

## INDIA'S FARMING FAILURE

There must be something amiss in a country that is the world's second largest producer of food, behind Brazil, but has the largest number of people ravaged by hunger and starvation

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MUMBAI (April 10, 2011) -- India's failure in agriculture is coming under increased scrutiny as soaring food inflation ravages the common man and cripples household incomes.

Spiraling food bills were the focus of both the Union Budget and the Economic Survey this year. Dwelling at length on the farm dilemma in his Budget speech, Finance minister Pranab Mukherjee said: "The recent spurt in food prices was driven by increases in the prices of items like fruits and vegetables, milk, meat, poultry and fish, which account for more than 70 per cent of the wholesale price index (WPI) basket for primary food items."

The problem is as much of a shortfall as it is of supply and distribution bottlenecks. Simple arithmetic dictates that if two decades ago, an output of 176.39 million tonnes fed, or nearly did, a population of 849.75 million, the present numbers of 1.2 billion would need yields of at least 250 million tonnes. The 1.42 per cent CAGR – compounded annual growth rate - in foodgrains has trailed behind the 1.66 per cent CAGR of the population. Oilseeds have trundled along at 1.14 per cent, with pulses, the staple for a large cross-section of the population, actually dipping 0.23 per cent.

For four consecutive years from 2005-06 to 2008-09, foodgrain production registered a rising trend when a cycle of good monsoons over those years led to yields scaling a record 234.47 million tonnes in 2008-09. Long spells of drought in various parts of the country the following year diminished production to 218.19 million tonnes, but no one anticipated the decline to flare up food prices as they did.

With foodgrain production rising to 232.07 million tonnes in 2010-11, wheat is estimated to achieve record production (of 81.47 million tonnes), pulses (of 16.51 million tonnes) and cotton (of 33.93 million bales of 170 kg. each).

Mukherjee, however, acknowledged that despite improvement in the availability of most food items, consumers were denied the benefit of seasonal fall in prices normally seen in winter months. "There are shortcomings in distribution and marketing, which are getting accentuated by the growing demand for these food items with rising income levels," he observed. "The huge differences between wholesale and retail prices and between markets in different parts of the country are just not acceptable." He said these differences were at the expense of remunerative prices for farmers and competitive prices for consumers.

His concerns were justified. At one stage, vegetable prices soared by almost 60 per cent, and this in a country whose population of 1.2 billion is largely vegetarian proved grim indeed. People are vegetarian out of both choice and compulsion, vegetables traditionally selling cheaper than meats and poultry. While initially it was the onion's threefold price increase that hit the consumers, a tardy government response helped push up the cost of eggs, meat and fish by 21 per cent, and fruits and milk by nearly 20 per cent.

This was alarming, considering that foodgrain WPI had shown a single digit growth, largely below 5 per cent, throughout the last 13 years. Even the devastating famine of 2002-03, when foodgrain production plummeted to 174.2 million tonnes from 212 million the year before, had not hurt the consumer as much, as the government had then managed to control the food prices.

### A paradox of plenty amid debasing malnutrition

It is a vicious cocktail of a weak purchasing power that denies nutrition to the masses, and a systems failure in tackling supply side challenges. Per capita income in India is Rs44,345 (\$985), compared to China's \$6,700. So while the country ranks first in world milk production, at 108.5 million tonnes, per capita availability of milk is but 258 grams per day, in contrast to the world average of 265.

India is also the world's largest producer of cashew nuts, coconuts, tea, ginger, turmeric and black pepper, the second largest producer of wheat, rice, sugar, groundnut and inland fish, and the third largest producer of tobacco. It also has the largest cattle population, of 281 million, and accounts for a tenth of the world fruit production, while being the foremost producer of banana and sapota (*chiku*).

The situation is thus a paradox of plenty across a landscape of debasing malnutrition. What is worrisome is that increasing yields over the past many years, barring sporadic declines, are not rendering food progressively affordable. Many hence laughed off the finance minister's assertion that "agriculture development is central to our growth strategy".

Though India's economy has raced ahead at a frenetic 7.5 to 9.6 per cent, agricultural growth has foundered at 3 per cent, at times a little above that, often below, but largely short of the targeted 4 per cent. Signalling a "crisis of stagnation in agriculture", the Planning Commission had, in 2006, postulated putting agriculture on a growth path of 4 per cent for the on-going 11<sup>th</sup> Five Year Plan (2007-12). Urging for a 'new deal' that would kindle 'hope' for farming, the Commission had prescribed such growth to be attained through spurring demand for farm produce matched with the supply side response based on productivity improvements.

The Economic Survey notes that during the first three years of the 11<sup>th</sup> Plan, agriculture and allied sectors recorded an average



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Table 8.1 - Agriculture Sector: Key Indicators

S. No.	Item	2004-05	2009-10	2010-11 (Advance Estimates)
1	GDP--Share and Growth (at 2004-05 prices)		0.1	0.4
	Growth in GDP in agriculture & allied sectors		15.7	14.6
	Share in GDP--Agriculture and allied sectors		13.3	12.3
	Agriculture			

Table 8.4 - Agricultural Production 2010-11

Crops	3rd Advance Estimates 2010-11	Target 2010-11	Percentage of 2010-11 production to target set for 2010-11	2009-10 (Final estimates)	Percentage change in 2010-11 compared to 2009-10
Wheat	84.01	82.00	92.17	80.09	5.52
Wheat	81.47	82.00	99.35	80.80	10.80
Coarse Cereals	40.28	44.00	91.55	35.55	19.86
Pulses	16.51	16.50	99.99	14.86	12.02
Total Foodgrains	232.07	244.50	94.92	218.11	6.40
Oilseeds	27.95	33.00	84.69	24.86	12.84
Vegetables	336.70	315.00	106.89	292.30	15.19
Cotton*	33.93	26.00	130.50	24.22	40.09
Job-Worked**	10.08	11.50	87.65	11.82	-14.72

Notes : \*million bales of 170 kg each \*\*million bales of 180 kg each

Table 8.7 : Production of Urea, DAP and Complex Fertilizers

Year	2006-07	2007-08	2008-09	2009-10	2010-11*
Urea	203.10	198.60	199.20	211.12	215.37
DAP	48.52	42.12	29.93	42.46	39.58
Complex fertilizers	74.64	58.50	68.48	80.38	91.66

Note: \*Estimated

Table 8.8 : Import of Urea, DAP and MOP

	Urea	DAP	MOP
2006-07	47.18	28.76	34.48
2007-08	69.28	29.90	44.20
2008-09	56.67	61.91	56.72
2009-10	52.09	58.89	52.86
2010-2011*	45.83	68.12	47.84

Note : \*(April-November 2010).  
 DAP : di-ammonium phosphate  
 MOP : muriate of potash.

2.03 per cent growth. While this growth in the first year, 2007-08, was an impressive 5.8 per cent, it was negative the following two years. It registered -0.1 per cent in 2008-09, though this was a year of a record harvest.

This decline has been attributed primarily to dwindling production of such crops as sugarcane, oilseeds, cotton, jute and *mesta* (raw material for jute production). In 2009-10, despite experiencing the worst south-west monsoon since 1972 and a subsequent fall in *kharif* foodgrain production (the autumn harvest, also known as the summer or monsoon crop), growth marginally recovered to 0.4 per cent mainly due to a good *rabi* crop (spring harvest, also known as the 'winter crop').

"Things are looking bright in the current year with a relatively good monsoon and the agriculture sector is expected to grow 5.4 per cent as per the 2010-11 advance estimates," said the Economic Survey. The 4 per cent targeted growth across the 11<sup>th</sup> Plan would nevertheless be unattainable, as it would require to grow by 8.5 per cent during 2011-12 to surmount the average growth of 2.87 per cent in the previous four years of the Plan.

Sure, it is an arduous task to expand the bread basket in a manner commensurate with the surge in numbers. But it is disturbing that despite emerging from the disgrace of food scarcity to an era of self-sufficiency and surpluses, India has around the same proportion – 24 per cent – of undernourished people as it did two decades ago.

In an unprecedented intervention last year, the Supreme Court had directed the government to release decaying wheat stocks for the hungry rather than have them rot completely. Contesting the ruling, Prime Minister Manmohan Singh contended that to implement it would hurt the interests of the farmers by denying them remuneration for their produce.

Poor handling of produce causes phenomenal post-harvest losses – of 10 per cent in foodgrains and 40 per cent in fruits and vegetables – distancing gross production from net availability to the consumer. "The fact that calorie deprivation is increasing when the rural BPL – below poverty line - population is claimed to be declining rapidly, highlights the increasing disconnect between official poverty estimates and calorie deprivation," says a recent report of the UN's World Food Programme.

The Prime Minister has urged for reforms to strengthen the public distribution system (PDS) to prevent any diversion of foodgrains and to curb errors in identifying BPL and AAY – *antyodaya anna yojana* - families. *Antyodaya anna yojana*, which literally means 'food programme for the last man in the queue', is a subsidised food supply scheme for the poorest of the poor who constitute about 15 per cent of the BPL population, itself estimated at 37.2 per cent of India's overall population.

The question that this malaise compels is: *Has India's Agriculture failed its people?*

Despite its sheen of a rampaging economy, India is a predominantly agrarian country. As one of the world's largest agrarian economies, India's farm sector accounts for 14.6 per cent of the GDP and contributes 10.6 per cent of total exports. Notwithstanding the fact that its share in GDP has been declining over the years – from 29.76 per cent in 1993-94 to 1995-96 and 23.15 per cent in 2001-02 to 2002-03 to 19 per cent in 2004-05 and to 15.7 per cent in 2008-09 - its role remains critical as it provides livelihood to 58 per cent of the workforce.

#### **Agriculture minister roused high expectations**

Whereas overall GDP has grown by an average of 8.62 per cent during 2004-05 to 2010-11, agricultural sector GDP has risen by only 3.46 per cent during the same period. Apart from the enormous employment it generates, the farm sector is a supplier of food, fodder and raw materials for a vast segment of industry. Its growth is hence vital for 'inclusive growth'. This is more so because the rural sector (including agriculture) is being increasingly seen as a potential source of domestic demand, a recognition that is even shaping the marketing strategies of entrepreneurs wishing to widen the demand for goods and services.

Considering the cross-section of the public that it touches and the influence it wields on the economy at large, India's Agriculture ministry has a pivotal role to play.

Hence, Sharad Pawar's nomination as the Agriculture minister in May 2004 had roused high expectations for the country's listing farm sector.

Here was an unalloyed son of the soil who was lionised for championing the cause of the farmers' cooperative movement in the industrialised state of Maharashtra, in western India, and for his keen understanding of the tillers' problems. That apart, his wide-ranging involvement with the farm sector included his founding of the Agriculture Development Trust in his pocket borough of Baramati, near Pune, and his lifetime chairmanship of the Vasantdada Sugar Institute, also near Pune.

Pawar has served in the past as Defence minister before assuming the portfolio of Agriculture & Consumer Affairs, Food & Public Distribution.

Having reigned over this ministry for the first full five-year term of the UPA government, he retained the portfolio when the Congress-led alliance was re-elected to power in May 2009. Thereafter he approached the Prime Minister twice with the request to "reduce (his) burden". Thus, in the Cabinet reshuffle of 19 January, he was divested of his responsibility over Consumer Affairs, Food & Public Distribution.

However, just months earlier, Pawar had endorsed his ministerial role to this writer during an interview at his *Krishi Bhavan* office in New Delhi. He clarified that his federal – or Union or Central, as it is termed in India - ministry's role was that of a facilitator and regulator, as Agriculture is a State subject and hence the responsibility of the State governments. His ministry enunciated approaches, formulated demands, set targets, provided guidance, developed agricultural industries, including machinery, fertilisers and seeds, and conducted research. Nevertheless, he said, the Central government was assisting the States by formulating schemes and programmes to meet national food security and to generate livelihood for millions of farmers.

Among his achievements that he listed were flagship schemes like the *Rashtriya Krishi Vikas Yojana* (RKVY, the National Agriculture Development Programme) and the National Food Security Mission (NFSM) that were launched to stimulate investment in the sector and to enhance production and productivity. He added that missions for horticulture, bamboo, and micro-irrigation too have been launched.

Budgetary allocation to RKVY has been increased from Rs6,755 crore (\$1.5 billion) in 2010-11 to Rs7,860 crore (\$1.7 billion) in 2011-12.

"We had record foodgrain production in 2008-09," he pointed out. "Notwithstanding the severe drought of 2009, where there was 23 per cent rainfall deficiency, agriculture and allied sector GDP rose 0.2 per cent in 2009-10." To make farming remunerative on a sustainable basis, his ministry had hiked the Minimum Support Prices (MSPs) of major cereals from 49 to 78 per cent and of pulses and oilseeds, to 83 per cent over the last five years.

As regards the menacing price spiral, Pawar deemed it a global phenomenon and hardly unique to India. "India's robust economic growth is driving demand for foodgrains, while the cost of cultivation and production is also going up," he said. "As in the case of pulses, rising international prices too have contributed to the price spiral." Surging feed and fodder costs have raised milk prices, whereas increased MSPs and rising demand have pushed up prices of rice and wheat. There were also production losses in the case of rice due to the poor monsoon the year before, he added.

Steps were being taken, he indicated, to safeguard vulnerable sections as with the issue price of foodgrains from the Central pool that has been kept constant since 2004, despite higher costs of production and procurement. Additional allocations were also being made through the public distribution system to provide relief to the poor.

#### **Food distribution system riddled with infirmities**

Ravi Shankar Prasad, a legal luminary who is also general secretary of the opposition Bharatiya Janata Party (BJP), says farming is in a quandary because of mismanagement of the food economy by not only the Agriculture minister, but also the Prime Minister, who is an acknowledged economist. "How is it that a food economy of surplus under our previous BJP-led National Democratic Alliance (NDA) government is converted now into a food economy of scarcity?" he asks. "The present government stands for the middleman, thereby shortchanging the farmers and taxing the consumers."

Devinder Sharma, chairman of New Delhi's Forum for Biotechnology and Food Security, deems it "quite natural" to weigh the performance of Pawar, especially when agriculture is passing through a turbulent period. But he too feels Pawar is not alone to be blamed. "The government as a whole is responsible for turning a blind eye to the paradox of plenty -- food rotting in storage while millions go to bed hungry," he says. "Manmohan Singh's rebuff to the Supreme Court only shows how indifferent the political leadership is to ground realities."

Agriculture secretary Prabeer Kumar Basu says that as a country, India has done well in agriculture. "A record production of wheat was attained last year, despite rainfall deficiency across 334 of the country's 604 districts," he notes. He nonetheless acknowledges a gap of 2 to 3 million tonnes in pulses, which are a staple for the poor. Only 65.55 million tonnes of pulses are projected to be realised of the 76 million tonnes targeted under the 11th Plan (2007-12).

Basu maintains that as an administrator, he would concentrate on distribution as this problem was critical. "This of course calls for enormous investments, but nowhere in the world does the government set up a distribution network on its own," he asserts. "At the same time, nowhere in the world does a government operate a public distribution system (PDS) on such an extensive scale as ours."

With reference to leakage from the PDS, Pawar explains that his ministry's responsibility extends to transporting foodgrains upto the district headquarters. "From then on, the onus is on the respective State governments to reach out to targeted households through the fair price shops," he mentions. "While the Centre handles the procurement, storage, transportation and bulk allocation of foodgrains, the States distribute them through networks of fair price shops to families below poverty line that they need to identify and issue BPL cards to." State governments are also responsible for issuing ration cards, weeding out ghost ration cards, supervising and monitoring the functioning of these shops, and prosecuting the errant.

One wonders what would have happened if the Green Revolution of half a century ago had not taken place.

Launched to improve productivity and benefit farmers, this landmark initiative synergised technology, services, public policy and farmers' entrepreneurship. The strategy intensified cropping methodologies and agro-scientists contributed by developing high yielding varieties and hybrids.

Irrigation outlays increased and farmers were given credit to invest in irrigation systems like tube-wells. This led to a breakthrough in the productivity and production of rice and wheat through the '70s and '80s, and India became self-sufficient in foodgrains. It was at this time that the scheme of minimum support prices was introduced to ensure a baseline guaranteed income for the farmers.

This integrated programme has made India the world's fifth largest edible oil economy. Last year's turnover of vegetable oils was \$18 billion (Rs81,000 crore) and export and import of oilseeds, oils and related products were worth \$6.6 billion (Rs29,700 crore). But though the area under oilseeds has increased from 19 million hectares (mha) (47.5 million acres) in 1986 to 27 mha (67.5 million acres) to date and production from 10.83 million to 28.2 million tonnes, with average productivity of oilseed crops almost doubling from 570 to 1,000 kg per hectare (2.5 acres), India's productivity levels are still only half the world average and a third of the world's best.

Since 2000-01, production of oilseeds grew 4.7 per cent per annum, but edible oil consumption increased at 6.5 per cent. "Oilseed productivity is lower than the global average owing to poor quality seeds, low access to inputs, poor farming practices and the fact that much of India's oilseed crop is cultivated in unirrigated areas," explains Rabo India analyst Pawan Kumar.

Pawar falsifies the assumption that farm yields are universally very low despite the many agriculture universities and research centres. "In fact, yields for wheat, rice, fruits and vegetables in several States are comparable to the best in the world," he says. "However, since a large part of the country is still rainfed, average yields in many crops tend to be lower."

#### **High arable area, low yields**

India's original Green Revolution has now lost its colour and its second *avatar* has yet to materialise.

As production and inventories grew under that programme, complacency set in. Government investments in the farm sector declined steadily through the next two decades. Yields and production stagnated and foodgrain production grew at less than one per cent on an annualised basis over the last decade.

Almost half – 159 million hectares (mha), or 397 million acres - of India's territorial area of 328 mha (820 million acres) is arable, the largest after the United States' 167 mha (417.5 million acres). But while 48.5 per cent of India's land is cultivable, in the U.S. it is only 18.2 per cent, in China, 16.13 per cent, and Brazil, 7.82 per cent. Yet, the yield of paddy in India is just 3,303 kg per hectare (2.5 acres) compared to China's 6,422 kg, Brazil's 3,826 and the world average of 4,233 kg. India's wheat yields are better, being 2,704 kg compared with Canada's 2,322 kg, the US's 2,705 kg and the world's 2,829 kg. In sugarcane, Indian yields are 72,555 kg per hectare, while those in Egypt are 119,557 kg, Guatemala, 88,630 kg and globally, 69,998 kg.

Value addition to raw food material in India is a measly seven per cent, in contrast to 23, 45 and 188 per cent in China, the Philippines and the U.K. respectively. India processes less than two per cent of fruits and vegetables as compared to 30 per cent in Thailand and 80 per cent in Malaysia.

Terming India's food situation as 'real bad', Dr. Lux Lakshmanan, Director of the Agriculture Consulting Service, of Davis, California, regrets it is unlikely to improve in the foreseeable future. A consultant in crop production to California farmers, Lakshmanan has set up a centre in Chennai in south India where educated youth are trained to become agriculture entrepreneurs who will use modern crop production technologies and tools.

India's agriculture will need to evolve in a manner that meets the requirements of the officially projected population boom, to 1.33 billion by 2020 and to 1.4 billion by 2026. But there is no silver bullet, no single solution for the problem. At the same time, it is clear that the country cannot continue to be beset with low productivity and growth.

Indian farmers are vulnerable because of two primary factors. One relates to their small holdings that tie them in a low income trap, restraining any credible investment of their income or surplus in land productivity. Secondly, 60 per cent of agriculture is still dependent on the rains; if the rains fail or there are unfavourable variations in rain or other climatic factors, then crops suffer.

Though irrigation is critical to sustaining food security, it has not fared too well. Only 35.8 per cent of India's cropland is irrigated,

the balance relying on rain. Though the Rs90,000 crore (about \$20 billion) outlay on irrigation under the 10<sup>th</sup> Plan (2002-07) was used up, the potential created was only half of the proposed 16 million has (40 million acres). The same target has been set for the 11<sup>th</sup> Plan and Rs116,480.895 crore (\$25.9 billion) apportioned, but even the most optimistic appraisals anticipate no more than 12 million has (30 million acres) being added.

There is a strong lobby for increasing the application of chemical fertilisers for raising crop yields, India already being only the third - behind China and the US - in fertiliser production and consumption. Per hectare consumption of fertilisers in nutrient terms has increased from 105.5 kg in 2005-06 to 128.6 kg at present.

There is the view that 'exploitative agriculture' – one that uses maximum chemical pesticides and mineral fertilisers - offers little chance for conservation farming that lays stress on the sustainable management of soil and water and involves soil health enhancement. "While the need to maximise crop yields to meet the growing demand for foodgrains is critical, we have to sustain agricultural productivity in the long run," the Union budget notes. "To address these issues, the government proposes to promote organic farming methods, combining modern technology with traditional farming practices like green manuring, biological pest control and weed management."

A balanced approach is thus crucial to sustain yields.

#### **Government initiatives for a turnaround**

In pursuit of the call for a 'Second Green Revolution', the government has a four-pronged strategy targeting 4 per cent growth by augmenting production, reducing wastage of produce, expanding credit support to farmers and boosting the food processing sector.

The first element of the strategy is geared towards invigorating the relatively neglected farm sector in eastern India through Rs400 crore (\$88.9 million) worth of funding for the region.

A further Rs300 crore (\$66.7 million) has been provided to organise 60,000 "pulses and oilseed villages" in rainfed areas and for water harvesting, watershed management and soil health to enhance the productivity of dry land farming areas. Claiming that an equivalent allocation last year has already paid rich dividends, the government expects a record production of 16.5 million tonnes of pulses this year as against 14.7 million tonnes last year.

The third element of the strategy relates to improving farm credit availability by raising agriculture credit target for banks to Rs475,000 crore (\$105.6 billion) for 2011-12. Apart from the seven per cent interest subvention scheme of providing short term crop loans to farmers, an additional subvention of 3 per cent has been proposed for 2011-12.

The fourth element of the strategy, which seeks to stimulate the food processing sector by providing streamlined infrastructure, proposes 15 more mega food park projects in addition to the 15 already set up and 131 cold storage projects with a combined capacity of 640,000 tonnes.

For improving the productivity and market linkage of vegetables, Rs300 crore (\$66.7 million) has been granted for establishing an efficient supply chain to provide quality vegetables at competitive prices.

For long has the country borne the burden of hunger and malnutrition, concedes the Finance minister. The National Food Security Bill that the country is close to enacting will entitle upto 70 per cent of the population to subsidised foodgrains. At present, each of the 65.2 million families identified as below poverty line is provided 35 kg of foodgrains through ration shops. Wheat is provided at Rs4.15 per kg and rice, at Rs5.65. The proposed legislation now fixes the quantum at 25 kg of foodgrains per month, but at a reduced cost: to Rs2 per kg for wheat and Rs3 a kg for rice. This massive effort will require about 60 million tonnes of foodgrains.

These are credible steps towards food security for the people of India. The government will need to have the will to see them through.

#### **Notes:**

- Figures calculated at the exchange rate of Rs45 = US\$1
- Yearwise mention is as per the Indian fiscal calendar of 1 April to 31 March
- One hectare = 2.5 acres
- One crore = 10 million.

#### **Source notes:**

1. Union Budget 2011-12, presented in Parliament on 28 February 2011
2. Economic Survey 2010-11, presented in Parliament on 27 February 2011
3. Budget speech by Finance minister Pranab Mukherjee while presenting Union Budget 2011-12
4. Second advance estimates released by the Ministry of Agriculture on 9 February 2011
5. Interview with Agriculture Minister Sharad Pawar, New Delhi, September 2010
6. Interview with Agriculture Secretary Prabeer Kumar Basu, New Delhi, September 2010
7. Interview with Alka Sirohi, Secretary, Dept of Food and Public Distribution, Ministry of Consumer Affairs, Food & Public Distribution (since changed), New Delhi, September 2010
8. Interview with Siraj Hussain, Chairman and Managing Director, Food Corporation of India (FCI), New Delhi, September 2010
9. Interview with B.B. Pattanaik, Managing Director, Central Warehousing Corporation (A government of India Undertaking), New Delhi, September 2010
10. Interview with Dr S. Ayyappan, Secretary to the Government of India & Director General, Indian Council of Agricultural Research (ICAR), Department of Agricultural Research and Education & Indian Council of Agricultural Research, Ministry of Agriculture, New Delhi, September 2010
11. Interview with Rajiv Mehrishi, Additional Secretary, Department of Agricultural Research and Education (DARE) & Secretary, Indian Council of Agricultural Research (ICAR), Department of Agricultural Research and Education (DARE), Ministry of Agriculture, New Delhi, September 2010
12. Telephone interview with Ravi Shankar Prasad, senior lawyer in the Supreme Court and general secretary of Bharatiya Janata Party (BJP), New Delhi, September 2010
13. E-mail interview with Devinder Sharma, chairman of Forum for Biotechnology and Food Security, New Delhi, September 2010
14. E-mailed quote from Rabobank India Agricommodity analyst Pawan Kumar.
15. E-mailed interview with Dr. Lux Lakshmanan, Director of the Agriculture Consulting Service, of Davis, California.