Biodiversity in Rubber Plantation

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The term biodiversity has a very significant meaning. Bio refers to living and logy refer to the discourse of science. Biodiversity serves as a stabilizing factor where heterogeneous populations express themselves either independently or in combination. The natural selection by way of millions of years of evaluation gave rise to a biodiverse planet.

Brazil is famous, both for the Amazon rain forest as well as the origin of rubber. Rubber tree *(Hevea brasiliensis)* is a natural forest tree from Amazonian basin of South America. This species is now grown in the tropical regions of Asia, Africa and America. Rubber is also cultivated in sixteen States of India. At present the total area occupied by rubber is 6,87,000 ha in India and around 98,83,000 hectares in world (Rubber Board, 2011).

Biodiversity in Rubber Soil

High populations of fungus, bacteria and actenomycetes were reported in the soil of unmanaged rubber plantation compared to teak or jarul plantation (Jacob *et al.*, 2002). The change of microflora population in rubber plantation was reported by Deka *et al* (1992). There are three species of earth worms viz: *poerionyx excavatus, Eudrilus eugeniae, Eisenie fetida* were reported in rubber soil (Choudhury *et al.*, 2003). These species converts the rubber leaves litter in to vermicompost which has adequate quantity of nutrients to plants. The presence of earth worms in rubber soil indicates that the soil health is hospitable to microflora.

Flora in Rubber Plantation

Natural vegetation like ferns, grasses, herbs and shrubs, which render the coverage to the exposed soil surface of the rubber plantation (Pal and Dey, 2000). The trunk of the rubber tree had more profuse growth of orchids, sphagnum moss and lichens than teak and jarul plantation (Jacob *et al.*, 2002). Some orchid species are noticed to be growing in the mature rubber plants in Tripura State (Dey, 2004).

Abraham and Abraham (2000) reported that 88 species of weeds grow in rubber plantation in Kerala State. As per their survey the weeds consist of 72 dicots, 16 monocots including 12 grasses and two sedges and two ferns. The most dominant weeds of rubber plantation in all stages where *Chromolaena odorata, Axonopus compressus, Clerodendron infortunatum, Borreria hispida, Ischaemum indicum* and *Mimosa pudica. Cyathula prostrate, Justicia simplex* and *Ischaemum indicum* were dominant in plantations during the tapping stage whereas *Mikania micrantha* and *Cynodon dactylon* were dominant during immature stage (Abraham and Abraham, 2000).

Chakraborty *et al.*, (2002) reported that a number of the species belonging to 42 genera distributed in 12 families viz., *Apocynaceae, Caesalpinaceae, Compositae, Euphorbiaceae, Gramineae, Labiatae, Mimosaaceae, Moraceae, Papilionaceae, Piperaceae, Verbenaceae* and *Zingiberaceae*

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were existed in rubber plantation in Tripura State. The distribution pattern of 24 species were exclusively available in the rubber plantations. Occurrence of a large number of species in rubber proves that rubber is hospitable to more species than other plantations. The distribution pattern of the weed species in other agricultural crops of the State (Chakraborty, 1990) agreed with the abundance and frequency observed in the rubber plantations. These species were reported to reproduce by seeds, vegetative means or by both methods. Nineteen out of forty two species have used for herbal medicine by local tribal's (Pal *et al* 2006). Occurrence of number of species in rubber plantations indicates that the soil and microclimate under rubber plantation are favourable for their growth and rubber plantations are ecofriendly and have not changed the vegetation of the area.

Diversity in agricultural crops in rubber plantation:

Rubber plantation usually takes about seven to eight years to begin production. The canopy usually closes at the end of fifth year. Up to fifth year inter rows can be effectively used for growing intercrops. A variety of intercrops has been cultivated during initial years of a plantation. Intercropping of banana and pineapple during the initial years in the immature stage is very popular in different States. Similarly, the crops like ginger, turmeric, pigeon pea, sesame, groundnut, chilli and vegetables like ladies finger, cowpea, amaranthus and cucumber has also been cultivated in different situations in the initial years. Tuber crops like Amorphophallus, dioscorea, colocasia and arrowroot also cultivated (Rubber Board 2011). Other crops including upland rice, mungbean, soybean, corn, cassava, castor bean, jute etc. were cultivated in rubber in Thailand. In China, many forms of mixed farming have been practiced in rubber. Perennial crops like Cocoa and Coffee can be grown as intercrop in mature plantation. The growers in China, Sri Lanka and some parts of India have been growing tea in rubber. Rubber trees have been intercropped with tea bushes, sugarcane, pineapple, pepper, cinnamon apart from various cover crops like *Calopogonium mucunoides, Centrosema pubescens* and *Pueraria phaseoloides.*

The shade loving plants such as orchids vanilla and some species of medicinal plants were also grown in a mature plantation. Shade tolerant medicinal plants like *Strobilanthus haenianus, Adhatoda vasica* and *plumbago roses* are being cultivated in the rubber plantation. Timber yielding species such as *Terminalia arjuna, Albizzia procera* and *Acacia auriculiformia* are being planted in border rows as wind belt in rubber.

Fauna in rubber plantation:

Rubber has always maintained a symbolic relationship with the surrounding biotic community. The supporting role played by rubber may explain as to why rubber is native to forest. Several plant and animal species can establish themselves in unmanaged rubber plantation. Various kinds of animals ranging from mites to elephants and a number of birds have been sheltering in rubber plantations in Kerala (Vijayakumar *et al.,* 1988). Spectacled langur (Phary's leaf monkey-State animal) can be sighted inside rubber plantation during fruiting season and the spotted deer *(Axis axis)* eating the bark

of young rubber plants were noticed in Tripura State. Larger animal like python is also noticed in rubber plantation in North Bengal area.

The rubber tree is a prolific source of honey, which is present in the extra-flora nectarines at the tip of the petiole. Nectaries secrete nectar after 20 to 25 days of refoliation. The nectar flow continues for two to three months as the refoliation in rubber trees occurs in an overlapping patter. Due to this reason, natural honey bees hives are also seen in rubber plants. Growers in different regions used to keep bees for honey in rubber plantations.

A stable biodiversity ecosystem has a number of tangible benefits like cleaning up of air by producing oxygen and regulation of carbon dioxide, purification of water system and creation of a self supporting and self sustaining system. Rising concentrations of green house gases in the atmosphere, particularly carbon-dioxide and resulting adverse changes in the global climate are of concern. In this context, the leaves of rubber plant remove carbon di-oxide from the atmosphere and release the oxygen in the process of photosynthesis. In the present context, Rubber plantation is a symbol of ecological prosperity and rich source of biodiversity. The genetic resources in rubber plantation are shrinking. We need to draw the attention of all people, who are associated with rubber industry for conservation of biodiversity in rubber plantation.

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