

UGC MAJOR RESEARCH PROJECT

FINAL REPORT

STUDIES ON PALAEOENVIRONMENT AND ECOLOGY OF THE TERTIARY FLORA OF NEYVELI LIGNITE, TAMIL NADU.

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UNIVERSITY GRANTS COMMISSION
BAHADUR SHAH ZAFAR MARG
NEW DELHI – 110 002

PERFORMA FOR FINAL REPORT OF THE WORK DONE ON THE PROJECT

1. TITLE OF THE PROJECT: **STUDIES ON PALAEOENVIRONMENT AND ECOLOGY OF THE TERTIARY FLORA OF NEYVELI LIGNITE, TAMIL NADU.**

2. NAME AND ADDRESS OF THE PRINCIPAL INVESTIGATOR:

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3. NAME AND ADDRESS OF THE INSTITUTION:

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4. UGC APPROVAL LETTER NO.AND DATE:

F.No.42-915/2013 (SR) Dated: 14.03.2013

UGC EXTENSION LETTER NO.AND DATE:

F.No. 42-915/2013 (SR) dated 26.03.2016

5. DATE OF IMPLEMENTATION:01-04-2013

6. TENURE OF THE PROJECT: 01.04.2013 to 31.03.2017

7. TOTAL GRANT ALLOTTED : Rs. 11,78,300.00

8. TOTAL GRANT RECEIVED

1st Instalment : Rs.7,76,800.00/-
2nd Instalment : Rs. 3,21,200.00/-

9. FINAL EXPENDITURE : Rs. 10,84,207.00/-

10. TITLE OF THE PROJECT : **Studies on Palaeoenvironment and ecology of the Tertiary flora of Neyvelilignite, Tamil Nadu.**

11. OBJECTIVES OF THE PROJECT

1. To document the biodiversity of fossil floral elements available in the various seams of Neyveli lignite.
2. To find out the exact age and stratigraphy of the Neyveli lignite.
3. To study the palaeoclimate of this area using the clues from the fossil plants.
4. To study the palaeoecology of this area using palaeoclimate and palaeovegetation.

12. WHETHER OBJECTIVES WERE ACHIEVED (GIVE DETAILS)

The major objective of the project is to know the fossil plants available in the Neyveli lignite sediment. The lignite samples collected from Neyvelilignite (mine I and mine II) shows various fossil floral elements- microfossils(include, spores of Pteridophytes and Fungi and pollen and cuticle of Angiosperms)and megafossils (include, leaves and woods of angiosperms) .These fossil floral elements used to elucidate the palaeoenvironment of the Neyveli region. From the study, it is identified that during Tertiary period the present Neyveli region having many discrete pockets of brackish water or estuarine mangrove swamps adjacent to the coastal line and having Tropical wet evergreen forests slightly away from the coastal region. From the above study the age of the Neyveli lignite Formation is identified as Eocene-Miocene

13. ACHIEVMENTS FROM THE PROJECT

Fossil flora of the Tertiary period, particularly Neyveli Formation was studied in great detail. The plants which were growing during Tertiary period in the Neyveli region used as an indicator to study the past environment and palaeoclimate, particularly the fossil woods collected from the lignite samples were used as a good indicator of palaeoclimate. The pollen

of angiosperms shows the past vegetation exists in the Tertiary period of Neyveli region. That in turn indicate the age of the Neyveli lignite deposits.

14. SUMMARY OF THE FINDINGS

The present study is about the identification of fossil floral elements found in the mine-I & mine-II of Neyveli Lignite Corporation of India Ltd. The fossil collected from the lignite samples are of microfossils (include, spores of Pteridophytes and Fungi and pollen and cuticle of Angiosperms) and mega fossils (include, leaves and woods of angiosperms). Microfossils were recovered from the samples using maceration technique. The wood samples were sectioned to study the internal details. Leaf fossils were observed under binocular microscope.

The fossil floral elements recovered from lignite sample are as follows, the fossil fungal spores recovered from the lignite samples are *Alternariasp*, *Ceratohirudisporamiocenica*, *Curvulariasp*, *Frasnacritetrusindicus*, *Helminthosporiumsp*, *Involutisporonites trapezoids*. The fruiting body of fungi includes *Astrothyritesp* and *Astrothyriteskonkanensis*, *Microthyritescooksoniae*, *Plochmopeltinitescooksoniae* and *Trichothyritesdenticulatus*. The angiosperm pollen observed from this Formation are, *Meliapollisfirmus*, *Meliapollisiratus*, *Meliapollisnavalei*, *Meliapollisquadrangularis*, *Meliapollisramanujamii*, *Meliapollistamilii*, *Grevilloideaepiteseocenicus*, *Margocolporitestsukadae*, *Paleocaesalpiniaceacipiteseocenica* and *Tamilipollenitesrobustus*. The angiospermic spores observed from this Formation are *Cyathidites minor*, *Gleicheniiditesindicus*.

The mega fossils observed in this Formation includes compressed leaves like *Garcinia*, *Harpullia*. The cuticles equivalent of the living taxa *Shorea*, *Cryptostegia*, *Hedycarya*, were also recovered from the lignite of Neyveli Formation. The charcoalified wood recovered from this Formation includes *Dryobalanoxylon*, *Hopenium* and *Dracaena*. Based on the fossil floral elements collected from Neyveli lignite the palaeovegetationpalaeoclimate and the age of sediment of this region during Tertiary period was worked out.

The Tertiary floristic spectrum of Neyveli lignite Formation clearly indicates the occurrence of discrete pockets of brackish water or estuarine mangrove swamps adjacent to the coast line and tropical wet evergreen forests slightly away from the coastal belt. From the above study it was concluded that the age of the Neyveli Formation is of Eocene – Miocene.

15. CONTRIBUTION TO THE SOCIETY

Lignite is an important member of the family of solid fuels is mainly utilized in power generation and commonly known as brown coal. It contains vegetable matter in various forms. The vegetable matter of the lignite includes pollen grains of Gymnosperms and Angiosperms, fungal spores, charred wood, fragments of compressed leaves, resins, plant tissues like epidermis, parenchyma, sclerenchyma, fibres, vessels and bark. These micro-constituents of lignite also includes dispersed organic matter(DOM),highly useful in predicting suitability of coal for various industrial and economical purposes, in search of oil and natural gas and in academic pursuits.

The main objective of the present work therefore to attempt dating of the Neyveli lignite deposits on the basis of palynofossils and their correlation with the contemporary stratigraphic units and also to infer paleoclimate and environment of deposition based on the palaeovegetation(reconstructed from partially decomposed leaves and petrified woods),which was prevailing during Tertiary period. The present study will help the coal geologists to find out the absolute age and position of the rock or lignite containing plant fossils. The present work is helpful to find out the palaeoenvironment and palaeoclimate of the Neyveli area. This in turn helpful to the climatologists who try to find the future climate of this area

16. WHETHER ANY Ph.D. ENROLLED/PRODUCED OUT OF THE PROJECT

Yes. Ph. D Enrolled

Roll No : 1319030007

Candidate Name : Mr. M.Elyaraja Ph.D awarded on 18.09.2017

17. NO. OF PUBLICATIONS OUT OF THE PROJECT

1. Kumarasamy,D and M.Elyaraja.2015 Tertiary spore and pollen assemblage from the Neyveli Lignite Formation, Tamil Nadu,India *Species*2015 17(54): 06-14.
2. Kumarasamy,D and M.Elyaraja.2016 A new species of Dryobalanoxylon Den Berger from the Neyveli Lignite Formation,Tamilnadu,India *Journal of Environment and Earth Science* 2016 6(4): 83-87.
3. Elyaraja,M and D.Kumarasamy 2016 Some fungal taxa from the Neyveli lignite Formation *International Research Journal of Earth Sciences* 2016 4(8): 5-9.

4. Elyaraja, M and D. Kumarasamy 2016 Cuticular studies on fossil leaves from Neyveli lignite Formation, Tamil Nadu, India *Journal of Geography, Environment and Earth Science International* 2016 8(3): 1-5.