

Subject area : Environmental Problems in Tea Gardens Institute of Advanced Study in Science & Technology, Khanapana, Guwahati, Assam



Tea Gardens, Environmental of Problems and Information System

Tea is known as the queen of all beverages. India is the largest producer of tea in the world, which produced 854 million kg in 2001. It is an agriculture-based industry that covers around 5,09,000 hectares of land.

The most important cause of concern for lose of production in this 'Green Industry' is the pest problem which is responsible for lose anything between 15 to 30 percent every year. Use of pesticides has been in vogue since its inception. But now indiscriminate use of pesticides has led to environmental problems. Tea is a major foreign exchange earner for India which is already being affected to some extent. Therefore judicious use of pesticides, intergrated pest management will help to retain its position and co-laterally improve the image of the industry product. The alternate steps is to grow tea organically which is gaining popularity in case of other crops. There are numerous economically viable & environment friendly methods of pest control, which the industry is not aware of or not seriously viewed.

Research works are going on in many isolated pockets and all of them are producing same type of preliminary data. Dissemination of such data to active research group as well as the growers and processors will help all concerned.

This Environmental Information System (ENVIS) node is formed with a view to reduce the task by re-organizing the available data and having ENVIS website for easy access. The motto of this ENVIS programme is to help with the information system for overall improvement of the tea industry.

While collecting the secondary data / information, it is experienced that a section of the industry have doubt about the role and aim of ENVIS and that it may effect the market / export scenario by over exposing the pollutant levels in tea. It is our endeavour to provide the

information to the planters, manufacturers and also to others associated with tea which will benefit the industry in long run.

We expect co-operation from the sources having generated data base. For any queries and communications we may be contacted at the address given in the Page No. 8.

ENVIS



ENVIS, Environment Information System, was first initiated in 1986 for development of database on environment. It deals not only with pollution but also into other fields leading to 27 other subjects 'Tea' being one of them. Each ENVIS is being handled separately by individual node. The target is to have 90 such nodes in next few years.

Institute of Advanced Study in Science & Technology (IASST), at Khanapara, Guwahati, Assam is chosen as node with the aim of development of database on "Environmental problems in Tea Gardens" as one of those subjects. It will include the information on the problems faced by Tea estates due to environment such as pollution of air, soil and other related issues and also for the ancillary industries coming up around the estates.

Website:

A website with the domain named www.nei-envis.org was uploaded in May 2002. The website contains many important data on tea environment, production, consumption, export, organic cultivation of tea etc. and give us link to other related sites. The database is generated with only secondary data and published data. There is also a plan to collect some primary data, which will be generated by approaching some representative tea estates. A questionnaire is already on the mail list. The project has a time frame of 15 months till June 2003 with a possibility of a extended time.

The news letter will be a quarterly publication. The ENVIS would like to appeal to the web browsers for sharing information on similar subject matter related to tea with listing their mailing address and also website.

There have been extensive queries to the ministry as regards environmental aspect of tea and Govt. of India through Ministry of Environment and Forests has provided ENVIS to serve this purpose through the responsibility given through Institute of Advanced Study in Science & Technology. The systematic data collected through various sources will be a great boon to the Scientists, Researchers, students as well as to the tea industry as a whole. There is a definite gain for the benefit of the industry and will also contribute to the health and growth of the industry.

In due course the industry will be a position to inform the producers as well as consumers about the positive effect of tea or any ill effect for its consumptive use.

The future of the industry will depend how closely the industry is monitoring the MRL (Maximum Residue Limit) on each product and growing of organic tea which is a rich product. The demand for this special tea is growing and has given a good product value for producers.

All about Tea in a nutshell:

Tea, Camellia sinensis (L) O. Ktze is known as queen of beverages, is a ever green perennial crop. When allowed to grow freely, it grows upto 15 m. For cultivation advantage its height is kept at 1 m or so as to pluck the young, tender shoots of two and a bud, which forms the harvest for commercial production at regular intervals.

The place of origin:

The tea origin may be referred to the earliest records in 2737 B.C. by Emperor Shung Nung in China and used as a stimulant. Tea as a beverage started in 6th century and by 17th century it spread to China, Indonesia, Malaysia and finally landed in Europe through Dutch/Portuguese merchants.

It is interesting to note that the natural home of the plant is considered to be within fan-shaped area between Nagaland, Manipur, Mizoram along Assam Myanmar boarder, in the west, through China to the eastern province and towards South through hills of Myanmar, Thailand and Vietnam. The East-West axis is 2400 Km long from 95 degree E. 120 degree E. The north axis is 29 degree N. - 11 degree N. Now tea is grown in different parts of the world within 42 degree N. - 35 degree S. and in over 30 countries.

There are three different varieties

1. *Camellia sinensis* var. *sinensis* (China type)
2. *Camellia sinensis* var. *assamica* (Assam type)
3. *Camellia sinensis* var. *lasiocalyx* (Cambod type)

Discovery of Assam plant:

Tea in Assam was discovered by Robert Bruce near Sadiya of Sivasagar in 1823. By 1836 181 commercial plantation started near Chabua.

Tea Soil:

Tea is grown in remarkably wide range of soil types. Some of the best tea soil are found in Brahmaputra Vally extending up to the Dooars in North Bengal. This is similar to the soil found in Malwai. The soil of Darjeeling, Sri Lanka, Tanzania, Uganda bears similarity. Soil of Japan, Indonesia and part of Tanzania has volcanic origin. There are unique soil type in Surmah vally, Cachar in Assam which is very rich in organic matter.

The best grown soil pH is 4.5 to 5.4.

In brief Tea requires a deep permeable well drained acid soils and forms the area with extensively tea in cultivated.

Planting Materials:

Tea is propagated both from seeds and vegetatively from cutting known as 'clone'.

There are 30 certified clones TRA and 135 numbers by different tea groups and holds true for seed known as jats which is more than 14 biclonal stocks.

Planting method:

Tea should be planted with at most care. Apart from good, health of plant material quality of work is a must which finally reflect the health of the bush, the planting pit, ramming operation after planting and manuring of phosphate (30 gm per pit) is an important consideration for visibility of the properly.

Once established in the nursery and transferred between 12 to 18 months to the field.

Shade plays are important part cutting of 60% of light and induce a micro climate.

Manu ring:

Tea requires NPK and supplemented through the fertilizers that is available. The doses range from 90 kg N to 300 kg N. 20 kg to 60 kg P₂O₅ and 100 - 120 kg KO depending on the soil status followed by a proper soil report.

Pest and Diseases:

Since its earliest planting tea is devoured by pests and also by diseases. The crop loss is 14% to 50% to extreme cases. In 1934 there were 10 insects and now the list is long as 40 species and compounded by primary and secondary diseases.

To combat pest attack a huge quantity of pesticides finds its way to the industry and this has been let to indiscriminate use instead integrated pest management. This has negated the cost of production, pesticides being high cost input. Now more and more tea estates have adopted biological control concept to reduce cost on pest control. Neem and its product are gaining extensive ground in this regard.

The earliest work on pesticide residue was done at Tocklai where it was confirmed that Chlorinated Hydrocarbon compound prevented in Nitrogen fixing bacteria from forming root nodules of legume plants.

The following methods or integration of few methods could be in a proposition to reduce the menace of pesticides currently used in plantations.

1. Biological control:

Predators, Parasitoids, Pathogens, microbial pesticides, botanical centifeedants and repellents.

2. Cultural control:

Destruction of alternate hosts, barrier crop, irrigation and fertilizer practice, mulching

3. Interference method:

Pheromones, sterile male Technique, Insect growth regulators.

4. Integrated control:

Combination of various methods.

5. Varietal control (plant residue):

Genetic makeup, tolerance use of mixed varieties.

6. Botanical control:

Plant extract, weed extract

Tea as a Industry:

Commercial cultivation was started as early as 1836 near Chabua and now 509,000 ha is under Tea (2001) with a production of 854 million kg, average yield per ha being 1678 kg per ha (2001). The industry employs one million directly with indirect benefit to 3 million workers. India earns about Rs 186 million from export (2001) and contribute substantially to the state of Assam and central excheques to the values of Rs 110 million.

Table 1 - The production and export figures are given below (2001) (in m.kg)

	Production	Export	%Export
India	854	183	21

China	695	250	36
SriLanka	295	289	98
Kenya	295	258	87
World	3090	1389	45

Until 1987-88 tea occupied a significant position in export with 20.7%. Due to global stiff competition, the share of tea exports started declining and slipped to 3rd position with a share of 8.8%. Similarly its contribution to GDP has declined from 1.24% in 1951 to 0.33% in 2001. It is a matter of concern for all involved in the industry.

Table 2 - The growth trend for Indian tea industry

	Area 0.00 ha	Prod .000 kg	Yield kg/ha
1950	316	278	881
1970	354	419	1182
1990	416	720	1731
2000	507	846	1669
2001	509	854	1678

Tea in Assam:

Assam tea is known world over for its distinctive quality. In Assam tea covers 53% of total area in India and contributes to the tune of 48% of India's production.

The total area under cultivation is 2,69,000 ha with 829 tea estates.

Assam has produced 450 m kg in 2000.

Small Garden Growers:

There is surcharge in the industry by small tea growers, which is bright sign of growth.

There are about 115,000 small tea growers with a minimum land holding of 10.12 ha and have produced 170 m kg in 2001 as compared to 52 m kg in 1991.

	STG (nos)	Area (ha)	prodn (m kg)	Labour
1991	33,173	25,108	52	66,000
2001	115,000	101,000	170	2,30,000

Tea consumption in India:

Tea as a major beverage in India has a market share of 65% in rural and 73% in urban areas.

Table 3 -The consumption trend and share percentage

Year	prodn (m kg)	Consumption	Export
1950	45	12	50
1960	39	16	36
1970	38	21	31
1980	32	19	26
1990	28	22	19
2000	28	22	15
2001	28	22	13

The above table indicates stagnant consumption and drop in export.

The Tea Consumption:

The per capita consumption in kg per ha is given below for different countries.

India -0.65
China -0.35
Sri Lanka - 1. 14
Kenya - 0.45

Japan - 1.00
Ireland - 3.00
UK -2.5

Table 4 - Export profile of Indian Tea

Year	Qty kg)	Value (Rs)	Unit price (Rs)
1991	202.92	1134.55	55.91
1998	210.34	2309.44	109.80
1999	191.72	1965.87	102.54
2000	206.82	1898.61	91.80
2001	182.59	1682.11	92.13

Organic Tea:

There is growing awareness of tea as a health drink. Apart from that organic tea is emerging as a special value added product. Over the past decade, organic tea consumption health grown by more than 10% per year globally. Based on this growing demand, price for organic tea has been generally % times higher than price of non-organic tea.

Economics of Organic Vs high external input in tea- cultivation:

The following table gives the comparative statement against organic tea:

Table 4- Area under organic tea cultivation

Area	OrganicTea Producers Area(ha)	Under conversion
Dadeeling	(17) 2775	(5) 1014
Assam	(71) 410	(3) 92
South India	(5) 481	(4) 735
N.W India	(1) 558	

(fig in bracket indicates no. of gardens)

Table 5 - World Scenario on Organic tea cultivation (IMO-2001)

Operation Inputs	Organic Production Area(ha)	In conversion
India/Sri Lanka	4300	3040
China	1940	1009
Other countries	1025	540
Total	7265	45119

Table 6 - Percentage of Cost of operation per ha and quality inputs for 3 years before and after conversion to organic farming in Tea

Operation Inputs	Pre conversion (Conventional)			In conversion (Organic)		
	Input	Labour	Total	Input	Labour	Total
Trenching	-	-	-	-	100	3
Fertilizer	92.1	7.9	84	97.8	2.2	89
Fungicide	74.5	25.5	2	-	-	-
Insecticide	67.9	32.1	2	-	-	-
Weedcontrol	23.4	76.6	12	-	100	7
Shade	-	-	-	-	100	1

The following table shows quantitative inputs for pre- conversion and conversion to organic tea per ha

Inputs	3yrs Conversion	1-3yrs Conversion	
Urea	1174kg	Neemcake	3750kg
SOA	900 kg	Castor cake	10,000kg
Rock phos	1050 kg	Rockphos	1050kg
Lime	2000 kg	Compot	20,000kg
Grainoxone	1.5 It.	Lime	2,000kg
24 D(L)	0.5 It.		
Ethion	0.5 It.		

Price of Organic Tea:

In early 90's the price difference with organic tea and non organic tea went up to 200-300% but now has stabilize around 50-100%

Price realization:

	Non-organic (Rs.)	Organic	(+/- increase in p.c)
1990 Dadeeling Tea	90/-	270/-	(+)200%
Assam	45/-	200/-	(+)344%
South India	35/-	-	
2000 Dadeeling Tea	150/-	300/-	(+)100%
Assam	95/-	150/-	(+)58%
South India	65/-	120/-	(+)85%

Tea: A cup of good health:

Tea contains antioxidants polyphenol which provide excellent source of lowering heart disease, stroke and certain types of cancer like oral, pancreatic and prostate.

It is now regarded as a wonder drink. There are about more than 100 scientific papers which confirms that tea is excellent health drink.

The tea polyphenols helps the body to detoxify harmful excess free radicals which occurs naturally in the body.

There is good deal of evidence that antioxidants promote healthy heart, prevent cancer and help to combat against diabetes, blood pressure, tumor, ulcers, inflammation, intestinal problems, dental decay and so on.

It also increases apoptosis, which is known as elimination of tumor cells.

The other known factor is that it suppresses unfavorable bacteria, helps in forming favorable bacteria, which helps in metabolism

Tea contains 2.5-4.5 mg of caffeine and 40 mg per day in beneficial as stimulants.

Tea is known to reduce risk of Alzheimer's disease, Parkinson's disease and Rheumatoid Arthritis.

The nutritional value is rich composition of carotenoidstocopherols and Ascorbic acid and Flavanoids (-TF/TR)

The studies show that tea has anti HIV properties apart from that it has old age remedy for dysentery and cholera.

Total antioxidant capacity of Tea and other vegetables

Antioxidant capacity

Tea -	927
Green Tea	814+30
Spinach	129+6
Beats	81+25
Leaf lettuce	49+7
Cauliflower	46+11
Garlic	46+9
Onion	40+2
Cabbage	32+2
Carrot	26+8
Potato	15+5

Now it makes more sense to drink more healthy life.

ENVIS QUERY FORM

1. Name:
2. Address
3. Phone / fax / e-mail (if any)
4. Location :
5. Environmental problems observed
 - Due to cultivation / processing of tea
 - Any problems faced by tea gardens from the surrounding environment
6. Details of the problem faced
7. Any observation on development towards organic farming in the locality
8. Any indigenous technical knowledge regarding pest control / disease control
9. Any additional comment.

Our contact address

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