PROCEEDINGS OF THE SEMINAR

ON

SUSTAINING RURAL LIVELIHOODS

5TH & 6TH FEBRUARY 2002
BANGALORE

ORGANISED BY

GREEN FOUNDATION

&

NATIONAL INSTITUTE OF ADVANCED STUDIES

Given by Dr. Vasavi of NIAS

19/2/02

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CONCEPT NOTE:

Farmers committing suicide, ever-expanding groups of people migrating to the cities, angry farmers destroying unsold fruits and vegetables, riots at the grain markets as prices collapse, a public interest litigation to enforce the government to provide rations, and the use of unregulated GM cotton seeds.

All these and more are testimony to the intense and widespread crises that are gripping rural India. Yet, the crises are reflective of the larger structural changes that are on-going and which in the longer term have implications not only for the sustainability of agriculture as the bases of India's economy but also for the viability of agriculture as a form of livelihood and as the bases of culture.

In the context of such trends, it is imperative to understand the range of factors, structures and processes that have produced such conditions. While the impact of the Green Revolution model on local knowledge forms, the socio-economic structures of rural India and on the biodiversity of regions are issues that are being raised, other questions relate to the role of the market and the state in the development of rural livelihoods. Under the prescriptions of the structural adjustment programmes, the presence and role of the state, which is increasingly, withdrawing from the rural and social sectors has implications for the links between people and the market. Such withdrawal of the state is laying grounds for the emergence of national and international agri-business agencies as key actors in the rural sector. In addition, the negligence of land reform policies and the broader development parameters has had a negative impact on the functioning of intermediary institutions and the regulatory agencies. A result, rural livelihoods are in a state of disarray with increasing pauperization of people who have little or no access to land and capital.

Similarly, while there has been some debate about the possible effects of the new global regimes (WTO, IPRs etc), inadequate attention has been placed on the forms of risk, working conditions and class and gender relations that may emerge from such restructuring of agriculture. The promise of new biotechnologies must be as

sessed with the problems that may result from them and questions relating to their impact on the production and reproduction processes, the rights of farmers, and the democratic processing of public policies must be raised.

In attempting to understand such issues, this seminar will seek to highlight and address the following questions:

1. What are the implications of the new international regime of structures and rules (WTO, IPRs, ...) etc on Indian agriculture and rural livelihoods?

2. What has been the impact of the decade-long economic reforms on the nation's development conditions and food security?

3. How are the institutions and regulatory mechanisms complementary to agricultural development functioning?
What are the implications of the neglect of land reforms in the nation?

4. How are non-agricultural classes and groups (artisans, service and labour) affected by the new economy?

5. What are the potentials and problems of the new biotechnologies?

6. How can agricultural sustainability be linked to the sustainability of communities and biodiversity?

SUSTAINING RURAL LIVELIHOODS

5TH & 6TH FEBRUARY 2002,

VENUE: NATIONAL INSTITUTE OF ADVANCE STUDIES

DAY 1

9.00 : 9.30 : Registration

9.30 : 9.45 : Welcome, Dr. Vanaja Ramprasad

- About the Workshop
- About Green Foundation and its Activities

9.45 : 9.55 : Release of book and a few words, Farmer representative

9.55 : 10.00 : Announcement

10.00 : 10.15 : Coffee

10.15 : 13.30 : Session – I

Moderator : Dr. H C Sharatchandra

10.15 : 11.00 : Overview on "Indian Agriculture and Rural Livelihoods in the context of Globalisation", Prof. Damodaran, IIPM

11.00 : 11.45 : Economic Reforms and Food Security, Dr. Balakrishna Pulapre, Prof. IIM, Calicut

11.45 : 12.30 : Contract farming and implications, Prof. K R Chowdry & Dr. Uma shankari

12.30 : 13.30 : Discussion

13.30 : 14.30 : Lunch

14.30 : 15.15 : Session II

Moderator : Dr. Vasavi

New Technologies – Implications for Food Security and Rural Livelihoods, Dr. Debasish Banerjee,

15.15 : 16.00 : Changing Land Reforms and Implications for Rural Livelihoods, Dr. Ravi Varma Kumar

16.00 : 16.15 : Tea

16.15 : Plenary Session

Moderator : Dr. Lawrence Surendra

DAY 2

9.00 : 9.30 : Registration

9.30 : 10.00 : About Community Seed Bank Network, Dr. G N S Reddy, BAIF

10.00 : 10.30 : Brief on Proceedings of 1st day, Dr. Sharatchandra

10.30 : 11.00 : Coffee

Session I

Moderator : Prof. T N Prakash

11.00 : 11.45 : Implications of PVP Bill on Farmers Rights, Prof. N S Gopalkrishnan, Cochin University of Science and Technology

11.45 : 12.30 : Livestock as an important component of Rural Livelihoods, Dr. Nitya

12.30 : 13.15 : Implications of advanced techniques in Livestock Breeding, Dr. Ramesh, NDRI

13.15 : 14.00 : Lunch

14.00 : 15.30 : Open Session

15.30 : 16.00 : Coffee

16.00 : Chief Guest : Prof. Bisaliah, Chief, Agriculture Prices Commission
Release of Biodiversity Register, Calendar
Honoring of innovator farmers
Presentation of Proceedings
Key note
Vote of Thanks

Economic Reforms and Food Security

Dr. Balakrishna Pulapre

Dr Balakrishna is a faculty member at IIM Calicut. Earlier he was at the Indian Statistical Institute, Bangalore. His specialization is in inflationary processes in the Indian economy; production growth in industries and his current interest is on the agriculture transformation that is taking place in Kerala.

Most of the things that I will be presenting are from a paper about economic reforms in agriculture that I wrote about a year and a half ago. Most surface manifestations of the liberalization program point to urban India and there is a tendency to believe that reforms are not targeted to agriculture. Reformers, however, felt that they were targeting agriculture indirectly and that what they were doing would be beneficial to agriculture. In international development circles there is a view that when you protect industry by having high tariff rates, you are discriminating against agriculture because you are shifting the terms of trade in favor of industry. In 1950 we decided on industrialization and that was possible only if industry was protected and that's how we got high tariff rates. The principle manifestation of liberalization since 1991, if you ask any economist, would be that the tariff rate has been reduced for industry. The argument is that if tariffs for industry were lowered, industrial goods prices would be lowered and that prices of agriculture products would now be higher relative to industrial goods. Let me read out an address by Manmohan Singh to the Indian Association of agriculture economists in 1994. "The policy of excessive protection of Indian industry hurt Indian agriculture in several ways. It raised the prices of industrial products relative to agriculture products that hurt the rural sector of the economy as consumers of industrial products. You also increased the profitability of industrial production compared to agriculture production thus drawing away investable resources from agriculture. This shift takes place in various ways. Low returns in agriculture activity reduced the ability to pay economic prices for many inputs such as power, water and credit. Instead of continuing with the subsidies for these inputs it would be much better to reduce the protectionist bias against agriculture by lowering tariffs favoring industry and altering relative prices in favor of agriculture. This would

create potentially a more profitable agriculture which would be able to bear the economic costs of technological modernization and expansion". In some sense, this argument of agriculture being worse off because of protection is not entirely correct because inputs that Manmohan Singh speaks about are not traded on the international market and the prices of this are set by the government in a way that is reasonably favorable to farmers or actually not priced at all such as in water. Let us take a look at some data and see if what they say is borne out. Let us take a look at Table. 2 titled protection and relative prices.

Table 2: Protection and relative prices

Year	Tariff Rate	Price
1990-91	87	108.5
1991-92	*	116.4
1992-93	64	113.2
1993-94	47	111.6
1994-95	33	114.4
1995-96	27.2	112.8
1996-97	24.6	117.5
1997-98	25.4	116.7
1998-99	29.7	126.3

Notes: 'Price' is the ratio of the index of agricultural prices to the ratio of index of manufacturing prices, base 1981-82=100;the tariff rate is the import weighted average percentage rate for the economy as a whole; the tariff rate for 1991-92 was not computed in the source.

Source: Economic Survey 1998-99 and the World Bank: 'India 1998: Macroeconomic update'

In a broad sense it is true but it comes about only after the second half of 90s, the question to ask is, whether this bias has improved due to the process that the government had in mind or due to some other process. I think that it is not because what the government had in mind but due to the deliberate intervention by the government. Interestingly when we talk about reducing the government involvement as part of liberalization, government intervention in some sectors has been increasing.

Let us now talk about reforms and growth – what has happened to growth? While we all know that growth by itself is not enough, purchasing power is also important. Table 1. shows the annual rate of growth before and after 1991.

Table 1: Growth, Before and After 1991

Period	Food grains	Non-Food Crops
1949-50 to 1964-65	2.93	3.54
1967-68 to 1989-90	2.74	2.72
1970-71 to 1979-80	2.08	1.66
1980-81 to 1989-90	3.54	4.84
1990-91 to 1997-98	1.66	2.36

Note: Annual Compound growth rate, except for non-food in the 1990s where it is the average of the year-to-year change

Source: Rows 1-2 from 'Area and Production of Principle Crops in India 1989-90' Directorate of Economics and Statistics, GoI; the rest from Economic Survey 1998-90, and author's estimates

The point is that in comparison to the 3 decades 70s, 80s and the 90s, the 1990s performs worse than 80s both in the growth of food grains and nonfood grains. The 80s was a period that grew exceptionally well. The 80s was a period when poverty declined at the fastest rate. Even casual empiricism shows that general levels of prosperity in the economy rose quite rapidly. The point is that agriculture growth is very important for overall growth. Table 4 shows the progress of selected agriculture programs. It shows that the rate at which they all increased between 1970 and 1990 is faster than its increase in the 90s, the programs being, area under HYVs, irrigated areas, fertilizer consumption, public investment.

Program	1970-71	1980-81	1990-91	1996-97
Area under HYV	15.4	43.1	65	76.4
Irrigated area	38	54.1	70.8	80.7
Fertiliser consumption	2.2	5.5	12.5	14.3
Public Investment	2.1	4	2	1.8

Note: Area is in million hectares, fertilizer consumption is in million tones and public investment is as a share of sectoral GDP.

Source: Economic Survey 1998-99 and National Accounts Statistics', Summary tables

It is quite worrying to note that public investment in the mid 1990s is lower than in 1970-71. One of the broad conclusions is that even though the relative price seems to have moved in the favor of agriculture exactly as the finance minister predicted, the rate of growth of agriculture has not improved. And as much as prices, development programs are a driver of growth of which public investment being one of them. Table 5 shows gross private capital formation and you will find that in the private sector there is a substantial increase in private investment as a share of total output and by 1996-97, private capital formation is higher than before.

Table 5:Gross Private Capital Formation

GCF	1970-71	1980-81	1990-91	1996-97
Volume	1969	2840	3440	5867
Rate	5.5	6.7	5.6	8.1

Notes: 'Volume' is in rupee crore at 1980-81 prices, 'rate' is volume as a percentage of sectoral GDP.

Source: Economic Survey 1998-99 and National Accounts Statistics', SO

There are 2 ways to interpret all this data. One is to say that the future is yet to come. Or you could say that that is a matter of faith and that unless public investment really improves, growth will not improve. Table 3 shows the intervention price.

Table 3: Intervention price

(Rs/quintal on a crop year basis)

Commodity	1980-81	1990-91	1994-95	1998-99
Paddy	105	205	340	440
Wheat	117	225	360	550
Cotton	304	620	1000	1440
Jute	160	320	470	650

Source: Economic Survey 1998-99

Even though relative price of agriculture has improved, you may want to ask if it is because of what the architects of reform had said. For most crops, intervention prices had grown faster in the 1990s than in any other period. So the relative price increase is because of intervention. Most crops, where there has been no intervention have been doing worse off. And I keep emphasizing this because I strongly believe that it is this form of intervention that has made food security even more tenuous after 1991 than before.

Let us now discuss reforms and welfare. The simplest approach to this is the price of food in relation to your income. Given the price of a commodity, it is your income that determines your access to that commodity. It could be completely independent of the availability of the commodity according to Amartya Sen. The price of food is very important in determining the food security, especially in India where poverty is highest. If reforms don't improve poverty at a faster rate than before, then it is useless. So will the reforms be able to reduce it at a faster rate? Lets talk about the factors by which the reduction in poverty is being slowed down in the economy. It is related to the nature of intervention of the government in the economy. Table 7 gives data about 4 indicators – procurement price, market price, general price level (general price of all commodities in the economy which is how inflation is measured), stocks in the economy.

Table 7: Food grain price, inflation and stocks

Year	Procurement price (index)	Market price (index)	General price level	Stocks (Mn tones)
1980-81	100	100	100	16.7
1990-91	193	179	185	11.3
1991-92	225	216	218	17.9
1992-93	261	242	235	13.9
1993-94	296	261	251	11.8
1994-95	314	293	283	22
1995-96	333	313	304	30.3
1996-97	375	354	328	2835
1997-98	406	363	340	20
1998-99	455	384	379	18.2

Notes:

(1) The procurement price index is based on a weighted average of the price of rice and wheat, the weights being the quantities procured.

(2) Stocks of rice and wheat, are as of January 1s;the prescribed norm for the buffer stock is 15.4 million tones.

Source: Economic Survey, GoI, various issues.

Once again by the mid 90s the procurement price had increased as much as it had increased in the entire 80s. So procurement prices are rising at a very fast rate, same for market price of food. The general price level has not risen quite that fast,

which is the point that I want to make. In India the relative price of food is rising. This is happening precisely at a time when reforms are being carried out which are meant to make the economy more modern. A high relative price of food is a feature of a very under developed economy. If you look at international trade market, from 1940-80 the relative price of food is declining at a steady rate and from that point of view the Indian experience is contrary to the rest of the world and it is extremely worrying. So for those sections whose incomes are fixed or not rising as fast as the rest of the economy, it is a matter of even more concern. This is no doubt on the result of the nature of government intervention in the market. The government is pegging the price of food and raising it from year to year at a rate higher than the inflation rate for which there can be no justification except for placation certain lobbies. Especially when the stocks of food is quite high. That explains the whole puzzle. Stocks are the price above what the market will bear. And because there is a procurement policy where the government will take up whatever is given to it at the MSP that cannot be sold because most of the population is tightening its belt because they cant afford the food and are getting poorer and that results in greater stocks. So the point that I want to make is that there is a conflict between producer prices and consumer welfare. All this is happening at a time when the food subsidy is ballooning. It is happening not because more is being distributed but more is being held.

The ballooning subsidy does not prove that the government is doing good work and giving more to our fellow citizens but the fact is that the food policy is being conducted in the maniacal sort of way where the price of food is constantly being raised and many sections are getting priced out. The stocks are also rising relative to total production and not just in absolute terms. The reason I mention food subsidy is that the argument from any economist cannot be from the level of subsidy but the use of the subsidy – in the Indian case it is just the operational loss of the FCI – it is not used to feed people. It is better to just go out and give the money to people who need it rather than buying food at a price determined at a political level and not being able to sell it.

There is a great deal of debate about the PDS. Well, there is some debate and there should be more in my opinion. There is the PDS being the answer to the high stocks. That is only the partial solution according to me. Generally, can PDS do anything much about poverty in the long term? I'd say no. The PDS is a supply side arrangement. It is giving you a certain amount of grain at a fixed price but it is getting the grain out of somewhere else in the economy. It is getting grain that the FCI has procured. If the FCI keeps getting grain at a higher price, then, unless it keeps increasing the subsidy to the PDS, it cannot maintain the price of food in the PDS. In an accounting price it is not feasible to do it without subsidy. So my thought is that the PDS is some sort of an afterthought. The principle purpose is to ensure a high price to the farmers, everything else is an afterthought. If maintaining food consumption levels was the primary purpose then you will not keep doing that by raising producer prices. It is not sustainable. There is a complete contradiction between the 2 policies. There is lot of talk about Kerala's levels of living having improved due to the PDS; poverty is less because of the PDS. I very strongly disagree, because the PDS can only help you get grain at a fixed price. If you don't have income then, god help you, you can't buy the grain. If you look at the procurement prices, these are not small increases. They are increasing at dramatic rates compared to the general price. This is not a case against subsidy or government intervention. But this kind of government intervention cannot but have the effect of weakening food security. I think the government has made the situation worse by raising prices of food at such dramatic rates. And you need to have a decline in the relative price of food to have any activity in the economy because only when food is cheaper, people can spend on other things.

Let me wind up by making another argument in the PDS. I have looked at some measure of the PDS and a measure of poverty. Table 6 has a ranking of the states in terms of the PDS and poverty.

Table 6: PDS and poverty: State wise ranking

State	PDS	Poverty
Andhra Pradesh	5	12
Bihar	11	2
Gujarat	4	10
Haryana	12	13
Karnataka	7	8
Kerala	1	11
Madhya Pradesh	9	5
Maharashtra	6	7
Orissas	10	1
Punjab	13	14
Rajasthan	8	9
Tamil Nadu	3	3
Uttar Pradesh	14	6
West Bengal	2	4

Source: The estimates, pertaining to the years 1986-87 and 1987-88 by Shikha Jha and the Planning commission respectively, are as reported by Mooji(1999)

If the PDS were an important element in combating, you would expect a positive relation. The poorer should have a greater PDS. If you take off Punjab and Haryana, which are very rich states, then the correlation is negative. What it shows you is that the PDS is not where it is needed most. I'd like to relate my own experience when I lived in Bangalore. I went to the civil supplies office close to my house. You will really have a shock if you go there because the staff there have no idea what is happening and you cant blame them. The government is not giving them any support. They are in no position to monitor what is going on. And this is the case for a person who was living with a valid address and paying income taxes. What if you are migrant labor? What if you live in a slum? I'm not sure if the PDS will help in its current state. My more general point is that a system that gives you food at a fixed price when the input prices are rising cannot work. The origins of the PDS were in Bengal when the government was pumping in a lot of money for the war effort and demand for food soared and prices spiraled. So in order to maintain urban prices, the government procured grain from the farmers at any price. So it benefits the people in the urban areas. But, what about the people in the rural areas who grow chillies or fish or whatever? They are affected because their access to grain is limited because prices are being bid up. Hence the PDS's viability is questionable.

Overview on 'Indian Agriculture and Rural Livelihoods in the Context of Globalization'

Prof. A. Damodaran

Prof. A. Damodaran is on the faculty of the Indian Institute of Plantation Management, Bangalore. He is an officer in Ministry of Environment and Forests. He stayed in Hoskote for a while looking at problems of farmers as part of government responsibility. He holds a Ph.D in environmental economics.

An overview and critical issues in Indian agriculture and rural livelihoods in the context of globalization

- The total area under food grains in India between 1970-71 and 1990-91 has grown by 2.22 %, whereas agricultural production increased in the pre-liberalization phase from 176.39 million tonnes to 203 million tonnes in the same period.
- Yield / hectare for food grains have grown from 1380 kg / hectare (all India) to 1620 kg / hectare representing a 17.39 % increase while last and most significant, area under commercial crops has grown by 20-35 % growth from 1990-91 to 1998-99, while production of commercial crops grew by 23.48 %.

Why the broad range of 20-35 % for commercial crops? If we take the growth of coffee during 1991-94 the growth rate was 15-16 % in area terms but after the coffee price boom, between 1994-99, growth accelerated to 35 % because people wanted to take advantage of prices and so people started growing coffee by even encroaching on reserved forest areas. Production of commercial crops including coffee, tea, spices, vegetable, gherkins grew by 23.48 % in the same period. Growth in the area under foodgrains after 1991 was around 2.9 % and production grew from 203-205 to 206 million tons in the same period. Obviously, one sees a substantial growth in commercial crops. And with that we come across problems of conserving biodiversity. Agribusiness is a very favored term today and people talk about converting every crop into agribusiness proposition. I am not saying that it is all because of globalization process but there are certainly signs of agribusiness. India had its economic reforms initiated in 1991 even though it has not been very pronounced in the field of

agriculture. There was the Bhanu Pratap Singh High Power Committee on Agriculture, which in its report of 1990 had argued that agricultural enterprises should be treated as industries. For people like our farmer friends, it will come as a shock because after cultivating landraces for ages they are told to abandon it and shift to high yielding varieties of other crops and make it into a profitable venture. In 1993-94, the WTO came into the picture and created the conditions for globalization in trade. One of the most significant changes in the WTO era was that of the Coffee Board moving away from the scene of pooling and monopoly marketing of coffee to a situation where small growers were made to confront the market directly. This coincided with the steep increase in coffee prices internationally and one of the most drastic dismantling of the command and control structures of the Coffee Board. So this is the larger context that I see. Now when we come back from plantations to agriculture, we see that:

- The net area sown in India from 1970-71 to 1990-91, which is the pre-liberalization phase rose by about 1.81 % - keep in mind this is not the gross area sown but the area that is practically brought under the plough. Now the gross sown area has grown by 13.48 % in the same period. So one sees that land that was intended for agriculture was not being cultivated. Obviously someone was claiming land as being under agriculture crops but was not actually using it.
- The net irrigated area has however increased by 70.4 % during 1970-71 to 1994-95 and by 10.9 % from 1990-91 to 1994-95.
- During the same period, (and this is the thing of great concern to agro ecologists), the ratio of ground water to surface water irrigation was 3:1. For every 4 litres used for irrigation, 3 litres is supposed to come from the aquifers and one litre from surface sources. This is bound to create some sustainability problems in the long run. Rather it has already created problems, as we will discover soon.
- The gap between irrigated yield levels and unirrigated yield levels has narrowed down for coarse cereals that is jowar, maize, etc. (1.98:1.56 tonnes / hec) gap between irrigated yield levels and unirrigated yield levels for coarse cereals is practically nothing for jowar, maize etc. My experience with ragi or finger millet has also shown the same trend. Though the Indaf variety had come by the 1980s, the new varieties of HS 64 varieties released by the GKVK came in resulting in

astounding progress. All this while, it was not as if the crop yield was responding to large doses of irrigation. Now the gap between irrigated and non-irrigated yield is maximum with rice. Rain fed vs. irrigated makes a big difference for rice, but not for coarse cereals. It is only for paddy and wheat that the difference in yield levels between irrigated and unirrigated crops is 2:1. This is not to say that the new varieties of coarse cereals are not yielding much – the HS 64 gives around 12 quintals / acre viz. a viz., 5-6 quintals / acre for the older varieties under rainfed conditions. But the critical issues for a poor coarse cereal farmer is how much fodder he gets. – This question is never raised because every one likes talking about grain yield. You will find that the traditional varieties had much more yield for fodder than the new varieties for the simple reason that the stalks were longer and broader. But when technification came after the green revolution, it resulted in a complete focus on cereal yields. And the method of harvesting also changed. Earlier the maize and finger millet crops, ear heads and stalks had to be cut before harvesting the stalks and the sickle was used to leave 1inch stubble on the ground. As the ear heads have become bigger, the focus is now on harvesting earheads first while the fodder part suffers due to indifference in its harvest. So these are some of the ground level realities that match with the macro economic policies that we have seen over the past few years. Irrigation has served to enhance the productivity of non-coarse cereals and the small and marginal farmers primarily cultivate coarse cereals.

The inference is that Indian agriculture has clear limits on the extensive margin because the net area sown has been growing at a very niggardly pace. The system of vertical growth has been the predominant strategy (i.e. increase of yield and not of biomass). There are clear limits to this too as there has been progressive depletion in ground water irrigation in the Deccan trap geological zone. My doctoral work has been on the externalities of bore well irrigation in Karnataka and I can tell you that in 1983-84 when I came to the villages in Hoskote, I found that (the farmer never used to tamper with land records as he does these days) dry land farming was the primary mode of cultivation. About 80 % of land was under finger millets. Bore wells had started coming into the Bangalore-Kolar belt and the ground water table used to be at 175 feet then. Last month when I went back to the village I was told

that it was 800 feet. So this is the kind of situation in an area that is declared as a 'red area' for ground water exploitation. Incidence of bore well failures is very high on the Deccan traps. Unfortunately the small and marginal farmers who are given subsidized loans have gone in for bore wells - For what? For taking to high yielding varieties of coarse cereals that do not respond to irrigation. There are excellent techniques being given by the AICRP to propagate water conservation measures. But today farmers are asked to 'advance', to 'agribusiness' – i.e., keep on producing and wait for Civil Supplies Department or FCI to come and pick up their surpluses. So at 800 feet depth, while bore wells are failing, farmers are still steadily advancing towards the ultimate dream of doing agribusiness.

I am told that the Karnataka government has been good enough to constitute a committee to study the agricultural crisis of farmer suicides. Some people say suicides arise from psychological problems. I have done an analysis of farmer suicides – it is very easy to theorize on other people's problems but it is different when it happens to us. I am sure that suicides have a lot to do with the changing economic conditions of the farmers, I described earlier. Last year I attended a meeting of farmer's families who had committed suicides that had assembled in Gandhi Bhavan – it was a very sad story that they had to narrate.

Here I can share with you something very interesting. I had just returned from North Kerala where I found that most of the farmers who had committed suicides were those who had switched to modern methods of farming. A lot of this shift was on account of the pattern of agricultural extension where they emphasize more yields, more pesticides, more fertilizers, high productivity, and more chemical use, all of which seems to have destroyed their farming and hence their lives.

Let us now move to Andhra – I had recently visited the Guntur area, which is known for chillies. Guntur farmers don't necessarily have large holdings. Some of the chilli farmers have very smallholdings. Their strategies are basically sell the chillies, get the cash and buy food grains. They have thus a food security problem when chilli prices crash. We often think that if you are raising a commercial crop you don't have food security problems but that is not the case. Farmers having smallholdings and who have gone in for a commercial crop have in reality a greater food security problem. This story goes like this – when I went to Guntur to do a study for the Spice

Board, I found agents from 5 pesticide companies telling farmers that "this year the rains are bound to be weak and the fertilizers won't work well and so you need more pesticides to solve the likely poor health of plants". This kind of ingenuity you will not find when our Agricultural Extension Departments market sustainable agricultural technologies.

So where are we now? Ground water tables have declined; there are pressures on fertilizer subsidies, MSPs are perverted. What is the latest story from Tamil Nadu and Karnataka? We have had a bumper rice harvest for Kalyani and Masuri rice. Prices have gone up during the post harvest season this year. Two years ago it was the other way around - prices were falling. Why is it so? Basically this year traders stocks have gone up. Many of the small farmers have lost their marketable surplus to traders. Traders are waiting for prices to go up and this is how things work. I also have a problem with the MSPs based on my empirical surveys on APMC systems working in Dharwad and Bangalore. Though the APMC Act is very well designed to improve the farmers in the regulated markets, in reality it is not the farmers who sell in the APMC. Further what the farmer gets is a neat Rs. 30-35 per quintal less from the market prices for maize and finger millets on an average. We can't avoid middle-men anyway. Once the stocks move from the producers to the middlemen you will have this situation. Now what is happening in Punjab? Last year there was an inter-state restriction on food grain movements in the last kharif season. This year they lifted the restriction. Traders bought from farmers from the UP mandis at Rs. 400 / quintal and sold at the MSP rate of Rs. 700 / quintal in Punjab. The point that I was always advocating even in my recent paper on the subject is that, farm gate prices form the most important criteria of deciding whether the farmer is in a good state or not. MSPs don't make any difference and neither does APMC prices. There is a big gap from farm gate prices to the actual price and that is where the farmer is losing out.

Now let us come to the prices stabilization front. When coffee and rubber prices start falling, we have talks of prices stabilization funds and buffer stocks. The Coffee Board looks like spending around Rs. 5-6 crores for mopping up the surpluses. We don't have a strategy of this kind for food grains. The point that Vanaja mentioned

about Common Property Resources (CPRs) is important. Essentially all the semiarid small farmers have survived on CPRs. It is not a fable, it is a fact – it is a biomass economy and there is a healthy relationship between livestock, CPRs and subsistence agriculture in arid and semiarid zones of India. Unfortunately, where are the CPRs today? They are no longer available. I have before me an interesting study done on total factor productivity (TFP) in Indian Agriculture in the pre-reform period by two renowned economists. As per the study TFP growth was between 1.1 – 1.3 % from 1956 to 1990 while conventional inputs contributed another 1.1 % thereby providing the 2.3 % growth in crop production during those years. This means that even though the green revolution has contributed its might, a lot of the growth has come from better organization and translation of the technology to operational practices.So out of the 2.2 % growth, 1.1 % from new technology but the remaining 1.1 % came about due to better organizational framework i.e., the tech was sold well and was backed up by marketing systems, agricultural credit and extension. This in turn was contributed in the post green revolution period by two things i.e., public investments and agricultural extension.

Can the same thing be maintained during the post liberalization period, which coincides with Gordon Conway calls the doubly green revolution i.e. biotechnology? The other interesting point about the study is that it mentions that agricultural production went up initially and then tapered off until 1972 when it began to rise again. The reason for that is that the initial seeds required for the green revolution were imported. Then the IARI / ICAR started indigenising the imported germplasm later. This phase resulted in a reduction of productivity for a while until the indigenisation was perfected around 1972, after which it rose again. Now public investment in agriculture has decelerated so we don't have a guaranteed method of achieving what we could achieve in the green revolution phase. The GR phase is now over and now we are supposedly entering the biotech phase so let us examine what the imponderables are, First is, whether agricultural extension can be continued to promote unsustainable activities? Second, whether the social and ecological costs of biotechnologies can be absorbed? and third is who will internalize these costs? Will agricultural extension get the money that it requires today as in the GR phase because we have fiscal crisis? Even if the government finds the money it is likely to put it into biotech,

GM or newer hybrid varieties with an eye to improving yields. Agricultural extension would then aggressively promote the case of transgenics. This will create a social cost. People say that there is biosafety problem in transgenics. There are strong reasons to support it. Supposing this is true, who will lap up the ecological and social costs? Is there a support mechanism in place for such cases? What should be the agricultural extension structure for biotechnology? Should it be following a precautionary principle even while it is advancing a tech such as a GM crop or should it be based on aggressive promotion of biotech? There is no policy stand on this issue. We have biosafety guidelines issued by the Ministry of Environment but we don't have an agricultural policy that talks about agricultural extension in relation to biotech crops. If this is not there, farmers will suffer. There are a few other questions. After 2000, will investment in biotech outpace conventional agriculture? What will be the process of indigenization of safe GM crops? IARI has already started researching indigenous GM crops such as Bt cotton, brinjal, cauliflower, sorghum. Will international seed companies run the show or will the national seed companies produce indigenous varieties of these crops? After all genetically modified germplasm could be dangerous. The basic point is whether we are prepared for the r-DNA biotech era in agriculture? We just seem to have a GEAC that will say 'yes' or 'no' to GM crops and there the matter ends. What follows? These are some of the questions we need to address in the biotech era.

Now on livelihoods, I was speaking at the World Spice Congress last week. An American delegate told me that for the American food industry, the primary issue is that of food security. The US FDA has been discussing food security with the meat and food industry. What is their concept of food security? The advanced countries, which were indifferent to food security until now would like to define food security. Their definition of food security is basically 'food safety'. September 11 and the anthrax scares have prompted them to go for this interpretation. Having seen the last two rounds of the WTO, I can see that the terms such as 'production limiting' in the Agriculture Agreement were taken right out of the EC-CAP and put in the WTO Agreement. Pierre Boudreaux the great French sociologist says that the harbinger of the arrival of globalization is the common use of jargon. So if food security is being appropriated and being equated to that of food safety, it is likely that this definition

will go though in the new round. We will then have tremendous entitlement issues when it comes to negotiating terms on the Agreement on Agriculture in the WTO. We should argue for defining food security in terms of availability of food as opposed to food safety. Also the issue of food security should not be confined only to farmers who are not involved in commercial crops. Any farmer could have food security issues.

The other matter is with regard to farm gate prices. We should be monitoring farm gate prices and not MSPs because that is what affects the farmers directly. Who will do that? - NGOs of course.

Third is market reforms and on the matter of insulation from negative effects of the market place. I am not against reforms. Let us consider what is happening tofew agro commodities. Farmers of Dakshina Karnataka or AP, TN or Kerala survive today not on paddy but on coconuts. Recently there has been a big problem of mites attacking coconut palms. Copra is supposed to be the basic produce of coconut and is milled and turned into oil. Nowadays all market reforms are happening at the upper end of the value chain – there is a coconut oil futures market in Cochin. But there is no future market or price-hedging mechanism for the copra, the basic product that the farmer is producing. So that market based safety valve reforms do not touch the farm gate. They are ail designed for rich exporters and processors. Why is it that the government not getting into it? After 1991, MSPs are alive and kicking but it is going to the wrong people. Cash crops are now being subjected to the play of market forces. But at the level of the farmer there is no reform. Now there is talk of precision farming that will avoid wastage – a very good idea for high tech farmers who want to cut their costs. What about simple biomass based farmers? Why don't we do them a good turn? Why are we talking about environmental programs separate from agriculture programs?

We need to revive common property resources. You have to increase public investment. We need to promote traditional practices that are environmentally appropriate for the region. There is a vacuum when it comes to that. But unfortunately there is policy fragmentation when it comes to agriculture. You have an environment policy, a forest policy, an agriculture policy but each is going in separate directions. Unless we have an enveloping theme we will not make meaningful progress. The latest craze

amongst Malnad farmers of Karnataka is vanilla cultivation as it fetches around $ 230 per kilo so many farmers are moving away from the traditional millets, etc aided by liberal extension on the part of the commodity board. But I am sure that it will go the way of coffee in a of couple years. The need of the hour is a careful structuring of the extension program, environmental policies and market based reforms so that even if we introduce new tech and market reforms our poor farmers could still hold out.

Genetically Engineered Crops—Risks*

Prof. Debashis Banerji

Prof. Debashish Banerji was formerly Professor and Head, Botany Department, CCS University, Meerut, India. Presently, he is the Director, Baba Amte Centre for People's Empowerment, Samaj Pragati Sahayog. He has made major research contributions in the area of Heavy Metal Pollution, Biochemical Technology. Presently, he is the Director of Baba Amte Centre for People's Empowerment, which is one of the 7 National Institutes recognized by the Government of India for training in watershed development.

There is a lot of euphoria about the genetically engineered crops being introduced in our country in the near future. These crops are being projected as solutions for food security and environment friendly agriculture. A lot of propaganda about Bt-cotton being the final sustainable answer to bollworm attack is also prevalent. However, proper scientific analysis of the Recombinant DNA technology which is used for making transgenic crops and the present world market for such Genetically Engineered (GE)/Gentically Modified(GM) crops indicate the situation to be quite otherwise.

The first thing to be realized is that transgenic crops/organisms are unnatural, as genes are transferred across species, e.g., frost resistance gene from Arctic Fish is transferred to tomato to make frost resistant transgenic tomato (such transfers if known, would be unacceptable to vegetarians and transfers like genes from pigs to vegetables as potato would be horrendous for the followers of Islamic and Jewish faith). Further, transgenic production, unlike the usual claims, are in no way similar to crops derived through conventional breeding, as, selection and cross hybridisation breeding.

To understand these points it is necessary to recall some fundamentals of cell biology. Plants /Animals are made of cells and each cell contains a nucleus in which are lodged the Chromosomes—the chains of genes. The genes have the codes for the various traits. It was proven long back that the nucleotide polymer chain, DNA (Deoxyribose Nucleic Acid), is the chemical basis of heredity. So, chromosomes consist of

DNA chains and specific nucleotide sequences are the genes or blue prints for the expression of the traits. An interesting feature is that all cells have the same chromosomes, therefore, the genes also and yet in different organs/tissues different genes are expressed, e.g., all plant cells have the genes for chlorophylls but, these pigments appear only in the green leaves and not in the roots. The explanation is that, in the chromosomal DNA, besides the gene sequences there are also regulatory sequences, which control the expression of the genes. Such sequences are the promoters, repressors etc., some sequences as transporters, mobile elements are also there which sort of move the genes. However, during evolution these elements have been 'tamed' to ensure stability of traits in a gene mix (neem begets a neem and a fly begets a fly). Organisms have a fixed number of chromosomes, e.g., in humans the number is 46. Further, the chromosomes occur in homologous pairs. Thus, in humans there are 23 pairs of chromsomes. Genes for any trait occur in pairs-alleles, e.g., for the trait height, there can be a pair of genes, one for tallness and its allele for dwarfness. Now, each homologue carries one of the alleles. Thus one chromosome will carry the gene for tallness and its homologue the one for dwarfness.

With this background we can now follow the path of a gene in conventional cross hybridization breeding for production of hybrids and in r-DNA technology for producing Transgenic Crops. Cross hybridization is based on the natural process of fertilization. For reproduction, male and female sex cells are formed from reproductive mother cells. For instance in plants, pollen mother cells divide to form pollen and egg mother cells give rise to egg cells. The division process involved in the formation of sex cells from mother cells is very important and different from the normal cell divisions. Normally when a tissue grows, the cells divide without any change in the number of chromosome between the mother and daughter cells. This type of division is called Mitosis. However, during the formation of the sex cells a special type of division, called meiosis, takes place, which ensures that the chromosome number is halved in the sex cells. Thus, in the case of humans, the mother cell has 46 chromosomes (diploid, 2n number) and the sex cells 23 (haploid, n number). This halving of chromosomes is not random. One of each of homologous chromosome pair of the mother cell goes to a daughter cell. Thus, in the sex cells the homologues with their

particular set of alleles get equally distributed. During fertilization fusion of the nuclei of the male and female sex cells takes place, restoring the 2n number of chromosomes as also the pairing of the homologous chromosomes which ensures that every gene and its allele gets correctly aligned. From this fertilized egg the whole organism develops. Thus, in natural fertilization based cross hybridization, the path of a gene is chromosomal homology directed and therefore it gets into its proper neighbourhood. This ensures its correct and stable expression. As the gene moves from parents to off springs, this transfer is termed as Vertical Gene Transfer.
A point to be noted is that during meiosis, crossing over of chromosomes takes place leading to various combinations of genes, which is necessary to generate diversity. Cloning and Transgenic production completely miss this out. Of course, ensuring diversity is not the concern of transgenic production!

Transgenic crops are produced by transferring genes across species barriers. Normally, alien DNA cannot enter and survive in host cells and cannot get integrated into host DNA. This is a natural phenomenon to preserve the characteristics of a species. So, how the magic of transferring a gene/DNA sequence from one species to another has been achieved? Scientists have used the DNA of pathogenic bacteria and viruses, which, as is common knowledge, can cross species barriers and enter all sorts of cells. They can further utilize the host cellular machinery to proliferate at the cost of the host. Such DNA is used as a carrier/vector to smuggle transgene DNA into the target plants. In the case of bacteria, their circular extra chromosomal plasmid DNA is taken, a portion is removed and in the gap so created the previously isolated transgene DNA is stiched/spliced. This recombinant DNA (plasmid DNA/ viral DNA plus transgene DNA) is also tailored to contain selectable marker genes, usually antibiotic resistance genes, and promoter sequences to ensure switching on of the transgene in an alien environment. The most common promoter is a fraction of Cauliflower Mosaic Virus (Ca MV 35S fraction). Incidentally, this virus resembles AIDS and Hepatitis B virus! This recombinant DNA is amplified and inserted, by various means, into free cells(protoplasts) of the target plants. The cells having the transgene integrated, are selected by exposure to specific antibiotics which kill all cells except those containing integrated antibiotic resistance marker genes and therefore also the transgene. Whole plants are developed from such transgenic cells.

In this technique, in the absence of any natural guiding element, there is random gene insertion through Horizontal Gene Transfer. As, the gene is in an alien neighbourhood there are high possibilities of its unpredictable, uncertain and unstable expression.

Thus, the r-DNA technique of production of transgenics is neither natural nor equivalent to conventional cross hybridisation. (In the lecture, all this has been explained through hypothetical diagrams, with arctic fish/tomato example. Only few chromosomes have been shown for convenience and they do not reflect actual chromosome numbers).

It must be remembered that the vector –transgene recombinant DNA construct is very different from normal DNA. Derived from pathogenic bacteria and viruses, the DNA is shielded against usual cellular degradative agents. This vector DNA has chemical groups which provide protection against degradative enzymes. Therefore, this DNA is relatively much more stable, in the digestive tract and the environment, than normal DNA. Further, as the DNA is made to cross species barriers and 'jump' into the target plant, it can also jump out and enter other related organisms causing genetic pollution —a pollution without recall.

The revealations of the human genome project have further shown that the very conceptual basis of transgenic production through r-DNA technique is incorrect. This technique is based on one gene-one trait concept. Now it is known that many traits are multigenic and even the expression of one gene is controlled by many other sequences in its natural neighbourhood. If one has to transform a plant, a whole set of sequences will have to be transferred specially in cases like yield enhancement, stress resistance etc.,. The success so far, in transgenic crops, has been with single gene product systems like Bt Toxin, resistance against a particular herbicide resistance against a pathogen and the like.

Even such successes are beset with problems as indicated by research worldwide in Research Institutes and Universities. Some major findings are mentioned in the following sections. In fact the health and other risks associated with transgenic cropseg.,

possibilities of Bt corn being allergenic, have affected their sales badly in the Global Market. Why India should lurch ahead to grab this so called opportunity is not understandable.

Our major concerns center around :-

a. Inherent Risks of R-DNA Technology and Transgenic Crops
b. Transgenic Crops and the World Market

Inherent Risks of r-DNA Technology and Transgenic Crops:
The major categories of risks are:

1.Unstable Expression and Instability of the Transgene
1.1 Farmer's Dilemma:
1.1.1 Uncertain Agricultural Productivity
1.1.2 Resistance of Pests to Bt Crops
1.2 Health Hazards
1.3 Environmental Hazards

2. Viral Recombinations
2.1 Super infectious viruses
2.2 Stable Harmful Microbial DNA

3.Horizontal Gene Transfer
3.1.Spread of Antibiotic Resistance Gene
3.4.Spread of the Transgene

4.Bt Toxin Related Risks
4.1.Effects on Non Target Pests and the Ecosystem Food Web
4.2 Risks to the Soil Microflora

1. Unpredictable Expression of the Transgene and Instability :-
1.1Farmer's Dilemma:
1.1.1. Uncertain Agricultural Productivity:-

Studies on the productivity of glyphosate(herbicide)tolerant soybean varieties conducted by several American Universities have shown that these transgenic crops yield on average 6.7 % less and require 2 to5 times more herbicide than nontransgenic

soya (Benbrook,1998,Ag.Biotech. Tech. Paper no.1).Similarly, a Nebraska University study revealed that GE herbicide resistant cultivars of soybean gave lower yields than their non GE sister lines (Elmore et al , 2001, Agronomy J.,93:408). There are reports that in tobacco , 64 to 92 % of the first generation transgenics show instability (Ho and Steinbrecher, Env. And Nutr. Interactions 2:51) and this could be due to silencing of the inserted transgene (Finnegan and McElroy , 1994, Biotechnology ,12:883).

1.1.2. Resistance of Pests (Bollworm) to Bt Crops:-

Several crops like cotton and corn are damaged by boll/stem borers. A biocontrol method is the spray of a bacterium Bacillus thuringiensis (Bt).This bacterium produces a protein protoxin which gets converted into a lethal toxin in the insect guts. The Bt crops have been developed by transferring the Bt gene, responsible for the production of the toxin (and not the protoxin) to target plants. Bt crops had been considered as eco- friendly crops, as , pesticide sprays were not supposed to be necessary. However, such hopes collapsed in the US, Canada and other countries where pests resistant to the Bt gene developed within 2 generations . Rigorous field studies by Prof. Bruce Tabashnik (University of Arizona) and Prof.Fred Gould (North Carolina State University) have shown that the frequency of resistance to Bt cotton is high (Tabashnick et al, 2000, Proc. Natl. Acad. Sci. US,97:12980; Gould et al, 1997, PNAS,US,94:3519). For pest management, now farmers have to sow along with the seeds of the Bt crops non Bt seeds, so that, some susceptible pests remain !! Planting a field with 100 % resistant crops will lead to the development of a totally resistant population of pests in 2 to 5 years.

1.2. Health Risks:-

The first case of a hazardous consequence, is the death of 37 people and permanent disability of 1500 others in the US in 1989 after consuming Tryptophan, an amino acid supplement, made by fermentation with a Genetically Engineered (GE) bacterium Bacillus amylequeformis (Myerno and Gleich, 1994, Tibtech, 12:346).Chances of induction of cancer in mammalian cells by residual Bovine Growth Hormone (BGH) in the milk of dairy cows raised with BGH administration have also been indicated (Epstein,1996, Intl.J. of Health Services, 126:173).In a landmark re

port Dr. A Pusztai had shown that pest resistant GE potatoes ,with snow drop lectin gene, when fed to rats, inhibited growth, disrupted the immune system and induced viral infection symptoms (Ewen and Pusztai,1999, The Lancet, 354:1353). Similarly, the observation that GE soybean containing a foreign brazil nut gene could cause allergic reactions in sensitive persons led to immediate withdrawal of this product (Nordlee et al, 1996, New England J. of Medicine, March 14, 688). Further, GE soya has been shown to have lower levels of phytoestrogens, as, genistin and diazdin and can have adverse effects on menopausal women already in need of estrogen replacement therapy (Lappe,J.Med.Food,1:4).

There are also several reports of unintended production of toxic chemicals due to unpredictable gene expression. Thus, the use of GE yeast with multiple copies of an alcohol producing enzyme, led to the production of toxic methyl glyoxal, besides, alcohol (Inose and Murata, Intl. J. of Food Sci. Tech.,30:141). Some tobacco plants engineered to produce gamma-linoleic acid, unexpectedly produced octadecatetranoic acid also, a substance, previously unknown in natural tobacco plants (Reddy and Thomas, Nature Biotechnology, 14:639).

1.3. Environmental Hazards:-

There are several instances of well intentioned genetic engineering efforts having adverse impacts. Thus, a common soil bacterium Klebsiella planticola had been engineered to transform plant residues, like leaves, into ehanol which the farmers could use as a fuel. But, released into the soil it decreased the population of bacteria and fungi.

In the root zone of the crops and consequently plant growth also (Holmes and Ingham, 1995,Bull.Ecol.Soc.Amer.,Suppl.,75/2,97;Holmes et al1 999, Appl. Soil Ecol.,11:67). Similarly, another bacterium Pseudomonas putida was engineered to degrade the herbicide 2,4-D. However, the degradation product was highly toxic to the root zone fungi, crucial for soil fertility and protection of the plants against diseases (Doyle et al, 1995, Adv. In Appl. Microb., vol40).

2. Viral Recombinations :-

2.1. Superinfectious viruses :-

Many plants have been engineered with genes from viruses to resist virus attacks. The transgene inserted is made noninfective. Several studies have shown that due to recombination between the viral transgene and coinfection viruses, highly infective viruses develop (Vaden and Melcher, 1990, Virology, 177:717; Lommel and Xiong,1991,J.Cell Biochem.,15A:151;Anderson et al,1992, Mol. Plant Microbe Int., 5:48; Green and Allison, 1994, Science263:1423; Palukaitis and Roossnick,1996,Nature Biotechnology,14:1264;). A matter of concern is that Cauliflower Mosaic Virus (CaMV) is closely related to human AIDS and Hepatitis Virus and a fraction of this entity (CaMV35S) is used as the commonest promoter to turn on the transgenes.Therefore, as pointed out by Prof. Joe Cummins, a Molecular Biologist of repute (jcummins@julian.uwo.ca), possibilities of the appearance of such infective viruses due to recombination between the CaMV promoter and coinfecting related viruses exist. So, in a country like India, just consuming the cob (bhutta) of Bt corn containing the CaMV promoter(if introduced) can induce AIDS/Hepatitis B. It must be noted that the microbial DNA is quite stable. it would be fatal to brush asidesuch caution by stating that, so far, there is no such evidence. We may note that absence of evidence is not evidence of absence.

2.2. Stability of GE Microbial DNA :-

Studies of Prof. R.Schubert and his colleagues have shown that viral DNA when fed to mice, can survive digestion in the gastrointestinal tract and large fragments can enter the blood stream and into many kinds of cells (Schubert et al1994, Mol.Gen. Genetics, 242:495 ;ibid,1997,PNAS, US , 94:961). Another study indicated that 25 % of GE plasmid DNA could survive in human saliva upto 60 min and transform Streptococcus gordonii a common oral bacterium(Mercer et al,1999,Appl andEnv.Microbiology,65:6).

2. Horizontal Gene Transfer :-

Various sequences of the 'made to be mobile' Vector-Transgene DNA can not only enter the target plant but can also jump out and get into other plants/microbes through the phenomena of pollination/transformation. Some examples are mentioned hereunder.

3.1 Spread of the Antibiotic Resistance Gene:-

As opposed to certain claims, spread of antibiotic resistance gene through HGT is a

well-established phenomenon. (Anderson, 1975, Nature, 255:502, Amabilecuevas and Chicurel, 1993, American Scientist,81:332). Further, transfer of kanamycin resistance gene from the leaf homogenates of various GE plants as, potato, tomato, oilseed rape, sugar beet and tobacco into soil bacteria have been convincingly demonstrated (de Vries and Wickernagel,1998,Mol.and Gen. Genetics, 257:606).

3.2. Spread of the Transgene (herbicide and pest resistance genes):-

Dr.Skogsmyr (1994,Theo.Appl.Genet.88:770) through field tests with GE potatoes demonstrated both high frequency and wide range of gene flow. Even at 100 m distance 35% of the seeds of non GE potato had transgenes. In fact, Bergelson and his colleagues have pointed out that as transgenes can escape 30 times more efficiently than host genes, herbicide resistance genes can lead to 'superweeds' (Bergelson et al, 1998,Nature,395:25).Actually a wild weed population of Brassica campestris was shown to have acquired herbicide tolerance genes from GE Brassica rapa (Mikhelsen et al, 1996,Nature,March 7,380).The Government of Thailand had banned Bt cotton trials after it was discovered that 16 medicinal plants growing in a nearby Institute of Herbal Medicine had acquired the BT gene(Bangkok Post, Nov 17,1997) .Recent discovery of transgenic DNA sequences in native corn of Mexico, the centre of origin of corn, has created quite a stir (Quist and Chapala,2001,Nature,414:541).

1. Bt toxin related risks:-

Several studies have shown that pollen/leaves of Bt crops can be harmful to the first trophic level insects of the food chain. Obviously such a damage can affect the 2nd trophic level and ultimately the whole ecosystem food web (Losley etal, 1999,Nature,399:274; Hilbeck et al , 1998, Env.Ent.,27:480;Birch et al ,1996-97,Scot Crop Res. Instt.,Ann Report)

Another problem is the persistence of the Bt toxin in the soil, affecting the soil microflora. Prof Stotzky of New York University has provided ample evidence in this direction (Crechio and Stotzky,1998,Soil Biology and Biochemistry, 30:463;Saxena, Flores and Stotzky, 1999,Nature,402.Dec2).

b)Transgenic Crops and the World Market

World markets have consistently rejected GM crops. The US Department of Agriculture has itself cancelled the registration of StarLink Bt corn and future planting of stocks of StarLink has been prohibited. It is making aggressive efforts to remove StarLink from the US market, all of which is expected-to disappear by next year. The European Union (EU) had already imposed a 3-year moratorium on genetically modified organisms (GMOs) in 1998, in the face of overwhelming evidence regarding dangers inherent in these products. At a Council of Environment Ministers in Luxembourg in October this year, 12 out of 15 EU governments rejected the idea of lifting this ban on importing and planting new GMOs. It could take another two years for countries to formally adopt the Commission's proposed regulations on traceability and labelling. These rules would make it possible to trace GM crops back to the farm they were grown in, making product recalls possible if health risks were found. The delay would be many years longer if members insisted, as France and Luxembourg said they might, on a major new directive on environmental liability to be drafted and passed into law before new licences were granted.

The EU has steadily decreased its purchases of US corn from about 2.8 million metric tonnes in 1995-96 to about 6,300 metric tonnes in 2000-01. Japan reduced its US corn purchases last year by over 50 million bushels. The US has foregone about 350 million bushels of corn exports to those two markets combined since 1997-98, the year after Bt corn was introduced in the US. According to the US Department of Agriculture's Foreign agriculture Service Weekly Export Sales report, total U.S. corn exports as of the week ending Nov. 15, 2001, were 12% lower compared to one year ago. It believes that GMO-driven importer alienation has lost U.S. corn exports. Those lost sales have meant higher corn inventories in the US, resulting in lower farm-gate corn prices.

Bowing to pressure from its customers, grocery chain Trader Joe's agreed last month to ban genetically modified ingredients from its thousands of private-label products. Monrovia-based Trader Joe's is not the first large chain to ban GMOs from its products. Natural foods chains Whole Foods Market Inc. of Austin, Texas, and Wild Oats Markets of Boulder, Colorado, dropped GMOs from their house-brand products two

years ago. The National Farmers' Union of Canada and the Canadian Wheat Board want to halt GM test plantings, fearing GM wheat will damage exports.

Meanwhile, Brazil and China are busy, aggressively capturing US corn markets. Argentine growers recently announced a move to implement identity preservation plans to ensure the non-biotech integrity of Flint corn, guaranteeing customers a non-biotech food product EU buyers already prefer Argentine Flint corn. Europe, Japan, Taiwan and South Korea now largely buy non-GM corn and soya from Brazil and China rather than the US. Algeria, a large food importer, says it may completely ban the import, manufacture or sale of GM products. Japan, which takes 20% of all US food exports, worth $11 billion a year, has imposed tough labelling rules on 24 product categories. It is not surprising, therefore, that a recent survey of the 14,000 members of the American Corn Growers' Association suggested 78% would abandon GM to recover lost export markets.

Since states such as Madhya Pradesh are reported to be eyeing the supposedly companies developing them are ever on the lookout for new markets, in countries where public opinion is still ignorant about the really serious problems of these crops. As a nation, we need to be vigilant that discredited technologies and products do not sneak into our borders, just because of the ignorance of public opinion. Any decision must be based on full knowledge of all available evidence on the issue to serve the best interests of our farmers and consumers. And not the interests of desperate companies seeking to make a quick buck at our expense. higher productivity of GM soybeans, it may be useful to mention that European demand for animal feed guaranteed to be free of GMOs has soared in recent years. Supermarket chains such as Tesco and Asda have become sensitive to consumer preferences for non-GM products. Since about 70 percent of the U.S. soybean crop is planted with GM soybeans, Brazil, which bans GMO crops, has become the major source of non-biotech soymeal.

Latest reports from Mexico also indicate that earlier this month, the Mexican Congress unanimously demanded that President Vicente Fox ban the import of GM corn, claiming that the new corn could affect the genetic integrity of Mexico's crops and

threaten the country's food supply. GM corn has been a hot issue in Mexico since genes from U.S. GM corn were found in wild corn in the southern state of Oaxaca several months ago.

At the same rime, in the US, Iowa state farmers and elevators have received a total of $9.2 million in compensation for losses associated with growing and handling StarLink Bt corn, which contaminated grain supply. Some estimates place total eventual payments, in compensation to farmers and elevators in 17 states, at more than $200 million. Elevators are being compensated for the genetically modified corn being mixed with traditional corn. Farmers were paid a premium to keep it off the market by feeding it to livestock. Farmers, whose corn was contaminated through cross-pollination, or those who purchased corn without being told it contained StarLink genetics, are also being compensated.

We are not anti-technology, back-to-nature romantics. We are scientists who believe that science in general and bio-technology in particular has a massive contribution to make in advancing human welfare. But as scientists we also believe it is our duty to conscientise people about technologies and products that are potentially dangerous. Uncontained Recombinant DNA as in the recent case transgenic Bt can cause genetic pollution –a pollution without recall. In contrast ,production of drugs/vaccines where the vector –transgene construct is contained in the laboratory and is not recklessly released into the environment as in the case of transgenic crops is safer. Massive evidence available in established scientific journals suggests grave risks for human health in the use of genetically modified products. Because of this, most countries have imposed bans or very strict regulations on GM crops. As a result, companies developing them are ever on the lookout for new markets, in countries where public opinion is still ignorant about the really serious problems of these crops. As a nation, we need to be vigilant that discredited technologies and products do not sneak into our borders, just because of the ignorance of public opinion. Any decision must be based on full knowledge of all available evidence on the issue to serve the best interests of our farmers and consumers. And not the interests of desperate companies seeking to make a quick buck at our expense.

Law to protect plant varieties – the farmer's right at jeopardy

Prof. N.S. Gopalakrishnan

Prof. N.S. Gopalakrishnan is presently a faculty member at the Cochin University of Science and Technology. Earlier he was at the National Law School of India for more than ten years.

Protection of the farmer's right on genetic materials particularly on seeds became a national issue, ever since, the demand of the global seed corporations to protect intellectual property rights on new plant varieties got incorporated in the Trade Related Aspects of Intellectual Property Rights (TRIPS) Agreement under WTO. According to TRIPS India is now duty bound to protect the intellectual property rights of the breeders of new plant varieties. From 1994 onwards many attempts were made to put a legislation to achieve this objective. It was the strong protest from the farmers' group that prevented the successive Governments from introducing legislation to protect the new plant varieties. The demand has been to effectively safeguard the traditional rights of the farmers in the use of genetic materials while providing intellectual property protection for the new products developed from the genetic materials. Of the many options available to India, the present Government decided to introduce a legislation, The Protection of Plant Varieties and Farmer's rights Act 2001, taking provisions favourable to the breeders from the International Convention for the Protection of New Varieties of Plants (UPOV) 1991 and introducing a set of new norms to protect the farmers' right. But it one examines the provisions dealing with farmers rights, it is clear that the legislation is intended to protect the interest of the breeders at the expense of the farmers.

The Act envisages different methods to protect the interest of traditional farming communities and farmers. This includes the provisions for recognition of rights of farmers, benefit sharing, paying compensation to communities for their contributions, payment of annual royalty by the breeders and the creation of Gene Fund. The right of the farmers include the right to save, use, exchange, share or sell his farm products obtained from a new variety protected as per the provisions of the Act. But this benefit is not extended in case where the sale of the farm produce is for the

threaten the country's food supply. GM corn has been a hot issue in Mexico since genes from U.S. GM corn were found in wild corn in the southern state of Oaxaca several months ago.

At the same rime, in the US, lowa state farmers and elevators have received a total of $9.2 million in compensation for losses associated with growing and handling StarLink Bt corn, which contaminated grain supply. Some estimates place total eventual payments, in compensation to farmers and elevators in 17 states, at more than $200 million. Elevators are being compensated for the genetically modified corn being mixed with traditional corn. Farmers were paid a premium to keep it off the market by feeding it to livestock. Farmers, whose corn was contaminated through cross-pollination, or those who purchased corn without being told it contained StarLink genetics, are also being compensated.

We are not anti-technology, back-to-nature romantics. We are scientists who believe that science in general and bio-technology in particular has a massive contribution to make in advancing human welfare. But as scientists we also believe it is our duty to conscientise people about technologies and products that are potentially dangerous. Uncontained Recombinant DNA as in the recent case transgenic Bt can cause genetic pollution –a pollution without recall. In contrast ,production of drugs/vaccines where the vector –transgene construct is contained in the laboratory and is not recklessly released into the environment as in the case of transgenic crops is safer. Massive evidence available in established scientific journals suggests grave risks for human health in the use of genetically modified products. Because of this, most countries have imposed bans or very strict regulations on GM crops. As a result, companies developing them are ever on the lookout for new markets, in countries where public opinion is still ignorant about the really serious problems of these crops. As a nation, we need to be vigilant that discredited technologies and products do not sneak into our borders, just because of the ignorance of public opinion. Any decision must be based on full knowledge of all available evidence on the issue to serve the best interests of our farmers and consumers. And not the interests of desperate companies seeking to make a quick buck at our expense.

Law to protect plant varieties – the farmer's right at jeopardy

Prof. N.S. Gopalakrishnan

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Protection of the farmer's right on genetic materials particularly on seeds became a national issue, ever since, the demand of the global seed corporations to protect intellectual property rights on new plant varieties got incorporated in the Trade Related Aspects of Intellectual Property Rights (TRIPS) Agreement under WTO. According to TRIPS India is now duty bound to protect the intellectual property rights of the breeders of new plant varieties. From 1994 onwards many attempts were made to put a legislation to achieve this objective. It was the strong protest from the farmers' group that prevented the successive Governments from introducing legislation to protect the new plant varieties. The demand has been to effectively safeguard the traditional rights of the farmers in the use of genetic materials while providing intellectual property protection for the new products developed from the genetic materials. Of the many options available to India, the present Government decided to introduce a legislation, The Protection of Plant Varieties and Farmer's rights Act 2001, taking provisions favourable to the breeders from the International Convention for the Protection of New Varieties of Plants (UPOV) 1991 and introducing a set of new norms to protect the farmers' right. But it one examines the provisions dealing with farmers rights, it is clear that the legislation is intended to protect the interest of the breeders at the expense of the farmers.

The Act envisages different methods to protect the interest of traditional farming communities and farmers. This includes the provisions for recognition of rights of farmers, benefit sharing, paying compensation to communities for their contributions, payment of annual royalty by the breeders and the creation of Gene Fund. The right of the farmers include the right to save, use, exchange, share or sell his farm products obtained from a new variety protected as per the provisions of the Act. But this benefit is not extended in case where the sale of the farm produce is for the

purpose of reproduction under a commercial marketing arrangement. These rights are going to be of little use to the farmer when it is looked from the angle of re-using the farm product as seed. The reason being that the products of many new varieties may not be capable of being used as seeds without further scientific processing. The new developments in biotechnology are going to make the farmers fall back every time to the seed producer if he wants the same productivity from the new variety.

For the purpose of rewarding the value addition by the traditional communities and farmers, the term farmer has been defined to include a person who consumes, preserves any wild species or traditional varieties or add value to it through selection and identification of their useful properties. But there is no special procedures provided in the Act to achieve this objective. If a farmer through selection and identification added value to an existing variety the only way to get protection is to file an application for the registration of the new variety following the same norms mandated for a breeder of new variety. This includes the proof of novelty, distinctiveness, stability and uniformity, that too by written description. These norms are based on the modern scientific methods of breeding rather than traditional methods and could be satisfied only if one undertakes laboratory research. It is obvious that this may not help the farmers who add value to a variety in their traditional settings.

Sharing of benefit by the breeder who used the traditional variety to develop the new variety is another method envisaged in the Act to protect the interest of farming community. For the purpose of claiming benefit the interested parties i.e. a person or group including NGO's must apply to the Authority created under the Act in the prescribed form paying the fees. The Authority after giving notice to the breeder and making necessary enquiry, if satisfied, fixes the amount of the benefit sharing. The breeder must deposit this amount in the Gene Fund. In case he fails to do so, the remedy is to approach the District Magistrate within whose local limit the breeder resides to recover the same as arrears to land revenue. Are these provisions going to work? The law presupposes the farming communities to be vigilant and make an application when a new variety based on their genetic materials has been protected. The Head Office of the Authority is going to be in one of the major cities and most probably in Delhi. There may be a few branches in the major cities. Given the social,

economic and educational conditions of our faming communities it is not possible for them to approach the Authority at the appropriate time. The law presumes that the NGO's will take care of the situation. There is no responsibility on the part of the breeder who used the genetic materials and the knowledge based on it to disclose the details of the community, place etc., from where he took the materials while applying for registration of the new variety. Nor there is any responsibility on the breeder to take prior informed consent from the custodians of genetic material and the knowledge based on it before it is used. This seems to be a total negation of the obligations under the Convention on Biological Diversity. The CBD mandates prior informed consent and participation of the communities when their knowledge is being used. There is also a mandate that the benefit sharing must be based on mutually agreed terms and conditions. There is no provision for this in the Act. The only option for the community is to ask for some money. Even for this, the community has to prove that the material and knowledge used belong to them. This has put the custodians of genetic materials and the knowledge based on it at the mercy of the exploiters of the materials who are going to be large corporations.

Payment of compensation by the breeder to the village or local communities for their contribution to the evolution of the variety is also contemplated in the Act. To achieve this centers will be created at different parts of the country. Interested persons on behalf of any village or local community whose genetic material and the knowledge based on it is used to develop new variety shall apply to the center staking claim for compensation for the contribution they made in the evolution of the variety. The claim must be verified by the center and if found correct will report the matter to the Authority. The Authority after giving opportunity to the breeder of the new variety grants a sum of money as compensation. This money is also credited to the Gene Fund. In addition to this the breeder is also bound to pay an annual royalty as determined by the Authority.

There seems to be an overlap between these payments particularly between benefit sharing and compensation. If benefit sharing is for the use of genetic materials, the compensation is for the contribution to the evolution of the variety. They seem to be for the same purpose. It is the knowledge about the quality, utility etc., of the variety

that make the breeder to use the same for the development of the new variety. This information is normally evolved by the constant use of the genetic material over a period of time by the community. This seems to impose responsibility on the breeder to pay more than once for the use of genetic materials. In all the cases it is the Authority, who determines the quantum of amount. But there is no provision to avoid double payment. In all the cases the money is deposited to the Gene fund and then paid to the claimants. It is impossible to think how money can be paid to an individual if the compensation or benefit sharing is for a community. It is also not made clear that the NGO's or group of persons who can also make a claim must have the authorization of the village or local community for doing so, nor the law obligates that the money must be spent for that specific community. There are bound to be conflicting claims. There is no provision to solve this as well. It appears that the whole scheme of law is impossible to implement and will remain in the paper. The attempt of the law seems to encourage investment particularly foreign in plant breeding, sacrificing the interest of the farming community. If one is really interested in protecting the interest of the communities who are the custodians of genetic materials and the traditional knowledge based on it the best approach is to have a separate legislation for this segment of the society.

Technology and livestock -Implications for rural livelihoods

Dr. K.P. Ramesha

Dr. K.P. Ramesh is a Senior Scientist at the National Diary Research Institute, Bangalore. His specialization is in Animal breeding and artificial insemination. Presently, he is engaged in research on conservation of Zebu breeds' germplasm, focusing on South Indian indigenous cattle breeds. He has many articles to his credit concentrating on molecular and genetic characteristics of Zebu breeds of cattle. He is a co-author of 'Kamadhenu'- a vernacular publication on indigenous breeds.

Domestication of zebu cattle appears to have taken place in the area of present Afghanistan, Sind and Baluchistan before 4000 B.C. Different breeds of zebu cattle (*Bos indicus*) were evolved over centuries to suit to the requirements and the agro ecological situations. Despite decades of modernization, India remains as one of the largest, oldest and predominantly rural agricultural societies in the world. Even today, every aspect of the country's economy, polity and day-to-today lives of the majority of its 1000 million population are governed by what happens in the agricultural sector. The sustainability of India's agriculture is, therefore, of paramount importance. While farmers and environmentalists struggle against the dangers of increasing un-sustainability and ecological/social imbalances, they understood that there are many aspects of conventional farming which are relevant, and the modern methods should at best supplement indigenous and local knowledge rather than displacing it.

The rural population, especially the poor and marginal sections, and those living in remote hamlets are still dependent on animal draft power for various agricultural operations and for rural transportation. It is often stated that India lives in her villages, and livestock is an essential feature of the rural scene. Over the centuries, many indigenous breeds of cattle and buffaloes were evolved to serve the specific purpose.

The challenge of the millennium is to evolve sustainable farming models for the small and marginal farmers who form the largest chunk of our farming community. The nature of small production and marketable surpluses of these farming units essentially depend on livestock draft power right from tillage to transportation of produce to the market as a viable and cost-effective model. The use of draft animals has implications for fuel requirements, conservation of fossil fuel and ecology.

Livestock enterprise, complementing the crop production is perhaps the only hope for the economically fragile population in the post-liberalization era. The small and marginal holdings have very little marketable surplus of the crop output but their cash needs for both purchased inputs and family needs have been increasing in leaps and bounds. Livestock enterprises have the potential to generate surpluses by not only utilizing the by-product of crop farming, but also to supply valuable manure for crop farming and provide productive employment to the family labour during off-season. One cannot deny the fact that the Indian livestock industry can boast of its "White Revolution" to match the much-acknowledged "Green Revolution" on the agricultural front. Nevertheless, the development focused more towards dairy farming with an emphasis on improving the quality of milch animals through introduction of exotic and cross breed cattle than on zebu animals and buffaloes. However, the benefits have once again eluded the marginal and small farmers' because of high initial investment on exotic/cross bred animals and hygienic animal sheds as well as high maintenance costs compared to the local breeds of cattle. Though crossbreds have the high genetic potential of production, they are unable to express fully due to environmental stress, low quality feed and fodder and high susceptibility to diseases. Along with the crossbreeding many new diseases like Theileria, Tuberculosis and Infectious Bovine Rhinotrechitis (IBR) etc also emerged. Due to soft hoof, many of the pure exotic cattle and crossbreds are suffering from foot rots. They are unable to survive and produce optimally under low input conditions of the majority of the rural areas. The increased use of modern techniques in animal production without desired level of veterinary health care and feed and fodder resources have resulted in sub optimal performance of crossbreds. In contrast, our buffaloes and indigenous breeds of cattle are able to convert available

poor quality roughages like paddy and ragi straw into milk where as exotic breeds like Holstein Friesian and Jersey require concentrates and quality fodder. Exotic breeds struggle to adapt to Indian climatic conditions.

Special characteristics of Indigenous cattle and buffaloes:

The general superiority of zebu cattle and buffaloes with respect to adoptability, disease resistance etc. is well recognized. Their special characteristics include their ability to withstand and graze even at atmospheric temperatures as high as 40°C. The sweat glands in indigenous breeds of cattle are twice as big and 30% more numerous than those of the European breeds. The extensive area covered by the dewlap, loose body skin, more sweat glands and their hair coat play a vital role in their heat tolerance. Zebu cattle and buffaloes can twitch their body skin and drive away flies and mosquitoes. The sweat also acts as a repellant to these insects due to its peculiar smell and their low level of metabolism also contributes to heat resistance.

The zebu breeds and buffaloes can efficiently convert poor quality forages into milk, beef, etc. and withstand long periods without water. Indigenous cattle as well as buffaloes have the ability to reverse down metabolism during extremes of scarcity and restore their body condition quickly with improvement in the availability of feeds and fodder. This is of great help in situations like drought, famine etc. They are efficient forager and better converter of poor roughages. Butterfat percentage in them is high and helps in rapid growth of calves. In indigenous cattle and buffaloes premunity is high as compared to *Bos taurus*.

There is a great degree of genetic variation in zebu breeds cattle and buffaloes with respect to their size, nutritional uniqueness, productivity, growth rate and reproductive efficiency that can be effectively utilisised for their improvement worldwide. As already mentioned, indigencus cattle and buffaloes have natural resistance to many diseases which will be of great use in developing livestock with least health problems.

Genetic resources of our country: India is bestowed with valuable and unique germplasm resources of cattle and buffaloes. Best milch breeds of buffaloes are native to India. The breeds like Murrah, Surti, Jaffarabadhi, Nili Ravi are native to our country and well adaptable to our agro climatic conditions. Many of our indigenous cattle like Amrithmahal, Krishnavalley, Punganur etc., are threatened with extinction. Indian milch breeds of cattle viz. Sahiwal, Tharparkar, Gir are well suited to tropical conditions of our country. The dual-purpose breed like Deoni is ideal for areas like Gulbarga, Bidar and surroundings areas. For hilly and malnad areas small sized cattle and buffaloes are well suited. Farmers have to choose animals, which can survive and perform optimally under the existing agro climatic conditions by utilizing the existing feed and fodder resources in a sustainable way with least health problems. The breed suitable to one area may not be suitable for another area. Hence, great care has to be taken while utilizing the modern tools for the improvement of cattle and buffaloes.

Changing Land Reforms and Implications for Rural livelihoods

Prof. Ravivarma kumar

Prof. Ravivarma Kumar is a renowned lawyer in Karnataka and Managing Trustee of Ram Manohar Lohia Samata Vidyalaya, which is active as a public forum and first Chairman of the Karnataka Commission for Backward Classes.

Land Reforms

Since independence India is seriously grappling with the problems of poverty, illiteracy and unemployment. The constitution of India has set a manifesto for every Government in the form of directive principles of State Policy (part IV). These directives have set a constitutional goal to be achieved by every Government and to secure a social order for the promotion of the welfare of the people (Article 38); secure right to an adequate means of livelihood (Article 39 (a); secure with the ownership and control of the material resources of the community are so distributed as pest to sub serve the common good (Article 39 (b); to ensure that the operation of the economic system does not result in the concentration of wealth and means of production to the common detriment (Article 39 (c); promotion of educational and economic interests of Scheduled Castes, Scheduled Tribes and other weaker sections (Article 46) and raise level nutrition and standard of living and to improve public health (Article 47). These directives are fundamental in the interest of the country and it shall be the duty of the state to apply these principles in making laws.

These constitutional goals remained unfulfilled for over two decades. Karnataka became sensitive to carry out its constitutional duty only after Devaraj Urs became the Chief Minister of the state. I am very proud to say that the late Devaraj Urs brought about revolutionary reforms in rural economy, through abolition of absentee landlordism; abolition of inams, abolition of village offices. The Karnataka Land Reforms Act, with effect from 1.3.1974 introduced three major reforms – (i) It imposed a dealing of land-holding and the holding in excess of the ceiling was distributed among the Dalits and Adivasis. The maximum permissible holding was 10

standard acres; (2) Absentee landlordism was abolished. Tenant was made the owner of the land and all tenancies were declared as unlawful; and (iii) There was a total ban on non-agriculturists holding lands.

I have heard that very good land reforms have been launched in West Bengal. I had the unique oppurtunity to interact with the West Bengal Minister for Land Reforms. I learnt that the West Bengal Land Reforms did not confer ownership rights on the tenant. Only tenancies were protected from harassment in the matter of fixation of rents and security of tenure. As against this the revolutionary Karnataka Land Reforms Act abolished absentee landlordism and directly conferred ownership of the land. It recognized the well-known socialist concept of 'one man one job'. It also abolished titles of non-agriculturists and prohibited land holding by persons other than the natural persons. Through this process the law ensured an adequate source of livelihood to greater number of field.

Surplus land, land held in excess of statutory ceiling, vested in the state government and is distributed in the ratio of 75% to Dalits and Adivasis and the rest to the landless laborers. Totally 2,68,219 acres of land has been determined as surplus land. 1,21,823 acres of land have been distributed to landless agricultural labourers and other Scheduled Castes and Scheduled Tribes eligible persons. The Schedule Castes and Scheduled Tribes have secured 77,281 acres and 44,542 acres of land has been distributed to landless labourers.

Under section 48A of the Karnataka Land Reforms Act, 8,40,171 applications were received from tenants claiming ownership rights, 21,03,566 acres of land has been distributed to 4,94,218 tenants.

Under the Karnataka Village Offices Abolition Act, 1961, out of a total extent of 12,96186 acres, 6,81,713 acres have been registered in the name of tenants. These were lands held by the former Patels and Shanbhogs and other village offices.

Another revolutionary measure taken by Devaraj Urs was to restore the lands to Advisasis and Dalits. The lands granted in their favour have been sold to others in violation of the condition of the grant. Such lands were restored to the original grantee with a very simple procedure.

These three enactments were implemented through the Land Tribunals, which were justly called as people's court. The Assistant Commissioner presided over these tribunals. Non-official members were in majority and one of them is required to be a Dalit. No specific educational qualification was prescribed to be appointed as members of the tribunal. Initially, even lawyers were not allowed to appear before the tribunal. These tribunals have power to confer occupancy rights, to declare the ceiling area not withstanding anything contained to the contrary in orders, decrees of judgments of civil courts including the Supreme Court. This is how in a major thrust in the economic reforms in the rural sector; the land tribunals were able to implement the laws without much legal complications and technicalities. In all over 17 lakh families were benefited from these three major reforms. Lakhs of acres formerly held by religious institutions and non-agriculturists were made over to the tillers and ownership was given to the tenants.

Persons with a family income of Rupees more than 12,000 were prohibited from acquiring agricultural lands. This income limit is now increased to Rs. Two lakhs. It is however regrettable that in thousands of cases, the orders of the land tribunals was set at naught on technical grounds. This has caused a serious set back to the implementation of the land reforms. About 500 cases are still stated to be pending. However by and large the law has been implemented.

I do not say that the Karnataka Land Reforms Act as a perfect enactment. There is scope for improvement. For example, the definition of personal cultivation permits cultivation through hired labourers. This should not be done. This has actually given room for evading the consequences of the Act by describing the actual cultivation as a hired labourer. The Act is not extendedCoffeeand Tea plantations, as a result of which unlimited extent of agricultural lands are even now in the hands of few persons as a coffee or tea plantation. The ceiling law should have been applied to these lands also with an enhanced ceiling area. About six years ago, the law has been amended in a major retrograde step. An amendment has been given a blanket power to the Government to issue notification exempting the application of the land reforms Act. This has given room for MNCs, Bio-tech industries and other non-agriculturists to acquire lands in contravention of the funda

mental rule 'no agricultural land shall be acquired by non-agriculturists'. Section 108 of Act permits the Government of Karnataka to issue a Notification and exempt operation of the whole enactment.

Though the original Land Reforms Act was enacted as early as in 1961, it was brought into force on 2.10.1965, as it was originally enacted had lacked the revolutionary aspects mentioned above. It was only with effect from 1.3.1974 through an amendment to this Act, the land reforms have been accomplished by means of ceiling, creating land tribunals and restricting the holdings to the agriculturists.

In Karnataka we have built 12 dams and spent thousands of crores of rupees and uprooted millions of families. The total extent of irrigated land through these dams is 40 lakhs of acres. As against this, the farmers have themselves tapped underground water through bore-wells and irrigated their smallholdings. On an average one lakh of rupees has been invested on each of these bore-wells. Karnataka has about 14 lakh borewells through which the farmers have irrigated 50 lakhs acres. This was accomplished entirely through the farmer's capital without any drain on the taxpayer. But these bore-wells required uninterrupted power supply. The power tariff has gone up from 11 paise per unit to 1.75 per unit. Even this has been subject to an upward revision. Farmers are discriminated on various grounds including ownership of vehicles and telephone connections. While the KPTCL is buying power at the rate of Rs.1.35 per unit, the cost of supply is estimated to be Rs.2.67 per unit. The transmission and distribution loss is estimated to be about 40%. Incidentally the loss, which was at 16% earlier jumped to 38% the moment the Reguiatory Commission, was set up under a new enanctment. Today power supply is made only once in two days that too for a period of six hours, but the tariff is being raised substantially imposing burden on the farmers and without taking their paying capacity into consideration. This anti-farmer policy has resulted in large-scale suicides of farmers who are unable to make both ends meet.

A major accomplishment by Indira Gandhi was nationalization of banks. The loan disbursement to farmers had gone up to 18% as a result of this nationalization. However according to Reserve Bank annual report of 2001, the disbursement of loans to small farmers (holding less than 2.5 acres) has declined by 50%. The farm

ers owing lands between 2.5 acres and 5 acres, it has come down by one-third of what it was earlier. It is in this backdrop that farmers are forced to fall back on private money lending and have become victims of unscrupulous loans. This is one of the major reasons of large-scale suicide of farmers. The agricuitural credit policy has literally eliminated the farmers from public financing. So now farmers are left with no financial assistance.

It is in this back-drop I request you to focus on certain major problems faced by the farmers and consider some of my suggestions as detailed below:

(i) The entire hydel power should be resurged for the agricultural sector. It is the farmers who had paid for these hydel projects. None of the present-day industrialists have contributed for the said construction. In law we have a concept known as restrictive right where by continuous user will acquire the right to continue to exercise such rights. The farmers have been using hydel power for the last 100 years and therefore the farmers are entitled to continue to use it. The hydel power in Karnataka is the cheapest in the country.

(ii) Remunerative prices should be fixed for agricultural produce. In food production we have crossed the earlier record of 209 million tons. In India agriculture happens to be the only sector on which self-sufficiency is accomplished. However income from agriculture has come down to third place, GNP making way for the services and the industry. This is only because the agricultural prices have crashed with the increasing production. The agriculture economy has also crashed by indiscriminate import of food-grains as a result of economic liberalization and globalization. It is therefore necessary to at once fix remunerative prices for agricultural produce and arrest on import of food-grains;

(iii) The Land Reforms Act should be restored to its original glory. All exemptions should be removed and the law should be made more progressive by applying to plantation lands also; and

(iv) 50% of public finance should be reserved for the agricultural sector. This is the only way to remove poverty from the villages and eradicate unemployment.

Institutional reforms- Land reforms- The question of distributive justice, I think, this is central to us in terms of looking as the major period of agricultural crisis in our country, it is very interesting in our media, about the success of East Asian countries and can selectively forget to tell us the celebration of East Asian growth which was first based because of excellent implementation of land reforms. In Taiwan, Japanese army did the Land reforms, China- Mac;s –Chinese revolution did the land reforms, Korea through dictatorship whereas Thailand- historically traditional laws have prevented accumulation of lands, so it is that I would call the first generation of reforms which as central to the East Asian countries.

In the latest issue of Frontline, the author mentions about, even at this moment of low agricultural growth, increasing poverty and hence forth, states that have done well with respect to land reforms are still doing better in terms of both agricultural growth and poverty. This is very important lessons for us, along with other questions were addressed in the morning. The whole technological gismo that we are bringing basically to support us to divert the attention from the fundamental institution questions. For if you cant implement land reforms, like the Green Revolution. Green Revolution was chosen because instead of adopted land reforms, you chose selectively well endowed districts which had irrigation and other things that increased production, avoiding the social route of land reforms. I think we are trying to do the same with GMO and so on, Dr. Banarjee mentioned today.

Discussion- Effectiveness of these measures are not equal district wise. In North Karnataka, in certain districts, see people holding 100 acres of land, as it a loop hole or was it designed to hold so much lands, by and large the ceiling has been vigorously implemented, mainly due to the legal interpretation made by the courts that some holes have been picked into the programme.

One of the greener areas for this venture is partition and membership of a joint family, that has been an area, courts have given a number of rulings which can be taken advantage of and hold more lands. Secondly, when the ceiling was imposed but was clear, However, the binami transactions that were quite valid then was made in order to hold more lands and of course like any other law, this law has also been subject to many violations like the land lords setting up their own servants at home as tenants and getting them registered in order to getting away with the ceiling laws

that is how lands are held in exces of the ceiling area. North Karnataka this has been made possible, mainly because the hold over the land tribunals in North Karnataka as in the hands of the land lords' themselves because of the caste system, because it is more feudal and more rigorous, than in the South, where we were ruled by a benevolent king who introduced reservation and social institutions. So in North Karnataka this has happened because land lord ruling the rules even in the land tribunals. Otherwise, it is for the land ceiling laws was implemented. We are short for the target. When the law was enacted it was estimated that 8 lakh acres of land in excess of ceiling area but we have acquired only three lakhs, so that itself is a clear testimony that the law has not been fully operated.

Comment- Pulapre- Agriculture becoming third part of the economy presumably you are referring it as GDP - being a smaller share, this is a feature in all over the world particularly in the Developing economy. What should actually concern is the standard of living in India. Internationally, the declining share of agricultural total output has been co-terminus with improvement in living standards. In India, much too slowly, but nevertheless. The share of GDP in agriculture is not so important as far as I see. Land reforms in Karnataka as interesting. You are absolutely right, about Bengal- Operation Bharga- just assures something like non immediate eviction, share of the rent is specified etc, and in that sense be radical at all.

You seem to have missed out in Kerala, 15 years back, in some sense it was much more radical than Bengal not necessarily what has happened in Karnataka. In Kerala also, Land reforms was not that radical, self cultivation was allowed with hired labour, the same thing which was not the land like to the tiller at all. And in some sense, it was not radical. Agitation of the adivasis led by C.K. Jalu is perfect evidence that in some sense as successful as it was made out. I feel Kerala has been blown out.

Was there a substantial section of agricultural labour, pure labour not tilling the land, but working for somebody else, not tenants and what has been as record as beneficiaries in Land reforms of Karnataka?

How have they fared? Agricultural labour – Did they get access to land as part of Land reforms?

Ravi varma kumar- i agree that agriculture has taken a back place, but in a socialist pattern of society, which is a welfare state, the first priority should have been to give enough work food and remuneration to the teeming millions in the country, that was to be achieved. Agriculture should have not been stepped down to the third place. It is true in the developed economies that this could happen because as very small percentage of farmers live on Agriculture.

Secondly, your comment on Kerala is also correct, I did miss it. In Kerala, one should not forget that the land reform as backed by a strong union, but in Karnataka we did not have a union, but in Karnataka, we did not have a union, though an initial attempt as made during Kaagdou Satyagraha when Gopala gowda was alive in 1951, there was an agitation and not after that. It was a Congress chief minister who accomplished it through the legislation.

So far as the agricultural labour are concerned, the entire land that has come from the ceiling area has exclusively gone to the agricultural labourers and 75% of land is reserved in favour of SC's and Adivasis.

Tenancy- Tenant has got it, land held on excess of the ceiling area whether he as in position or not- Adivasis and ST.

Umashankari- I would like to share experiences of Andhra Pradesh, J.P Centenary year- close to Bhoodhan movement, Bhoodhan is still sitting on the land given and not distributed it. Atleast we should campaign for that to be distributed.

Very often when land reform is raised, where is the land, there is no land to be distributed because of fragmentation of land plus forests cannot be touched, actually there is enough land if we look at it, carefully, if there is no political will to go for a revolutionary kind, even if the government is willing to pay a market price, to the lands and distribute to the poor, then food subsidy can come down. Instead of giving food subsidy, if you can give the acre of land to landless farmer with irrigation and let the state somehow, Now the government's say that they don't have money, if government does'nt have money- then who has it?

Comment

Agriculture contribution to GDP is coming down. Observation is 1950's agriculture was contributing 70% and 70% people was dependent. 84% of the income was from agriculture, now it has drastically come down to 40% in 97-98 from agriculture, now that our industry is growing, it is understandable. But what is the ratio of decline of population dependent on agriculture, it is very less 68%.

Second generation reform is aiming at diluting the whole spirit of MSP for the priced market what have the structural adjustment. In industries, it is very clear, privatize a separate sector is there, ministry for disinvestments. In agriculture, the largest private sector- diluting the reforms under the agenda is what is focused at. Contract farming- equity constraint- is what is the outcome.

Public Distribution system has come into effect for various reasons may be poverty allievation, what can be observed is that it has not gone into look deeply into the socio-cultural aspects of the people, whom we are targeting it. PDS has completely rained the dryland farming, draining away all Biodiversity, hundreds of varieties of millets have vanished and everybody in India should eat rice and wheat, nothing else, tragic situation. Youngsters don't even know the name. Proved by studies- have highest nutritive by our own policies. We have brought about devastation our capacities has reduced and we are spending huge sums on health problems making the pharmaceuticals, prosperous. Dry land area which has cannot be brought under irrigation, 2 Rs. Rice, we could have got Kuralu, Ragi, Why dint' we get into the PDS, it was during Kumarappa and Gandhi's time, rice was supposed to be distributed unpolished. There is constant nutritional destruction and by changing the food habits of through technical change and cultural change in food habits and leading in the long run undermining our own sustainable agricultural systems- Dry land areas even now have capacity to produce. 25 lakh acres i.e 75% was under food crops in Anantpur – from 73 now- groundnut has taken over and the whole area is dominated by groundnut- presently. After the starting Rs.2/- for Rice, people started buying only. This has gone into supporting the infrastructures; our own studies have shown that only 2,500 acres have small millets under the 25-lakh acres of cultivated area of

land. This has to be considered, start using millets, one way of promoting biodiversity. Unless the urbanites start eats if, rural people will not produce it. We need to look to taste.

One of the Pavagada taluk of Tumkur district- a Thesis was submitted to Indian Institute of Science- Study indicated that 50 years back, 40 to 50 different crops was grown in this taluka, now it has lined down to 3 to 4. All the varieties were suitable by the rainfall pattern that was occurring in these region even if they lost one crop, the other ones would bail them out.

People are talking about million tones of rice, oil but they are not talking about grass root level changes. Oilseed – massive propaganda of production of oil seeds. Ragi is never grownfor commercial production. Fragmentation is taking place, many numbers of families living in 1/4th of an gunta- growing mulberry, keeping the family intact. As Chairman of the backward classes Commission, it had come to my experience that the best thing that could be done is to wind up the whole social welfare department and distribute the cash to the beneficiaries directly – No schools, no hospitals. According to one estimate, the total amount spent to SC and ST's after the independence, in their name, if only it had been kept in a bank without distribution today every child born yesterday would have got 2.9 lakhs net cash.

The beauty of Karnataka programme as that the Dalits and Adivasis need not spend a penny what was granted to him, it was totally under the cost of the state was restored and no compensation as paid from whom the land was purchased. Andhra government, government is giving 26,000 rupees per acre to buy land, 26,000/ family. There is money, source of livelihood could be provided by providing the capital, such an experiment should be done in a wider range. It can be taken in phases. Adivasis in one year, SC-ST in two or three years.

Lawrence Surendra

The major thing is that such an important type is not getting the kind of attentional focus it is supposed to get. One of the reasons the rural people are fed up- NGO's- as Japanese call them, 'No Good Organisations' and Net working as 'No working',

we have diverse groups, that e had fundamental issues like distributive justice and institutional reforms, we did address in the early 60's and not now. Any government or the government in power, given the nature in shift of social classes contribute are becoming political class, if you like the reason is the political class today feels that it should support the traders, 2 successive budget have made trading more profitable than – one engaged in any manufacturing or production activity. Discussion on this is necessary. With diverse ecological country like ours that we are moving into such situations, the agricultural- in the week end, traditional fishing community, situation is terrible and pathetic.

Deep South of Tamil nadu- village- fishing king prawns was the main occupation. It is pathetic that the village will close down - Houses are built of stone, beautifully built houses in the 80's, gives an impression that they are rich. None of the fishermen knew about globalisation but expressed that it all happened after the 80's and gave intricate economic calculations. Everytime I see a village closing down, along with them the tradition, occupation and culture. If we start from that kind of discussion to the questions we asked today, then we have to ask what is this nation about? With the initiation taken by Vanaja, I hope atleast some educationists, researchers, interested citizens, so that some attempt , hopefully will enter public debate and public policy.

List of Participants

Sl No	Name	Organisation	Address	Phone/Email
1.	Dr. Debashis Banerji	Samaj Pragati Sahyog, Baba Amte People's Empowerment Institute	SPS, Bagli District, Dewas, Madhya Pradesh	07271 – 77757
2.	Ms. Sughandha Upasani	Valley School KFI	Valley School KFI Kanakapura Road Haridvanam	8435240
3.	Ms. Sunita Rao	Kalpavriksha	908, Deccan Gymkhana Pune: 411004 Field Base Karkolli Village Hulekal p.o. Sirsi Post – 581336	08384 – 38563 serow @ rediffmail.com
4.	Dr. S. Surya Prakash	University of AgriculturalSciences Bangalore – 65	B – 15, UAS Staff quarters, Hebbal Bangalore - 24	3636774 (O) 3433050 ®
5.	Mr.M.N.Dinesh Kumar	Timbaktu Collective	Chennekothapalli Anantapur Dist Andhra Pradesh-515101	08559 – 45335 (O) 45149 ® 45337
6.	Mr. Raghuram		19/2, 4th Main Road Apt 301 Malleswaram Bangalore - 560003	3360493 bkr ram @ yahoo.Com
7.	Dr.Sridhara Adiga	K.S.A.P.C. Bangalore	Karnataka State Agriculture Price Commission, Bangalore	2220912
8.	Mr. K.N. Shanyu Kumar	Karnataka State Department of Agriculture	Department of Agriculture Sheshadri Road Bangalore - 560001	2215093 ext 127

9.	Mr. P. Banu	Agriulture Price Commissio Commissioner	S 65, 10th Main, Bamgalore - 72	3211539
10.	Mr. Cardl Upadhya	Bangalore Indepen dent researcher	447 11th Main 5th cross RMV ext Bangalore - 80	3318541 Cupadhya @ vsnl.com
11.	B.P. Amarnath Rao	Department of AgricultureAgriculture	**Assistant Director of Agriculture M&E Unit** Directorate of Agricul ture Bangalore	2211350
12.	P.S. Hanuman tha Rao	Department of Agriculture	Asistant Director of Agriculture (Fertilizer)Commisinerate of Agriculture	22123431
13.	Prof. Hanuman tha	Institute of Social Sciences, Bangalore	191, 10th Cross NGEF layout, Nagarbavi, Bangalore	3213613
14.	Dr. Nandeesh V. Hiuemath	Faculty member **National Centrefor Mgt. Dept Agricul ture & Rural Develo pment Banking**	# 67 RICM Campus Padmanabhanagar Bangalore - 70	6691928
15.	Mr.Jacob Nellithanaa	Kisani Samvardhan	Kisani Samvardhan 148, Fadrapuri Indore Madhya Pradesh – 452 017	Jackne @ readof mail.Com
16.	G.C. Devnendra	ADA KPAPC Bangalore	Sheshadri Road Bangalore	6690592
17.	Mrs Sudha G. Bhat	DANIDA – WYTEP	522, 33rd Cross VI Block, Jayanagar Bangalore - 11	6634930

18.	Sarvamangla Yard Secretary	Voluntary Actiion for Rural Development Ainangalu Chitradurga	Ainangala Hiriyur Taluk Chitradurga – 577 588	08193 73326
19.	Dr. H Prakash	Department of Agriculture	486/A 23rd Main IVT Block Jayanagar Bangalore -11	6648402
20.	Prof. Dasappa	UAS Bangalore – 65		3424637
21.	Dr.T.N. Prakash	UAS Bangalore	Department of Agricultural Economics UAS GKVK Bangalore - 65	3637002
22.	Mr.Shubham Singh	DHAN Foundation		
23.	Dr. M.Sumanth Reddy	Aggricultural Professor	US, GKVK Bangalore - 65	6647706 ®
24.	Mr. N. Chandra Kumar	Department of Agriculture	Commissionarate of Agriculture Sheshadri Road Bangalore	6321568 ®
25.	Mr. Hanumanthaiah		C/o C.H. Kunchiti Hariyobbe Hiriyur Taluk Chitradurga (dist) Pin – 577 546	
26.	Mr. S.D. Kalyam Shety	MYRADA	ISPWDK Kodli Chincholi (Tq) Gulbarga	75402 (08475)
27.	Ms. Parvathi Menon	Frontline	19, Bangalore	2861154
28.	Dr. G.N.S. Reddy	BAIF	PB NO. 3 Tiptur – 572 202	50654 (08144)
29.	Mrs. Rashmi	Department of Aricultural Economics UAS Bangalore		3637002
30.	Mr. Ramji			6686591