

# Organic Tea

A Vrikshayurveda Experience

by  
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#### **About the author**

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## Foreword

The Asian Agri-History Foundation (AAHF), a non-profit trust, was established and registered in 1994 in Secunderabad, India to facilitate dissemination of information on agricultural heritage in order to promote research on sustainable agriculture in South and Southeast Asian regions. These regions provided food security to the population for several millennia, with occasional famines that too in limited pockets, primarily due to drought. Farmers here had evolved some of the most sustainable agricultural management techniques suitable for different agroecoregions. There is a great deal to be learned from the traditional wisdom, and the indigenous, time-tested technologies that sustained the farmers of South and Southeast Asia in the past. One of the major objectives of AAHF is to disseminate information on ancient and medieval agriculture by translating old texts/manuscripts into English and publish these translations with commentaries on the scientific content of the texts. The aim of these commentaries of the experts is to stimulate research to validate old practices.

The Asian Agri-History Foundation has so far published six bulletins: Vrikshayurveda (The Science of Plant Life) by Surapala (c. 1000 AD), Krishi-Parashara (Agriculture by Parashara) (c. 400 BC), Nuskha Dar Fanni-Falahat (The Art of Agriculture), a Persian manuscript by Dara Shikoh (c. 1650 AD), Kashyapiyakrishisukti (A Treatise on Agriculture) by Kashyapa (c. 800 AD), Vishvavallabha (Dear to the World: The Science of Plant Life), and Lokopakara (For the Benefit of People).

The present Report is a brief account of the work done by Mr Valmiki Sreenivasa Ayangarya in Arunachal Pradesh, India. He innovatively used the techniques given in Surapala's Vrikshayurveda as also in some other publications, to successfully produce organic tea, getting higher yields. He was also able to develop organic pesticides.

It may be noted here that Vrikshayurveda by Surapala (c. 1000 AD), an ancient Sanskrit text on the science of plant life was a mere name until few years ago. The names of both the text and the author were preserved by tradition. The actual text, however, was unavailable. Dr Y L Nene of AAHF procured a microfiche of the handwritten manuscript of Vrikshayurveda by Surapala from the Bodleian Library, Oxford, UK. The AAHF published English translation of Vrikshayurveda in 1996. It has since then been translated in Hindi, Marathi, Telugu, Kannada, and Tamil.

Valmikiji was provided freedom and facilities by the Abali Tea Estate to carry out the work. This report captures a fascinating account of the experience in Valmikiji's own words. The AAHF congratulates Valmikiji for taking interest in validating ancient techniques of Vrikshayurveda. AAHF hopes that trained agricultural scientists take genuine interest in validation efforts. We expect this Report to stimulate many farm researchers.

**Y L Nene**

Chairman

Asian Agri-History Foundation

## Prayers

With prayers to Lord Vishnu – the master of this universe, our ancestors, and teachers like Surapala and others – pioneers of Vrikshayurveda, I hereby expound my personal experience of Vrikshayurveda in the beginning of the twenty-first century at ‘Gandharvanagari’ (Arunachal Pradesh, India) for the welfare of the world.

## Why Vrikshayurveda

In April 2004, I received an unexpected assignment in the ‘Gandharvanagari’ of India, which is the state of Arunachal Pradesh, to undertake the project on organic production of tea. I was exposed through visits to few tea estates. Earlier I had not seen a tea bush or plant. It was also the first experience of good rains in April and May, the summer months of the Indian subcontinent, wherein I needed a woollen blanket in the night to keep warm. I was not sure of taking up the project, as I myself had not tested my experiences at Keshavapuri, Maharashtra, India on a large level. In fact, all trials at Keshavapuri were limited to a small piece of land, two or three hectares, where the soil is very rich in humus being uncultivated by the modern farmers due to non-proximity to the village, and the difficult terrain as also the prohibitive costs involved in making agriculture economically feasible. I did not have any idea of extending Vrikshayurveda trials beyond Keshavapuri, when I developed those. My only interest was in formulating and developing a system of agriculture wherein the inputs are from the available local resources, without any need of transport, heavy machines, and high technology. My aim at Keshavapuri was and is to revive the simple, practical, yet very effective and highly scientific traditional Indian systems and technologies, which are often misunderstood as useless or obsolete. Due to the basic negative approach of the people to our Indian traditional technologies, I did not even dare to disclose my findings to the outside world. I was happy to confine myself to the research on agriculture, my dream right from childhood, which could be realized at the age of 48. I was not keen to take up any assignments as my methods are/were all new and not looked upon favorably by the so-called learned people and scientists. Even when I was given the assignment to undertake the project of organic tea cultivation, I was not sure of the mindset of the host, whether he was serious or not. His approach, however, impressed me and I just took up this assignment without any further thoughts. Even the terms were not negotiated. The method of organic cultivation called ‘Vrikshayurveda’ was never known to anyone here, perhaps not to many people in the world. By now I had successfully developed ‘herbal *kunapa*’, the liquid manure-cum-growth promoter-cum-insecticide, which showed rapid results when applied to the soil or given as foliar sprays. I had also developed the method of preparing various herbal/organic insecticides using herbs having insecticidal properties. By this time I had learned to identify the plants in the wild, which are either called weeds in the present-day agriculture and destroyed using either knives or herbicides as a method of weed management. But for me the weed is an essential input. So, having done a good basic work in the development of Vrikshayurveda techniques, I was confident of succeeding in the organic tea cultivation. But, being basically a shy person, unwilling to even talk to strangers/new people, my acceptance of the new assignment at the northeast tip of India in Arunachal Pradesh was indeed a very bold step.

I took up the project of Vrikshayurveda treatment for tea in Abali Tea Estate (Roing), which has an area of about eighty acres (32.4 ha). This project was started on a very simple note establishing the organic preparation unit using a few drums of 200 L capacity for preparing the inputs like ‘herbal *kunapa*’, organic insecticides, etc. The first preparation made was the ‘herbal *kunapa*’ from all sorts of weeds and organic wastes collected from the vicinity. I did all the work myself since I had to show the way. All the people were surprised at the way in which I was using the cow dung and water and handling these with my own hands.

## Sasyagavya

The first preparation was *Sasyagavya* (*sasya* = plant product; *gavya* = obtained from cow) wherein all the weeds were chopped and fermented in water along with cow dung and mixed well by continuous stirring. This was prepared in four days and strained through an aluminium strainer, which was also a scrap in the tea garden till then. The well-strained liquid was used for drenching the soil near the tea bushes. Considering the manurial requirements of about eighty acres (32.4 ha) of the tea estate, various preparations using many ‘wastes’ were developed. Hence, all types of purchases of any type of organic manures, insecticides, growth promoters, etc. from the market were banned. This surprised my host. But he did respond positively to this proposal.

## ***Dhanyagavya***

A major surprise was the preparation of liquid silica from rice husk. This was made by fermenting rice husk in cow urine, and rice husk in cow dung and water separately for one month and strained later. Proper care was taken to stir the contents well at least twice a day. Both the preparations were allowed to ferment for one month. It was found that the strained extract had silica in liquid form. The rice husk extract in cow urine had 0.19% of silica, whereas the extract in cow dung had 0.35% of silica in soluble form. There was a threat of fungal attack on tea bushes at that time. Hence, this preparation(s) was used along with *Sasyagavya* to drench the soil. Thus the simple farm-level method of extraction of liquid silica was developed using the Vrikshayurveda methods and with my own reading and understanding. Later the preparation was named as *Dhanyagavya*.

When I started my project of Vrikshayurveda treatment for tea, I had not known much about tea bushes or their problems. In fact, I just started by treating the tea bush as any other bush.

## ***Chahagavya***

The next preparation was *Chahagavya*. Tea waste, now called 'tea dung', is at present a useless waste of the tea factories though there is some demand for it from the instant tea manufacturers. As Roing in Arunachal Pradesh is a very remote place with no proper market approaches and facilities for such products, the tea dung is unwanted at present. Tea dung containing a lot of fiber, which is not marketable, was fermented in cow dung and water for just three days and this proved an efficient and good manure. Many might not have thought of using 'tea dung' for tea plants. This *Chahagavya* (*chaha* = tea) was used to drench the soil of the tea garden.

## ***Kantakari***

The workers and executives of the estate pointed out that *kantakari* (*Solanum xanthocarpum*), a common, useless, and thorny plant, "needs to be destroyed for the welfare of mankind". This showed the ignorance about a very useful growth promoter-cum-insecticide, which is available right at the doorstep. Hence, an effort was made to make a preparation of *kantakari*. The fruits of *kantakari* were collected and crushed by pounding them with a stick and fermenting the same in cow urine. Everyone was surprised at this action. Many self-styled experts of agriculture even considered it as sheer madness, as they had not even heard of such methods, let alone use them. Even some executives expressed that these methods are not to be done in the tea garden on the grounds of sophistication and health consciousness. Perhaps they might have thought that use of imported and toxic chemicals alone will upkeep the health of the garden and the people! This *kantakari* extract was made in another small tea garden called Jia Estate (Roing) nearby, which was also converted into a parallel organic estate. Fortunately, the supervisor of the Jia Estate was found to be a willing person than others in understanding or working with such methods. In fact, he was very cooperative and enthusiastic in implementing Vrikshayurveda methods, and it was easy to communicate with him through the work language, though I was unable to communicate with him verbally. By this time after traveling to so many places, where verbal communication is almost impossible, I have learned the art of conversation with the "work language".

This *kantakari* extract, seven days after fermentation was found to be a remedy for common insects, viz., green fly, red spider, thrips, and other insects of the tea in Jia Estate as well as in Abali Tea Estate. The tea experts were surprised to see the results. By this time I had understood the plant 'language' and now it is very easy and simple to communicate with these plants rather than with humans. In fact, I was challenged to control the insects and diseases of tea organically without any market purchases by some managers of the tea gardens. According to them, chemicals are the only remedies as per their experience spread over decades. Being a non-tea man and attempting to prepare insecticides and fungicides without any machinery at the farm level was just an unbelievable method. According to them, a lot of investment on plant and machinery was needed. But, I was and am not in a position to hear to such opinions any more. I have my own knowledge of Vrikshayurveda as understood and learned by me through our forefathers and my own successful trials in Keshavapuri, the place of rebirth of Vrikshayurveda in the present times perhaps.

## ***Chimmigavya***

Fermenting chopped fern leaves in cow urine or cow dung with water was the next preparation. Both can be used as insecticidal sprays at ten percent solution, which also act as growth promoters. In fact, the *Chimmigavya*

made out of cow dung and fern leaves was found to function both as manure and an insecticide. This was successfully tried in Jia Estate for the whole season of 2004.

## ***Kunapa* – its omnipresence**

By the trials and experiences as well as the understanding of Vrikshayurveda, I realized that all the liquid and solid wastes of agro-based industries can be utilized as liquid manure or herbal *kunapa*. I also got successful results from the herbal *kunapa* prepared from the wastes of the forest from the so-called useless materials. So, the next target was to look for pollutant wastes of agro-based industries. I looked for the pollutant waste of the tea factory and found that the washed water from the tea factory is a waste here, though it is not yet declared as a pollutant by the governmental authorities.

### **‘Tea urine’**

The next waste material used in making herbal *kunapa* was the waste water from the tea factory. This tea water now named as ‘tea urine’ contains some amount of tea wastes also in solid form. In fact, tea is said to contain gibberellic acid, which is a plant hormone and growth promoter. This ‘tea urine’, which is free from any other pollutants, was used in various preparations of herbal *kunapa*. In fact, all the ‘tea urine’ was collected from the factory at the time of washing itself and used in various preparations of herbal *kunapa*. So, like cow urine and cow dung, the ‘tea urine’ and ‘tea dung’ also became utility products in the preparations.

Another material available in the tea garden was the tea leaf. Mature leaves are not used in making tea. The mature leaves are considered as waste and often thrown. It was noticed that these leaves are available in plenty when the leaf plucking was done by leaf harvesters. So, these mature leaves also became an input of herbal *kunapa*, to the surprise of all the experts.

The next waste noticed was the sawdust, which was also used to prepare herbal *kunapa* at Jia Estate.

## ***Sarshapa kunapa***

The next waste product that was a challenge to me was the mustard oilcake. Mustard is the *rabi* (postrainy season) crop of this area, which is grown without much effort. In fact, this crop fetches good income to the farmers who are often lease tenants. Usually one enters into an oral understanding with the landowner to grow some crop for some period. The agreed amount is paid in advance and the tenant is allowed to cultivate the crop and take the harvest. Thus the tenants grow the crop without much effort and harvest the crop, which is usually of about 100 days duration. There are good numbers of small oil expellers established mostly under some rural employment sponsored schemes, which carry out the oil expelling for the farmers who wish to get the mustard oil. Mustard oil is used here in large quantities for domestic purpose. Refined mustard oil manufactured in Rajasthan and far-off locations is also sold here. So, the mustard cake is also a waste though it is sold to locations in Assam, about 100 km on the other side of the Brahmaputra river. This mustard is known as a fungicide in Ayurveda. Hence mustard cake preparations were made as a fungicide. Various formulations of mustard cake using cow dung, ‘tea urine’, whey water, etc. were prepared. It was observed that the mustard cake ferments very fast, in just a day or two, and it is a catalyst for faster fermentation during the cold season of November to February, where the ambient temperature will be around 20°C, with good rains almost throughout the day. These continuous rains in January and February are also obstacles to mustard harvesting. This is the period for blister blight of tea. The young tea plants which were showing signs of weakness were revived by using these mustard cake preparations called *Sarshapa kunapa*. In fact, these young newly planted tea plants required proper nutrition. As chemical fertilizers were not given due to the restrictions of organic production, *Sarshapa kunapa* was applied to these weak young tea plants and it was noted that they fully recovered in just a day after application. In fact the young tea plants showed good signs of recovery. *Sarshapa kunapa* was used for the whole garden as a soil drench. We observed that the tea bushes had turned green and more healthy than before. This prompted us to use this *Sarshapa kunapa* with herbal *kunapa* at the rate of five percent in drenching the soil. Mustard is our captive *rabi* crop. The mustard cakes were used in preparing another fungicide *Cowper*, that was developed here as a replacement for copper oxychloride and Indo-paste, which are used as spray or paste to the large cuts of the pruned tea bushes. This mustard cake is now used as a catalyst to quicken the fermentation process of the herbal *kunapa*, *Cowper*, herbal alkaline wash, etc. during the cold season of pruning.

## **Bharija kunapa**

The next surprise for all the experts was the use of fruits of “outenga” (in Assamese), which is called “*bharija/bhavya*” in Sanskrit. It is sad that this medicinally useful *bharija* (*Dillenia indica*) fruit is discarded by the people except for the poor migrant laborers who use it only as a need as it is available freely. This has very less market demand except in the weekly *bazaars* that too only with the known people. My host informed that elephants in this area like *outenga* fruits and this is their food. Usually, this fruit is pickled and used. This is also used as the sour fruit in the daily food. It is also tasty when used raw or cooked. It can be neatly cooked and made into a soup or *rasam* with the needed spices. Like elsewhere in the country, these *bharija* trees are felled for timber (money) here also. These fruits are found to be full of nutrients needed for the tea plants. *Bharija* fruits were collected from the forest and fermented in water to find out the feasibility. This preparation named as *Bharija kunapa* was found to be useful for the tea plants.

## **Chakkota kunapa**

The next preparation was that of *chakkota* fruits (*Citrus maxima*). This fruit is locally known as *rabak tenga* and I remember my childhood days as well as the days in Agni, Karnataka where I used to relish this fruit. Having prepared *Naranga kunapa* from the sour and broken oranges in Keshavapuri, it was decided to prepare *Chakkota kunapa* from these fruits. In fact, this fruit has no market value in the modern civilization. It is yet a tribal fruit liked most by the poor and children. The modern man has not found its use. This fruit is used to prepare the medicine for removal of dandruff from the scalp in Ayurveda. I also prepare herbal *kunapa* from this fruit, which can be used as toilet soap. It is a very good growth promoter as well as an insecticide also. But this is not used so in agriculture. Perhaps I might be the first person to use the same in agriculture. These fruits were found in abundance in front of a tribal house where there were no takers. Most of the laborers thought it was a mad idea to bring so much quantity of *chakkota* fruits and some even thought it as a gift to them. In fact, no one could even imagine why the *chakkota* fruits were being cut and fermented. The fruits were fermented in 200-L drums for two months and stirred twice a day. A neat and smooth thin paste was formed with the acid of the fruits helping the pulp and the outer skin to ferment easily. One of the visitors of the estate in December 2004 made a trial of the thin paste as a skin conditioner. He was pleased by its use for the first time. He immediately collected about 1 kg of the paste in a metal box and took it home. In fact, he became its publicity manager. He found the same to be a cure for dry skin in winter, useful for instant remedy for dandruff when applied on the scalp, and also a skin conditioner when bathed with the diluted solution. In fact, the readers may be surprised to know my experience to halt hair fall which is a common disease among the modern people. I was also facing the problem of hair fall in November in Abali, as I was new to the environment, and I immediately applied the diluted solution of the *chakkota* paste to my head during my bath in the morning. Within a day I had the problem solved and my hair had totally stopped falling. My anxiety to become bald at the age of fifty was stalled thus. Now, this *chakkota* paste is my daily soap and I use none other than that. In fact, I have prepared soap by adding some foam additive so that the city people can also use that being fascinated by foam rather than the use of the product. But alas, most of the people want only foamless paste and not the foam soap.

Having taken about two months to completely ferment the whole *chakkota* fruits in this way, now it was another “mad” idea to test in the tea estate. As said earlier *Bharija kunapa* was used for reducing the pH of *Sasyagavya*. Now, the diluted *chakkota* paste with water was kept for further fermentation for two to three days to decrease its pH value. The solution with pH at 4 was mixed with *Sasyagavya* to bring down the pH of *Sasyagavya* to 5 from 6 or 6.5. Thus, it became a catalyst to reduce the pH of *Sasyagavya*. The application of this modified *Sasyagavya* was found to be more useful in maintaining the soil pH as well as to provide the much needed nutrients by the plant to improve their health. In fact the sulfur and magnesium deficiencies, as identified by one of the tea advisors, had totally disappeared and he had nothing to say after the recovery. In fact, he went on to find that the tea bushes were very healthy and there were no problems of pest and disease in the garden. This *kunapa* was named as *Chakkota kunapa*.

After its use as manure, I tried to use it as a foliar spray. Due to scorching heat on account of long spell of absence of rain, the tea bushes did not have the yield in the whole garden. In order to get an early flush, we sprayed this *Chakkota kunapa* mixed with the *Chimmigavya* and found it effective in giving flush almost the next day. One round of foliar spray with this preparation gave ample flush again and we had to look for methods of plucking. Thus, the *Chakkota kunapa* also became a very good growth promoter. Everyone was just surprised at the developments. Now, the present practice is to add this *Chakkota kunapa* with *Chimmigavya* and spray onto the tea bushes, which act both as an insecticide as well as a growth promoter. The staff and the workers

know this. In fact, they know the method of preparation and just need instructions for its use. So, this is the research of *chakkota* fruits, the unwanted and useless *rabak tenga* of this place.

The natural resources here are really plenty and the land is not yet contaminated with chemicals as the location is thinly populated. As most of the food materials are brought from neighboring Assam, and the government provides subsidies to the people of this area to a large extent, the practice of modern/conventional/scientific agriculture is less. Many plants including medicinal plants can be found in their wild form, perhaps, due to the remoteness of the location and unawareness of the local people about the external market. This has given us lot of natural resources for Vrikshayurveda trials without much effort.

## ***Curcuma* spp.**

Being a person who can identify plants in the wild and use them in daily life, most people try to impress me with their knowledge of herbs and try to get some favor from me. Most of such interests have a personal/selfish motto and these people are mostly self-centered or misuse the situation right under my nose so that they are saved from the wrath of their superiors. It was such an attempt by the car driver, which made me look into the natural and various types of turmeric and ginger available here and use them in organic farming successfully. On that particular day, the driver wanted to take the car for his personal work by dropping me at the river for my usual bath. I knew his intentions as he sought my permission to bring *kala haldi*, a rare herb but available in plenty and has not attracted commercial interests. I was certainly interested in the subject. But, my vigilant mind made me to go to the herb without staying back at the river. So, this was a surprise for him. He could not use the car for his selfish purpose and had to show the *kala haldi* plant to me. He reluctantly took me to the plant in the forest. I collected some samples and returned to the river for bath and then to the house. When this *kala haldi* was shown to the estate supervisor, he laughed at these samples and informed that there is plenty of this weed in the tea estate itself and the estate management is trying its level best to eradicate the same from the estate, but has not been successful yet in that endeavor. Eradication of a valuable medicinal plant in the estate is the most popular work in the tea and coffee estates. Its utilization in the garden for fighting the diseases and pests was not even thought by the estate management so far. It was identified as *Curcuma caesia*, known as black zedoary. The estate supervisor called me crazy for taking pains to find it and attempt to collect and plant it in the open space. He even advised me to look for some organic products from the market in Dibrugarh or Tinsukia in Assam instead of hunting for useless weeds in the garden or the forest. But it has not influenced me. In fact, I regularly receive such free advice from many people and I have learned to ignore them.

In this process of finding the black zedoary in the open spaces of the garden, I was able to trace five other species of *Curcuma* – *C. aromatica*, *C. zedoaria*, *C. domestica*, *C. amada*, and *C. leucorhiza*. All the plants grow naturally and are useless plants for people as they have no market. While searching for this *Curcuma* species in the forest, we also collected a natural ginger called *borong* locally and used by the local *Mishmi* priests to cure many diseases. This is an unwanted weed by the *Mishmis* as it occupies a lot of ground and it grows well even amongst the weeds. Ginger is the most pet commercial crop of this area, as it fetches a good price nowadays. As this natural ginger has no market value it is now called a weed here except for the *Mishmi* priests who grow or collect this from the forest to treat the diseases of their followers. When it was decided to buy *C. domestica* and other *Curcuma* species, some people wanted to know whether we can buy this *borong* also. Perhaps they might have found a “mad” person who can buy this product and they could earn some money from the useless weed, which grows effortlessly. We agreed to buy the same and everyone started to bring this *borong* and *Curcuma* and sell the same to us. As these are basically fungicides and insecticides besides being growth promoters we used them to make regular preparations like that of ginger or garlic. We crushed the rhizomes and fermented them in cow urine as usual. The extracts are used throughout the year as and when needed. This method of extraction is now very common. The *borong* extract is now used regularly instead of ginger extract. This acts as a fungicide, insecticide, and growth promoter.

## ***Kshira chikitsa***

The next preparation used was milk and water in April 2005. Some tea bushes were affected by lightning in the last week of March 2005. One bead tree (*Melia azadirachta* – shade tree in the tea estate) was burned due to lightning, which is a common happening in March and April every year here. In this area at the foothills of Himalayas, it rains almost everyday. Whereas it is hot and dry in most parts of India, it is chilly and rainy here in these months. Heavy rains and floods are also not uncommon. This is the season for the most dreaded disease of tea here, viz., blister blight in addition to pest attacks like green fly, mites, thrips, red spider, and *Helopeltis theivora*. In fact, the conventional tea planters make every effort to protect the tea bushes from various diseases

as well as pests. Most of the money is spent on cultural practices of tea in this period of February to May and the peak of the plucking season begins somewhere in mid-May or first week of June, when the major job will be only to harvest the green leaves. In such an instance, our attention was diverted to this problem. Immediately, I recalled *sutra* 51 (Chapter VIII) of Vishvavallabha, which I had read recently, that mentions spraying of milk solution as a remedy for most of such diseases of plants. When this problem came to our knowledge we quickly sprayed 5% milk suspension in water to these affected bushes. This spray was repeated at intervals of three days for four weeks, by which time the bushes had completely recouped from the lightning shock. The tea advisor of the garden suggested removal of all the affected bushes according to the conventional practices. But, we declined to do so. Instead the milk solution was used as a spray to revive the tea bushes, which was found to be successful, both theoretically as well as practically.

Having translated “An Agricultural Testament” by Albert Howard and with the first hand experience of natural farming/organic farming in the forests of Western Ghats of Karnataka, and in the Vindhya mountains of Central India in Keshavapuri, I had been convinced in the relation between soil health and plant health. The top priority was to improve the soil health vis-à-vis plant health. The herbal *kunapa* called *Sasyagavya* here is virtually an all-rounder. It nourished the soil, improved the microbial activity, increased the earthworm population manifold, and also improved the soil health, which was otherwise in a sorry state under chemical farming practices earlier. In fact, it was this herbal *kunapa*, which had reduced the chemical residue content in the tea in a short time, which was unbelievable. Having understood the importance of herbal *kunapa*, we were not willing to remove the lightning- affected tea plants. This treatment with milk was unknown to the tea advisor and he was also surprised at this treatment and its result. Actually, the tea bushes revived to the surprise of all except me as I have full faith and belief in the advice of our elders.

## Other preparations

Other preparations were made from garlic, ginger, turmeric, sweet flag, and yellow zedoary. Rhizomes were collected in raw condition, crushed in an iron mortar and wooden pestle and fermented in cow urine separately. These preparations took hardly one week and the extracts utilized whenever needed. Usually these are mixed in equal proportion and used along with *Chimmigavya*. This preparation was found to be effective against pests and insects in agriculture in Maharashtra and other places. But, the technical know-how of its manufacture is not known widely. There is a lot of printed literature available on methods of manufacturing such preparations, but the actual practice is yet limited. Perhaps, the use of cow urine in such preparations may not be palatable to the modern scientific organic technocrats/bureaucrats who prefer to use some organic chemicals. But, we have developed the technical know-how at Keshavapuri, the place of revival of Vrikshayurveda.

These preparations were used as foliar sprays at one percent dilution and found to be effective against almost all pests and insects of tea in the initial stages of the conversion. But, *Helopeltis theivora* was still the problem of tea in this area. Even chemical sprays did not control the *Helopeltis theivora* menace in other tea estates.

## Panchagavya

*Panchagavya*, which is not well known in this area except for some hearsay by some visiting organic technocrats, was prepared using cow's milk, curd, ghee, urine, and dung. As I was well trained in the preparation of *Panchagavya* right from my childhood in the family, its preparation was not difficult. The officers of the estate, who are more modern in their talk, but not so in practical approach, were surprised at the handling of cow dung and urine by me personally. The preparation was looked down with contempt by almost all the officers of the estate, but some workers were very curious to know the new happening, which was only heard and never seen publicly that too in large quantities.

Preparation of *Panchagavya* by a priest in some rituals, *pujas*, and ceremonies was well known to others, but that was out of religious compulsions and not out of real individual intentions. But, no one even could imagine the preparation of *Panchagavya* in such large quantities. If *Panchagavya* was not prepared in such large quantities, it could not be used in this large area to feed the organic needs of the tea estate. There was no foul smell of the cow urine or dung in *Panchagavya*, but a pleasant smell of ghee. The rotting of cow dung was not observed, but a controlled fermentation of milk, curd, cow urine, and cow dung was observed. Except above no other materials were added to this *Panchagavya* to retain its originality though several people are recommending the addition of country liquor, banana fruits, etc. Actually we prepared *Chaturgavya*, without ghee, as we found ghee was not readily available due to lack of milch cattle. This *Chaturgavya* was found to rot quickly as there was no anti-oxidant added to it. This way a large quantity of *Chaturgavya* was prepared and used as foliar spray

frequently on tea bushes at two to three percent concentration as an insecticide, growth promoter, and soil conditioner.

## ***Mathsya kunapa***

Looking at the severe threat of *Helopeltis theivora* for tea another preparation called *Mathsya kunapa* was made. The area of Abali being generally inhabited with non-vegetarians, it was not at all difficult to prepare the *Mathsya* (fish) *kunapa* by just boiling it and adding some ingredients as per *kunapa* preparation. But, due to lack of sufficient commitment to the work, the officers of Abali estate did not prefer to continue it. Though, the initial response for preparation of *Mathsya kunapa* was good, it was completely absent afterwards. In fact, they had a concocted vision that *Mathsya kunapa* will not work as an insecticide for the most dreaded insect of tea here, viz., *Helopeltis theivora*. So, they did not bother to prepare *Mathsya kunapa* afterwards, and stopped use of any such preparations in future for protection from *Helopeltis theivora* for tea declaring that there are no organic insecticides for controlling *Helopeltis theivora* according to their vast and long experience in tea estates. Perhaps, they might have thought that their decision will be final and I will give up Vrikshayurveda methods for tea and go back to my native place. They might have wanted me to declare Vrikshayurveda methods as a failure in tea just as they had declared earlier. I realized the psychology of the officers and supervisors of Abali estate and thus determined to work hard to develop an organic plant protection product from the locally available products.

## **Difficulties experienced**

Usually, I would not like to stay at any place for longer periods to perform work, as my work is only to provide the technology and guidance to suit the work culture so that the technology can be implemented. When I found that my advice was not taken seriously, I decided to stay in Abali estate for one full year and execute the project myself, to ward off all types of apprehensions against the Vrikshayurveda methods for tea cultivation. Therefore, I had to give up my focus on Keshavapuri for the year 2005. When it was found that the officers of Abali estate have not bothered to prepare *Mathsya kunapa* for foliar application against *Helopeltis theivora* or use *Chimmigavya* for soil drenching due to their own reasons, there were no alternatives but to take charge of the affairs myself and demonstrate how to administer an organic tea estate using Vrikshayurveda methods, perhaps for the first time in the world.

I had known that tea is the most traded agricultural commodity in India both in quantity and quality. The demand for organic tea from Assam is very good especially from European countries and there is a dearth of the same. There are many organic tea cultivators in India and they are not having a full-fledged input production center. The advice of usage of large quantities of compost, vermicompost, etc. is taking a large area of land as well as vast infrastructure both in terms of resources and money. The practical application of biodynamic farming technology has been limited. The main drawback is the apathy towards the natural resources around us and eagerness to import materials from outside. The use of ready-made products from the market is the normal trend. If the tea estate officers are not asked to buy anything from the market for cultivation, it is a setback for them, may be due to their own assumptions that they cannot manufacture those inputs themselves. Thus, the above described methods of preparing the inputs like *Sasyagavya*, *kunapa*, and insecticides are not acceptable. Now I realized how difficult it is to execute a new technology in an established industry which is full of knowledgeable and experienced persons, who have established their own theories and practices over a period of time and these have become a daily practice in their life. By this time I also realized the difficulty of reviving the technology of our ancestors in India under the present context. Because of the full support of the host and his determination made me not to look back and keep on trying and working on the models and products to be developed.

During the visit of Abali estate in the end of October 2004, it was observed that the whole tea estate was infested by *Helopeltis theivora* and the concerned officer expressed his helplessness in executing the project as per the directions. By this time I realized that he is inefficient and incapable of attempting new ways and approaches. The officers of the estate were very critical of my taking charge of the affairs with a comment that I am bound to fail in my project and run away from the project. But, I was determined to achieve in this unique project, as I knew that if I succeeded in providing a remedy for tea from the attack of *Helopeltis theivora*, I would be the inventor for it. My whole life has been full of such challenges and I have succeeded after the usual hindrances. This had happened even in Keshavapuri in 2001, wherein all the people involved in the project in the initial stages let me down completely and I had to set up the project virtually staying there and doing the job by myself including the labor work but with happiness. The happiness obtained after the achievement of success

is beyond even one's imagination, and so I was also ready to repeat another performance now in Abali in 2005. I had a similar experience at Agni too in managing the cardamom and coffee estates during 1996 to 1998. In fact, taking up such challenges has become very common for me.

## Organic tea in Korunu estate

Another tea estate, at a distance of about 25 km from Abali by the land route and about 5 km aerially, called Korunu, was also under my control for organic cultivation. The methods of cultivation are different compared to Abali and Jia. It is almost zero cultivation practice except for tea leaf harvesting in the season and pruning in the cold season. In fact, there is no manuring or pesticide of any nature. Even the organic matter like the weeds is allowed to die in the garden itself without any disturbance. No herbicide is being used. Yet the tea bushes are growing very well without any disease or pest attacks. However, the harvesting of tea leaves is a problem due to lack of sufficient labor force. Obviously, the quantity of tea leaves harvested does not match the industry standards, but the quality of 'made tea' is superior to the conventional inorganic 'made tea'. This estate is in the midst of a thick forest of Arunachal Pradesh at the foothills of Himalayas with rivulets flowing on two sides and evergreen forest all-round. This fascinated us on the natural balance of the tea plants and insects because in other tea estates, there are several insects and diseases on the tea bushes. In Jia it was under control by using *Chimmigavya* for soil drenching, whereas it was never under control in Abali due to sheer lack of control measures.

## Post-pruning methods

It was thought proper to plan the production of organic inputs for the season 2005 well in advance. It was now the month of November and there was sufficient spare labor force to prepare these formulations as there is no harvesting of tea leaves due to cold season, and the tea bushes are pruned in this season and the garden cleaned of the weeds. Now, the challenge put forth was to provide the necessary inputs for pruning of tea bushes.

Under conventional method of farming, the cuts and large cuts are applied with the paste of copper oxychloride or Indo-paste, the tea bushes are given caustic soda alkaline wash, and manure is applied to the soil. A herbicide is applied to the weeds to control them. These practices are followed during the cold season. Therefore, the following alternative organic inputs for the post-pruning practices were developed:

- *Cowper*, the alternative for copper oxychloride or Indo-paste;
- *Sasyagavya* (10% solution) for alkaline wash; and
- *Sasyagavya* soil application for manuring.

*Cowper* is a "fungicide" prepared as per Vrikshayurveda methods by fermenting raw cow dung and cow urine for one or two days into a thick paste used for pasting the large cuts of tea bushes after pruning. If the season is cold, then a little mustard cake or any oilcake can be added to hasten the fermentation. Otherwise, black gram powder or sesame powder can also be added to hasten the fermentation. As an alternative, goat dung was used instead of cow dung and *Cowper* prepared from this also was used. This *Cowper* has worked very well in providing the much-needed paste to the large cuts of the pruned tea bushes in Abali estate as well as Jia estate.

*Sasyagavya* was found to be alkaline when prepared. Its pH value was always above 7 and this gave the idea to use it as an alkaline wash with ten percent dilution that worked both as an alkaline wash as well as a soil conditioner. *Sasyagavya* is our usual manure, soil conditioner as well as insecticide. Thus, it was now made known to everyone that alternatives for post-pruning of tea are also available from Vrikshayurveda methods.

## Fungal disease

Maintenance of soil pH is a major problem in coffee and tea plantations. Generally it is said that coffee needs a normal soil pH and tea needs a little acidic soil with pH 4.5 to 5.5. But, my short experience has found that it is agreeable to have a neutral soil pH even for tea. The most dreaded diseases of coffee and tea are the black rot and blister blight, respectively. These two diseases occur during heavy rains. Coffee and tea are grown in areas where the rainfall is usually high to very high and spread over long periods of the year. Bordeaux mixture is generally sprayed in coffee against black rot. Similarly, copper oxychloride is sprayed in tea against blister blight. Of course, the role of Bordeaux mixture and copper oxychloride as good fungicides is now well established and known to the farmers.

The challenge was to provide a solution to this fungal disease of tea, which is really rampant during the rainy months of January to May. The northeast part of India is basically a heavy rainfall area with almost daily rainfall, with sunlight being a premium at most times of the year. Even the ambient temperature will be usually less than 20°C whereas the temperature elsewhere in the country will be usually higher. Even, harvesting the *rabi* crop of mustard will be very difficult due to continuous rains and absence of sunlight. Whereas one has to sleep with fan and light clothes in summer months of March and April in most parts of India, in this northeastern part of India one needs warm clothes and woollen blanket. This is a period when the horticultural gardens are given irrigation with sprinkler or with drip facility in many parts of the country, whereas the tea planters are engaged in draining the water out of the tea garden to avoid waterlogging. This area experiences flood in this period either due to heavy rains or even without rains due to melting of snow from the Himalayas. It rains often even in December and January and the temperatures are low. This is the season for blister blight in tea here in the northeast. The demand for sprayers and copper oxychloride here is in large quantities well before the agricultural season elsewhere in the country. Everyone is engaged in spraying copper oxychloride onto tea plants in this period here, whereas it is the lull season for agriculture in most of the other parts of the country.

## **Blister blight – preventive methodology**

A strange method of finding a solution to blister blight (*kapha dosha*) of tea using Vrikshayurveda methods was developed by maintaining the soil pH at neutral right from the pruning season through the application of *Sasyagavya*. The pH meter was useful to test the soil pH often to decide the pH value of *Sasyagavya*. This methodology worked successfully averting blister blight whereas it was a menace in upper Assam. Some traces of blister blight were found, but they subsided on their own without disturbing the tea bushes.

Maintenance of soil pH in tea gardens is an art by itself. Conventionally, where the chemical nutrients are used, the soil gets too acidic in February to May, often resulting in blister blight on tea plants. To maintain the soil pH, lime is added to the soil. If the soil pH is alkaline, sulfur is added to the soil to neutralize the soil. All tea garden managers, supervisors, and workers are experts in this work. But, all these activities are banned in the organic production. So, this was also a challenge to handle this problem organically. The pH of *Sasyagavya*, which is usually alkaline, was adjusted by adding *Bharija kunapa*. It was a very easy task and the soil pH came down from 6.5 to 5.2 within one week upon drenching the soil with this acidic *Sasyagavya*. If the soil is too acidic, keep the pH of *Sasyagavya* at alkaline level. If the soil pH is alkaline or neutral, adjust the pH of *Sasyagavya* by adding the acidic preparations. Addition of *Dhanyagavya* also increases the pH of *Sasyagavya* as it is basically alkaline. Application of *Dhanyagavya* to the soil along with *Sasyagavya* is a useful method to prevent blister blight in February to May when heavy rains might occur in this place.

## **Large-scale production of *Sasyagavya***

One may wonder how *Sasyagavya* is produced in such large quantities for the 32-ha tea estate. It was realized that *Sasyagavya* requirement will be heavy as the soil had a very low organic matter content. Though the preparation of *Sasyagavya* was made in small quantities in the initial stages in 2004, a methodology of preparing *Sasyagavya* in large quantities was developed. For this a 4 m<sup>3</sup> *gober* gas plant (Dinabandhu model), attached with two small tanks for collection of the final product was installed. The inlet of the *gober* gas plant is added with the materials of *Sasyagavya* including cow dung slurry, stirred well, and allowed to ferment in it. The new addition will drive out the *Sasyagavya* in the *gober* gas plant, which will be collected in the two tanks attached to the outlet. An aluminium strainer is put on the outlet pipe on line in the first tank to strain the *Sasyagavya* and the *Sasyagavya* is passed onto the second tank, wherein it is filled into drums and taken to the garden in tractors. The viscosity of *Sasyagavya* is also important. If the rainfall is heavy, then the viscosity of *Sasyagavya* should be as high as possible. If the weather is dry the viscosity should be below fifty percent. The viscosity depends upon the weather conditions (rainfall, soil moisture, and atmospheric moisture). This parameter is adopted to help the tea plants to absorb the nutrients immediately upon soil application of *Sasyagavya*. With this mechanization of *Sasyagavya* production without any power and machinery, the *Sasyagavya* production is around 10,000 L everyday. Now, *Sasyagavya* is produced and applied to the soil the very same day within six hours. The labor force has skilled in its production and use in the garden. The application of *Sasyagavya* has three utilities – manure, growth promoter, and insecticide. This method is very beneficial in maintaining the soil pH under the Vrikshayurveda methods.

## ***Indsafari***

The local fisherman of the village had started to provide us a large quantity of fermented fish waste, which is a nuisance to him but of very high usefulness to us. According to modern science, the animal products contain proline, which is useful for good and sumptuous plant growth. Keeping this in mind as well as the use of *kunapa* as a provider of the much needed nutrient to the plants, it was decided to use this as a manure as well as insecticide. To utilize this waste I took the help of *rasasastra* (Indian alchemy) methods of Ayurveda. According to *rasasastra*, dung or urine of any animal has potential to detoxify the material. Two different preparations of fish waste, viz., one with cow dung and water and the other with cow urine were made and called *Indsafari*, which are ready within two days. *Indsafari* is now added with *Sasyagavya* for soil drenching as well as foliar spray as a growth promoter and an insecticide too. Thus, the *kunapa* can be prepared without cooking, using cow dung and water or cow urine. This is another new innovative approach.

Surprisingly, we observed the natural regeneration of earthworms in the organic pharmacy unit and subsequently in the garden too. I also observed microbial activity. Thus, the vermicompost was available near the cow shed as well as in the entire garden.

## Awareness

All types of notorious weeds, plants, and plant products have been used in preparation of *Sasyagavya*, which has given very good results in the tea estate. This way we were able to utilize the cut weeds of the tea garden in the organic pharmacy unit for preparation of *Sasyagavya*. This helped to keep the tea garden clean. Hence, the demand for all types of wastes became so great that every worker in the estates was of the opinion that there is nothing that may be called as waste any more. If anything cannot be used for some other purpose, it is to be used for *Sasyagavya*. This is the extent of awareness of the workers.

With the success of the Vrikshayurveda methods in organic tea farming, the next step was to develop a strategy to protect the tea leaves from *Helopeltis theivora* in 2005. Whereas red spider was a big menace in other estates (chemical and organic), it was totally absent here. According to local people, red spiders are found throughout the season. But, it never appeared in the season of 2005 in Abali Tea Estate. Our tea advisor had warned us to get prepared for organic insecticides for green fly, thrips, loopers, and red spiders along with the most dreaded insect, *Helopeltis theivora*. But, we did not bother about any insect other than *Helopeltis theivora* as our preparations of *Sasyagavya* soil application was sufficient to keep all such insects away. The tea advisor had also suggested us to spray for *Helopeltis theivora* early morning or late evening. Of course, he knew that it would be a difficult task to execute as it needs labor cooperation to do the work. In fact, he accepted that it is a man management skill and if it is done, then the crop could be safely protected from *Helopeltis theivora*. His experience and advice played an important role.

With the bad experience of the entire garden being infected by *Helopeltis theivora* in the season 2004, and with my physical presence in the garden, everyone was awaiting to find fault with my technology and condemn its failure. All the criticisms had now vanished with a silent observation from the surrounding people. Many people had already judged that the crop would not be protected from the attack of *Helopeltis theivora* this year also. They did not have any knowledge of *Indsafari*, which was made sufficiently for use at any time. Actually the main priority for the season 2005 was to maintain the soil health by judicious use of *Sasyagavya* as said earlier.

Still people were having doubt about this innovative technology, and believed that tea bushes will not survive without the application of inorganic fertilizers (NPK). Luckily, I got a supervisor, Mr Kundan Jha, who cooperated with me in using the technology, though he was new to this organic tea cultivation. He had the willingness to work and succeed. He had the willingness to learn new things as well as to work late hours with commitment to do the job.

## Loopers

Our tea advisor had warned of the pest attacks on the shade trees in the tea estate in March to June and suggested to paint lime solution to protect them. Tea needs shade trees in this part of India, perhaps to protect the tea bushes and the tea leaves from the scorching sun of the post-rainy season or even the scorching sunlight of the non-rainy days. The pest attack on these shade trees is also common in the tea estates and as a preventive measure lime or Bordeaux mixture is pasted on the trunk of the trees. Though this is permitted in the standards of organic production, we were not willing to adopt this method.

In the third week of May 2005, my host suddenly noticed the pest attack of shade trees near the residence. Immediately, he approached me and sought my consent to carry out some measures himself. I was surprised at his enthusiasm and approved his plan. However, I kept myself away during the operation. After the operation, he himself informed that he had sprayed the shade trees with one percent solution of *Indsafari*. Next morning during my usual walk, I was surprised to find the loopers having decreased by fifty percent which was duly intimated to him. He repeated the *Indsafari* spray the next day also and this had resulted in total disappearance of the loopers from the shade trees. Everyone eagerly looked at this entire method and this result gave everyone the message that *Indsafari* is the best remedy for controlling pests and insects. In fact, earlier, *Indsafari* spray was used at one percent dilution against *Helopeltis theivora* in February and March 2005 itself. This way, all the criticisms and sarcastic comments about organic method of tea cultivation disappeared.

Though an effective and successful demonstration of *Indsafari* for control of the attack of *Helopeltis theivora* was now made, a small portion of the estate of about 200 *nulls* (one *null* = 12 ft 3 inches × 12 ft 3 inches) was affected by *Helopeltis theivora*. This was rectified thus – “skiffing”, spraying of *Indsafari*, and *Sasyagavya* application to the soil. After the operations the tea leaves were ready for harvest in the next ten days and the affected tea bushes revived totally. By this time the supervisors had known well that *Sasyagavya* is needed for soil drenching in order to maintain the tea bushes free of problems.

Another subject was the cattle management. As there was a captive need of huge quantities of cow dung and urine regularly, it was decided to establish a cattle herd.

## Leaf count

After the successful control of the pests and diseases of tea, the target was to maintain the production of green leaves of tea with a good leaf count, which is the main criterion in the quality of ‘made tea’ that is called black tea. Now, I thought it proper to learn the basics of tea manufacture without any prior exposure or knowledge in the field. Therefore, I started to learn from the workers and the supervisors, which is one of my ways of learning. One of the supervisors helped me to find out the leaf count of the green leaf which is very important to maintain the quality of tea in the open market. It is called two leaves and a bud theory in northeast and three leaves and a bud in southern India. Generally, in order to get more weight of the green leaves the planters like to pluck green leaf containing even five to six leaves and attempt to make tea.

Green leaves are to be plucked in a round of six days to get a good leaf count as per the traditional practice. The theory is that once the green leaves are plucked, the same part is to be plucked again the next seventh day. Otherwise, the leaf count decreases day by day and the delay in plucking is not beneficial to ‘made tea’. As the green leaf plucking is done manually with the labor force, sufficient labor force is needed to maintain the plucking cycle. Here, it is a major drawback. According to tea estate norms one hectare of tea garden needs three and a half person-days plus one person-day in the plucking season (total four and a half person-days). It means that for every 10 ha of tea garden forty-five laborers are required. So, according to the tea estate norms this estate must have 135 laborers. But, we had only eighty. In addition to other work of the tea estate, we need at least five workers to maintain the organic pharmacy along with cattle maintenance. So, the problem was how to deploy the labor force. Besides this, we need the labor force to apply *Sasyagavya* to the soil, and also for spraying growth promoters to get a good quantity of green leaf for harvesting in the next round. Thus, twenty workers for spraying, ten for *Sasyagavya* soil application, five for organic pharmacy, fifteen for controlling the weeds, seventy for green leaf plucking, and fifteen reserves, which sums up to 135 workers were required. In addition to this labor force, one supervisor each for green leaf plucking, weeding, organic pharmacy, foliar spray and *Sasyagavya* soil application, and office maintenance (total five) were required. But, in this place of eternal shortage of manpower of all types, there were hardly eighty workers and three supervisors.

## Positive aspects

Yet, there were many positive aspects of the project even commercially. One of the reputed tea tasters of Kolkata appreciated this tea. He was of the opinion that this tea had a better liquor, flavor, as well as taste when compared to the conventional tea, viz., “inorganic tea”. A similar response was also received from the market, wherein the tea buyers (whole sellers) in Rajasthan were demanding this tea and willing to offer a higher price.

## Negative residues

After the conversion of the Abali Tea Estate into an organic plantation, we proceeded to get the 'made tea' for residual analysis. It was sent to SGS laboratories in Kolkata. We were surprised to see the report of 'nil' residues.

When this was reported to the certifying agency the concerned official refused to believe this report and wished to test the same with their contracted laboratory. Accordingly, the tea sample was provided promptly to the certifying agency for analysis by their contracted laboratory M/s Shiva Analyticals, Hosakote, Bangalore, Karnataka. The earlier result received from SGS laboratories was confirmed by this laboratory also. It was beyond our expectations as many people of the tea industry would not believe the absence of residues in 'made tea' in such a short span of time.

## Theory behind negative residues

In 2003 when I was doing Vrikshayurveda trials in Keshavapuri, I had started the translation of an ancient book on Indian alchemy, viz., *Rasarathna samuchchaya*, which deals with the metals, their treatments of purification, their medicinal uses, etc. While translating this text, I noted that urine and dung of any animal usually called *mutra* and *vishti* in *Rasasastra* nullifies the toxicity. Probably, this was the reason for the absence of residues in tea.

In spite of the problems as mentioned earlier the season for 2005 ended in November without any technical problems. Hence, Vrikshayurveda methods were found to be efficient, useful, and successful in organic tea cultivation.

## Certification

Certification of organic farming is a bureaucratic system in today's world of agriculture. With my experience, many officials of the certifying agencies behave like demigods. Their approach to the farmers is that of suspicion and they try to probe into the farmer and his activities. Perhaps, they might have been trained to behave like that in the world of farmers, who want to get a certificate for their product without even caring for the guidelines. Often, I have found that the guidelines and restrictions imposed by them are just not easy to be understood by the indigent farmers. Many farmers may not be aware of the products mentioned as not allowed or restricted. I was really surprised to find that use of neem and neem oil is banned in organic production guidelines whereas azadirachtin isolated from neem kernels is freely allowed. Why this sort of disparity? Whereas there is a large amount of publicity going on in the media for use of neem oil and other non-edible oils, there is a ban on its use. In fact, tobacco is also banned. But, alas! Many farmers do not know it at all. Even the guidelines mention only the restrictions on use of certain products, but they never mention the use of any product. So, the farmer is often puzzled by the restrictions, and so in my own opinion many farmers who are not aware of the organic certification and its restrictions do not fall into the category of certified organic farmers. Perhaps now there are two classes of organic farmers, viz., "certified" and "uncertified". The products grown from uncertified farmers are treated as conventional produce whereas those from the certified farmers are treated as certified produce. As there is a premium price available to the certified organic produce, the farmers would like to get a certificate from the certifying agency. I agree that this is the common mentality of our people. But, the approach of the certifying agency cannot be the same to everyone. They must have the ability to assess the organic farmer and then come to a conclusion. But, they also act like some strict government officers without going into the details of the organic farming methods. Surprisingly most of the officials do not even know farming. Their knowledge is theoretical and not practical. How many of the officials of the certifying agencies or the governmental agencies are aware of the practical problems in organic agriculture? Everyone advises to follow the set standards by someone that too by some foreign countries. But, they themselves do not know these standards properly. They often try to harass the organic farmers with too many cross-examinations, which are not needed. In fact, a person having knowledge of organic agriculture will be able to identify the methods of organic farming upon a feeling of the soil by walking barefoot, and by observing the flora and fauna of the area. The weeds and the health of the plants also exhibit the method of farming of that place. One need not look into the records of the farmer at all. In fact, these will be only formalities. This is what I do when I go to the farm at the first instance or during my inspection of new farms. In fact, a visual inspection of the soil itself is sufficient to find out the truth of the soil and the organic farming methods adopted. The attitude of the certifying agencies is in fact a deterrent to the research in agriculture by the common man and ordinary people like me who have no qualifications, reputation, position, etc. Due to apathy of the establishment, more talents are going down the drain in the field of agriculture. In my opinion, every farmer is an innovator as he has to work under variable conditions everyday, and he cannot seek the advice of an expert for each and everything. But, the experts never

try to understand him. This gap needs to be bridged by providing training for the experts on the practical adaptabilities of the farmers at the field level. Practice of theory in the field is a different aspect altogether. The ignorance of the so-called experts on the practical aspects of agriculture has been a hindrance in the innovations of the farmers.

Even the certification procedures and rules are also contradictory in many instances. There is a clause for reduction of conversion period, which is rather contradictory to the basics of the certification of the organic production itself. In fact, the reduction in conversion period is allowed depending upon the previous land use subject to the satisfactory proof submitted by the farmer to the certifying authority. The very basic aim of organic farming is to reduce the residue levels in the plant product. Perhaps, the concerned authorities may have to amend the rules to allow the plant product to be certified as “organic” once it is tested negative for the residues. In fact, the residue analysis may be made a parameter for reduction in the conversion period once the farmer wants so. In this case of Abali Tea Estate, the “made tea” is tested negative for the residues and yet it is not certified as “organic” just because there is no rule. What a law to negate the truth! Perhaps, this might be an instance of negating the truth by law. These anomalies need to be attended to by the concerned rule-making authorities.

## Farmer innovations

The next subject is the attitude of the agricultural scientists towards the farmers and their methods. According to most of the agricultural scientists, the farmers are not able to deliver things at the fields properly. True, the large farmers never stay on the farm. Even their visits to the farm are rare. They normally reside in a nearby urban place and the workers do the work in the field. The workers being unaware of the methods due to their own weaknesses do not do the job properly and at proper time. This is one of the reasons for the sorry state of the present-day agriculture in the country. But, there are many exceptions also. There are some people who work really hard both mentally, as well as physically in the field, overcoming all the problems. They also invent many methods without being aware of their own innovations. Due to lack of publicity, the innovations remain unknown. The capacity to read the innovations and their achievements at the field level is the need of the day. But, the west-minded scientists never even think of the local and indigenous talents and skills of our farmers. This leads to dying of the talents in the country. This has been happening since many years and will continue for more years in future unless the rulers make up their mind and take some unconventional actions to stem the rot.

## Tea research

When the Abali Tea Estate was completely infested with *Helopeltis theivora* attack in 2004, I was referred to the Tea Research Association (TRA) scientists in the beginning of 2005, though I was not willing to meet them as I had full confidence in Vrikshayurveda. Even then, I agreed to meet the research scientists of the TRA. In the first discussion itself, it was realized that they are also groping in the dark regarding the problem and they were also not sure of the methods to be adopted. But, they were always trying to emphasize on the absence of a proper broad-spectrum organic pesticide for *Helopeltis theivora*. In fact, one research scientist was trying to seek information from me about the organic pesticides for other pests like green fly, thrips, red spider, etc. But, alas, after having realized their non-cooperative attitude and their ignorance on the organic tea cultivation methods, I decided to take the challenge myself without any help. The experience with them made me work with more vigor and dedication. I was always willing to succeed and this attitude made me face all types of challenges, which finally led to the successful finding of *Indsafari*, the organic pesticide for tea. In fact, this can be said to be a simple, easy, cheap, and local broad-spectrum organic pesticide for tea.

## Asian Agri-History Foundation

While working in Abali Tea Estate with the Vrikshayurveda methods for tea, I had maintained good relation with the publishers of Surapala’s Vrikshayurveda (English translation for the first time) – Asian Agri-History Foundation (AAHF), Secunderabad, India. In fact, I had developed a good relationship with the Chairman of AAHF, Dr Y L Nene. I have been writing articles based on the Vrikshayurveda methods developed by me and used in the field. In fact, AAHF has been publishing many of my findings regularly in their journal “Asian Agri-History”. Perhaps, they might have been also surprised to find a person who was willing to implement Vrikshayurveda methods in today’s agriculture at his own risk. Now, they are aware that Vrikshayurveda methods are being implemented in Abali Tea Estate. They were also interested to know the results of the implementation of Vrikshayurveda perhaps for the first time in the present-day agriculture. Perhaps, the readers

may not believe that I have not met the Chairman till today. But, I had a surprise offer from AAHF in October 2005. The Foundation's Rajasthan Chapter had organized a National Conference on validation research in agriculture from 16 to 18 December 2005 at Central Arid Zone Research Institute (CAZRI), Jodhpur. The Organizing Secretary Dr S L Choudhary invited me to present a paper on my work at Abali as he was aware about my work. He also had seen the photographs of the Vrikshayurveda methods implemented at Abali. He suggested to me to present a video of the work done as a lead paper at the conference. This invitation came as a surprise and I was not prepared for it. I decided to avoid this conference on account of the *Dhanurmasa vrata* from 15 December 2005 to 14 January 2006 during which period I do not travel outside as the practice of a penance. He suggested to send someone to present the paper in the conference. I sent my younger brother from Bangalore to present the paper in the conference. He prepared a good presentation on his own with the information provided to him and presented the paper with his own remark: "A work done by a mathematician, presented by an orthopedist to the agricultural scientists". Thus, the paper on Vrikshayurveda methods of tea cultivation developed at Abali was presented at that conference. I was appraised by my brother and Dr Choudhary that the participants of the conference greatly appreciated the paper. Really, this response was never imagined by me. Perhaps, the agricultural scientists might have felt that the Vrikshayurveda methods are of the past and cannot be implemented in the modern scientific environment. Perhaps, they might have thought that the methods are too simple or may not justify their so-called scientific environment. But, it is not so. The Vrikshayurveda methods are feasible at all times and forever as long as the world exists.

## **Technical results**

Thus, by the end of the tea season of 2005, the Vrikshayurveda methods of tea cultivation were established in Abali Tea Estate, and proved to be technically feasible.

This technology is implemented perhaps for the first time in the present-day agriculture without using any such standard or approved inputs of the current day agriculture. All the inputs are found to be locally available and of high utility.

By the end of the season, all the so-called apprehensions of the people in the tea estates about the technical feasibility of Vrikshayurveda methods were put to rest. In fact, no one now dares to remark sarcastically about the organic tea cultivation.

## **Local people**

Though I was willing to have a good acquaintance with the local people, due to language and behavioral differences, I was not successful. Due to the basic negative approach about organic tea cultivation of the surrounding people and their apathy towards organic cultivation, I did not dare to get acquainted with them. In fact, the rich people used to visit the garden and express their apprehensions about the methodology. For many people, the economics was more important than technical success. For some, the methods are unknown and so they did not want to bother about the same. For some, there was no approval from the concerned departments. For others, the products available in the market were sufficient. So, I could not develop good relations with such people in the neighborhood. So, I had to keep a lonely life.

## **Sustainable agriculture – future**

Perhaps, the readers may be surprised to know that this Vrikshayurveda method of tea cultivation was not mooted by any government (state or central), or any governmental agency. There is a very good scope for simple, low cost, and sustainable organic cultivation systems in agriculture all over the world. In fact, the demand for a sustainable organic tea cultivation method by the tea industry is very high. Many tea estates and tea research bodies are searching for a sustainable organic cultivation system for many years. Lot of money is being spent on just searching of systems. But, my grievance is that nothing is done to implement the same at the practical level. Perhaps, this report may show the way for such searches in organic cultivation for tea and also other crops, thus ending the never-ending search for know-how in organic cultivation.

My host has just summarized the methods adopted by me as: "Proper and beneficial utilization of the waste resources in agriculture, which is certain to reduce the so-called wastes that cause pollution to the environment."

## **Tribal understanding**

Perhaps, the readers may also be surprised to know that I have not attempted to bring these methods to the notice of the concerned tea board authorities or the tea research industry authorities or any agricultural authorities in the world. This has been made known to my host who has taken so much of interest in the project, which otherwise would not have succeeded. This has been regularly intimated to the publishers of the Vrikshayurveda book, Dr Y L Nene, Chairman of AAHF as a mark of reciprocal respect to their work of publishing the book. I am happy that they have also reciprocated to me by fully respecting my tribal understanding of Vrikshayurveda at the field level.

## Present scenario

When I returned to Abali Tea Estate in March 2006, I was happy to find that the supervisors have now learned the Vrikshayurveda methods and are doing the work themselves without seeking advice from me for even small matters. Now, I find many workers have learned preparing *kunapa* from anything and everything. This *kunapa* is now called *Tenga* in the work language. In fact, there is so much competition among the workers to learn *kunapa* making that they vie with each other. The workers, supervisors as well as the executives now know the utility of the so-called foul or filthy material called *kunapa* by Surapala. Today I do not have teething problems that I faced earlier. In fact, I just give instructions, and the supervisors, workers as well as the executives follow them meticulously. This is a totally different situation now in contrast to completely adverse situation earlier.

## Responsibility and objectives

I undertook this project as almost sole responsibility even without knowing or caring for any adverse remarks or negative results. As I already implemented the methods personally at Keshavapuri, I did not have any semblance of doubt in the negative results. I was fully aware of the negative attitude of the people. So I did not even bother to take any help from the present setup of the organic tea cultivation in the tea industry. After the completion of the project I came to know that one of the objectives of the organic tea industry is to “preserve and enhance the traditional and indigenous knowledge” and I believe that this project has done its duty in achieving this objective. My only apprehension is how many people can understand this project in its complete traditional and indigenous knowledge system and the completeness of its organic agriculture. Perhaps, the westward looking scientists and authorities may not appreciate my effort. But, I do not consider it as a concern at all.

## Thanks!

Finally, I thank everyone who has been associated in this project though willingly or unwillingly. In fact, I thank the host who refused to take the due credit for this initiative and the all out support by him. I appreciate his humbleness in not being greedy for publicity though he is the patron of this project from all angles. As he has preferred not to be named, I have accepted his opinion as a mark of my respect to him.

## Revival path of Vrikshayurveda

In this way this Vrikshayurveda method of organic cultivation was initiated at Agni village, in the Western Ghats of Karnataka in 2003, developed at Keshavapuri in the Vidharbha region of Maharashtra in 2003–04, and implemented on large-scale agriculture on tea in Abali Tea Estate, Arunachal Pradesh in 2005–06.

This is the practical story of the 1000 year-old Indian science of plant life, **Vrikshayurveda**, having seen the light of the modern times in the Gandharvanagari of India, i.e., Arunachal Pradesh, used in the cultivation of tea, the king of agricultural crops, as it is the most traded agricultural commodity of agriculture both in quantity and price.

This experience of Vrikshayurveda methods of tea cultivation was written on 10 October 2005 and completed on 30 April 2006 at Abali.

## **About the Report**

An end to the never-ending search for an inexpensive, holistic, simple, eco-friendly, and sustainable agricultural technology unearthed from the past.

A practical research methodology at the field level now available in the public domain.

A field-level research work done by a common man for a common man.

A practical guide to 'Vrikshayurveda', the ancient Indian organic agriculture.

A must for farmers, industries, pollution control authorities, civic bodies as well as rulers and administrators.