MATERIALS AND GENERAL METHODOLOGY:

Material-

Some common weed plants naturally occurring in different forest floors of Paschim Medinipur are namely, – *Lantana camara* Linn, *Cassia tora* L., *Eupatorium odoratum* L., *Crotalaria pallida* Ait., *Tephrosia purpurea* Linn., *Ocimum canum* Sims., *Cleome viscosa* L, *Chrysopogon aciculatus* (Retz.) Trin.etc. However, many of them are not commonly available in all forest beats. So four commonly available weed species were chosen on the basis of the usefulness, traditional or ethno medicinal use, natural occurrence in all selected forest areas as well as their habitat. These selected plant species are –

Table 2.1: Selected Plant Samples.

Sl. No.	Colloquial Name	Scientific Name	Family	Habit
1	Chotra.	*Lantana camara* Linn.	Verbenaceae.	Shrub
2	Bon Atasi	*Crotalaria pallida* Ait.	Fabaceae.	Herb
3	Bon Tulsi	*Ocimum canum* Sims.	Lamiaceae.	Herb
4	Bon neel	*Tephrosia purpurea* Linn	Fabaceae.	Herb

Soil: Nitrogen, Soluble Phosphorus, Potassium content and pH of soil.

Lantana camara Linn.

Brief Description:

Shrub, stem woody and prickly. Leaves ovate, margin serrate, arrangement opposite, petiole present, scabrid found on both sides. Flowers orang yellow and inflorescence cymose. Corolla tube pubescent, slender and tetra lobed. Fruit small shining black berries.

Systematic Position:

Plantae

Tracheophyta

Magnoliopsida

Lamiales

Verbenaceae

Lantana

Lantana camara Linn

Distribution:

Local: Andaman & Nicobar, Andhra Pradesh, Arunachal Pradesh, Bihar, Chhattisgarh, Delhi, Haryana, Himachal Pradesh, Jammu, Kashmir, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Mizoram, Nagaland, Odisha, Punjab, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh, West Bengal.

Global: Asia, Africa, America, Australia, Bhutan, Canada, China, Europe, India, Indonesia, Malaysia, Myanmar, Nepal, Russia, Venezuela**.**

Crotalaria pallida Ait.

Brief Description:

Herb, erect, stem woody and fibrous. Leaves compound, trifoliate, leaflets obovate, arrangement alternate. Flowers in elongate terminal racemes. Sepal's teeth five and corolla yellowish in colour. Stamens 10. Fruit glabrous, cylindrical Pod.

Systematic Position:

Plantae

Tracheophyta

Equisetopsida C. Agardh

Fabales

Fabaceae

Crotalaria

Crotalaria pallida Ait.

Distribution:

Local: Andaman & Nicobar, Andhra Pradesh, Arunachal Pradesh, Bihar, Chhattisgarh, Delhi, Haryana, Himachal Pradesh, Jammu, Kashmir, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Mizoram, Nagaland, Odisha, Punjab, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh, West Bengal.

Global: Asia, Africa, America, Australia, Bhutan, China, Europe, India, Myanmar, Nepal, Russia.

Ocimum canum Sims

Brief Description:

Herb, stem woody and branched. Leaves elliptic lanceolate, margin entire or partly serrate, petiolate, acute on both ends. Flowers in whorls and inflorescence raceme. Bracts and stalk with white hairs. Calyx and Corolla 2 lipped, white. Fruit small black nutlet..

Systematic Position:

Plantae

Tracheophyta

Magnoliopsida

Lamiales

Lamiaceae

Ocimum

Ocimum canum Sims

Distribution:

Local: Andaman & Nicobar, Andhra Pradesh, Arunachal Pradesh, Bihar, Chhattisgarh, Delhi, Haryana, Himachal Pradesh, Jammu, Kashmir, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Mizoram, Nagaland, Odisha, Punjab, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh, West Bengal.

Global: Asia, Africa, America, Australia, Bhutan, China, Europe, India, Indonesia, Malaysia, Myanmar, Nepal, Russia.

Tephrosia purpurea Linn

Brief Description:

Herb, stem woody, many branched and hairy. Leaves imparipinnate, leaflets oblanceolate, under surface glabrous, base cuneate, apex truncate. Flowers purple, bracteate, calyx long, pubescent, corolla orbicular and inflorescence pseudoracemes. Fruit cylindrical dark brownish Pod .

Systematic Position:

Plantae

Tracheophyta

Equisetopsida C. Agardh

Fabales

Fabaceae

Tephrosia

Tephrosia purpurea Linn

Distribution:

Local: Andhra Pradesh, Arunachal Pradesh, Bihar, Delhi, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Odisha, Punjab, Rajasthan, Sikkim, Tamil Nadu, Tripura, West Bengal.

Global: Asia, Africa, America, Australia, Bhutan, India, Indonesia, Malaysia, Myanmar.

Methods:

Survey:

Random surveys were carried out in different forest areas of Paschim Medinipur district like Nayagram Beat, Keshor Rekha Beat, Ramrama Beat (Jhargram Forest Division); Nimpura Beat, Kalaikunda Beat (Kharagpur Forest Division); Chandra Beat, Gurguripal Beat (Rupnarayan Forest Division); Goaltor Beat, Gongoni Beat and Bhadutala Beat (Midnapore Forest Division). In each forest beat some sites were randomly chosen but only considering availability of weeds. So, the chosen sites were the samples representing respective beat. Survey was conducted following quadrate method (Cox, 1990). Geographical status of each chosen survey sites was taken into account in terms of longitude, latitude and altitude with the aid of GPS.

Finally, one forest Beat area from each forest division was selected on the basis of availability of common weed plants as well as easy communication.

Selection of forest areas:

Four forest beats of the district Paschim Medinipur were chosen on the basis of accessibility, a cursory visit of the places in search of availability of forest floor weeds and a considerable distance between the sites.

Study Area:

Selected study areas with G.P.S. are as follows:

Table 2.2: Selected Forest Area (With G.P.S.)

Forest Division/ Area	Forest Beat	Latitude	Longitude	Altitude
Jhargram	Ramrama	N $22^0 26' 13.32''$	E $86^0 59' 32.76''$	81MT.
Kharagpur	Kalaikunda	N $22^0 20' 23.89''$	E $87^0 13' 37.18''$	61MT.
Rupnarayan	Gurguripal	N $22^0 48' 28.93''$	E $87^0 22'' 51.86''$	62MT.
Medinipur	Bhadutala	N $22^0 29' 9.74''$	E $87^0 19' 30.78''$	54MT.

Selection of Plant Species:

Forest weed species for the study were chosen after a preliminary study of the forest sites, noting the available species, selecting out the common ones growing in all sites and also in consideration of the prior knowledge about the utilities of the weed species.

Identification of Plant samples:

Primarily identification of weed plants has been done with the help of experienced foresters and local people. This process is botanically termed as “Spot Identification Method”. This exercise was, however, further supported with literature survey and help of digital herbarium of Berlin (BGBM, http://www.bgbm.org). Plant samples were identified and authenticated from the Central National ‘CAL’ of Botanical Survey of

India, Acharya Jagadish Chandra Bose Indian Botanic Garden, Shibpur, Howrah, West Bengal, India and also with the help of its website i.e. (CNH, http://164.100.52.111/cnh/index.htp)

Recording of nutritional status of soils of chosen sites:

Soil samples (500 gm) were collected from a depth below 35 cm from every forest beat area under this research work. Soil samples were taken out in tray and allowed to dry first. Then air dried soil samples were transferred into clean cloth bag mentioning collection place, soil type, date of collection etc. Amount of Nitrogen, Phosphorus, Potassium concentration are determined by the methods proposed by (Tandon, HLS.1993), (Tandon, HLS.1993) and (Jackson,1967). All experiments regarding Soil samples are performed at 'Soil, Water and Manure Testing Laboratory' of DBT -DST sponsored 'Vivekananda Institute of Biotechnology' at Nimpith Ashram, South 24 Parganas, West Bengal, India. All experiments are performed thrice and then mean value is calculated. Final result is published as –

Mean value ± SD.

Soil pH Determination:

This was carried out in soil to water ratio 1:2 with help of Systronic pH meter, model (Systronics µ pH meter 361) with glass electrode (Jackson 1967).

Soil Nitrogen Determination:

In determination of available nitrogen, the process involves distillation of soil with alkaline potassium permanganate solution and determine the ammonia liberated. (Tandon, HLS.1993).

Soluble Phosphorus Determination:

For determination of soluble Phosphorus, the Olsen's method was applied in case of neutral -alkaline soils while the Bray and Kurtz method was used for acidic soil. (Tandon, HLS.1993).

Potassium Determination:

The available cations were determined by extracting the soil with 1N ammonium acetate (pH 7.0). Potassium with flame photometer model (Systronics flame photometer 128. (Jackson 1967).

Morphological Diversity Study:

External morphological studies of four plant species have been carried out. The habit of plant, height of plant, leave length and width (cm/mm), weight of fruit and seeds (gm) of selected plants were taken into account for this study.

Biomolecular Study:

Fresh leaves and seeds of 40 plant samples of the selected every four-plant species were taken from each forest beat area. Leaves of these plant were used to determine the quantity of DNA, RNA and seeds for the determination of protein. Plant Protein extraction and estimation was studied according to Lowry's method (1951). In quantification of plant protein, the absorption was measured at 660nm. Plant DNA is extracted by 'CTAB' method and RNA is extracted by the process proposed by Brawerman (1974). Plant DNA and RNA quantity is measured by the process proposed by Ashwell (1957). In quantification of DNA and RNA the absorption was measured at 600 nm and 660 nm respectively with help of Spectrophotometer (Spectrophotometer Model: UV-1800; SHIMADZU CORP, Serial No- A11454703023) and calculated as

mg g^{-1} F.Wt. by using DNA calibration curve and RNA calibration curve. (Sadasivam S and Manickam A, 2008).

All experiments are performed thrice and then mean value is calculated for determination of Protein, DNA and RNA quantity. Final result is furnished as –

Mean value ± SD.

Phenological Study:

Phenological studies related to all plant samples were done on the basis of simultaneous surveying in the selected forest areas. Majority of the works were carried out in the four chosen forest beat area was expressed on the basis of time span, such as year, month and week. Flowering time especially the peak time of it, fruit setting time, fruit maturity period of all selected plants was determined in course of month and percentage of plant species per year in all locations.

Plant Utility Study:

Uses specially ethnomedicinal purpose and other aspects of each species by the people dwelling nearby or on the fringe of each forest were recorded through personal contact, interrogation and interview of local people. Interviews were taken both by individual interrogation and group discussion. Various information obtained from the people regarding many aspects of plant use through normal conversations and methodical interview were kept as 'Data' as outlined by Jain, S.K. (1964). Framed questions, conversations and participatory outlooks were used to form information from the concerned persons by using proper methods (Martin, 1995).

Study of Plant Loss:

Damages of various natures caused to the species under study were recorded. The nature of damage was scrutinized, noting the parts of plants and extent of damage. Causal agents of these damages were also considered and grossly classified.

Data Analysis:

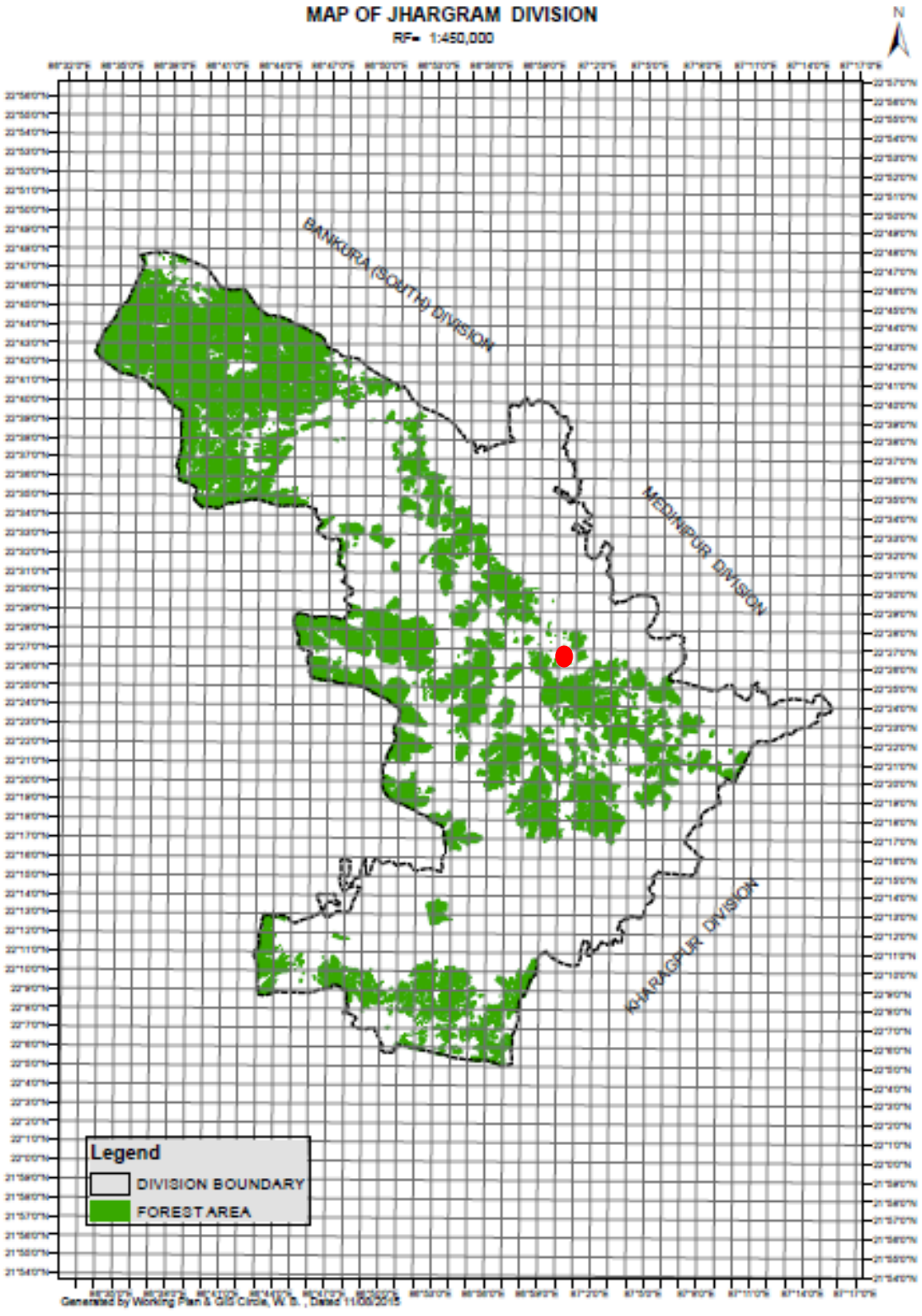
All data were taken in M.S. Excel and analyzed with the help of SPSS.1.60 and M.S. Office 10 software. LSD value is determined by 'One Way ANOVA' from SPSS software.

Soil Nutrient Status of Forest Sites under Study

Soil nutrient status is a very important parameter to influence plant growth. In consideration of this fact these pertinent parameters like soil pH, Nitrogen, Soluble Phosphorus and Potassium for all chosen sites have been recorded from Soil Testing Laboratory, Kharagpur and are displayed below (Table 2.4).

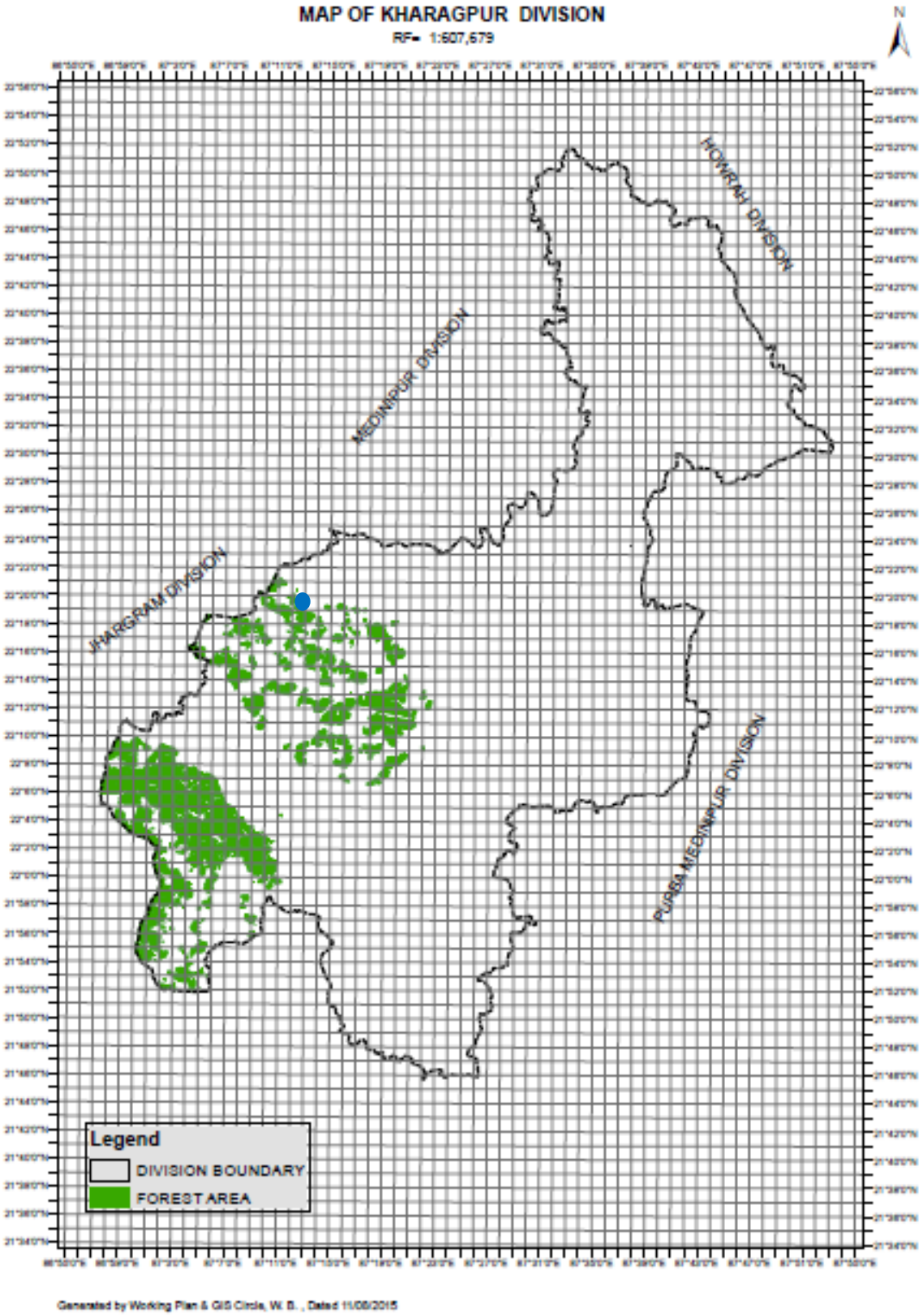
Table 2.3. Soil status of different selected forest sites.

NAME OF FOREST BEAT	AVERAGE p H OF SOIL	ORGANIC NITROGEN (Kg/Hec)	PHOSPHORUS (Kg/ Hec.)	POTASSIUM (Kg/ Hec.)
RAMRAMA BEAT.	5.35 ± 0.20	160.5 ± 10.2	26.06 ± 3.01	109.12 ± 3.20
KALAIKUNDA BEAT.	5.78 ± 0.36	244.2 ± 45.2	26.57 ± 4.84	121.86 ± 6.61
GURGURIPAL BEAT.	8.27 ± 0.29	199.9 ± 6.2	86.75 ± 1.70	358.85 ± 109.5
BHADUTALA BEAT.	5.89 ± 0.78	234.29 ± 12.4	29.01 ± 2.71	155.12 ± 45.33



- Indicates Ramrama (Latitude - N $22^{0}26'13.32''$ and Longitude - E $86^{0}59'32.76''$)

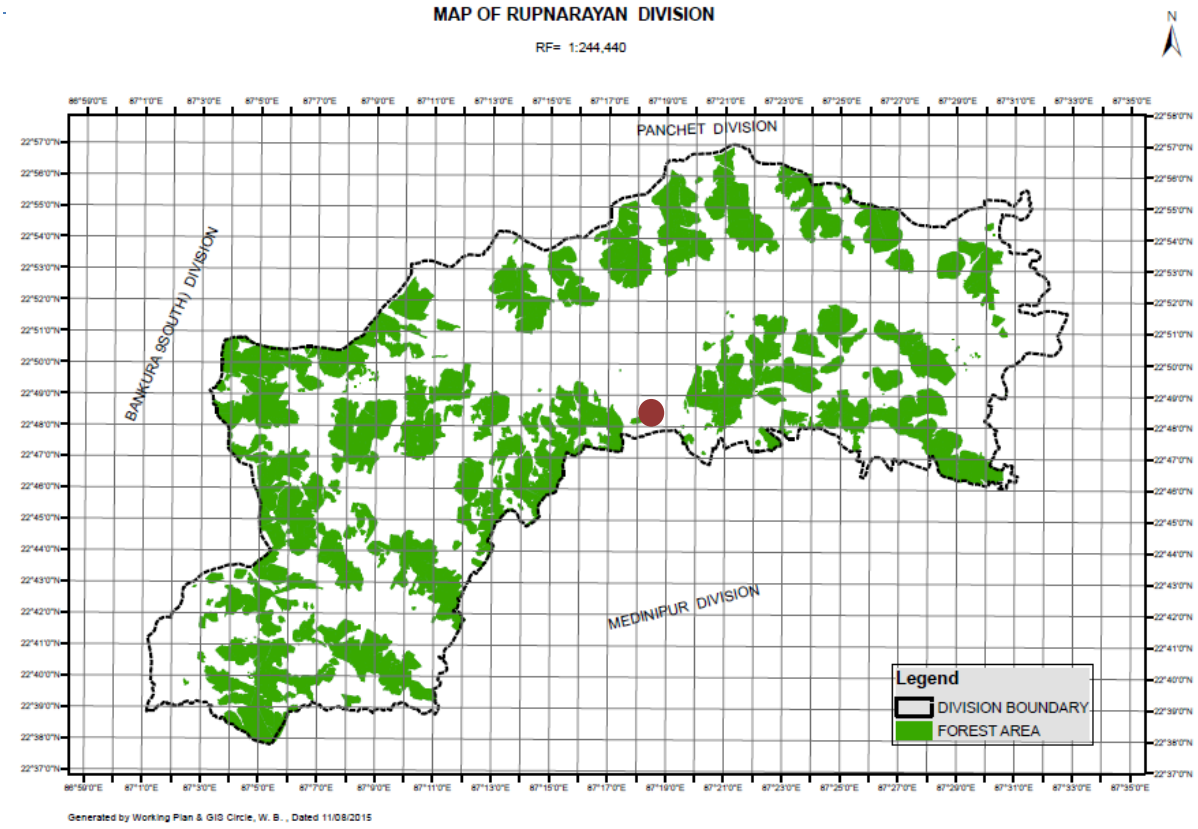
Fig 2.2 a: Map of Jhargram Forest Division, indicating 'RAMRAMA' Beat.
Source: Website of Forest Department, Govt of West Bengal.



● - Indicates Kalaikunda (Latitude - N $22^0 20' 23.89''$ and Longitude - E $87^0 13' 37.18''$)

Fig 2.2 b: Map of Kharagpur Forest Division, indicating 'KALAIKUNDA' Beat.

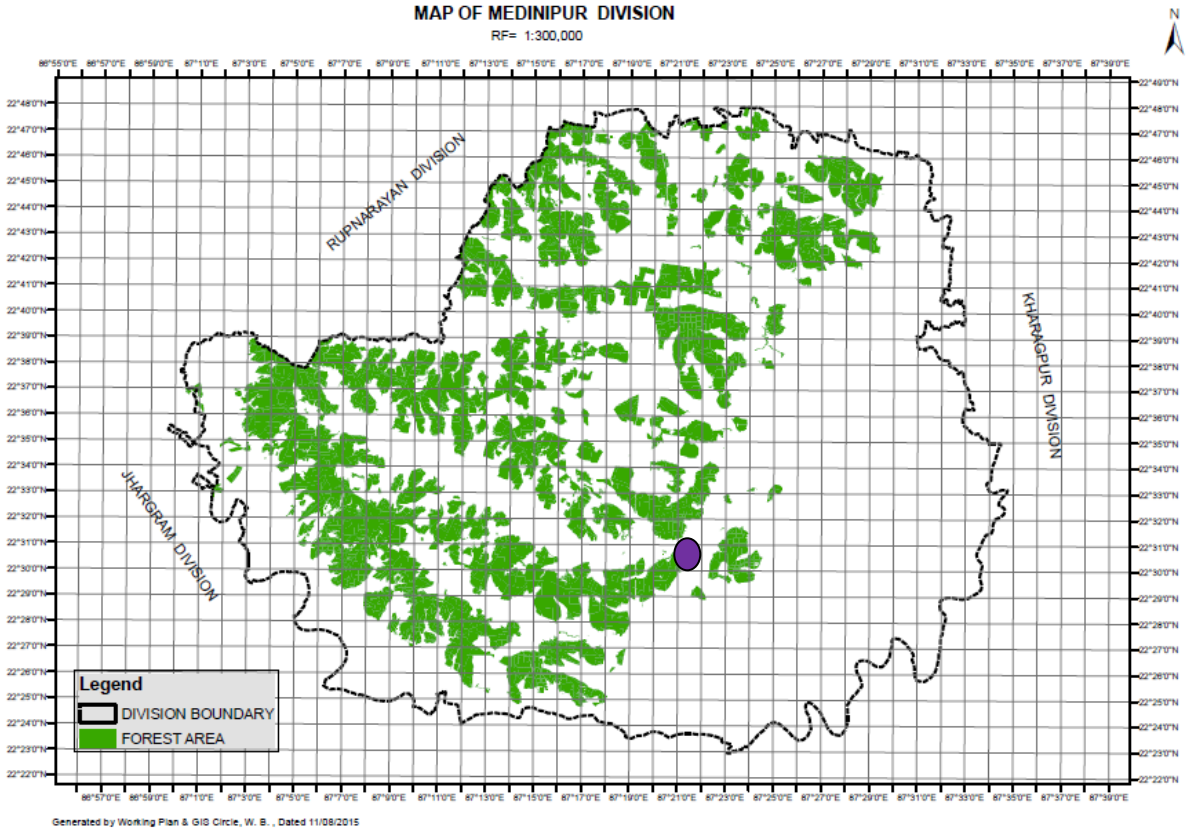
Source: Website of Forest Department, Govt of West Bengal.



● - Indicates Gurguripal (Latitude - N $22^{0}48'28.93''$ and Longitude - E$87^{0}22''51.86''$)

Fig 2.2 c: Map of Rupnarayan Forest Division, indicating 'GURGURIPAL' Beat.

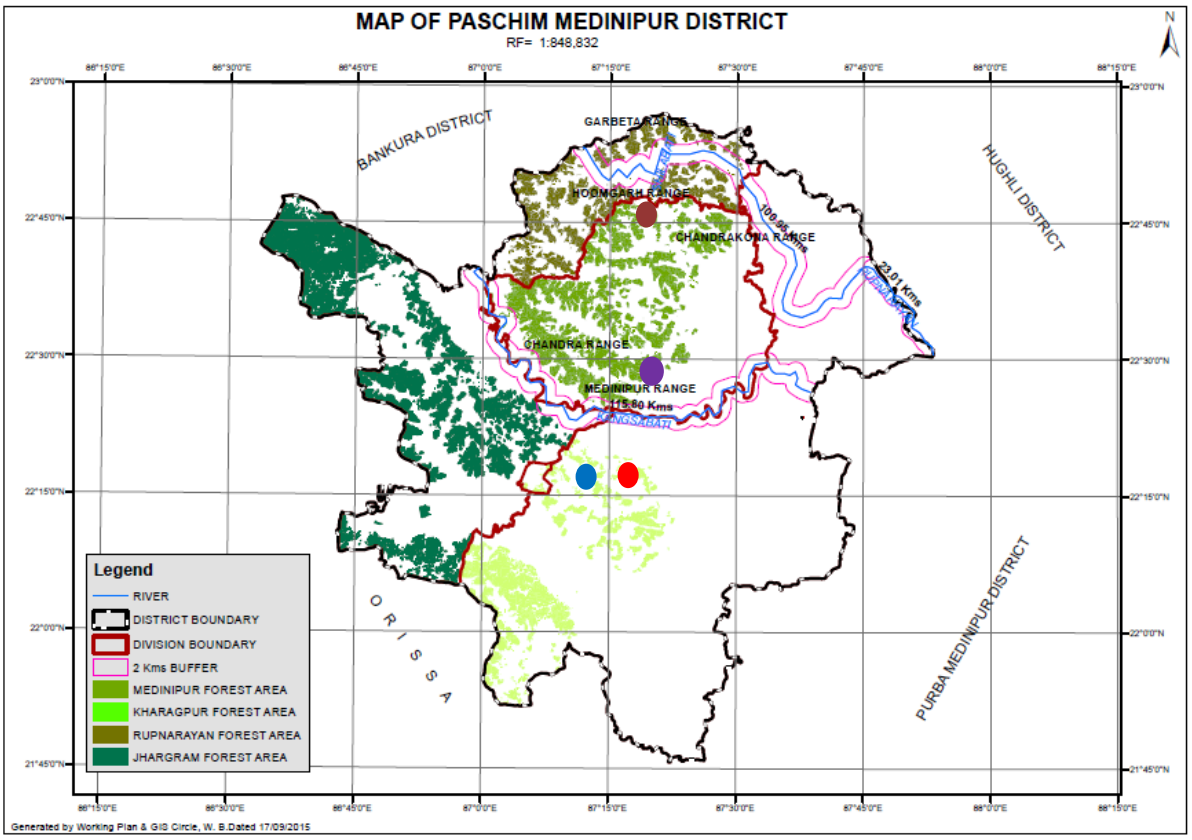
Source: Website of Forest Department, Govt of West Bengal.



● - Indicates Bhadutala (Latitude - N $22^0 29' 9.74''$ and Longitude - E$87^0 19' 30.78''$)

Fig 2.2 d: Map of Medinipur Forest Division, indicating 'BHADUTALA' Beat.

Source: Website of Forest Department, Govt of West Bengal.



- Indicates Ramrama (Latitude - N $22^0 26' 13.32''$ and Longitude - $E86^0 59' 32.76''$)
- Indicates Kalaikunda (Latitude - N $22^0 20' 23.89''$ and Longitude - $E87^0 13' 37.18''$)
- Indicates Gurguripal (Latitude - N $22^0 48' 28.93''$ and Longitude - $E87^0 22'' 51.86''$)
- Indicates Bhadutala (Latitude - N $22^0 29' 9.74''$ and Longitude - $E87^0 19' 30.78''$)

Fig 2.2 e: **Map of Paschim Medinipur District with all Forest Division including four study area.**

Source: Website of Forest Department, Govt of West Bengal.