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Tea Cultivation In Cooch Behar Changes The Nature Of Its Soil's Fertility & Water Availability.

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Abstract

Tea garden along with its factory is known as tea industry. Thousands of acres of unfertile land of Dooars of North Bengal came under the ambit of the tea plantation from long past. To satisfy the growing demand of green tea leaf, the concept of Bought leaf tea factory is introduced in India. Consequently, the plain fertile area of Mekhliganj, Cooch Behar covered very rapidly by the mushroom like growth of small tea garden. This study showed that by nature, 85% the soil of this very area is, deep to very deep fine loamy & coarse loamy and suitable for crop plant like Paddy, Wheat, Jute, Tobacco and other winter vegetables etc. Tea plant needs huge amount of water, in every year a large amount of water come out of the soil. Water table of soil gradually declined. An average crop of 2000 kg made-tea/hector will remove around 100 kg nitrogen, 20 kg phosphate and 40 kg potash per hector per year from soil in addition to nutrients locked up in the bush frame. So, the growers of small holdings used to provide large amount of fertilizer mainly of chemical nature such as urea and potash to the soil to satisfy the fertilizer requirement of the tea plants. Nature of soil degrades in course of time. Unscientific use of herbicides like Glyphosate, Paraquat became the cause of complete eradication of ferns and other angiospermic herb. This paper, focus that the profit- making attitude of cultivating tea plant in plain area ultimately leads to spoil the soil nature, lowered the ground water table and loss of biodiversity of this very region.

Keywords- Tea, Bought-leaf factory, Herbicides

INTRODUCTION:

Tea [*Camellia sinensis* (L.) O. Kuntze] (Theaceae) is the most widely consumed beverage drink in the world, ranked second after water (Zhen 2002, Ho et al.2009). In the world India is the second highest producer of tea after China and the production is increasing gradually from 955,907 metric tons in 2006 to 1,389,382 metric tons in the year of 2019 (Jan Conway 2021). In India, the tea plant was discovered growing wild in upper Assam (India) in 1821 (Roy) [5]. In West Bengal, the first tea garden was

established in 1857 at Darjeeling, thereafter tea plantations started extending down to sub Himalayan *Terai* region from 1862 and *Dooars* from 1874 (Joseph)[6]. It is the most important economical crop of Darjeeling district and its contiguous Dooars region of Jalpaiguri district. However, tea garden was quite uncommon to the plain area of Cooch Behar district. Cooch behar is a district of West Bengal southern to Jalpaiguri Ditrict dominated by Rajbanshi community people. In the nineteenth century, the group was identified by many ethnographers as belonging to the same tribe as Koch and Paliya of northern Bengal (Baverly 1872; Hunter 1876; Risley 1891; Baines 1912). However, they possess strong cultural heritages which are closely associated with nature. One such trait is the maintenance of sacred bamboo groves which is a unique feature among the Sacred Groves of the country. With the introduction of Bought leaf factory (Bought leaf tea factory means a tea factory which sources not less than two-thirds of its tea leaf requirement from other tea growers during any calendar year for the purpose of manufacturing of tea.) in the plain area of Cooch Behar mainly the cultivators of Mekhliganj sub-division started tea plantation in purely agricultural crop land. There was not a single tea garden in Mekhliganj before 1985.Upto 2010 only 4 Tea estates were registered: Kuchlibari Tea Estate area 217.79 hectors, Mainak Hills Tea Estate of 284.79 hectors, Mou Priya Plantation Pvt. Ltd. of 16.49 hectors and Tinbigha Tea Estate of 223.29 hectors, and the production of leaf reported by the T.E. in kg were 510800 kg ,376895 kg ,32500 kg,597600 kg during 2010 respectively. But it is only the head of an iceberg. Land under which Tea plantation has been done in Mekhliganj without taking any permission from appropriate authority has been exceeded than that of total amount of land under the 4-tea-estate. It becomes a common object for the people of this locality to initiate tea garden in small holding like 1/2 to 20 bigha of land leaving their age-old common crop plants like paddy, wheat, jute, and other vegetable like cauliflower, cabbage, chilly, brinjal, tomatoes etc. Mekhliganj is a good habitat for fern also *Ampalepteris* sp., *Blechnum occidentale*, *Cheilanthes* sp. *Christella dentata*. They do not bother about the land quality, Ph or fertility level. The quality of tea leaf used for manufacturing is highly influenced by soil nutrients and tea clone. Concentration of nutrients in tea leaf is related with the soil environment (Özyazici *et al.*,[3]) Mineral content of harvested tea depend on the soil properties on which it is grown along with its agronomic practice (Kalita and Mahanta[4]). So, the contents of nutrient element of tea plant are related with soil environments.They are not interested to the consequence to be followed in the long run to the small streams and small rivers of this region. The soil status will be changed in the long run due to improper use of chemical fertilizer i.e., urea and potash to maintain the soil fertility by these tea uncultured farmers.

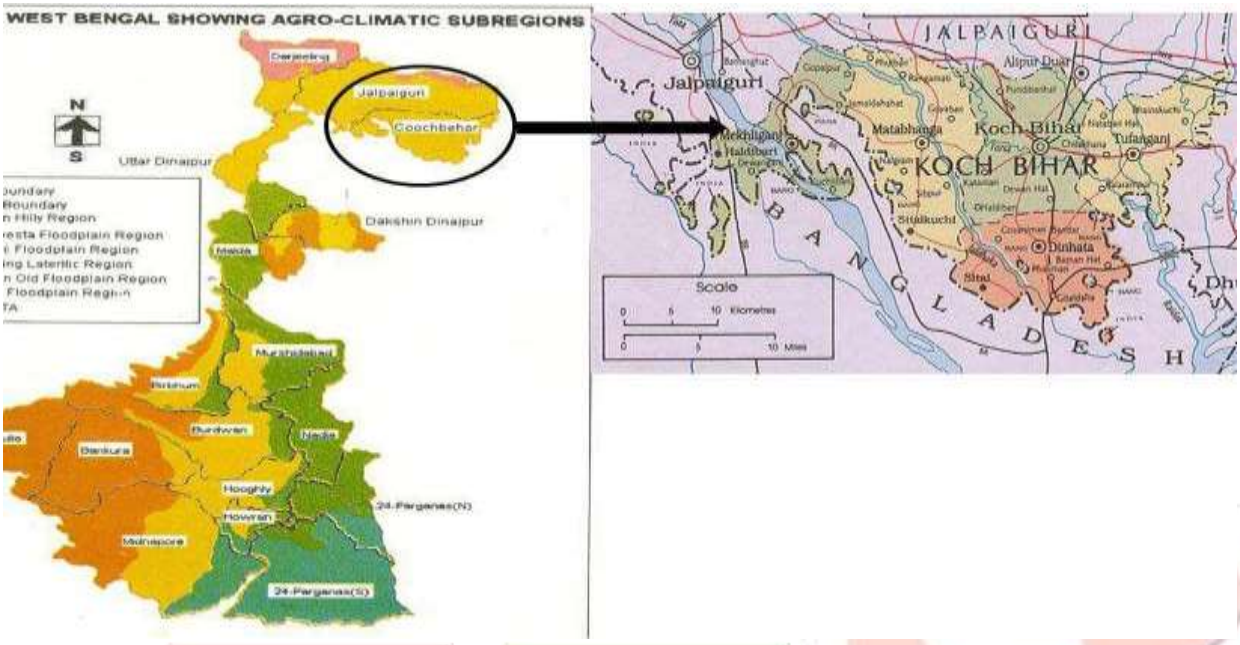
STUDY AREA:

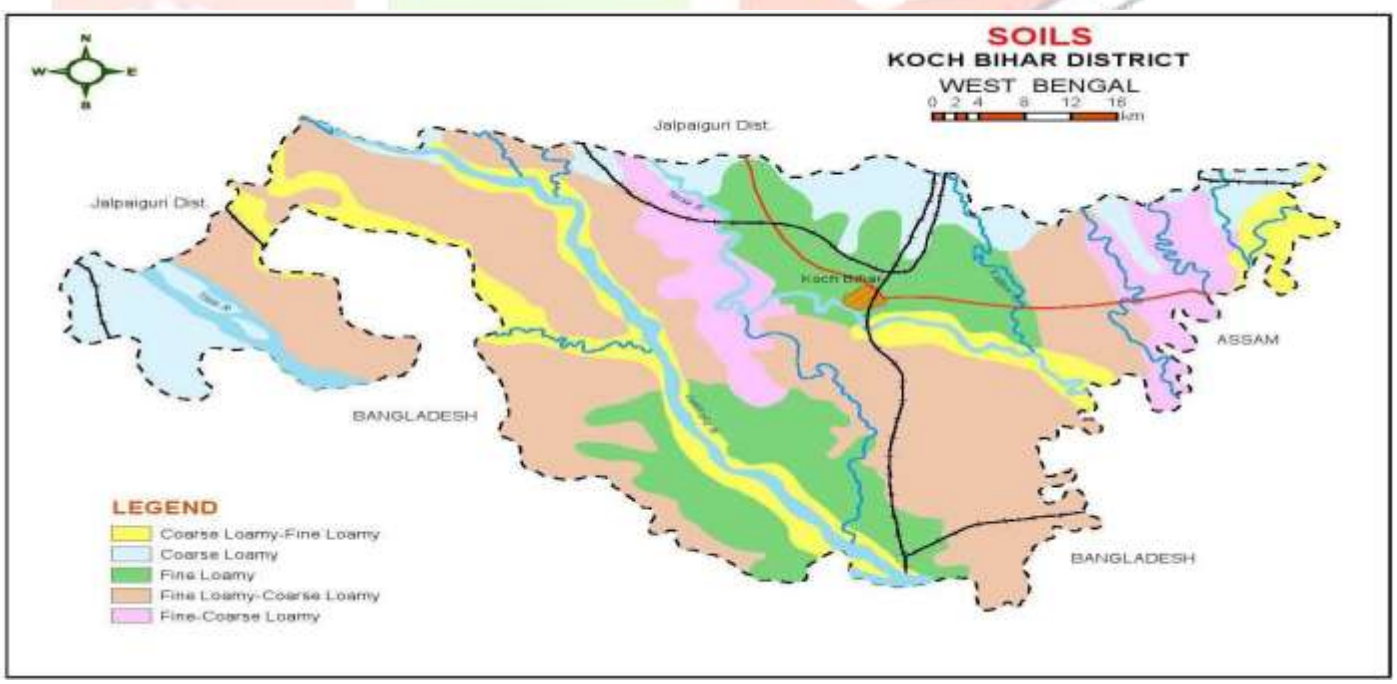
- The study area lies in the south western part of Cooch Behar district, West Bengal covering area of (Map enclosed) 8264 hectares and is enclosed within latitude 23°42'-23°40´ and longitude 87°20´-87°22´in the survey of India topographical maps (73M⁄10, 73M⁄11, 73M⁄14, 73M⁄15).
- The area located just midst of two rivers Jaldhaka, flowing in the west, the Teesta, in the east, and area is watered by river Sutunga, Dharla, Saniajan, Seuli etc.
- Physically, the area is nearly 37 meters height from mean sea level. Typical subtropical climate and fine loamy & coarse loamy soil

helps to grow normal crop plants

- Our study area, Mekhliganj Block, Cooch Behar is an agriculturally developed due to its fertile soil water availability through a number of river and stream like Dharla, Sutunga, Saniajan, Seuli etc.

After a long period small scale cultivation spread to the other tea producing states of India like West Bengal and Assam. The Tea board of India adopted the concept of STGs during the eighth five year plan (Hannan, 2008).





MAIN ISSUES

- Tea grower's profit-making attitude makes them use huge amount of chemical fertilizer mainly urea and potash that ultimately leads to change in soil quality of this area.
- Tea plants have a long tap root for sucking water from 3 to 6 meters deep of the soil and transpire a large amount of water through their stomata. In the long run that will bring down the water level of the soil of this area.
- Tea plants need large amount of water, Grower are used to drain it from nearby river or stream or they use shallow pump that also leads to change the soil water level.
- Tea is a perennial plantation crop grown under monoculture providing favourable conditions for a variety of pests.
- Greater dependence on the use of pesticides showed a higher tolerance/resistance status in the pests
- Over reliance on pesticides end up with pesticide residue in made tea.
    - Tea plantation increased the runoff on the area cleared of forests. METHODOLOGY
- Information was gathered, taking interview of the informants and as witness of the uses during the period of studies in the field.
- The field study was carried out by putting questionnaire to people of different category of laborer, tea garden manager, the proprietor of small tea gardens and the nearby inhabitants of the small tea garden.
    - The informants were requested to accompany us in the field FINDINGS

LAND HOLDER- MANAS CHAKRABORTY AREA-27 DECEMAL

PREPARATION OF TEA GARDEN

1. Plantation done in October/ November month in a year.
2. Soil preparation is done by mixing 2 kg of thymet.
3. Space between two Tea plants is 3ft by 2 $^{1/2}$/3ft.
4. Before monsoon fertilizer like cow dung of 800 kg was given.
5. Watering done at the month Chaitra(last month of Bengali calendar) for three days 1 and ½ hours (machine capacity1/2 horse power)
6. So called vitamin like ISABION/ OVIRON is sprayed after one day of plucking leaf.

- Last twenty years the plain area of North Bengal witnesses' great extension of tea gardens converting the paddy land.
- Tea is a perennial plantation crop grown under monoculture providing favourable conditions for a variety of pests.
- The soil under tea, over a long period of time, undergoes deterioration in relation to its structure and nutrient status (Dey, 1966).
- The preferable pH range of soil for rising of tea cuttings is 4.5 to 5.5.

Figure 1 Tea garden with cleared ground surface

Figure 2 Water drawing from deep soil

Figure 3 water drawing from river

Figure 4 Lucas sp. an index plant for tea garden

Figure 3 Presence of weed adjacent to tea garden

Figure 4 Dry ground surface

Figure 7 Presence of fern adjacent to tea garden

Figure8 Labourers plucking tea leaf

RESULT AND DISCUSSION

- Soils of Dooars where tea gardens are prevalent from earlier are mostly loamy in texture and coarse and sandy. The average annual rainfall in these tea areas is 2000 to 4000 mm.Other types of soil i.e., terai soil on which paddy can grow well enough, brought down by the hilly river like Tista, Jaldhaka, Torsha etc. from 10,000 ft above and deposit to 200 to 300 ft above the sea level mostly sandy and of raw humus deep to gray black in color. Now tea gardening is intruding this area of land. In spite of the initial policy that tea garden is to be established in unfertile highland which are not suitable normal crop plant. There is a positive correlation (0.9233) between organic carbon and nitrogen percentage in soil. Chief reason for low nitrogen content in some region may be due to low use efficiency of the externally applied fertilizers by plants as well as their long term application. Since 1980s, the use of nitrogen in tea plantations has been increasing rapidly; though several researchers are being involved in the study on tea, research work on mineral nutrition is rare (Luczaj and Skrzydlewska)[24].Active growing roots of tea plant gradually lowered down the pH of the soil may be by absorbing NH^4 ion and releasing proton to the soil. The tea growing areas generally have moderately to highly acidic soil and it is well established that under the acidic or calcareous soil large amount of phosphorus is fixed (Gyaneswar*et al.*, [28]). The problem of phosphorus deficiency is of particular concern for acid soil like tea garden soil, as tea prefers a low pH (4.5- 5.5) soil (Zoysa*et al.*,[29]); which cause unavailability of phosphorus due to binding to soil mineral surfaces and fixation into organic forms[27]; (Kochian*et al.*,[30]). Additionally, when concentration of phosphate in soil exceeds the natural soil-phosphate holding capacity, phosphate can be carried downward, or leached; commonly referred to as phosphate leaching (Bolan *et al*., [31]). After nitrogen, potassium is the second major nutrients required for tea cultivation and constitute 1.5-2% of tea leaf dry matter (Verma[32&33] & Xun*et al.*, [34]). Potassium deficiency occurs in the tea plantation mainly due to excessive leaching as a consequence of higher precipitation and more demands by plants as well[33&34].
- By using uncontrolled use of herbicides like Glyphosate and Paraquet changes the natural vegetations. Tea growers always try to keep their tea garden completely weed free. However, it has long been recognized that insect pest pressure tends to increase in agro- ecosystems as they become less diverse. It

is almost 70 years since Wolcott (1928) first drew attention to the possibility that the destruction of weed communities in the tropics might increase crop damage by insect pests and insect transmitted disease. For intensive agriculture, the view has been expressed by Way and Cammell (1981) that insect communities in and around agroecosystems have been affected more by herbicides than by insecticides. Although a number of so-called weeds available in and around tea garden can be used for the management of different tea pests. As *Clerodendron infortunatum, Adhatoda vasica, Lantana camara* for *Helopeltis theivora*.

- The importance of field margins as conservation areas for flora and fauna is well established in Europe and for some pests they may act as reservoirs of beneficial insects (Marshall, 1988). Field margins and natural vegetation can provide a habitat for beneficial arthropods where they can find physical shelter, the polyphagous species can second alternative hosts, a diverse flora may provide pollen, nectar or water and perhaps a more favorable microclimate than is available within the cropped area, especially if it is a monocrop (Dyer and Landis, 1997).to establish a small tea garden in a field, some types of weeds are often used as indicator plants for soil conditions.in China *Botrychium virginianum*, *Cunninghamia lanceolata* are used as indicators of acidic soil (Sichuan Chaye 1977). In Sri Lanka *Pteridium* are regarded as indicators of good soils for tea.the most reliable plant indicators for tea are aluminium accumulators such as *Osbeckia*in Sri Lanka (Eden 1976) and *Lucas* sp. in India.
- Tea plants need huge amount of water. Their root system composed of two types of roots, "feeding or feeder roots and extension roots can penetrate 6mt. deep to the soil and absorb water. At summer water is extracted from nearby river, stream or it is drawn from ground water layer may cause the lowering of ground water level.
- Greater dependence on the use of pesticides showed a higher tolerance/resistance status in the pests due to formation of greater amount of esterases, glutathione S-transferase and acetylcholinesterase.
- Number of pesticides like thymets are now band as it kills a number of beneficial pests of the soil. RECOMMENDATIONS
- Plain fertile land should not be allowed to tea cultivation.
- Awareness regarding the use of pesticides and herbicides must be encouraged.
- Like animal each and every species of plant have the right to survive on the earth.
- Use of organic fertilizer instead of chemical fertilizer must be encouraged.
- Control of pest by Biological or Physical method in lieu of Chemical pesticides are to be encouraged.
- An integrated nutrient management system involving the use of organic manures, biofertilizers and synthetic fertilizers is the need of the hour. Foliar application of major, secondary and micronutrients have been recommended.

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