Honey Bee

Vol 5 No 3 July - September, 1994

The spirit of sustainability

A Voice of
Creative Farmers, Artisans, Pastoralists,
and Other Grassroots Innovators

In this issue...

July-September, 1994 Vol 5 No 3

Honey Bee stands for

(a) People to people networking in local language, just as cross pollination by the bees, and

(b) Assurance to providers of knowledge that they would not be impoverished because of sharing the knowledge just as flowers do not complain when pollen is taken away.

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Cover Story

Spirit of sustainability is the key

Even if we have technologies which can help in the use of resources within sustainable limits, will appropriate institutions emerge if the spirit is absent? Such was the question posed once in an Indian epic, Ramayana. In this epic, Lord Rama symbolizes *Dharma* (noble conduct) and Ravana (who otherwise is a very wise sage) the *Adharma* (bad conduct).

Ram was very frustrated on knowing that his wife, Sita (abducted by Ravana) was just on the other side of a vast expanse of water and that he did not have the wherewithal to cross the sea or to build a bridge. His followers were equally restive. The task appeared impossible. Suddenly a ray of hope emerged.

Ram observed that a squirrel was behaving in an odd fashion. She was wetting her tail in the water, coming back to the shore, rolling in the sand, going back to the sea and washing her tail. She was doing it repeatedly and almost furiously. As if in a great hurry. Ram called that squirrel and asked her the reason for her odd act. She replied that knowing the challenges before them, she was contributing her mite. She was trying to fill the sea by sand attached to her tail so that a path could be built.

The entire work force of Rama felt ashamed at their despondency. And soon, with their collective effort, the path was built.

Project like the squirrel's efforts are seldom sustainable. But a non-sustainable act like this could inspire a sustainable process. The trick thus is to unfold the locked up entrepreneurial energy of all those around. The momentum so generated may eventually solve the problem or generate the ripple which unsettles those believing in maintenance of status quo. The spirit of sustainability is prior, the substance is subsequent.

The above extract is taken from Prof Anil K Gupta's paper titled "*Sustainable Institutions for Natural Resource Management : How do we participate in people's plans*".

Collaborating Institutions

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- **Nootan Gram Vidyapith**, At: Thava, Tal: Valia, Dist: Bharuch, Pin: 393 130
- **Lok Bharati**, At: Sanosara, Tal: Shihor, Dist: Bhavnagar, Pin: 364 230
- **Shree J C Kumarappa Gram Vidyapith**, At: Gadhada (Swamina) Dist: Bhavnagar, Pin: 364 750
- **Gram Vidyapith Shardagram**, At: Shardagram, Dist: Junagadh, Pin: 362 235
- **Gram Bharati Gram Vidyapith**, At: Amarapur, Tal: Kalol, Dist: Mehesana, Pin 382 721
- **Mahila Gram Vidyapith**, At: Nardipur, Tal: Kalol, Dist: Mehesana, Pin: 382 735
- **Shree Saraswati Gram Vidyapith**, At: Samoda-Ganwads, Tal: Siddpur, Dist: Mehsana, Pin 384 130
- **Sabar Gram Vidyapith**, At: Sonasan, Tal: Prantij, Dist: Sabarkantha, Pin: 383 210
- **Lok Niketan Vidyapith**, At: Ratanpur, Tal: Palanpur, Dist: Banaskantha, Pin 385 002
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An informal quarterly newsletter to document innovations produced by farmers, artisans and farm workers; generate debate around sustainable alternatives based on people's knowledge systems among farmers, scientists, political leaders and social activists and lobby for protecting intellectual property rights of grassroots innovators.

Editorial

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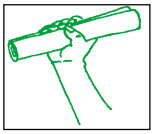
An Appeal to the Scientists

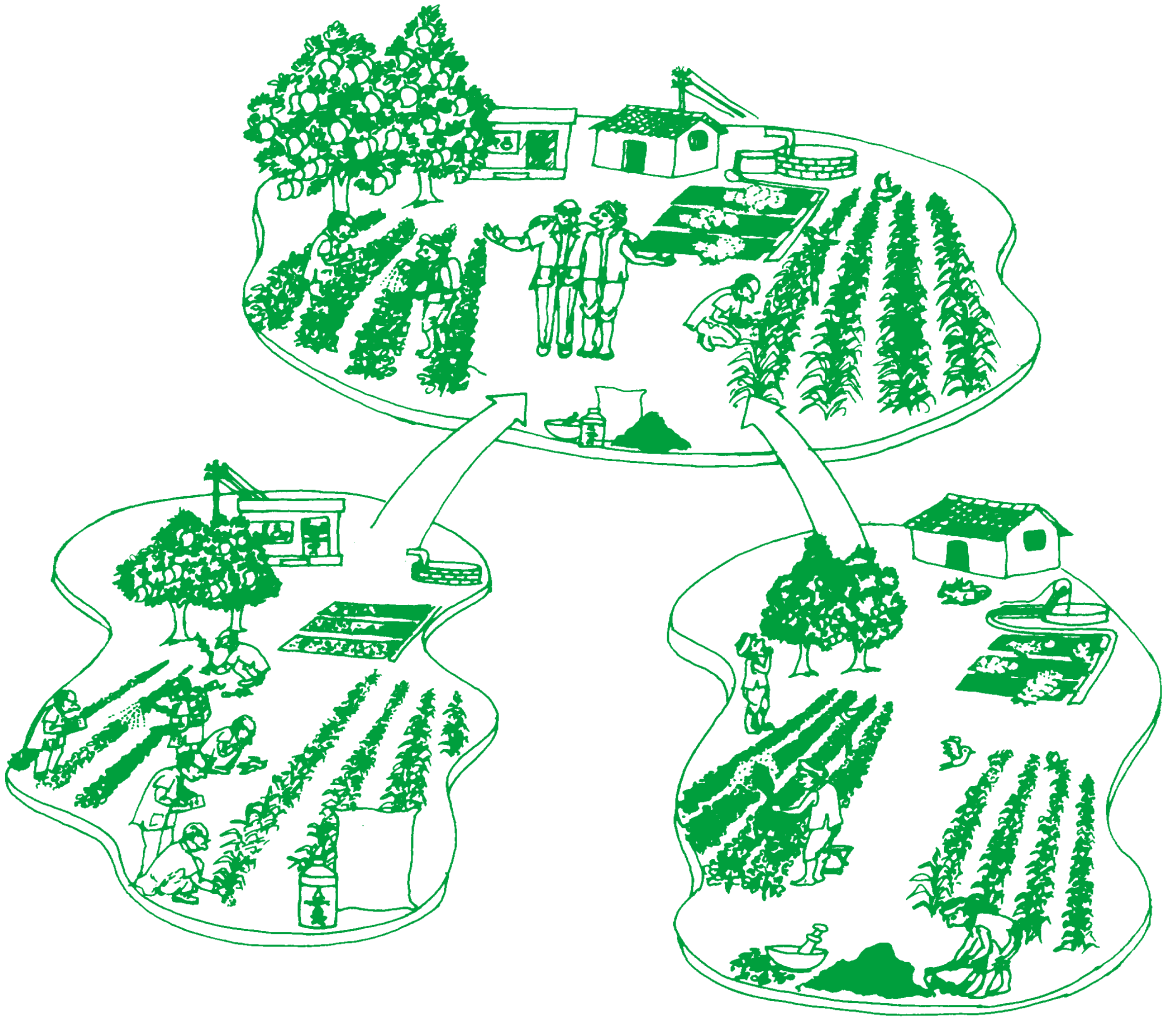


Almost all professional societies of different agricultural disciplines have tried in recent times to address issues related to sustainability . This has also meant a slight increase in the appreciation of the wisdom of the farmer. In some instances they have used resources in a highly sustainable manner. And yet, there are hardly any formal research programmes in different disciplines on the subject. The rhetoric of sustainability remains to be matched with serious restructuring of scientific discourse in agriculture.

In his speeches to the governing board of Indian Council of Agricultural Research (ICAR) in 1952-53, Dr. K. M. Munshi had stressed the need for taking sustainability issues into account while pursuing various research programmes (Honey Bee, no.2 vol.1). Why is it that the research establishment of one of the most ancient civilisations lost interest in understanding science underlying sustainable practices so that value could be added to make them even more efficient and effective?

Scientists ought to reflect on this lapse and offer suggestions on how to redress this flaw. An attempt was made by ICAR way back in 1964 to study outstanding agricultural practices. Mr.Lal Singh headed the central team in India to list the outstanding agricultural practices in the states of Andhra Pradesh, Madras, Gujarat and Punjab. He noted, "The central team undertook this task with a certain amount of apprehension and uncertainty about the result of its efforts. There is a vast treasure of outstanding agricultural practices in different parts of the country which has, for long, remained hidden from the farmers of other states and which deserve to be unearthed for the benefit of agriculture as a whole in India". Readers will recognize the strains of the Honey Bee philosophy in this 30 year old statement. We could easily add that this need for lateral learning among farmers exists not only in India, but among farmers all around the world - a goal Honey Bee is trying to pursue through its local language versions. This was much before the phrases, 'Farmer Participatory Research', 'Farming Systems Research' and 'Farmer back to Farmer' had even been coined by the scientists abroad. It is not surprising that Indian scientists (as perhaps is the case with the scientists in most developing countries) are totally ignorant of the farmers' wisdom of centuries in some cases and contemporary explorations in other cases. But most of them are familiar with the terminologies developed in the West and popularised by the donor agencies.

The Central Team observed many interesting practices, some of which had become fads. For instance, the team noted (a) intensive use of paddy field bunds for growing green manuring crops in situ, (b) possibility of growing green manuring plants in wastelands for preparing of compost with particular reference to the possibility of growing ***Ipomoea cernia*** for mass scale compost preparation, (c) growing green manuring crops along with the main crops, (d) transplantation of sorghum, bajara, ragi in rainfed areas, (e) agro horticultural combinations, (f) life support for mango grafts, (g) manuring and cultivation of crops in permanent furrows for several decades to economise on the use of manure and cultivation costs, etc.



Readers will recognise that many of these practices are part of what is called as modern technology, such as agro-forestry and agro-horticulture. Mr.Lal Singh however, cautioned that there were some practices which appeared unrealistic. He advised his readers to be dispassionate in evaluating these practices and added, "There is nothing like giving a fair trial to any new practice with open mind". I wish scientists will heed this advice. Mr.Lal Singh concluded the preface of the report by inviting agricultural experts from foreign countries like USA and Japan to demonstrate their best methods and practices in Indian condition. He felt, "It is essential that the best in agriculture must be found out and brought to the notice of every farmer in the country". It is a tragedy that during the era of 'lab to land' which continues to some extent even today, learning from and among farmers across different regions and countries has been neglected.

The Central Team noted many interesting and sustainable technologies besides that mentioned above. In East Godavari, even though sufficient moisture was available, the report says, the planting of seedlings of second crop of paddy was postponed to middle of February so as to save the crop from the effect of stem borer. A practice called as *Haud* and *Dhim* (called *Besauni* in Eastern India) was noted in the Kangra valley of Punjab in which the entire paddy field was puddled (when the seedlings were nine inches tall) to control weeds. Later, gap filling was done. In the Godavari district of Andra Pradesh, the paddy field was allowed to be nibbled by cattle so as to prevent lodging and to improve the yield. Nibbling by cattle was similar to nibbling by sheep in gram field in Haryana which we noted in early 80s as a practice used to promote lateral branching.

There are a large number of such practices which we will be serialising in Honey Bee. We request readers to reflect on the reasons why the scientists and planners do not learn from these insights. We also hope that readers from other countries would dig out such studies from their own regions and send us either the reports or their reviews: these may help in rejuvenating the interest of scientific community and policy planners in pursuit of excellence by farmers through their own innovations. One important aspect which Lal Singh stressed upon seems to have been ignored by scientists. He asked for a 'fair trial to any new practice with an open mind'. In the light of the challenge posed by threats to sustainability, the very norms or parameters of evaluation by scientists may have to be modified. For instance, if an indigenous plant protection practice provides only 30 per cent

protection as against 80 per cent by a chemical pesticide, does it need to be considered for recommendation or not? Imagine that this 30 per cent effectiveness in controling pests is achieved at a negligible cost. Or, after achieving this effectiveness, the population of the pests gets controlled by the predators. Further, a 30 per cent control in one year may be followed by an increasing rate of effectiveness in succeeding years due to build up of natural predators. Besides this, the adverse consequences through residues of pesticides for the environment as well as for the consumer may be eliminated. There are many cases where scientists as well as extension workers have ignored technologies which do not show spectacular results in the short run but which are nevertheless highly sustainable, and cost effective in the long run and environment friendly too. The ecological economic considerations may reveal the true worth of technology much better than purely a socio-economic analysis. Scientists may have been constrained so far by their methods, resources and traditions. It is time that we take a fresh look at our ways of analysing and evaluating alternative technologies so that producers, workers and consumers feel safe and satisfied in the long run.

There are many ways in which scientists can collaborate with us: (a) they can take up on-station or on-farm research on the practices published in Honey Bee pertaining to their area of interest and send us communications about the scope for value addition, (b) they can encourage post graduate students to take up thesis problems on specific aspects of farmers innovations for identifying the scientific principles underlying the practices and also exploring the possibility of adapting practice of one region for another, (c) comment upon the practices based on published literature but clearly acknowledging lack of knowledge in cases where literature is silent, (d) identify areas where farmers wisdom may be in contradiction with the scientific understanding, (e) suggest areas where scientists are willing to work with the farmer innovators, members of Honey Bee network.

We did a study of post-graduate research trends in five disciplines including Agronomy, Economics, Extension, etc., in 1985. It revealed that the skills we were developing among young graduates would hardly equip them for the challenges of sustainablity in coming decades when they would occupy the positions of responsibility. Three out of every four theses in agronomy, for instance, dealt with fertiliser use and almost ninety per cent of these dealt with chemical fertilisers. So much for the concern on sustainability in Indian agricultural research institutes. It is obvious that the scientific community has to do considerable soul searching and align closely with the expectations of society and responsibility towards future generations.

There may be many other areas in which NGOs, activists, and other readers may like to work together with us to pursue common concerns.

In this issue, apart from the regular columns, we carry a contribution from Narendranath, a farmer from Chittoor, experiences of a farmer from Surendranagar, a workshop report from Tamil Nadu on indigenous animal husbandary, a report on control of rhinocerous beetle in Karnataka, etc. We once again request readers to keep sending us their reactions, comments and contributions about farmers innovations, ecological knowledge systems, eco-indicators and other aspects of sustainable natural resource management.

I look forward to hearing from you,

Anil K Gupta

Some Old Wisdom (Agriculture)

Dr G V Tagare[1]

The science of Agriculture has advanced greately over during the last 1500 years. But ancient works record some practices which are worth experimenting with before discussing them. I record here the practices found in Varahamihira's encyclopedia called "*Brihat Samhita*" (AD 506). Varahamihira is one of the most famous astronomers of ancient India. He based his work on the teachings of older sages like Kashyapa, Gargya, Parashara etc. [Below very briefly are some of his opinions:]

1. Fertilisers (Green Manure)

"As soft soil is conductive to plant growth, sesamum plants are to be sown first. When they are in bloom, they are to be cut and crushed and completely mixed the soil". It was then believed that the soil which is not conductive to the growth of sesamum is barren. Kashyapa, a predecessor of Varahamihira recommends the sowing of a fragrant grass called VIRANA for this purpose. It may be noted that a Nobel Laureate too has recommended the use of such grass for soil-conservation.

2. Treatment of diseased plants:

For the sake of brevity, I drop the diagnosis of plant diseases. Only remedies are noted. The diseased part of the plant is to be scraped with a knife and paste of Vidanga ghee and silt should be applied to the scrubbed part. It should be sprinkled with milk and water.

3. In case of fruit bearing trees, if the fruits get destroyed prematurely, it should be watered with milk in which boiled black grams, green grams, sesamum and barley are boild when this decoction becomes cool, the plant is to be watered therewith.

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One Step Backward, Two Steps Forward: Experience with Neem as Pesticide

Gorrepati Narendranath

I have recently (January-March, 1994) tried out experiments using neem oil and neem cake as pesticides on mango, ground nut and paddy crops. I have reported my successes as well as failures and look forward to receiving suggestions. I do not know the scientific names of the diseases and pests that I have described here, and should this lead to difficulties in identifying the species, I do apologise.

The First Experiment : Mango Crop

I selected a two and a half acre plot of 70 year old mango trees for my experiment with non-chemical ways of pest control. This garden has *'thotapuri' (bangloora)* and *neelam* varieties. I could not risk the experiment on a larger plot. The plot had flowered reasonably well. A crop of seven to 10 tonnes could be expected had I used the normal pest control methods using chemical pesticides.

I planned to spray a herbal pesticide from the budding stage till the fruits were the size of small marbles (six to eight weeks). I was informed by experienced people that neem acts best as a preventive and also that its repellent nature is short-lived. So I decided to spray the pesticide once a week for six weeks.

Preparation of pesticides

The first spray consisted of neem oil 250ml in 300 g of detergent powder (brand name, *Nirma*) and 50 litres of water i.e, 0.5% concentration of neem oil. First, I dissolved the detergent powder (300 g) in a little water and then poured the measured quantity of neem oil (250ml) and mixed them thoroughly. The rest of the water could be added subsequently and mixed thoroughly before.

Spraying: I carried out the first spray on 10th of January 1994 when the trees had just begun to bloom. The flowering was a bit late this year, so I was pretty much on time. The second spraying was done after 17 days; this time I used neem cake instead of neem oil. The second spraying was delayed by 10 days as I was busy attending to the other gardens. The detailed time-table of the spraying are as given in Table 1.

Second Spray of Neem Cake Extract

Thirty five kg of neem cake was soaked in water for four days in a pan that has a capacity of 1000 litres (These are generally used for making jaggery). Initially I had planned to soak the cake for only 48 hours but here again my schedule was upset because I had to complete spraying chemical pesticides elsewhere. There were at least 750 litres of water after 4th day. Before spraying, I filtered the water through a gunny bag. Yet the spraying became cumbersome as suspended particles of the soaked neem cake tended to block the spray gun nozzle. The delay in the second spraying had its effect on the *'neelam'* trees. The flowers were discolored and showed signs of withering in some trees, but *'thotapuri'* trees were doing fine.

Third Spray with Neem oil: Ten days later I carried out the third spraying with neem oil as I wished to change the pesticide for every new spray. Another reason was that I had a limited stock of neem cake.

Fourth Spray: Within ten days I noticed a black sticky substance on the leaves of Neelam trees. The disease is known locally as '*thene manchu*' or 'honey dew' is caused by a small white fly that breeds on the flower. This time I changed the pesticide again.

At the Traditional Science Congress held in Bombay in November 1993, a retired Vice Chancellor of Vidarbha University narrated how he could control pest in pigeon pea by spraying a mixture of garlic paste soaked overnight in kerosene oil and then mixed with a paste of green chillies. I modified this formula a little. I collected 50 litres of cow urine and also soaked 1 kg of arita in water separately. I soaked a paste of 250 g of garlic overnight in the water containing arita. To this mix, I added about 0.25kg of green chillies' paste just before spraying. About three to four litres of this mix (8%) was put in a 50 litre drum along with 5 litres (10%) of cow urine and the final volume was made up to 50 litres with water. The mixture was sprayed on the *'neelam'* trees. The particles of garlic paste have a way of blocking the spray despite several strainings. I sprayed the rest of the garden with neem oil and detergent.

All these sprays did not prevent the disease from spreading to the *'thotapuri'* trees as well. I persisted with the garlic and green chilly paste mix for the neelam trees and sprayed them the very next day. When the 5th spray also failed I tried a 6th spray with neem oil. I also sprayed pure undiluted cow urine on two trees just to see if they had any effect at all. When all failed I hoped it would rain as rain is the traditional natural healer of these diseases. But no rain came. After the 6th spray I abandoned the experiment and left the whole thing to Nature. In some trees the flowers had completely withered (small flies, some black and some white, would drop into the palm when the blossoms were tapped gently). I also noticed several red ants and green beetles besides the flies. Some fruits managed to survive. My guess was that I have about half the crop of what I would have harvested had I used chemical pesticides. The experiment

Table 1
Spray of Mango Gardens -1994

S No	Date of spray	Contents of spray and concentration	Remarks and Observations
1.	10.1.1994	Neem oil 5ml + 6g detergent (Nirma) / litre	Sprayed at flowering stage
2.	27.1.1994	Neem cake -33kg soaked in a jaggery pan for 4 days. Prepared solution in 750 litres of water and filtered through gunny sack.600 litres of upper layers of water is used for spray. Pan was filled twice. Obviously, the second filling left a more dilute spray.	Flowering developing. In*'neelam'* trees flowers darkened and showed signs of withering in some trees. In *'thotapuri'* mango flowering was alright.
3.	6.2.1994	Neem oil 5 ml+ 6 g detergent (Nirma)/litre.	No sign of disease spreading.
4.	13.2.1994 (4th spray)	250g garlic paste + 1/2 kg arita soaked over night + 1/4 kg green chillies paste diluted. About 4 litres of this solution mixed with 5 litres of cow urine. this solution was diluted to make 50 litres of spray.	Black coating of sticky substance on leaves of neelam trees was noticed. White flies were also there.
5.	15.2.1994 (4th spray)	Neem oil + detergent	For '*bangloora*' trees only.
6.	15.2.1994 (5th spray)	Garlic paste + Green chillies + cow urine	For '*neelam*' trees only.
7.	15.2.1994 (6th spray)	- do -	- do -
8.	15.2.1994 (6th spray)	Only undiluted cow urine	For two trees only

appears to have cost me at least Rs.20,000 in loss of mangoes.

My doubts about the experiment

First, I suspect that the neem oil and neem paste were adulterated by the oil presser (*ghani/teli*).
Second, the second/late flowering in mango normally withers away. It is quite likely that much of the flowering would anyway have disappeared even if I had used chemical pesticides.

Third, weekly sprays may perhaps have acted as a preventive.

Fourth, perhaps I should have used a higher concentration of the pesticide.

Future Plans

1) To overcome what I perceive as flaws in my experiment, I am planning to collect neem seeds from villagers on a large scale to ensure sufficient quantity of good quality of oil and cake. This way I hope to be assured of the purity of the material I use.

2) On the advice of knowledgeable persons, I am planning to increase both the frequency and dosage of pesticide.

3) I plan to use neem cake as fertiliser for mango trees to increase their resistance to disease.

Economics of the spray

For each spraying the labour cost me Rs.150; the neem oil cost about Rs.80 and the detergent cost Rs.60 totaling roughly to Rs.300, Neem cake (at Rs.6 per kg) also worked out to the same. In all, the six sprays cost me around Rs.1,800 apart from being time and labour consuming. As compared to this the normal chemical spray would have cost me Rs.450 per spray and under the present conditions one spray would suffice. Despite this, I am sure one needs to persist with experiments like mine in the hope of hitting upon the right solution, because every year the pests are becoming resistant to the synthetic compounds we use against them. First it was DDT, then Endrine, followed by Endosulfan and Sevin. Now it is Monocrotophos, Nuvocron and artificial pyrethroids which have already started damaging the mango trees. Can anyone tell me how to fight pest/disease in mango using natural/organic pesticides?

The second experiment : Groundnut Crop

I sowed ground nut in a small plot of about 12 cents in December 1993. The crop was coming up reasonably well. Two months later, when the plants were in the budding stage, the leaves started

developing black spots on the reverse side and withering away. We call this condition '*penu*'(which means lice in our local language, Telugu). Three days after noticing the '*penu*', I sprayed neem oil (0.5%) along with detergent (Nirma - 6g/litre). The disease appeared to be clearing. But two weeks later it had overcome the spray and had started spreading once again. I sprayed a second time using the same formulation. This time I succeeded in completely eliminating the disease. I had a reasonably good harvest (about 2 1/2 bags) by local standards.

The Third Experiment

I sowed paddy of IR-36 variety on one acre and another locally popular variety: '*Nellore sambavulu*' on another one acre. When the crop was about one and a half months old, it was affected by disease: the green leaf turned gray and withered. No one seemed to know the name of the disease which struck all other paddy fields in the area as well. Other farmers had used what they were using on mango trees, that is either Endosulfan or Cypermethrin 10% EC (brand name Bilcyp). These pesticides proved quite effective.

I was firm about not using these pesticides. I regretted not having put enough neem cake as fertiliser; I did not have enough of it anyway. I think adequate neem cake used as fertiliser might have helped plants to resist the disease. Fortunately, I had enough neem oil. I also had some cow urine left over from my mango spray. Instead of discarding it I decided to spray one small plot of three cents with undiluted cow urine. Since the stock was over 15 days old I thought that it may not be strong. I sprayed another plot of four cents with neem oil (0.5% in 0.6% detergent. I purchased 35 kg of neem oil from the oil presser explaining to him the purpose and requesting him not to give me adulterated stuff. He assured me that he was giving me pure stuff except for a bit of ***Pongamia*** cake of the previous pressing which had got mixed up. I felt this should not be a problem as ***Pongamia*** is also a good fertiliser. In any case, I soaked the cake in water in the used for making jaggery (35kg in 750 litres of water approximately). After soaking for 48 hours, I used the strained supernatent for spraying on 36 cents of paddy crop. But I could see that the so called neem cake seemed to have more of Pongamia than neem. The spray did not even smell of neem and was not bitter to taste either. So, I bought more neem cake from another oil presser paying a higher price (Rs.6/ kg as compared to the Rs.4/ kg of the earlier stock) and soaked 35 kg afresh and sprayed the paddy crop of two acres excluding the plots sprayed with neem oil and the one sprayed with cow urine.

The 3 cent plot in which I had sprayed cow urine turned yellow. The plot on which I had sprayed neem oil did not show any sign of improvement whereas the plot sprayed with unadulterated neem cake water showed distinct signs of improvement. But within ten days the disease seemed to be coming back. So I sprayed the same formulation a second time. We got rid of the disease completely.

Doubts and propositions for the next crop

Maybe I should have used neem cake in the preparation of the nursery. Perhaps I should have added 1 bag of neem cake per acre soon after deweeding. I had put 50 kg of neem cake along with 100 kg of castor cake and 50 kg of ***Pongamia*** cake per acre instead of the usual NPK. This had perhaps helped the paddy crop to resist the disease.

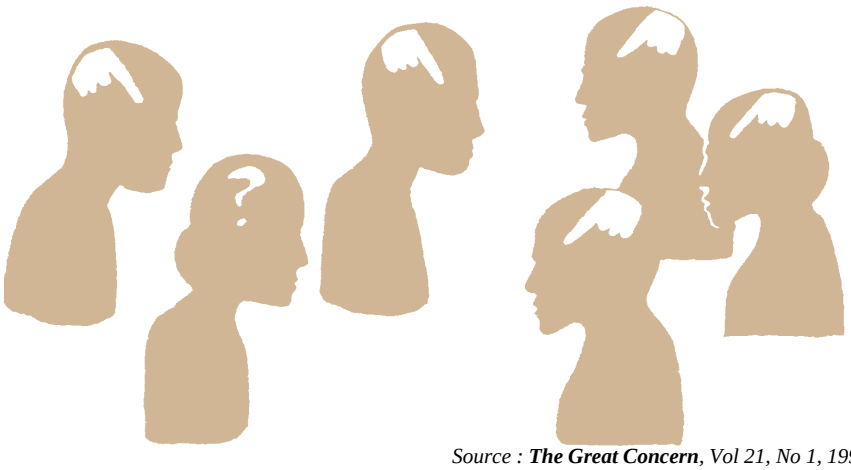
Prof. Jayaraj explained to me that in Chittoor, North Arcot and Chengleput districts paddy is grown throughout the year without a break. So there is opportunity for some pest or the other to breed. It is not possible to get rid of pest/disease easily under such circumstances.

I am also searching for traditional varieties of paddy-(6 months crop) which need to be in the nursery longer but which are able to withstand the vagaries of nature better.

I request readers to send me suggestions on what variety of paddy is suitable for hilly regions dependent upon tanks and ground water for irrigation. How much cake/neem oil one ought to use and when and what other organic pesticides not harmful to the soil/life can be tried, or are there other biological methods available?

Please write back to: G.Narendranath, Venkatramapuram, Vallivedu Post, Dist: Chittoor , Andhra Pradesh-517 152.

What you can and should do ?



Source : ***The Great Concern****, Vol 21, No 1, 1994*

Commentary

Virda : An Ingenious Method of Rain Water Harvesting

Srinivas Chokkakula and Sunil R Patel[1]

The following people helped during the study; Gulbeg Miahussain Muthwa, Ali Akbar Gulbeg (Vill: Dhordo), Kaladhar Vadal Muthwa (Vill: Gorevalli). The work has benefitted from the comments from Dr P Sharma, PRL, Ahmedabad.

'*Virdas*' are rain water harvesting wells found in Kutch. (For a full description, see Honey Bee Vol 5 No2). Here we put forward some hypotheses on how the '*virda*' gets charged with fresh water. We had focussed our study in the same village Dhordo described in the previous issue. Dhordo village has six tanks and though all the tanks have '*virdas*' in them, only those in three tanks are in use. In the main tank, in which '*virdas*' were a failure; the water is saline. Two of the other tanks are slightly away from the village and the '*virdas*' in these tanks are not in use. We were told that these '*virdas*' were old and so were abandoned. The general slope of the ground is towards the main tank, which is at one end of the village. If a section is taken on the line connecting the main tank and the farthest of the tanks, the other tanks will be seen at different levels of the slope with three of the tanks on one side of the line and one on the other side. This line approximately represents the slope direction towards main tank. The depth of the '*virdas*', which indicates the point beyond which the saline water strikes varies from one tank to other and follows an order. The depth of the '*virdas*' in the tank which is at higher level is deeper than those in the tank at lower level. The water level in '*virdas*' in the tank adjacent to the main tank is 2.0 metres (6 ft) from the bottom of the tank and the total depth of the *'virda'* is more than 3.0 metres (10 ft), whereas those in the tank farthest from main tank, the depths are beyond 3.0 m (10 ft) and more than 4.6 metres (15 ft) respectively.

If it is assumed that the saline water table is in a horizontal plane for the whole village (which could be a valid assumption over such small distances), the above observation implies that as we go towards the main tank, the slope is downwards and consequently the depth of the saline water table is also decreasing . This may be one reason why the saline water is struck at shallow levels in the main tank and the *'virdas'* are unsuccessful.

Each tank contains many *'virdas'*. The cattle troughs are constructed in the tank itself and in many cases each of them is fed by more than one *'virda'*. This is done by connecting a newly opened one to the same cattle trough after the old one is exhausted. It is also observed that a new *'virda'* is constructed adjacent (about 1.0m to 1.5 m away) to the exhausted one.

Hypotheses and Questions

Since the saline water is beyond a certain level, it could be taken that the saline water table is somewhere just below the bottom level of *'virda'*. This implies that the *'virda'* is being charged by the water in the top layers of the ground above this level. If it is so, we need to answer the following questions.

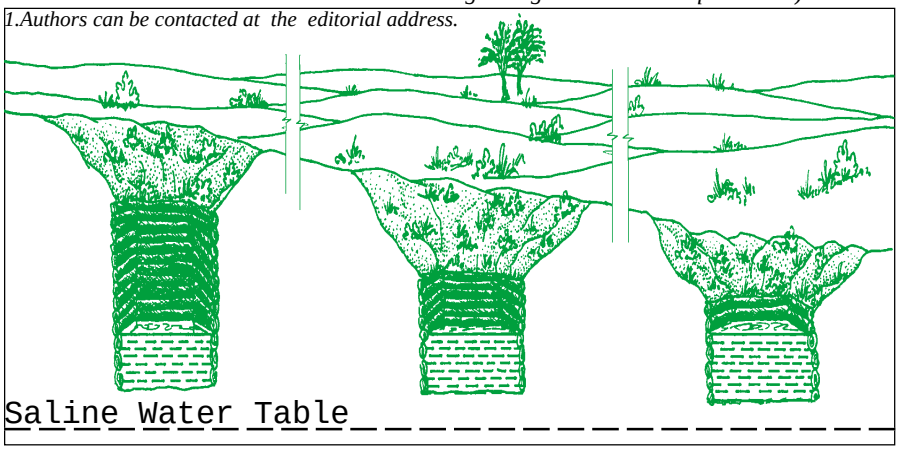
(i) How can the water in the top layers of the ground be fresh water when the whole land is visibly saline?

(ii) This phenomenon of surrounding soil in the top layers charging the *'virda'* with fresh water should be localized. If so, could the soil in the immediate surroundings, hold such a large amount of water? (The discharge rate of a'*virda*' is about 200 litres per day for two to three months.) And also, in this case the newly constructed *'virda'* adjacent to the exhausted one should not work. But, how is it possible that they are also working as efficiently as the older ones?

(iii) The other possibility is that there is a constant flow of ground water towards the downward slope (in this case, towards the main tank) and this constant flow must be the reason for an adjacent *'virda'* to be successful. Then, the first *'virda'* constructed itself should continuously yield fresh water for the reason that the flow is persistent. An explanation for this can be that the flow of the fresh water in the top layers of the soil is much slower compared to the rate of extraction of fresh water from *'virda'*, thus resulting in saline water ingress throughupconing. And the exhaustion of a *'virda'* can be a localized and temporary phenomenon.

(*In the absence of empirical data regarding the water quality, soil properties and other geological information, it is difficult to come to a conclusion. The arguments were put forward to create a discussion on the technique. We request the readers to respond with their arguments and information regarding similar techniques. :Ed.*)

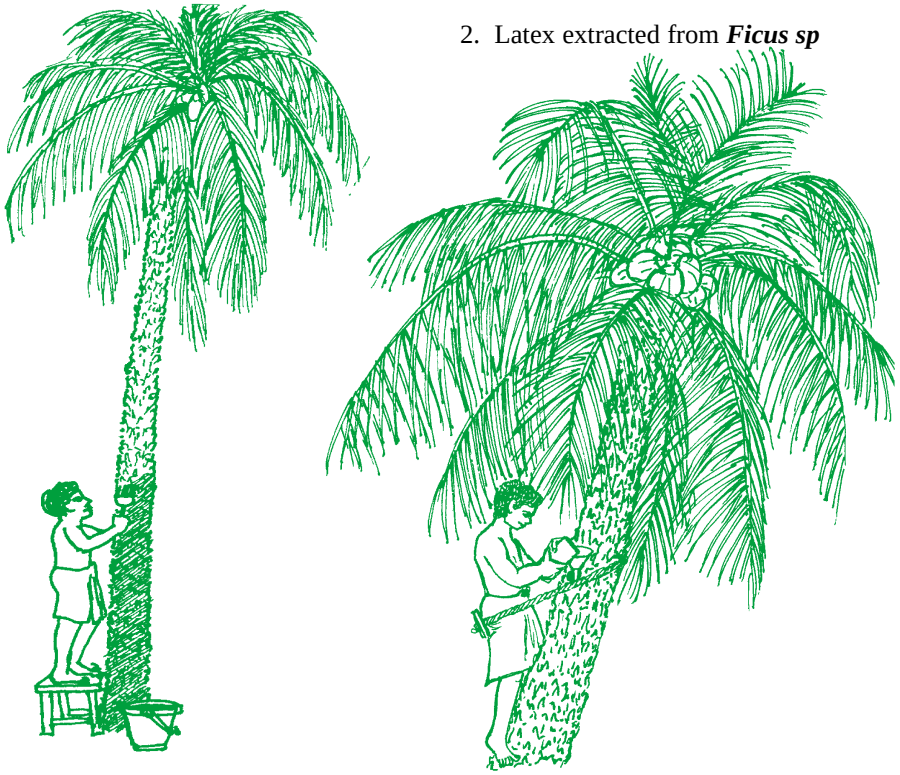
1.Authors can be contacted at the editorial address.



More on Rhinocerous Beetle Control from Tamilnadu

T Shivashankar [1]

The Rhinocerous beetle is one of the most dangerous pests of coconut and causes an annual loss of about 10% in coconut yield in India. The beetle breeds in the manure pits and the adult bores into the crown region of the tree resulting in the reduction of leaf or a spadix (loosing an entire bunch). Often the tree is killed by this pest. The new methods used to control this pest are (1) application of Chlorinated hydrocarbons to manure pits (these are persistent chemicals and accumulate in the food chain), (2) dusting BHC or keeping Phorate in the crown so that the smell prevents the beetle from landing on the crown, (3) extraction of the beetle using long hooked iron rod, and (4) application of sand mixed with BHC or DDT and Blitox into the bored region to prevent secondary infection of pathogens or weevil pest.



We met a farmer, Mr. Shanmukayya, the son of Salgame hobli, Doddagaddenahalli, in March, 1994 in a coconut garden. He explained local methods of controlling rhinocerous beetle in coconut.

According to him, he has been able to successfully control or prevent the attack of Rhinocerous beetle in more than 3,000 palms in the past eight years. He uses a unique mixture of some herb extracts for the purpose. After a detailed discussion with him we were able to find out the ingredients of the mixture which he uses to prevent or pull out the beetle if it has already bored into the palm. We have yet to learn proportion of the ingredients:

1. The liquid extracted from the opium (***Cannabis sativa***) plants (locally called 'ganja').

2. Latex extracted from ***Ficus sp***

These two are mixed together and poured into the hole bored by the beetle. According to him, this makes the beetle come out itself, and it can then be collected manually and killed.

The solution when poured into the center of the crown also prevents beetle attacks for nearly three months.

The plant products used here are environmentally safe compared to the chemical control methods. A line of research in this aspect would be very useful for developing pollution-free control methods.

1.Coconut research section, Arasikere, Hassan district, Karnataka.

Contd. from Page 17..

In the chapter on tillage, the author critiques traditional sayings and warns against following them blindly. He suggests that specific principle should be developed about number, timing and interval of tillage to suit for different kinds of soils/climate.

The remaining sections of the book deal with crop rotation, agroforestry, horticulture etc.

Now out of print; the book deserves to be reprinted and re-examined. It could provided a creative way of improving productivity in dry regions. It is pity that what lies hidden in vernacular literature is often celebrated as 'new' discoveries by the alienated scientists and NGOs long after they have ceased to be new. Ignorance leads to their marvelling at second-hand 'inventions'. I strongly suggest, we ought to locate such sources of experimental approach to learning from different parts of the world.

Farmers Rights: Whose Rights and for What Purpose?: Beyond FAO, GATT and Rio

Anil K Gupta

Clause 22 of the draft bill on the Indian Plant Varieties Act 1993, drafted by the Government of India, recognizes the contributions made by rural communities through on-farm innovations, and enrichment and conservation of plant genetic resources. The Act provides the possibility for an Authority to be enacted under it to

"provide for rewards and/or compensation to such communities and clusters, integrating considerations of equity and ethics such that rural communities have a stake in and continue their efforts at the preservation and improvement of land races in the interests of intra and inter-specific variability among plants."

The farmers' rights have been defined as rights arising from the past, present and the expected future contributions of farmers in conserving plant genetic resources, particularly in the centres of origin; or diversity through on-farm evolution of variation within the variety.

However, only two rights and three duties of seed sellers are actually defined in the Act,

(a) Farmers have the right to dispose off their farm produce as they choose. This includes the right to save, use, exchange, share and sell propagating material or seed from seed, obtained or descended from protected varieties. The exception is sale of branded seed/propagating material. Across-the-fence sales were allowed in UPOV 1978 (a model for this law) and are also allowed under this Act.

(b) Farmers may claim compensation from a breeder of a protected variety and/or dealer, in case the variety fails to perform as promised.

Duties/Obligations of Seed Companies/Sellers

(a) The sale of seed or propagating material of a protected variety which is not duly certified by a government seed certification agency is not allowed,

(b) Dealers selling commercial branded seeds have to register themselves with the state authorities concerned and

(c) The sale of varieties of seed/propagating material not registered with the state authority is not allowed.

This draft act provides a framework for re-interpreting the rights and responsibilities of farmers, breeders and those who conserve biodiversity. The act does, of course, have its own inadequacies. The compensation of communities which conserve genetic resources should not be left to the discretion of the 'Authority' as specified under the act. Such discretion, history shows, is unlikely to be used in favour of poor tribals and farmers unless the law makes it mandatory. This is the major weakness of the draft Act.

There has been a turn-around in the position of many scientists including Dr M S Swaminathan who, till recently, were advocating farmers' rights as enshrined in the FAO undertaking on plant genetic resources. Under this provision compensation, if any, for the farmers' contribution would accrue to an international fund to be used for financing conservation activities of different governments. Nothing of this would have directly reached the innovative farmers. Such a definition of farmers' rights is hardly justifiable, though the lobby of 'green revolution' farmers having very low biodiversity farms would like to uphold this position.

The definition of farmers' rights given in the draft Plant Varieties Act, 1993, is certainly a desirable advance. But these definitions, we feel, need further modifications in the light of some of the provisions of the Rio Treaty. Under Article 8J of the treaty, the knowledge and the resources conserved by traditional communities, local innovators and farmers can be accessed only through *involvement and approval* of the communities/individuals, ensuring, in the process, *an equitable distribution* of benefits.

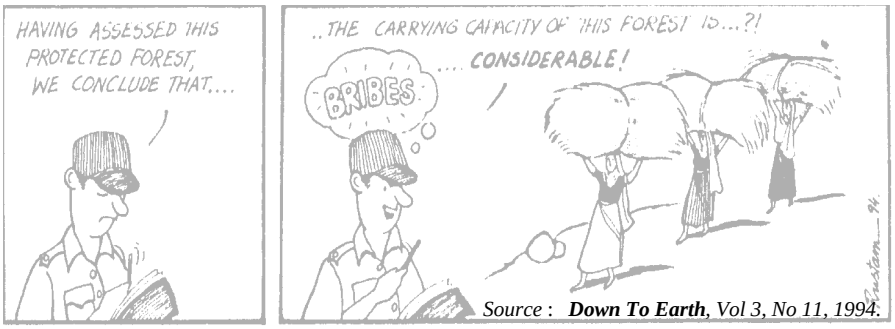
Under Article 15.5 of the treaty *prior informed consent* of the providers of this knowledge and conservers of the resource is mandatory. However, this will apply only in those countries where prior informed consent is considered legally necessary. The Rio Treaty implies that this consent is necessary from the countries and not the communities or individuals concerned.

Article 8(j)

Subject to its national legislation, respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity and promote their wider application with the approval and involvement of the holders of such knowledge, innovations and practices and encourage the equitable sharing of the benefits arising from the utilization of such knowledge, innovations and practices.

Article 15.5

Access to genetic resources shall be subject to prior informed consent of the Contracting Party providing such resources, unless otherwise determined by that Party .



Source : ***Down To Earth**, Vol 3, No 11, 1994.*

In its present form, The Plant Varieties Act does not serve this purpose. Further, the treaty gives precedence to other agreements including the GATT enacted by the contracting parties or countries.

An 'effective' ***Sui Generis*** system, instead of patenting varieties, is supposed to serve the ends of communities which conserve the land races. It is also supposed to protect the interests of researchers who develop new varieties, whether in the private or the public sector. These interests are protected by permitting the holder of varietal protection rights to derive monopoly rent through commercialization for 17 to 20 years. The farmers' exemption implies that they can use the seed of the protected variety for themselves as well as exchange or sell it across-the-fence to their neighbours.

The purpose of this clause, which enables the right-holder to recover the cost of developing a new variety and earn profits, is to ensure that incentives are available for innovation. We are pleading for similar incentives to those communities and individuals who make selections, develop land races and maintain genetic diversity and thereby making it possible for breeders to draw upon their selections. So far, protection has been advocated only for semi-wild or domesticated land races. We submit that this protection be available also for those wild plants from which local communities have derived specific usable products. This will require modifications in the Plant Varieties Act.

Compensation could be given to farmers - individually or collectively; through the following kinds of charges or taxes:

a) A charge on the sale of seeds by the public and private sector could be used to set up Trust Funds for use by the communities conserving various land races.

b) A tax or charge imposed on the export of all agricultural commodities could be used to provide price incentives and processing and marketing support to the growers of local varieties.

c) A National Fund for financing alternative agriculture could be set up to support the organic cultivation of traditional varieties in rainfed regions so that natural resources are used within their sustainable limits.

d) For every village or group of villages where local land races are grown, a specific proportion of production of these varieties could be procured at the price at which the best high-yielding varieties are procured. This would encourage in situ conservation, as then, the growers of these varieties would not suffer. By earmarking a designated area, incentives are provided only for limited regions and not for all farmers growing these land races on any size of land.

e) All those who develop specific innovations such as herbal pesticides, veterinary medicines, growth regulators or natural dyes using wild or domesticated plants, could register their innovations pending the granting product patents. In cases where large numbers of farmers use a particular product known only within a small territory, they could be allowed to exercise collective rights.

f) In cases where a practice is widely known within a taluka or group of villages, funds can be set up at the mandal, taluka or district level, funds could be set up. These funds could be administered by practitioners of the technologies in consultation with local non-officials/NGOs wherever possible.

g) A framework for precise royalty-sharing agreements between local communities and commercial users of local biodiversity should be created for independent economic gains to the communities conserving resources. A share of these royalties should also go to national or regional conservation fund. But no bureaucratic hurdles should be allowed in negotiation of such contracts.

h) The National Authority to be set up under the Plant Varieties Act must be mandated to ensure that local communities are compensated for their conservation and innovation. It should not be a discretionary matter. An appellate structure would have to be created so that the communities, individual innovators or activists/ organisations representing these communities can appeal against the decision of the authority, if they are not satisfied. This appellate authority should have a regionally dispersed network of professionals who could provide expert opinion on the worth of each local contribution. However, this advice may be overruled by the authority in case there is strong evidence to the contrary from the communities' own sources or otherwise.

Besides financial compensation, non-monetary rewards and recognition mechanisms should be developed so that outstanding conservators of genetic diversity in each region are honoured.

To identify the domain of the constituency eligible for claiming compensation, several methods can be developed:

i) Revenue inspectors or *Patwaris* can be made to generate information about cultivation of local varieties as well as availability of land races. Primary school teachers and pupils can also be involved in the enumeration, data collection so that they too get sensitised to the diversity in their environment. Such a task cannot be accomplished on a large scale by any one organisation or group of professionals working in different parts of the country.

ii) Most botanical or ethno botanical surveys in the past have failed to demarcate clearly the zones of local land races or wild plants with specific uses in agriculture or other wise. It should be made mandatory in future for every national and international surveyor only to leave a parallel collection with a local school, village panchayat office or other such social group, and but also to acknowledge (by name and address) the providers of information as well as the extent of the latter's coverage. The collectors should be required to share the information they have collected with the providers by making available an adequate number copies of the document in the local language. Any gains resulting from this knowledge must be shared with the pro viders.

iii) A special campaign could be launched by which the entire student population of secondary schools and colleges are mobilised to inventorise local biodiversity in summer (during their vacations), monsoon and winter seasons. This can be done in a competitive manner so that the quality of this work is properly appreciated.

We duly feel that to make farmers' rights effective in their true spirit, different models will be needed in different regions to match the the heterogeneity of situations. A single model will obviously not be suited to all regions. Uniformity has been the greatest weakness of currently available schemes; these schemes tried to put too much power in the hands of State institutions through uniform provisions. If the State, with all its commitment, cannot ensure the provision of basic needs in high biodiversity regions, it is unrealistic to expect it to ensure the percolation of globally generated resources. The State can merely facilitate this process. That it can do by providing an appropriate legal environment and generating proper databases. The other tasks have to be managed by the people's own institutions committed to safeguarding the intellectual property rights of local communities.

We have found that often the conservators of local resources do not even demand compensation; this is because of their superior ethics. But the question is: should we use the ethics of the poor to keep them poor? Surely, one cannot argue that the knowledge of the poor should be available to everybody while the knowledge of the rich be protected by trade secrets or patent laws.

We hope that readers will respond and send us details of creative models of compensating local communities. We will publish these and award prizes to the outstanding ones.

A Farmer Tackles Cumin Disease

M S Vahora[1]

Dhulabhai Bharwad has a 4-acre farm at village Sorimbda, in Sayla block, Surendranagar district, Gujarat , three km on the way to Sitagadh. The land type here is sandy loam; locally called *'rato jehvo'*. He has a well on his farm for irrigation and has been sowing cumin, a cash spice crop, during winter for the past few years. In summer, he migrates with his family to central Gujarat, and returns after the rains and cultivates sorghum, sesame, pearl millet and some pulses on his farm.

There are three major diseases that can afflict the cumin crop: (i) wilt, (ii) black-blight and (iii) powdery mildew. This year, this cash-intensive and risk-prone crop seemed to be doing well till it was struck by black-blight in a big way. Since farmers had already experienced black-blight and wilt last year, they expected the same to happen again this year. It did and so they started devising of methods for controlling it in their own ways. Dhulabhai started experimenting with salts, Neem leaves, smoke, ash etc.

1) **Salt Solution**

Despite applying two doses of Dithane M-45 in the early stages, some plants in Dhulabhai's field started showing the symptoms of black-blight. He noticed that the disease spread very rapidly, and so he tried to dry up the affected plants with salt. In two beds of the crop he used different concentrations of salt solutions.

In the first bed, he sprayed a salt solution of 100 g in five litres of water, whereas in the second bed, he sprayed salt solution of 500 g in 5 litres of water. He found the 10% salt solution to be effective in drying up black-blight affected clusters of cumin plants. He presumed that after the affected plants dried up once, the disease would be contained.

2) **Use of Neem leaves**

Wilt is a soil-borne fungal disease and once it starts, uprooting the affected plant is the only way to control its spread. Dhulabhai found some plants dying of wilt. He stopped irrigating the crop and decided to treat it with neem extract. He crushed 500 g neem (***Azadirachta indica***) leaves and mixed the crushed leaves thoroughly with five litres of water and kept the mixture overnight. The next day, he applied 100 ml of the extract to the plants showing the initial symptoms of wilt and then applied the leftover water to the entire 4 m x 2 m bed. A week later, he found, the plants revived. He had successfully controlled the spread of the disease.

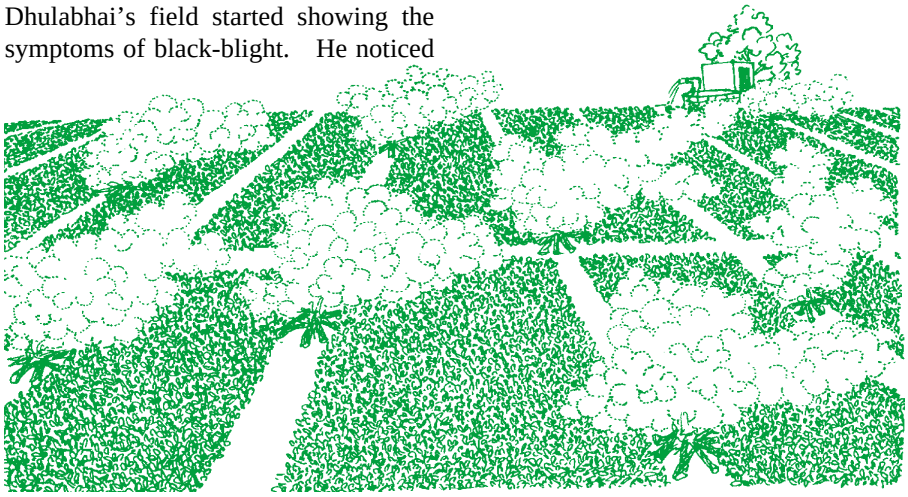
3) **Use of smoke**

In winter, Bharwads burn dung to create a smoke blanket to protect their animals from dew and the cold of winter nights. Dhulabhai reasoned that if smoke could protect animals against dew, why not use it in the fields to protect the cumin plants; dew is a major factor responsible for the occurrence of diseases in the cumin crop. Since Dhulabhai owned goats, he thought of using goats' droppings instead of cow dung. Goat droppings burn for a relatively longer time and hence could serve the purpose of maintaining a smoke blanket layer throughout the night over the field. The other materials used along with goat droppings were dried *'fafdo thor'* (cactus) and straw residues of cattle feed. *'Fafdo thor'* itself burns for a long time. The fuel material was kept in a dry water channel at distances of every 30 to 40 feet; three to four firiey locations were selected according to the wind direction.

4) **Other minor experiments**:

Dhulabhai also feels that the dew falls more in a wet field than in a dry field. So he irrigates his fields only alternative beds and hence the field is never entirely wet at the same time.

Scientists from Gujarat Agricultural University who visited Dhulabhai's farm appreciated these experiments. They felt that the chemical reactions between the neem's active ingredient (Azadirachtin) and fungus needed to be studied in the laboratory. They showed an interest in taking up neem leaf experiments on their research farms for study. However, they still had doubts about the efficacy of the use of salt solution. However, Dhulabhai



1. Programme Organiser (Agriculture) , AKRSP, Sayla, Surendranagar District, Gujarat.

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Scaring the Crows and Trapping the Rats:

Learning from the farmers of Palladam Block, Coimbatore District, Tamil Nadu

We are compiling research done on indigenous knowledge systems. The following are excerpts from the thesis "Indigenous Knowledge Use in Drylands-Exploratory Study" submitted by P. Balasubramanian under the guidance of Dr. V.S. Subramanyan, Extension Department, Tamil Nadu Agricultural University, Coimbatore 641 003. (We regret that names and addresses of the farmer respondents/innovators are not given in the thesis and hence this note. We hope students will follow proper citation protocol in future. :Ed.).

1. **Cow dung cake as rat burrow fumigant**

A cow dung cake is kept in a mud pot which has a hole on its side. The cow dung is ignited and the mouth of the pot is closed and kept over the entrance of

the rat's burrow. A hole is made in the pot, such that the smoke enters the burrow and suffocate the rats inside and kill them.

2. **Soaking sorghum seeds in cow urine**

Seeds of sorghum are soaked in cow urine to induce drought tolerance. Sometimes they are treated with salt solution before sowing, to ensure better germination.

3. **Plastic to Scare Crows**

A polythene sheet is tied to a long pole and placed in the centre of the field; the sheet flaps and flutters in the breeze and sound that is produced wards off birds.

4. **Coating of redgram seeds with red soil**

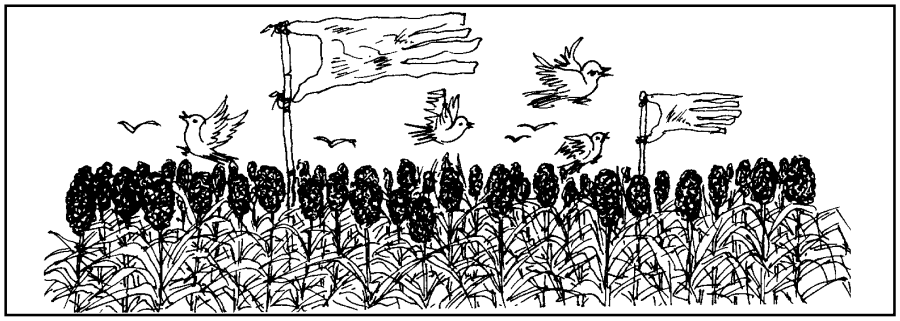
Red soil is moistened and mixed with seeds of red gram (***Cajanus cajan***) and dried before storing them. This protects the grain from storage pests during prolonged storage. It also facilitates easy separation of kernal.

5. **Castor Crop as border crop in cotton field**

To attract ***Spodoptera litura***, castor is grown on borders of cotton fields. (The adult moths are attracted to lay eggs on the under surface of castor leaves in preference to cotton; the newly hatched larvae can be collected and destroyed).

6. **Night fire to prevent Red Hairy Caterpillar**

There is a practice of using fire near groundnut fields in order to get rid of Red Hairy Caterpillar. (We learnt about this through personal communication by Dr N K Sanghvi that same practice has also been tried in Andhra Pradesh by several NGOs. :Ed.).



Indigenous Birth Control Practices in Rural Areas in Mayurbhanj district of Orissa (India)

Pritishri Parhi reports in the study conducted by him that some social customs existing in the villages of Mayurbhanj district, have helped in directly its population control.

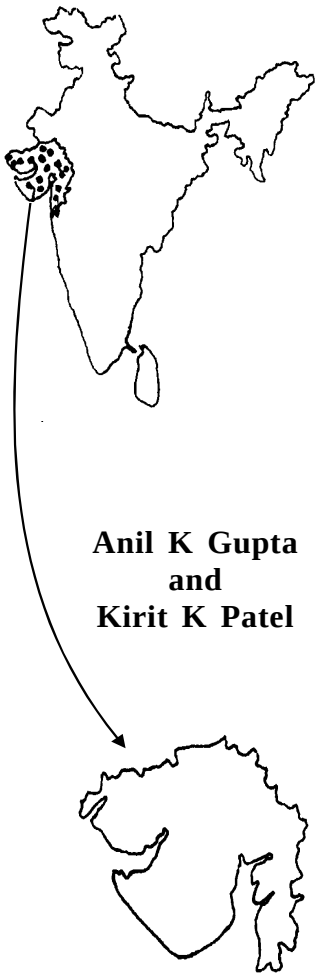
He mentions that the full moon day, new moon day, sankranti day, solar and lunar eclipse days are sacred days in the Hindu calendar Tuesday, Thursday and Saturday are considered as unauspicious. The day time is considered as "bad hours". Thus there is little chance of cohabitation, in turn to separation between couples.

However, he reports that there are several direct measures used by rural couples for birth control. For example, the white variety of a plant named '*kaincha*' (***Abrus precatorius***), bears white seeds and the red variety bears red seed. One white seed, if swallowed with honey or jaggery in empty stomach on the 4th day of the menstrual cycle before sunrise, it is said can prevent conception for one month. If continued for five days, it makes the lady sterile for more than five years. Several such practices are reported by him, which need scientific validation.

The author's address is : *Lecturer, Child Development, College of Home Science, Orissa University of Agriculture and Technology, Bhubaneswar 751 003, Orissa, India.*

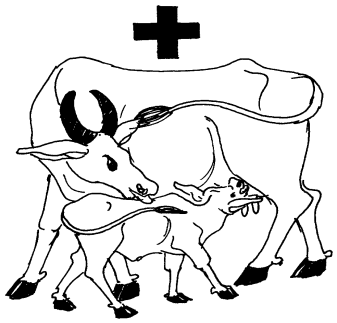
Survey of Innovations in Gujarat

Part IX



Anil K Gupta and Kirit K Patel

Livestock and Animal Husbandry



5301

Unsuccessful Conception

Approximately 2 kg of *'gundi'* (***Cordia spp***) leaves are crushed and the juice is extracted. One kg sugar and 500 g *'majith'* are added to the extract along with three litres of water and given to the buffaloes to help them to conceive. For cows, the quantity of all the ingredients are halved and mixed and only two litres of water are used. This mixture is given to buffaloes during 5th and 9th month after delivery and to cows, during 5th and 8th month.

Harchandbhai D Patel, Dist: Banaskantha, Comm: Mulabhai H Patel

5302

Cleaning the Uterus after Abortion in Sheep and Goats

To clean the uterus after an abortion, the following treatment is given: Crushed tender twigs of *'sipda'* are mixed with butter-milk and boiled till the solution becomes white. It is then cooled and given to the animal to drink. It is given three to four times for complete cleansing of the uterus in sheep and goats.

'Sipda' is a two to 10 (0.5m to 3.0m) feet tall plant with small leaves; it grows on hedges and bunds of fields.

Subaji A Thakor, Dist: Mahesana, Comm: Jayanti D Thakor

5303

Prolapse of Vagina

The apical portion (new growth) of cactus (250 - 300 g) is crushed and mixed in 700g buttermilk and administered orally once to the animal to correct the prolapse of vagina. Farmers believe, that a 60-70 per cent success is achieved with this treatment.

Radhaji Bhalaji Vankar, Dist: Banaskantha, Comm: Mulabhai H Patel

5304

Post Calving Care

Immediately after calving, the cow sits down to recoup herself. The chances of milk fever is high if excessive colostrum is withdrawn. To prevent it chalk dust (lime) is fed to the animal along with other feed.

Rumabhai V Damor, Dist: Sabarkantha, Comm: Kantibhai S Damor

5305

Intestinal Parasites

It is believed that because of excessive feeding, very young calves get infected with an internal parasite called '*karamiya*'. The infected calf stops eating and, if not treated promptly, it may die within 10-15 days. The following two treatments are given to the infected calf.

(*a*) **Butter Milk and Salt**

Approximately 50 g of salt is dissolved in 500 ml of buttermilk and given to the calf to get it rid of intestinal parasite. A regular dose of the treatment for a week cures the calf. This practice has been in use for ages without any modification. It is very widely used in this region.

(*b*) '***Rati Bhindi*' or '*Sesame*'**

To expel intestinal worms, calves are fed with leaves of '*rati bhindi*' or sesame. To cure the same in bullock, 250 g white onion is fed for a week, along with '*rati bhindi*' or sesame.

Pratapsinh Kodarsinh Chauhan, Dist:Sabarkantha, Comm: Chhatrasinh N Chauhan.

5306

Bloat/Flatulence

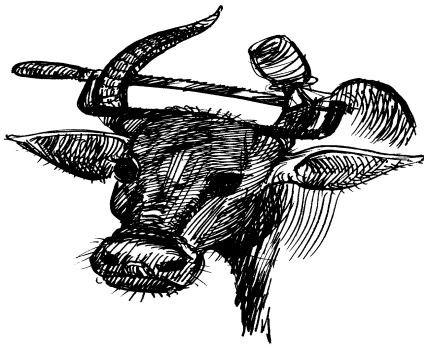
Bloat or flatulence is caused by overfeeding on green fodder, unripe sorghum, castor leaves etc. It is treated as follows. Crush 200 g flowers of '*mahuda*' (***Madhuca indica***) and add 100 g jaggery. Pellets made from the mixture are given twice a day to the animal for two days. There is no side-effect to this treatment according to the users. About 25 per cent farmers have been using this practice for the past 20 years in the districts of Bhavnagar and Bharuch.

Fatubhai Raysangbhai Tadvi, Dist: Bharuch, Comm: Vijay A Chauhan; Kishorebhai Sukhdevsing Gohel, Dist: Bhavnagar Comm: Raghav H Gohel

5307

Horn Rotting

Horn rotting is common in bullocks. A slight bending of the horn is the initial symptom of the rotting. In advanced stages, pus forms. The rotting horn is cut away with a hack-saw leaving four cm stub. Approximately 100 g of castor oil is applied on exposed cut surface of the horn. A mixture of 50 g of '*kalijiri*' (***Vernonia anthelmintica***) and 50g of urea fertiliser is applied over it and bandaged. Healing occurs after a week or so. Shri Kalabhai Kurabhai Desai learnt this method from Shri Ukabhai Rabari , Shirohi district, Rajasthan, 30 years ago. Kalabhai is now a local expert for the treatment in his village.



In the village Kansa, Mehsana district, farmers use hair (instead of '*kalijiri*') and urea after treating the cut wound with castor oil. Sometime they use a leather bandage instead of a cotton one. According to them, two to three dressings are required for complete healing.

Kalabhai Kurabhai Desai, Dist: Mahesana, Comm: Mulabhai H Patel and Kanabhai V Chamar, Dist: MahESANA, COMM : MAHESH L MAKvana

5308

Bone Fracture

Bhavanbhai has been treating animal fractures for the last 22 years. He aligns the broken bone manually and then massages the affected part with *sesame oil* or iodex. The fracture is splinted with bamboo or wooden splints and bandaged. The area is massaged gently with *sesame oil* daily for the next five days. He does not charge money for this treatment.

Bhavanbhai D Patel, Dist: Sabarkanta, Comm: Dinesh M Bhambhi

5309

Rejuvenating Milk Veins

To prevent occlusion of milk vein (or any problems) in the udders of cattle the extract of a certain creeper is fed to the animal in the village Mahuvaria of Surat district. About 500 g of creepers of '*manson*' are soaked in water till the water becomes milky white owing to the latex in the plant. Sometimes the creepers are squeezed lightly to extract more latex to last for two days. The mixture is filtered and the filtrate is given to animal for two days. The treatment takes effect within a week. It is a widely used practice in the surrounding villages too. The '*manson*', a creeper, grows mainly in hilly areas during monsoon. It has small stick-like leaves and white flowers.

Kelbhai Devjibhai Patel, Dist:Surat, Comm: Vijay A Chauhan

Contd. from Page 12...

believes that if the disease is controlled, there is not much harm to soil fertility which can be maintained by applying higher doses of organic manure, the cost of which is much lower than loss of the whole crop.

(*The response of the scientists raises an interesting question: Should we pursue research only on those practices of farmers which match with our prior beliefs, as in the case of Neem and dismiss these which don't appeal to us ? Is functionality not a reason enough to warrant scientific attention and trial? And if the scientists find some long-term harm or some side effects, will it not be worthwhile to evaluate these as well as various benefits and costs if any?: Ed.*)

Practices from Local Versions of Honey Bee

Lateral Learning among Animal Healers: A Workshop on Indigenous Veterinary Practices

Num Vazhi Velanmai network and **SIRPI**, a voluntary organisation engaged in rural development, organised a one-day discussion on indigenous veterinary practices, at Ammapatti village, Tamil Nadu, India. Thirty farmers, twelve of whom were women, from four villages of the Ammapatti circle attended the meeting. The participants discussed animal husbandry practices in three groups and then prepared a common list of the practices. The following practices were published in different issues of ***Num Vazhi Velanmai*** as an outcome of the workshop.

1. **Control of Cough in Cattle**

(*a*) The leaves of *'veeli'* are crushed in cow's milk and the mixture is administered to the ailing cattle.

(*b*) Pieces of cloth soaked in pig's blood are burnt along with *'samprani'* (incense) and the cattle are exposed to this smoke in order to control cough.

(*c*) The affected cattle are exposed to the smoke from burning the skin of the pangolin.

2. **Wounds on the Legs of Cattle**

Droppings of sheep, water-soaked seeds of tamarind and soil of termite mounds are mixed together and boiled in water and cooled. When lukewarm the solution is applied to wounds on the legs of cattle.

3. **Black Quarter in Cattle**

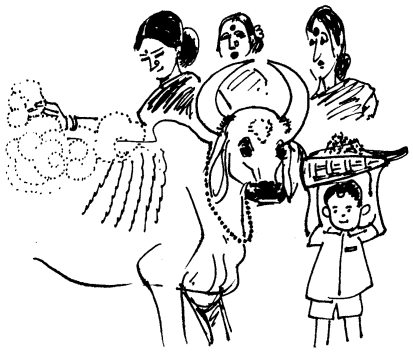
Pork soup (prepared without tamarind) is mixed with boiled *'samai'* (***Panicum miliare***). The mixture is kept overnight and administered the next day to cattle.

4. **Anoestrus**

The juice of *'chotrukatrazhai'* (***Aloe barbadense***) is fed to cows. A week later, they are fed with sprouted bengal gram for three to four days.

5. **Fever**

When cattle exhibit symptoms of high temperature and shivering of legs and go off feed, the vines of *'kundumani'* (***Abrus precatorius***) are tied loosely around the neck of the animal. This is followed by gentle winnowing of ash



over the animal, three times, starting from the head and proceeding to the tail. It is believed that three women who have the same name should perform the practice, with each woman carrying out one round. However, in some villages, one woman may perform all the three rounds. (Is there a limit to the creativity of people! We, of course, don't deny the fun-seeking spirit of people while developing such rituals).

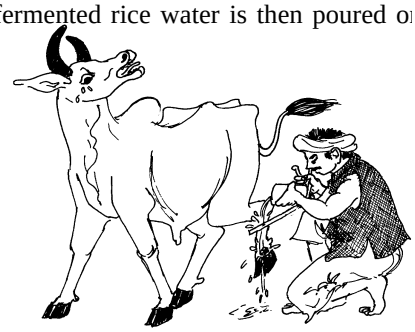
6. **Swelling in the Neck of Cattle**

Some of the 'formulations' smeared on the affected portion are:

a) A mixture of wax and coconut oil.
b) Oil from sun-dried seeds of ***Madhuca longifolia***.
c) Crushed leaves of ***Muyal kathazhai*** (a type of agave).
d) Steamed and crushed onion.

7. **Plough Rod Wounds in Bullocks**

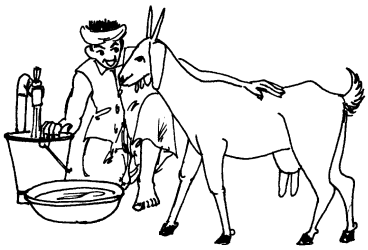
A ploughing rod is heated and held i such a way that it is just above the wound fermented rice water is then poured o



the rod so that the heated water falls directly on the wound on the sole of the affected animal.

8. **Judging the Correct Weight of Livestock For Sale**

Increasing the weight, and therefore the



value, of sheep and goats by forcing them to drink a lot of water is a practice adopted by traders operating in weekly markets. To detect this leaves and tender branches of ***Tamarindus indica*** are crushed and administered to the animals in order to expel the water (One person's cleverness leads to another's creativity!).

Book Worm

Plants Used by the Great Lakes of Ojibwa

James E. Meeker, Joan E. Elias and John A. Heim, Odanah: Great Lakes Indian Fish and Wildlife Commission, 1993.

This book is a compilation of 384 species of plants used by the native American communities which are part of Anishinabe culture, also called as Ojibwa. Compiling is not an extraordinary thing in itself, but the book has captured the spirit of Anishinabe and added a new dimension by giving the distinctive Anishinabe name for each species. According to Schlender, the Executive Administrator of the Great Lakes Commission, the book should not be seen as merely scientific document for ethnobotanical use. He also writes in his preface to the book, "we hope to convey both the essence and spirit of an Anishinabe world-view which carries with it respect for each of the living things on this planet that we call Aki, our mother the earth. If we treat these plants with respect we engender an attitude of respect, honour and dignity for all of creation".

Not every person in the community knew how to use every plant. Ceremonies are associated with use of most plants. "...in this dignified manner, the plant was honoured, the medicine obtained, the creator thanked, and the cycle of life ensured", the authors explain. A dilemma that the administrator of the Commission faced was, "how to preserve the knowledge that, some argue, should only be taught orally, during ceremonies or from person to person".

The communities inhabiting parts of Minnesota, Wisconsin, and Michigan have contributed their knowledge to be included in this book. Of 900 to 1500 species estimated to exist in the above mentioned territories, 384 were used extensively.

The book seems to have been circulated among the Ojibwa, as mentioned by the authors, to get their feedback. This is a nice gesture. Researchers rarely share their findings with the providers of knowledge. The authors have also identified 14 rare species which, they advise, should not be collected. This is a useful bit of information and may help generate a conservation agenda.

The description of each species is accompanied by a map of the territory showing its spatial distribution, a line diagram, its scientific name along with the local name(s), the plant's morphology, its cultivation period, and the parts of the plant which are used for various medicinal purposes.

The book would be useful to every student of ethnobotany, of indigenous knowledge system pertaining to plants and of ecological geography.

There is one drawback: to us this seems a major lapse. The book does not discuss how the knowledge compiled will be disseminated to the rest of the world. Also it makes no mention how the intellectual property rights of the medicine men as well as the communities can be protected when this information is widely publicised. In future, we hope, ethnobotanists will follow the principle of prior informed consent of the people whose knowledge they wish to document and use even if they beloged to the same community.

The names of the information providers should also have been given along with each medicinal use. This would ensure the right compensation to these individuals/communities if any commercial drugs are developed based on this knowledge. For example, a part of the profit could be made to go back to the community.

Krishi Tatwa Prakash (Elements of Agriculture)

Munshi Raghnath Malrai, Bali, Marwas; Swadeshi Karkhana, 1939.

The book elaborates on ways to improve the agriculture productivity in western Rajasthan. It deals with the nature of soil and ways to retain its fertility under different conditions. Munshi traces soil formation in the different parts of western Rajasthan by building upon historical evidence. Much of the soil, he explains was brought by now defunct rivers: *Halanda* flowed into Rajasthan from Punjab, but it disappeared after a major disturbance revised the ground level. He examines the names of different villages along the ancient *Halanda* from other sources to bolster his hypothesis. Likewise, he also refers to the Saraswati, the other famous river which disappeared - referred in most ancient texts. The nature of soil, sub-strata and the evolutionary changes it underwent over the years are discussed.

The methods of improving the quality of soil and also its productive potential are discussed at some length. Munshi describes various soil conservation measures such as bunding, agroforestry, green manuring etc. Bunds are of different kinds: they vary according to different fields and crops. He also discusses dry farming practices and ways of using saline water. The importance of spacing - between the rows as well as between seeds, is highlighted. Indigenous ways of seed preservation, such as using ash, dung, sulphur ash and salt solutions; asafoetida; '*guarpatha*' extract, occasional sun drying; using dung and ash as lining material for seed storage bin etc., are covered in some detail.

In the section on manures, Munshi describes an interesting practice: twigs, shrubs, calotropis branches, etc. are piled in heaps at distances of 10 or 15 feet (3 to 5 m) in the field. During summer, winds deposit crop residues and loose dust on these twigs which, on decomposition, becomes a rich source of manure. This practice is common in western Haryana where, besides heaping twigs, furrows are opened in the field so that they trap the wind - blown dust an innovative way of nutrient harvesting.

...Contd. in Page 8

News & Views

CD ROM On Patents

We have recently acquired three CD ROMs containing all the genetic engineering patents filed in US till the end of 1993. We invite scientists and researchers in the third world to contact us for any particular searches that they may like to make on the subject. We are trying to set up a Third World Patent Information Centre for Small Innovators. This is to encourage farmers, entrepreneurs and the scientists in Third World not only to have access to the state of art but also that they can protect their intellectual property rights. SRISTI would like to hear from colleagues having similar data bases at their command.

SRISTI Fellowships for graduate students and small grants for individual activists, researchers and innovators.

SRISTI has entered into a research collaboration with Indian Institute of Management, Ahmedabad in order to strengthen the Global Indigenous Knowledge and Innovations Network (GIKIN). As a part of this collaboration, we are exploring opportunities of collaborative action research with colleagues interested in: (1) documenting indigenous innovations, (2) adding value to farmers' innovations, (3) starting regional language versions of Honey Bee in different parts of the world, (4) commercialization of value added products, (5) protection of intellectual property rights of the innovators, (6) data base on technological and institutional innovations as well as liteature on the subject, (7) pooling of litertare on ecological indicators used by local communities, and (8) organization of biodiversity contests among school children and adults. Post graduate students interested in researching any of these topics could apply for travel, research or publication grants. We are also looking for partners who would like to bring out local language versions of Honey Bee with a local name, with an autonomous and independent editorial committee with a deep commitment to acknowledging local contributions and interested in sharing information and any income (accrued through value addition or documentation) with the people who have provided the knowledge.

Please write back for detailed guidelines. Preference will be given to requests from those who have pursued research on these subjects through their own resources and shared the same with the people in local language.

Rural developement workshop

A joint workshop was organised on Innovations in Rural Develop-ment by Department of Rural Development, Gujarat Government, Centre For Regional Management Studies (CRMS) at IIMA, and SRISTI on September 13, 1994 at IIMA. Project Directors and other senior officials of District Rural Development Agencies from all over the state attended the workshop. Mr David, Additional Chief Secretary, Rural Development presided and senior colleagues from state secretariat also participated in the deliberations.

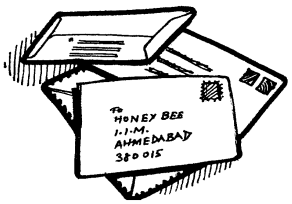
Prof.P.M. Shingi, Chairperson, Centre For Management in Agriculture (CMA), IIMA traced the history of rural development research in CMA and highlighted the relevance of the workshop in the context of liberalised economy and focussed on innovation and entrepreneurship. Prof.Ramesh Bhatt assured participants that any follow-up initiative decided upon in the workshop would receive active support from CRMS which is committed to goal of regional development.

The first half of the workshop dealt with the innovations tried by the rural practitioners, problems faced in scaling up or in implementing initiatives. The second half of the workshop dealt with the innovations developed by people without outside help.

A presentation was made on the Honey Bee data base on indigenous innovations. Group discussions were held to identify ways in which rural development programmes can build upon local creativity and innovations. Mr.David, in his overview of the workshop said that many opportunities of learning from people were somehow lost in the mask of bureacracy. He also said that such workshops ought to be organised regularly adding that many more entrepreneurial ideas would have to be incorporated in the rural development programmes. Those interested in the full report can write to us.

Biodiversity Contest...

Vinaymandir School in Virampur village, Banaskantha District in Gujarat hosted Biodiversity contest for the first time in collaboration with SRISTI on September 1, 1993. In the same spirit, the school took part in a state-level Science Fair organised at Augad Vidyalaya (at village Tara, Kankrej Taluka, Banaskantha District) held on January 1, 1994. Shri Pathubhai N Prajapati and Shri Rameshbhai N Solanki, two seventh class students from the school prepared excellent charts of dry specimens, thematically arranged, highlighting "Medicinal Uses of Local Plants" under the guidance of their school teacher Shri Devajibhai M Patel. These exhibits fetched them II prize for the school, a Rolling Shield and a Certificate of honor.



To
The Editor

Letters

People's Knowledge Can't Be Standardised; Nor Is Compensation Alone An Answer.....

Dr.R.E.Johannes
Tasmania
Australia

We are all concerned about the misappropriation of TEK. I am also concerned, however, about oversimplified responses to the problem - specifically about the fact that some writers state or imply that all TEK should be given and received (or not) according to a standard protocol. Some writers suggest the result of generalisations made too hastily based on the value to drug companies of indigenous medicines.

Giving indigenous people the idea that their TEK is routinely saleable, that they should keep their mouths shut tight unless some form of payment is made, would be counter-productive for the owners themselves in some instances. An important part of the value of much TEK lies in the fact that once scientists are aware of it, they can work with its possessors (and others with similar natural resources but do not possess the knowledge) to combine scientific and indigenous knowledge for the greater benefit of local people through improved natural resource management.

I believe that any document discussing principles associated with intellectual property rights should not lump TEK into a category, but should carefully analyse the different categories and attempt to match them with appropriate procedural and financial arrangement.

(We appreciate your response and hope that you help us to get in touch with Aborigines and Alternative Agriculture Group in Australia: Ed.)

Waiting For The Thai Report

Dr Sophia Wigzell
Bangkok
Thailand.

I was interested to learn of Honey Bee's work to encourage the responsible use of farmer's knowledge by researchers and scientists and to help breakdown artificial boundaries between formal and informal knowledge systems. I am currently in the process of drafting a proposal for an information and support network for farmers and NGOs involved with alternative agricultural technologies in Thailand. Our project will involve substantial data collection from farmers and two-way transfer of technology.

(Dr. wigzell, could we not expect contributions from you describing the creativeness of Thai farmers:Ed.)

In Defence Of An Alternative Model

Erminia Licitri
Rome
Italy

We find Honey Bee very interesting, because it is searching for a concrete development model as an alternative to the dominant, and extremely wasteful one we have now.

Unfortunately we are not able to subscribe, but we should be very happy to exchange our BIRN (Basso International Research Network) newsletter with you.

(Dear Erminia, we do understand the hard times that many NGOs in Europe are facing. We will be happy to continue to exchange copies :Ed.)

The Idea Of Biodiversity Contests Spreads

Chhaya Kunwar
New Forest P.O
Dehra Dun, India

We would like to publish some material from your newsletter in our quarterly newsletter *Boond* to spread this information amongst the hill people. We want to exchange *Boond* with the Hindi version of Honey Bee.

I would appreciate if you could give us the details of the Biodiversity Contests. We are always willing to organise such contest.

(Then why not start, Chhaya. We are sending a note on Biodiversity contests once again. Will gladly sponsor prizes too. Do send us reports about creative children: Ed.)

Low Cost Storage System For Potato

Dr Hira Nand
Simla
Himachal Pradesh

I am writing to you about an interesting innovation which has its basis in traditional technology. The principle it uses is the same as that used in the cooling water in a earthen pitcher during summer months, particularly in plains where the temperatures are high and humidity low in summer. This principle has been used by CPRI scientists in developing a 'country cool store' for long term storing of potato.

This low cost cool store runs on passive evaporative cooling and can keep the temperature in the store as low as 10^0C when outside temperature ranges between 20 to 44^0C from February to June. The only expenditure involved is for arranging for the circulation of water.

The loss of weight in the tubers is only 10 per cent during storage, whereas the farmers may get 50 to 30 per cent more money for their produce in summer because of the hike in wholesale process of potato in the market in May-June.

(Is not it strange that Dr Hira Nand who did an excellent thesis on Indigenous Knowledge of Dry land farmers at HAU, Hissar, 1979 writes so infrequently. Please do take your pen again Dr Hira Nand, we are waiting! :Ed.)

Towards An'Indian Science?' No That Was Not the Idea

Jitendra Bajaj
Madras
Tamil Nadu

Incidentally, while writing the short postscript about Honey Bee, which I now realise was badly drafted, I only meant to convey my feeling that someday some great scientists of India would be able to craft the outlines of an indigenous science of agriculture from the mass of material collected by you. I have, as you know, convinced myself that the Indian ways of doing science are quite different from the western ways, and I see the techniques and inventions you have been collecting as exemplars of the Indian way of pursuing the science of agriculture. In fact, I am quite hopeful that the sheer volume of your material shall someday tempt some wise man of India to tie all these techniques together as specific examples of the Indian science of agriculture.

I did not mean to say that your material is of no use today. The techniques you collect are obviously already in use in the field, and these must be useful for the people to have invested the effort of inventing and adoring them.

(Jitendrabhai, thanks for your comments but you got us wrong - a little. We don't believe in an 'Indian' science the way you imply. Because then the next stage will be 'Gujarati' science or 'Delhi' science and where would this ultimately lead to? We do respect science underlying farmers' creativity in India and we also find similar innovations exist in other parts of world; farmers in China, Mongolia, Colombia, Ethiopia or any where else, are equally creative. The heuristics may vary, the scientific principles may not :Ed.)

A Newspaper Column For Farmers!

Hans Carlier
Khatmandu
Nepal

I have an idea. Why not use the newspapers to promote the idea of farmers' knowledge. We want to start with some advertisement with some prices/premiums for the best ideas about natural pest management in main crops like rice, maize etc. After that we can start a column in newspapers with farmers innovations in which we will include information of Honey Bee.

(A wonderful idea indeed. Please send us clippings of newspaper campaigns when they begin :Ed.)

European Search For Indian Practices

Anders Borgen & Lars Kristensen
Frederiksberg
Denmark

We are doing a research project about seed quality in organic agriculture. As the disease 'stinking smut' or '*bunt*' caused by the fungus '***Tilletia caries***' is one of the major problems in the organic wheat production in Denmark, this is one of the major topic for us.

Mr.Morten Leth from the organisation Nepenthes in Arhus, Denmark, contacted us for an enquiry about the problems in Danish organic agriculture practice. He told us that you, with your registration in Indian traditional agricultural production methods, might have solutions for some of the problems we face, when we try to quit the pesticides in a time, when we have forgotten how to avoid problems without pesticides.

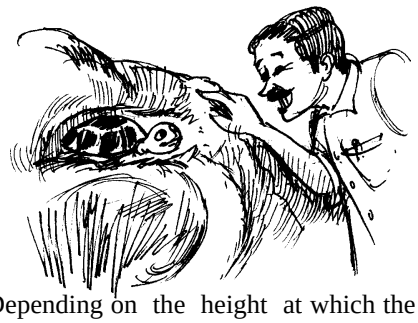
One method to avoid stinking smut in wheat is to treat the seeds before sowing with organic compounds or plant extracts. In our study of this method, we have read an article written by Singh, Goel, Sharma and Nayar. In this context we would like to ask you if you are aware whether this research has continued in India or if you know some of these methods or others like them which have been used in practice in India.

We believe that, the development of these methods might be a solution for organic agriculture in the northern hemisphere and possible also for farmers in the South, where chemical seed dressing are relatively more expensive if at all available, and where home grown seeds are more commonly used.

Turtle Nests Can Predict Monsoon Intensity

Dr.Tinni Sawhney
Dist: Savai, Madhopur
Rajasthan

A feature that we have found remarkable in our area is the skill with which local communities observe nature and predict the intensity of the monsoons. One of the villages we work in is on the banks of the river Banas. Farmers whose agricultural fields lie on the banks observe the nesting of the fresh water turtle, which nests in niches on the sides of the river banks.



Depending on the height at which the turtle builds its nest, farmers predict the intensity of the monsoon in a particular year. Villagers here also study where the lapwing makes her nest and depending on that, they are able to tell which '*Nalas*' (streams) get inundated. This again is an indication of the amount of rainfall.

(We will appreciate if other readers send in contributions about eco-indication :Ed)

We shall render our services!

Dhanjibhai B Boliya
Village: Dolarpada
Gujarat

I was very happy to receive the magazine ***Khedut Vigyan*** you have sent me. The magazines like Khedut Vigyan will encourage people to look at environmental factors and make the people turn towards nature for help. It may also prove very much useful for the development of farm technologies. You are doing a very good service to the nation. We will render whatever services we can to make your efforts a grand success. Giving the names of students who have provided you information in the magazine is a thoughtful gesture. It will certainly encourage students to participate further.

I am employed as a workers' manager for a Farm. If you send me your questionnaire, during my visits to the farmers, I will contact the local tribal community and collect information regarding their lifestyle, farming and area-wise details along with the illustration samples which may be of interest to you. I will come personally and give them to you.

Mango trees not bearing fruits...

Khansingh Khodisingh Rathod
Village : Bhatia
Gujarat

I have some suggestions to make regarding your write-up on marking the trunk of the barren mango tree to make it bear fruits. Remove the outer bark of the trunk with a very sharp axe and then make an incision in the trunk. After doing this the tree starts bearing fruits.

To prevent rats attacking crops the following is a cost free method. Four or five tablets of camel excreta (which is discharged in tablet form) should be placed at the entrance of the rat holes. The rats will immediately abandon the burrow without doing any damage. I have used both methods with success.

In drought situation or when there is scarcity of water for crops like castor, pigeon pea, cotton, maize, etc water can be conserved by irrigating alternate furrows. This will also be cost effective because more land can be irrigated and so is affordable by small farmers.

We would like to preserve it!

Jayaram H Vadher
Village : Motichandur
Gujarat

We wish to subscribe to ***Khedut Vigyan***. My farmer friends also welcomed the newsletter, and they want to read it regularly to keep abreast with the new developments. We are satisfied with the format of the magazine but we would like if its binding is improved for then the magazine can be better preserved and more farmers can read it. Some farmers feel that certain methods described and the information on such topics should be widely disseminated. They suggest that the print quality be improved.

Another suggestion is that when you publish farmers' practices, you should also

give information regarding current scientific methods. This will help us to make an easy comparison and select the method we wish to to use. For example, regarding foot and mouth disease (FMD) among cattle, if you give information about scientific methods as well as 'country' methods of treatment, the disease could perhaps be controlled at the shortest possible time. That would help in preventing other animals from being infected. The people of this area do need such information. Currently FMD is widespread in our area, and we are trying out the methods mentioned in your newsletter. We will keep you informed about our results.

After meeting other farmers, we will be able to give you more information on new methods. Here is one method we use to treat injuries. If an animal has suffered penetrating cuts or injuries, we apply ashes of freshly burnt green leaves of *'vakhda'* on the cut. This promotes quick healing. There are many such remedies which we will collect and forward to you.

We are delighted and grateful that there are people like you, and your colleagues, who live in a big city and yet take interest in the development of rural farmers. We will reciprocate your efforts by sending you information about local practices and any discoveries we may make.

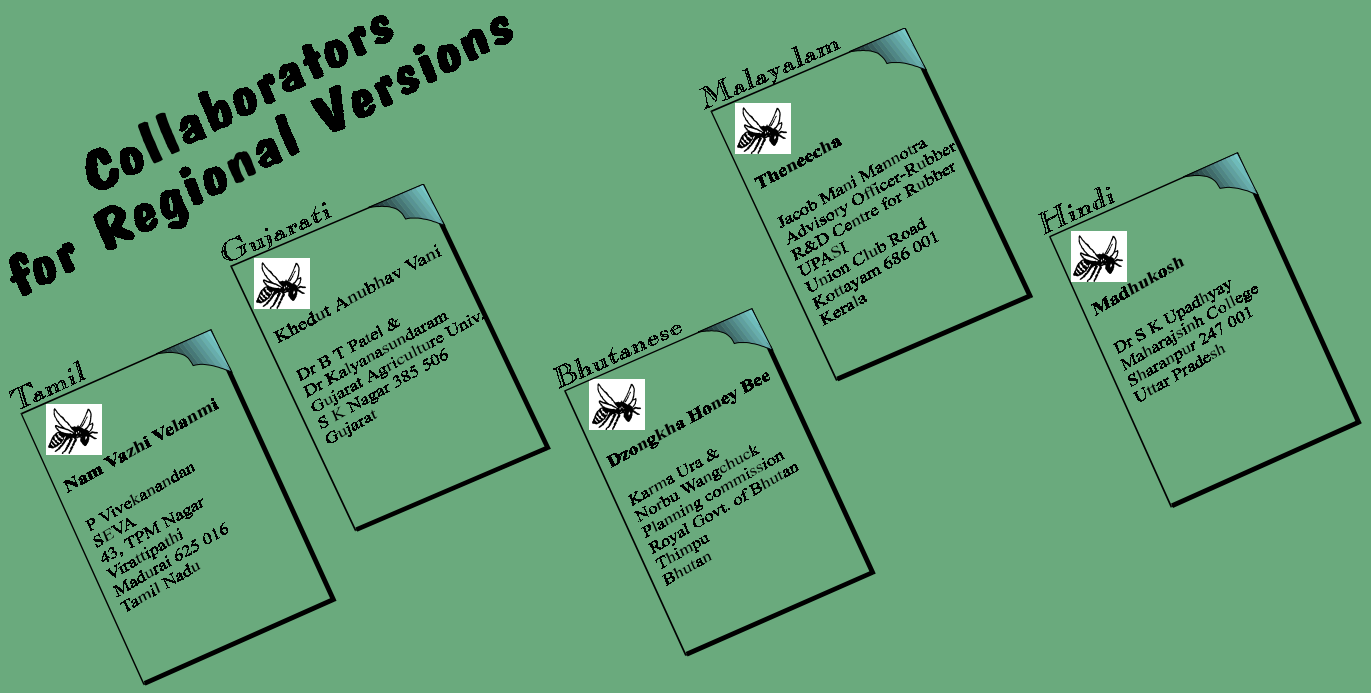
100 per cent salinity absorption!

Lali Kanji Pardhi
Village :Danawada
Gujarat

I would be pleased to receive ***Khedut Vigyan*** regularly. I wish to share our experience on controlling salinity of the soil. You have described methods of using plants that can absorb the salinity of the lands. This is time consuming and a costly affair. Instead, *'chirodi'* should be incorporated in the lands before sowing any crops. Many of the farmers in our village are using *'chirodi'* with great success. The salt absorption is total and 100 per cent. And we also get a good yield of crops from our lands. To maintain the fertility of lands we bury the green wastes of the previous crop in the soil after harvest. Before fresh seeds for new crops are sown, the field is irrigated. This method is known as *'leela padwas'*. By this method water remains under the ground and helps fermentation and decomposition of the buried green residues which then becomes a good natural manure.

And then this is how we conserve irrigation water in our district, Surendranagar. I feel that in growing SANKAR-4 cotton crop in their lands, a perpendicular channel could be erected between two furrows, and while irrigating the field, water can be directed through this channel to every alternate furrow. At the next watering, the water can be directed to those channels which have not already been watered. In this way, moisture level in the soil is maintained. The water is adquate for the crops also.

We hope that your magazine will continue to inform us about current scientific methods as well for then farmers can benefit more from the magazine.



Membership Fee for Honey Bee Network

Dear Readers

We have shared with you more than three hundred innovations and illustrations of farmers' wisdom in the last seven issues of **Honey Bee**. If you have found the newsletter interesting, we invite you to join the **Honey Bee Network** by sharing the cost of keeping network active.

Please write back suggestions for improvement and how you can share the burden of keeping this global but third world based network of scientists, NGOs, farmers, artisans, professionals, activists, political leaders etc., vibrant.

Category	National	International	
		Developed Countries	Developing Countries
Annual Membership			
Patron	Rs 2000 or above	US$ 200 or above	US$ 100 or above
Supporter	Rs 500	US$ 50	US$ 30
Scientist/Professionals	Rs 120	US$ 30	US$ 10
Foreign aided NGOs	Rs 200	US$ 25	US$ 10
Farmers/NGOs (without foreign aid)			
-Large	Rs 100	US$ 15	US$ 10
-Small	Rs 50	US$ 10	US$ 5
Students	Rs 20	US$ 10	US$ 5
Unemployed Worker	Rs 2	Free	Free
Institutions/Libraries	Rs 2500	US$ 100	US$ 50
Life Membership			
Individual	Rs 1000	US$ 250	US$ 40
Institutions/Libraries	Rs 10000	US$ 1000	US$ 150

This membership entitles you to receive the newsletter and other information about the network. Please send your contributions in the form of bank draft/postal order/money order in favour of **A/c Honey Bee** at the editorial address.