

The Parsi Contribution to Indian Agriculture and Agri-research

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Abstract

The Parsis arrived on the Western shores of India from Persia around the year 716 CE. Being basically agriculturalists, they established orchards and plantations on the land they were granted by the Hindu Raja Jadi Rana. In the drier areas they also cultivated cotton, sorghum, and millets. They were moderately successful in these endeavors. The Parsis became well-known as growers of chikoo, mangoes, citrus, etc. After the British took over the seven islands of Bombay (now Mumbai) from the Portuguese, they encouraged the Parsis to move there to develop the city. Several Parsis engaged themselves in botanical sciences and carried out research for crop improvements. Among them were Professors RD Asana, FR Bharucha, RH Dastur, and VM Meher-Homji. They not only encouraged students to take up the study of botany, ecology, and crop improvement in the city of Mumbai but also at the all-India level. However, due to socioeconomic reasons, and also due to the restrictive practices followed by the Parsi community itself, their numbers started falling after they migrated to Mumbai in large numbers after the year 1900. In recent years their numbers have declined to such a level that the Government of India and the UNESCO have launched campaigns to arrest further decline in their population. This paper documents a fraction of their achievements in the field of horticulture, agriculture as well as agri-research.

There are less than 100,000 Parsis in the world today, of which 61,000 reside in India, most of them in and around the city of Bombay (Mumbai). Demographically, they are a diminishing community with deaths outweighing births by a very wide margin. Demographic trends project that by the year 2020, India will have achieved the distinction of being the most populated country on earth with 1250 million people. At that point, Parsis will number a minuscule 23,000 or 0.0002 per cent

of the population. They will cease to be termed a community and will be labeled a 'tribe', as is any ethnic group in India that numbers below the 25,000 head count. The Darwinian formula for "Survival of the Fittest" seems to have worked in reverse here! Parsis like to quote a remark that Mahatma Gandhi once reportedly made, "In numbers the Parsis are beneath contempt, but in contribution, beyond compare." Among the many contributions is one devoted to Indian agriculture.

So, who are the Parsis? The late SKH Katrak, a one-time Mayor of Karachi (before partition) answers the question authoritatively (Katrak, 1958). “Parsis are a people who uprooted themselves from the province of Pars in Iran and moved to a different part of the world to save their religion and culture. The followers of Zoroastrianism left their country forever by sailboats, to seek refuge and freedom to practice their religion in the far off land of Hindustan over one thousand two hundred years ago. They landed at the port of Diu (later to become a Portuguese colony) in Kathiawar (Gujarat) in the year 716 AD. Here they stayed for 19 years but the soil and climate was unsuitable for the form of agriculture that they practiced, and so they once again set sail southwards when a great storm arose and the small fleet of sailboats was washed ashore some 25 miles south of Daman on the west coast of India. The area at that time was under the rule of a wise and liberal Hindu king, Jadi Rana, who on request granted the Persian refugees a safe haven (see Fig. 1). The Parsis were given a stretch of land that had not been cultivated, but with a lot of hard work and toil they were



Figure 1. The Parsi priests pleading for refuge at the court of Raja Jadi Rana near Sanjan.

able to convert the land into farms of fruit trees and vegetables. This land, at that time, was fed by many small rivers and streams, and with clever water harvesting techniques, which they had practiced in Persia, the Parsis succeeded in developing it and establishing themselves principally as agriculturists.”

The Parsis remained at or near the village of Sanjan for nearly 300 years, before they moved northwards and into the hinterlands of Gujarat, due to their increase in numbers and further migrations from Persia. As they prospered they acquired more land, and with the help of the locals, developed these into orchards, fruit farms, fields of cotton (*Gossypium* spp.), sugarcane (*Saccharum officinarum*), sorghum (*Sorghum bicolor*) and various species of millets. The landing at Sanjan has been commemorated by a pillar erected in 1903 (Fig. 2).

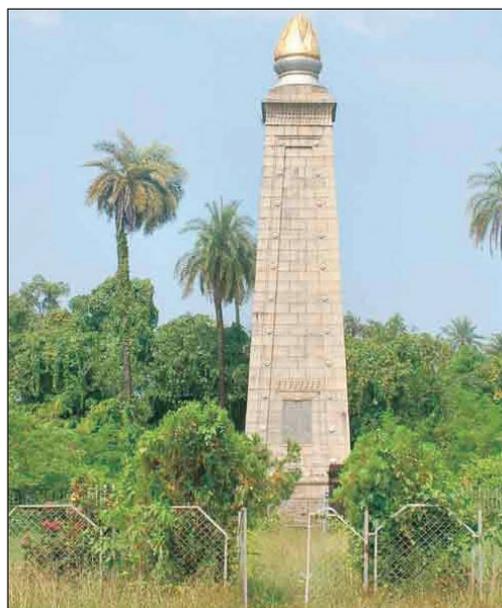


Figure 2. Pillar at Sanjan commemorating the landing at Sanjan 736 CE.

The *chikoo* (sapodilla) orchards

The first *chikoo* tree was planted in the town of Gholvad (literal meaning ‘round tree’) in Maharashtra by an Irani family in 1901. When nature lover Ardeshir Irani cut a few *chikoo* saplings from a garden in Bombay’s Dinshaw Petit Lane to plant them in his village in Dahanu 114 years ago, he probably would not have realized that the fruit would soon place the region among the state’s leading *chikoo* producers. The plant had reached Mumbai a few years earlier from Singapore. The *chikoo* of the Sapota variety, an all-season fruit, is grown over 1,100 acres of land in and around Dahanu, 150 km from Mumbai. The fruit has spawned an industry, giving livelihood to thousands.

Political events too helped in the spread of the *chikoo* tree. About 30 years ago, communist party workers started targeting Parsi and Iranian families, who cultivated it and other fruits in the large tracts of lands they owned. The tribal population (the *Warllas*), who came to the families’ rescue, learned *chikoo* cultivation techniques, thereby increasing the fruit’s popularity tremendously. Gholvad is about 15 km from Bordi. The entire Dahanu–Gholvad–Bordi belt is devoted to orchards, especially *chikoo* and mangoes.

Bordi is a small village north of Mumbai at a distance of 17 km from the small town of Dahanu. It is an ideal seaside hamlet. The beach is calm and quiet, and clean. The sand on the beach is in its original form – blackish in color and sticky. The simple beach looks serene with the backdrop of *chikoo* (*Achras sapota*; syn. *Manilkara zapota*) and casuarina (*Casuarina equisetifolia*)

trees. The community of Bordi mainly comprises of the Parsi orchard owners and their descendants.

Chikoo, a native of southern Mexico, Central America, and the Caribbean, is the main crop plant within Bordi but litchi and mango trees are also well grown by the Parsi/Irani community. Banana and other crops are grown as intercrops because a *chikoo* plant takes five years for good fruits and during the first year *chikoo* requires shade for plant growth. Thus intercropping helps the *chikoo* trees in their early stage of development. *Chikoo* is grown with the grafting method.

In Bordi there are 150-year-old *chikoo* plantations existing within Parsi community farms. After heavy rains in July/August *chikoo* grafting is carried out. Local Adivasi tribal people are skilled in identifying which *chikoo* fruit is ready and which is not. They help to select and harvest the *chikoo* for market. First, the flowers are seen within

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chikoo tree leaves and after 4 months the *chikoo* fruit starts growing. The best time for harvesting fruits is June–January. A 25-year-old tree produces 200–250 kg of *chikoo* fruits annually. Humidity, black soil, and adequate supply of water are required for *chikoo* cultivation and Bordi is the best area having these conditions. There are about 10 million *chikoo* trees within Bordi, Gholvad, Palghar belt and nearby places. *Chikoo* plants are grown organically, which makes it profitable to grow them.

Rohinton and Ruby Batliwala are Gholvad's popular Parsi–Irani *chikoo* farmers. They live in a huge and rambling planter's house a short distance away from the Gholvad Railway Station and zip about their vast *chikoo wadi* on an old motorcycle. Every evening during the season, trainloads of their *chikoos* depart from the Gholvad station for Bombay, from where it enters the fruit and vegetable markets for sale. Rohinton is one

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of the 50-odd Parsi–Irani *chikoo* farmers left in the area. He owns one of the most prestigious *chikoo wadis* in Gholvad. And it was his great-grandfather, Cawasji Patel, who brought the first *chikoo* plant to Gholvad in 1920. This was from the Hanging Gardens in Bombay. His grandfather, Maneckshaw Cawasji Patel, developed the plant, and that is how the Parsis of Gholvad and Dahanu became *chikoo* farmers. The oldest *chikoo* tree is said to be 70-odd years old. Rohinton has been farming *chikoos* since he was 16. He talks about a Gholvad that never required air-conditioners or fans even in the peak of summer. The maximum temperature used to be 30°C. During the cold months it hovered around 12°C. All that has, however, changed these days. The hot period, which used to be only a month then and in May, now begins in February and ends in June!

Earlier, the *chikoo* farmers in Gholvad and Dahanu had three crops of the fruit every year, i.e., in November, April, and September. Now, with environmental changes due to industrialization the *chikoo* season is unpredictable and the yields have dropped. At one time, the economy of Dahanu and Gholvad survived on the *chikoo*. Now the scene is dismal and alarming. Many of the Parsi–Irani *chikoo* farmers have migrated to other cities and different professions. At present there are perhaps no more than 50 of them still left in the coastal belt who continue farming *chikoos*. Incredibly, despite the environmental changes, the soil and climate and the proximity of the sea and mountains, still favor the growth of *chikoos* in Dahanu and Gholvad (Fig. 3). The fruit is eaten just as it is, simply cut in half, and then the flesh is scooped out and the seeds



Figure 3. A *chickoo* variety of the highest quality.

discarded. The fruit can be mashed and stirred into cream or custard, or made into ice-cream, fool, and mousse.

Despite the uncooperative environment and whimsical weather, the Irani–Parsi farmers are making the most of their *chikoo wadis*. The fruit is plucked by hand. They use a strange contraption for the job. It is a wire-basket on the end of a long stick. The trees are not very tall; they are about 15 feet, and the stick reaches up to the fruit and breaks it off the stem. The *chikoos* are washed and packed and then dispatched to the local market and by train to Mumbai. The Dahanu–Gholvad *chikoos* are also sent to Delhi, Jaipur, and Udaipur, but not the

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South. At one time they were even being exported to Dubai.

Nerges Irani versus Reliance Corporation

Nergis Irani is a Parsi lady not unlike a pit bull dog; once she sinks her teeth into something she will not let go. That might explain why at the age of 75 years she will not withdraw from a fight that has spanned more than 20 years. The battle now pits the grandmother against one of India’s most powerful corporations, Reliance Infrastructure, owned by one of the richest men in the world, Anil Ambani. “He may be the richest in money but I am richest in integrity and commitment,” Irani said with a steel gaze, “I don’t see how we could lose.”

Irani lives in a lush beachside town called Dahanu. The town is known as the food bowl of the region sending its precious fruits and vegetables to feed Mumbai. But it also provides Mumbai’s fast growing suburbs with something else. Dahanu is home to a coal-fired power plant that sits on its wetlands and pumps electricity into the city. That is where the fight begins.

Irani has fought to keep the power plant from expanding because she says its pollution is ruining the fragile ecology of her hometown and the region’s fresh food bowl. “The destruction of our *chikoo* orchards, mango orchards, the coconuts is shocking” she said. And the changes are happening rapidly.

In 1996 Irani won a battle in the Supreme Court when an order was entered designating

the area “ecologically fragile”. The court order prohibited “construction of any kind within 500 meters of high tide”, and no construction on the wetlands area as well as ordering the plant to convert from coal to cleaner natural gas. In her battle which is playing out between rural and urban environments across the developing world, Irani argues the desire for more power by any means necessary is killing other important elements for a good life in countries such as her beloved India. “We can do without television sets, we can do without cars, big houses, we can do without all this technical stuff,” Irani said with an intense gaze, “but we can’t do without food, or water and clean air.” And she is right.

Toddy

Taari, or toddy, is an all-time favorite drink of the Parsis and Iranis living in the coastal areas of southern Gujarat. It is a drink they would dearly like to have everywhere they go or settle down. Unfortunately, the date palm (*Phoenix dactylifera*) from which toddy juice is obtained, does not grow easily in cities. In India it needs the climate of a coastal area, the sandy soil, and brackish water, for it to blossom and fruit.

In towns of Dahanu, Gholvad, Nargol, and Sanjan, on the west coast of India the conditions are perfect. And almost every Parsi family used to own a *wadi* or farm where the date palm tree grows. From these trees, the families tap the toddy juice and harvest it before dawn everyday (Fig. 4). If anyone visits them for breakfast, they are more likely to offer a glass of *neera* (i.e., toddy before it ferments) rather than a cup of tea!

In its early avatar, toddy is known as *neera*. And it is a refreshing and light drink, extremely cool in sensation, and sugary sweet to taste, like palm juice and more importantly nonalcoholic. When the tree is tapped in the late evening and slanted cuts made on the inflorescence the fresh sap collects in a clay pot. The tapper then climbs the tree early morning and brings down the filled clay pot. Consumed before 10 am in its pure and natural form, *neera* is supposed to be an extremely good healthy drink. The laborers who do the tapping are a skilled lot of Adivasis. They are known as *Bhandaris*, or toddy tappers. They are experts at climbing the palm tree. Toddy tappers climb the tree in the evening to rig the pots and then go up again next morning,



Figure 4. A toddy tapper in the 1920s.

to collect the toddy. It collects in the pot after dripping all night in the form of a milky white, translucent sap. Toddy tappers say that the best sap is obtained from those trees that are just flowering. However, they also tap those trees that are bearing fruit.

Toddy tapping generally runs in the family. The technique of climbing the tree and tapping toddy is an art. Toddy tappers use very precise tools for the task that are created for them by blacksmiths and often procured from cobblers. They wear a leather belt that has several pouches into which these tools fit. And they strap themselves to the tree around the waist, and also the ankles, so that once up, their hands are free for them to get on with the task of slitting the tree or the fruit to fit in the pipe and to tie their pots beneath to collect the sap. The toddy tappers have yearly contracts with the Parsi–Irani families in Dahanu and Gholvad. They pay the families a sum of money depending on

the number of trees in the *wadi* from which they can tap toddy. After giving the family a small percentage of the toddy, they take the rest away for sale.

The Parsis and Iranis believe that their *taari* has great medicinal values as well. They make ‘*ooni keedheli taari*’, which is a mixture of warm toddy with ginger and jaggery (*gur*), said to be an excellent cure for stomach upset. Some Parsis are also known to prepare a drumstick (*Moringa pterygosperma*) dish in toddy. The drumsticks are heated in a pan with ghee and ground spices and then simmered with toddy for a while. Parsi bakers use toddy in the doughnuts called *bhakhra*. Some Parsis use toddy like Gujaratis use yogurt, to make a curry served with *khichdi* and *papad*.

Valsad mangoes

The Alphonso mango (known locally as *haapus*), for which the town of Valsad in Gujarat and environs was once famous, is still important to the local economy. Villages in the Valsad district have numerous mango orchards, the only source of income for many villagers. The *haapus* mango variety is well-known for its sweet taste among mango lovers all over the world. The famous and finest Valsadi *haapus* will soon fill the shelves of the world’s largest retailer, Walmart (see Fig. 5).

My maternal grandmother Avabai, from the Asunderia family from the village of Asunder (near Navsari) was earthy and brave. Soon, the fifth of her 9 children (2 died in infancy), was courageous and full of life. Soon had

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Figure 5. Sample of best of the Valsad mangoes.

married into a prosperous land owner family of my uncle the Davierwallas (hailing from the seaside village of Davier in Gujarat). Soona and her husband, Noshir, managed a vast farming enterprise around Sanjan. Those were the days before Gujarat's Agricultural Land Ceiling Act came into force. Indeed theirs was a substantial undertaking with envious revenues and complex costs. It had to be run like any other big corporation, i.e., production deadlines were dictated by seasonal commitments to fruit and grain wholesalers. One could say her husband was the chairman while she was the chief operating executive. The farm was in and around a densely vegetated village called Kambada.

The wheat fields stretched into the distance. They were bordered by large Valsadi mango trees burdened with warm, heavy fruit hanging from foot long stems. From the front yard of the Kambada farmhouse, my aunt Soona would squint her eyes in the blazing April sun. She scanned her wheat fields shimmering in the heat. Her fair face with light brown eyes reflected her steely resolve and all-business manner to her

employees on the land. She shouted orders in Gujarati to her trusted lieutenants. With Noshir, her husband, away on business, meeting wholesalers in Mumbai and signing contracts, all responsibility of production rested squarely on her shoulders.

The native *Warlla* tribal workers used to keenly watch every move of Soona. Over the years, they had come to respect her. They have experienced both compassion and fierce anger from their *Soonabai*. She had no choice but to be a tough taskmaster – tough but fair. After all, she was a woman operating alone amongst men on a farm in a jungle at that time in the 1930s to 1950s. And of course, at no time could she exhibit even a hint of fear.

In the distance, the tractor and trailer lurched dangerously as it makes its way over an uneven dirty road. It brought yet another load of juicy *haapus* (*alfanso*) mangoes harvested from trees, all of them green with a little bit of red tinge. In front of her a packing operation would be humming along. Workers arrange the warm fruit in a neat circular pattern in woven baskets; all 55 of them on golden yellow straw in each basket. Further down the line, men would be sewing the '*toplas*' shut. Their arms stretch above their heads in quick motion. Fingers clutch metal needles that sew and tighten the jute cloth covering. A few men then carry the *toplas* (hand-woven baskets of twigs) to a nearby godown. One of the best baskets of Valsad *alfanso* mangoes would be dispatched to us in Mumbai.

In front of the farmhouse the land is vast. To the left preparations are being made

for threshing of wheat. Two huge logs lie horizontal, raised to waist level. They are worn smooth over the years as hundreds of bundles of wheat have been beaten into submission. The golden grain falls to the ground as it separates from the chaff. Some distance from the threshing area, two wooden presses are operating. Men with their sweaty bare chests ply two bulls in a circular “*rheinte*” slowly compressing the straw into dense rectangular bundles. The golden yellow bundles are sold to dealers as cattle feed or hay. Soona is fair in assigning tasks and demanding a good day’s work. She reminds herself that several freight cars are waiting to be loaded at the siding at Sanjan railway station. There is little time to waste.

At first, the *Warllas* had a curious reaction to a woman boss. In their culture, men always rule. Men dominate and women

follow. Soona had to prove herself. She had to work harder than Noshir when managing them. She knew they were judging her every decision, her every move. Slowly over the years she had gained their respect. She has decided to manage out of both fear and kindness; not fear alone – an important distinction. She died in her sleep one day. Noshir said that he did not know it until morning. He remarried but then due to the Land Ceiling Act sold his entire holding and retired.

The Asunderia family from Asunder

The story of the Asunderia family and their agricultural enterprises is more or less typical of the hardworking Parsi farmers and their destiny. Behramji Sohrabji Asunderia, known affectionally as “Behla Mama”, was the head of the clan and lived up to the ripe old age of 82 years (when the life expectancy of the village male in India was around 42 years only). Dosabhai Behramji Asunderia, his son, was born in 1914, around the same time as my mother the late Dr Goolbanoo B Damania. The Asunderias were at that time all engaged in agriculture and owned vast tracts of land in Gujarat in and around Asunder (near Navsari) and another village called Vesma. Income from agriculture (mainly sorghum, millets, and cotton) was good, and they afforded a comfortable and relaxed village life with good unadulterated food and drink. Then disaster struck. In 1949, only 2 years after independence, the Bombay Prohibition Act was passed, and a great number of Parsis lost their income from licensed toddy and liquor shops and businesses. In

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Gujarat, in those days only rainfed farming was possible, so many of these Parsis, not wanting to take up agriculture, closed their houses and business premises and left to seek work and fortune in Aden (which was still a British territory). Dosabhai did the same and started work as a clerk for the big Cawasji Dinshaw Adenwalla & Co. But he missed his wife and family so he returned to Asunder and tried his hand at farming once more. He bought more land as he went along and built a house in Asunder village in 1962. He sent his sons to boarding schools in Pune and Bombay so that they learn English. Dosabhai's health began to fail so his sons returned to Asunder and joined their father in farming. At that time this was rare as most of the other Parsis with small holdings in the mofussil Gujarat were selling their land at throwaway prices and moving to Navsari!

The Asunderias took to farming with a vengeance and dug several tube wells and installed pumps and began to grow bananas and sugarcane, while dropping dryland crops like sorghum, millets, and landrace

cotton. They even planted high-yielding hybrid cotton. They tried any new thing that came along including applying pesticides and composting and success was achieved to a limited extent. Now, Dosabhai's eldest son Aspandiar was managing the show and in 1975 they bought a brand new tractor for ₹ 75000, a very large sum for a farmer at that time. It was the first tractor in that area. After their own land was worked on by the tractor, the multipurpose machine was rented out to other farmers and was used day and night bringing in additional income. Finally, all crops were dropped in favor of sugarcane. This was for two reasons: (1) finding labor to harvest and manage other crops was becoming difficult, and (2) sugarcane brought in maximum profits since a cooperative sugar mill in Maroli (about 8 miles away on road to Surat) bought the entire sugarcane crop which was easy to harvest mechanically with minimal human labor. Sugarcane is a crop that is least affected by weather and pests, but it does need a high amount of nitrogen fertilizer.

Expansion in dairying was the way to go and with the purchase of a few buffaloes and cows a thriving milk distribution business was set up. Seventy customers including sweetmeat shops in Navsari were supplied with pure milk delivered on three-wheeler motorcycles and scooters. Success in business led to success in village elections and Aspi Dosabhai Asunderia was elected Sarpanch of the village. He also was inducted as Director of the Maroli sugarcane cooperative factory. With the purchase of more land from his uncles, who wanted to retire, he planted 300 *chikoo* trees and 500 mango trees too. With the income

from *chikoos*, mangoes, and sugarcane increasing he stopped his labor-intensive milk business, much to the regret of his so many customers who relied on him absolutely for unadulterated fresh milk.

Aspi could have bought more land, but recently on expectations of Narendra Modi's election to the prime ministership there is a rush by urban Gujaratis to buy land and the prices have skyrocketed in the area! The cost of the land for a newcomer is so high that little can be gained for putting the land to agricultural use, and urban sprawl of buildings have arrived. Aspi's wife Shirinbai (see photo right) started a nursery school for kids at Maroli and became active in social work and worked for the poor. She was elected Sarpanch of Asunder unopposed. She worked hard and administered Asunder so assiduously that the village became a model for other villages in the whole area. She now became known as "Shirinbai Sarpanch" and news of her good work even reached New Delhi political circles. In 2011 and 2012 the Asunderias got a citation



Sarpanch and social worker Shirinbai A Asunderia

and an award of ₹150,000 (1.5 lakhs) from the Gujarat Government for obtaining the highest yield in sugarcane in the entire state!

There is much more about Parsi farmers in Halol (near Baroda) and the milling factory of Shiavaxa Jilla at Maroli. Shiavaxa purchased a huge Ruston diesel engine in 1934 at great expense as it was imported all the way from England (no Kirloskar in those days), and was reputed to be the best in India (Fig. 6). The engine supplied traction to several mills that processed *jowar* (sorghum), *bajra* (pearl millet), and wheat on his premises. Local farmers from miles around would bring their produce to be milled in bullock carts or trucks for a fee. Next to the mill, Shiavaxa had the only house in Maroli with electricity (petrol generator), and a machine that bottled soda water (for personal use). This was in the late 1940s

Then disaster struck. In 1949, only 2 years after independence, the Bombay Prohibition Act was passed, and a great number of Parsis lost their income from licensed toddy and liquor shops and businesses. In Gujarat, in those days only rainfed farming was possible, so many of these Parsis, not wanting to take up agriculture, closed their houses and business premises and left to seek work and fortune in Aden (which was still a British territory).

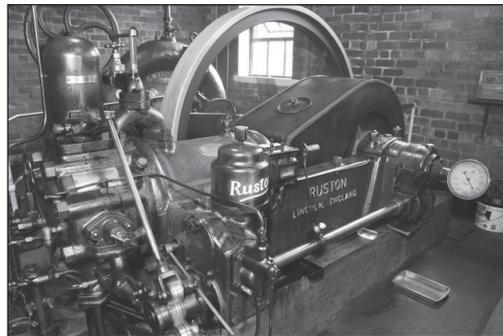


Figure 6. The Ruston diesel engine workhorse at the Jilla Mill in Maroli in the 1930s.

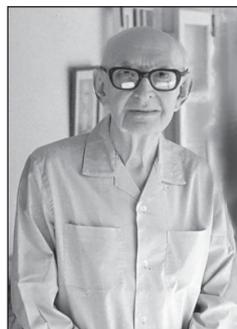
and early 1950s. Today Maroli village has changed in appearance and it boasts literacy rate of 75%. Lying about 25 km from Surat on the Bombay–Ahmedabad Road, it was surrounded by good agricultural land. Although the rainfall was low, crops like *jowar* were the best. In the smaller villages surrounding Maroli some of the best toddy palms used to grow. It was always a wild drive on deep mud roads to these villages for a drink of the best nectar of the date palm.

Parsi scientists contribute to agriculture and botany

There have been several Parsi professors and scientists of distinction mostly in the past. Parsi agricultural scientists have been unsung and largely unrecognized by their own community even though they made very significant contributions. Among these are Professor Rustamji H Dastur, Professor Faredoon R Bharucha, and Professor Rustamji D Asana, and Vispi M Meher Homji. Their achievements and contributions to Indian agriculture are described.

Professor Rustamji D Asana: Teacher and scientist

Professor Rustamji D Asana was born in August 1908 in rural Gujarat. His earlier years were uneventful till he went to Ahmedabad to study at the Gujarat College for a Bachelor's Degree in science. Subsequently he studied for MSc degree at the Royal Institute of Science in Bombay under the guidance of Professor Rustamji Hormusji Dastur, Head of the Department of Botany from 1929 to 1935. Later he



**Prof RD Asana
(1908–1999)**

proceeded to London to do research for a Doctorate at the Imperial College of Science and Technology. After obtaining his PhD, Dr Asana was offered a postdoctoral appointment at the Botanical Laboratory at Utrecht in the Netherlands to work under the eminent Dutch botanist Professor Victor Jacob Koningsberger. Here he worked on the “Avena Test” for the estimation of auxins in plants, a frontline topic at the time concerning the growth and development of crop plants. However, Dr Asana was not keen in working abroad and he longed to return to his home country.

In India Dr Asana first worked at the Biochemistry Department of the Indian Institute of Science at Bangalore. In the meantime, his Professor, Dr RH Dastur was posted at the Punjab Agricultural College at Lyallpur (now in Pakistan). Here Dr Asana worked on cotton physiology and became a full-fledged physiologist. The Dastur and Asana team worked on the “*tirak*” disease of cotton, which is basically premature opening of the cotton bolls resulting in poorly developed lint. The disease, that had manifested itself initially in 1919, reduced the yield and brought about heavy losses to cotton farmers in Punjab (land of the five rivers) in undivided India. By 1935 the cotton crop in Punjab had failed completely. The work carried out from 1935 to 1943 by Professor Asana's team, at Lyallpur,

showed that *tirak* disease was caused by low amount of nitrogen in the soil; and high alkalinity was not helpful to the crop. New methods of cotton planting, culture, and fertilization resulted in much improvement of the crop. For example, late sowing of cotton seeds (mid June instead of mid May) and closer spacing resulted in reduced plant size and less demand for moisture from the soil. This innovation worked, and the bolls opened normally with mature seeds (used in commerce for oil extraction) and good lint (for spinning into cotton cloth). This discovery, published in the prestigious British scientific journal *Nature*, is considered even today in agronomy as one of the classical contributions of applied aspects of crop plant physiology – thanks to the efforts of the Dastur–Asana team.

Professor Asana was next posted at the Sugarcane Research Station, Pusa 50 miles north of Patna in Bengal (but now in Bihar). Pusa was a sleepy and dusty town with a small railway station where very few trains stopped. It was an isolated post. Thankfully he was not there for a long time. Due to a devastating earthquake in 1934, the Pusa Institute had to be transferred to the outskirts of Delhi where it still stands.

Under the scheme of expansion in Government spending after the end of World War II, as funds were freed up, separate sections of Genetics, Plant Physiology, etc. were created within the Botany Department of the Imperial Agricultural Research Institute. In 1946 Professor Asana was appointed as the Head of the Physiology Section. In the meantime, after independence in 1947, the name of the

Institute was changed to Indian Agricultural Research Institute (IARI) but was also otherwise known in the local circles as “Pusa Institute”. On 14 November 1966, the Botany Department was split into two full-fledged departments, viz., Genetics and Plant Physiology. Dr Asana continued as the Head of the Department of Plant Physiology.

From 1946 till his retirement in 1970, Professor Asana worked on the physiology problems of several crop plants, but his main work was focused on wheat. As I was also working on wheat at the International Center for Agricultural Research in the Dry Areas (ICARDA) at Aleppo, Syria, I sought Professor Asana to discuss some problems that I was facing in wheat pre-breeding research.

I wrote to him from ICARDA, Aleppo, Syria, at Valsad (formerly Bulsar) where the good Professor had retired with his wife (they did not have any children). He wrote back to me and invited me to visit him. So, on my next home leave to India I took a train early in the morning and landed at his ancestral home “Jamasp Lodge” on Tithal Road at Valsad. He came out, walking with the help of a stick, to welcome me. Immediately we began a long chat about agricultural research and he answered some questions that I had about my research at ICARDA on salt tolerance in wheat. Then I presented him with a copy of my latest book at that time, “Biodiversity and Wheat Improvement”. I could see that he was very pleased, as he slowly turned the pages, but he said he may take a long time to read it as his eyes were not as good as they used to

be. Afterwards, he said he would send the book to the Navsari Agricultural University where he had donated all his own books. "One day they (students) came in a jeep and took all my books to their library". I was happy to hear that since Navsari is where my family comes from and we have still our ancestral home there. At that juncture Mrs Asana interrupted us and announced "Lunch is ready."

Thus ended my first and last meeting with Professor Asana. He continued to correspond with me even when I joined the University of California at Davis in 1994. His last letter is dated 17 December 1994. He mentioned in that letter that his wife and he were not keeping good health. I was sad to learn later that he had passed away in 1999 at the ripe old age of 91 years.

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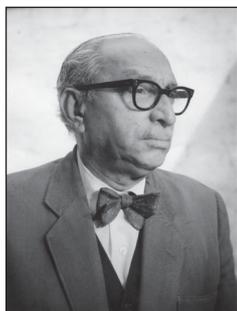
His students at IARI claim that Professor Asana was a great teacher. He guided a large number of students for their PhDs over a span of almost 25 years, including Dr NP Saxena of the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT). Later, several of his students occupied important positions in various universities throughout India. They also served at agricultural research institutes in the country as well as abroad. The Indian Society for Plant Physiology (ISPP), of which he was one of the founder-members, has instituted a Gold Medal in his honor which is given each year to a young physiologist. The ISPP also published the Indian Journal of Plant Physiology of which Professor Asana was Editor-in-Chief from 1958 to 1966. He was truly a great, generous, and humble scientist. Those who knew him well at IARI, told me that he used to work quietly without much fanfare and was deeply devoted to his research.

Professor Asana never applied for or sought any award. However, the Indian Council of Agricultural Research (ICAR) recognized his contributions to crop physiology in India and awarded him the Rafi Ahmed Kidwai Memorial Prize for the biennium 1966–67, a few years before retirement. He was also invited by the Government of Australia to work on a research project at the Centre for Education and Research in Environmental Strategies (CERES) in Canberra ("Ceres" is also the name of the Roman Goddess of agriculture and farming). The greatest tribute to this genius is the worldwide recognition he received for his groundbreaking work in crop plant physiology. Professor Asana, writing in

Nature (December 23, 1961) on the death of Professor Dastur, described the latter as a man who was “reserved, but (with) a gentle and kindly disposition and shunned publicity; he virtually lived for his work and had little interest in social activities and scientific conferences (abroad) which would take him away from it.” It seemed to me that Professor Asana had modeled his own life on Dastur, his teacher. Today, Professor Asana is remembered in India and abroad as an honest, humble, and humane person and a scientist with the highest integrity.

**Professor Faredoon Rustamji
Bharucha: Teacher and scientist**

After reading about Professors Dastur and Asana, I was at once struck by how their meeting each other was similar to my meeting



**Prof FR Bharucha
(1904–1981)**

the late Professor Faredoon R Bharucha in 1970 at the Royal Institute of Science, Bombay, and studying plant ecology and geography under him. Professor Bharucha was the Head of Department of Botany from 1936 to 1953, and the First Director of the Institute of Science (the word “Royal” was dropped when India became a republic) from 1953 till his retirement in 1959.

Professor Bharucha was born in Bombay on 4 May 1904 and graduated from Wilson College, a short walk from his home at the foot of the Cumballa Hill. I am grateful to have known Professor Bharucha and

to have had tea with him several times in the Royal Institute of Science canteen or at Café Royal, the Irani restaurant opposite the Regal cinema. One day in March 1971 just before my final exams, as we got up after having tea and biscuits at Café Royal, I offered to pay our bill as we went towards the cashier. Then with a twinkle in his eye he said from behind, “Adi, thanks for the tea but I hope you are not under the impression that I am one of the examiners, because I am not!” And we both laughed as we walked back to the Department. I missed getting a First Class for my Master of Science degree in Botany by only a couple of marks, and proceeded for higher studies to England in 1974 and numerous international assignments. But that is another story.

Bharucha graduated from Wilson College in Bombay and did his postgraduate research in ecology at Downing College, Cambridge, UK and later at the University of Montpellier in France. After his return from Europe, Professor Bharucha joined the Royal Institute of Science as Professor and Head of Department of Botany from 1936 onwards. He also served as the Institute’s Director from 1953 till 1959. Subsequently he was appointed United Nations Expert in Botany at the University of Damascus, Syria, for a period of 3 years, followed by a similar appointment at the University of Baghdad (Iraq) for 2 years. He continued to lecture on ecology for the University of Bombay till 1972.

Here I would like to relate an interesting incident. While I was at the (Royal) Institute of Science, Professor Bharucha had got

a grant from ICAR to study the ecology of the plant species of the Thar Desert in Rajasthan. He had taken an assistant from Uttar Pradesh to help him with the project. The assistant got himself also registered for a PhD by research as Professor Bharucha was eminently qualified to act as his guide. Both Professor and student (like a *guru* and *chela* team) would be seen in the corridors of the Royal Institute of Science, with the student invariably carrying a heavy leather satchel of Professor's personal items, books, papers and other paraphernalia, and always walking respectfully a few feet behind. They traveled to Rajasthan several times and gathered lots of ecological data on the vegetation of an area near a place called Pokhran. Totally unknown to them, another team of scientists, led by nuclear scientist Dr Raja Ramanna, had also chosen the same area to test India's first atomic device. On the morning of 18 May 1974, operation "Smiling Buddha" culminated with India's first successful detonation of an atomic bomb! The whole nation was jubilant. Professor Bharucha and his student, on hearing the news, rushed immediately to the area and took extremely important data on the effect of the nuclear blast on the ecology of the vegetation at and around Pokhran and compared it to data taken before the nuclear blast. The student got his PhD without much problem the very next year based upon that unique set of data.

Professor Bharucha passed away peacefully in Bombay at his family home on Owen Dunn Road, near Laburnum Road at the foot of Malabar Hill on 30 March 1981 while I was in Italy. Later, on one of my visits to Bombay, I was told that Professor

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Bharucha's memory had begun to fail before he could complete his last book. It was to the credit of his former students at the Royal Institute of Science, particularly Dr Sharad Bhalchandra Chaphekar, that the book was completed and finally published two years after his demise: "A Textbook of the Plant Geography of India", Oxford University Press, 1983. Professor Bharucha's portrait hangs among other great persons at the gallery of "Eminent Botanists of the World" at the Hunt Botanical Library of the Carnegie-Mellon University, Pittsburg, Pennsylvania, USA. Professor Bharucha was also to influence another Parsi student, Dr Vispi M Meher-Homji (retired) of the French Institute, Pondicherry. Dr Meher-Homji was honored by the Government of France for his work. His contributions are elaborated later.

Professor Rustamji H Dastur (1896–1961)

India lost a distinguished plant physiologist and agronomist in the death of Rustamji Hormusji Dastur in Bombay on October 1, 1961 at the age of 65 years that Parsis considered young! After graduating from the Gujarat College in Ahmedabad in

1918 with a BSc degree, he was appointed as a Botany Demonstrator in the same college. He obtained his MSc degree by research in 1921. Subsequently he spent a year in 1924–25 at the University of Reading, UK, where he tested his early ideas on the relation of water content to photosynthesis. He published his findings in the reputed journal the “Annals of Botany”.

Dastur was appointed Assistant Lecturer in Botany at the Royal Institute of Science and eventually became the Head of the Department from 1929 to 1935. During this period he was successful in establishing a very active school of plant physiology and his investigations, together with his students, concerned the influence of photosynthesis of factors such as moisture and chlorophyll content of rice plants. This research was published in journals like the Annals of Botany, the Journal of Indian Botanical Society, and Indian Journal of Agricultural Sciences. After he gave up the position of the Head of the Department his interest shifted to the applied aspects of plant physiology with particular reference to cotton. His work on cotton improvement was to consume his interest for the next 26 years till his death.

Since 1919, after World War I, the cotton crop of the Punjab–American varieties, which had been the mainstay of the cotton farmer in the canal colonies of the Punjab was suffering serious setbacks and loss of crop due to attacks of *tirak*, a physiological disease of Indian cotton due to nutrient deficiency and characterized by premature yellowing

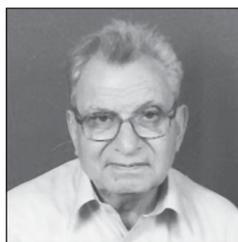
and shedding of the leaves and cracking of the bolls before maturity thereby reducing yields. Initially the leaves turn yellow and subsequently become red. The capsule wall of the bolls becomes tight and do not open completely. The affected bolls may turn black with time. The fiber as well as seed quality are affected. By 1935, seven partial or complete crop failures had occurred. Several theories were put forward as to the cause of *tirak* and remedies cited, but none worked satisfactorily. Finally, Professor Dastur was invited by the Indian Central Cotton Committee (ICCC) to undertake investigation into the problem. Dastur’s appointment was a rare honor because he had no contact with or knowledge of the cotton plant before that time. However, it was well-known in agricultural circles in India that he was one of the brightest plant physiologists available. The agriculture directorate’s faith in Dastur’s abilities was not unfounded for between 1935 and 1943 several papers on the symptoms, causes, and prevention of *tirak* were published. Eventually a monograph on Dastur’s work and results was published in Nature (Vol. 158, 524; 1946). The story told was of how investigations into the realm of pure science can be turned to practical advantage in everyday agricultural practice. Dastur retired formally in 1951, but the ICCC retained his services in an honorary capacity and he continued to work till his death in 1961. During this period he solved the puzzles of more diseases of cotton and published two monographs each in 1959 and 1960. At the time of his death he was still working on the exact balance of fertilizer application of N, P, and K to cotton to prevent physiological diseases.

For his pioneering work in Punjab on cotton, Dastur was awarded an OBE (Order of the British Empire) by King George VI. He was Fellow of the National Institute of Sciences of India, and elected President of the Botany Section of the Indian Science Congress in 1933. He was also the President of the Indian Society for Plant Physiology in 1959.

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Professor Vispi M Meher-Homji: Botanist and ecologist



Prof VM Meher-Homji

Vispi M Meher-Homji was born in Bombay (Mumbai) on 18 January 1932. He comes from a family of doctors. His father, Dr MJ Meher-Homji, was a medical practitioner in the town of Udvada, Gujarat. The good doctor was also an ardent lover of trees and it was this passion that was passed on to his son Vispi.

Vispi Meher-Homji's earlier years were spent in and around the Parsi pilgrimage town of Udvada which at that time had large remnants of forests of *Tectona grandis* (teakwood) trees. After completing his schooling he joined the (Royal) Institute of Science where he topped the list of graduates with BSc (Hons) in Botany in 1953. This distinction earned him the Meldrum Memorial Prize of the Institute of Science as well as the Eduljee Dinshaw scholarship of the University of Bombay for pursuing higher studies abroad. While at the Institute of Science, Vispi came under the influence of eminent scientists like Professor Faredoon R Bharucha (Ecologist), Professor

TS Mahable (Paleobotanist), Father Henry Santapau (Taxonomist/Botanist), and Dr BS Navalkar, a great teacher who could inspire students to excel. Navalkar also worked with Bharucha on the study of mangrove forests around Bombay in the early 1940s. Surrounded by such eminent professors it was but natural for Vispi to continue his studies towards MSc in Botany (1955).

Around that time, Pondicherry which was a French colony since 1673, was handed over to India by a Treaty of Cession signed between India and France on 28 May 1956. However, the people of Pondicherry were given an option to either remain French or become Indian citizens. France continued to maintain monuments pertaining to the French period, and opened a French Consulate through which it supported several cultural organizations. A new Indo-French Centre of Research (otherwise known as the “French Institute”) was established in Pondicherry and Meher-Homji, the fresh postgraduate student, found an opening for his talents. He joined the Ecology Department of this Institute with a mandate to map the vegetation and the environmental conditions of peninsular India.

Subsequently, Meher-Homji had an opportunity to study at the Institute of Vegetation Cartography under Professor H Gaussen, the well-known botanist and cartographer at the University of Toulouse, France. His Doctoral (DSc) Thesis on “Bioclimates and Vegetation of the Indian Sub-continent and their Analogous Types in the World” was so well-received that

the University of Toulouse published it in a book form followed by an award of a PhD degree by the University of Bombay in 1962.

Next Dr Meher-Homji specialized in arid zone ecology and visited reputed ecological institutes in North Africa, Europe, and Asia. He also came into contact with Professor R Misra who had set up a School of Plant Ecology at the University of Banares in 1940. Earlier Professor FR Bharucha had established his own School of Ecology and Phytosociology at the University of Bombay in 1935. Bharucha and Meher-Homji collaborated on a study on the Semi Arid Zones of India. Despite all the work done on the ecology and conservation of the mangroves and the grasslands of India by these stalwarts, urbanization, encroachment, and deforestation on a massive scale has resulted in the destruction of our fragile

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ecosystem. The vegetation maps with insets of climate, soils, geology, and agricultural regions, therefore, provide guidelines for preservation of flora and fauna.

Some noteworthy contributions of Meher-Homji are the original classifications of both forest types and climates with the proposal of an index of aridity-humidity, the concept of a probable year rather than an average year in climatology, the importance of regime (season of occurrence of rains) in explaining distribution of species, degree of influence of Mediterranean ecology in the subcontinent, probable links between deforestation and hydrological cycle and vegetational history.

During a career spanning four decades Professor Meher-Homji has published several scientific papers and served on the editorial boards of many leading journals of ecology, established a school of ecology at the University of Pondicherry, and is on the governing board of many institutes like the Indian Institute of Science, Bangalore; Indian Institute of Forest Management, Bhopal; Wild Life Institute of India, Dehradun; and has been consulted by several national and international bodies for his opinion. He has also been active with the "Save Udvada Committee" (see Damania, 2008).

Epilogue

So think about the great Parsi scientists of the past like Professor Asana when

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you consume a wheat product, Professor Dastur when you wear a cotton raiment, and Professor Bharucha when you gaze upon the beauty of an ecologically balanced desert countryside. For in a few decades there may not be any ethnic Parsis left in India! I am hoping I am wrong.

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