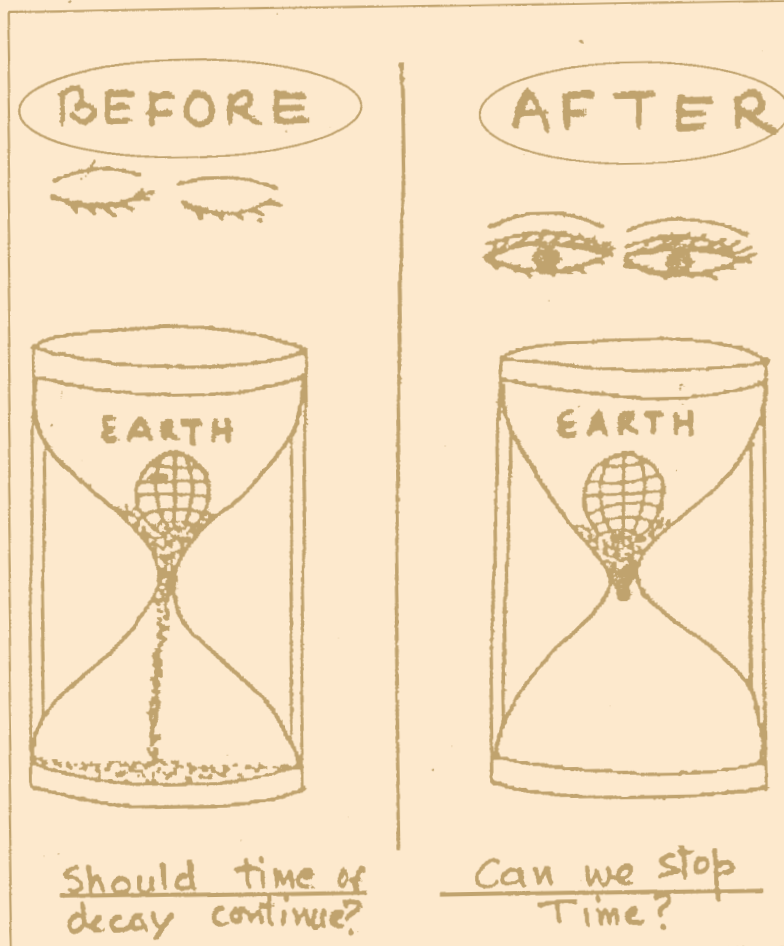


Honey Bee

Volume 3, No. 3 & 4 Aug. - Dec. 1998

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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 system among farmers, scientists, political leaders and social activists and lobby for protecting intellectual property rights of grassroots innovators.

Editor : Anil K Gupta

Associate Editor: Kirit K Patel

Editorial Assistance:

Sumati K Sampemane
A S Ready
Jyoti Capoor
Vijaya SHerry Chand

Graphics & Design:

A S Ready
Aditi Desai
South Asia News
The Smallholder
SAIIC Newsletter
Avance Bulletin
Space Graphic

Composing:

V B Computer

Secretarial Assistance:

R Baskaran
P Mahadevan
P V Sethumadhavan

Active Members of Gujarat Network:

Dr N K Kalyanasundaram
Dr G S Judal
Dr P R Patel
Dr F S Kavani
Dr M B Pande
Dr G M Patel
Dr P M Mane
Dr M B Pande
Dr D V Rangnekar
Yogesh Trivedi
Kamudchandra Thakkar
Sudhir Jani
Kapil Shah

Editorial Address:

Honey Bee
Prof Anil KGupta
C/o Indian Institute of Management
Vastrapur, Ahmedabad - 380 015 India
Tel: 91-272-407241, (R) 469079
Gram: INDINMAN
Telex: 121-6351 IIMA IN
Fax: 91-272-427896
email: anilg@iimahd.ernet.in

International Correspondent:

Dr Frands Dolberg
Novembervej 17, 8210 Aarhus V
Denmark.
Tel: + 45 86 152704
Fax: + 4586 139839
email: fdolfd@vm.uni-c.dk

Collaborator for Regional Versions

Hindi	"Madhukosh"	Dr S Upadhayay Professor Maharajsinh College Saharanpur - 247001
Gujarati	"Khedut Anubhav Vani"	Dr B T Patel Associate Director of Extension Education Gujarat Agricultural University S K Nagar - 385 506
Oriya	"Madhuchakra"	Dr Subachi Rath M 5/8, Acharya Vihar Bhubneshwar, Orissa
Tamil	"Nam Vazhi Velanmai"	P Vivekanandan Sustainable Agriculture Environmental Voluntary Action (SEVA), 43, TPM Nagar Virattipathi, Madurai - 625 016
Malayalam	"Thennecha"	Jacob Mani Mannothea Advisory Officer-Rubber R & D Centre for Rubber United Planters Association of Southern India (UPASI) Union Club Road, Kottayam-686 001
Bhutan	"Dzongkha" Honey Bee	Karma Ura & Norbu Wangchuck Planning Commission Royal Government of Bhutan Thimpu, Bhutan

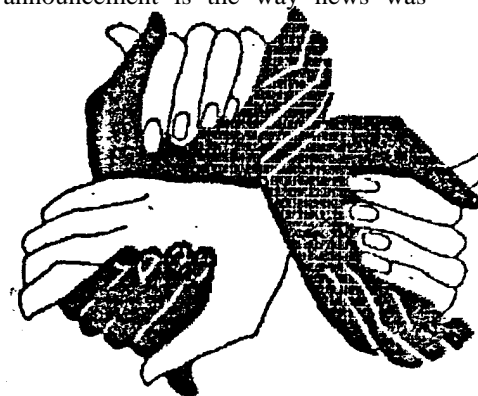
Collaborating Institutions

• **Gujarat Agricultural University**, Dr K Janakiraman, Director of Research, Sardar Krushinagar - 385 508. • **Nootan Gram Vidyapith**, At: Thava, Tal: Valia, Dist: Bharuch - 393 130. • **Lok Bharati**, At: Sanosara, Tal: Shihor, Dist: Bhavnagar, Pin: 364 230. • **Shree J C Kumarappa Gram Vidyapith**, At: Gadhada (Swaminarayan), Dist: Bhavnagar, Pin: 364 750. • **Gram Vidyapith Shardagram**, At: Shri Shardagram, Dist: Junagadh, Pin: 362 235. • **Gram Bharti Gram Vidyapith**, At: Amarpur, Tal: Kalol Dist: Mahesana, Pin: 382 721. • **Mahila Gram Vidyapith**, At: Nardipur, Tal: Kalol, Dist: Mahesana, Pin: 382 735. • **Shree Sarswati Gram Vidyapith**, At: Samoda-Ganwada, Tal: Siddhpur, Dist: Mahesana, Pin: 384 130. • **Nootan Bharti**, At: Madana-Gadh, Tal: Palanpur, Dist: Banaskantha, Pin: 385 519. • **Sabar Gram Vidyapith**, At: Sonasan, Tal: Prantij, Dist: Sabarkantha, Pin: 383 210. • **Lok Niketan Vidyapith**, At: Ratanpur, Tal: Palanpur, Dist: Banaskantha, Pin: 385 002. • **Gram Seva Mahavidhyala**, At: Dumiyini (Ashram), Dist: Rajkot, Pin: 360 440.

I am happy to place in the hands of readers, the first issue of 1993 with my best greetings and wishes for a close cooperation among all members of the Honey Bee network.

The Year of Indigenous People :

The award of Noble Peace Prize to Rigoberta Menchu - a Quiche Maya Indian from Guatemala, indicates a growing realization that the knowledge rich and economically poor developed state and societies. It is not without significance that 1993 has also been declared by United Nations as a year of Indigenous People. The pathetic part of this UN announcement is the way news was broadcast in the global media. The visuals accompanying the news included some dancing, indigenous people. This is the tragedy. When tribal people are invited for independence day celebration in our own country, their dances and crafts are the only things which media highlights and government considers worth-while. We strongly believe, as do many of the readers and collaborators, that we should not depict the indigenous knowledge systems of tribal people only through the motifs of dance and art. There is a considerable reserve of ecological knowledge embedded in the way many of the indigenous groups have maintained biodiversity. This deserves appreciation, recognition and protection as their intellectual property rights.



Tribal art and craft are important but not in isolation of their environment ethic and technological and institutional knowledge systems locked up in unfair exchange traps resources is a price which we do not approve of.

What price Indigenous Knowledge ?

Our data base on innovation is increasing in size, quality and diversity. We are trying to raise resources to develop computerized data base accessible through electronic mail to encourage scientists and activists from across the globe to send us their reactions to the ideas. We also hope that ours being the biggest data base of its kind anywhere, would attract colleagues from different parts of the world to take up research to uncover the science underlying innovations. Whenever possible, we should try to add value through linkage with modern science and technology.

INBio Model : A Recipe for success or Disaster

We have noted an extraordinary collaboration between a multinational drug company Merck and the **National Biodiversity Institute of Costa Rica (INBio)**. The drug company has signed a \$1 million, two year contract to screen biological extracts derived from flora and fauna collected by INBio while inventorising their forest resources. INBio will use these resources to strengthen and support the documentation of biological diversity in Costa Rica. They will use ten percent i.e.\$100,000 for direct conservation efforts. Merck has rights to use this knowledge for two years of the discovery.

All the samples collected in Costa Rica would be given a code name and the actual identity of the source would be revealed only after a royalty sharing agreement has been finalised between the company and the INBio. At the face of it, the proposal looks quite interesting. However we are not sure what share of the profits would be repatriated by the drug company to the NGO and what share out of it will flow to the people and their communities. More knowledgeable people in this field like Dr Farnsworth of University of Illinois, Chicago have estimated a drug to yield about 200 million \$. Whether 2 million is the right share is for Cost Rican to decide. But the fact that they have insisted on coding the plants and execute separate royalty agreements shows that this is not entirely one way deal. In addition, the company is supposed to have agreed not only to build infrastructure for research in Costa Rica but also transfer technology to the Cost Ricans for general screening of plants as well as for development of specific drugs. The stakes of Indian people in Costa Rica in the whole scheme of knowledge extraction, value addition and distribution of royalty are not clear. Can the sovereign rights of Costa Rican people subsume the rights of indigenous

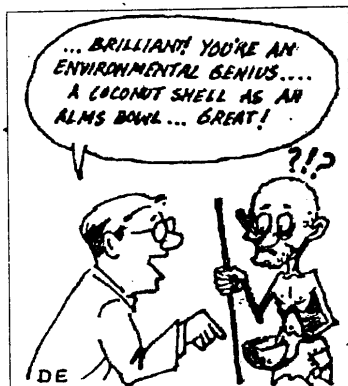
people ? Will we allow government in our country to extract, the way it has done in past, resources from forest and tribal regions without ensuring that the share of tribals is decided in a fair, open and participative manner? The struggle around Narmada Dam (more on it in next issue) and the rights of tribal people signifies this tension.

Much is said about the damage the multinational corporations do to the economics of developing countries. However the fact remains that the extent of international borrowing by various third world governments in many times more than the share of investment of multinational corporations. While most of the multinational corporations, particularly in Latin American and African countries did extract natural resources in non-sustainable and unfair manner, it often happened in collaboration with and through active support of local governments. One cannot argue that this outcome is inevitable regardless of the policies and the institutional strength of a third world country.

Our position is that we should negotiate from a position of strength as Cost Ricans seem to have done in this case only partly. For instance, if only two or five percent royalty is to be shared, then the deal is certainly unfair. I realise that there is a lot of controversy in that country about this deal. But I am also not convinced that we should let rest of the society grow and accumulate surplus keeping the tribal people poor in the name of their being the guardian of vulnerable ecological resources and biodiversity. The literacy rate in some of the tribal regions in India is hardly 5 to 7 percent. Further, people in this regions do not have access to health, education, and other economic infrastructure like rest of us.

National conduits for international capital

Reality however, is that the ethnobotanists in most countries unfortunately have become (often involuntarily or unwillingly) an extended arm of the pharmaceutical industry. While we have opposed the role of multinational corporations in extracting the third world resources and knowledge, I have not yet heard either from the International Association of Ethnobiologists or from National Associations and activities that such a behaviour be considered unethical and unprofessional henceforth. We plead with our collaborators to create pressure on our own institutions in the third world whether of academic or commercial nature such that these do not become conduits for the non-sustainable extraction and use of natural resources. Multinational cooperations are distant, big and powerful or even more powerful actors with in our societies in our societies whose role in development in even more suspect?



Birth of SRISTI!

We have recently set up **SRISTI (Societies for Research and Initiatives for Sustainable Technologies and Institutions)** to create an organisation of innovators which would articulate and negotiate future deals on the issue of local knowledge in a socially just and fair manner. **SRISTI** would support documentation, experimentation, value addition and dissemination of the local creativity across the global. We are not worried that some of the knowledge being published in this newsletter is becoming a common property or even open access resource weakening the possibilities of protecting intellectual property rights of these innovators. Our hope is that before it is too late we would be able to develop a protocol and an internationally acceptable institutional framework which can ensure proper returns to local knowledge without having to break the common property foundation of their knowledge system.

In this issue we have contributions on indigenous pest control methods from Srilanka, a short note on women and homestead utilization studies in Bangladesh in addition to Part Five of our continuing series based on our survey of innovations by farmers, artisans, pastoralists, etc., in Gujarat. The Marathi and Malyalam language versions are to come on soon.

I hope readers will write back how can this seemingly impossible goal of combining the best of the modern science and technology wherever available with the best of the local knowledge system be achieved through our collective effort.


Anil K Gupta
Editor

Indigenous Pest Control Methods in Srilanka

Dr Rohana Ulluwishewa

Prior to the information of conventional chemical pesticides, paddy farmers in Srilanka used a wide range of traditional pest control practices. These practices are rapidly disappearing as farmers adopt high yielding varieties (HYV) of rice which necessitate chemical use. I conducted a study with 30 farmers from the Badulla and Hambantota Districts. The farmers practices can be categorized as biological, botanical or mechanical methods. In addition, some practices are supplemented with religious ceremonies and rituals.

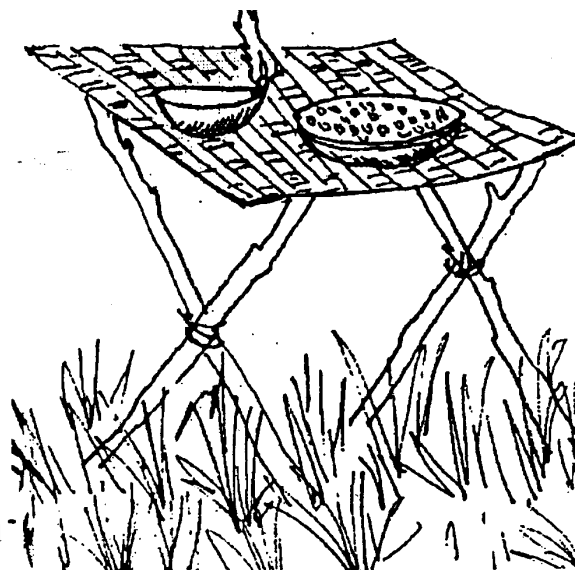
Biological methods

In and around their fields farmers maintain habitats² and develop micro-climates required for the vertebrates, reptiles, birds, and mammals that prey on crop pests. The farmers I interviewed described some religious rituals which upon close scrutiny, appear to help in attracting a number of crop pest

predators. For example, *Ptyas mucosus*, commonly known as the rat snake and the lizard, *Varanus salvator*, feed on rats and a number of other small mammalian and crustacean paddy pests.

Botanical methods

The paddy farmers portrayed a facile knowledge of the botanical species in their environment and identified a wide range of plants that they had used for pest control. *Diospyros affinis* ('Kaluwel'), *Anamirta cocculus* ('Tithawel'), and *Ananas comosus* ('Pineapple') are believed to control flies such as *Orceolia oryzae* ('Gap Massa') and *Atherigona oryzae* ('Kanda Massa'). *Euphorbia* ('Daluk') is used by farmers to control *Tryporyza incertulu* ('puruk panuwa'). The leaves of these plants are crushed and added at the point of impounding water (water body) for irrigating rest of the paddy. The seeds of *Garyota urens* ('Kitul') are crushed and added to water at the field entry point to destroy paddy damaging worms. The leaves of *Pongamia pinnata* ('Karadha') and *Crotalaria retusa*

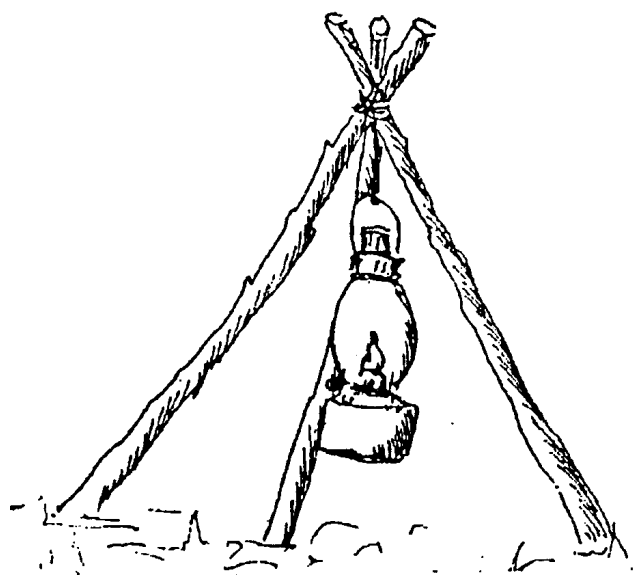


('Keppitiya') are added to paddy soil to control rice pests.

Cycas circinalis ('Madu') *Cymbopogon citratus* are planted and hung around paddies; farmers believed they emitted odours that repelled certain rice pests. Again, to control rats, pieces of raw *Garica papaya* are spread in paddies. The farmers believe papaya has a chemical substance, causing tissue damage in rats' mouths. Farmers world over, use wood ash, but those interviewed found *Lcymbopogon nardus* plants particularly effective in controlling *Spodoptera mauritia* ('Gedawella').

Mechanical methods

Food and oil lamp traps are the major means of mechanical pest control in addition to other cultural practices such as soil cultivation. Regardless of the methods used, integrating newly introduced technology with indigenous strategies



¹Senior Lecturer, Department of Geography, University of Sri Jayawardenepura, Nugegoda, Sri Lanka

²The role of weeds around crop field in harbouring predators in attracting attention of the scientists too: I'd

Caring for the predators of pests: Letting nature be nurturer !

Dr. Rohana Ulluwishewa

Traditional Sri Lankan farmers know that the rat snake *Ptyas mucosus* is a beneficial creature. This non-venomous snake is one of the most important biological agents for the control of small mammalian pests in paddy fields and is therefore never harmed by farmers. They in fact help the snake by creating and protecting breeding sites for it. The rat snake needs a wooded habitat or dense thicket where its young can be safe. One such habitat is around pools maintained at ends of paddy tracts where water drained from the fields collects. The same habitat also houses another friend of the farmer a lizard, *Varanus salvator* which lives on fresh water crabs that weaken and destroy bunds around paddy fields.

The farmers also encouraged the growth of aquatic fauna in the fields. The fields, normally kept flooded during the early stage of the growing season, provide a suitable habitat for many fish species which migrate here from the pools at the ends of tracts. As the fields dry out at harvest time, the fish die; only those in the pond survive. When the rains come again the fish in the ponds move to rain water streams to breed and from there they repopulate the waterlogged fields and as they grow, they devour the insect pests of the paddy plant.

The farmers also encourage spiders and in case of frogs, they may even go to the extent of collecting them from other places and releasing them in their own field. Also, if the farmers notice swifts (*Wehi lhinaya*) near their fields they keep away to let the birds have their fill of the pest *Nilaparvata lugens* (*'Keedewa*).

of pest control may, in fact, increase the effectiveness of both approaches. For example, a recent experiment carried out in India concluded that the use of white lights bulbs provided an effective element for pest traps (Widanapathirana, 1983).

The unfortunate conclusion of this study is one that has been found the world over: the farmers' knowledge developed through the ages and handed down through generations, is disappearing and is being replaced by what younger

agriculturists call "modern scientific knowledge." We must reverse this trend.

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Rain Prospecting on Ancient Beliefs

P R Kanani, V J Savaliya and B C Rawal¹

Farmers here believe the "sky" is a live laboratory as well as a "slate" where the future in relation to rain is clearly written in ancient literature. Therefore, the farmers only need to relate these tabloids in the sky to a form that is readily available to the community. The key to understanding the sky, therefore, is presented and passed on in a community's folklore, rituals and ancient literature. Professors Kanani and his colleagues are identifying ancient beliefs regarding rain and systematically testing them with what is presently known about rain.

Methodology

First they collected beliefs and folk-tales on rain from two ancient "Gujarati" books, "Prachin Varsha Vigyan" by Ratilal Adhvuryu and "Bhadli Vakyo" by J N Trivedi, and one "Sanskrit" book.

"Meghamala Granth" by Acharya Shri Vijaya Prabhusuriwar. They began their actual study in May 1990 by maintaining a register of daily observations on rain, the direction of the wind, cloud formations, humidity levels, lightening, sunrise and sunset, etc. They tested traditional beliefs on weather during 1990-91 by comparing them with the daily weather trends recorded in the register to see if there were any meaningful insights. The data of subsequent years are presently under analysis.

Findings

1. If the second day during the month of 'Jayeshtha' (according to traditional calendar) is roaring with rain and lightening, there will be no rain for the next 72 days.

During 1990, this prediction

¹Authors are working as: (1) Assistant Professor, (2) Agricultural Officer and (3) Associate Professor respectively at Department of Extension Edu., College of Agriculture, Junagadh 362 001.

from the ancient literature held true. In fact, after the stormy second day of 'Jaycshtha', there was not a drop of rain until 15th August, 1990 — a total of 72 rainless days!

2. If rain occurs in the 'Magha' constellation¹ it will rain in the remaining constellations (i.e. 'Purva', 'Uttara', 'Hasta', 'Chitra' and 'Swati').

According to official 1990 weather records, it rained in all the constellations following 'Magha', with 459.48², 22.59, 53.28, 133.26 and 73.06 in 'Magha', 'Purva', 'Uttara', 'Hasta' and 'Swati' respectively.

3. If the 11th day of the month of 'Ashadh', also called 'Devpodhi Ekadashi' falls on Sunday, Saturday or Tuesday, heavy rains will fall in areas that usually receive less rainfall.

This ancient forecast held true throughout 1990 in Banaskantha, Kutch and adjoining areas of Rajasthan (arid zone). During that year, a rainfall of 400, compared to the usual 100, was recorded.

4. If it rains during the last ten days of the 'Mrugshirsh' constellation, there would not be any rain in the remaining ten constellations.

During the 1990 monsoon season, it did not rain during the last ten days of the 'Mrugshirsh' constellations of 'Adra', 'Punarvasu', 'Pushya', 'Ashlesha', 'Magha', 'Purva', 'Uttara', 'Hasta' and 'Swati', rainfall amounted to 35.50, 30.26, 18.42, 21.29, 459.48, 22.59, 53.28, 133.26 and 73.06 respectively.

5. If it rains during the 'Adra' constellation the following constellation will experience lesser amounts.

This ancient forecast was also in line with the current data, Kanani and his colleagues recorded. During the 'Adra' constellation rainfall amounted to 35.50 while the rain during 'Adra', 'Punarvasu', 'Pushya' and 'Ashlesha' constellations amounted to 30.26, 18.42, and 21.29, respectively.

6. If there is rain on 2nd and 5th day of the first fortnight during the month of 'Ashadh', rain will appear on the 2nd fortnight as well as the first fortnight of next month called 'Shravan'.

During 1990, investigators recorded 5.00 and 22.08 of rain on the 2nd and 5th days of first fortnight of 'Ashadh'. During the second fortnight of 'Ashadh' rain amounted to 37.46 with 22.34 recorded during the first fortnight



of 'Shravan'.

Recommendations

1. Ancient and traditional agro-astrological beliefs recorded in the old literature and oral traditions of local communities should be accumulated and documented then tested in various agro-climatic zones in the state and throughout India. Folk tales appearing in the literature and local vernacular should be collected for future reference.

2. Projects that identify and test traditional beliefs on weather patterns and rain, or agro-astrological sciences, should be initiated. Such such projects should not be less than ten years in duration.

(It is obvious that results reported here are insufficient so far as statistically valid inference is concerned. We have included this communication only to share the kind of research which is going on in this region despite some of the earlier studies disproving the validity of many of the traditional beliefs in this regard. We also believe that due to large scale climatic changes, while some the beliefs might be valid, others might need modification : Ed).

¹The period of constellation is decided by the astrologer of the society who keeps their eyes on the planetary movements. The period of various constellation in relation to English calender is given here, for the rainy season, 1990.

Rohini : 25th May - 7th June
Magha : 16th Aug - 29th Aug.
Mrugshirsh : 8th June - 21st June
Purva : 30th Aug - 12th Aug.
Adra: 22nd June - 5th July
Uttara : 13th Sept - 9th Oct.
Punarvasu : 6th July - 18th July
Hasta : 27th Sept. - 9th Oct.
Pushya : 19th July - 1st Aug
Chitra : 10th Oct - 23rd Oct.
Ashlesha : 2nd Aug - 15th Aug
Swati : 24th Oct - 5th Nov.

²Rainfall is expressed in millimeter

Innovations from other Parts of the South Asia : A Perspective from the Hills of Bhutan

Dasho S Lam and Karma Ura¹

Although the HoneyBee staff makes every effort to provide the botanical names for all the practices we print. Unfortunately, at this time, we can only describe the following Bhutanese practices using local vernacular names. Plant samples are being collected so as to provide you with the more commonly accepted botanical name. In the meantime, interested people can write to author for clarification.

1. Worm infest both animals and humans. A pungent smelling mushroom, 'Silla' that grows in coniferous forests, is used as an effective deworming agent.
2. 'Gewang' is a solid substance found in the gall bladder of one out of hundred carcasses. It is extremely rare but highly valued in indigenous

medicine. The 'Gewang', bear bile and musk is mixed in equal proportion and believed to be a cure for all diseases.

3. The root of the 'Shutara' weed is used for flea and lice control in Bhutanese homes. The roots of 'Shutara' are cut into small pieces and kept throughout the house. 'Shutara' grows in the marshy areas of Bhutan.
4. The root of the 'Panpey' plant, is kept amongst stored clothes for worm, silver fish and moth control as well as for its pleasant odour.
5. In Bumthang, the mountain 'Lechum' tree bears small bitter red fruit. The fruit is ground and boiled alongwith tender reddish leaves then the leaves are dried and added to curry for flavour. The same procedure can be followed with spinach and Chinese leaves also.

Creative Farmers of Eastern India : A Learning Post in District Faizabad

We have set up a "Learning Post" in district Faizabad to monitor and learn from the contemporary experiments of farmers. There is a university in the region which for some reason has now decided to ignore this wealth of knowledge even though it took a keen interest in such things earlier. The region is considered economically quite backward. Through the insights gained from the "Listening Post" we intend to highlight that the reason the region seems backward is not because the people are resistant to change or inherently adverse to innovation. There are other institutional reasons apart from the technological and ecological limitations.

The enclosed map illustrates the variety of plotwise diversity documented in 1989-90. Charan Das Yadav, a young student resident of village Bhola - Ka - Pandey has communicated these practices as a part of our attempt to survey creative experiments in different ecological regions.

1. 'Gundhy' Pest (Melay Bugs) of paddy

To save paddy crops from 'Gundhy', farmers take a discarded cycle tyre and burn it. They drag it around the field and put it on the windward side. The smoke and smell is assumed to repel the pest.

2. Damage Caused by Wild Animals in Sugarcane

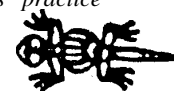
Jackal and other such animals harm the cane crop by biting, the cane about one foot above the ground. The cane is eaten less but damaged much more. Farmers have developed an indigenous way to trap such animals. They put 'Madhuca' flowers in an earthen pot tied to a pole. There is also a rope trap attached to the earthen pot so that when pulled, it ties a noose around the neck of the animal. In the night, animals get attracted by the smell of 'Madhuca' flowers. Once they put their mouth in, they can not take it out. When the pot is pulled, the rope noose tightens around the neck. In the morning, the farmer kills the animal and hangs it in the field to deter other animals.

3. Rodent Control : using Trap Crops

Fruits of 'Kaitha' (*Limonia acidissima*) are plucked, and pieces are scattered around the field. Rats get attracted to these pieces, but when they eat them, their mouth turns sour and they leave the crop undamaged. Another method to control rats is to spread leaves of 'Sarpat' (*Cenchrus munjo*) around the border of the field. These leaves are sharp edged. When the rats move over them on entering the field, their stomachs are cut by the leaves and they die.

4. 'Kharia' Disease of Paddy

Several old practices continue to be practiced for the control of 'kharia' disease. Pigs are made to move through field, 'Sada Bahar' plants are planted on a particular day in the fields early in the morning. Sometimes salt is sprinkled on the field. The efficacy of these methods remains to be seen. (*Dr. Mayuya, Dean, NDUAT, Kumarganj had also observed this practice earlier : Ed*)



¹Senior Retired Officer and Senior Planning Officer respectively, Planning Commission, Royal Government of Bhutan, Post Box. 127, Thimpu, Bhutan. Also, Mr. Karma Ura is the Editor of the 'Dzongkha' (Bhutanese) version of Honey Bee.

Women and Homestead Utilization : Insights from Bangladesh

The homestead is one area where most, if not all, rural women work. Therefore, the homestead is indeed a viable unit of analysis yet for many other reasons it is not. The Honey Bee believes that readers can better serve the interests of agrarian societies by appreciating and understanding the plurality of perspectives on innovation that exist within a household and in/around homestead. Our understanding can be increased by identifying the indigenous skills of women, for example, those involved in during pre-and post-harvest operations on farms, gardens, or livestock management. Much of the research on women's role in development has focused, most regrettably, on the problem of time allocation for different tasks. Such studies served a useful purpose in sixties and early seventies. In the nineties, these studies are surely out of place (notwithstanding the major donor support for this research in India and other developing countries). A more important and urgent need is to understand the role of women as experimenters and innovators in the tasks that are their speciality (Gupta, 1985, 1986, Nadira et al, 1986).



In most agrarian cultures women play a major role in the collection and preservation of seeds - this constitutes a major human contribution to biodiversity. In Bangladesh, for example, rural women preserve tomato seeds in mud balls, cauliflower seeds in polyethylene bags, while amaranth, chilli, and smoke-gourd seeds are wrapped in paper and stored in tin cans. Rural women in Bangladesh sun dry water melon, cucumber, brinjal and bitter and smoke-gourd seeds. After sun drying (without washing) the seeds are mixed with various types of ash and stored within the mud walls of the household for future planting.

If we can conceptualize the inter-relationship between tree-crop-livestock-crafts and labour exclusively by or between men and women, we can generate hypotheses and develop an analytical framework for further testing. The above example of Bangladesh women and seed preservation could illustrate this point:

H1 : Different storage practices influence the vigor and viability of different seeds in storage.

H2 : Various sources of ash improve the viability of different seeds in storage.

H3 : The 'Shelf-life' of seeds depends upon the ash sources used during storage.

Examples of indigenous innovation that enable rural women to improve the productivity of their



existing resources we invited. We believe a first step in assisting women is to identify and research current factors that are stemming declines in productivity.

Research on role of women in homestead management was guided by Prof. Anil K Gupta during his term as Farming Systems Research Advisor in Bangladesh in 1985-86. About 28 female scientists of different divisions of Bangladesh Agricultural Research Institute (BARI) collaborated in the research. They had genuine complaints concerning the seminar presentation of results. The entire synthesis was done by male scientists as if female scientists were only good enough for data collection. Even worse consequences followed when several of the collaborating scientists did not acknowledge the role of excellent women researchers in the follow-up research projects and publications. Though some of the international scholars like Gellia Castille (then at IRRI) considered the BARI research programme the most systematic and advanced of its kind at the time in South and South-East Asia. Nadira Begum, Dilruba, Manuar Husain, Zoinal Abedin, Fazabul Haque, N. Alam and several and other colleagues participated. More findings will follow in the next issues.

Workshop on Setting up Rural Rice Gene Banks¹

High yielding varieties (HYVs) yield high only when certain capital inputs such as irrigation and commercial fertilizers and pesticides are available. These are called highly responsive varieties (HRV too). Whereas the HYVs require uniform production and cultivation methods, the local skill used in traditional rice production that is handed down by word of mouth over generations, are being forgotten. When short term yield improvement goals led to diffusion of HRVs, the local varieties lost out.

These losses contribute to genetic erosion i.e. diminishing genetic variability. This variability is an important survival strategy for plants. Plant breeders draw upon this variability to improve crops. Rice, which originated in India, is one of the crops most affected by genetic erosion. And because India is the birthplace for rice it contains more genetic diversity than any other place in the world.

The Academy of Development Science (ADS) of Karjat in Raigad District, Maharashtra and the Indian Society of Rural Gene Banks held a two-day workshop on preserving local varieties. Dr. R H Richaria, former director of the Central Rice Research Institute in Orissa and who has researched on rice for over half a century, stressed the need to set up gene banks in every taluka (local government).

Bua, a local farmer trained by Dr. Richaria, demonstrated a simple method of cross breeding rice. Using alcohol sterilized forceps, Bua snipped the small pollen bearing structures of the rice flower, Farmer Bua gently brushed the pollen of another rice plant to achieve fertilization. The rice

ear was then covered with a plastic bag. Dr. Richaria explained how this "cross-fertilized" seed is then sown and as soon as the plant develops tillers, they are separated and planted individually. This process, called 'cloning' can be repeated as long as the plant is in the vegetative state. By repeating the process every 15 days a single rice grain planted in February can cover one acre of land and yield 20 kg of seed by November. The time of sowing and duration of cloning will vary with each variety.

Dr. Richaria and some participating farmers, from Raigad District, also explained and illustrated how to set up local gene banks. In fact one farmer attending the workshop claimed he had been growing 30 different varieties of rice regularly. His hobby is to collect rice from every place he goes to and grow it in his field. On reaching a new village the oldest farmer is contacted to find out about all the varieties that are (and were) grown there. Actual collection begins in farmers' fields by nothing all the physical characteristics of the rice plants; a sample of each variety is collected. The growing conditions and any particulars relevant to its production are noted. They collect six earheads of each variety along with an interview of the grower to get details such as taste, flavour, market demand etc. Two earheads are stored and the crops of four are sown in the "bank". Collections for rice seed usually start in September for early maturing types and continue through October to November for the late maturing varieties. In one year's collection, Dr. Richaria assisted farmers in Raigad were able to collect 365 varieties of which only 35 to 40 were on the documented list. The number of rice varieties that



have been documented in India is 60,000. If we extrapolate from the Raigad District to the rice growing region in the whole country rice varieties could number more than 2,00,000!!

Farmers have always experimented with their crops and methods of cultivation. Many rituals and cultural practices too have evolved to support and enhance indigenous agriculture. For example, it is customary for a bride to bring a gift of rice seed grown by her family to her new husband's home. The rice is sown by her husband's family to her new husband's home. The rice is sown by her husband's family along with their own local varieties. In the tribal regions of Bastar local farmer bring their best seeds from their current rice crop to a local priest called "Baiga". All the farmers sit in a circle while the Baiga chants. Arbitrarily, the priest waves his hand and strikes the seed in front of a particular farmer. Every farmer goes to the house of the man identified by the Baiga and takes some paddy seed to plant along with their own next season. In one instance, Dr. Richaria also collected some seed from the farmer the Baiga selected and planted it in an isolated field. At harvest he found not a single earhead bore any grain. Apparently the Baiga had selected a male sterile line. Such a crop when grown in a field with others gets cross fertilized and thus upgraded. Practices such as this along with traditional seed varieties must be preserved.

¹ Reported by Sumati K. Sampremane, Science Journalist, 49 Patrakar, Bandra (East), Bombay 400 051

Honey Bee Hums

The Editors of the Gujarati version of the Honey Bee viz : 'Khedut Anubhav Vani'¹ (Vol 1(1), 1992) solicited comments from colleague at Gujarat Agricultural University

(GAU) campus at Sardar Krushinagar. Some of the practices listed below, include comments provided by Drs. I D Patel (Rice Research Station Scientist), K D Solanki (Assoc. Prof. College of Agriculture), L R Patel (Training Assoc.)and J A Patel (Dryland Project).

1. Sowing Methods

a) Castor

In the village Jangra, North Gujarat, farmers are experimenting with cultivation of castor as a 'ratton' crop (lopping off a plant, but leaving enough base for regrowth) by 'dibbling' (manual soil drilling for seeding) the seed at 240 cm x 240 cm x 240 cm in pits of 30 cm x 30cm size filled with manure, castor cake and diammonium phosphate. Farmers also grow lucerne (*Medicago sativa*) as an intercrop for seed production.

b) Cabbage

Ratooning of cabbage is followed in Deesa area. First harvesting of September transplanted crop is done in the month of November and the ratoon is taken in December. Four auxiliary buds develop after harvesting.

Source : Status report of North Gujarat, Vol. II, GAU

2. Plant Protection

a) Dust as a Diseases Preventive

Farmers grow cumin (*Cuminum cuminum*) in roadside fields to take

advantage of dust that sellers on the crop. They believe dust absorbs moisture and makes the crop less vulnerable to diseases. For the same reason the crop is grown on sloping lands also. Comm: Dr. I A Patel

b) Fumigation in Chilli and Mango

To prevent malformations (viral or otherwise), fumigation of 'Gugal' (gum of *Boswellia serrata*) is practiced in chili and mango crops Comm: Dr. J A Patel.

c) To Improve the Quality of Fruit and Vegetables



Residue of clusterbean (*Cyamopsis tetragonoloba*) is incorporated into soil around the 'Ber' (*Zizyphus spp*) tree to improve the quality of fruit, in Langanej, Mehsana taluka. Farmers apply castor oil in the furrow prior to planting okra (*Abelmoschus esculentus*) in Jagudan, Mehsana District to enhance the luster of its fruits. Comm: Dr I D Patel.

d) Treating Seeds to Deter Stray Animals

In Kheda District there is a practice, now rare, of treating sorghum seeds with 'Arani' (*Clerodendrum multiflorum*) leaves prior to planting 'Rabi' (winter crop). Farmers believe 'Arani' leaves are highly toxic (HCN?), killing animals almost immediately upon

consumption. Farmers also use this practice to control smut disease but, of course, do not use this practice in fields near their homes where their own cattle may enter. Comm: Dr. K D Solanki.

3. Seed collection and storage

a) When farmers store pulse grains in earthen containers, the grains are covered with layers of fine sand and wood ash for protection from the grain pests. It is an age old practice Comm: Dr. I R Patel.

b) Farmers in the Kheda District cut the brinjal (*Solanum melongena*) fruit vertically into few pieces, soak it in water for a few days and then separate the seed from the fruit by straining through a mesh Comm: Dr. I R Patel.

4. Soil Conservation

In Kapadwanj, Dehgam and Thasara talukas (irrigated sandy loom soils) a mixture of 'Kodra' (*Paspalum scrobiculatum*), 'Nagli' (*Eleusine coracana*) and 'Bhindi' (*Hibiscus cannalinus*) seeds are broadcast on the bunds for soil conservation. Comm: I R Patel.

5. Animal Husbandry

a) Tick Infestation

Ticks burrowed into an animal's udder are treated with local applications of salt mixed with castor oil Comm: Dr. I R Patel.

b) "Subabul" Seeds as a Food Additive

'Subabul' (*Acacia spp*) seeds added to livestock's feed, increases milk yields and fat content. Comm : Dr. I R Patel.

¹ Edited by Dr. B T Patel Dr. Kalyanasundaram and their colleagues from Gujarat Agriculture University, Sardar Krushinagar 385506, Gujarat, India

Survey of Farmers' Innovations in Gujarat : Part V

Anil K Gupta and Kirit K Patel¹

In this part of our continuing series on innovations in Gujarat, we present 29 practices out of which 18 deal with animal husbandry and rest with agriculture and related practices.

We wish to first mention in brief the way we conceptualize the process of innovation (for details see Gupta and Patel, 1992, Survey of Innovations for Sustainable Development. Do methods matter? IIMA Mimeo) followed by some aspects of the innovations documented in this issue.

Process of Innovation : The process is neither random nor entirely purposive. While a proper taxonomy of the innovations remains to be developed (and we are working on it), we intend to briefly review some of the important dimensions emerging from our work.

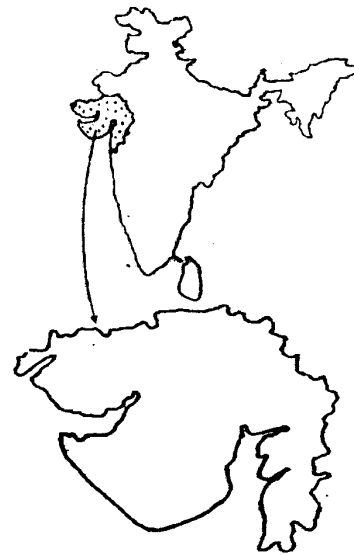
The process can be classified into five categories viz: (a) **Conceptual transformation**, (b) **Improvisation**, (c) **Accidental or serendipity**, (d) **Collective or individual processes**, (e) **Triggering new metaphors**, (f) **Funny processes, and Institution for humour**. These processes can manifest in several ways - religious, cultural, socio-economic and political. Each one of these may be multi-dimensional and may involve underlying agronomic or biological logic.

Various innovations may draw upon different kinds of materials for example botanicals (plant derived compounds), locally available compounds, chemicals or species, modern manufactured inputs, various kinds of wooden, iron or earthen artifacts, biological organisms or micro organisms, various kinds of fumigation, etc. In addition farmers may use different physical mechanism to transform the context of the problem. This is just an illustrative list because most innovations go beyond just the materials.

If we analyse any innovations, it may require, a) **Materials**, b) **Proportion** and c) **Principles**. Any indigenous recipe draws upon some materials often available locally and having been used repeatedly. These materials are combined in specific proportions derived through theories (for example as given in Ayurveda) or through hit and trial. Certain principles determine the conditions under which the given materials and the proportions are supposed to work. Not all these principles are analyzable in the context of modern nationality. Although rationality may be inherent but it may not be utilitarian in nature. The logic may be philosophical or cultural. For instance certain practices may have to be done in a particular condition of sanitation. It may be difficult to specify those conditions. Therefore the practice may require that the person takes bath and wears either new cloths or washed cloths. In some cases the conditions might be pure superstitions.

The principles also imply the complementarily or contradiction between different technologies, recipes or practices. In this sense the principles are the underlying theory. Though it may not be articulated very precisely. The principles therefore provide the context. The materials and proportions provide the content.

To illustrate the above, control of Foot and Mouth disease widely covered in the columns of this newsletter may involve several materials like plant extract



local chemicals, agro-bye products, fumigants like various kinds of leaves and gums, sand etc. treatment may be applied externally given as an oral medicine, may be aimed at checking the secondary infections reducing the pain on account of viral infection, preventing infection further or acting as an antidote to the infection. The ratio of different compounds and dosages of treatment are always given. Principles underlying the methods and materials used may range from disinfection increasing the vitality of the animal health to increase its capacity to fight the infection or some other biological processes. The challenge to readers is to help in experimentally discovering the causal mechanism of the process as well as materials. To say as some did that viral diseases can not be controlled and thus entire repertoire of the farmers is wasteful and does not take us very far on the scientific approach of carrying this dialogue.

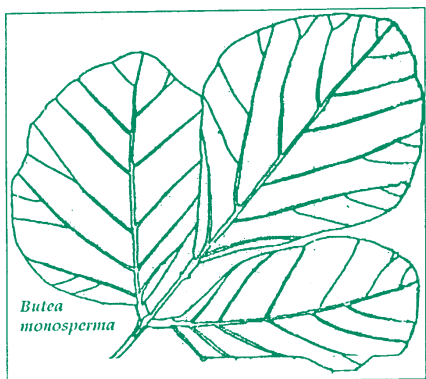
In this survey we also have some practices for curing leather which we did not report earlier. We look forward to hear from the readers about the follow up actions they propose or reaction to the ideas mentioned in this note.

¹ Professor, Centre for Management in Agriculture, and Associate Editor, Honey Bee, respectively at Indian Institute of Management, Ahmedabad - 380 015, India

Agricultural Practices

4101. Improving Soil Texture

Turmeric and ginger, which require fertile and well-drained soil, are grown in winter in Panch Mahal district. To make preparation of the heavy soil easier, farmers spread leaves and twigs of 'Mahuda' (*Madhuca indica*) over field and burn them. The field is then tilled and irrigated before sowing. This practice has existed



for at least 25-30 years. Recently farmers began to use 'Khakhra' (*Butea monosperma*) leaves along with 'Mahuda'. (farmers also use 'Mahuda' seed cakes as soil amendments)

Damor Manilal Sartanbhai, Vill: Rena, Tal: Shahera, Dist: Panch Mahal, Comm: Babhor Karansinh B.

4102. Enhancing Germination

To advance germination of coconuts, farmers place them in the standing water of an open irrigation well. After only one month or so the sprouted nuts are transplanted to the field. (Same practice has been reported in Kerala one of the major coconut growing state : ED)

Vadoliya Ramjibhai Narsinhbhai, Vill: Kesariya, Tal:Una, Dist: Junagadh, Comm:Dabhi Premaji G.

4103. Water Detection

To indicate sources of water for well drilling several tree species, such as 'Vikla' (*Maytenus emarginata*), 'Kanthar' (*Capparis sepiaria*), 'Bordi' (*Zizyphus mauritiana*), 'Harmo' (*Peganum harmala*), 'Vad' (*Ficus benghalensis*), 'Khijda' (*Prosopis cineraria*) and 'Rayan' (*Manilkara hexandra*) are reportedly useful. The chances of finding water are believed to be even greater if the well hole is drilled near termite burrows or nests of 'Sahudi' (a wild animal found in fields in this area).

Manubhai Keshubhai Akbari, Vill: Bhad (Vikiya), Tal: Khambha, Dist: Amreli, Comm: Dhabhi Premaji G.

4104. Storage of onion bulbs

Onion bulbs can be stored for up to a year. Bulbs are sorted to remove the damaged ones. The good bulbs are stored on a platform that is raised 2-3 ft above the ground. The platform is made of bamboo strips that are loosely woven so as to allow free air movement. Bulbs are piled 2-3ft high onto the platform and protected from sun and rain by a cover. (Compare this to the much celebrated "diffused light storage system" of Center for International Potato (CIP): Ed).

Baraiya Bhimajibhai Babulbhai, Vill:Kapat, Tal:Una, Dist:Junagadh, Comm:Dabhi Premaji G.

4105. Insect Pest Control

a) Surface Grass Hopper in Sorghum

Surface grasshopper, locally called 'Khapedi', infects sorghum during the monsoon season. Fresh 'Aag Futla', fruits are collected when still green, crushed in water,

and then filtered. The liquid is sprayed on the crop and begins to take effect in 4-5 hr. This practice continues unaltered since time immemorial. 'Aag Fultra' is a creeper with transparent white flowers and grow in bedgerows. The fruit is a berry and resembles the fruit of 'Tindola' (*Coccinia grandis*).

Vasava Dhanjibhai Vittalbhai, Vill: Kakadkut, Tal: Valiya, Dist:Bharuch, Comm: Chauhan Vijaysinh A

b) White grub in Fruit Trees

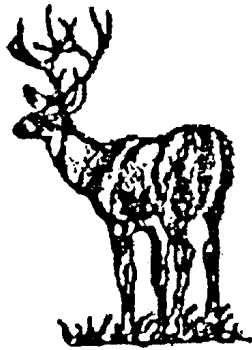
The white grub bores into coconut trunks and reduces the quality of nuts. Severely infected insect dies. A concentrated solution of jaggery is prepared and poured in and around the grub holes to attract ants. Ants are the natural predators and so reduce populations of white grub. From a long history of use, the farmers of Saurashtra report that this practice is very effective and free of harmful side-effects.

Mango, farmers use a similar practice to control beetle larvae that harm trees by boring into the trunk. A mixture of ghee (clarified butter oil) is poured in the holes to attract ants. Other techniques also exist, e.g. the larvae can be pulled out using a wire loop. (The practice of closing the holes by cement has been refined as technology by the scientists at Indian Agricultural Research Institute (IARI), New Delhi. another instance of simultaneous innovations and science behind farmers technology : Ed)

Patel Jadiben Bhanwanbhai, Vill: Nava Nesda, Tal: Deesa, Dist: Banaskanta, Comm:Raval Munjibhai B and Rabari Narsinhbhai Rajabhai, Vill: Alindra, Tal: Mendarda, Dist: Junagadh, Comm: Rojara Mansukh V.

c) Protect Crops from ungulates such as deer

In the Gir forest, large ungulates such as 'Haram' (deer) or 'Nilgay' (blue bull) can cause extensive damage to crops. To defer this feeding and trampling lion excrement collected in the forest is sprinkled along the boundary of the farm.



Bhikhabhai Maganbhai Makvana, Vill: Prempava, Vill: Visaea dar, Dist: Junagadh, Comm: Pithiya Laxman A.

d) Fruit Fly in Mango

Mango is vulnerable to a fruitfly, locally known as 'Talmakhi', that injures the fruit and causes premature drop. The infested fruits are disposed of by burial. To deter the appearance of the pest, basil (*Ocimum santum*) is planted throughout the orchard.

Thaker Popatji Thonaji, Vill: Juna Nesda, Tal: Deesa, Dis. Banaskantha, Comm: Raval Munimjibhak B.

e) Caterpillars in Castor

The Gujarat hairy caterpillar (*Amsacta* sp), locally known as 'Tunkani,' causes severe damage to the castor crop during the monsoon season. Roasted seeds of maize or sorghum, locally 'Dhanni,' (approx. 5 kg/acre) are broadcast on the field. Reportedly, the caterpillar can be successfully controlled within one week. (Perhaps the seeds attract birds that pry on the caterpillars.: Ed.)

Rathod Mahobatsinh Sitaji, Vill: Kuriya, Tal. Harij, Dist.: Mehsana, Comm: Raval Jayesh B.

f) Rats in the Granary

Rats pose an ever present threat to stored crops. The cumin stems and leaves that remain after the grain is separated are mixed with the crop stacks in the threshing yard. The aroma probably helps repel rats. This technique can also be used when dry fodder is stored in the field. In this case, a layer of cumin chaff is placed at the bottom of fodder pile. (Cumin plants can also be used as a trap crop for controlling some of the pests. The nectar rich plants are known to attract predators of the pest (in Pimbert, 1988 Gupta, 1988): Ed.)

Amarabhai Dayalji, Vill: Kumbharli, Tal: Mahuva, Dist. Bhav Nagar, Comm: Dandhalya Bhargav K.

4106. Disease Control

a. Fumigation in Sorghum

Farmers always keep firewood on hand to protect their sorghum from 'Ratda' disease. The wood is burned in the affected field and ghee (clarified butter) is added to produce smoke that brings the disease under control.

Kuvarjibhai Chhgabhai Chaudhari, Vill: Kavchiya, Tal: Valiya, Dist: Bharuch, Comm: Chaudhari Vanjibhai I.

b. Viral Disease of Chili : Fumigation for Viral Control !



'Kukad', a viral disease spread by the white fly (*Beinisia tabaci*), stunts chili (*Capicum* sp.) growth. Farmers fumigate the crop by smoldering husks and broken grains of 'Kodra' (*Paspalum scrobiculatum*), a type of millet) during the evening when air is comparatively still.

Kalujibhai Dhyabhai Chaudhari, Vill: Pati Khaida Tal: Valiya, Dist: Bharuch, Comm: Chaudhari Vanjibhai I.

c. Disease in Cotton

When red spots appear on cotton leaves (in July or August) farmers dilute buttermilk with water and sprinkle it on the crop. When the application is made during the early stages of the disease, control comes within a week. This practice can also be used as a preservative measure.

Buttermilk is also sprayed on chili and brinjal crops to control 'Kukad' leaves disease. (See practice — and also see use of milk for control of Tobacco Mosaic Virus (TMV), Foot and Mouth Disease (FMD), etc in Honey Bee 3(2):2)

Popatbhai N, Pandya, Vill: Timana, Tal: Talaja, Dist: Bhavnagar and Nanubhai Valabhai, Vill: Reliya, Tal: Talaja, Dist: Bhavnagar, Comm: Dardhalya Bhargav K.

4107. Leather Technology

In the villages, only people of a specific caste are involved in the tanning of leather. The flaying and tanning is done at a site called 'Kund'. The hides are treated with plants locally known as 'Igoriya' (*Balanites aegyptica*), 'Dhamasi' (*Fagonia cretica*) and 'Aval' (*Cassia auriculata*). These are crushed together and suspended in water. The hides are soaked in this suspension for 15 days until the hides become smooth and durable.

(The use of training water for pests and disease control for plants as well as animals has been illustrated in this as well as previous issues of Honey Bee :Ed)

Parmar Ganeshbhai B. Vill: Akharathar Tal: Muli. Dist: Surendranagar, Comm: Rojara Mansukh V.

Animal Husbandry

4108. Treatment for Foot and Mouth Disease(FMD).

FMD is a contagious viral disease, that is characterised by development of ulcers on hooves and/or in the mouth. More than 20 different practices for curing of FMD have been given in previous issues of Honey Bee (Please see HB Vol.2:20 and Vol.3(2):20) and more are given here.

a. Hot Sand and *Azadirachta indica*

The infected animal is taken to a riverbed and forced to walk on hot sand. Then, a decoction of neem (*Azadirachta indica*) leaves is poured onto the hooves. A piece of cotton cloth is sometimes placed over the treated part to reduce evaporation of the neem extract.

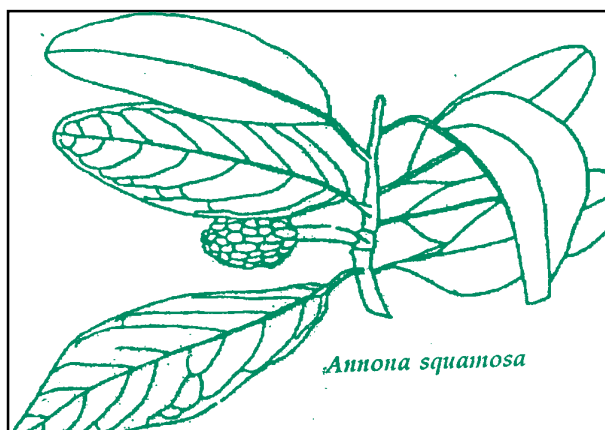
(TCL¹ : Walking on hot sand is painful and cruel. Also it infects wound hence it is not advisable. While decoction of *Azadirachta indica* leaves is local antiseptic and lusecticide which prevents secondary bacterial infection and maggot formation in the wound and heals ulcer. This is recommended)

(This wide spread practice in some parts of Karnataka also. Here, scientists have given their advice and farmers have provided the practice. What for readers say ? : Ed)

Narsinhbhai Bhgavanbhai, Vill: Digsar, Tal: Muli, Comm: Rojara Mansukh V.

b. Leaf extract of *Aristolochia bracteolata* and *Annona squamosa*

Fresh leaves of 'Kidamari' (*Aristolochia bracteolata*) and 'Sitaphal' (*Annona squamosa*) are taken in equal proportion and crushed together to make semi-liquid paste. This paste is applied to the infected hooves, and reportedly cures the disease within three days. There are no ill side-effects.



This practice has been used for years. (The custard apple leaves contain hydrocyanide (HCN) which might be toxic for the virus: Ed)

Mer Ravjibhai Somabhai, Vill: Krishnapura Tal: Talaja, Dist: Bahvnagar, Comm: Dhandhalya Bhargav K.

4109. Prolapse of Vagina in late Pregnancy

In cattle, the vagina sometimes prolapses in late pregnancy before calving. As treatment, juice is extracted from fresh onions by chopping and

pounding. The prolapsed part of Vagina is washed with this juice as a disinfectant and then carefully pushed back into place. A leather shoe or 'Chappal' (also disinfected we suppose :Ed) is used when pushing against the surface of the Vagina. The animal is then forced to stand and fed the tuber of the elephant foot plant, locally known as 'Suram' (*Amorphophallus campanulatus*). About two or three kg of this is cut in small pieces and given along with other food. It is believed that this plant extract helps in fixation of the ulcers. Sometimes a thin rope is tied around the body in form of the net so as to prevent recurrence of prolapse. Besides this, the slope of ground surface in the cattle shed is kept such that the rear of the animal remains higher than the front.

(TCL : Juice extract of onion bulb is antiseptic but irritant hence not advised. Carefully pushing back of the prolapsed mass is a standard treatment but the use of leather shoe or 'Chappal' is an unhygienic and may lead to infection or injury, which may induce further prolapse.

After replacement, the animal is forced to stand which relieves the pressure in abdomen and helps in retention of the prolapsed mass, hence is recommended.

Feeding of tuber of *Amorphophallus campanulatus* has multiple actions since it is stomachic carminative, tonic, emmenagogue (stimulating action on uterine fiber) nutritious and

Comments given by technical committee on livestock and veterinary science (TCL), consists of Drs. P.R. Patel, F.S. Kavani and M.B. Pande from Gujarat Agricultural University, Sardar Krushinagar - 385 506, Gujarat India. We invite readers to give their reactions.

hemorrhoids (arrest bleeding). All these properties directly or indirectly help in overcoming this problem.

The application of the rope in the form of net around and over the vulva region is known as "thrust". This is the standard scientific practice to prevent recurrence of prolapse.

While keeping of the hind quarters of animal at higher elevation by making the slope on the ground surface reduces the pressure on abdomen which helps in retention of the prolapsed part.

(This is another instance where scientists find, so much to command in an existing farmers practices. Why then the veterinary extension can not built upon it ? : Ed)

Patel Ramajibhai Karshandas, Vill: Vanod, Tal: Patdi, Dist: Surendranagar, Comm: Charkata Babu G.

4110. Advancing the Onset of Puberty Heifers

Pearl millet and 'Math' (*Vigna aconitifolia*), 10kg of each are boiled in water and fed (in accordance with normal intake) to the heifer over a period of eight to 10 days. This treatment reportedly produces the heat in an animal's body that is necessary for the onset of puberty.

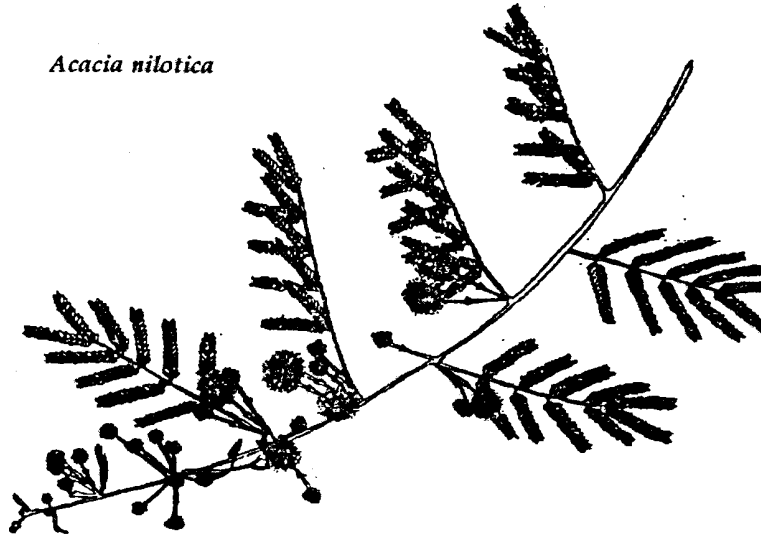
Harshadbhai Manilal Patel, Vill: Morvad, Tal: Vijapur, Dist: Mahesana, Comm: Patel Ramesh A.

4111. Retention of Placenta After Calving

It is believed that the cause of the problem is a deficiency in some essential nutrients that provide proper development of the uterus. To induce the Placenta, or

fragments that sometimes remains to drop, fresh flowers of 'Mahuda' (*Madhuca indica*) are crushed and heated in a vessel over a gentle flame until it becomes sticky and greenish in colour. If fresh flowers are not available then dried flowers are soaked in water and used. This is given (quantity

Acacia nilotica



unreported : Ed) after calving along with 500g of an extract of the fruit of the plant called 'Kokam' (*Garcinia indica*) and 2-3 kg of cooked rice. This should induce the placenta to drop within 2-3 hr. Larger quantities of 'Kokari' may be toxic. About 60-70% of the cattle farmers in Savli Taluka use this treatment. Farmers say that animals that graze in pastures where *Madhuca indica* grows are usually free of this problem; hence the origin of this idea. It is also believed that this food causes contraction of the uterus. (This practice offers an interesting clue about the causal route of indigenous innovations. "Compare and Contrast" used as an analytical rule provided the spur for this innovation :Ed)

Another approach for inducing the placenta to drop is to feed, after calving, dry fodder along with one kg of pearl millet or wheat mixed with ghee (clarified butter)

and offer hot water for drinking.

Abhesinh Mayajisinh Parmar, Vill: Choryana Muvada, PO: Sandasal, Tal: Savli, Dist: Vadodara, Comm: Parmar Pravin D.

4112. Skin Disease

Cattle often suffer from skin diseases characterised by hair loss and rough, hard skin. A paste is prepared by adding water to the scraping of the inner portion of the bark of

'Baval', (*Acacia nilotica*). Application of this to the affected area is continued for 7-10 days. This method has been widely used in this region for many years.

Kalubhai Lilabhai, Vill: Rena, Tal: Shahera, Dist: Panch Mahal, Comm: Bhabhor Karansinh B.

4113. Removal of Tumour

Painful tumour, the size of the beetle nuts or larger often appears on the neck. Leaves and fruits of 'Dhaturo' (*Dhaturo* spp) are pounded and mixed with jaggery (cooked and crystallized sugar cane extract) and pasted over the tumour. After two or three applications the tumour usually bursts. Healing of the treated area even the surrounding healthy skin, occurs slowly. Thus, precise localisation of treatment is required.

Vankar Jethaji Mohanji, Vill: Indran,

Tal: Bayad, Dist: Sabarkanta Comm: Makvana Kanusinh K.

4114. Broken Horn

Fresh branches of 'Shimala' (Bombay ceiba) tree are stripped of their bark crushed and mixed with flour of 'Nagli' (Eleusine coracana) grain. One part of 'Shimala' and two part of 'Nagli' are made into a semi-liquid paste. Long strands of human hair are tied around the broken edge of the horn. Then the preparation is pasted over the hairs and a bandage tied over this. It is left undisturbed till 20-30 days. This practice has been used for ages by most of the people in the village Kavachiya.

Chaudhari Kuvarjibhai Chhaganbhai, Vill: Kavachiya, Tal: Valiya, Dist: Bharuch, Comm: Chaudhari Vanji I.

4115. Diarrhoea Remedies

a. Ventilaflo denticulata Roots and Syzgium cumini Bark

A mixture of 'Asul' (Ventilaflo denticulata) roots and 'Jambu' (Syzgium cumini) bark is crushed and given with water to suffering animal. A cure can be expected within 2-3 days. 'Asul' is a creeper found in hedgerows throughout the year and 'Jamun' is a common tree.

b. Decoction of Soymida febrifuga

Fresh leaves of 'Royan' (Soymida febrifuga) are crushed and soaked in water for 1hr and this concoction 100-150 ml is given to the animal. Results begin to appear in 24 hr. This remedy has a long history in this region.

Patel Kalabhai Dalsukhbhai, At & PO: Bori, Tal: Shahera, Dist:

Panch Mahal, Comm: Bhabhor Karasinh B.

4116. Healing of Wound

a. Curd and Natural Indigo

A mixture of curd (100-150g) with natural indigo (25g) is applied once in a day to open wounds, such as yoke galls in bullocks. The practice is widely used in this region and has no ill side-effects. Unfortunately, natural indigo (Indigofera spp) is now difficult to find.

(Vijaya Sherry Chand comments : the seeds of Indigofera articulata have antithecmenthic properties and leaves of Indigofera linnael are used on scales and burns.)

Parmar Kalubhai Somabhai, Vill: Vejpura, Tal: Savli, Dist: Baroda, Comm: Chauhan Vijaysinh A.

b. Specially Prepared Ash

Leather of discarded shoes



Syzgium cumini

(cut into small pieces), one half of a coconut (the white inside part), and a small quantity of tar are burned together. A paste of the ash is prepared by adding water and applied to the septic wound. This treatment helps in healing and in keeping away flies and other insects. (In some places, water from leather tanning ponds are similarly used for keeping away insects. : Ed)

Rudiben Keshubhai Patel, Vill: Mandra, Tal: Shihor Dist: Bhavnagar, Comm: Ms. Pandya Neha K.

c. Leaves of Annona squamosa and Momordica charantia

Leaves of the 'Sitafal' (Annona squamosa) and 'Kareli' (Momordica charantia) are crushed into a semi-liquid paste and applied to the animal's wound. This technique has been used for years in this region as an antiseptic.

(Vijaya Sherry Chand's comments : The leaves of Annona squamosa contain traces of hydrocynic acid; the leaves, unripe fruit and seed contains alkaloids)

Parmar Kalubhai Somabhai, Vill: Vejpura, Tal: Savli, Dist: Baroda, Comm: Chauhan Vijaysinh A.

d. Fresh Jaggery from the processing unit

Livestock often suffer from ulcerated hooves after walking on hilly, rocky terrain or on tramac. Farmers collect jaggery from the sugarcane processing while it is still hot and paste it on the affected hooves approximately 25g per hoof. The application is repeated three times per day for 2-3 days.

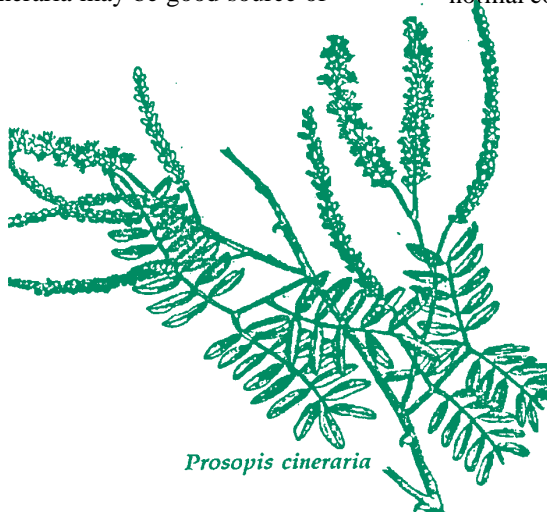
Jambhucha Devajibhai Kanjibhai, Vill: Kantala, Tal: Ghogha, Dist: Bhavnagar, Comm: Dhandhalya Bhargav K.

4117. Feeds and Fodder

a. To Increase Milk Production

Pods of 'Khijada' (*Prosopis cineraria*) and 'Baval' (*Acacia nilotica*) trees are fed in combination to dairy cattle to increase the milk yield. (A very widespread farmers practice : Ed)

(TCL : Pods of *Prosopis cineraria* may be good source of



Prosopis cineraria

energy and protein. No work has been done on the subject but there is no harm in feeding. While pod of *Acacia nilotica* is nutritious feed and it is recommended in combination of other food.)

Nathiben Gandabhai Dudharejia, Vill: Munjpur, Tal: Vadhan, Dist: Surendranagar, Comm: Rojara Mansukh V.

b. To Increase the Fat content of Milk

Feeding fresh promordia and immature cotton bolls to dairy cattle reportedly increases butterfly content.

(TCL : Immature cotton boll contains high fat, hence increases the fat content in milk. The cottonseeds

are laxative and galasctagogue which helps in milk secretion hence, it is recommended.)

Chanchiben Gandabhai, Vill: Dudhrej, Tal: Vadhvan, Dist: Surendranagar, Comm: Rojara Mansukh V.

c. Stress Feeds and Fodder

Stress feeds and fodders are mostly consumed during the scarcity period. Farmers believe that certain feeds and fodder of these category may cause harm to the animal health hence, they do not prefer to use during normal condition.

(I) Cactus and other xerophytic plants

There was a severe drought for three successive years during 1986 to 1988 that forced people to try many kind of local resources as livestock food for their animals. Cactus and other xerophytic plants after collecting were cleaned of horns, choppend into, small pieces pounce slightly and soaked in water. Later after draining off the water, mollasses and table salt were added for taste and the preparation was given the livestock. Not only did the animals find this food source comparatively tasty, it was also believed to be very nutrititious.

In Surendranagar District most people use the species locally called 'Dindliyo thor' (*Euphorbia* spp) a xerophyte that can grow even under severe drought condition. Some people in the Bhavnagar District are using 'Hathelio thor' (*Opuntia elatior*) which is commonly available in the field. These plants are lightly baked over the fire to burn off the thorns. The baked plants are then scraped to remove any remaining thorns and cut into smallpieces for animal food. (We would like to hear more about stress

feeds and fodders from the readers : Ed)

Chavda Ajmalbhai Ganeshbhai, Vill: Vaghada, Tal: Patdi, Dist: Surendranagar, Comm: Mori Vasubhai N, and Baraiya Bhimajibhai Babubhai, Vill: Khaput, Tal: Una, Dist: Junagadh, Comm: Dabhi Premaji G.

(II) Green fodder substitutes : Flower of *Madhuca indica* & cotton boll

During summer when green fodder is scarce the dried flowers of *Madhuca indica*, about 2kg, are boiled with cotton boll and fed to cattle. Only a few farmers in this region are using this practice. Feeding animals cotton seeds and seed coke is a much more common practice. Farmers believe that feeding cotton boll soaked in water makes seperation of butterfat from the animal's milk easier.

(Vijaya Sherry Chand's comment : cotton seed cake is high in protein but is unsuitable foe young calves because it contains a toxic element, Gossypol. Being Madhuka flowers are in rich sugar are used even in making country-wine. It is interesting to note that Indian Veterinary Research Institute, Izatnagar, recommends feeding buffalo with madhuca seed ('Dhodi') cake. This is prepared by soaking the cake in water for 2hrs and then mixing it with an equal weight of wheat straw of wheat brah, salt and jaggery.)

Parmar Gajubhai Gemabhai, Vill: Vejpura, Tal: Savli, Dist: Baroda, Comm: Chauhan Vijaysinh A.

d. Energetic Food for Bullocks : Dateplam Nuts

To increase performance of bullock that are working intensive farmers feed them a small amount of dried datepalm.



Letters to the Editor

Parmar Bhyjibhai Adabhai, Vill: Vejpura,
Tal: Savli, Dist: Baroda, Comm:
Chauhan Vijaysinh A.

R Chakraborty

Technische Hochschule Darmstadt
6100 Darmstadt, Residenzschloß, FR
Germany

I teach a course for graduate students on solutions to environmental problems in developing countries. I would be grateful if you could send me a copy of 'Honey Bee'. It would be very helpful for contrasting the conventional top-down approaches to innovation management with initiatives at the grassroots level as documented in your newsletter.

(Dr Chakraborty, we hope that you will become a member of the network and write about the experiments and innovations of organic farmers in your area : Ed)

Surya Gunjal

Head of School of Agriculture Sciences
Yashwantrao Chavan Maharashtra
Open University, College Road.
Nasik- 422 005.

Our open universities provides home based short term training and education for rural farmers on sustainable agriculture.

We adopt a "Prayog Pairwar" approach. In Marathi, it means experimenter's group. It is a group for experimenters, a group of like minded farmers with a common goal who have come together, study the latest technology on the subject, experiment among themselves and make appropriate alterations more applicable to field conditions.

While doing so what is new is combined with farmers, innovative knowledge, techniques so at field level are propagated by open education

through Prayog Priwar system and supported by a computerised system.

The knowledge and information thus generated would be easy to disseminate with the help of "Honey Bee". We are ready to start the 'Marathi' version of "Honey Bee". (Dr. Gunjal is perhaps collaborating with Winin Pereira, Center for Holistic Studies, 79, Carter Road, Bandhra, Bombay - 400 050 who is spear heading the efforts of Marathi version. We hope to hear you, about the experiments done by "Prayog Parivar". : Ed)

Rajeev Khedkar

E/05, Guru Prasad,
Arunodaya Nagar,
Mulund (East)
Bombay - 400 081

In all your writings one thing has impressed me deeply- "exploitation of knowledge". Almost everyone is extracting knowledge without compensating the people or community which contributed it in the first place. I am witnessed a tendency on part of so called "highly educated people" to "cash in" on the indigenous knowledge of local communities. I will be raising this issue at various meetings of our group which are involved in traditional medicine and genetic resources.

Any group which is working with a particular community should set up a fund for the benefit of that community. In the area of traditional medicine, the fund can be used to a raise a nursery to provide saplings of medicinal plants to the community, or purchase vessels and other equipments for the community to process medicines, or give a fellow ship to elevate the importance of local practitioners, etc.

I hope to learn more from others

experiences. Coming to genetic resources, I agree that we should argue from a position of strength. But what exactly constitutes position I am not sure as of now.

B N Bhatia,

286, Adarsh nagar,
Jaipur - 302 004.

My tribal groups and I will write to you again after absorbing the content and aims of 'Honey Bee'. My main concern is how to improve the productivity of assets of the farmers, I am associated with. They have a little land in the hill tracts, and add to their incomes through raising goats and selling milk products.

I work as an individual, therefore, my effort is small and limited. But I am one for self reliance and not for outside intervention. Therefore, I favour giving all rural development funds directly to panchayats. No doubt there will be some waste, but it will be very small as compared to money being wasted on bureaucracy and political administration which does not add any value to the village product.

Jyot Singh

36, Puram, Nepean Sea Road
Bombay - 400 006.

The dissemination of information about indigenous agricultural innovations is sadly lacking in our country and is the single most important cause for the backwardness of the farming sector.

(Dr. Singh, why not you test out some innovations or spread the word around!: Ed)

Ravi Santhivana

Vazhikilangara
North Parur P.O.
Kerala - 683 513.

Your approach to indigenous science and creativity is very

appreciable. Responses from readers and the so-called “**unskilled labourers**” has prompted my desire to go through earlier issues. Kindly send us the back issues for the benefit of my friends and visitors who consider small as beautiful. We have a few patches of natural forest, fortunately well-maintained for traditional serpent worship around here. We have been watching the peaceful co-existence among rare creepers and medicinal plants. We also employ weeds as indicators of soil conditions. (Ravi, we look forward to hear from you so that HB readers benefit from the local knowledge of Eco-indicators : Ed)

Subbiah Arunchalam

Central Electrochemical Res. Institute
Kararikudi - 623 006

I found Honey Bee most interesting and useful venture. As an editor and information scientist, I am familiar with collecting information and publishing research journals. What you have done, namely collecting the distilled wisdom of the common people and disseminating this among similar people who can actually make the use and benefit from it, is indeed commendable. (Dear Subbiah, I think I have seen your work on citation analysis and importance of Indian Science. Will you try to get scientists in CERI interested in developing some probes which can strengthen local experimenters. : Ed)

Dr P S Reddy

National Res. Center for Groundnut
Ivnagar Road, P.B. No. 5
Junagadh - 362 001 (Gujarat)

The information in your newsletter will be very useful to both researchers and farmers. I take this opportunity to congratulate you. (Dr Reddy, please take initiative to conduct experiment on farmers innovation and let us know : Ed)

Dr Jeffery W. Bentley

Zamorano, PO. Box 93
Tegucigalpa, Honduras

I have enjoyed reading Honey Bee and am passing them on to the agricultural scientists. Some of the information is really intriguing like milk for viral diseases.

I have spent five years now doing experiments with Honduran farmers two things impress me how creative farmers are and how difficult it is for agricultural scientists to collaborate with them. I have wondered a lot about how creativity works and who the thinkers are. At first I thought that only a few farmers were what I then called “**natural scientists**”. Later I thought they all had a propensity to experiment and recently I am coming back to think that while everyone may try out new varieties and tools that they see others using there are relatively few who invent new techniques. I was glad to see that you also believe in the importance of these “**odd balls**”. This year we gave a course in biological pest control to hundreds of farmers. At the end of the year we’re going to hold a workshop for the “**odd balls**” and see what kinds of things they can work out on their own.

Omar da Rocha Jr.

C/o Angola Desk
274, Banbury Road
Oxford OX 27DZ, UK.

I have just received three issues of Honey Bee which took nine months to arrive here. It seems that the global village is another planet hence I am giving above another address. I like very much your stimulating newsletter, plenty of ideas. Unfortunately very few people in Angola can read English where I am living and working we have no translator at all. The philosophy of the publication is very similar to ours, through the concept of “Intuitive Technology should be a spontaneous response to the challenge of life, supported of course by

experience and science. We aim to develop men rather than techniques. India Specially could help us with all your ancient knowledge of getting in with the inner source of oneself. Social organisation, popular education, empowerment, training, networking consciousness, gender, revolution etc. These words could be politically used if people are not in a process of awareness. Your image of Honey Bee is indeed very beautiful in its association of work and pleasure. Congratulations on your truly original focus and innovative work.

(Dr Omar : Honey Bee welcomes collaborators in Angola. We hope, HB reaches you faster this time. Please do send us examples of Angolan creativity : Ed)

A letter from eighty years old farmer to the editor of Oriya Version of HB - “Madhuchakra”

Madan Mohan Sahu

Nisarg Niwas
Paikamal, Sambalpur - 768 039
Dear Shri Rath Babu,

If we fully appreciate the traditional knowledge there would be no need to depend on borrowed technology. Since agriculture is moving in the wrong direction its future seems dark. If a farmer would become the Director of the Agriculture, he would give more weight to traditional practices. Similarly, if a herdsman were to be Director of Animal Husbandry we would not have the problem of ill-suited introduced breeds.

I write from my forty years experience as a farmer. It is a fact that there is difference in practice in agriculture from village to village as there is a difference in soil condition from one plot to another. Therefore, during the planning process our farming experience should be given more emphasis. I am unable to write legibly as I am over eighty. I am happy that people have started giving

News and Views

importance to the farmer's voice and intellect. Scientists even though it has taken long are beginning to realise that not all the farmers practices are unheard and non profitable.

International Workshop on Sustainable Agriculture

The United Planter's Association of Southern India (UPASI) will hold an international workshop on Sustainable Agriculture and The Environment at the Rubber Institute in Kottayam, Kerala during April 28-30, 1993. The workshop will provide a platform for scientists, farmers, government officers, academicians, the commercial sector and policy maker to share their experiences regarding sustainable agriculture and to establish a network to promote sustainable farming at all levels.

For further information contact :
Dr Jacob Mani Mannothe,
UPASI Research and Development
Center for Rubber,
Ancheril Bldgs.
Union Club Road,
Kottayam 686 001, Kerala.



Fellowships for those who 'feel' a sense of social commitment

Academy of Development Science (ADS) is a voluntary organisations engaged in applications of science and Technology for rural development. ADS is offering 5-year fellowships in the following fields to young professionals prepared to live and work in a rural areas :

- Plant breeding and genetics (rice and horticulture species)
- Appropriate technologies (Person should have hands on shop floor workshop skills)
- Learning oriented teaching methods and educational aids (for middle school education)
- Management systems (finance and marketing for small-scale agro processing unit)
- Botanist (specialised in taxonomy, interested in plant ecology)

The fellowship amount is modest but is enough to cover basic living requirements in a rural area. Only committed individuals with a desire to use their knowledge for service and have no major economic responsibilities or family expectations should apply.

Please send applications with particulars including fields of interest, name, age, health-status, qualifications and experience, family background and reasons for applying to:

Secretary
Academy of Development Science

Kashele P.O. Karjat Taluka,
Ralgad District,
Maharashtra - 410201
India

Serving Universities with traditional knowledge AGRUCO is the Agroecology programme of the University of Cochabamba in Bolivia. It was established in 1985 with the general objective to diffuse and sustain the use of biological agriculture systems. AGRUCO works with rural extension component of Non-Governmental Organisations (NGOs) and Governmental Organisations (Gos). The University has a holistic approach and its research methodology involves participatory technology development.

AGRUCO established a data base on local knowledge and local technologists by organising regional and national meetings aimed at modifying the academic curriculum by including FISA. Many NGOs are not familiar with the Low External Input & Sustainable Agriculture (LEISA) concept or AGRUCO's development approach. AGRUCO supports a network of 18 NGOs from Bolivia, Equador and Peru focussing on local technologies.

Every year AGRUCO organises a training course in LEISA for university in Bolivia. Results to date have been so positive that five universities already have a group of teachers initiating their own LEISA activities.

For further information please do write to :

Stefan Rist,
AGRUCO, Casilla 1280,
Cochabamba,
Bolivia

Book Worm

(We hope AGRUCO will join Honey Bee family and not collaborate with us to bring out Latin America version : Ed)

BOOKS

1. Asking the Earth¹ : The Spread of Unsustainable Development by Winin Pereira² and Jeremy Seabrook The other India Press: Goa, 1990.

Winin Pereira and engineer assisted by Jeremy Seabrook, put forth a compelling and thought provoking formulation of development in the “...Two-Thirds World for two-thirds of humanity live in what is commonly misnamed the Third World...” (p.v.) The authors vividly illustrate how “development” continues today where colonialism left off in the Two-Third World. Development is based on Western Science and technology which pre-empts any scientific formulations outside of its own parameters. This technological domination blankets and destroys whatever self-reliance the Two-Thirds World has left.

The authors hold British colonialism responsible for ‘much’ of the poverty in the Southern Asia, as many others before them have. But Pereira and Seabrook describe why Indians and other in the Two-Thirds World can only hold themselves responsible for their current state of dependency and poverty. Unless they discard the West’s culture based on unlimited growth, the few (whether it be those within the Two-Thirds World) will continue to become richer as the masses become poorer.

Only when the Two-Thirds World devise and employ solutions by

1. Received by Dr. William Gibson

2. Center for Holistic Studies, 79 Carter Road, Bandra, Bombay - 400 050

reclaiming and documenting their vast intellectual heritage can they break with their existing imitative and unsustainable patterns of development.

An old Indian Proverb asks, “Who sees the peacock dancing in the jungle?” Few do, but the beautiful dance is an integral part of the survival of the species. The authors cite this as an analogy to the countless indigenous communities with truly sustainable lifestyles which have survived for millennia without degrading the environment. But like the peacock’s dance, indigenous knowledge is crucial, not only to cultural survival, but to the web of life. For instance the authors (p.9) cite the Agni Purana (an ancient religious text) to show the importance indigenous people give to human-nature interdependence.

The planting of trees...(is) conducive to purgation of sin and enjoyment of prosperity. The supremely wicked man who cuts down trees and there by stops the passage (of water) to wells, ponds and lakes gets his family degraded and even his distant relatives dispatched to hell.

Thanks to still relevant but rapidly disappearing indigenous knowledge purveyed in local proverbs, rituals, myths and oral tradition we still see both the forest and the trees. But, warn Pereira and Seabrook unless we act soon we would not be able to see the forests for the simple reason that the trees are in our homes, offices and garbage dumps!!!

2. Krishi Marg Darshak (A Guide to Agriculture)

By Munshi Ragnathmal Rai,
Prabhakar Printing Press, Jodhpur,

1936 (out of print)

Ragnathmal Rai was a member of the Central Advisory Board and Assistant Superintendent in Revenue Department, Jodhpur Kingdom. He wrote several very important books such as **Krishi Tatwa Prakash (Elements of Agriculture), Akal Kasht Niwarak (Elimination of Distress caused by Drought)**. We will be reviewing these books in the coming issue because Ragnathmal Rai demonstrates an extraordinary insight about nature human interaction and a scientific approach to learning about improvement in agricultural conditions through experimentation.

In the book under review lie provides in Hindi dialogues between a student and a teacher about the way we make sense of what we observe and do not. For instance how do plants take their food and how do we find out which seed should be sown when and where. He links the conventional knowledge transmitted through oral traditions with the contemporary knowledge. Different kinds of soils need following at different frequencies to enable soil to recuperate its fertility. When we violate this principle the crops are weak, productivity is low and soil gets diseased. To find out which should be sown when, he suggests a simple experiment. Divide a piece of land into six equal parts. sow all the seeds available in each part in six seasons. Depending upon the growth of different seeds in different plots, their suitability for different seasons could be found out. Obviously there are more precise ways of doing this and therefore he adds folk saying underlying the importance of timely sowing. If the same crop sown in the same plot year after year then the yield is likely to be low. Using from “Gita” and other scriptures author raises questions about sustainable agriculture

and provides simple metaphorical and practical answers. For instance different micro nutrients required by the crop are described and need for replenishing the same is stressed. He adds (page 80) if a crop requiring a particular mineral is grown year after year then obviously the soil will become deficient in that nutrient. Hence the principle of crop rotation. Sesame after sorghum kidney bean after wheat or barley help not only in maintaining fertility but also in moving nutrients from one layer into another.

The book is a printer but with a difference. It teaches how to form land without impairing long term fertility of soil so that crops grown on health soil are healthy. It is a pity that in the wake of modernisation we not only ignored these lessons but also forgot about the pedagogy of learning through indigenous metaphors.

Reports

1. "Gramin Praudhogiki : Parmpargat avam Vartaman" (Rural Technologies: Traditional and Contemporary), May 1989

This is a report (published in Hindi) of a survey on rural technologies by Dr Bhartendu Prakash¹ and his colleagues in seven northern states in India. There are several distinctions in this survey. Unlike most research studies, it provides names of the people contacted in different villages from whom knowledge has been gained in the beginning of the book. The technologies are surveyed relating to food, health environment, energy, rural transportation, habitation and handicraft and village industries. The agro ecological conditions of the studied villages in different states are viewed in part one. Different ways of storing seeds and protecting them from pests are described. For instance the use of chemicals is reviewed just as the

practices of using dung ash, neem leaves, treatment by cows urine etc. are mentioned. The storage of fodder vegetables and use of farming practices is also reviewed. Design of ploughs with their dimensions used in different parts of the northern India are described. Similarly, the designs of hand tools are illustrated. The section which may be most interest to the students of indigenous knowledge is the one dealing with health and sanitation. The beliefs regarding food are documented such as what should be eaten or not after which other food. List of indigenous folk medicine for various ailments is provided both for human beings as well as animals. We will be reproducing the list of veterinary medicine practices in the future issues of Honey Bee. The section on environment includes the culture of maintaining tanks which is under considered erosion. Similarly reference is made to the medicinal properties of the water in some of the ponds which had rare trees around them. The varieties which have become extinct are also mentioned. Some of the early signals of the increasing pollution are listed. The most interesting part of the section deals with the ecological indicators as well as folk sayings about climate prospecting.

The book is an extremely valuable document which should be the basis of similar surveys at regular intervals all over the country. I hope that the author has sent a copy of this report to various villages which so generously provided the information.

Research Papers

1. We received an announcement from Dr Jim Duke, US Department of Agriculture Economic Botanist, duke that laments the pitiable state that the US finds itself regarding alternative herbal and food 'farmacy' (the term he

uses) therapies. It seems justified that he is puzzled by US Food and Drug Administration (FDA) policies that lead to confiscation of evening primrose oil, an indigenous plant, from an American food processing firm, but allows as a major ingredient, the use of the cotton seed oil in potato-chips both latter these species are introduced in the US. More and more he observes Americans find themselves unable to afford modern pharmaceutical even though their tax dollars support the development of said drugs. A case in point : **levamisole when used as a sheep dewormer costs \$14 US per treatment but when the FDA approved it for colon cancer treatment the pharmaceutical firm raised the price a hundred fold.**

Dr Duke laments that the US Government does little to emphasize the importance of preventive medicine. Regardless of the costs and efficacy to the patient, the pharmaceutical industry already one of the most profitable of all US industries prefer semi-synthetic derivatives to the natural product.

Since it costs over \$300 million to register a drug as safe and effective, economic forces promote this condition. While drug company wishes to invest millions to prove that an herb like fever feed, which people can grow in their gardens can prevent migraine it has obviously no interest in letting people take control of their health through local remedies.

Thus reversal of trend from synthetic to naturally derived medicaments will require government legislation. Duke is organising collective grass root action to affect such a change.

He intends to settle down in Latin America after retirement. He feels very depressed that US government is not more responsive to

1. Dr Bhartendu Prakash, Vigyan Shiksha Kendra, S.T. Communication Centre, Civil Lines, Lajwantika, Banda 210 001, Uttar Pradesh

the health need of it's own population. He strongly believes that indigenous herbal knowledge system of third world as well as the Indian and other local communities developed world could constitute a great deal towards low cost self reliant health care system (Dr Duke, Please keep in touch and keep up your spirit. Advocates like you will certainly strengthen the case of IPR of third world farmers : Ed)

2. Traditional Water Management Systems in India's Hilly Regions by Dr A Singh, Principal Scientist, Water

Technology Center Indian Agricultural Research Institute, New Delhi-110012.

India's water use has greatly expanded under agricultural irrigation systems. With this expansion centuries of knowledge and wisdom pertaining to water management has fallen in to disuse and is therefore disappearing. Environmentally sound traditional water management systems are institutionalized at the community level and continue to be operational because knowledge continues to be generated and is accumulated over time by its

users. Although these highly equitable and efficient systems and vanishing sustainable indigenous water systems still operate in more remote areas of India.

The following issues of the Honey Bee will print Dr Singh's work on traditional water management systems in hilly and valley regions. Dr Singh has documented indigenous techniques for land and nutrient management as well as community reforestation initiatives with forest vegetation and local resources use.

Subscription for the Honey Bee Network

Dear Readers

We have shared with you more than three hundred innovations and illustrations of farmers' wisdom in the last six 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. So far we have managed the network and publication of the newsletter through our own resources. The contribution received from India (Rs. 22000/-) and from abroad (US\$ 300) have totaled to a sum of Rs. 31000/-. This meets hardly to cost of editing & printing of one issue (2000 copies). We will continue to send this to all those who like to contribute to the growth of idea in cash or kind (by sending articles, reports and news about people's creativity and innovation for sustainable technologies and institutions).

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., active.

Category	International	National
<i>Annual Membership</i>		
Patron	US\$ 200 or above	Rs. 2000/- or above
Supporter	US\$ 50	Rs. 500/-
Scientist/Professionals	US\$ 30	Rs. 120/-
Foreign aided NGOs	US\$ 25	Rs. 200/-
Farmers/NGOs (without foreign aid)	US\$ 10	-Large Rs. 100/- -Small Rs. 50/-
Students	US\$ 5	Rs. 20/-
Unemployed Worker	Free	Free
Institutions/Libraries	US\$ 100	Rs. 2/-

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 **SRISTI** C/o, Prof Anil K Gupta, Indian Institute of Management, Vastrapur, Ahmedabad - 380 015, India