal of carbon from the atmosphere.

INTRODUCTION

Most of the horticultural fruit crops are perennial in nature. Their high value, role in nutritional security, increased utilization in processing industry etc. resulted in increased demand of fruit and which ultimately leads extension in area under fruit crops. According to the 1st Advance Estimates 2018-19 of National Horticulture Board, Ministry of Agriculture and Farmers Welfare Government of India, the total area and production of fruit crops in India is 6.530million hectares and 96.754million metric tonnes.

At present global warming and climate change is the major global issue, which is affecting entirely the biological system. IPCC have been already reported that greenhouse gases viz. CO₂, CH₄, NO₂, CFC etc. are foremost cause of the above problem. Individually CO₂ emission, owing to human intervention (burning of fossil fuels, deforestations, change in and use pattern etc.) contributes 55% of total increasing in the global temperature. According to recent report of IPCC (2007), its concentration has been reached to 400 ppm in the present year 2016 and up to year 2050 it will reach up to 800-1000 ppm. Industrial revolution of past augmented the global energy use. Human interference in natural ecosystem through deforestation, environmental pollution etc. is the foremost reasons behind the increased level of carbon concentration in atmosphere. This Winch in level of atmospheric carbon is directly or indirectly related with the climate change and its devastating impacts. The time has came to act upon for managing the carbon emission, control the CO₂ level and make a balance between them for sustainability.

CO₂ emission can be minimized by the following ways:

1. Dropping the global energy use
2. Fuel switching (Utilization of renewable sources of energy)
3. And the most recent way is “Carbon sequestration”

What is Carbon sequestration/carbon capture?

Carbon sequestration is the process of increasing the carbon content of a reservoir/pool other than the atmosphere (IPCC Fourth Assessment Report: Climate Change 2007). It can be also defined as “Long-term storage of carbon dioxide or other forms of carbon in carbon pool”. Various approaches through which carbon sequestration possible are geological sequestration, oceanic sequestration and terrestrial sequestration.

Role of Fruit crops in carbon sequestration

Carbon capture by mean of artificial geological and oceanic sequestration necessitate by large set ups and lot of investment which is doable for the developed countries only, whereas for developing countries like India terrestrial sequestration can be the best possible alternative until other proficient low cost techniques will developed. In this context increased area under fruit trees can play an important role. In terrestrial sequestration fruit tree play two important roles.

1. Tree by process of photosynthesis capture atmospheric inorganic carbon in form of CO₂.
2. Different part of tree soil etc. act as a sink where captured CO₂ stored in its organic form.

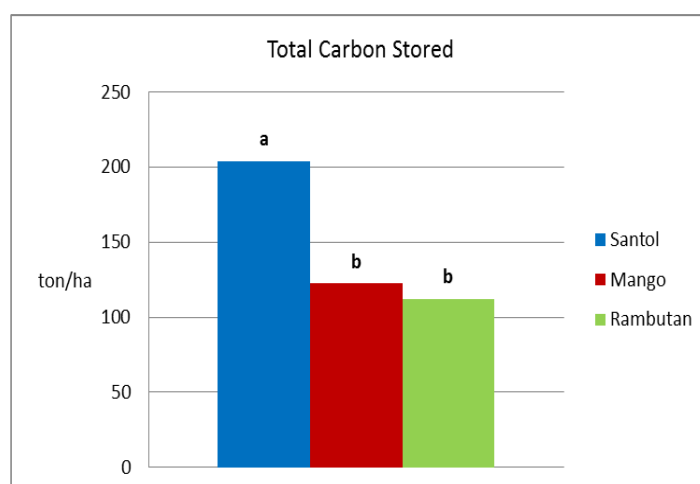


Fig.1 Graphical presentation of total carbon stock of some fruit and forest crops
(Source- Janiola and Marin, 2016)

The fruits based system is a self-sustainable system where solar energy can be harvested at different heights, soil resources can be efficiently used and cropping intensity is increased (Patil and Kumar, 2017). The fruit tree orchards could play an important role in the carbon (C) cycle of terrestrial ecosystems and contribute to C sequestration (Wu *et al.*, 2012). According to Janiola and Marin (2016), that tropical forest had the largest potential to mitigate climate change and global warming through conservation of existing carbon pools. This study also revealed that the cultivation of temperate fruit crops species such as apricot, apple, and walnut could be exploited more efficiently for carbon sequestration which subsequently helps in mitigating global CO₂ levels and restoring degraded land in these cold, arid areas by improving soil organic carbon (SOC) contents.

Potential of fruit tree for carbon sequestration varies with the age of tree, species of tree, growth characteristic, edaphic factor, climatic factor (temperature, humidity, rainfall, wind velocity) and others. So, terrestrial sequestrations of carbon not only reducing high atmospheric CO₂ but also in indirect way provide the benefit of improved soil structure, increased soil fertility. Improved soil microorganism, reduction in soil erosion, improved biodiversity, better water use and storage and healthier ecology. Likewise increased area under fruit crop one hand lead to increased in fruit production to meet out the demand for different purpose and on the other hand it can play key role in carbon sequestration. There is need of Assessment of carbon sequestration potential of perennial fruit crops and augment the research and development for innovative technologies to accelerate total carbon sequestration in horticulture cropping system under different agro-ecological region of country.

CONCLUSION

Recently climate change and global warming is considered most important alarm globally owing to enormous release of GHGs (Greenhouse gases) to the environment. Carbon dioxide (CO₂) is a major contributing gas to the greenhouse effect. Carbon dioxide is engrossed by trees, plants and crops via photosynthesis and accumulates as carbon in biomass in tree trunks, branches, foliage and roots and soils. Therefore, Carbon sequestration is a usual way for the taking away of carbon from the environment. In context to agriculture sector, carbon sequestration refers to the ability of agriculture, horticulture and forests to take away carbon dioxide from the environment. The fruit tree orchards could play an important role in the carbon (C) cycle of terrestrial ecosystems and contribute to C sequestration. In conclusion, when the CO₂ concentration of the atmosphere increases due to global warming, perennial fruit trees species will probably show augmented rates of photosynthesis and biomass production, despite of soil moisture conditions. As a result, elevated amounts of carbon will possibly be sequestered in the trunks and branches of such woody fruit species. Furthermore, fruit yields may increase as well. The woody fruit trees plantation can not only help in food and nutritional security but also can provide a cheapest removal of carbon from the atmosphere.

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