INTRODUCTION OF VETIVER SYSTEM IN COFFEE EFFLUENT TREATMENT

A STUDY CONDUCTED AT TATA COFFEE LTD, KARNATAKA

PRESENTED BY H.R.NAGESH RAO,
Senior Manager (Plantations)

Tata Coffee Ltd; About ourselves:

- Tata Coffee is India's largest coffee producer and exporter
- A winner of Green Business Leader ship award for pioneering work in the “Low Energy Sector”category.
- Has been acknowledged for the initiatives in areas like environment & climate change, natural resources management, and governance for sustainability.


fe EVI
GREEN
BUSINESS
LEADERS
ILITY AS BUSINESS STRA
EXPRESS
Ventures

INDIAN COFFEE SCENARIO

CROP	PRODUCTION IN INDIA (MT)	PRODUCTION IN KARNATAKA (MT)	CROP SUBJECTED TO WET PROCESSING (MT)	VOLUME OF EFFLUENT GENERATED (MILLION LITRES)
ARABICA	105000	75000	56000	1000
ROBUSTA	220000	145000	50000	1000
TOTAL	325000	220000	106000	2000

CHARACTERISTICS OF COFFEE EFFLUENT

- Highly acidic with the pH as low as 3.5
- An organic pollutant with high levels of BOD and COD
- A thick, viscous & mucilaginous substance with highTSS (36000 mg/Lit)
- Murky due to high concentration of suspended solids giving out an offensive odor

Composition of coffee pulp

Contents	Proportion(%)
Ether extract	0.48
Crude fibre	21.40
Crude protein	10.10
Ash	1.50
Nitrogen free extract	31.30
Tannins	7.80
Pectic substances	6.50
Non reducing sugars	2.00
Reducing sugars	12.40
Chlorogenic acid	2.60
Caffeine	2.30
Total caffeic acid	1.60

Composition of mucilage

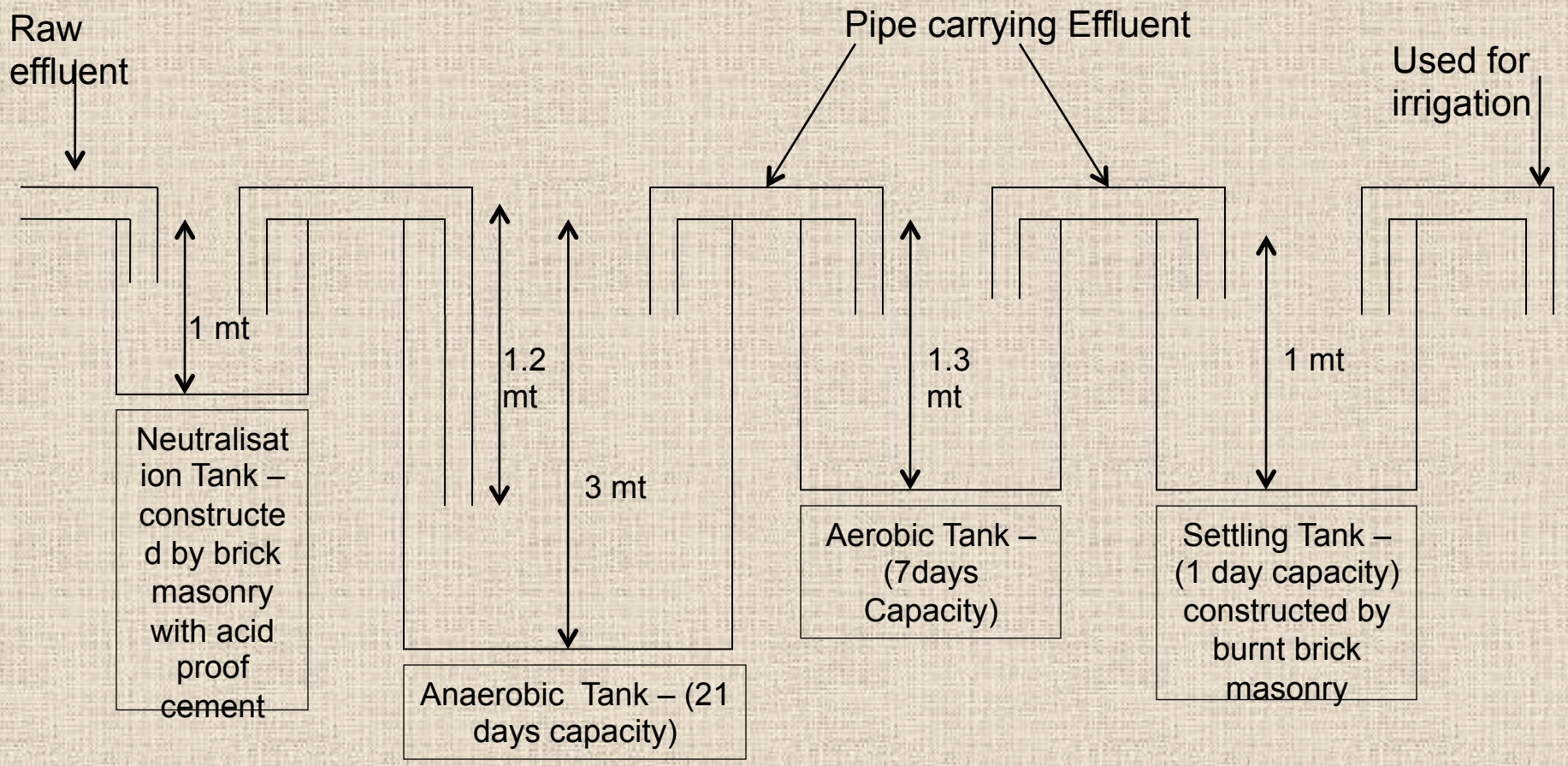
Contents	Proportion (%)
Water	84.20
Protein	8.00
Sugars - Glucose (reduction) - Sucrose (non reducing)	2.50 1.60
Pectin	1.00
Ash	0.70

HOW WE MANAGE THE EFFLUENT

- Treatment and disposal of effluent generated by Coffee processing is a statutory obligation regulated by the rules stipulated by the Karnataka state Pollution Control Board under Water (prevention and control of pollution) Act 1974.

- Adopted Effluent treatment plants designed by NEERI to treat the Effluents.

KSPCB approved design of Coffee Effluent Treatment Plant (ETP)



Neutralisation tank - add CaO @ 1gm/ltr

Anaerobic tank - add Urea @ 4.5 kgs and SSP @ 2.5 kgs per tonne of clean coffee to hasten up anaerobic degradation

NORMS PRESCRIBED BY KSPCB

PARAMETERS	Karnataka State Pollution Control Board norms
pH	6.0 - 8.5
Biological oxygen demand (BOD)	100 mg/ltr
Chemical oxygen Demand (COD)	250 mg/ltr
Total suspended solids (T.S.S)	200 mg/ltr
Colour and Odour	Colourless and odourless

NEUTRALISATION TANK

ANAEROBIC TANK

Aerobic tank


SETTLING TANK

LEVELS ACHIEVED IN THE ETP RECOMMENDED BY KSPCB

PARAMETERS	INITIAL POLLUTION LOAD IN FRESH EFFLUENT	POLLUTION LOAD AT VARIOUS STAGES OF TREATMENT			Karnataka State Pollution Control Board norms
		An-aerobic tank	Aerobic tank	Settling tank	
pH	3.5	6.34	7.3	7.4	6.0 - 8.5
Biological oxygen demand (BOD - mg/litre)	12600	141	105	96 *	100
Chemical oxygen Demand (COD - mg/litre)	36000	850	980	250 *	250
Total suspended solid (T.S.S - mg/litre)	36800	1640	1340	1240**	200**

* Achieved KSPCB norms in 68 days

** In view of the above results an effort is made to utilize the Vetiver System to bring down the TSS load to KSPCB norms.

Why Vetiver??

- **Vetiver system has an ability to remove suspended solids such as nitrates and phosphates rapidly.**

- **It is a green and environmentally friendly wastewater treatment technology as well as a natural recycling method at low cost.**

- **Tata Coffee's Environment Policy:**

  "We are committed to preserving and enriching the environment by optimal use of resources and adopting GREEN processes"

Original site with vacant space adjacent to tanks

Initial solid waste filtration area

Developing Vetiver system

Established Vetiver filtering system

Unutilized paddy fields developed to Vetiver system

Unutilized paddy fields developed to Vetiver system

Vetiver on Floating method


TATA


TATA


TATA

RESULTS ACHIEVED

PARAMETERS	EFFLUENT FROM ETP DISCHARGE	EFFLUENT DISCHARGE FROM VETIVER PLOT	KSPCB NORMS
pH	4.33	6	6 – 8.5
Colour and Odour	Blackish with slight unpleasant odour	Light yellowish and odourless	Colourless and Odourless
B.O.D (mg/ltr)	2920	277	100
C.O.D (mg/ltr)	5592	308	250
T.S.S (mg/ltr)	1326	176	200
T.D.S (mg/ltr)	2084	450	2100

TATA

WAY FORWARD

- **Scientific Institutions to come forward for further studies on this System**

- **The certifying authorities like State Pollution Control Boards, NEERI etc. to study the outcome to introduce low cost and alternative Effluent treatment systems**

THANK YOU