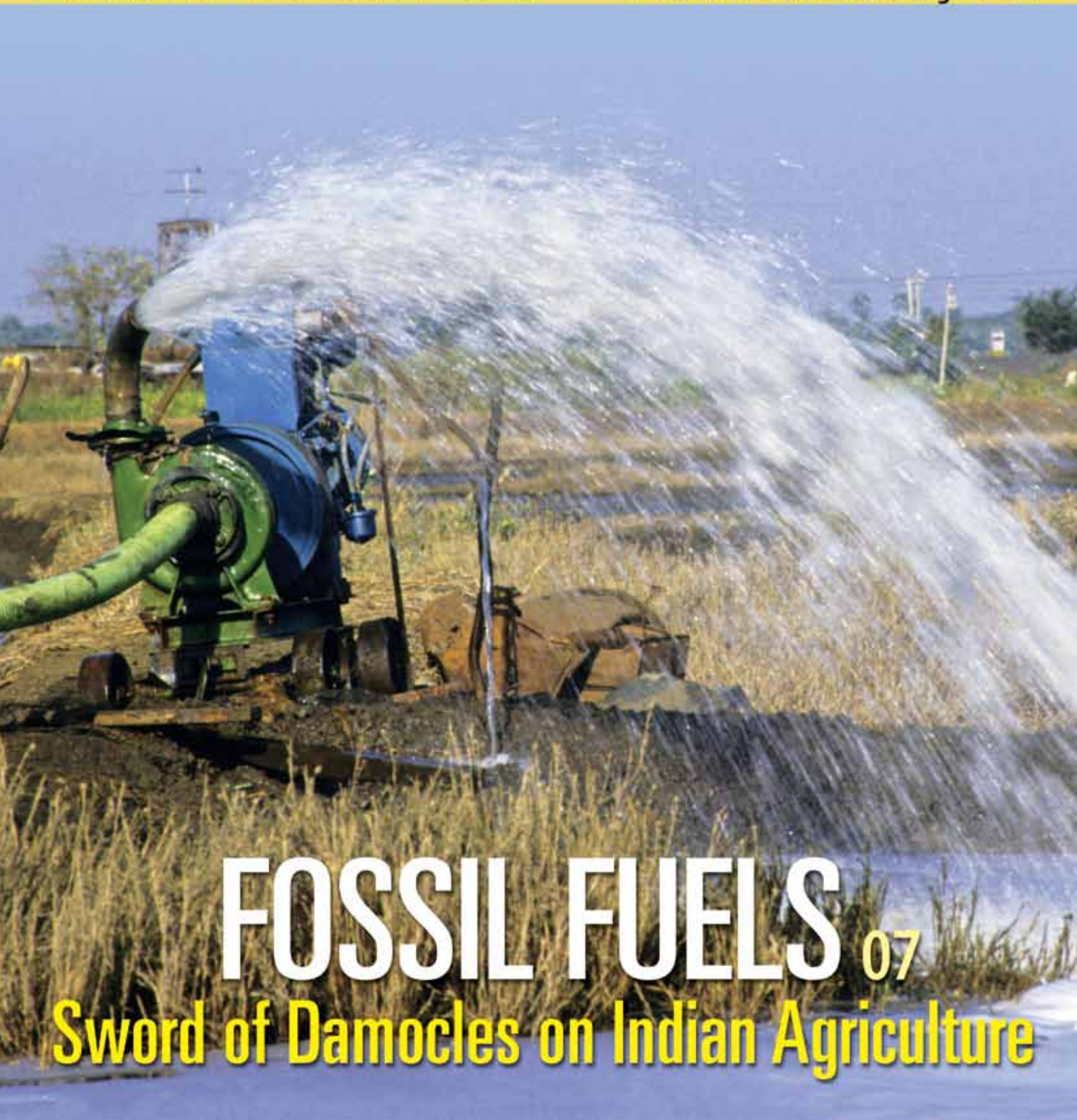


FARMERS' FORUM

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Issues and Ideas for Indian Agriculture



FOSSIL FUELS 07

Sword of Damocles on Indian Agriculture



IFFCO KISAN SEZ - Nellore

Creating India's First Agribusiness Based Special Economic Zone

Business opportunities that invite you to IFFCO Kisan SEZ

Processing of cereals and pulses

- Ready to eat
- Bakery
- Biscuits
- Primary processing and milling
- Snack Foods

Fruits & Vegetables

- Mango
- Citrus (Acid Lime and Sweet Lime)
- Papaya
- Tomato and varied vegetable crops
- Sapota
- IQF / Freeze dried / RTC / RTE / Pickles
- Juices, Jams, Jellies, pulp making
- Snack foods

Hi-tech Green Houses and Poly houses for fruits/vegetables/flowers

Medicinal & Aromatic plants

Feed Manufacturing

Nutraceuticals & Food additives

Aquaculture

- Fish
- Shrimp

Meat & Poultry

Dairy Processing

Tax benefits

Additional Strategic benefits

Realizing the need to bring in high value agribusiness activity into the country, IFFCO, Asia's largest fertilizer company through its SPV IFFCO Kisan SEZ Ltd., has embarked on the development of an **Agri-based Special Economic Zone based on the concept of "Agroparks" (AP) in Nellore** in the state of **Andhra Pradesh**. The developer has brought in the expertise and lessons learned by the northwestern European agro sector in **innovating metropolitan agriculture by forging strategic consultants with Wageningen University and Research Center**, the Netherlands and YES BANK Limited.

• **IFFCO Kisan SEZ** is a notified Multiproduct Special Economic Zone spread over 1000 hectares located 22 KM North of Nellore, A.P. It comes with many customs duty and sales tax concessions provided by the government of India to promote economic activity in notified Special Economic Zones. The concept of Agropark is based on the principles of sustainable development, i.e.

- Application of principles of industrial ecology, i.e. mutual use of waste and by-products.
- Advantages of scale through industrial production and processing.
- Improvement of farmers position as a preferred supplier.
- Independence from seasonality and land during the whole year of production cycle
- Significant reduction of costs

Locational Advantages: IKSEZ is at a distance of just 50 Km from Krishnapatnam Sea Port, a new mega port on the east coast, and within a reach of three hours drive from Chennai International airport.

Nellore, the catchment area which is the Heart of Indian Aquaculture, is a strong source of various agricultural produce such as paddy, sugarcane, fruits & vegetables (especially tomato) and is a prime source of supply of poultry products and milk to near by metropolis. Major fruits include mango, citrus, papaya, banana & sappota.

• **Infrastructure that is being provided:** The IFFCO Kisan SEZ comes with a bundle of world class common infrastructure conforming to international standards including internal roads, high quality rain harvest supported water supply, uninterrupted power supply, common operation, maintenance and management of security, logistics, ICT etc. Moreover, the Agropark offers a framework of industrial ecology, managing waste and byproducts thus significantly reducing costs.

• **Land at IFFCO Kisan Project site** is being offered on long term lease basis for 33 years for potential Entrepreneurs for setting up their units on attractive terms and conditions. For further details contact our website www.iffcokisansez.com or can be obtained from,

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BUDGET 2013: Good Signals and Glaring Gaps

A fellow farmer's message to all organizations reads, "If you have come to help, you may as well leave... but if you see my survival as part of your future we can work together"

The managers of the Indian economy show a strange predilection for rolling out policies to treat the fallout of problems facing the country rather than solving the problems themselves. This would be one clear factor responsible for the current resource crunch and nowhere is it as palpable as in Indian agriculture, where the farmer's woes seem to be no one's concerns even while agriculture is everybody's baby.

It is possibly on account of funding limitations that food processing, extension outreach, irrigation and other critical issues that afflict the farmer do not find a mention in the budget speech. Too much weightage is given to the external factors as being responsible for the mess that the country finds itself in today.

There is, however, one issue around agriculture that draws a lot of attention: farm subsidy, which is one of the most controversial subjects. Every economist under the sun seems to be demanding that farm subsidies be withdrawn or capped. Yet, even as policy influencers want to do away with them, millions of farmers find them grossly inadequate. It is time to explode some of the myths around farm subsidies.

First: Too much is being given to the farm sector. The truth is that farm subsidies come in various forms and, globally, the total subsidy per hectare during 2009 was \$988 in the European Union, \$190 in the USA but only \$149 in India, while per capita farm subsidy was \$239 in the E.U., \$102 in the USA and a meagre \$21 in India.

Second: Policy makers condemn the overuse of fertilizers in India. The reality is that apart from Punjab, Haryana and scattered regions of the country, most parts of India suffer from fertilizer use being much less than the optimum level. China consumed 400 kg/ha of NPK and produced 5,399kg/ha of foodgrain, while India used only 166kg/ha and produced 2,237kg/ha during 2010. Even Bangladesh used 224 kg/ha and Pakistan used 185 kg/ha.

India is faced with the herculean task of doubling food production

PER CAPITA
FARM SUBSIDY
WAS \$239 IN
THE E.U., \$102 IN
THE USA AND A
MEAGRE \$21 IN
INDIA



THE WORRY IS NOT THAT OBVIOUS MISCONCEPTIONS ARE ON ACCOUNT OF IGNORANCE AT THE POLICY MAKERS' LEVEL BUT THAT THEY REALIZE THE TRUTH AND CHOOSE NOT TO ACT

04

even with the land man ratio in the country falling from 0.34 in 1951 to 0.15 in 2009. To do so and achieve the targetted four per cent agriculture growth rate, fertilizers consumption needs to be increased by three per cent every year. Reduction in farm subsidies will lead to reduced consumption and complete removal will cause an 18 per cent drop in farm production.

Third: The primary objective of the pricing policy is to promote balanced use of fertilizers. The reality is that the primary objective is to reduce subsidy and nothing else. Nutrient-based fertilizer subsidy was introduced in 2010 followed by a nearly four times hike in the price of potash, a two and a half times increase in the price of phosphate, while that of urea remained constant.

The resultant nutrient imbalance is destroying soils, causing pest infestation, lower yields amongst other problems. The imbalance in fertilizer use cannot be

addressed by reduced use of some nutrients but by increasing the use of those that are not being used in their prescribed quantities, supported by extension outreach to farmers and giving them access to better technology. Instead, curious solutions are suggested. Small farmers, for instance, are asked to first buy inputs that they can ill afford and wait to be compensated during procurement. Such an ill-advised move will only sink them further in the quagmire of debt and poverty.

The depreciation of the rupee has compounded the problem and queered perceptions about subsidy. Farm subsidy is not charity or wasted expenditure as many argue. It helps productivity, generates farm employment, ensures low food prices and prevents large-scale exodus of rural masses to cities and ultimately revolting against the establishment. The worry is not that such misconceptions are on account of ignorance at the policy makers' level but that they realize the truth and choose not to act.

The problem is not funding alone and indeed, the government has made a good beginning allocating Rs 300 crore for crop diversification. The problem is around the allocations achieving their purpose. Conditions all over the country are somewhat similar to Punjab, where there are 167 posts for horticulture development, of which only about 100 are filled and that too mostly with people on desk jobs or senior positions, while there is a need for at least 300 positions.

Admittedly, funding is insufficient but even when central funds are available, there is a delivery problem courtesy agriculture being a state subject. The bottomline is that all states are short of funds and, therefore, cannot fill the posts.

The solution is simple: central funds for this purpose must be allowed to reach their allottees; used for deploying officers on the ground for extension outreach, otherwise farmers and the farm sector are doomed. This is not to suggest a change in the federal structure of the country but to emphasize that the central government is sometimes so disconnected from the masses that they would be better off without the central government appropriating state government powers in any manner. ●



Ajay Vir Jakhar
Editor

twitter: @ajayvirjakhar

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To the Editor

Poor data; poorer policy

Apropos of your Editorial, "Farmer just as important as the farm sector" (*Farmers' Forum*, January-February 2013), I am entirely in agreement with your position that good policies based on wrong information do as much as damage as bad policies. What surprises one is that even though the government and economists believe that farmers are important, those who are in power are constantly manipulating information leading to the plight of the farmers. Indian agriculture is afflicted by a paucity of data and even when there is data, it is often not available where it is needed or not correctly interpreted. It must be realized that data is the backbone for making good policies. How can a developing country, so dependent on agriculture expect to achieve inclusive growth when policy-makers do not have access to critical data and those who have access to data manipulate them to serve their vested interests.

Salim Khan,

Lucknow, (Uttar Pradesh)

Work-family equilibrium leads to creativity

I read with interest your article 'Kinnow farmer survives; but wary of imports', under your Green Fingers column (*Farmers' Forum*, January-February 2013) but am all confused between an orange and a kinnow. I feel many people like me misunderstand the kinnow and it would be useful to have an article elaborating the difference



Wanted diverse viewpoints

Apropos your pre-Budget analysis, 'Towards a Fair Deal for the Farm Sector?' by Surinder Sud (*Farmers' Forum*, January-February 2013), it is now clear that that budget has very little of interest to the agriculture sector. However, for all such analysis, it would be appropriate for *Farmers' Forum* to have different points of view rather than one point of view that directs readers to a particular perspective. I hope will keep this in mind in the future.

Narender Rana,
Delhi

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Log in to check out all
earlier numbers.**

between the two. Having said that, I was most impressed by the story of Sukhpal Singh Bhullar and his prosperity. In these days when farmers have such stressful lives it is wonderful to hear about how Sukhpal Singh is maintaining such a perfect work-family equilibrium. The Indian farmer has been known to be inventive and innovative. However, he needs a conducive environment to live and work. Stories of people like Sukhpal Singh are inspiring and should help other farmers try to achieve harmony at work and home. Creativity will follow.

Rakesh Sharma,
New Delhi

Changing mindsets

I was most impressed to read the proceedings of the conference organized by *Farmers' Forum* on "Land acquisition bill: issues and concerns of the Indian farmer" (*Farmers' Forum*, January-February 2013) continuing the series of such seminars on issues of interest to the farming sector. It is good that you are getting varied and conflicting points of view on the same platform because it is only through open and free discussions that opinion is formed. However, while commending your efforts, I cannot but wonder if real change is being ushered in and impacting on the mindsets of those who make policy for farmers or influence policy. *Farmers' Forum* should continue with its one-on-one interactions with key policy-makers.

Rohit Thakur,
Bharatpur, (Rajasthan)

Fossil Fuels

**Sword of Damocles on
Indian Agriculture**

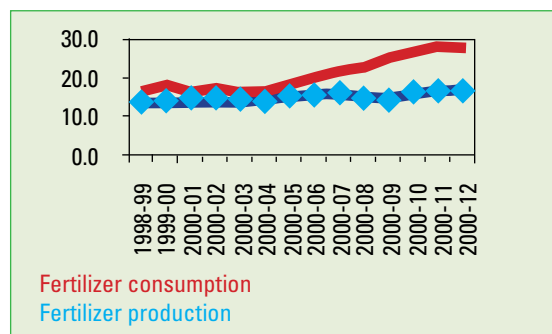
A Farmers' Forum Report

It may surprise many but petroleum is the single most important input in modern day food production in India!

It serves as a fuel for tractors to till the land, food transportation and as the chemical base for fertilizers. The worry is that petroleum products are gradually becoming so scarce and expensive that many of the assumptions underlying the global industrial food system are now in question. It is to understand the fossil fuel economy and its impact on Indian agriculture that Bharat Krishak Samaj (BKS) organized a seminar on “Fossil Fuels in Indian Agriculture” on March 26, 2013 at the India International Centre Annexe, with different players in the fossil fuel and farm sector field making presentations.

The BKS predicts that the price of crude will reach \$200 a barrel by 2020 or even sooner if the Arab Spring spreads to Saudi Arabia. At those prices, India's finances will be in a shambles. Even as the oil producing nations conspire to increase the price of oil without let, the price will also be influenced in a large measure by external factors beyond the control of such producers. Such impetus to oil prices often happen without warning and the spurt in prices is unexpected.

Flagging off the discussions, Ajay Jakhar, Editor, *Farmers' Forum* and chairman of Bharat Krishak Samaj, emphasized that India cannot farm without cheap crude oil. Even though new deposits of shale oil and natural gas are being found, the price of fuel is bound to increase as economies expand and rebound out of the recession. BKS has suggested many times that India should have a sovereign fund and pointed



out that many policies of the government lead to the waste of enormous resources leaving the country perpetually short of funds for development, growth and mitigating future shocks. Issues relating to the price and the availability of scarce fossil fuels hang like the proverbial Sword of Damocles over the Indian economy in general and the country's farm sector in particular.

Since India is currently importing 80 per cent of its total requirements of crude oil, of which roughly two-thirds come from countries in West Asia, the price of oil and the political situation in that part of the world exert a huge influence on the farm economy of the country.

The big question: how are we going to farm without cheap crude oil? This and such other questions were what the BKS sought answers to at the seminar – supported by India's largest oil and gas explorer and producer, the public sector Oil and Natural Gas Corporation (ONGC) – as India is indeed headed for dire straits and is in desperate need of sustainable solutions.

“It is important to develop and adopt practices that that will allow the country to farm without or

Issues relating to the price and the availability of scarce fossil fuels hang like the proverbial Sword of Damocles over the Indian economy and agriculture

The administered price policy provides incentives to the farmers by making fertilizers affordable

| Particulars | Period | | Costed year |
|--------------------------|-----------|-----------------------|----------------------|
| | From | to | |
| Retention Pricing Scheme | 1.11.1977 | 31.3.2003 | Updated periodically |
| New Pricing Scheme (NPS) | | | |
| Stage I | 1.4.2003 | 31.3.2004 | 1999-00 |
| Stage II | 1.4.2004 | 30.9.2006 | 1999-00 |
| Stage III | 1.10.2006 | 31.3.2010 (till date) | 2002-03 |

As a result there has been a significant rise in urea output

Agricultural sector: fertilizer nutrient imbalance

| Year | NPK Use ratio | Price ratio | |
|-------------|---------------|-------------|------------|
| | | DAP / Urea | MOP / Urea |
| 1991 - 92 | 5.9:2.4:1 | 1.4:1 | 0.6:1 |
| 1992 - 93 | 9.5:3.2:1 | 2.3:1 | 1.1:1 |
| 1996 - 97 | 10.0:2.9:1 | 2.4:1 | 1.2:1 |
| 2009 - 10 | 4.3:2.0:1 | 1.9:1 | 0.9:1 |
| 2010 - 11 | 4.7:2.3:1 | 2.1:1 | 1.0:1 |
| 2011 - 12 | 6.5:2.9:1 | 3.8:1 | 2.3:1 |
| Kharif 2012 | 8.1:3.2:1 | 4.5:1 | 3.2:1 |





with minimum use of petroleum products that are used to till the land and harvest the crop, provide nutrients to the plants and also transport the farm goods. I personally think only technology and innovation will provide the way forward. That is what we will need to debate in the future,” Mr Jakhar said.

The speakers at the seminar were Mukesh Kumar Anand, assistant professor at the National Institute of Public Finance and Policy; Ritu Raj, director, Asia Technology Innovation Centre, John Deere India Pvt Ltd; K. M. Tandon, senior vice president, fertilizers and power, Shriram Fertilizers and Chemicals; Dr S. Nand, deputy director general, the Fertilizer Association of India; S. P. Singh, senior fellow and co-ordinator, Indian Foundation of Transport Research and Training; and Anumita Roychowdhury, executive director, research and advocacy, sustainable cities and urban mobility, Centre for Science and Environment. The discussions were moderated by eminent journalist, Paranjay Guha Thakurta.

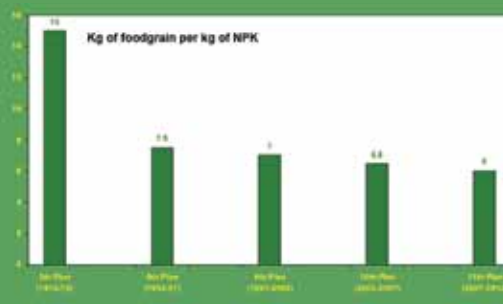
Mr Guha Thakurta pointed out that the two

biggest issues concerning the future of India are the country’s food security and energy security. It is difficult to say which is more important because the two are closely interlinked. The price of diesel, which is a universal intermediate, has gone up in recent months and is expected to go up further. Diesel accounts for roughly 40 per cent of the total value and volume of all petroleum products sold in this country and the price of diesel impacts the prices of a wide range of commodities of mass consumption, notably food.

Thus, diesel prices directly or indirectly affect the life of each and every human being in this country. When one looks at the movement of food products, the biggest consumers of diesel are the Indian Railways, the Food Corporation of India and state road transport corporations. When the government recently increased the wholesale prices of diesel for bulk users, such sales dropped and even bulk users started masquerading as retail users. This represented yet another instance of how subsidies are diverted/misused and do not reach the intended beneficiaries.

Imbalance in fertilizer nutrients due to adverse price ratio of nutrients

Fertilizer costs due to imports have gone up as rupee has depreciated from Rs. 49.5/\$ to Rs. 55/\$



Source DSCL

The arithmetic around fossil fuel use in farms

MUKESH KUMAR ANAND

Assistant Professor, National Institute of Public Finance & Policy

The use of diesel in Indian agriculture is much higher than its use in the industry and probably second only to the transportation sector. Farming finds both direct and indirect use of fossil fuels courtesy diesel to run tractors, pump-sets, generators, tillers, harvesters and use of kerosene. There is also the indirect use of naphtha and natural gas used as feedstock for fertilizers along with coal and diesel as a source of power.

There are, however, several other interesting facets to this fossil fuel use that need to be understood with irrigation and perhaps even the use of fertilizers and pesticides being more concentrated on the relatively larger land holdings, perhaps owned by relatively richer farmers. The dominant rhetoric around the farm sector is that subsidy in input use (diesel, irrigation, power, fertilizers and pesticides) is disproportionately appropriated by larger and richer farmers.

| Sector | Mode | Deisel 2010-11 | GDP 2009-10 |
|--|----------|----------------|-------------|
| Transportation | Railways | 4.0 | 1.0 |
| | Water | 0.9 | |
| | Aviation | Negligible | 5.5 |
| | Road | 60.4 | |
| Industry (Registered Manufacturing) | | 10.5 | 16.0 (11.0) |
| Power Generation | | 8.2 | 2.0 |
| Agriculture, Forestry and Fishing (Agriculture) | | 12.2 | 14.7 (12.4) |
| Miscellaneous | | 3.6 | |
| Total diesel consumption by sectors and their share of the GDP | | | |

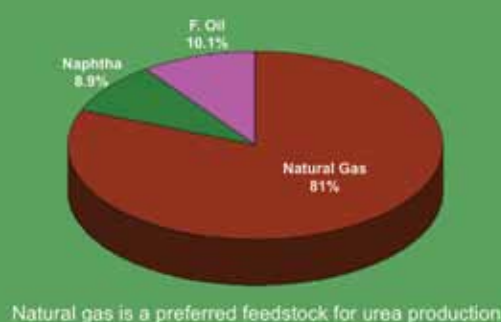
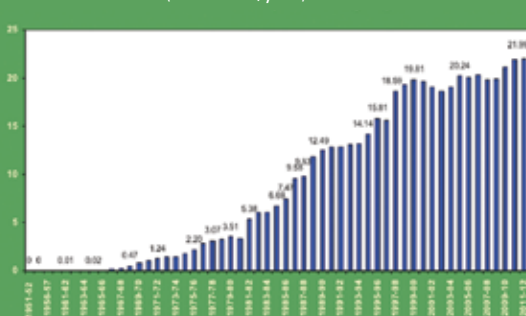


The point, however, is that the subsidy policy on input-use is subservient to the objective of food sufficiency, which, in turn, is all about raising farm productivity and output. What is the arithmetic around this fossil fuel use?

At an aggregate level, the intensity of direct use of fossil fuels in farming has changed slowly between 1998-99 and 2007-8 (from 0.005173 to 0.009826). However, fossil fuel intensity in farming, including indirect use, has increased more than three times in the same period showing inverse demand, from 0.020639 to 0.065810.

Assuming that the operational cost of machine labour consists of only diesel use, a 25 per cent increase in price of fuel (diesel), could raise average cost of cultivation/production on farms by

Growth of fertilizer use in 70s and 80s
Production of urea (million MT/year)



Natural gas is a preferred feedstock for urea production

two per cent. However, if price of all fossil fuels is similarly raised and, in turn, is reflected in the cost of such inputs in agriculture as power and fertilizer, the cost of cultivation/production on farms could be far higher.*

Making smart machines for Indian farming

RITU RAJ

*Director, Asia Technology Innovation Centre,
John Deere India Pvt Ltd*

Equipment manufacturers such as those engaged in making tractors and turbines for harvesting crops and other equipment needed for farming operations have to be increasingly conscious of the many variables that the farmer has to contend with. Fossil fuels is one of them and manufacturers are focusing on improved technology to make the farm equipment more efficient. This means research and development and a great deal of investment.

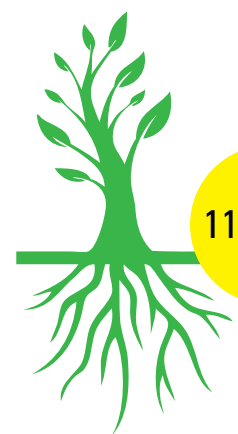
The farmer today thinks of using technology not just to till the land but for sowing seeds, for nourishing and maintaining the growing crop and for harvesting. All this makes farming a very mechanical process and a great deal of 'smart'ness goes into making every piece of equipment across the globe. In John Deere equipment in the USA, just as one turns the ignition key of the tractor and even before the engine gets fired, millions of lines of codes actually get executed. That is the amount of work that goes into a tractor. "One of the most complex pieces of equipment that we have is termed as an office in the field as it has a PC, which is directly linked to a mill."

After the harvest, the processing that takes place is linked in real time and an appropriate level of



technology goes into such machines. The question is: Why does that technology not exist today in India? There are resource constraints but one can always address aspects of fuel efficiency and the utilization of fossil fuels in machines used in India by making them a little bit smarter; by incorporating certain elements of smart technologies that will enable farmers to have better control and better utilization of machines and better efficiencies.

Again, it has been proven across the globe that the farming population actually shrinks if the size of land increases. In a situation where five tractors are managing a farm and in another where one tractor is managing another farm, it has been proved that one bigger tractor will have better fuel efficiency than the combination of the other five tractors.



11

Natural gas price – impact on energy cost



Maximum retail prices of urea



Source DSC

* The results, figures, and numbers reported are tentative and part of work-in-progress, which was presented at the conference on. Those interested in details are encouraged to request for details of the working procedure by writing to Mukesh Anand of NIPFP at mukesh_anand@hotmail.com.

Finally, how the farmer actually uses the machine makes a big difference in its fuel efficiency and fuel economy; of as much as between 25 per cent and 40 per cent. The good news is that the Indian farmers are slowly getting used to mechanization.

Alarming under-provisioning for fertilizer subsidy

K. M. TANDON

Senior Vice President, Fertilizers and Power, Shriram Fertilizers and Chemicals

Consider Indian agriculture from the perspectives of India's population growth and its food requirements in 2025. India's population will move up from 1.21 billion in 2010 to 1.43 billion by 2025 with a corresponding increase in food grain requirement. Foodgrain output will need to move up from 257.4 million mt in 2011-12 to 299.9 million mt by 2025. Agriculture will thus continue to be a significant part of the Indian economy as it is today with two thirds of the population dependent on farming and allied sectors. The fertilizer industry is a major component of this allied sector.

Three points need to be made:

- Fertilizer use must increase to enhance agricultural output
- Farm inputs such as fertilizers, seeds, machines and such others will have to be made available at affordable prices
- Subsidy support from government will need to continue

The administered price policy has provided incentives to the farmers through availability of fertilizers at an affordable price. As a result (see box), there has been a significant increase in the

Administered price regime for fertilizers

| Particulars | Period From | to | Cost in year |
|---------------------------------|-------------|-----------------------|----------------------|
| Retention Pricing Scheme | 1.11.1977 | 31.3.2003 | Updated periodically |
| New Pricing Scheme (NPS) | | | |
| Stage I | 1.4.2003 | 31.3.2004 | 1999-00 |
| Stage II | 1.4.2004 | 31.9.2006 | 1999-00 |
| Stage III | 1.10.2006 | 31.3.2010 (till date) | 2002-03 |

production of urea. The fertilizer industry has been a very important player in the farm sector and played a critical role in India attaining food self sufficiency.

Also, an energy consumption survey undertaken by the International Fertilizer Industry Association (IFA), Paris in 2002-03, found that Indian gas based plants are comparable to the world average in terms of energy consumption. Yet the industry is in dire straits in the country.

The other worrisome aspect of fertilizer consumption is that while this witnessed an increased by five per cent per annum during the 11th Plan, food production increased by only 0.5 per cent. Also, there was virtually nil investment in fertilizer manufacturing during the last 14 years as India's import dependence on fertilizers increased: urea – 25 per cent of requirement; phosphates – 90 per cent either in terms of finished product or raw material; potassium – 100 per cent.

There is a misplaced belief that the fertilizer subsidy goes to the producer and not the farmer and the government is under constant pressure to reduce the subsidy. Channelizing subsidy through the industry is an efficient way of giving subsidy to the farmers because it reaches the farmers who are actually using the fertilizers. The government is, of course, trying other methods like cash transfers now.

Fertilizer subsidy: India v/s other countries

| Country | Total farm Subsidies (US\$ Million) | Population (million) | Subsidy (US \$) Per capita |
|----------------|-------------------------------------|----------------------|----------------------------|
| European Union | 181,365 | 500.679 | 262.45 |
| Japan | 52,868 | 126.536 | 417.97 |
| United States | 25,552 | 310.384 | 82.32 |
| Turkey | 22,138 | 72.752 | 304.3 |
| Rep. of Korea | 17,461 | 48.184 | 362.38 |
| Canada | 7,431 | 34.017 | 218.44 |
| Switzerland | 5,391 | 7.664 | 703.44 |
| India | 28,464 | 1224.614 | 23.24 |

Natural Gas scenario – Price of gas

| Source | Consumers | Landfall price USD / MMBTU |
|-------------------------|---|----------------------------|
| ONGC & OIL (APM) | Outside North East | 4.2 |
| ONGC & OIL (Non APM) | Outside North East | 4.5-5.25 |
| ONGC & OIL (APM) | Power & Fert in North East | 2.52 |
| PMT | Weighted Average Price of PMT except RRVUNL & Torment | 5.85 |
| Ravva, KG Basin (CAIRN) | GAIL | 3.5 |
| Ravva Satellite | GAIL | 4.3 |
| KG D6 | All Consumers | 4.205 |
| Ampuri Fields, Assam | GAIL | 2.52 |
| Term RLNG | All Consumers (vary on monthly basis) | 9-10.5 |
| Spot RLNG | Vary on cargo to cargo | 15.36 |
| CSA | Eastern Region | 6.79 |





By global comparisons there is considerable scope to increase fertilizer use in India; there is a major imbalance in fertilizer nutrients use because of adverse price ratios of the nutrients

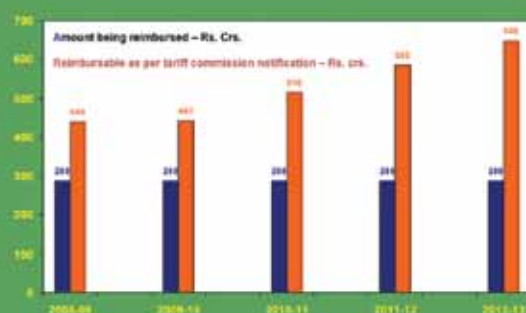
The point is that by global comparisons there is considerable scope to increase fertilizer use in India; there is a major imbalance in fertilizer nutrients use because of adverse price ratios of the nutrients; fertilizer costs are up because imports have gone up even as the rupee has depreciated from Rs 49.5/\$ to Rs 55/\$ and some other factors; finally, there is a worrying declining crop response ratio to fertilizer use.

There is also the natural gas price phenomenon and its impact of production cost. Energy cost accounts for 80 per cent of the cost of producing

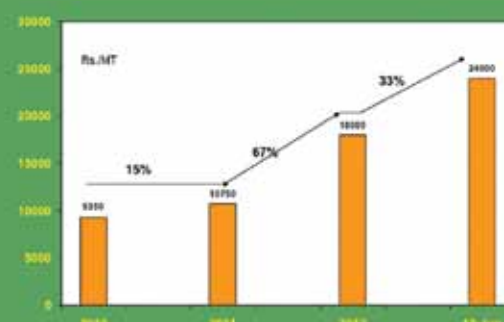
urea. An increase in natural price by \$1/MM Btu increases production cost by Rs 1,200/mt (increase in subsidy by about Rs 2,200 crore/annum). Natural gas prices (wt. avg.) have increased to \$8.5/MM Btu from \$ 6.5/MM Btu within two years leading to the increase in production cost by Rs 2,400/mt and a subsidy outgo of Rs 4,500 crore.

The Rangarajan Committee set up by government on the production sharing contract (PSC) for natural gas has recommended a formula for pricing of domestic gas indexed

Estimated impact of secondary freight payments for urea since 1.4.2008



Significant increase in retail price of DAP



Source DSCL



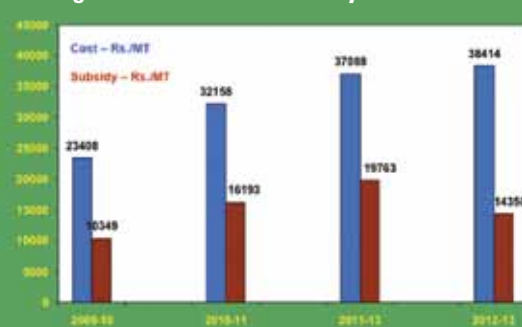
There is an absolute funds crunch vis-à-vis paying for the subsidy and the country is nowhere near reforming this sector that is so critical for the economy

to world gas prices, including LNG. Based on this formula, natural gas prices are expected to be doubled and production cost is expected to increase by Rs 5,500/mt, which will result in further increase in subsidy outgo by Rs 10,000 crore a year.

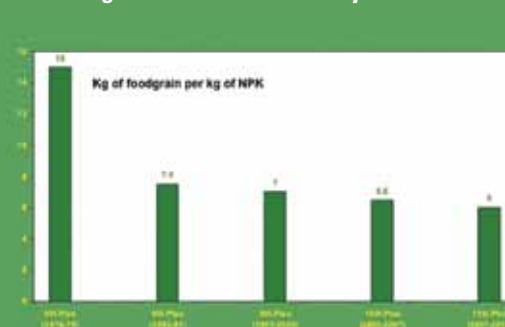
Given this background and the continuing need for fertilizers for Indian farming, the continued under-provisioning of the fertilizer subsidy is alarming. For 2012-13, the projected subsidy

requirement is Rs 1,02,207 crore, the budgetary provision was Rs 65,874 crore, the revised estimates were Rs 70,628 crore and the outstanding subsidy payments were Rs 31,580 crore. The truth is that fertilizer subsidy bills have been passed only up to July-August, 2012 and even fixed costs have not been updated since 2002-03. There is an absolute funds crunch vis-à-vis paying for the subsidy and the country is nowhere near reforming this sector that is so critical for the economy.

Average landed cost and subsidy on DAP



Declining fertilizer use efficiency



Source: DSCL



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Fertilizer subsidy and prices northwards bound

DR S. NAND

Deputy Director General

The Fertilizer Association of India

India is the second largest fertilizer consumer and the third largest fertilizer producer in the world. It mainly has urea, DAP and NPK plants apart from some ammonium sulphate plants, some of which some are by-products of steel plants. There is an ammonium chloride plant that makes nitrogenous fertilizers too. India has 90 plants producing single super phosphate (SSP), a dilute or low level P_2O_5 content fertilizer, of which 80 is recognized by the government in the subsidy policy. These plants contribute between eight per cent and 10 per cent phosphate consumed in the country. The rest of the phosphate comes from DAP and NP and NPK.

Among all fertilizers, the most energy intensive one is urea, consuming 90 per cent of the energy used in the fertilizer sector. Energy accounts for 70 per cent to 80 per cent of the cost of production. For the others it is far less. In making DAP or NPK, the raw material costs account for about 80 per cent to 90 per cent of the cost of production as these are mainly imported.

Urea is made by using only natural gas that is the least expensive of the feedstock. The energy consumed in making one tonne of urea, using natural gas is the lowest compared to making it with naphtha or fuel oil. Urea can be even made from coal though the bad quality of Indian coal and the design of plants makes the process difficult.

With urea responsible for 90 per cent of the energy consumed in the production of all fertilizers, the energy used can be said to be the equivalent of 50



million tonnes of oil since all energy is finally reported in oil equivalent terms. Natural gas forms 73 per cent of all the energy required just for urea while fuel oil used is 11.1 per cent. With the switch to gas in 2012-13 that 73 per cent of gas will become 84 per cent. Finally, if naphtha is also reduced, almost 90 per cent of the energy required will come from natural gas.

The cost of gas is what concerns everybody. Today, the average delivered cost, or the basic price is \$4.205 per million British thermal units (mmBtu) for Reliance and \$4.40 mmBtu for ONGC gas. India also imports the more expensive liquefied natural gas (LNG) that is around \$13 per mmBtu. Besides, when the rupee depreciates, gas prices in terms of the rupee also goes up.

If the delivered cost price goes up from \$8 to \$9, the cost of production of urea goes up by Rs

Fertilizer consumption



Nutrient use efficiency in India

| Nutrient | Efficiency (%) |
|----------------|----------------|
| Nitrogen (N) | 30 - 50 |
| Phosphorus (P) | 15 - 20 |
| Potassium (K) | 65 - 70 |
| Zinc (Zn) | 2 - 4 |
| Iron (Fe) | 1 - 2 |
| Copper (Cu) | 1 - 2 |

1,320 a tonne. The Rangarajan Committee intends to make the delivered cost of gas between \$12 and \$13. If everything remains the same, the cost of production at \$12 will go up by Rs 5,280 per tonne. Assuming that all the entries are passed, the government will not be able to afford a higher subsidy. This means the price of urea is doubled. If a bag of urea costs Rs 310 including local taxes, there will be a further increase of Rs 250 a bag. This is the kind of impact that the Rangarajan Committee report is asking for.

The FAI argument is that indexing domestic gas prices to the LNG imports of Japan or Korea, which can afford to pay the price, is unfair. These two countries do not use it in agriculture but for cars and electronics among other things, where the cost of production with gas is low. In India, 80 per cent of the cost of production is gas. Recently, a loose group has been formed where Japan, Korea as well as India and China attempt to negotiate these high LNG import prices that India and Japan pay. If at all there is a need to index it, it should be done with the prevailing prices in the USA, where the price is \$4-\$5 per mmBtu. If they can find it profitable to explore for more gas and produce more of it at \$5, why not in India where it can be attractive even if it is priced at \$6?

There should be attractive investments opportunities for oil and gas exploration and production in India but it does not mean that the price should be indexed to Japanese LNG imports for which they can afford to pay any price. Instead of \$4, they can afford to pay \$14. Urea production is most sensitive to cost of energy. The cost of energy is already much higher than most urea producing countries. India imports eight million tonnes of urea, which is what China consumes.

Any large increase in the cost of natural gas will increase the cost of production of urea. This

will result in a hefty increase if the Rangarajan Committee recommendations are implemented, when either subsidy goes up by Rs 10,000 crore or the farmer pays 100 per cent more for urea. There is no other magic.

Diesel prices not the only culprit

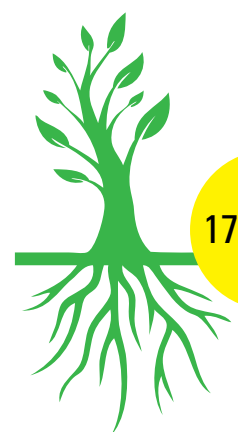
S. P. SINGH

Senior Fellow and Co-ordinator, Indian Foundation of Transport Research and Training

Over the past 15 years or so, diesel prices have been going up. It is an imported product and India has not been able to control it because of price parity and other issues. One does not contest the subsidies per se but as an organization, the Indian Foundation of Transport Research and Training (IFTRI) presents the transporters' point of view on whether the oil companies are pricing the product properly and whether under-recoveries are true and to what extent.

As far as buying various inputs by the trucking industry is concerned, diesel is only one of the dozen inputs and it is legitimate to ask why should the cost of only one input be controlled and not those of the others. The other question is how one can enhance the efficiency of equipment. In 1997, diesel was priced at about Rs 9.70 per litre and goods carriages and commercial vehicles manufactured in India were highly fuel inefficient because fuel price was never a great constraint. In November 1999, diesel prices went up by Rs 3.60 per litre, and triggered a different thinking in the market with trucking companies talking about fuel-efficient vehicles.

Finally, a 2-axle truck, which was the normal



17

Challenges to agriculture and fertilizer industry

Imbalance use of fertilizer nutrients due to adverse price ratio of nutrients

| Year | NPK Use ratio | Price ratio | |
|-------------|---------------|-------------|------------|
| | | DAP / Urea | MDP / Urea |
| 1991 - 92 | 5.9:2.4:1 | 1.4:1 | 0.6:1 |
| 1992 - 93 | 8.5:3.2:1 | 2.3:1 | 1.1:1 |
| 1996 - 97 | 10.0:2.9:1 | 2.4:1 | 1.2:1 |
| 2009 - 10 | 4.3:2.0:1 | 1.9:1 | 0.9:1 |
| 2010 - 11 | 4.7:2.3:1 | 2.1:1 | 1.0:1 |
| 2011 - 12 | 6.5:2.9:1 | 3.8:1 | 2.3:1 |
| Kharif 2012 | 8.1:3.2:1 | 4.5:1 | 3.2:1 |

Challenges to agriculture sector and fertilizer industry

Fertility status of Indian Soils

| Nutrient | % deficient samples |
|-------------|---------------------|
| Nitrogen | 89 |
| Phosphorous | 86 |
| Potassium | 59 |
| Sulphur | 40 |
| Zinc | 48 |
| Boron | 33 |
| Iron | 12 |
| Manganese | 5 |

Deficiency of at least 6 nutrients (N, P, K, S, Zn & B) is quite widespread in Indian soils

Increasing deficiency of secondary and micronutrient have started limiting crop response to NPK application

Source DSCI



Earlier a 2-axle truck, the normal load carrier in India, gave a fuel efficiency of 3.5 kilometres per litre; today it gives 5.5 kms per litre

load carrier in India, gave a fuel efficiency of 3.5 kilometres per litre. The same truck today gives a fuel efficiency of 5.5 kilometres per litre. Many have also moved from 2-axle trucks to multi-axle trucks. This has reduced cost per tonne kilometre by 40 per cent at constant diesel prices.

With villages connected by roads under the government's Grameen Sadak Yojna, over the last six years, the sub 1-tonne trucks, introduced to bring in raw material for the agricultural business, have improved fuel efficiency to around 20 kilometres per litre. Prior to this, the locally made small tractor had a fuel efficiency of only six kilometres per litre. Since fossil fuel or diesel is imported and subsidies cannot be removed, the best option is to make the transport system more efficient and cost effective.

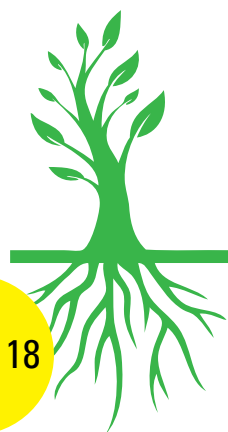
The structure of the road transport system is also curious. When diesel price goes up the escalation in the freight cost is much higher, particularly for the rural masses. This is because those who hire these vehicles have access to very poor market information. Every time diesel prices are hiked the inflicted damage is much more than the actual impact. This

is because the commercial road transport business is controlled by intermediaries/brokers who, despite the advent of fuel efficient vehicles, multi-axle trucks and better farm vehicles, offer the poorer option and the farmer, who has to rush the produce to the market accepts whatever is on offer.

The September 2012 price increase of Rs 5 a litre should have increased truck rentals at best by five per cent or six per cent but the market went up by 10 to 12 per cent. In a multi-axle truck, diesel accounts for 32 per cent of its total annualized fixed and operating cost, where the truck is running between 70,000 to 80,000 kilometres a year. Other costs (about 70 per cent) are obviously major factors determining the cost of freight.

A recent judgment of the Punjab and Haryana High Court wants trucker unions to be examined because they control prices by virtue of their profitable contracts with fertilizer and big foodgrain companies and do not allow reasonable freight charges to be charged by others.

In BRIC countries, the operating logistics costs account for eight to nine per cent of the GDP but in India they account for between 15 per cent and



17 per cent. Thus, the belief that transportation costs go up because of diesel price hikes alone is not correct. There are other inefficiencies in the road transport and delivery systems that include wasted time and idle fleets.

At the beginning of the 11th Five Year Plan, the IFTRI had placed its concerns about the issues of under-recovery and so-called losses to oil companies before the government. It suggested a price hike starting with a quarterly increase; after two-quarters a bi-monthly increase; followed by a monthly increase, after which it could be open to the market. This method would give the truck operators time to get used to the system where future changes in price increase are known. Suddenly increasing the price one evening by Rs 5 and sending the whole market into a tailspin is not good management.

Policies perpetuate the subsidy regime

ANUMITA ROYCHOWDHURY

*Executive Director, Research and Advocacy,
Sustainable Cities and Urban Mobility
Centre for Science and Environment*

As a civil society group, the Centre for Science and Environment (CSE) has been studying diesel and its pricing mainly because it sees it as a public health and quality issue. Clearly, the

whole economic argument now building up is that beyond a point the economy cannot bear the burden of under-recovery and subsidy of diesel. Data from the Ministry of Petroleum and Natural Gas says diesel today is responsible for 58 per cent of the total under-recovery losses and that is a huge share.

Diesel goes into all kinds of intermediary products and its price has a cascading effect influencing final prices of all those products. Although one reason for subsidizing diesel is to help the farmers, this rationale is, in many ways, perpetuating this whole subsidy regime. While there have been targeted beneficiaries, the intended benefits are not going to only them but also to a whole range of other unintended beneficiaries. It also suggests the way it is changing the profile of the diesel market.

It is not farmers who are the largest users of diesel in this country. The truck sector is the highest consumer of diesel, largely because of the steady shift of freight from railways to roadways. Again, cars are the second largest users and consume more diesel than farmers today. The share of consumption by cars continues to increase. In 2008-09 it was 15 per cent, now it is 16 per cent. We call cars the luxury end-users of diesel.

The industrial sector that should be using furnace oil, a de-regulated commodity with a price higher than diesel, is substituting it with diesel. Industrial usage of diesel is now increasing quite phenomenally. With the increase in diesel prices in September 2012, big players like the railways, bus





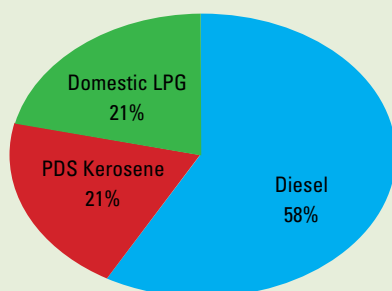
The industrial sector that should be using furnace oil, a de-regulated commodity with a price higher than diesel, is substituting it with diesel

transport corporations and defence have, in one go, increased the prices by Rs 10 a litre. Is this trend therefore inevitable? The recent Kirit Parikh report had a clear message for the finance ministry:

- If the policy and diesel pricing is not changed, the rate of inflation will go up over time.
- If under-recoveries are not addressed now, they will cost the country in the long run.
- If diesel prices are increased they have a short-term inflationary stress but prompt a longer-term deflationary trend.

Agriculture accounts for 12 per cent of the total diesel usage. Of that about 26 per cent is used for tractors and other equipment and a small six per cent for pumps. It is said that diesel costs actually get accounted for in the Minimum Support Price (MSP).

Oil marketing companies report close to Rs 70,000 crore under recovery from diesel, kerosene and LPG, **Diesel account for the highest losses: 58 per cent**



Logically and technically, it would mean that in some sound ways the MSP is taking care of that. However, it is also being said that it may not fully cover the price as more diesel than what the average pump-owning farmers actually use is consumed. Such guzzling happens because of the availability of cheaper diesel. While a mechanism is available through MSP to deal with that input cost, it may not suffice if there is diesel guzzling. There are other questions too.

How many farmers actually benefited from the 2001 drought diesel subsidy specifically for rain deficit areas? Since 60 per cent of agriculture is rain-fed, the number must have been quite small. Consider the question of the estimated five million pump sets in India. If Rs 5,000 per year is given to each diesel pump owning farmer, it will cost roughly Rs 2,500 crore, which is less than what is incurred from the general subsidy of around Rs 70,000 crore. If one rationalizes in this manner and the beneficiaries are accurately targeted a great deal of sense can be injected into the system but this will need a whole range of other reforms.

A deeper question is why, when cost of food is going up due to inflationary stress, are the farmers not beneficiaries of that increasing cost. Something must be terribly wrong with the market. India needs mechanisms to protect the vulnerable and create them now. The other issue is about transportation costs and trucks. In the worst-case scenario, fuel cost



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would be 45 per cent of the transport cost and one cannot make such a hue and cry over the increase of diesel price alone. Therefore, from the policy perspective if a decision to rationalize fuel prices is taken, it is important to look at the whole range of other strategies that are needed to cushion the cost of transformation where fuel efficiency, fleet management, tax structures on public transportation and ecology issues should play a very big role.

Reports of the Global Burden of Disease by the World Health Organization (released a couple of months ago) show air pollution as the fifth largest killer in India. Where does diesel fit into this? The two pollutants - nitrogen oxide (NOx) and particulate matter (PM) are mostly emitted by diesel vehicles. Even when Euro III or Euro IV standards are met, these diesel vehicles are legally allowed to emit three times more NOx and several times more PM compared to petrol vehicles. Adding one diesel vehicle to a fleet is the equivalent of adding three to five petrol vehicles in terms of pollutants emitted.

I would like to relate a small incident that occurred near Delhi during the last winter. A NASA picture showed that during early November, when the paddy straw was being burnt in the states of Punjab and Haryana, the smoke from it drifted over Delhi and fouled up the air. After that a fascinating discussion took place between the governments of Delhi, Punjab, and Haryana. As one of the mitigation strategies, they looked at the same paddy straw being used as a resource. Instead of the farmers burning it, engineers of Punjab looked at drilling the seeds and

at the same time mixing the straw with soil so that the straw became a part of the manure.

It could be that the same straw is used for energy production even though rice-straw is not the best for this purpose as it has to be mixed with other straws as well. One has to think in terms of local energy security in the farm sector. The use of bio-diesel and bio-gas for pumps and the ability to use this kind of bio-fuel at the local level for local energy security is one of the most important strategies to 'de-risk' from the vagaries of fuel prices and also 'de-risk' from the aspects of environment and public health risk caused by diesel. ●

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Ownership Statement of Farmers' Forum English Bi-Monthly

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I, Ajay Vir Jakhar, do hereby declare and confirm that the above particulars of Farmers' Forum English Bi-monthly are correct and true.

Place: New Delhi
Dated: 1st March, 2013

Sd/-
Ajay Vir Jakhar
Signature of Editor, Printer & Publisher

No Justice for the Rural Scientist?

Bharat Dogra

“There are some half a dozen sites where Mangal Turbines were once operating, which were visited by many dignitaries and experts. But these assets have been damaged allegedly by some vested interests with the help of anti-social elements who did not like the innovation and particularly the low cost construction of check dams as the comparison was exposing their misdeeds. All these sites need to be restored with the functioning of Mangal Turbines. It will be of great help to the farmers of the area who are spending huge sums in operating large number of diesel engines for irrigation.”

– DR B. P. MAITHANI

for the Department of Rural Development (BPM-RD report)

Mangal Singh, a farmer-cum-rural-scientist of Lalitpur district (Uttar Pradesh) has gained fame for his invention, the Mangal Turbine, which has been admired by several highly placed scientists and development officials. Over the years, the value of his work increased because the Mangal Turbine (MT) could reduce greenhouse gas emissions in a big way. After getting the patent for it, he has worked for several years in very difficult conditions to take his innovation to many remote areas, often spending his own meagre finances. Yet, today, Mangal Singh is a heart-broken man without the inspiration to take his many ideas to fruition for want of government recognition.

In his youth in his native Bundelkhand region, Mangal Singh noticed how farmers had difficulties in purchasing pumping sets and diesel (or accessing electricity) to run them when they had to lift water from rivers and streams to irrigate their fields (or for other purpose). Thus was born the idea of a fuel-less water-lifting device that, in these times of climate change, has great value for reducing fossil fuel consumption as well.

What exactly is the MT or, more precisely, what is the ‘fuel-less Mangal Water Wheel Turbine Pump-cum-P.T.O. Machine (patent no. 177190, dated 13-11-97)? To quote Mangal Singh: “The water wheel turbine machine consists of a water wheel, which is firmly mounted on a steel shaft and supports on two bearing blocks fixed on foundation supports. The shaft is coupled with a suitable gearbox through universal couplings for stepping up the speed of rotation. The output shaft of the gear box is coupled on one end with a centrifugal pump for lifting water. The other end is mounted with a suitable pulley for deriving power for operating any machine. The design of the water wheel turbine is simple. It is available in different sizes to meet

the varying requirements. Operating the water Wheel Turbine Pump-cum-P.T.O. Machine is easy and anyone can operate it by opening the wooden or steel gate valve. The machine is stopped by stopping the flow of water through the gate.”

Thus apart from lifting water, the Mangal Turbine can be used for several other tasks as well. Says Mangal Singh: “This is used for pumping water from the rivulets and water streams on which it is installed. The machine can be used for several rural works such as operating an atta chakki, for sugarcane, crushing, threshing and winnowing, oil expelling, chaff cutting and such others. The machine provides a clean alternative (non-conventional) source of energy in remote rural areas for increasing agricultural productivity, income and employment.” If linked to a generator, this machine can also provide electricity.

Several highly placed officials who examined MT carefully confirmed its great value and utility. At least two former secretaries of the Rural Development Ministry (B. K. Sinha and S. R. Sankaran) were known to be admirers of Mangal Singh’s efforts. B. K. Sinha has spoken widely about the great usefulness of the MT. Others who have admired and appreciated it include the Alternate Hydro Energy Centre, IIT Roorkee, The Energy Research Institute (TERI) New Delhi, Dr Punjab Singh, the former director, IARI Delhi, senior bureaucrats like Kalika Prasad, erstwhile commissioner of Jhansi, Sarla Gopalan former advisor Planning Commission, and Dr R. S. Tolia former director, State Institute of Rural Development, Delhi and MC CAPART (Council for Advancement of People’s Action and Rural Technology), Central Zone, Lucknow.

Dr T.P. Ojha, former deputy director general (engineering) of the Indian Council of Agricultural Research, wrote: “Mangal Singh’s device offers



The entire system designed by Mangal Singh is easily fabricated in the village itself, using available material and local workmanship

great promise and possibility of lifting river water for irrigation, fisheries, forestry and drinking purposes. The water head created by putting a check dam across the river or perennial water course generates enough force to rotate the water wheels to operate one or two centrifugal pumps in series ... The designer of the system Sh. Mangal Singh deserves appreciation and support to install few more units in different parts of the country for demonstration purposes.”

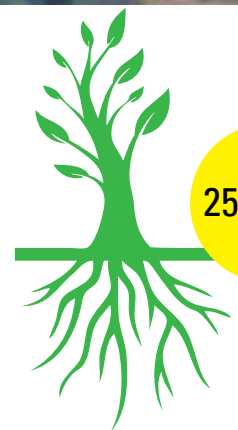
A report titled ‘Problems and Potential of Bundelkhand with Special Reference to Water Resource Base’ was prepared in 1998 by the Centre for Rural Development and Technology (CRDT) IIT Delhi and Vigyan Shikshan Kendra (VSK). This report examined the MT and recommended it for its great utility saying that the most significant “aspect is that the entire system designed by Mangal Singh is easily fabricated in the village itself, using available material and local workmanship. Besides, it requires minimal maintenance compared to other types, expertise for maintenance is available in the village itself.”

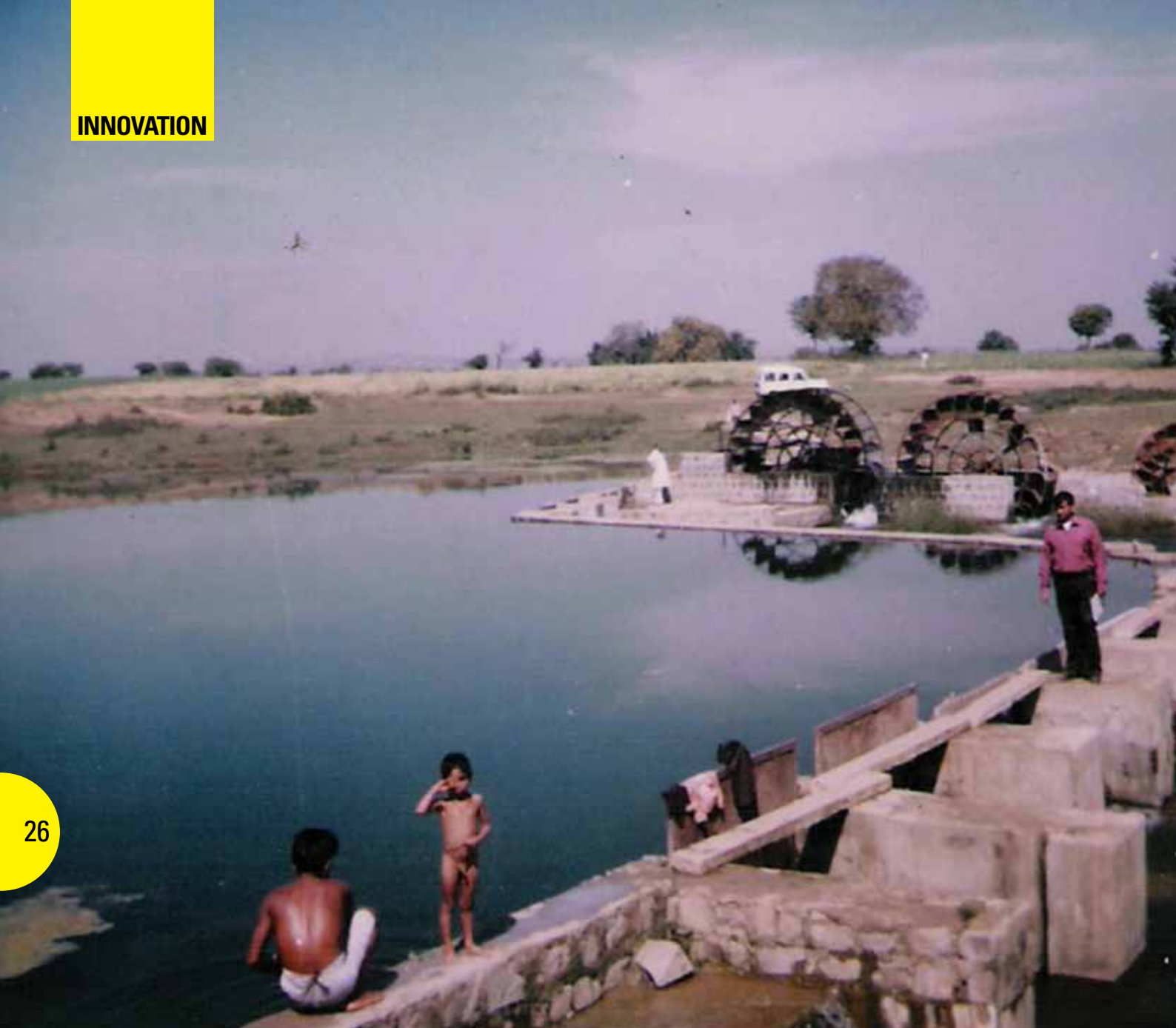
“Using his engineering skills (though he had no formal training in engineering), Mangal Singh coupled a sugar cane crusher to the main

shaft using a belt drive. Simultaneously, both water pumping and crushing could also be done. Similarly, the energy generated could be used for running a grain thresher, grinder etc. He uses this energy for operating the machines tool of a local workshop. Effectively water wheel becomes a source of rotational energy, which can be used for any purpose,” the report added.

Thus, the MT would prove a boon for fulfilling the energy need of irrigation, agro processing and in the rural sector wherever there is low water head in the rivers or nallahs. Preliminary study of this system conducted by IIT personnel has indicated that its efficiency can be further improved by using some modern scientific-technical inputs, according to the report that added: “Considering 500 suitable hydrosites in one district of Bundelkhand, for installing Mangal Turbine, it is estimated that by using this system, about 25 MW energy can be easily generated. On an average, two turbines on one site have the potential to irrigate 200 hectares of land. Thus total command area of 500 hydro-sites would be 0.1 million hectare.”

“This turbine is a fine example of common people’s inventiveness and should be encouraged by all means for people’s benefit. It is unfortunate that





“Bundelkhand is a drought prone area and its main problem is lack of irrigation. Unfortunately, our policy makers and planners prefer big and extravagant projects...”

in the pervasive atmosphere of “foreignomania,” this device has not got the recognition it deserves,” the report concluded.

Dr B.P. Maithani, former director in the National Institute of Rural Development, says that the MT “is undoubtedly unparalleled in its simplicity and utility. Its cost benefit cannot be restricted to the extent of area irrigated and increase in production and income on account of that. Its benefits are multiple and multidimensional.”

“Bundelkhand is a drought prone area and its main problem is lack of irrigation. Unfortunately, our policy makers and planners prefer big and

extravagant projects, which allow pilferage and splurge. Mangal Turbine offers the low cost, environment friendly and sustainable solution to the irrigation problem of Bundelkhand.”

In a letter of March 9, 2001 the member convenor for the Regional Committee, Central Zone, CAPART, wrote while recommending Mangal Singh’s name for prestigious ‘Jagjeevan Ram Kisan Puruskar: “I along with Prof. D.S. Chauhan, vice chancellor UP Technical University and Dr R. C. Saraswat, director, Institute of Engineering and Technology, Jhansi, visited the village Bhailonilodh, district Lalitpur on 21st February, 2001 and went



I made a detailed analysis of the economic viability of the 'Wheel' and its comparative advantage vis-à-vis alternative methods of pumping water from streams and small rivers for irrigation. The system is extremely cost-effective even after taking into consideration the cost of the Stop Dam. Where the Stop Dam is already available, the system is even more cost effective. Installation of this device is strongly recommended wherever there is flowing water in small streams by constructing a stop dam and installing one or two water wheels as designed and developed by Shri Mangal Singh. It saves on energy like electricity or diesel and is ecologically completely benign.

– **B.K. Saha**

former chief secretary, Madhya Pradesh

to the site of one check dam where the Mangal Turbine was operating. We were delighted to see water flowing miles away through underground pipeline and up about 100 feet from the river. I had heard about the feat from many people but seeing was believing. The device has been studied and evaluated by many experts from several S&T institutions and all are unanimous in their opinion about its utility to boost agricultural production in semi-arid Bundelkhand and adjoining areas. One estimate shows that some 500 hydro sites have been found suitable for its installation in Bundelkhand region with the potential of irrigating 1 lakh ha of dry land.”

Even though there is no provision for any reward for such inventions, such an honour is being considered for Mangal Singh “with a citation as a token of our appreciation for his inventive genius. We feel that such initiatives of common people like Mangal Singh should be encouraged as it serves the public interest in the most cost-effective manner. We, therefore, strongly recommended Shri Mangal Singh for the award of Jagjeevan Ram Kisan Puruskar and hope that you will give this recommendation due consideration,” said the member convenor, Regional Committee, Central Zone, CAPART.

The value of Mangal Singh’s work has increased in recent times as the need to curb fossil fuel consumption and the related greenhouse gas emissions has increased. It has been estimated that if one unit of the Mangal Turbine runs for 11 hours in a day, it saves 44 litres of diesel in a day (on the basis of use of four litre diesel per hour by 25 HP diesel pump). Again, assuming irrigation by MT on 190 days in a year, a single unit of MT can save 8,360 litres (44x190) in a typical year. Over a lifetime of 15 years, one unit of MT can potentially save 1,25,400 litres (8,360x15). In terms of greenhouse gas emissions (using assumptions made in the U.S. Environment Protection Agency fact sheet) this works out to 335 tonnes. This estimate by Dr Jai Shankar Singh is made on the basis of the assumption that one unit of MT will lift water from a stream which is equivalent to 25 HP diesel pump set and irrigate a command area of 50 ha. Diesel consumption and related GHG emissions can decrease further to the extent that the MT is used also (in addition to water lifting) for processing of various farm produce and other work.

Despite this, Mangal Singh, who speaks very frankly and fearlessly, particularly when he comes across any irregularities or injustice, did not get the

deserved encouragement from the government. Instead, he was harassed to such an extent that his ancestral land had to be auctioned. Today, he is a shattered man who has a bag full of documents to prove how badly he was treated by various officials and government agencies.

Considering that encouraging innovation is amongst the stated principles of the government of India, it is time that the government created a system that recognizes, encourages and honours farmer scientists like Mangal Singh. Had he received official help and encouragement that was rightly his, he would have saved the country billions of rupees and foreign exchange. More importantly, his equipment would have saved massive amounts of fossil fuel in these days of climate change. The bigger challenge, while correcting the wrong done to Mangal Singh, is to ensure that other 'farmer scientists' or 'barefoot scientists' do not suffer Mangal Singh's fate.

Why has Mangal Singh suffered this fate despite widespread recognition of his work of great potential? Why has he been victimized by government and international organizations time and again? Initially, reputed government and international organizations invited Mangal Singh to work with them. However, some corrupt officials wanted that the recipient of their funds should give them some commission or illegal share. He was even taken to 5-star hotels and feted but the minute he insisted on protecting his position as the innovator his hosts turned hostile and ended up inflicting grave damage on him.

People trained by him were lured away and his designs copied and machines installed in such a manner that MTs installed by Mangal Singh would get submerged. Some officials who were not paid bribes devoted their efforts to finding some mistakes or loopholes in his projects and nitpicked with his calculations instead of working on them and helping him make professional projections. Mangal Singh is a scientist not an accountant. Nor did he have the means to appoint professional accountants. Using this weakness to harass him, these officials tried to stop his funds so that his projects could not be completed. Things became so difficult that Mangal Singh's ancestral land was auctioned by the government.

When Mangal Singh repeatedly protested against this injustice, the Department of Rural Development of the government of India, appointed Dr B.P. Maithani, former director National Institute of Rural Development, to



MANGAL SINGH

Agriculturist-cum-Inventor

Village and Post: Bhailonilodh, Block-Bar,
District-Lalitpur (U.P.)

Pin-284123 (India)

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prepare an evaluation report on Mangal Singh's projects taken up with CAPART. This report has clearly established that allegations against Mangal Singh (and hence all victimization based on them) were completely wrong and unjustified. It shows how some officials with their own selfish agenda even ignored and/or violated the directions of their own director general to inflict injustice on him.

The report prepared by Dr B.P. Maithani for the Department of Rural Development (BPM-



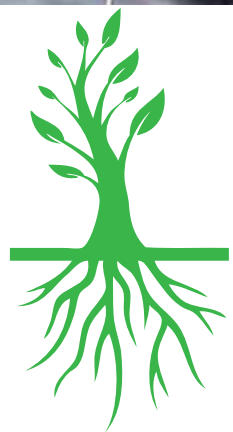
Mangal Singh is no ordinary man. He is not only a farmer inventor but a hard core activist and crusader against corruption

RD report) says: “Both of us (Dr Maithani and technical expert Sh. S.M. Singh) visited Lalitpur and project area from 16th to 19th February, 2011. When we reached the site Kanji Ghat on Sajnam River we found that the project was inoperative. Although there were six water wheels installed at the site but unfortunately, the huge check dam and the turbines installed in a row were submerged in the backwaters due to construction of another check dam and installation of a turbine just about half a km downstream of the same river....”

Providing an overview of what happened this report says: “The euphoria generated by the success

of Mangal Turbine led many other institutions like CIMMYT India, NEDA, Development Alternatives and DRDAs etc to join the bandwagon of Mangal Turbine. However, the party did not last long. Soon, the round of deception, desertion and depreciation started all aimed at subverting the rising popularity of Mangal Singh...”

“On his part, Shri Mangal Singh is also not an ordinary man. He is not only a farmer inventor, as he likes to be portrayed but more than that the man is also a hard core activist and crusader against corruption. His activism against corruption in public institutions increased with his rising



popularity which militated against the interests of those who had joined him thinking of profiting under the glory of Mangal Turbine."

After examining all the evidence in great detail, the BPM-RD report concluded: "It will be clear from the above account that Shri Mangal Singh was harassed and harmed in the process of implementation of the project. This has happened not only in connection with the project under reference, which was the last sanctioned by CAPART. It has happened in respect of all projects sanctioned by CAPART to Shri Mangal Singh earlier too."

The report adds: "There is no case against Shri Mangal Singh who needs to be compensated for the losses suffered due to adversary role played by CAPART in all the projects sanctioned to him simply because he did not 'please' them! Or, because he was from humble background and rural area or because he was an anti-corruption activist."

Finally, this report lists the following action points: "There are some half a dozen sites where Mangal Turbines were once operating, which were visited by many dignitaries and experts. But these

3569066/- and Rs 1194591/- respectively. The total net present value of these two projects works out to Rs 4763657/- and Rs 14,50,000/- have already been released by CAPART for these projects at different times. A suitable compounding rate can give the NPV of the fund released. The balance can be released to Shri Mangal Singh with the condition that both these projects would be restored to their planned capacity, which can be supervised by a team of neutral monitors."

"Submergence problem of the assets of Kanji Ghat project where six turbines are installed can be solved by relocating the single turbine installed ... just below the CAPART project site. For this purpose CAPART should request the district administration, Lalitpur to remove or relocate that unit causing submergence of CAPART assets which has the potential of irrigating about 100 ha of land against barely 20 ha by the other located downstream."

"The Secretary RD, Government of India speak to the Secretary /Principal Secretary Rural Development and also to the APC Uttar Pradesh Government to withdraw the false cases against

All of Mangal Singh's work has been in very difficult conditions but nothing has been more difficult than getting justice. Will he ever get justice?

assets have been damaged allegedly by some vested interests with the help of anti-social elements who did not like the innovation and particularly the low cost construction of check dams as the comparison was exposing their misdeeds. All these sites need to be restored with functioning Mangal Turbines. It will be of great help to the farmers of the area who are spending huge sums in operating large number of diesel engines for irrigation.

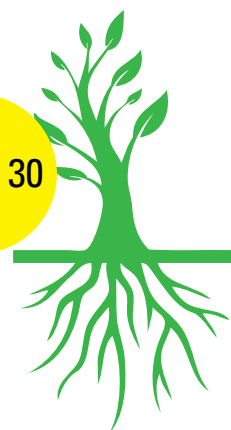
"CAPART should compensate for the damage of its project sites and also the monetary loss suffered by Shri Mangal Singh. This should be the part of out of court settlement of the dispute. One possible way to do this could be to reimburse the net present value (PV) of the investment made in these projects by Shri Mangal Singh minus the NPV of the amount already released by CAPART. Estimates for two projects (i) the last one at Kanji Ghat for which Rs. 12 lakh were released in 2001 and (ii) another Pura Toria/Pachauni project for which Rs. 2.50 lakh were released in the year 2000 are enclosed at annexure II & III. The NPV of these projects has been assessed by the valuer at Rs

Shri Mangal Singh, defreeze bank account and restore his land through an out of the court settlement process. For this the inquiry report of Shri Arun Arya IAS exonerating Shri Mangal Singh of inaction and misappropriation charges could be the basis for such an action by the state government.

"Shri Mangal Singh needs to be suitably rewarded for his invention and contribution for the betterment of society."

Despite suffering so many adversities and against so much hostility, Mangal Singh has continued his work. Apart from installing MTs at several places (or doing the initial work necessary for this) in his native district (Lalitpur), he has also travelled far and wide in Uttarakhand, Jammu and Kashmir, Madhya Pradesh, Gujarat, Uttar Pradesh and other states to help in the installation of Mangal Turbines at various places. All this work has been in very difficult conditions.

Nothing has been more difficult than getting justice though. Will he ever get justice? Will the country secure the benefits of his invention or will the corrupt prevail? ●



The author is a veteran New Delhi-based journalist

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Budget 2013-14 and Indian Agriculture

Lofty goals, lacunae aplenty

Surinder Sud

Prima facie, the proposals concerning the agricultural sector in the 2013-14 union budget seem to aim broadly at spurring growth, especially in the agriculturally under developed regions. However, going by the fine print and the resource allocations, this objective may not be fully served, regardless of some well conceived initiatives mooted in the budget. The hike in outlays (in real terms) for the ongoing schemes and the new ones seem insufficient to meet the lofty goals.

With the much-cherished foodgrains self sufficiency having been achieved, the need now is to tackle the second-generation problems of the green revolution, filling up gaps in development and tackling ecological concerns facing the Indian farm sector. Only half-hearted attempts have been made in the budget to address these critical issues.

The Economic Survey tabled in parliament prior to the presentation of the budget describes the Indian agriculture as a “success story.” Echoing similar views, Mr P. Chidambaram, finance minister, maintained in his budget speech that agriculture has continued to perform very well, thanks to India’s hard-working farmers. The average annual growth

viewed against the original budget estimates for that year. The total central plan allocation for the sector as a whole has been fixed at Rs 18,781 crore, which marks an increase of Rs 2,810 crore or 17.5 per cent, over the revised estimates for 2012-13.

When compared with the original budgetary allocation, the increase is merely Rs 1,089 crore or 6.15 per cent. Similarly, in the case of the allocation for the agriculture ministry, the increase works out to more than 22 per cent over the revised budget estimate for last year but only six per cent over the original budget estimates. The trend in the previous years has been the same. Clearly, something is amiss. Either the budget estimates are off the mark or the allotted funds are not released in full or part of the sanctioned funds remains unutilized. All these situations are untenable and smack of flawed budgeting.

The most glaring instances of under-budgeting are evident in the case of food and fertilizer subsidies. The 2013-14 budget has set apart Rs 90,000 crore for food subsidy. This includes Rs 10,000 crore provided especially for the implementation of the proposed National Food Security Act that envisages provision of rice, wheat and coarse cereals at Rs 3,

The average annual growth rate of the agriculture and allied sector in the 11th plan was 3.6 per cent, against 2.4 per cent in the 10th plan and 2.5 per cent in the 9th plan

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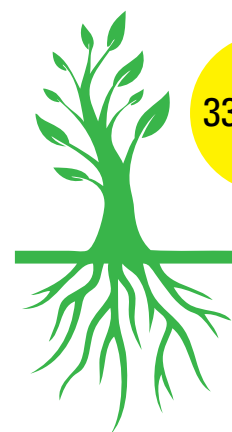
What the finance minister chose not to allude to is the bitter truth that the coveted aim of pushing up agriculture growth to four per cent a year – which is deemed desirable for achieving the overall economic growth of above eight per cent – has remained elusive in all these plans. The growth rates in the output of several mass consumption farm commodities, such as fruits, vegetables, pulses, oilseeds, milk, meat, eggs and the like, though higher than the rate of increase in the cereals output, have failed to keep pace with the rise in demand. The prices of these items have, therefore, maintained a steady uptrend to sustain high food inflation.

The 2013-14 budget has, of course, stuck to the convention of raising overall central plan outlay for agriculture and allied sector as well as the allocation for the agriculture ministry. The increase, however, looks substantial when compared with the revised estimates for last year (2012-13) but not so when

Rs 2 and Re 1 a kg, respectively, to nearly 67 per cent of the population (75 per cent rural and 50 per cent urban). This amount is clearly inadequate to meet the actual requirement that is estimated by the food ministry at over Rs 1,31,000 crore.

In the case of fertilizers, the practice of under-budgeting for subsidy has been going on since 2008. Huge subsidy arrears payable to the fertilizer industry are carried forward almost every year to the next fiscal. The 2013-14 budget has provided Rs 65,971 crore for fertilizer subsidy. This amount is lower than even the revised estimate for 2012-13 of Rs 65,974 crore, regardless of the fact that the fertilizer industry was not fully reimbursed for the subsidy dues even in that year. Going by the industry estimates, the government owed some Rs 30,000 crore in subsidy arrears to the industry at the end of the 2012-13 fiscal, which has been carried over to 2013-14.

Even if the total subsidy requirement in 2013-14 declines because of a softening of fertilizer prices in the international market, the carried forward arrears



are unlikely to be fully cleared during the year for paucity of allocated funds. Belated payment of subsidy causes severe cash crunch for the industry. This is also acting as a deterrent for fresh investment in the fertilizer sector. Unsurprisingly, therefore, no new fertilizer plant has come up for over a decade, raising the country's dependence on dicey imports for meeting the plant nutrients demand.

Realizing the significance of research and development to speed up agricultural growth and to boost the sector's capacity to cope with emerging challenges, the budgetary allocation for the department of agricultural research and education has been stepped up to Rs 3,415 crore for 2013-14 from Rs 2,520 in 2012-13 (revised estimate). Though this will be of some help to the country's agricultural research network, amongst the world's largest, considering the need to breed new high-yielding crop varieties, which can withstanding stresses posed by pests, diseases, droughts and climate change, it will still fall short of the target of raising research spending to one per cent the country's agricultural gross domestic product (GDP).

The average R&D investment in the 11th plan, too, fell below the coveted level of one per cent

This was despite the region's rich endowments of almost all natural resources needed for agriculture, such as deep, fertile soil, copious water and plentiful sunshine. What was lacking in this vast zone was the modernization of agriculture through induction of new, yield-boosting technologies and efforts to harness its vast water resources, both underground and surface water.

To cover these lacunae, a new scheme was envisaged in the budget 2011-12 to extend the green revolution to eastern India with a token allocation of Rs 400 crore. The areas covered under this scheme included Bihar, West Bengal, Orissa, Assam, Chhattisgarh, Jharkhand and east Uttar Pradesh. The impact of the scheme began to be felt immediately as was reflected by an impressive seven million-ton surge in paddy production in this zone in the 2011 kharif season.

Consequently, the budget for the 2012-13 stepped up the funds earmarked for this programme from Rs 400 crore to Rs 1,000 crore. Though Mr Chidambaram acknowledged the success of this initiative in this year's budget speech, pointing out that Assam, Bihar, Chhattisgarh and West Bengal have increased rice production, he has, for some inexplicable reasons, kept

The average R&D investment in the 11th plan fell below the coveted level of one per cent. This level is unlikely to undergo any major change in 2013-14

and was estimated at around 0.7 per cent of the GDP at the constant 2006-07 prices and even less, around 0.64 per cent, at current prices. This level is unlikely to undergo any major change in 2013-14.

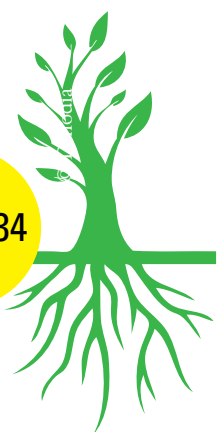
The 2013-14 budget has also mooted setting up of two new institutes for research in hi-tech fields. A National Institute of Biotech Stress Management is proposed for Raipur in Chhattisgarh to address the plant protection issues that are becoming critical due to the emergence of new strains of pests and diseases and the influence of the climate change. An Indian Institute of Agricultural Biotechnology is also planned for Ranchi in Jharkhand to give a boost to the research on the state-of-the-art technologies like genomics and other disciplines of biotechnology that are essential to breed varieties capable of giving higher yields with reduced costs. It is envisaged to serve as a centre of excellence in agricultural biotechnology.

One of the problems with the green revolution of the 1960s was that it almost bypassed eastern India.

the budgetary support for this programme unchanged at Rs 1,000 crore for 2013-14.

A higher allocation for this well-run programme would obviously have paid richer dividends. Higher grain production in the eastern states, some of which are thickly populated and suffer from chronic poverty, would have reduced the pressure on such agriculturally progressive but natural resource-stressed areas as Punjab, Haryana and west Uttar Pradesh in the north and Andhra Pradesh and adjoining states in the south, to feed the nation.

The farmers in these states have, however, continued to follow intensive cropping of rice and wheat that, because of open-ended grain procurement at the liberally hiked minimum support prices, remained the most lucrative crop combination. As a result, the natural resources of the so-called green revolution states have now begun to show signs of fatigue. Referring to this, the finance minister said in his budget speech: "The original green revolution states face the problem





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of stagnating yields and over-exploitation of water resources. The answer lies in crop diversification.”

Both the diagnosis of the malady and the proposed remedy seem correct. However, only Rs 500 crore have been earmarked in the 2013-14 budget to administer this remedy for encouraging crop diversification in the agriculturally developed tracts that are following rice-wheat or rice-rice crop rotations year after year. This aspect, obviously, deserved far higher budgetary support to enable farmers switch from growing cereals, which are already available in plenty and are accumulating in the official grain coffers, to other high-value or protein-rich foods that may or may not be as lucrative for want of government’s marketing support.

Such high-value and nutritious farm products as vegetables, fruits, milk, meat, eggs and fish are currently suffering from a supply crunch and are contributing to the stubbornly high food inflation. The diversification of agriculture in the irrigation-based intensive farming states can help augment the supplies of these goods to bring down their prices to reasonable levels. The finance minister has mooted two other programmes in the budget to supplement the supplies of nutritious foods. While the first one aims at enhancing the output of micro-nutrient crops to alleviate widespread

malnutrition, the second one involves launching the National Livestock Mission.

The programme for encouraging the emergence of “nutri-farms” to grow crop varieties that are rich in micronutrients is being taken up on the suggestions made by some eminent farm scientists to Mr Chidambaram. Such crops will include, among others, iron-rich bajra (pearl millet), protein-rich maize and zinc-rich wheat. The budget has set apart Rs 200 crore to start pilot projects for this purpose. The scheme for implementing this programme will be formulated by the agriculture ministry. The finance minister has expressed the hope that agri-businesses and farmers would come together to start a sufficient number of pilot projects for growing these crops, especially in the districts where malnutrition abounds.

The proposed National Livestock Mission, to be set up in 2013-14, is also a well-intended move to attract investment in the livestock sector and enhance the productivity of farm animals, taking into account local agro-climatic conditions. This sector has already been growing at an average annual rate of 4.8 per cent for past several years.

India is now the world’s largest producer of milk with the annual output touching 127.9 million tonnes last year and anticipated to rise further to around 133



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The Livestock Mission to help bridge the demand-supply gap in livestock products, has been allocated a paltry Rs 307 crore, which is too little compared to the magnitude of the task

million tonnes in 2012-13. Similarly, the output of meat, eggs and fish has made remarkable gains. Yet their growth has been unable to match the steady rise in demand and, thus, needs a further boost.

It is, however, a pity that the proposed Livestock Mission, which will strive to help bridge this demand-supply gap in livestock products, has been allocated a paltry Rs 307 crore in the 2013-14 budget, which seems too little compared to the magnitude of the task. Simultaneously, Mr Chidambaram announced a sub-mission for increasing the availability of feed and fodder. In addition, a small mission is to be set up to improve animal breeds to enhance their inherent production potential.

Adequate availability of good quality fodder and feed is vital not only for sustaining high growth in the livestock sector but also for the success of any programme for genetic improvement of farm animals. At present, the availability of fodder has been severely constrained due to rapid shrinkage of natural pastures and common grazing lands besides the deterioration in their green cover. The

net shortage of green fodder is officially assessed at some 34 per cent. The prices of dry feeds and feed concentrates, too, are spiraling.

It may be worth recalling that a centrally-sponsored scheme for fodder and feed development was introduced in 2010 to supplement the efforts of the state governments to promote fodder production. Subsequently, an Accelerated Fodder Development Programme was also launched in 2011-12. With the adoption of the mission mode approach, as proposed in the 2013-14 budget, the fodder and feed development efforts can get the much needed shot in the arm but only if adequate funds are made available for this purpose – which does not seem to be the case.

In the field of natural resource management, the budget has rightly focused on watershed development approach as the major means for conserving soil and water resources. This aspect has assumed all the more importance due to the unabated degradation of the natural assets like soil and water, leading to loss in farm productivity.

Growth in agriculture GDP vis-a-vis other sectors of the Indian economy

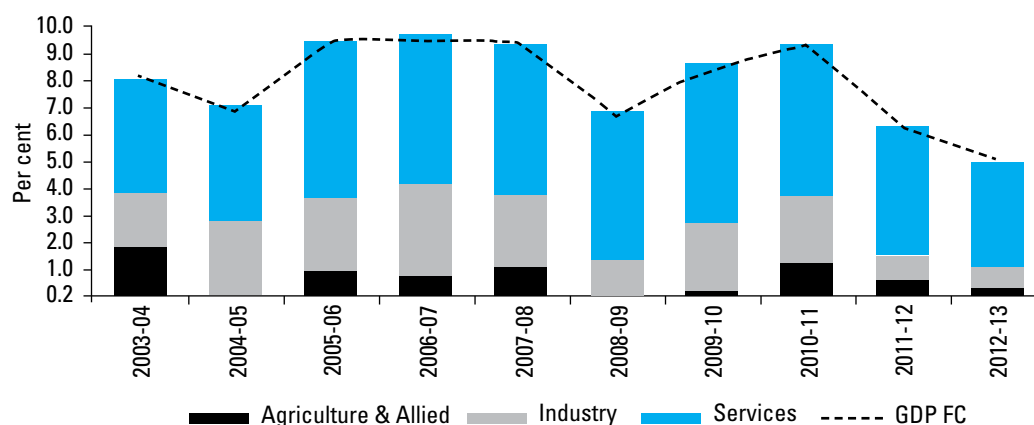
| | 2005-06 | 2006-07 | 2007-08 | 2008-09 | 2009-10 ^{3R} | 2010-11 ^{2R} | 2011-12 ^{1R} | 2012-13 ^{AE} |
|---|---------|---------|---------|---------|-----------------------|-----------------------|-----------------------|-----------------------|
| Agriculture, forestry & fishing | 5.1 | 4.2 | 5.8 | 0.1 | 0.8 | 7.9 | 3.6 | 1.8 |
| Mining & quarrying | 1.3 | 7.5 | 3.7 | 2.1 | 5.9 | 4.9 | -0.6 | 0.4 |
| Manufacturing | 10.1 | 14.3 | 10.3 | 4.3 | 11.3 | 9.7 | 2.7 | 1.9 |
| Electricity, gas & water supply | 7.1 | 9.3 | 8.3 | 4.6 | 6.2 | 5.2 | 6.5 | 4.9 |
| Construction | 12.8 | 10.3 | 10.8 | 5.3 | 6.7 | 10.2 | 5.6 | 5.9 |
| Trade, Hotels & restaurants, Transport & Communication | 12.0 | 11.6 | 10.9 | 7.5 | 10.4 | 12.3 | 7.0 | 5.2 |
| Financing, insurance, real estate & business services | 12.6 | 14.0 | 12.0 | 12.0 | 9.7 | 10.1 | 11.7 | 8.6 |
| Community, social & personal services | 7.1 | 2.8 | 6.9 | 12.5 | 11.7 | 4.3 | 6.0 | 6.8 |

Source : Central Statistics Office (CSO).

Notes: 1 R : First Revised Estimate, 2R : Second Revised Estimate, 3R : Third Revised Estimate, AE : Advance Estimate.

Source : Economic Survey 2013

GDP growth and point of contribution of different sectors



Note: Data for 2012-13 is as per Advance Estimates released by CSO.

Source : Economic Survey 2013

The finance minister has rightly observed in his budget speech: “Small and marginal farmers are vulnerable everywhere and especially so in drought-prone and ecologically-stressed regions. Watershed management is crucial to improve productivity of land and water use.” The budget has, consequently, proposed to increase the allocation for the integrated watershed development programme from Rs 3,050 crore in 2012-13 (budget estimates) to Rs 5,387 crore in 2013-14.

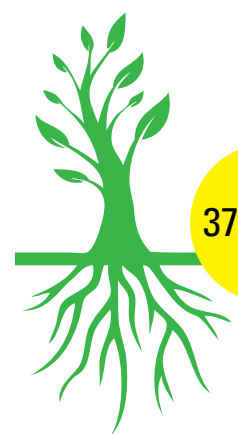
The 2013-14 budget has some other positive features as well. One such aspect concerns agricultural credit, which is the key farm input, especially for the cash-starved small and marginal farmers who dominate the Indian rural scene. The finance minister described the agricultural credit in his budget speech as the “driver of agricultural production.”

It is, indeed noteworthy that the government has been enhancing the target for farm lending year after year and these targets have invariably been exceeded since 2003-04. The target for the flow

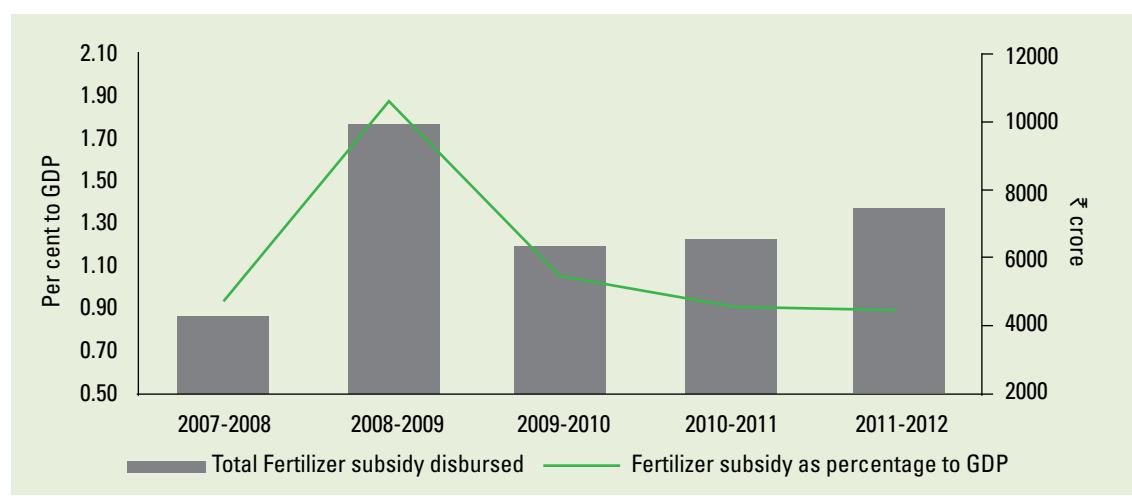
of institutional agricultural credit in 2012-13 was pitched at Rs 5,75,000 crore, which is expected to be met or exceeded. Encouraged by this buoyancy, this year’s budget has not only further raised the credit target to Rs 7,00,000 crore but has also mooted some other well-conceived measures to improve the farmers’ access to timely finance at reasonable rates of interest.

The interest subvention scheme for short-term crop loans is proposed to be continued so that those farmers who repay their debt in time get fresh loans at just four per cent interest, instead of the usual seven per cent.

More importantly, this interest subvention scheme, which was hitherto confined only to the crop loans disbursed by the public sector banks, regional rural banks and co-operative banks, will now be extended to the private sector scheduled commercial banks as well. This will provide a level playing field for the public and private banks in terms of farm credit even while expanding the



Fertilizer subsidy disbursed



Source : Economic Survey 2013

Despite the increase in institutional agricultural lending, farmer dependence on informal sources of agricultural finance, basically the money-lenders, has not fallen

window for the farmers to seek farm loans. In the absence of this, the private banks were handicapped to expand their credit disbursement base in rural areas for meeting their priority lending targets.

The worrisome factor in this area, however, is that despite the massive increase in the institutional agricultural lending, the dependence of the sizable chunk of farmers on the informal sources of agricultural finance, basically the money-lenders, has not diminished to the desired extent. Besides, a sizable part of the bank credit is tending to land up in the hands of the same set of non-defaulter farmers who become eligible for fresh loans after repaying their old dues. Unless such issues are suitably addressed and more and more new farmers are linked to the institutional credit network, the real purpose of extending cheap finance may not be fully served.

Agricultural marketing has become crucial for the farmers, especially small and marginal farmers, to realize adequate returns for their produce. Though new, relatively more transparent and internet-based marketing options are emerging in the form of commodity exchanges, spot marketing exchanges, e-Chaupals and the like, most farmers are unable to make use of them individually for various reasons, including the small size of the produce they have for sale.

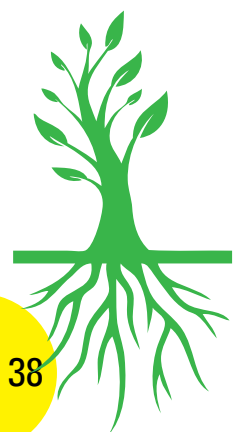
Farmers need aggregators to pool their stocks and sell through these channels in an appropriate

way and at the appropriate time for maximizing the returns and reducing marketing and price-related risks. As noted in the budget, the Farmers Producer Organisations (FPO), including Farmers Producer Companies, are coming up to serve as aggregators of agricultural produce to indirectly connect the farmers with the markets. These companies also provide some other needed services, such as procurement of inputs, arranging for farm machinery for custom-hiring, conducting crop protection operations and similar others to let the farmers collectively reap benefits of scale.

Supporting this trend, the budget has proposed that the government would provide matching equity grants to the registered FPOs, up to a maximum of Rs 10 lakh per FPO, to enable them to leverage working capital from financial institutions. To further mitigate the problem of sourcing finance by these FPOs for conducting their routine business, the budget has mooted creation of a Credit Guarantee Fund for them under the Small Farmers Agri-Business Corporation with an initial corpus of Rs 100 crore.

The finance minister has also urged the state governments to support these FPOs and amend their agricultural produce marketing committee (APMC) laws suitably for this purpose. This measure will go a long way in spurring the emergence of more FPOs for the benefit of the farmers. ●

The author, a veteran agricultural journalist, is consulting editor of the *Business Standard*.



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Eliminating the Fertilizer Subsidy: Reality and Myth

Pratap Narayan



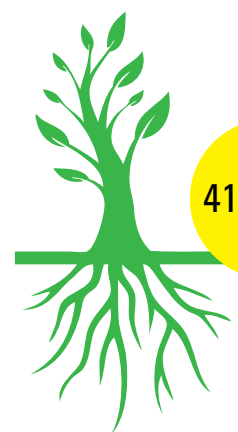
There is increasing clamour in official and academic circles and in the media, to eliminate the fertilizer subsidy that is perceived as a drag on budgetary resources, which retards growth. Yet no rational decision is taken to achieve this objective, even if it is feasible. Alongside, the realities of Indian agriculture, dominated by resource poor small and marginal farmers (accounting for over 80 per cent of operational holdings), get ignored.

Around 70 per cent of India's population still lives in villages and is mainly dependent on agriculture for livelihood. Nearly 60 per cent of India's labour force is engaged in agriculture. Apparently, a sense of complacency around India's food security has set in, buoyed by bulging buffer stock of foodgrain, ignoring that this is largely due to a large percentage of the population – the poor or those below poverty line – not having access to adequate food. It is pertinent to point out that the net per capita availability of cereals and pulses, which had touched 510 grams per day in 1991, has dropped to 439 grams in 2010.

There is also an erroneous notion that fertilizer subsidy benefits only large farmers. The so called 'rich farmers', with more than 10 hectares, account for only one per cent of the total farm holdings and consume much less fertilizer per unit of land as compared to the smaller farmers as can be seen from the *Table 1* for 2006-07. This is because the 'rich farmer' has access to technology, irrigation and mechanization to optimize his yield and fertilizer is only one of the inputs. A poor farmer, depending upon favourable weather, depends mainly on fertilizers to increase his yield.

Notwithstanding the commendable success in increasing production and consumption of fertilizer nutrients and agricultural production in the last three decades, India has much catching up to do with China, the only comparable country, in terms of population impacting food demand (*Table 2*). The need to increase agricultural productivity in the face of the falling land man ratio, down from 0.34 in 1951-52 to 0.15 in 2009-10, cannot be over emphasized and fertilizers will play a very important role.

Contrary to the general notion that the increased subsidy is on account the inefficiency of the domestic industry, it is entirely on account of acts of omission and commission on the part of the government under the administered price regime. The subsidy represents the difference between the reasonable cost of production/import and



It is pertinent to point out that the net per capita availability of cereals and pulses which had touched 510 grams per day in 1991, has dropped to 439 grams in 2010



distribution and sales realization, all determined by the government.

First, while there has been sharp escalation in the costs of main inputs like feedstock and imported raw materials due to freedom of pricing allowed to suppliers and the sharp depreciation of the rupee. The product price has lagged far behind as can be seen from *Table 3*. This has naturally increased the gap between cost and realization and consequently subsidy sharply.

Second, there has been significant increase in consumption of nutrients from 12.546 mmt in 1990-91 to 28.122 mmt in 2010-11 which, though intended and essential to increase agricultural production, has multiplied the overall subsidy volume for which neither the farmers nor industry can be blamed.

Third, with the stagnation in domestic industry due to adverse changes in pricing policy, the level of imports has gone up significantly from zero in 2000-01 to 7.834 mmt in 2011-12 of urea and from less than 1mmt to 7.399 mmt of DAP/MAP, entailing significantly higher subsidy than on the indigenous product. For instance, during 2011-12 the subsidy released on 7.834 mmt of imported urea was Rs 17,475 crore (average Rs 22,307/MT) while on 21.992 mmt of indigenous urea the subsidy released was Rs 20,285 crore (average Rs 9,224/MT).

The objective of the fertilizer subsidy since the seventies has been to ensure health and growth of the industry to avoid exploitation in the international market. After the initial success over nearly two and a half decades, since 2001, many adverse changes have been made in pricing parameters, leading to stagnation in domestic



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production, in turn, increasing dependence on costlier imports as brought out earlier.

Similarly, while policy makers keep on lamenting the overuse of urea, when it comes to pricing and subsidy, urea is favoured by pegging its price at a ridiculously low level, under the garb of so called decontrol in 1992 and now, under the Nutrient Based Subsidy, the prices of phosphate and potash products have been allowed to increase manifold discouraging their use as clear from *Table 4*.

The sole objective of the changes in pricing parameters appears to be to somehow reduce subsidy at the cost of the domestic industry and agronomic requirements but even that has failed.

Table 1: Size of Farm (hectare) and fertilizer consumption

| | Below 1 | 1 to 2 | 2-4 | 4-10 | Above 10 |
|---|----------------|---------------|------------|-------------|-----------------|
| Distribution of cultivator households (%) | 63.90 | 18.65 | 11.15 | 5.30 | 1.00 |
| Proportion of fertilizer consumption (%) | 29.03 | 23.84 | 22.05 | 18.95 | 6.13 |
| Consumption per ha. of fertilized area (kg) | 189.79 | 167.49 | 143.42 | 133.09 | 116.48 |



Table 2: Food production and fertilizer consumption: India and China (million metric tons)

| | | India | China |
|---------------------------|-------|--------|--------|
| Production | N | 12.179 | 35.988 |
| | P | 4.386 | 17.108 |
| NPK consumption | | 49.770 | |
| | Kg/Ha | 166 | 400 |
| Cereals/Pulses production | | 277 | 502 |
| | Kg/Ha | 2237 | 5399 |

What is worse is the gross under provision for the subsidy budget, completely divorced from requirements even under the distorted policy. During the current year, no subsidy has been released to industry on decontrolled products after July and on urea after August, leaving the industry gasping for breath. Failure to provide for it even in the latest Supplementary Demands will lead to about Rs 30,000 crore being thrown forward. The same story will be repeated next year.

Contrary to the general misconception, neither

the poor farmer nor the suppliers benefit from the subsidy. The farmer does not benefit because in working out his output price (MSP), only the administered price of inputs is taken into account; in fact, he is not even allowed a minimum remunerative price. Nor does the fertilizer supplier benefit because the subsidy is supposed to represent only the difference between reasonable cost of production and distribution, all determined by the government and even this is not available because of adverse policy changes (for example, despite sharp inflation, fixed costs are pegged at 2003 level for urea) over the last 10-12 years. In fact, in case of the so-called decontrolled fertilizers, even this pretence has been given up.

Finally, payment is not timely, making the industry suffer due to uncovered borrowing costs. The industry is the sacrificial goat, being sandwiched between government's desire to keep fertilizer price low level without controlling

Table 3: Gap between fertilizer cost and realization

| Year | MRP | | | FO Rs/000 CM | Cost | | Phos Acid Ammonia |
|---------|---------------|--------------|------------------|-----------------|------------------|---------|-------------------|
| | Urea Rs/MT | DAP Rs/MT | Naphtha Rs/KL | | N.Gas \$/MT # | | |
| 1981-82 | 2350 | 3600 | 596 | 829 | 320 | NA | |
| 2003-04 | 4830 | 9350 | 13198-16846 | 10732-15072 | NA | 356 | 194-356 |
| 2010-11 | 5310 | 9950 | 37877-49015 | 29641-36739 | 8816-10574* | 711-830 | 323-410 |

#Greater impact due to depreciation *RLNG costs significantly more at Rs 11,492-22,360

cost factors and also not making even adequate budget provision for subsidy. Actually, only the feedstock and other input/service suppliers (mainly government owned) have been given the freedom of pricing and benefit from increased subsidy, apart from various taxes and duties.

There has now arisen the question of direct payment of subsidy to the farmer. Purely from industry's point of view, it would be ideal if it is freed of all administered price and subsidy mechanism. It can then plan its business on normal commercial considerations. It will be ideal if, as per its avowed objective, subsidy is paid directly to the farmers. However, is this practical?

- First, considering that there are over 137 million farming families (including 117 million small and marginal farmers) spread over six lakh villages, where is the infrastructure to distribute small sums a few times a year and what would be the cost of administration. That is why, despite repeated pronouncements for nearly a decade, the process has not started even on a trial basis. The Alagh Committee had recommended trial in two districts way back in 2005. It is now being claimed that direct transfer to beneficiary accounts will be undertaken based on Aadhar

Table 4: Influencing fertilizer use through pricing

| | N:P:K Price Ratio* | N:P:K use Ratio |
|---------|--------------------|-----------------|
| 1991-92 | 2.35:2.67:1 | 5.9:2.4:1 |
| 1996-97 | 0.96:2.26:1 | 10.0:2.9:1 |
| 2009-10 | 1.41:2.18:1 | 4.3:2.0:1 |
| 2011-12 | 0.57:1.95:1 | 6.3:3.1:1 |

*N thro' Urea, P thro' DAP and K thro' MOP. Based on maximum price of decontrolled products during the year

Cards through banks, but they would obviously not do so for free.

- Second, at what stage would the amount be transferred to beneficiary account: before or after he purchases? If before, where is the guarantee that he will not utilize the amount for other more pressing needs? If after, where does he get the resources to buy fertilizers in the first instance?
- Third, because of the consistent gross under provision in the budget for fertilizer subsidy, even the industry is gasping for breath but the availability at reasonable price somehow continues. How will the farmer finance his purchase in such a situation?

A time has come for the government to come out with a clear cut policy instead of continuing to tinker with the subject piecemeal and jeopardizing the health of the farm sector and the farmers. ●

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Bajra : 068, 045

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Indian Agriculture: In Need of Continuous Capacity Building

Ajay Jakhar in conversation with Dr S. Ayyappan, Director General,
Indian Council of Agricultural Research

AJ: The Indian Council for Agricultural Research (ICAR) is a premier institution for agriculture research in India. How many employees do you have and what is the budget of ICAR?

S. Ayyappan: We have around 6,000 scientists, who provide the main strength for research. They are assisted by about 7,000 technical colleagues, about 5,000 administrative staff and about 7,000 supporting staff. The planned budget in 2012-13 was Rs 3,200 crore but with some recent revisions, the amount may be a little lower.

AJ: Does this reflect a problem of co-ordination between the agriculture ministry, the ICAR, the state governments and different organizations?

S. Ayyappan: Not quite. There is a process by which we go about disseminating technology. There are interface meetings, held bi-annually, before the Kharif and Rabi seasons. They are attended by all the agriculture production commissioners, directors of agriculture and animal husbandry. We make presentations on our technologies and their possibilities and so on. There are also demonstrations that can take place in two or three modes. At the Krishi Vigyan Kendras (KVK) we have demonstrations on new technologies and varieties. Then come the All India Coordination of Research Project Trials, which are well networked with the state agriculture universities. So, the research activities plus the extension programmes of the state agricultural universities are also dovetailed into the KVKs. There are interfaces with the state departments, with specific queries coming from them; often there are demonstrations and there are training programmes too.

AJ: So there is no problem at all?

S. Ayyappan: I would not say that; in a vast country like ours, there will be some problems but there is a major mechanism of interfacing with state governments and state departments. There are also the eight regional committees of the ICAR that meet biennially and every year there are quarterly regional committee meetings. Issues are raised, the research agenda is determined, the achievements are recorded and the failures are discussed.

AJ: Are you satisfied with the recommendations for the ICAR for the 12th plan?

S. Ayyappan: The working group of the Planning Commission has recommended an allocation of about Rs 55,000 crore in the 12th plan but we are

still to get the final figures. The meeting is due soon.

AJ: There is a lot of demand from many non-government organizations, newspapers and the media for organic practices. Is the ICAR also doing something to propagate organic practices?

S. Ayyappan: We have specific projects on bio pesticide, bio fertilizers and one project specifically addressing organic farming of different commodities. Our take on this is that organic is good; it can fetch us high prices; a premium; even if not everywhere. The average organic carbon content of the soil of this country is 0.34 per cent and there are places where organic farming would be suitable and fetch us a good price. However, a blanket recommendation saying that organic farming should be taken up everywhere, given the soil health conditions in the country, may not be right.

A blanket recommendation that organic farming should be taken up everywhere, given the soil health conditions in the country, may not be right

So we are talking about integrated nutrient management and balanced application of fertilizers. In comparison to nitrogen, there is less of potassium and phosphorus being used. If we do not replenish the soil with a suitable amount of potassium and phosphorus there will be a problem of imbalance. In many cases, organic manures in different forms would give adequate organic carbon and some micronutrients but not all of them in a very balanced manner. The reduction in animal and livestock presence in agriculture is also becoming an issue. Earlier, animal energy was used in agriculture and in states where it is still available, as in central India, there is no problem. In other places, for example the green revolution belts, where mechanized and inorganic fertilizers are applied, organic farming would be a problem.

AJ: Animal husbandry, which is very important for sustaining families of small and marginal farmers, faces problems. The focus has been on crop sciences for the past many years. Is ICAR now focusing on animal husbandry and fishery?



S. Ayyappan: We appreciate that and have quantified the contribution of animals (and related dairy, poultry, fishery) to the agricultural GDP to be in excess of 30 per cent. This point has been absolutely appreciated and we have acknowledged that monoculture does not work in this country. Every holding is both crop and animal based. So integrated farming system is the way forward. We have around 300 different models of integrated farming systems across the country. In the new plan there is definitely greater emphasis on livestock, research and related activities.

AJ: GM crop is a very controversial subject. Is it possible for ICAR to develop indigenous technology so that we are not dependent on others for GM technology? A lot of opposition against GM stems from the fact that the technology is from foreign companies and foreign countries. Are ICAR and Indian companies in a position to provide these technologies?

S. Ayyappan: We have an awareness campaign for GM crops: biotech in general, GM crops in particular. Quarterly newsletters are brought out



We send our scientists overseas from the national agricultural system. For the last two years, we have also had exchange of scientists between public and private labs

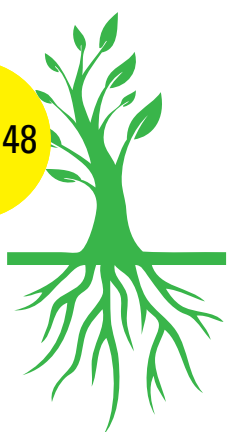
to sensitize people at the district level. In fact, we keep talking to vernacular press because many of them pick up stories from websites and national and international media. We provide them with material/content about what GM crop means. However, our investment in this area is of recent origin and not at the level as in some multinational companies. There may be a perception that it is all their technology but I must assure you that it is not so.

There is also research from the public research system. Research is not always for growth but also to measure herbicide tolerance, drought resistance and several other traits. We have almost a dozen new products in line. We have submitted all the material to the Hon'ble Supreme Court and other agencies. We are sure that given the mechanism and once this regulatory authority is in place we will get more products with indigenous investment with a little more focus. We are trying to provide, a multi-ministerial, a multi departmental effort.

AJ: As the head of ICAR, do you think that Indian

scientists would gain if they were encouraged to go and work with the private sector, NGOs outside the system for two or three years and then returned and applied that knowledge for commercial purposes? You could commercialize the knowledge that you have?

S. Ayyappan: Any exposure would be good and we do provide them with exposure. The first exposure was to good laboratories overseas. We send our scientists overseas from the national agricultural system. For the last two years, we have also had exchange of scientists between public and private labs and systems to expose our scientists to way they work in the private system. Many of our colleagues are working in different locations and we have given a number of seed companies this offer. Let us see how it works. We also have a company, AgrinnovateIndia and have invited a number of people to come and work with us for seeds, farm implements, machinery, diagnostic vaccines and value-added products.





AJ: One important thing that you have talked about is PPP on which your take has been somewhat different from the standard Public Private Partnerships. Can you elaborate on that?

S. Ayyappan: We are looking at Profit-Prestige-Prosperity in agriculture. Agriculture is a skilled enterprise and we have been talking to farmers (they say at least 50 skills are required to become a successful farmer). First, while we showcase their skills we say that profit is very important. Second, we talk about the prestige involved in agriculture. Farming should not be last option. Third, we focus on prosperity.

AJ: The truth is that small-scale farming is not remunerative. Would the ICAR ever support reduction in land ceiling? Also, what is your position on land issues?

S. Ayyappan: We are worried about land going out of cultivation though the situation is not alarming, despite large green fields being converted into real estate and so on. While some agricultural land is being lost, some marginal/degraded land is coming into cultivation. So about 140 -142 million hectares would more or less remain constant. What we are trying to do is to customize farm implements and machinery for small holders. Small holders are not an Indian phenomenon only. Several countries

have similar issues.

Customization could begin with irrigation or cluster farming; or combined irrigation. We demonstrated this in some places in Andhra Pradesh where, instead of every plot having its own well, the plot owners join hands for combined irrigation. So, the first possibility is cluster farming; the second is to use customized farming machinery; and the third is to go to the market together. If there are 200 small farmers, they can have a common input management featuring seed, fertilizer, pesticide, machinery and such things, along with a common harvest strategy and a market. This idea is gaining ground and we have been able to set up a few models.

AJ: Krishi Vigyan Kendras (KVK) play a very important role but they face a great staff crunch as do the research networks. In a lot of places we find that vacant positions are not being filled up. Is it a resource crunch or is it a problem of just hiring people?

S. Ayyappan: KVKs are a 100 per cent ICAR-driven mechanism and planned projects have 100 per cent financing from the centre. As of now, we have 631 KVKs. In each centre there are six positions comprising subject matter specialists, one programme coordinator with a total staff of 16. There is absolute funding from us. Now, about 400 KVKs are with the

Today, the need is wherever there is water. That is why we are talking of the second revolution in eastern India – where there is water.

universities. A hundred of them are with the NGOs and another hundred of them are with the ICAR institutes. There is absolutely no funding problem but there may be a problem with the recruitment process because these locations are at the district level and sometimes remote. We have been emphasizing recruitments and trying to ensure full recruitment.

The point is that this is a multi-disciplinary approach and we normally have a standard set practice and agronomies: a land protection person, an animal specialist and so on, depending on the need in different locations. It is flexible and the disciplines can be changed, depending on the locational needs. In coastal areas, fisheries might be important. In Gujarat, dairy might be important. Given the funds, given the flexibility, we are trying to ensure that all positions are filled. We are also trying for a number of new positions given that secondary agriculture is becoming important, mechanization is becoming important and also climate change. We believe that these categories, agro-climatologist and engineers, should be included. Also, a person with good marketing skills and business sense should be there.

AJ: The National Centre for Agricultural Economics and Policy Research has emerged as a reputed international organization but what about data collection? Do you think more attention is to be paid to data collection because a lot of policies are made on the basis of the data collected? Do you think there is a gap as far as data collection is concerned?

S. Ayyappan: One is collection and the other is storage and management. We had a two-day workshop on how to manage our data. It is not that we necessarily know how much data we have. For example, when it comes to soil profile, the data with some of our agencies is huge. It is time for us to get into modelling and data mining and we need to build expertise in this area.

AJ: The central and state governments are talking of crop diversification. Do you think MSP (minimum support price) could be a tool to help diversify, by increasing MSP for alternate crops?

S. Ayyappan: We think good cold chains and market linkages would be a value addition,

especially at the primary processing at the catchment areas. These would be of much greater value than just the MSP. Perishables, for example pineapple or mango, would benefit a lot if some primary processing was available.

AJ: Everyone is now talking about the proposed second green revolution. What are the learnings from the first green revolution that you would want to avoid for the second green revolution?

S. Ayyappan: We analyzed the productivity enhancements for about 150 different crops and commodities of Rabi and Kharif, which have ranged from four to 27 folds. Each of them should have been called a revolution. The point is that the first one was commodity specific; just wheat in essentially two or three states in what we know as the green revolution belt. Today, the need is wherever there is water. That is why we are talking of the second revolution in eastern India – Jharkhand, Chhattisgarh, Bihar, Orissa and West Bengal, where there is water.

Soil condition is another challenge. We are addressing the basic requirement for agriculture today and the first focus is on water and the second is on high value crops: horticulture, for example. The growth rate is eight per cent and people have diversified into several horticultural crops and we need to provide what they require to sustain this. We need to get to secondary agriculture. Again, just producing and putting it into a national market is becoming very risky and we are trying for secondary agriculture with some processing and shelf life enhancements. It is not always for exports.

The domestic market is absolutely huge and we need not be apologetic that we are not exporting. We have a good domestic market and if it is exploited we will be fine.

AJ: If someone were to ask you for your wish list for ICAR that would be given to the prime minister, what would the first two things on it be?

S. Ayyappan: We have been talking about state-of-the-art infrastructure, laboratories and farms. Quality manpower and exposing them to good laboratories all the time; continuous capacity building. ●

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A photograph of a man in a yellow shirt working in a large poly-house. The poly-house is filled with rows of green plants, likely vegetables, supported by stakes. The structure is covered with a translucent material, and the interior is well-lit. The man is standing in the middle of the rows, tending to the plants.

PROTECTED FARMING

Pramod S. Bhardwaj

Small land holders in uncertain climatic conditions across the five districts of Himachal Pradesh are getting exciting returns courtesy protected farming with poly-houses. The minimal required space for crop production with low but regular water under this process has turned farming into a lucrative venture in this hill state, where small terraced fields were not considered fertile enough to produce much.

Protected farming has proved to be a boon. "Vegetable and flower production in the area was often affected with climatic uncertainties, especially in the last five years but with the poly-houses the climate spell has been reduced, making farmers feel more secure," says Shimla agricultural officer, Dr Raghuvir Singh. Farmers with small land holdings have not only got better returns from flowers but carried out experiments with protected vegetable farming as well, he adds.

Under poly-house farming, plants are grown in a shelter created by a greennet. The thickness of green net helps to maintain the desired temperature inside the poly-house making it possible to have favourable conditions for vegetables and flowers.

The proposition is expensive but government subsidy is making it a viable for the farmers who are getting incredible returns with short investments. The department of agriculture in Himachal Pradesh says that the state government, with help of central funds, gives an 80 per cent subsidy for growing vegetables in poly-houses. Farmers or co-operatives need to invest the remaining 20 per cent only.

A success story comes from Himachal's capital Shimla, where farmers at Jubbarhatti, a small suburb near the Shimla airport, formed the Mahakali Flower and Vegetable Growers Co-operative Society in 2009. The idea was to work as a collective entity to save each other from market forces and bring down



Overview of the poly-house chain where flowers and vegetables are packed by the farmers to be sent to markets. All packaging is being done by the society members.



(Left and above) Vegetable beds and rows after the initiation and sprouting. Farmers begin picking the vegetables and flowers after sprouts appear on the new stems

per capita cost of the poly-houses.

Ram Gopal, the society's secretary says, small land holdings of around 1,000 square metres are of little help to farmers but, in this region, holdings tend to be small. To ensure that each farmer gets better returns, the society has successfully explored new markets outside the state for its vegetable produce. The society also arranges for good seeds for its members and other farmers. "We have arranged for a space in Kharar in Punjab, where we prepare vegetable and floral seeds as the local environment is not conducive for seeding and sprouting is a little difficult," he says.

Initially, the thrust was on flowers and markets in Chandigarh and Amritsar markets brought in handsome returns to society members. Recently, the society's experiment with protected seedless cucumber and capsicum has turned out to be a money spinner. The society did not have much luck

with local markets but struck gold when it explored markets outside the state. Orders poured in from Chandigarh and Delhi. The society is planting exotic vegetables in February-March, with a focus on local as well as national markets, Ram Gopal adds.

The protected farming trend in Himachal Pradesh with flowers and vegetables continues to catch on with more farmers vouching for it. According to the Y.S Parmar University of Horticulture and Forestry, Solan, the area under vertical farming is increasing. The five districts: Bilaspur, Shimla, Solan, Mandi and Kangra, top the list of initiatives and total area under vertical farming across these districts has touched 250 hectares.

The price swings during summer and winters have fostered an interest to grow crops that could cater to larger markets even during periods deemed 'non-season' by the traditional agriculture calendar and for crops with poor productivity. The plan

is working both from better yields and optimum utilization or small holdings. Even neglected, arid regions of the villages can be put in use using protected farming methods. The series of marathon meetings and training workshops by the university culminated in proposals from the locals, says Dr R. S. Spehia, assistant professor (Soil Science) and principal investigator at Y.S Parmar University.

Today farmers are taking up the initiative that is helping them deal with the vagaries of weather and time of the year with round-the-year produce. In order to grow sweet pepper and tomato through protected farming the university had carried out on farm trials (OFT) at Basal (Solan), Mahog (Chail) and Sai (Baddi). Neighbouring farmers were trained to grow two varieties of capsicum called



Protected cultivation of vegetables not only helps farmers overcome financial distress but also opens the gates for off-season and year round supply of vegetables with remunerative prices to the growers

54



Vegetables are graded on the basis of quality to be sent to Chandigarh and Amritsar markets.

The Obstacles

Initially, protected farming appears to be expensive compared to traditional farming. Despite the subsidies, installation costs and other associated expenses are high. Besides, there is paper work to be done to receive the subsidy and these cause concern. Initial expenses and paper work can, indeed, be harrowing but these obstacles are expected to be smoothened over time and disappear once the first produce is sent in markets.

While in traditional farming, the cultivator makes Rs 2 lakh to Rs 2.50 lakh per 1,000 square metres, in protected farming the farmer can earn between Rs 4 lakh and Rs 5 lakh in vegetable markets. Also, 1,000 square metres under protected farming can accommodate 3,200 plants. There is a contrast in the production ratio as well.

Under traditional vegetable farming, the cultivator can get two kgs of produce, while a single plant in a protected farm can give a yield of five kgs on an average. The farmer has to use drip irrigation system and plants are grown up to a height of 8ft with help of a rope staking system. The average yield obtained by the farmer per plant is around five kgs. Therefore, growing coloured capsicum under protected conditions has proven to be a boon to growers.

Bomby and Orebelle. The Kandaghat and Solan blocks of Solan with a large number of small and marginal farmers are now the largest producers of vegetables in the state. They grow mainly cash crops like tomato, capsicum, pea, cauliflower, ginger and French bean and earn attractive returns.

The protected cultivation of vegetables not only helps farmers overcome financial distress but also opens the gates for off-season and year-round supply of vegetables with remunerative prices to the growers, a vertical farmer, Inder Singh Thakur of Dolag village in Solan district said told the Y. P. University officials.

More importantly, the concept of protected farms is no longer looked at in askance. With financial support available, even bigger farmers are seeking to subscribe to this approach, Dr Spehia says. The other impact of protected farming is that produce consumed locally can be grown locally and not have to be transported over large distances because protected farming fosters non-traditional produce regardless of growing season and cost, he says. ●

The writer specializes in Indian agriculture

India's cotton farmers' lives transform for the better

Research indicated that 87 per cent of Bt cotton farmers enjoyed higher standards of living, 72 per cent invested in their children's education and life insurance, and 67 per cent repaid their long pending debts*. Many more built *pucca* (stone) homes, purchased farm equipment and motorcycles, leased additional land for cultivation etc. Further, women from Bt cotton households had higher access to maternal care services, while children had higher levels of immunization and school enrolment*. Additionally, female earners witnessed a 55 per cent gain in average income, and 42.4 cr. additional days of employment across the total Bt cotton area**.

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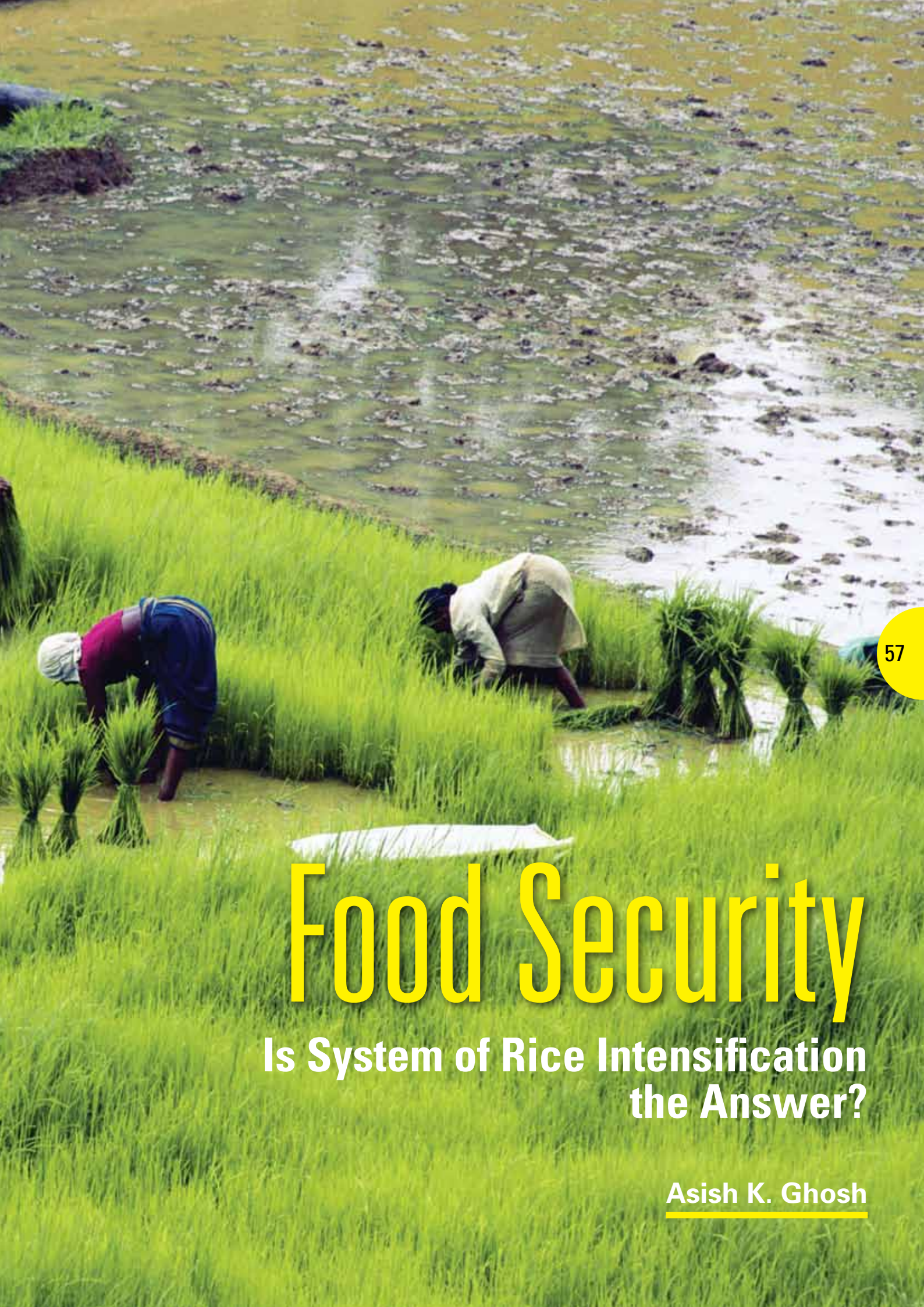
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*IMRB Somiksha 2007 ** Nature

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Food Security

**Is System of Rice Intensification
the Answer?**

Asish K. Ghosh

The System of Rice Intensification that has reported remarkable yields in eastern India has attracted great attention and some controversy with some global experts saying that the data is manipulated and unreliable. From the Indian perspective it is important to understand this remarkable system and to ensure that it works because rice is one of the two major staples, feeding not just vast numbers of India's population but seven billion people the world over.

Historical evidence indicates that wild rice varieties have been domesticated and cultivated about 8,200 to 13,500 years ago, presumably in the Pearl river valley region of China. Opinions differ on the cultivation of rice in the Indian region dating back to between 2000-7000 BC. Historians believe that while the indica variety of rice was first domesticated in the area covering the foothills of the eastern Himalayas (north-eastern India), stretching through Burma, Thailand, Laos, Vietnam and Southern China, the japonica variety was domesticated from wild rice in southern China, which was introduced to India before the time of the Greeks¹.

Globally, India ranks second in terms of rice production (Table 1). According to the Nabard, the area under rice cultivation in India was 44 million hectares and production was 96.43 million tonnes (2007-08). During the same period, it was stated that the area under rice accounted for 34 per cent of



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Rice yields and area under it have stagnated. Land being a finite resource, there is not much scope to increase the area even when India's population has crossed the billion mark

India's food crop area and 42 per cent of its cereal crop areas².

Admittedly, the green revolution, with its package of high-yielding varieties, fertilizers, pesticides and irrigation, helped increase rice production and the area under cultivation for nearly three decades. However, over the last 20 years, rice yields and the area have gradually stagnated. Land being a finite resource, there is not much scope to increase the area under rice cultivation even when India's population has crossed the billion mark.

The System of Rice Intensification was developed

by Father Henri de Laulanie, a Jesuit priest in Madagascar in 1980s. He had been working there since 1961. In the late 1990s, Dr Norman Uphoff from the Cornell International Institute for Food and Agriculture, Ithaca, USA, brought the system to the notice of the outside world. SRI was introduced to India in the year 2000. Interestingly though, the use of SRI techniques actually goes back to 1911. A Tamil monthly magazine described such methods and many articles, published in 1911, talked of single-seedling planting and wider spacing of plants in square or rectangular arrangement, using

¹ (<http://www.rkmp.co.in/general-domain/history-and-evolution/history-of-rice-cultivation-in-india>)

² (www.nabard.org/nrmc/sri.../SRI%20food%20security%20done.pdf)





Table 1: Top 20 rice producing countries in 2010 (million metric tons)

| | |
|----------------------------|-------|
| People's Republic of China | 197.2 |
| India | 120.6 |
| Indonesia | 66.4 |
| Bangladesh | 49.3 |
| Vietnam | 39.9 |
| Burma | 33.2 |
| Thailand | 31.5 |
| Philippines | 15.7 |
| Brazil | 11.3 |
| United States | 11.0 |
| Japan | 10.6 |
| Cambodia | 8.2 |
| Pakistan | 7.2 |
| South Korea | 6.1 |
| Madagascar | 4.7 |
| Egypt | 4.3 |
| Sri Lanka | 4.3 |
| Nepal | 4.0 |
| Nigeria | 3.2 |
| Laos | 3.0 |

Source: Food and Agriculture Organization

less water, which could provide much better yields.

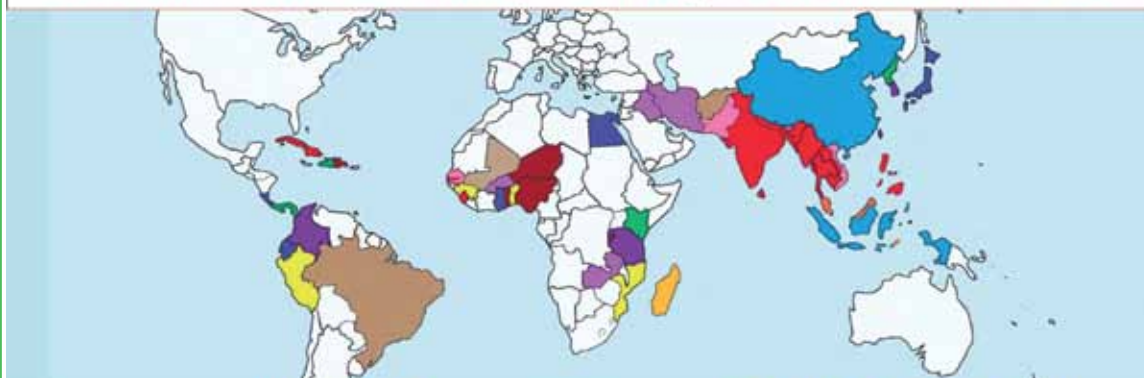
The change in agronomic practice provides the rice plant with a growing environment that is more favourable in terms of achieving its potential and benefits farmers by enhancing their income and reducing the costs of input, while assuring increased yield. Why such a practice was discontinued even after proven benefits, remains a mystery. However, one can surmise that many traditional Indian practices were discontinued during the colonial rule in the name of modernizing Indian traditional systems.

Today, the efforts of Fr. de Laulanié to improve lives of rice farmers through SRI have not only helped the farmers of Madagascar but also the rice farmers in more than 50 countries cutting across geographical barriers of Asia, Africa and Latin America. (See Map 1)

“The National Development Council (NDC) in its 53rd meeting held on May 29, 2007, adopted

Map 1

2012: SRI benefits have now been seen in >50 countries of Asia, Africa, and Latin America



Before 1999: Madagascar

1999: China, Indonesia

2000-01: Bangladesh, Cuba, Laos, Cambodia, Gambia, India, Nepal, Myanmar, Philippines, Sierra Leone, Sri Lanka, Thailand

2002-03: Benin, Guinea, Moz., Peru

2004-05: Senegal, Pakistan, Vietnam

2006: Burkina Faso, Bhutan, Iran, Iraq, Zambia

2007: Afghanistan, Brazil, Mali

2008: Rwanda, Costa Rica, Ecuador, Egypt, Ghana, Japan

2009: Malaysia, Timor Leste

2010: Kenya, DPRK, Panama, Haiti

2011: Colombia, Korea, Taiwan, Tanzania

2012: Burundi, Dominican Republic, Niger, Nigeria, Togo

Source: http://sri.cifad.cornell.edu/images/global/SRI_Spread_Map_2012.pdf

SRI demonstrations are to be conducted under upland conditions on the fields of progressive farmers having assured irrigation and drainage

a resolution to launch a Food Security Mission comprising rice, wheat and pulses to increase the production of rice by 10 million tons, wheat by eight million tons and pulses by two million tons by the end of the Eleventh Plan (2011-12).” Accordingly, a centrally-sponsored scheme, the ‘National Food Security Mission’ (NFSM), was launched from 2007-08 to operationalize the resolution by the Department of Agriculture and Co-operation, Ministry of Agriculture, Government of India.

Under the NFSM, SRI has been identified as an accepted technique to be promoted during the implementation of the mission objective. It was decided that SRI demonstration would be conducted under upland conditions on the fields of progressive farmers having assured irrigation facility and provision of drainage. Assistance of Rs 3,000 per demonstration of SRI will be provided to the implementing agencies.

A separate website on SRI was jointly launched

by ICRISAT and WWF-I in 2007 and a newsletter on the subject was launched in 2008 from the same platform. It appears that during last five years SRI has become a centre of major attraction, promising assured increase in agricultural produce. Meanwhile, SRI has been given additional support through the Mahatma Gandhi National Rural Employment Guarantee Act 2005, and the schemes implemented thereunder.

Further, on the basis of a discussion held in January 2012, a National Consortium on SRI provided several arguments in favour of the system.

However, a critical appraisal of SRI is needed to establish if all indigenous seed varieties or land races can be successfully grown, following SRI methodologies or whether the yield pattern also depends on the land characteristics such as upland/lowland. It must be noted that the NFSM only supported SRI in the upland area. The intensive campaign on SRI has, however, led

to the introduction of the process in 246 out of 564 districts of India. Under NFSM, it has been introduced in 62 districts out of 136. (See Map 2)

Since its inception, the SRI method has received a mixed response. On the one hand, there is widespread acceptance and significant benefits among the farming community and, on the other, it is criticized by segments of the scientific community. SRI is different from the conventional method of paddy cultivation that consists of mainly raising seedlings in flooded nurseries for up to 30 days and transplanting them. There is usually no regular spacing between clumps of plants and inundation of the field is a must. In contrast, under SRI, single 12-day seedlings are transplanted at a precise spacing of 25-centimetre squares in a grid pattern. The soil at the roots is kept moist, well-aerated, well-drained and addition of organic nutrients to it is encouraged. SRI thus requires less seeds and water and no chemical fertilizers or pesticides. Also, SRI is not confined to rice alone but can be applied to other crops, employing the same method called System of Root Intensification.

Deb et.al., 2012, in a paper, *A critical assessment of the importance of seedling age in the System of Rice Intensification (SRI) in eastern India*, stated that: “Our study seems to corroborate the standard claim of significant yield increase with early transplantation³ but does not corroborate any miraculous yield improvement.” Deb et. al., (op.cit) further stated that transplanting of 10, 14 and 18 day old seedlings of the lowland variety Shiuli had a significantly positive effect on both Panicle Density (PD) and yield compared with conventional Multiple Seedling Transplants (MST) of 28 days. However, the effect disappeared in the upland variety Tulsa, whose younger transplants showed no difference from the MST in both Total Grain Count per Hill (TG) and yield. This finding contradicts the recommendations of the NFSM that suggested SRI for upland varieties only.

A February 16, 2013 report by John Vidal in *The Guardian* UK, says that a farmer in Darveshpura, Bihar, had grown an astonishing 22.4 tonnes of rice on one hectare, beating the previously held records by using SRI. “This was a world record and with rice the staple food of more than half the world’s population of seven billion, big news. It beat not just the 19.4 tonnes achieved by the ‘father of rice’, the Chinese agricultural scientist,



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Why SRI?

If a rice growing area (and farmers) transits to the SRI method, the following would be the major benefits:

1. Enhanced soil structure and productivity through addition of compost and other organic matter
2. Water saving production systems through enabling the transition to better management and skills. In case of a groundwater scarce area, this also results in saving groundwater (30 per cent) and savings in electricity consumed per acre of rice. If there is surface irrigation, savings in irrigation water leads to possibilities of expansion of irrigated area.
3. Saves inputs (seed, in particular, up to 70 per cent)
4. Soil carbon sequestration and other climate change mitigation benefits (such as reduction in methane and other GHGs)
5. Yield enhancement (a minimum of 15 to 20 per cent)
6. Enhances labour absorption and enhancing wage labour productivity

Source: http://www.sri-india.net/documents/SRI_MGNREGS_2012.pdf

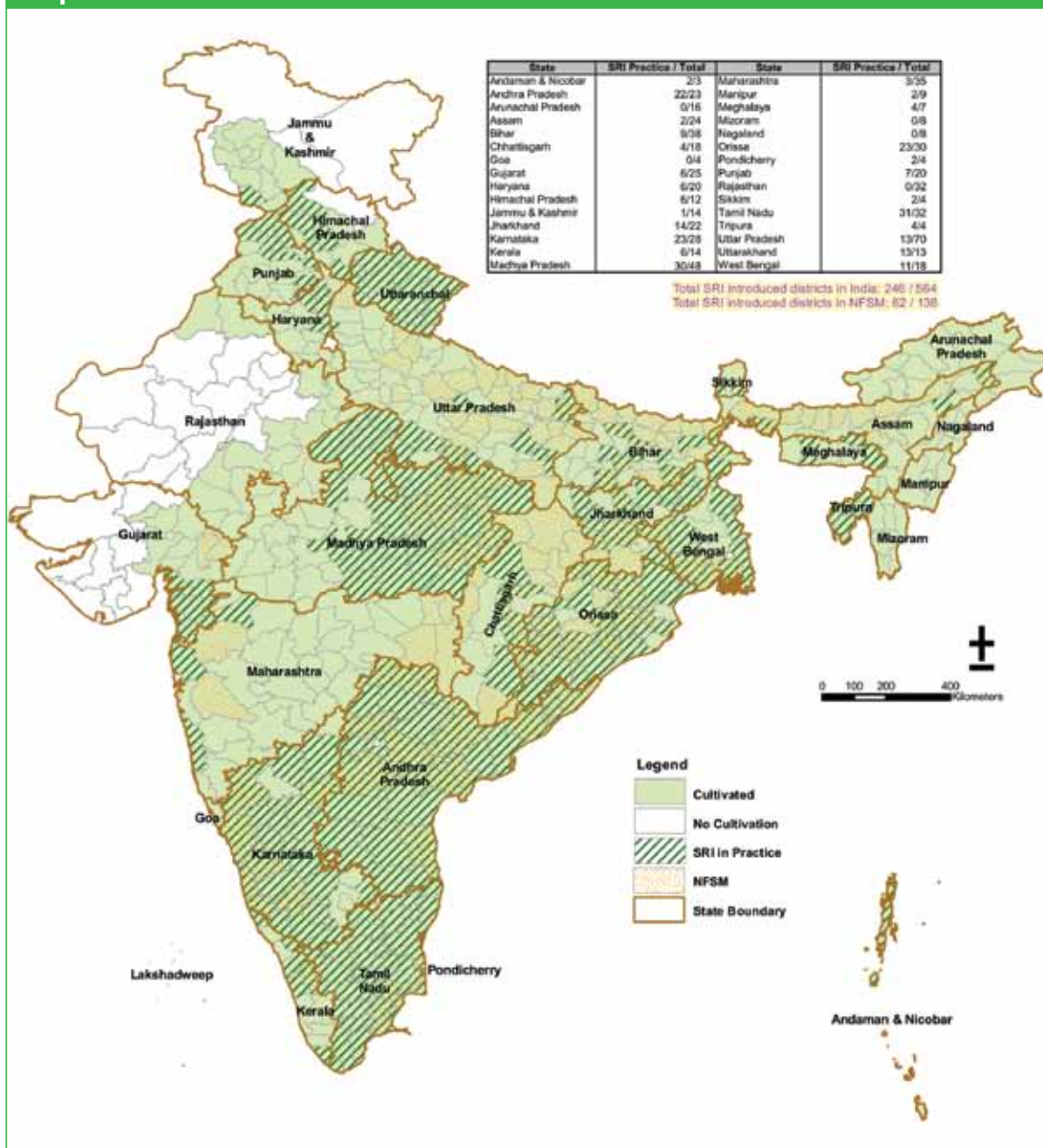
Yuan Longping but the World Bank-funded scientists at the International Rice Research Institute in the Philippines and anything achieved by the biggest European and American seed and GM companies.”

However, the feat has been criticized by Yuan Longping in an interview with the China News Service stating that “It is 120 per cent fake. He (the Indian farmer) said they had lots of rain and little sunshine that year but high yields would



³ (Pasuquin et al., 2008; Stoop et al., 2002; Uphoff, 2003; Uphoff et al., 2008)

Map 2



Source: (Draft Map, 2010) http://www.sri-india.net/images/SRI_INDIA_A4.pdf

be impossible without adequate sunshine.” The claim from Nalanda has also been questioned by Trilochan Mohapatra, director, Central Rice Research Institute (CRRI), Cuttack, according to whom, “A 10 tonnes or 11 tonnes per hectare yield is by itself a good one but it is nowhere near the 22.4 tonnes.” India’s average yield is reportedly about six tonnes per hectare.

Mohapatra’s statement has, however, been contradicted by Nalanda district agricultural officer, who had certified Kumar’s high yield in 2011, saying that the figure had been calculated

through the standard method adopted by the state. “It is done in a very transparent manner and the authentication of the figure is done in the presence of the block agricultural officer, circle inspector, statistical supervisor, block development officer, the farmer and a representative of the local panchayat”⁴.

One is inclined to quote Thakur (2010) from Critiquing SRI criticism: beyond scepticism with empiricism, where he stated that: “The rice research establishments in India, China, Indonesia and Vietnam, where about two-thirds of the

⁴ Mudur G.S. et. al., *The Telegraph*, February 23rd, 2013



world's rice is produced, have done their own evaluations of SRI and have found merit in them. The anticipation that SRI will slip into obscurity is proving false as there are around 1-1.5 million farmers who have adopted SRI. It is time for rice researchers around the globe to direct their

intelligence and knowledge towards refinement of this innovation through critical research that can bring in a greener green revolution, addressing the question raised by Surridge, whether or to what extent SRI methods and insights can substantially reduce hunger and poverty.” ●

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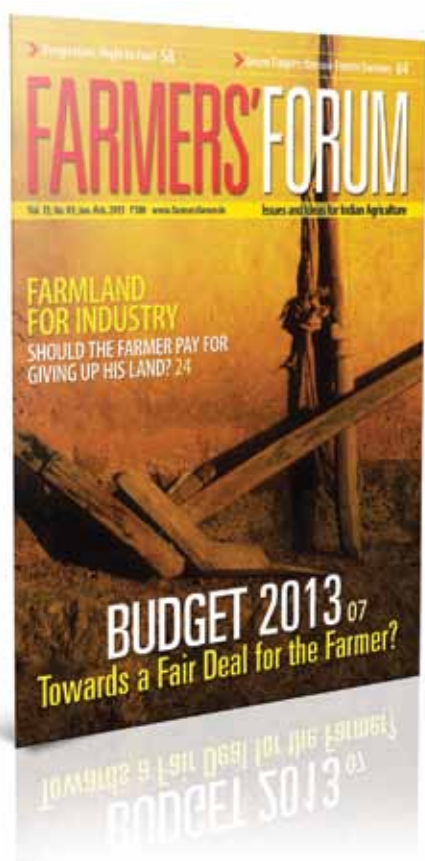
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Opium Farming in India: Nothing pleasing about it

"The opium farmer is neither intoxicated nor hallucinating, but without freedom to make a choice he could soon be in rehab"

Ajay Vir Jakhar

A day-long drive takes me from my village to Pushkar, Rajasthan, to attend the 36th National Convention of Bharat Krishak Samaj, where more than 500 farmers had converged from across India. The journey was through the heart of barren Rajasthan's undulating sand dunes, dotted with khejri (*Prosopis cineraria*) trees. Where ever they found ground water, farmers have planted jeera (*cumin*), saunf (*aniseed*) and isabgol (*psyllium husk*). The story that struck me though was that of a major constituent of the Bharat Krishak Samaj members: the opium

farmers of district Mandsour in Madhya-Pradesh; the region's opium belt.

Member Govind Ram is an opium farmer from the village of Kanghatti in tehsil Malhagarh of Mandsour. Govind's story is neither intoxicating nor pleasurable or sleep inducing. It is a sad tale of government apathy and restrictions, sans vision of any kind. The 42-year old Govind is a hard-working farmer, who was forced to quit school after class 12 to help his father in the field. He lives in a joint family with his two brothers. Govind has no children but the family bonding is strong. Together, the family owns 20 bighas of land, which is equal to 13 acres; 25 aris are equal to a bigha and 1.75 bighas is equal to an acre.

Opium poppy was cultivated in lower Mesopotamia in 3400BC by the Sumerians, who called it Hul Gil or the 'joy plant'. Mandsour is not Mesopotamia though and for the poppy farmers here it is a joyless existence. Since the British East India Company established a monopoly on the opium trade, all poppy growers in India were forbidden to sell opium to competing trading companies in around 1793. The policy and restrictions continue to this day with the government of India only permitting cultivation of opium in 10 aris of land.

If the yield from 10 aris is to the government satisfaction, the farmer may get permission to cultivate opium over a maximum of 15 aris. This means the individual farmer is permitted no more than an acre to grow opium on. Earlier, the government permitted even up to 50 aris. Today it is 15 aris. Period.

The land for sowing is prepared in November and the opium seed, saved from the previous year's crop, is used for sowing. The seed is treated with bawistin powder to make it less vulnerable to fungal disease. Sowing is done by hand, germination of

the crop is ready to be harvested. During harvesting alone, Govind needs to employ six people daily at Rs 500 per day for 20 days of back-breaking work to harvest opium from 10 aris. Incision is made in the poppy capsule in the afternoon to avoid dew, wind or rain as they can spoil the exudation. The next day the extruded latex is scrapped off with a knife and collected between 6 am and 11 am. Normally, one applies four to seven cuts per poppy plant over a period of 20 days. Growing opium is difficult but what follows is a nightmare.

The narcotics department appoints a village mukhiya or head to monitor the harvesting. The villagers have to take their harvested opium every day to the mukhiya, who weighs the goods and makes a note in the official register. At the end of the season, the opium needs to be delivered to the narcotics department at its camp called "afeem godam." At the camp, on the designated days, farmers come from adjoining villages to stand in lines to deposit their crop of opium in buckets to the narcotics department.

The payment, depending on the grade of opium, can vary from Rs 600 to Rs 2,500 per kg. The open market price of opium is Rs 25,000 per kg!

seeds is irregular and the farmer is forced to sow more seeds than required. Therefore, the farmer has to do thinning of the crop by removing some small plants that have grown in closer proximity to each other than required.

Removal of plants continues till winter arrives when plants need to be sprayed with M-45. Susceptible to multiple pests and disease, black spots called "Kali Massi" appear on the plants during extreme cold. Other applications like Redomil, Metalixin, Humicaminog and Aminus are constantly required at time of flowering and later.

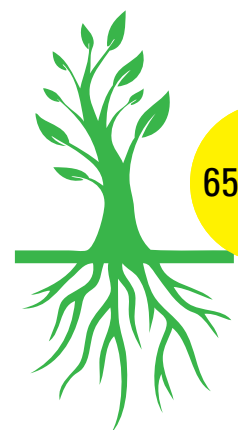
After the Gudgil Sagar Dam was built on river Retam, the water level has gone up making multi-cropping is possible. Before that Govind was dependent on the rainfall and would only grow one crop of soybean. Now he is able to grow opium and another crop in a year. Opium requires to be irrigated four to five times per cropping cycle. As the time for watering is important, many farmers are forced to water their fields with help of water tankers that cost Rs 500 per tanker trip. It takes five tankers to irrigate 10 aris of land each time.

Come last week of March and first week of April

A sample is taken from each farmer's bucket and sent to a far off laboratory for testing its purity and quality. Another sample is taken by the officials on site and, on manual testing, a presumed grade is given to the opium delivered by the farmer. Based on this grade the farmer is given an immediate payment. The problem is that the report from the laboratory may take up to six months. The final payment is calculated on the basis of the lab report.

If the report varies from that obtained under manual testing done on site, the farmer is forced to refund any amount that might be due owing to inferior quality. Farmers are correctly insisting that the delivered opium must be tested on site during delivery and the payment once given must be final. The farmer must not be left at the discretion of laboratory assistants and bureaucracy for six months to know the value of his produce.

The rate of payment, depending on the grade of opium, can vary from Rs 600 to Rs 2,500 per kg while the open market price of opium is between Rs 25,000 and Rs 30,000 per kg. Farmers are forced to grow less profitable crops because licenses to grow opium are not freely available. Farmers who





Someone, somewhere, should take a fresh look at the entire opium farming space to ensure that the farmers get a sustainable income

Rs 1,000 per kg. Farmers feel that the waste must also be bought by the government at a fair price.

The profit from growing opium even at prices designated by the government is more than what one might make while growing the alternate crop of soyabean. The government expects eight kgs per 10 aris from the farmer. That yields one quintal of chura dodha, which sells for Rs 10,000 per kg. Another by product is poppy seed paste – between one quintal and 1.5 quintal – that sells for Rs 40,000. The farmer can keep his seed for use or for sale without restriction. It might sound like a lot of money but this finicky crop is expensive to cultivate.

In 2011-12, there were 27,382 farmers who received “patta” or permission to cultivate opium in 873 villages. The yield was 4,78,412.205 kgs and the payment released was of Rs 57.47 crore. The narcotics department operates two processing plants at Neemuch and Ghazipur. It imports opium for processing for re-export. Govind and other farmers feel that the government should not import raw opium for processing but should allow Indian farmers to grow more opium. How can one disagree with the proposition? Then again the processing facilities are not state-of-the-art. These should definitely be upgraded to better process Indian quality opium.

Finally, someone, somewhere, should take a fresh look at the entire opium farming space to ensure that the farmers get a sustainable income. Or else, the opium farmer will have little option but to consume his own produce to deal with his misery. ●

choose to exercise their freedom to grow what they want are charge sheeted under the Narcotic Drugs and Psychotropic Substances Act, 1985. There are some 900 such farmers behind bars today.

There are even more uncertainties. If the weather is not conducive for a good crop, the yield and quality of opium drop and the narcotics department may choose not to renew the license of the farmer for the next season. The farmers are also asking for an increase in the price of opium to Rs 10,000 a kg.

The opium waste is called “chura dodha” that has to be sold off before the monsoons or else they are infested by a poisonous scorpion-like insect. The farmer, however, is not allowed to sell the waste in the open market but has to sell to government appointed licensees. The licensee is supposed to purchase the waste from the farmer at pre-designated prices of Rs 125 per kg in Rajasthan and Rs 100 in Madhya Pradesh. In reality, the farmer is sometimes forced to sell his produce at Rs 41 per kg. The licensee processes the waste to form a quality of dust that sells for up to



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