



Tata Chemicals greens the land

By the Okhamandal coast of Gujarat in Mithapur is the soda ash plant of Tata Chemicals (TCL), which was set up in 1939. Over the years, as the production volume has grown (from 80 tonnes / day in 1944 to the current 2,400 tonnes / day), so has the volume of wastes generated from its operations. Solid waste disposal is one of TCL's biggest concerns. The company stored all its solid wastes at nearby Malara, a barren site. As the years passed, hamlets grew around it and people started living in the vicinity. Malara became a problem as the wind blew dry dust all around.

In the meantime, Tata Chemicals came up with a green and innovative solution for its solid waste treatment — the sludge and sediments from the soda ash manufacturing process were used as raw materials to make cement. In 1993, the cement plant was put up and the company's own brand of cement, appropriately named 'Shudh', hit the market. Shudh is a working and viable example of the company's policy of 'reduce, reuse, recycle'.

But the problem of Malara remained. Tata Chemicals made several attempts to resolve this problem. It tried to prevent the dust from rising by spraying seawater and dampening the piles of wastes. Though this helped, the Tata Chemicals team was looking for a permanent solution to this problem. Fresh soil, water, planting of shrubs and grasses, fertilizers, etc. were among the various solutions that were tried on the sludge-ridden land. Nothing worked.

Not a blade of grass took root.

Having exhausted all other options, in 1999-00 the company considered relocating the entire site to another spot, but the cost for this exercise was estimated at about Rs120 million and there was still no permanent solution in sight.

A year later, a team was constituted to work on alternative solutions and they came up with an innovative one: The use of bio fertilizers and bioremediation techniques to remediate the solid wastes and develop a green cover.

The team found certain types of plants and grasses that survived in the saline and alkaline lands in pockets of Mithapur, but their distribution was sparse. When their roots were studied microbiologically with the help of a team from The Energy and Resources Institute (TERI), it was observed that a special group of microorganisms got established on the root system helping the plants and grasses extract soil nutrients to defend themselves against the natural adversities faced in that area and survive.

The microorganisms and the plants worked to help each other, with the organism feeding off the plant and in turn aiding in the plant's survival under adverse conditions. The team realised that this bioremediation technique would work to rejuvenate the solid waste site and allow plants to grow.

TCL then engaged the services of experts of TERI's Centre for Mycorrhizal Research, Biotechnology



PROMISING INNOVATION

Nature shows the way. A 20-year-old inorganic chemical dumpsite gets transformed into a verdant acreage by using bio fertilizers and bioremediation techniques.

and Management of Bioresources for the identification and isolation of the special microorganisms that were observed, and to make a pure culture of the same in their laboratory. Similar compatible bacterial and mycorrhizal consortiums were also brought and inoculated to the root systems of saplings in their young age. Sediments were also treated the same way. To everyone's amazement, the experiment was a success. The plants managed to take root and survive in the harsh soil conditions.

Today, out of the 30-acre dump site, 22 acres have been transformed into lush green belts of plants and shrubs. More than 20,000 plants of as many as six different varieties are growing at Malara. Even vegetables grow in favourable seasons and there is a small ecosystem of small animals, insects, frogs, butterflies and birds that is flourishing in what was once a dead zone.

The innovation

The world over, solid wastes from the synthetic soda ash industry are a major ecological problem. The manufacturing process is such that more than 400kg of waste is generated for every tonne of soda ash. Considering that Tata Chemicals alone produces 2,400 tonnes of soda ash per day, the treatment of solid wastes is a huge concern.

TCL has, over the years, invested in sustainable initiatives such as putting up a cement plant to consume the wastes and designing new filtration technologies to lower its effluent discharges. But in other sites around the world, these wastes are conventionally discharged into the sea or stored on land in stockpiles going up to 40m in height.

No company in the world has been able to recycle or treat these piles, with the result that environmental awareness and policies have led to the closure of 12 soda ash manufacturing companies. In the US and Europe, for the last 15 years no licences have been granted for new soda ash plants.

The success of Tata Chemicals has repercussions for more than one industry. The techniques used here to



Team Tata Chemicals received the 'Promising innovation' award from Mr Tata at the JRD QV Award function on July 29, 2009

grow plants on dumpsites can be adapted to meet the requirements of other similar industries.

The project is innovative in several aspects. For one thing, the team did not use any fresh or natural soil. The new plantations grow in the same sterile, inorganic chemical sludge that has existed for 20 years. For another, the plants are irrigated not with fresh water, but with saline water. Yet, analysis of the sediment shows that with each year, the sediment is becoming more like normal soil. Today, the acres are verdant and there is even a second generation of plants growing from fallen seeds, a fact once considered impossible.

The locals are now less concerned about the dumpsite; in fact it now contributes to local jobs by taking on people for managing the plantation.

Hurdles

The biggest obstacle that the team faced was a psychological one — they had to find solutions to a problem that was almost historic; for 20 years no one in the soda ash industry had been able to come up with answers.

The team also faced some technical issues. The first attempt at planting the land was a failure. The sediment-ridden land had been ploughed and the seeds were sown. But this was during winter when temperatures were extremely low. Even after two months, not a single seed

germinated. The team left the site and headed back for more lab trials. They found that a combination of low temperature and excess moisture was not allowing the seeds to germinate.

A new approach was tried — saplings were raised and transplanted instead of seeds. The soil was contoured into raised beds and furrows, and drip irrigation was arranged for better moisture management. Availability of fresh water was a constant challenge. Low rainfall and irregular monsoons demanded better water management. The plants selected were those that could survive on less water or a mix of seawater and fresh water to minimise the dependence on fresh water, which is scarcely available.

Success

The success of this bioremediation technique using mycorrhizal microorganisms has had a number of positive fallouts. In terms of numbers, the savings may not be significant. Tata Chemicals has saved the Rs12 crore it would have spent on relocating the site.

But the environmental impact of this project is such that it stands as an example of how dumpsites the world over can be reclaimed over time. By converting a lifeless dumpsite into a new green ecosystem, the project gives a direct boost to the sustainability of synthetic soda ash manufacturing facilities. ●

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