

Potential of Reduction of Carbon Dioxide Gas Emissions in the Thar Desert by Kheemp (*Leptadenia Pyrotechnia*) Conservation Based Carbon Farming

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Abstract. Due to the climate change happening on the earth, the immunity of both humans and animals is decreasing along with this the plants are also getting affected. The main reason for which is the continuous increase in the temperature of the earth. The main reason for the increase in temperature is anthropogenic action, due to which carbon dioxide is emitted in high quantity in the atmosphere and this generates greenhouse effect. Due to the excessive emission of carbon dioxide, frequent changes in the climate are happening very fast and their ill effects are clearly visible. Due to this, the frequency of natural disasters is also increasing and their area is also increasing, due to which the biodiversity is also being lost. Because only natural plants have the amazing ability to prevent negative changes in the climate and adjust by absorbing carbon dioxide emitted in large quantities. In this sequence, there is an urgent need to implement the possibilities of reducing carbon dioxide emissions by cultivating carbon farming from the dry shrub Kheemp (*Leptadenia pyrotechnica*), which is found abundantly in the Thar Desert.

Index Terms: Carbon Dioxide, Thar Desert, *Leptadenia Pyrotechnia*, Conservation, Carbon Farming

INTRODUCTION

The main reason for the continuous increase in the temperature of the earth is carbon dioxide gases (green house gases) emissions into the atmosphere by the anthropogenic activities. Due to this increase in temperature, ill effects of climate changes on the earth are clearly visible and the areas prone and affected by natural disasters due to climate changes are expanding frequently and widely, as a result the biological diversity necessary for the survival of mankind on the Earth is also decreasing. That is why it has become necessary to reduce the amount of carbon dioxide emissions in the atmosphere, So that the negative effects of climate changes are eliminated and biological diversity is conserved and our future generations can be protected.

What is carbon farming?

Large scale plantation of high carbon sequestering plant species in the land unfit for the agriculture purposed is called carbon farming.

Role of tree plantation to reduce green house gases emissions and carbon farming:- Nature has blessed trees with the amazing ability to absorb carbon dioxide and adjust it, that is why trees and plants play an important role in preventing the climatic changes and global warming caused by greenhouse gases emissions. Eco-

friendly, cheap and practical method of reducing greenhouse gases emissions gas based on conservation and plantation of local plant species of larger areas of dry and uncultivated land are proposed for various geographical regions of the World. One such hypothetical carbon farming project was proposed in the year 2013 by a German scientist K.Becker. That project envisaged plantation of *Jatropha curcas* on 10,000Km² coastal land of Saudi Arabia which is unsuitable for agriculture. The computer based outcomes of the project was accumulation of 25 tons of carbon dioxide for 20 consecutive years.

Inspired by the above said hypothetical project, the present theoretical project Kheemp (*Leptadenia pyrotechnica*) conservation and plantation based carbon farming in unuseful and wasteland of Thar Desert of Rajasthan, India is presented here.



Map of Thar Desert

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Dr.Amit Kumar Vyas – “Potential of Reduction of Carbon Dioxide Gas Emissions in the Thar Desert by Kheemp (*Leptadenia Pyrotechnia*) Conservation Based Carbon Farming”, Pg no: 16 – 18. 2022

doi.org/10.36647/978-93-92106-02-6.3



Thar Desert



Thar Desert with plants



Greening desert with plantations



Prosopis cineraria(Khejari or Ghaap)

SOME IMPORTANT MEDICINAL PLANTS OF THAR DESERT, RAJASTHAN



KHEEMP (*Leptadenia-pyrotechnica*)



KHEJARI(*Prosopis -cineraria*)



JHARBER(*Ziziphus-nimularia*)



KER(*Capparis-decidua*)

Due to the diversity of the ecosystems, this type of carbon farming in Thar desert, Rajasthan areas may make the use of naturally occurring native plant species more environmentally suitable for plantations, which have higher carbon dioxide capture capacity and which can grow successfully in uncultivated landscapes. In Thar Desert, Rajasthan, 1,14,19,000 hectares of land are becoming uncultivated due to wind erosion. The vast area may be used for conservation and plantation of multi use shrub Kheemp (*Leptadenia pyrotechnica*) along with other high carbon capture capacity species for carbon farming.

Simultaneously greening of earth surface will help to check the temperature rise on earth due to solar radiations will reduce surface evaporation and thus will help to mitigate the bad effects of climate changes.

❖ The main points of the proposed project are Kheemp conservation and plantation based carbon farming:-

- *Leptadenia pyrotechnica* (Kheemp) is a versatile arid resistant desert shrub, traditionally used for medicines, food, animal feed, fiber production, huts and ropes, and as fuel.
- The Kheemp has great potential for carbon capture capacity both above and below ground soil stabilization, so it plays an important role in the environmental balance of the area.
- The project envisaged in the present project incorporates a greater potential for reduction of carbon dioxide emissions of kheemp.
- The project is based on protection from use. It has also included the fact of real engagement of farmers and partners so that they can get immediate and direct benefits, which is necessary for such comprehensive public interest schemes. For this, first of all, the possibilities of marketing of value added measures for industrially useful Kheemp products based on our own research at local level have been outlined.
- Carbon farming based on a single botanical species *Jatropha curcas* is proposed to be done in a vast single area of 10,000 Km² in the coastal Arabian Desert. But in the present project, carbon based

farming is proposed to be done only on the meadows of barren and uncultivated land. For this, it is proposed to conserve naturally occurring kheemp in the area and plantation of Kheemp in new areas.

- The root to shoot ratio of Kheemp is 0.69 and *Jatropha curcas* is 0.27. The comparison shows that Kheemp has almost 2.5 times higher than *Jatropha curcas*. Thus Kheemp has more below ground carbon sequestering capacity than *Jatropha curcas* and thus Kheemp has more negative carbon foot print than *Jatropha curcas*.
- Due to the decentralization, carbon farming based on Kheemp will benefit in wide areas and if it is possible on the vacant land of the farm by growing Kheemp on the meadows, then agricultural tax benefits can also be obtained.
- Theoretical calculation of carbon capture in the Thar desert of North-West Rajasthan:-

From the wild plantation of Kheemp:-

Due to soil erosion in the Thar desert of North-West Rajasthan, a lot of land is being affected and agriculture is becoming unfit. Based on the research work of A.F.R.I. Jodhpur, it has been concluded that about 1,14,19,000 hectares of land is affected by airborne soil erosion. Simultaneously, the carbon capture of naturally grown Kheemp in the same area has been calculated. According to this, the total average availability of Kheemp Biomass is 128.77 kg/ha and the average carbon content is 44.91%. On the basis of simple mathematical calculation, the per hectare carbon capture capacity of the Kheemp would be $128.77 \times 44.91 / 100 = 58.90$ kg. For an area of 10000 hectares, its estimated figure will be 5890.00 kg, which can prove to be very important.

From the projected cultivation of Kheemp:-

Assuming only 1% of the Thar desert land unfit for agriculture activities for cultivation of Kheemp and plantation of 2500 plants/hectare following quantities of CO₂ gases (Green house gases) emissions may be reduced.

1. Total land of Thar desert unfit for agriculture = 1, 14, 19,000 hectare
2. 1% of this land = 1, 14,190 hectare
3. Kheemp plant / hectare = 2500 plants
4. Total plant of Kheemp in the projected area = $1,14,190 \times 2500 = 28,54,75,000$ plants
5. Approximately average biomass (dry) available from/plant/year = 4 Kg (above ground 2.5 Kg and below 1.5 Kg) = .004 tons
6. Projected biomass/year from the projected area = 11,41,900 tonnes
(above ground 685140 tons and below ground 456760 tons) =
7. carbon sequestering capacity of Kheemp = $11,41,900 \times 44.91 / 100 = 5,12,827$ tons

Proposed Kheemp plantation on 10,000 hectare = $10,000 + 2500 = 2,50,00,000 \times .004 = 1,00,000$ tons.

(above ground 60,000 tonnes, below ground 40,000 tonnes)

Carbon content capture = above ground $60,000 \times 44.91 / 100 = 26946$ tonnes, below ground $40,000 \times 44.91 / 100 = 17964$ tonnes)

Therefore total carbon content capture from 10,000 hectare Kheemp plantation will be 44910 metric ton. Therefore the average carbon content capture /hectare = $44,910 / 10,000 = 4.4$ ton/hectare, which is within range of perrineal Desert shrubs.

If only systematic protection of the naturally growing Kheemp in this desert area can be done at the initial stage, and then its deliberate integration in the present agro forestry system along with other trees and crops could potentially increase carbon sequestration and decrease green house gases (GHG) emission from this desert ecosystem annually.

Simultaneous industrially useful medicines, foods, animal feed, fiber and bio fuel will be available. Thereby, both the farmer and the participant will get immediate and direct benefit and they can practically use such broad-based project and stay connected with public welfare schemes. In future this project is expected to be implemented in Government and Private sectors on real basis.

REFERENCES

1. www.earth_syst_dynam.net/4/237/2013/esd-4-237-2013.html (carbon farming in hot, dry costal area; an option for climate change mitigation by K.Becker et.al)
2. Carbon farming prospectus and challenged by Meenakshi Sharma,et.al. "sustainability" 2021 13/11122;<http://doi.org/103390/su13191122>
3. www.researchgate.net/publication/257865775 (vegetation diversity and roll of *Leptedenia pyrotechnica* in bio mass contribution & carbon storage in arid zone of India by G.Singh; A.F.R.I. Jodhpur)
4. <http://theconservation.com> -to-ma "To make agriculture more climate friendly carbon farming by Laura Van Pol et.al
5. The Wikipedia, A free encyclopedia
6. On the basis of detailed documentation available with the author of the research work done at own level.