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DOCUMENTATION OF MEDICINAL PLANTS FROM NORTHERN COAL FIELDS AREAS, SINGRAULI, M. P.

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ABSTRACT :

Due to mining activities a great loss of vegetation including medicinal plants is inevitable. Northern coal field areas Jayanth coal Block of NCL had been selected for the present investigation. The selected sites are divided into two zones i.e. core zone (mining lease area) and buffer zone (10km radius from mining lease area). A large number of medicinal plants were recorded from the buffer zone in compare to core zone; some of them were, *Semicarpus anacardium, Buchnania lanzan, Lannea coromandelica etc.* However few species were noticed in core zone *viz., Zizyphus jujube, Calotropis procera* and *Evolvulus alsenoides etc.*

KEY WORDS : *Northern coal field areas Jayanth coal Block (NCL), Medicinal plants, Core zone, Buffer zone and Over burden dumps (OBD).*

INTRODUCTION:

Open cast excavation of coal deposits involves the removal of overlying soil and rock debris and their storage in overburden dumps (OBD). The OBD contents normally soil particles, pebbles, stones, boulders, rocks and coaly matter *etc.,* It is devoid of true soil character (Raju and Hassan 2003; Deka Boruah 2006; Gogoi, *et al.,* 2007). Thus, the admixture of OBD soil nutritional poor biologically stressed and physically degraded. It also modified the natural vegetation and land topography affecting the drainage system and natural succession of plant growth as such creating quite problems of soil erosion and environmental pollution (Singh, *et al.,* 1994; Singh, *et al.,* 1996). Mining spoil represent very rigorous condition for plant and microbial growth because of low organic matter content, low organic carbon, unfavorable pH, either coarse texture or compacted structure (Meyer, 1973; Harthill and Mckell, 1979). Mining degraded land is devoid of fertile soil, fauna and loss of flora including plant wealth with some endemic flora and subsequently favors invasion of exotic species.

Before coal mining or any other industrial activities started in NCL, coal field region was covered with

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tropical mixed and dry deciduous forests. The undulating, nearly flat area is under cultivation, where as forest is confined mostly on hilly areas. The soils of the area is shallow, leached, residual, sandy loam and reddish to reddish brown soils. The native forest soil contains 60% sand, 32% silt and 8% clay with the moisture content of 14.5%. The pH of the soil is 6.9. The bulk density is 1.25gcm^{-3}, whereas, water holding capacity is 45%. Available nutrients are higher in forest soil (NO_3^-N, 9.65μg g^{-1}; NH_4^-N, 12.1μg g^{-1}; available P, 20μg g-^{1}). The contents of organic carbon, total N and total P are 1.13%, 0.16% and 0.068%, respectively. Due to mining activities huge amount of materials were disposed on adjacent to mining pit, which creates a waste heap. These heaps technically termed as spoil or overburden dumps. OBD soil is the geological matter above coal sesames, may be sometime several meter thick and below the developed soil horizon where living seed and rhizome are normally absent (Hell, *et al.*,1995 and Singh, *et al.*,1996). The OBD normally contain soil particle, pebbles stones, boulder, rocks and coaly matter *etc.*, Thus, admixture of OBD soil is physically stressed, nutritionally and biologically poor in such condition pioneer succession is very slow.

A limiting knowledge with regard to diversity of flora in stressed ecosystem is a major impediment in developing predictive understanding required for reclamation of plant communities on mined land. Thus, there is great need to find ways in which either the native or substitute flora can be re- established quickly and economically. As per the laws of ecological succession, the new ecological links will be established by nature itself. However, the natural process of establishment of vegetation is very slow.

MATERIALS AND METHODS:

Study Areas :

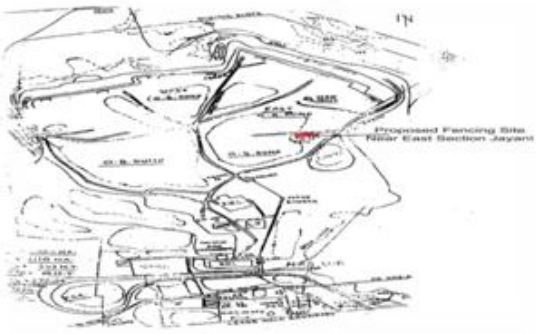
The Northern coal field limited Singaruali (Kakri, Bina, Marrak, Khadia and Dudhichua lying in U. P. where as, Jhingwida, Gori, Moher, Almora, Nigahi, Jayant a part of Khadia and Dudhichua lying in M. P.) Map-1. NCL is situated between latitude 23^0-41", 24^0-12" N and longitude 81^0 - 48", 82^0 - 52" E. Elevation range is 280 - 519m above sea level.

This study was conducted on the mine spoils of Jayant opencast coal mine, Northern Coal Limited situated in the Sidhi district of Madhya Pradesh, India (24° 05' 55" - 24° 11" N latitude, 82° 38" 10" - 82° 40' 45" E longitude, 300 - 500m above the sea level). The climate is tropical monsoon type. During the study period, the minimum temperature mean range was between 13.5 - 34.4°C and maximum temperature mean range between 19.0 - 43.5°C in an annual cycle. The annual rainfall was 750mm. The humidity mean range varied between 30.4 (May) to 73.3% (July). The climatic data were obtained from the Central Mine Planning and Designing Institute at Jayant.

Survey Identification and Documentation of Native Flora:

Survey for collection of flora plants during 1st, 2nd, 3rd and 4th quarter of year at regular interval of coal mine areas were made. The coal mine area was

selected and divided into two zones *i.e.,* Core zone (Mining lease area) and Buffer zone (10km radius from mining lease area) for documentation of plants. Some plants were identified on the spot and some were identified in the department by comparing their characteristics with Herbarium specimen.



RESULTS AND DISCUSSION:

The survey reports clearly indicate that 36 & 53 angiospermic plants of diverse nature were found to grow in core and buffer zone respectively in NCL. Herbaceous plants were more prevalent in the core zone due to settlement of new soil with changed microbial niche. Out of 62 species belonging to 35 families, 29 trees, 4 shrubs 17 herbs and 4 climbers recorded from buffer zone and 12 trees, 3 shrubs and 20 herbs, 2 climbers were recorded in core zone belongs to different families. 4 taxa for Euphorbiaceae, Caesalpinaceae, and Convolvulaceae; 3 taxa for Anacardaceae, Fabaceae and Papilionaceae; 2 taxa for Meliaceae, Moraceae, Graminae, Rhamnaceae and Combretaceae; and one taxa for Mimosaceae, Anacardiaceae, Graminae, Myrtaceae Malvaceae, Poaceae, Solanaceae, Combretaceae, Oleaceae, Zygophyllaceae, Cuscutaceae, Convolvulaceae, Nyctaginaceae, Cucurbitaceae, Martyniaceae, Sapotaceae, Verbenaceae, Apocynaceae, Asclepidaceae, Labiatae *etc.,* (Table 1). The common plant species were found *i.e., Bauhinia racemosa, Cassia fistula, Terminalia alata, Azadirachta indica, Syzygium cumini, Melia azadirachta, Ricinus communis, Zizyphus jujube, Mimosa pudica, Tridax procumbens, Cuscuta reflexa, Woodfordia fruticosa, Saccharum spontaneum, Sida cordifolia, Ocimum basilicum, Calotro pisprocera, Sida rhombifolia, etc.*

Table.1: Showing floral composition studied in Jayant Opencast Coal Project (OCP) (NCL)

TREES				
Botanical/ local name	**Family name**	**Economic importance**	**CZ**	**BZ**
Semicarpus anacardium (Bhelwa)	Anacardiaceae	Fruits extract used as liver tonic, antiseptic, cardio tonic, beriberi and cancer.	-	+
Buchnania lanzan (Chironji)	Anacardiaceae	Stem & leaves extract are used in diarrhea digestive, cough, bronchitis, dyspepsia, leprosy, skin diseases, nervous and in burning sensation.	-	+
Lannea coromandelica (Houtt.) (Mohwai)	Anacardiaceae	Leaves extracts are used in elephantiasis, sprains inflammation and neuralgia,	-	+
Eucalyptus maculata (Nilgiri)	Myrtaceae	Plants & leaves extracts are applied in oral, nasal operation and cancer.	-	+

Moringa citrifolia (Aal)	Moringaceae	Root powder is used in wound to kill the worms and root drops in paused ear.	+	+
Bauhinia racemosa (Apta)	Caesalpinaceae	Bark & leaf extracts are used in diarrhea, dysentery, urinary discharges and malaria	+	+
B. variegata (L.) (Kachnar)	Caesalpinaceae	Roots, barks, dried flowers; buds are used in dyspepsia and flatulence, astringent, tonic, skin disease, ulcers leprosy and diarrhea.	-	+
Cassia fistula (L.) (Amaltas)	Caesalpinaceae	Leaf extract & root powders are used in skin disease, leprosy, ulcer, dry cough, bronchitis skin & tuberculosis.	+	+
Tamarindus indica (Chinch)	Caesalpinaceae	Root leaf & seed are used against diarrhea, asthma, ulcer, wound, ulcer and jaundice.	-	+
Terminalia alata (Hayne & Roth) (Ain)	Combretaceae	Leaf, bark & flower are used in urinary, skin diseases and diarrhea.	+	+
Diospyros melanoxylon (Roxb.) (Tendu)	Ebenaceae	Bark is used as styptic, cardio tonic and purgative.	-	+
Phyllanthus emblica (L.) (Amwla)	Euphorbiaceae	Root, bark, leaf & fruit are used in jaundice, diarrhea dysentery, dyspepsia tonic, diabetes and leprosy.	-	+
Butea monosperma (Lam.) (Palas)	Fabaceae	Root, bark and seed applied in night blindness, elephantiasis, piles.	-	+
Pongamia pinnata (L.) (Karanj)	Fabaceae	Root is used to cure cleaning, foul ulcer, cleaning, teeth, strengthening gums.	+	+
Pterocarpus marsupium (Roxb.) (Bijasar)	Fabaceae	Leaf extracts are used in skin diseases, fever, gum and liver disorder.	-	+
Bambusa arundinacea (Katang bamboo)	Graminae	Stem & leaf extract are used in Ayurvedic system of medicine as a blood purifier, in leucoderma and inflammatory conditions.	-	+
Azadirachta indica (Neem)	Meliaceae	Oil, leaves & oil cake used in leprosy and skin diseases, healing of wounds.	+	+
Melia azadirachta (Bako Neem)	Meliaceae	Root, leaf and seeds are used in leprosy, leucoderma, wound, ulcer, cough, asthma, astringent, typhoid fever and pain.	+	+
Ficus benghalensis (Badgad)	Moraceae	Bark is used in burning, ulcer, diarrhea, leucorrhoea, diabetes, hemoptysis, hemorrhages, dysentery and skin disease,	-	+
F. religiosa (L.) (Pipal)	Moraceae	Bark power is used in gonorrhea, diarrhea, dysentery and hemorrhoids.	-	+
Miliusa tomentosa (Kari)	Annonaceae	--	-	+
Tamarindus indica (Chinch)	Caesalpinaceae	--	-	+

Casurina equisitifolia	Casurinaceae	--	+	+
Moringa citrifolia (Aal)	Moringaceae	Roots are used to kill the worms and root drop in paused ear	+	+
Syzygium cumini (L.) (Jamun)	Myrtaceae	Bark, leaf & seed are used in diabetes, leucorrhoea, fever, and antibacterial.	+	+
Madhuca longifolia (Roxb.) (Mohwa)	Sapotaceae	Seed oil, flower, bark and roots are used in skin diseases, and headache alcohol in coughs, colds and bronchitis in rheumatism, ulcers, itches, bleeding, spongy gums and tonsillitis.	+	+
Zizphus maurituana (Lam) (Bor/ Baer)	*Rhamnaceace*	Fruit, root & bark are used in purify the blood and digestion in fever and to cure wound and ulcer diarrhea.	-	+
Punica granatum (Anar)	Punicaeae	Bark, fruits & seeds are used in dysentery, diarrhea fruit juice in leprosy and anthelmintic	-	+
Tectona grandis (Sagwan)	Verbenaceae	Timber	+	+
SHRUBS				
Ricinus communis (Eranda)	Euphorbiaceae	Oil is used as purgative, lubricant and illuminate.	+	+
Zizyphus jujube (Ber)	Rhamnaceae	leaves, bark & fruit are used as eye lotion, rheumatism	+	+
Artabotrys hexapetalous (Hirwa)	Annonaceae	--	-	+
Woodfordia fruticosa (L.) Kurz.	Lythraceae	--	-	+
Tabernaemontana ivaricata (Tagar)	Apocynaceae	--	+	+
Zizyphus oenoplia (Mokha)	Rhamnaceae	Stem bark is used as mouth wash for core throat, dysentery and inflammation of the uterus.	+	+
HERBS				
Parthenium hysterophorus (L.) (Gajar ghass)	Asteraceae	Whole Plant is used as tonic, febrifuge, emmenagogue and decoction of root is given in dysentery.	+	+
Tridax procumbens (L.)	Asteraceae	Leaf is used in bronchial catarrh, dysentery, diarrhea, antiseptic bruises, wounds., hair tonic, antifungal and insect repellent	+	+
Calotropis procera (L.) Aak	Asclepiadaceae	Root, bark & flower are used as dysentery, diaphoretic expectorant and emetic, cold, cough and asthma.	+	+
Evolvulus alsenoides (L.) (Shankhapuspi)	Convolvulaceae	Plant, roots & leaf are used as tonic, asthma, dysentery, diarrhea, cardiac, fever, anemia, ulcer, leucoderma, leucoderma, jaundice, and smallpox.	+	+
Setaria glauca	Poaceae	---	+	+
Merremia emarginate (Undir khami)	Convolvulaceae	Root & root bark power are used as purgative, and have many medicinal properties.	+	+

Euphorbia hirta (Dudhi)	Euphorbiaceae	Plant is used in bronchial affections, cough, and asthma and latex of applied on warts.	+	+
E. prostrate	Euphorbiaceae	Plant is used in dysentery, cough and asthma.	+	+
Cynodon dactylon (Doob)	Graminae	Plant is used in hypertension, burning sensation, leprosy, hemorrhoid, skin disease, vomiting, dysentery, diarrhea	+	-
Ocimum basilicum (Bantulsi)	Labiatae	Plant & seeds are used in digestion, cardio tonic, ringworm, cough, asthma. diarrhea, chronic and dye sentry	+	+
Sida cordifolia (Bariyar)	Papilionaceae	Stem is used in diarrhea, tuberculosis, leucorrhoea and burning sensation.	+	+
Sida rhombifolia (Bariyar)	Papilionaceae	Stem plant and roots are used in skin diseases, diuretic, febrifuge, tuberculosis rheumatism and leucorrhoea.	+	+
Merremia emarginata (Undir khani)	Convolvulaceae	Root & leaves are used in cardiac, anemia, leucoderma, rat bite, fever leucoderma, ulcer, dysentery, jaundice, asthma, smallpox tonic tumor ulcer.	+	+
Cassia occibentalis (Chakban)	Caesalpeniaceae	Root, leaf and seed are used in whooping cough, sin disease	+	+
Saccharum spontaneum (Kansi ghass/ munj)	Poaceae	Fodder grass	+	+
Croton bonplandianum (Mirchaini)	Euphorbiaceae	Plant is used to cure liver disorder, swelling of body, against ring worm and skin disease and plant juice used in headache.	+	+
Leucas cephalotes (Bhodki)	Lamiaceae	Leaves juice useful in cure burning sensation and painful urination and urinary discharges.	+	+
Datura metal (Kaladatura)	Solanaceae	Leaf & seeds are used in asthma, cough, fever ulcer, skin disease juice of leaves epilepsy skin diseases treatment in dandruff and lice.	+	-
Tribulus terrestris (Gokhru)	Zygophyllaceae	Root, fruit and leaves are used in cooling, tonic cough, asthma anemia, ophthalmic, gonorrhea and leprosy.	+	+
Andropogon pumilus	Poaceae	---	+	+
CLIMBER				
Cuscuta reflixa (Amarbel)	Cuscutaceae	Whole plants are used in jaundice, cough bronchitis, fever and paralysis.	-	+
Momordica chameli (Karela)	Cucurbitaceae	Fruit is considered as tonic, stomachic, curminative rheumatism, diseases of liver and spleen.	+	+
Jasminum officinale (chameli)	Oleaceae	Root, leaf & flower are used against ringworm, ulceration of wound, headache and eye troubles.	-	+
Ipomoea quamoclit	Convolvulaceae	Seed is used in purgative.	+	+

Note:'+'Sign denotes presence, '-'Sign denotes absence,CZ = Core zone, BZ = Buffer zone

DISCUSSION:

Due to mining activity a large number of angiospermic plants species were disappear from core zone (mining lease area). All 62 species belonging to 35 families, 29 trees, 4 shrub, 17 herbs and 4 climbers were recorded from buffer zone; 12 trees, 3 shrubs, 20 herbs and 2 climbers' were found in core zone.

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