Perspective: Well Above the Danger Levels

From Jungle Raj to Jungle Raj?

FARMERS' FORUM

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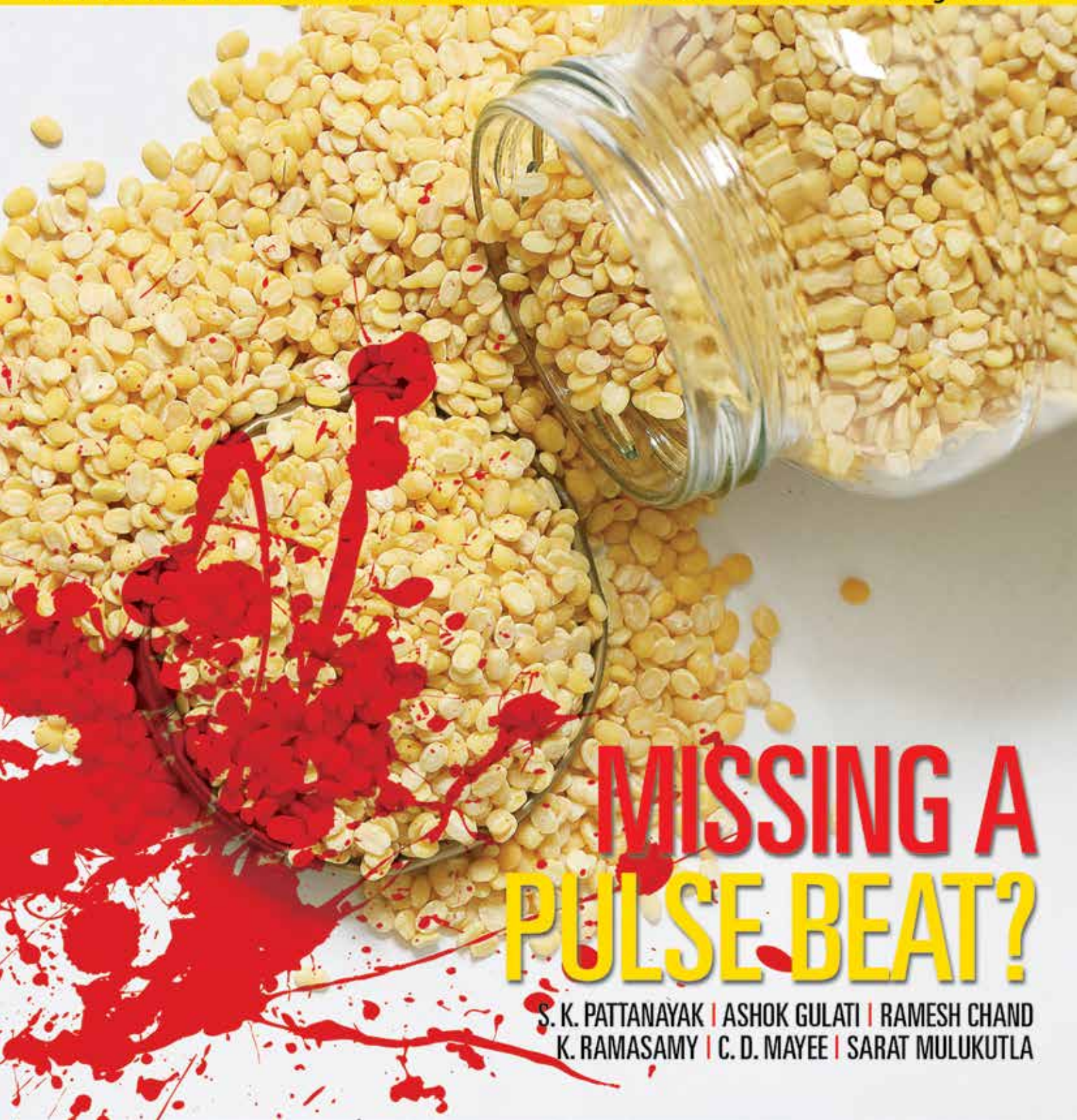
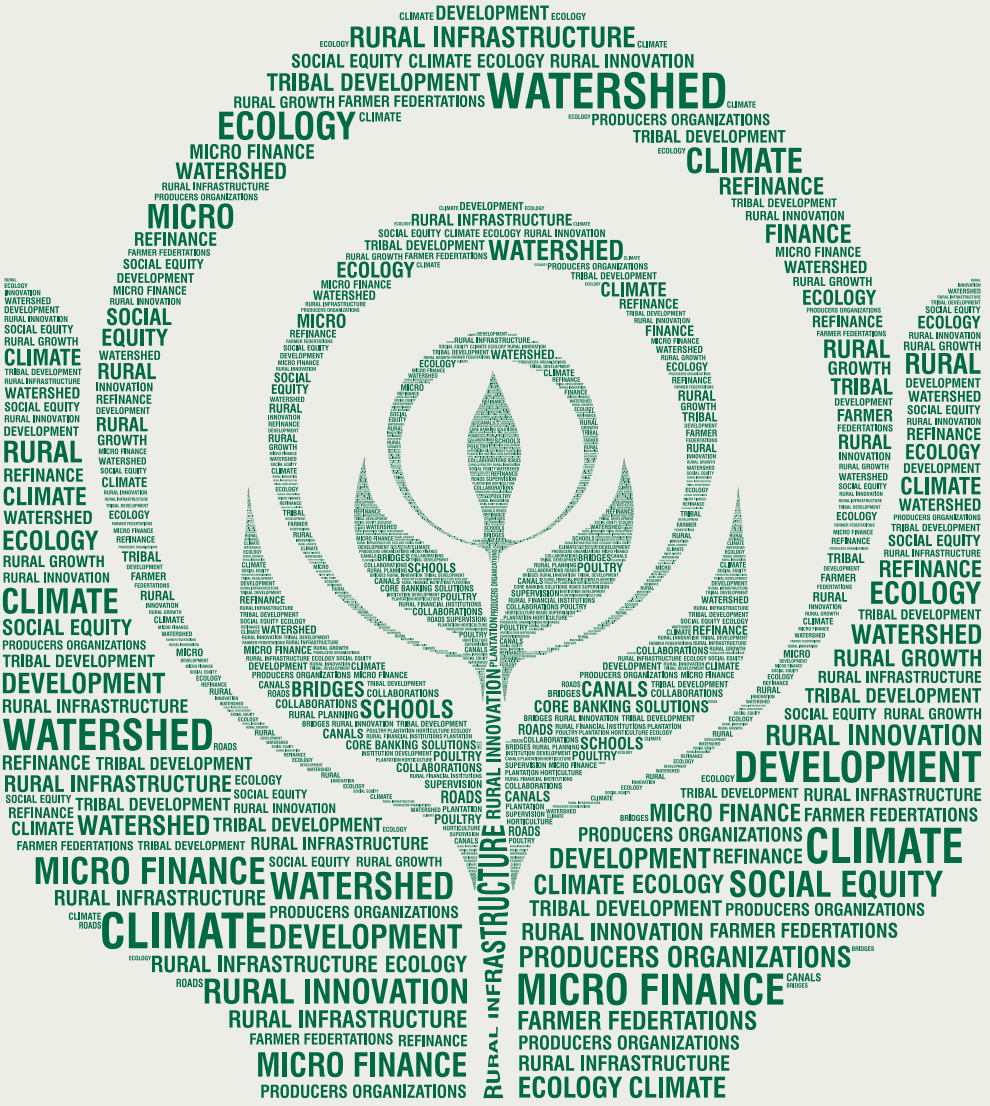
Issues and Ideas for Indian Agriculture



MISSING A PULSE BEAT?

S. K. PATTANAYAK | ASHOK GULATI | RAMESH CHAND
K. RAMASAMY | C. D. MAYEE | SARAT MULUKUTLA



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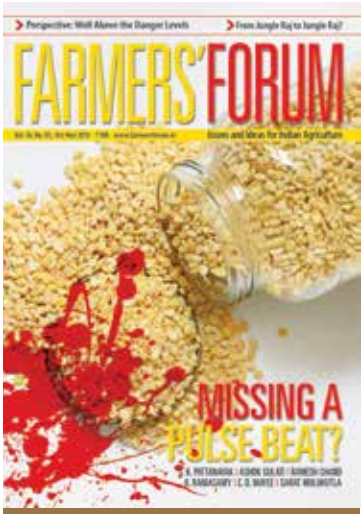

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Squinted Lenses for Cost: Benefit Analysis

The Pune Metro could cost a whopping ₹15,000 crore. Touting it as an achievement are economists and policy makers, making one wonder if development economics taught in top academic institutions are totally divorced from the grassroots that, in India's case, lies in the rural countryside. Where is the rural logic in development planning is what one may legitimately ask. Is there no inclusive growth matrix against which major investments ought to be measured? Should the large populace in the countryside be accused of being churlish if it does not jump to assess the many benefits of the Pune Metro but wonder, instead, what a similar quantum of resources could deliver to the farm sector and India's prosperity or, for that matter, what is happening to the allocated sums for the farm sector?

Even as crops like maize and moong are being harvested, most crops are selling below MSP and the government is conveniently looking the other way. For crops like paddy, procurement at MSP is only happening in limited regions. When objectives get manipulated, lofty promises of doubling farm income or job creation become impossible to deliver. Subsequent frustration can only force the current Indian leadership to dole out populist promises as done by past UPA regimes.

A primary reason, amongst the many, for farmer debt is individual ownership of farm equipment. Around 80 per cent of the farmers are too small to make optimum use of machinery. The annual interest servicing cost and loan repayment instalment is more than the annual farmer income. If farm machinery hiring services were made available to farmers, the gain would be manifold. The capital cost on equipment would be lower by 80 per cent; productivity would increase by 20 per cent on account of better machinery without any corresponding increase in input; and seed quantity used per acre would be lower. These gains cannot be overestimated and one is not even looking at the political windfall!

WITHOUT STAKEHOLDER PARTICIPATION, POLICY OBJECTIVES GET LOST AS THE FINE PRINT IS DEVIOUSLY TWEAKED TO BENEFIT PRIVATE COMPANIES

Bharat Krishak Samaj has advocated for farm machinery custom hiring centres for over five years — and effectively so — because the central government started the 'Sub-Mission on Agricultural Mechanization' programme. Different states have modified it and a subsidy of up to 75 per cent (centre and state component) is available to those who start farm machinery service hiring centres. A ₹25 lakh subsidy to each centre would help start 60,000 custom hiring centres; one for every 10 villages across

RATHER THAN CONTROL THE PROBLEM OF RURAL POVERTY, POLICY MAKERS ARE WASTING MONEY TO STEM THE CONSEQUENCES

India. In this era of jobless growth, apart from enormous savings on the farm, the investment would create 60,000 rural start ups with entrepreneurs offering farm machinery on hire employing over half a million operators and mechanics.

Without stakeholder participation, policy objectives get lost as the fine print is deviously tweaked to benefit private companies. The original policy allowed one centre for one individual but states have removed the clause and tractor/farm machinery manufacturers (including multinational corporations) have signed deals with state governments to open hundreds of centres whereby they get up to 75 per cent subsidy on retail value (unbelievably set by themselves) for their own equipment. This practically translates to the 'service centre' being fully funded by public money. It is blasphemy, to say the least; unethically allowing machinery manufacturing companies to set such centres with public money. Meanwhile states are opening government-owned centres, where utilization is less than 10 per cent, which must stop forthwith.

Returning to the Pune Metro, one crucial reason why the Metro is required is that farming is unviable and farmers are migrating to cities in hordes and city infrastructure keeps falling short. Alternative investments in rural areas that generate prosperity and jobs are the best way to keep cities smart. Rather than control the problem of rural poverty, policy makers are wasting money to stem the consequences. ●

Ajay Vir Jakhar
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To the Editor

Kudos for the six committed years

Sir, I would like to congratulate the team of *Farmers' Forum* on the magazine completing six years of committed service to the farmers' cause and for lending them a voice while also getting people of significance to participate in these pages. The magazine has become a compulsory read for those interested in the farm sector. I wish it continued success.

Kuldeep Atree
Gurgaon, Haryana

Why policies fail

Apropos of your editorial "Double or Quits" (*Farmers' Forum* August-September 2016), you hit the nail on the head when you said that "policies primarily fail to deliver because of flawed design, the proposed beneficiaries – the farmer – and those who are to actually implement the programmes, like patwaris, block development officers and such other members of the administrative system, are not taken into confidence at the drawing board stage". If we fail to get the basics right how can we expect results?

Vineet Kumar
Dehradun, Uttarakhand

State of the matter

Sir, Ramesh Chand's, Five-point Focus to Double Farmer Incomes, Cover Story, (*Farmers' Forum*, August-September 2016) talks of the absolute income picture and shows that 53 per cent of the farmers cannot keep themselves above the poverty line based on their farming incomes. The question is whether the five-point road to poverty alleviation that he suggests will actually lead the farmer to prosperity. Except for a few, clearly the states do not seem "to be showing proactive interest in doubling the farmer's income and the Ministry of Agriculture needs to do something about this on a mission mode basis and sensitize and persuade the states", he says. It is time that the government seriously gets the states on board.

Puneet Jain
Patna, Bihar

Getting states on board

Your Green Fingers column, "Cotton Growers: Case of the Missing Government" (*Farmers' Forum* August-September 2016) clearly shows what ails Indian farmers: "agriculture is a state subject but policy is made by the central government, to be implemented by many a badly governed state". The farmers have to face the brunt of this misalignment.

Lalit Bhatt
New Delhi

Farmers' Forum website www.farmersforum.in is now up and running. Log in to check out all the earlier issues.

Integrated farming

Apropos of the Union Minister of Agriculture and Farmers Welfare, Radha Mohan Singh's column under Thought Leadership (*Farmers' Forum*, August-September, 2016), one is happy that farmers are leaning towards integrated farming. The minister says that a family of five living on a hectare of land can save around ₹4 lakhs a year and the practice has enabled thousands of families. "The Krishi Vigyan Kendra and other institutions are being funded at the state level and farmers are being encouraged to adopt integrated practices" so that the family can engage in cereal production along with other horticulture activity even on a couple of acres. The government must publicize this initiative and place its results in the public domain, while addressing emergent problems to ensure that it does not fall by the wayside.

Pramode Kant
Meerut, Uttar Pradesh

COVER STORY

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Getting a Feel of the Farmer's Pulse

A *Farmers' Forum* Analysis

Minimum support prices have been announced by the government in June 2016; ₹5,250, including a bonus for pulses. What should have been a comforting thought for farmers has suddenly collapsed into a calamitous one. Well into September, most state governments had not started purchases at the minimum support price (MSP). "Farmers like me and others, who cultivated 19 lakh hectares of pulses are faced with a situation of prices having crashed to around ₹3,800. If this continues for moong – the crop currently arriving – the price could even fall to around ₹3,200", said the Chairman, Bharat Krishak Samaj, Ajay Vir Jakhar, flagging off a discussion on 'Pulses in India' in New Delhi on September 14, 2016, at the India International Centre Annexe.

Yet pulses are at the centre of the government's attention as far as Indian agricultural produce is concerned. Announcing the MSP for kharif crops (2016-17), the government release said: "To incentivize cultivation of pulses and oilseeds, the Cabinet has decided to give a bonus, over and above the recommendations of the CACP". The bonus was in the region of ₹425 per quintal for kharif pulses: arhar (tur), urad and moong, a bonus of ₹200 per quintal for sesamum.

"There is an increasing gap between the demand and domestic supply of pulses and oilseeds and reliance on import is increasing. Government has, therefore, announced this bonus on pulses and oilseeds to give a strong price signal to farmers to increase acreage and invest for increase in productivity of these crops. The increase in cultivation of leguminous pulses and oilseeds will also have additional environmental benefits", the government said. These crops consume less water and help in soil nitrogen fixation!

How far off target is the government's vision from the reality on the ground? The math is simple: "If one takes an average yield of three quintals per acre, at ₹2,000, the earning is ₹6,000 per acre. Calculated in terms of a small holder (five acres), it represents a loss of ₹30,000 per small holder farmer", explained the Bharat Krishak Samaj (BKS) chairman.

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What should have been a comforting time for pulses farmers has collapsed into a calamitous one

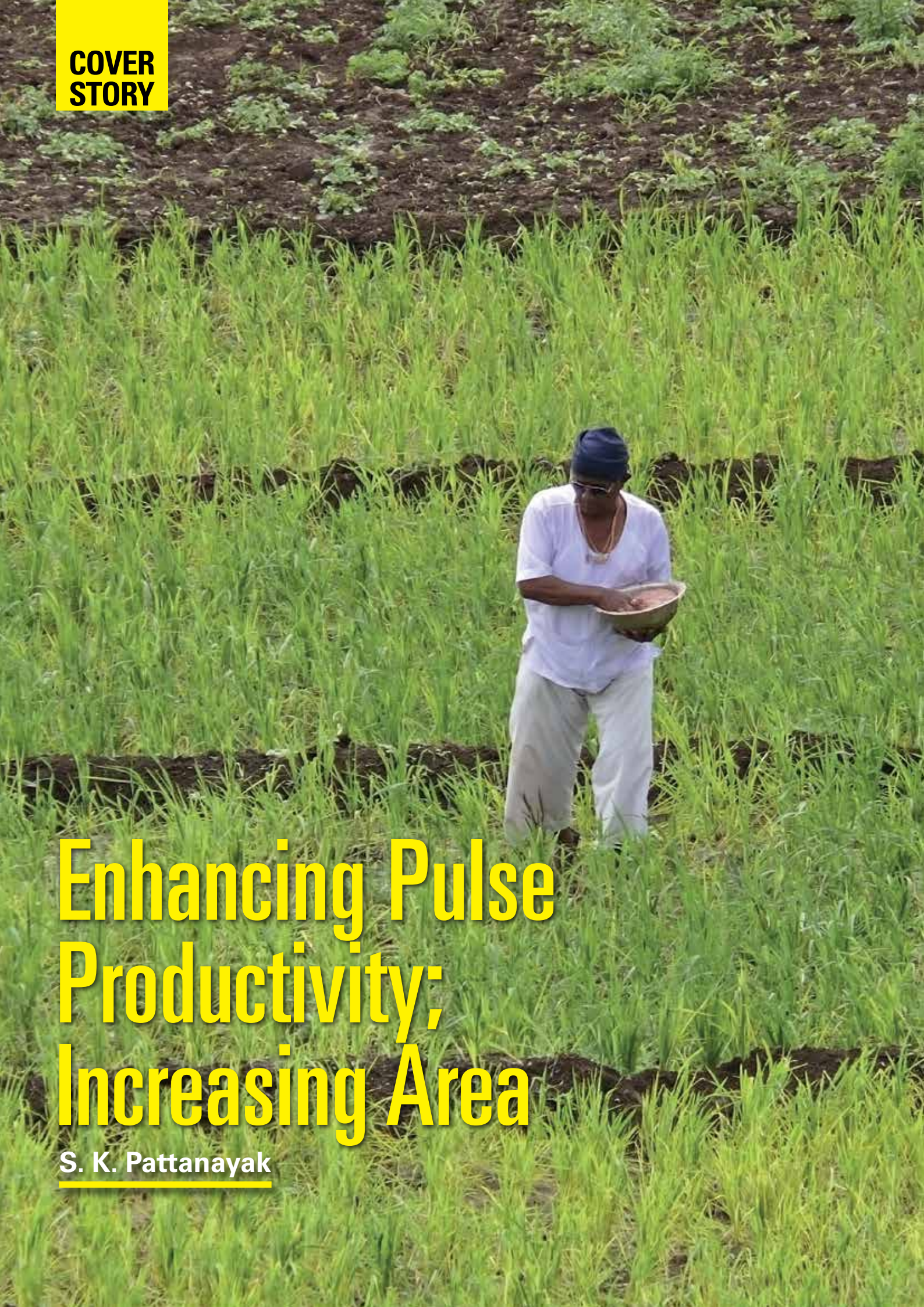
Yet the government is focused on increasing yields amidst misconceptions that any loss is a presumptive one, as was said during the UPA regime! Even if farmers are making a "presumptive loss" over 19 lakh ha with ₹2,000 per quintal (below MSP), the loss is around ₹3,000 crore only on account of moong, for one sowing season. Clearly, a better understanding of ground realities is needed. The BKS seminar was all about bridging that information gap.

"Farmers look to the government to keep its promises and it is important that the state and central governments are pressurized or cajoled to

act collectively on the matter of keeping promises on MSP", Ajay Vir Jakhar said, introducing the high-powered panel to discuss the state of pulses in the country.

The panel included, the Secretary, Ministry of Agriculture and Farmers Welfare, S. K. Pattanayak; Ashok Gulati, Infosys Chair Professor for Agriculture, Indian Council for Research on International Economic Relations (ICRIER); Ramesh Chand, Member, Niti Aayog; K. Ramasamy, Vice Chancellor, Tamil Nadu Agricultural University; C. D. Mayee, former Chairman, Agricultural Scientists Recruitment Board of the Indian Council of Agricultural Research, Sarat Mulukutla, Chief – Commercial Segment for National Commodity & Derivatives Exchange Limited and Amit Bansal, Zonal Head (North), Star Agriwarehousing and Collateral Management Limited, who explained the storage issues specific to pulses, given that storage is critical with the government's plans to build a buffer stock of two million tonnes of procured pulses; Sreedhar Nandam, Vice-President, National Collateral Management Services Ltd to focus on post-production issues vis-à-vis pulses that lead to spike in prices; and K. C. Tyagi, Member of Parliament, Rajya Sabha. ●

COVER STORY



Enhancing Pulse Productivity; Increasing Area

S. K. Pattanayak

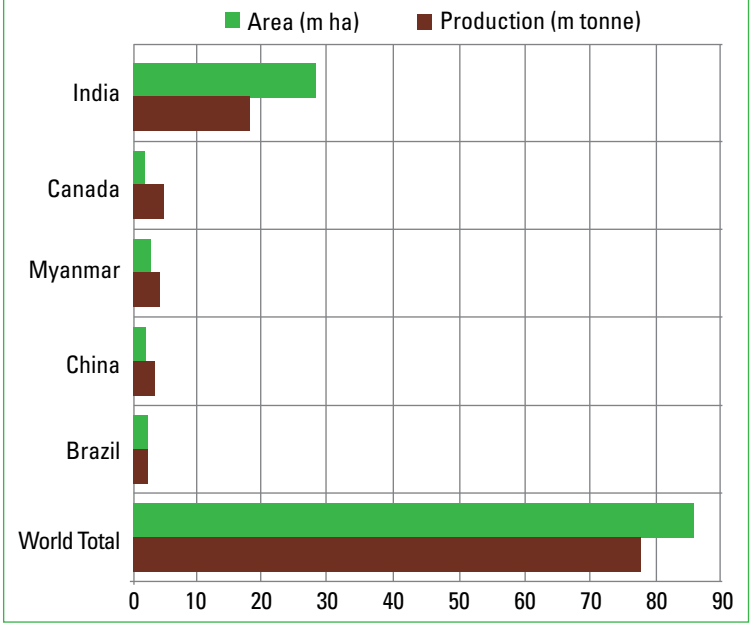
S. K. PATTANAYAK
Secretary, Ministry of Agriculture and Farmers Welfare

It is important to get a perspective on all that the government is doing for pulses that are very important from nutritional, economic and ecological perspectives. Pulses are a critical component in India's food basket, especially for the poor man, for whom it is the only source of plant protein. When the price of pulses reaches ₹200 a kg, he is deprived of the protein content in his food and gets malnourished. This situation must be avoided at all costs.

The nourishment aspect apart, pulse fixes nitrogen to enhance soil fertility. It is good for the planet because it consumes very little water; it grows in drought-prone areas and under diffi-cult conditions, being a hardy plant. It is good for the small holder farmer because the input costs are lower, thereby reducing risks. It also has other health benefits in that pulses help address obesity and diabetes.

India is the world's largest producer (17-19 million tonnes); the largest consumer (21-23 million tonnes); and the largest importer of pulses (3-5 million tonnes). This places the country in a peculiar position with many debates on whether or not India should become self-sufficient in pulses. The government's current initiatives are about bridging the demand-supply gap, given that there has been a decline in pulse production in recent times. (see *Chart 1*)

Chart 1: Pulses scenario – World and India



India contribute 24.8 % of world pulses production (FAO 2014)

The government included pulses in the National Food Security Mission (NFSM) in 2007-08 and has focused on increasing the pulses output over the years. The target was to produce an additional four million tonnes of pulses and this involved extending the NFSM to 638 (almost all) districts of India. The debate is over whether pulses should be grown everywhere or be restricted to the seven or eight states where they grow well. Should India concentrate on those states or listen to those who insist that pulses can and should be grown everywhere.

In the current year, pulses have the largest allocation of ₹1,100 crore of the ₹17,000 crore dedicated to NFSM. Madhya Pradesh occupies the dominant position among the major pulse-producing states, followed by Rajasthan, Maharashtra, Karnataka. (*Chart 2 & 3*). Regrettably, pulse production was less than 17 million tonnes last year in spite of the efforts that had pushed post NFSM production from 14 million tonnes to 19.2 million tonnes in 2013-2014. Pulse production has since declined to around 17 million tonnes.

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Chart 2: Major pulses producing states in India

- Madhya Pradesh (5.12*)
- Rajasthan (1.95)
- Maharashtra (1.41)
- Karnataka (1.39)
- Andhra Pradesh (1.23)
- Uttar Pradesh (1.22)
- Tamil Nadu (0.57)
- Odisha (0.55)
- Jharkhand (0.55)
- Gujarat (0.53)
- Chhattisgarh (0.51)
- Bihar (0.43)
- West Bengal (0.33)
- Telangana (0.24)

* Production in million tonnes. *4th advance estimate 2015-16*

Chart 3: Major Pulses : Production Status

(In million tonnes)

	Season/Crop	Production		Increase in during XI Plan	Production		
		Base Year (2006-07)	Terminal Year XI Plan (2011-12)		2013-14	2014-15	2015-16
A	**Kharif**						
1	Arhar	2.31	2.65	0.34	3.17	2.81	2.46
2	Urad	1.44	1.77	0.33	1.70	1.96	1.39
3	Moong	1.12	1.63	0.51	1.61	1.50	1.01
4	Other Kharif pulses	0.70	0.93	0.23	0.71	0.77	0.67
	Total Kharif	**4.80**	**6.06**	**1.26**	**5.99**	**5.73**	**5.53**
B	**Rabi**						
1	Gram	6.33	7.70	1.37	9.53	7.33	7.17
2	Other Rabi Pulses	2.29	2.40	0.11	2.53	2.77	3.76
	Total Rabi Pulses	**9.40**	**11.03**	**1.63**	**13.25**	**11.42**	**10.93**
	Total Pulses	**14.20**	**17.09**	**3.07**	**19.25**	**17.15**	**16.47**
	Total Area(m ha)	**23.19**	**24.46**	**1.27**	**25.23**	**23.55**	**25.26**

There has been no breakthrough technology in pulses that have an average productivity of around 700 kg. In China and other countries yield levels are double

What are the constraints that have led to this decline? Basically, farmers were not incentivized to grow pulses. A farmer with access to water would rather grow rice and wheat because of low productivity in pulses and the virtual absence of procurement. Pulses are mostly grown in rain-fed, marginal and poor fertility areas, with low use of nutrients. They suffer from poor price realization, poor seed chain, lack of high-yielding or stress tolerant varieties. In central India, pulse production is hit by stray animals that damage crops. The government wants to revitalize this scenario by emphasizing on productivity enhancement and increasing the area under pulses, which entails a series of measures.

- First, the seed replacement rate has to be addressed. There has been no breakthrough technology in the area of pulses that have an average productivity of around 700 kg. India is nowhere near China and other countries where yield levels are double.
- The lack of seeds is the second issue. Breeder seed production in India is stagnant, around 12,000 quintals and is proposed to be increased by 1,000 quintals a year reaching 15,000 quintals by 2021.

Though pulse grows in marginal and dry areas, it needs at least two to three irrigations at critical phases of its growth, at the flowering stage and again later

- The third issue is that though pulse grows in marginal and dry areas, it needs at least two to three irrigations at critical phase of its growth: at the flowering stage and again later. Though it does not need much water, it must have water in these critical phases. This is being addressed under the Pradhan Mantri Krishi Sinchayee Yojana by assisting farmers to either go in for sprinkler or drip irrigation or by giving the farmer a pipeline whereby water can be pumped to irrigate the crop.
- The fourth issue is around pulse being very sensitive to the nutrient deficiency in soil, especially of sulphur. A series of interventions has been planned in the form of soil ameliorants that is a critical component of the programme.
- The fifth action is to mechanize pulse production. The government is trying to popularize machine harvestable pulses to reduce cultivation cost.
- The sixth is to increase area under pulses by promoting intercropping. (see *Chart 4*)

There are different permutations and

Chart 4: Approach-II: Area Expansion

Potential crop/ cropping systems	Specific area/niche	Increase by 2020-21 (million ha)
1. INTERCROPPING		
Mungbean with Sugarcane (Irrigated); & with Cotton & Millets (Rainfed Upland)	Uttar Pradesh (Central, Eastern & Western), Bihar; Maharashtra, Andhra Pradesh & Tamil Nadu	0.30
Pigeon pea with Soyabean, Cotton, Sorghum, Millets & Groundnut (Rainfed Upland)	Andhra Pradesh, Malwa (Madhya Pradesh), Vidarbha (Maharashtra), Karnataka (North), Tamil Nadu	0.30
Chickpea with Barley, Mustard, Linseed & Safflower (Rainfed)	Rajasthan (South Eastern), Punjab, Haryana, Uttar Pradesh, Bihar, Vidarbha (Maharashtra)	0.10
Chickpea/Lentil with autumn planted/ Ratoon Sugarcane	Maharashtra , Uttar Pradesh, Bihar	0.30

combinations across the country and some intercropping options. Intercropping can increase the pulse production and can be used as a cash crop in certain areas. There are efforts to promote it in a very big way in the rice fallows of eastern India. Eastern India grows a lot of paddy and the land is fallow post-harvest till the next monsoon. Traditionally, some farmers grow pulses using the residual moisture available but many farmers just do not grow anything. The strategy is to promote production of pulses in a very big way during rabi in the eastern region and in the kharif fallows as well, wherever possible. The idea is to bring 2.4 million hectares of additional areas into production.

One third of the pulse output is raised during kharif and two thirds during rabi and actions have to be planned around these patterns. How does one promote a technology or persuade a farmer to do adopt something different?

- The government organizes frontline demonstrations that are being stepped up through the KVKs (Krishi Vigyan Kendras) in the country, particularly to popularize certain new technology and seed varieties.
- The ICAR is being funded to produce the breeder seed and will be involved along with the government to set up 150 seed hubs in the country; 100 to be taken up during the current year.
- Farmers in farmer producer organizations are also being encouraged to get involved in seed production and procurement and to adopt new technology. These farmers are sought to be organized through the SFAC (Small Farmers' Agribusiness Consortium).
- The use of bio-fertilizers is being emphasized within the pulse production process.
- Certain pulses like tur suffer quantitative loss because of processing delays and the government wants it to be processed immediately after harvesting. Small dal mills are being promoted in a decentralized manner in rural parts of the country.
- Quality seeds are being subsidized.
- Soil ameliorating sulphur content is being provided; bio-fertilizers and bio-control agents are both being taken care of.
- Price incentive has been announced with substantial increase in the MSP for different pulses during the kharif 2016-17. Arhar has been fixed at ₹5,050, urad at ₹5,000, moong bean at ₹5,225. The price stabilization fund has been used to partly meet the country's needs by importing pulses.

Some concern has been expressed over the MSP for moong that has started arriving in the Indian market. Moong bean is a 60-day crop and started arriving immediately after the current year monsoon started. It is not true that no procurement has been done. Procurement centres have been opened but certain minimum specifications are to be met before the moong is procured. The moisture content in the moong that has arrived is close to 20 per cent and, for moong to be procured,

the moisture has to be in the range of 10 per cent to 12 per cent because the moong has to be storable, which is another issue that is being addressed.

Procurement centres have been put up in Maharashtra and Karnataka. The Ganesh festival delayed procurement in Maharashtra and the delay in Karnataka is over certain disturbing political developments. However, the centres have opened in Gulbarga and some other places. The crop is yet to arrive in Rajasthan and Gujarat. Procurement centres have just been opened in Telangana and Andhra Pradesh.

These are developments of the past week and have not got the desired attention but the government is committed to the procurement of moong. Procurement centres have been opened through the state and central food corporations. After the procurement of moong, the government will be better prepared to take urad and tur, when they arrive in the market, beginning October.

The government is committed to creating a buffer stock of two million tonnes of pulses. This is the first time that India will have a buffer stock for pulses, as it does for rice and wheat. Necessary resources have been committed and the cabinet has given the approval and this is in public domain. The entire machinery is geared up to ensure that this does happen. The government will procure 10 per cent of the pulse production in the country. The Indian Council of Agricultural Research (ICAR) has also been mandated to consider a long-term strategy for advanced research in pulses. The moong bean is a 65-70 day variety and the plan is to do research on reducing the time to 50-55 days.

There are efforts to popularise the hybrid variety of pigeon pea, which has been produced by The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT). Stakeholder-ICRISAT interactions have taken place in six states, Maharashtra, Madhya Pradesh, Telangana, Andhra Pradesh and Odisha and Karnataka, to ensure that that seed is made available and that seed is getting multiplied so that the hybrid pigeon pea is introduced in a very big way. The same thing is true of research in chickpea. Genomic research and genomic editing (not biotechnology) had helped in identifying traits that are responsible for higher production and less susceptible to diseases and such chickpea will soon be available with the help of ICRISAT. If not a new variety, it will be a variety that will be resistant to a lot of problems and there will be a change in the production of this crop. (see *Chart 5*)

Chart 5: Long Term Strategy – Research Support

Crop	Present status	Research strategy	Target	Time frame
Mungbean	65-70 days	Hybridization using cultivated germplasm and wild accessions for combining different components of maturity duration for reducing the crop duration and increasing per day productivity.	50-55 days	2020
Cowpea	65-75 day		55-60 days	2020
Urdbean	75-85 days		65-70 days	2025
Lentil	110-130 days		95-110 days	2025
Chickpea	110-130 days		100-115 days	2025
Pigeon pea	120-150		<120 days	2025

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In Favour of Custom Hiring Centres

The government's landmark decision on storage of pulses will go a long way in stabilizing prices and, indeed, getting farmers better prices. The Bharat Krishak Samaj (BKS) had another proposition around setting up custom hiring centres that the government considered and responded to with an initiative, supported by a subsidy scheme. ₹400 crore were allocated for such custom hiring centres but curiously only two equipment manufacturing companies accessed 75 per cent of the subsidies that were as substantial as 75 per cent of the retail value of the tractors that these custom hiring centres acquired.

It would appear that the tractor manufacturers themselves are opening custom hiring centres and buying their own tractors with government funding of 75 per cent. One wonders if that is the next scam that will get exposed. This is under a state government scheme. As a farmers' organization, the BKS is in favour of custom hiring centres; anybody should be able to open them; and the private sector can play a very major role. They need not be set up by co-operatives or farmer producer organizations only but there is a question of social equity when it comes to distributing subsidy and transparency of operations.

— **Ajay Vir Jakhar**

Chart 6: Roadmap for higher pulses production

Sr. No.	Year	Area (million ha)	Production Target (million tones)
1	2016-17	25.25	21.00
2	2017-18	25.75	21.75
3	2018-19	26.25	22.25
4	2019-20	26.75	23.00
5	2020-21	27.25	24.00

This is a roadmap for higher pulse production. Having reached a peak of 19.2 million tonnes in 2013-14, the government expects to cross 20 million tonnes in the current year, though the target is 21 million tonnes, to reduce the country's import dependence to a considerable extent (see *Chart 6*). It is just not enough to allot money and we expect everything to follow especially in a complex area as agriculture, where guaranteeing output is difficult given a whole set of 20-30 different variables that determine the output in the agricultural system. This makes agriculture technology, the most complex in the world.

The government has regular interactions with the ICAR, ICRISAT and is also engaging with the states and appealing to the elected representatives, with whom there are video conferences every Tuesday to step up the output of pulses. Output is increasing not only because of the monsoons; it is a combination of forces. There is also quick monitoring of the progress through the National Monitoring Team (under NFSM) and people are being sent to the states to provide assurance to farmers around all production issues and information is being disseminated through various fora such as the Doordarshan Kisan channels. There is every reason to hope that India will exceed 20 million tonnes of pulse production. ●

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Cons and Pros around Pulse Management

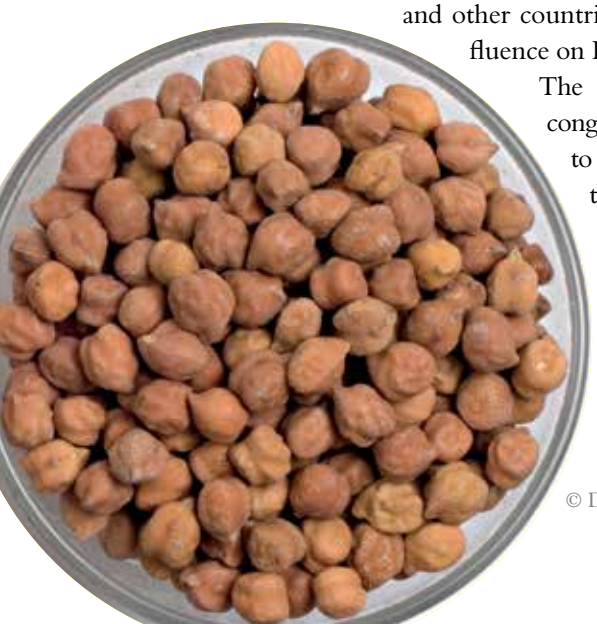
Ashok Gulati

ASHOK GULATI
Infosys Chair Professor for Agriculture, Indian Council for Research on International Economic Relations (ICRIER)

What is the objective function to be accomplished in the pulse sector? Is it only to increase production? If so, why and at what cost? Is it because India wants self-sufficiency or is it to address the panic caused by retail prices shooting up to ₹200? If that be so, the objective function is to stabilize prices for the consumer at a lower level.

When pulse prices touch ₹150-₹200, a vocal middle class — upper and lower — protests and everyone gets concerned. Such noise, discussion or action is not in evidence when prices crash below MSP. This has a very interesting good connotation in terms of policy bias in that it is clearly pro-consumer. If India wants to control prices at a lower level and keep them somewhat stable for the consumers, it has to depend on imports.

Pulse imports in 2015-16 were 5.8 million tonnes. Normally when imports arrive, they douse the fire around the retail prices. Things were different this time with international prices on the upswing because of deficient rainfall in Australia and other countries that exerted an influence on Indian prices.



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The government must be congratulated on its decision to have a two million tonne buffer because that is a standard tool for stabilization. It does not come free though; it costs money and it has been done in the case of wheat and rice. Whatever the inefficiency of the practice, the volatility in prices in these commodities is controlled and the same thing has to be done for pulses. At least 10 per cent of the 22-23 million tonne consumption should be within the administration's control.

Today, when prices are crashing, the controls still remain with the government courtesy domestic stocking limits and controls on exports, yet — and despite the claimed government procurement — pulse prices have dropped. One is familiar with the standard argument used, whenever prices fall below MSP, of moisture content being high, which means the quality is poor and the government cannot procure.

A personal visit to Bihar some years ago, when rice procurement was falling short of target, even though prices were 25-30 per cent below MSP, had an interesting story to tell. At the procurement centre, the procurement officer, asked about the permissible moisture content for rice, said that it was five per cent. Asked for the reason — since the government's permissible limit was 17 per cent — and further asked for the moisture meter, he said that the moisture was checked by breaking the grain between the teeth.

Essentially, the moisture check excuse is a rent-seeking exercise. The first thing to do if the government is serious about effective pulse procurement is equipping all procurement centres with moisture meters for transparency. Pulses that indeed exceed permissible moisture content can be put through some drying facility, set up in the mandi to dry the pulse for a small fee, or could even be aggregated and dried. This is the only way to deal with rent-seeking procurement officers.

Buffer stocking apart, another significant aspect needs to be addressed. In 2013-14, a standard year with a bumper output, prices went below MSP and imports were coming in at prices below MSP. This was a big policy goof up in that the trade policy was not well linked with the MSP policy. Allowing imports at below MSP would mean selling the imported pulse at MSP and making huge profits without any increase in production. There is need for import parity prices that cannot be below MSP. Should that happen, there should be an immediate trigger to impose a 10 per cent to 15 per cent duty. Trade policy and MSP policy have to work in harmony and cannot be conceived of independently.

With the suspension of futures in the domestic markets, there is no signal for what is going to happen. There are stocking limits, export bans, suspension of futures, which seem to be anti-farmer as they are subtle policy instruments to tax the farmer. The theory is very clear on this and India is a classic case. Once imports are allowed at zero per cent to five per cent duty, exports can be opened up too. If there are niche markets where farmers can get better prices, they should be allowed to access them and things should work both ways.

There is also the question of abolishing of stocking limits on the private trade that have been imposed because of hoarders. The produce comes at a specific time but people consume throughout the year and somebody has to hold the stocks for the entire period. If the government does not do that, it has to be held by the private sector. When the bumper harvest arrives and prices crash — as is happening now — the country seems to be caught napping because the private sector cannot hold stocks, the government is dilly-dallying and moving towards procurement after a lot of thinking. The farmers are suffering as a consequence and it is

In 2013-14, with a bumper output, prices went below MSP. Even imports were at prices below MSP thanks to a policy goof up; there was no link between trade and MSP policy

important to look at a proactive policy on abolishing these controls.

As far as storage of pulses is concerned, it is different from that for wheat and rice, which the administration is geared to handle. First, specialized agencies are needed to handle quality control and there should be adequate training for this. Second, the costs have to be considered. The existing storage cannot handle quantities being offloaded in the country even with prices around ₹200 per kg. The main problem is that while the centre wishes to hand over the produce to the states, the states are not ready to accept it because of the adverse economics of the exercise.

If the Centre or the Food Corporation of India are not procuring directly, the states will have to procure through state agencies and some cost will be incurred. It the cost of storage and procurement is higher than the market price, who will bear the loss? There is confusion here and the states are not interested. This means that there are stocks with the government, prices are touching ₹200 a kg but things are still not moving. Ideally, when the prices are the high, the stocks should be zero and everything should be in the market. When the prices are low, there should be a big procurement push for pulses to provide at least the minimum support price, if not more.

There is also need to examine crop neutral incentive structures. Earlier, India had to accord top priority to wheat and rice procurement for food security, which is no longer a concern with the country adequately stocked with wheat and rice. Yet all subsidies, whether on fertilizer, power, canal irrigation and even much of agriculture credit — two-thirds or three-fourths — goes to three crops: rice, wheat and sugarcane. Subsidies must become crop neutral and this requires innovation in policy making.

Pulses are nitrogen fixers and render a great service to the soil but all the subsidy for chemical fertilizers go to others. In states like Punjab and Haryana, the subsidy is more than ₹10,000 per hectare in all irrigated places. If only irrigated area under pulses are to be subsidized, given that only 16 per cent of the pulse-growing area is irrigated, the outcome with be sorry.

Whenever the monsoons are bad, there will be a production shock in the system leading to price shocks and that is a veritable cobweb that one will have to go through. Thus the need to create a crop neutral incentive structure — like giving

₹5,000 to ₹2,000 per hectare of pulse or whatever is affordable — should be considered because pulses provide a great service to the soil and savings on water. Precious water and power will be saved, as will the fertilizer subsidy. Crop neutrality of incentive structures is the need of the hour.

Pulse imports stood at 5.8 million tonnes last year of which 2.2 mt were yellow pea though virtually no one consumes yellow pea. Yellow pea is used to 'adulterate'. Matar (yellow pea), which is not a traditional pulse as such, is being mixed in besan (gram flour) without the consumer's knowledge. The consumer may be informed that it is blended but not that it is adulterated.

Items not traditionally in India's diet have come in because they are cheaper to import. Yet the need to consume pulses is driven by the need for more protein in the food basket. One of the things that India sits on is a mine of protein in the shape of soya. I once asked 100 soya farmers (growing only soya) if they consumed soya at home? They asked: 'Sir, is this an edible product?' The point is that India can get 40 per cent protein at the lowest cost through soya but is extracting oil out of soya and all the oil cake is being sent outside for the cattle in south-east Asia or other places.

There is need to innovate: product innovation and use of protein at home, using food tech-nology to reconstitute the taste like soya dal. One of the cheapest pulses available outside the country is lupines that are protein rich but it is banned though other pulses are allowed. There are so many such issues that need to be sorted out because the country does not need self-sufficiency in everything at any cost. Cropping patterns should be decided by where India's comparative advantages are.

India should export some things and import others and, within the pulses group too, it should export some and import others. Eastern India can export something that western India imports. Neutrality is needed in trade, in incentive structures and there is need for product innovation to get better protein at a lower cost.

Ajay Vir Jakhar
Chairman, Bharat Krishak Samaj

I am a maize grower but maize is not sold as maize but is used to 'adulterate' gram flour. That is the hard fact but one way to look at the issue is through the lens of economics. Pun-jab, where I farm, is a problem state both from the environment and economy perspectives. It receives ₹9,000 crore of subsidies on fertilizer and electricity. There are around 1.1 million cultivators in Punjab and if ₹9,000 crore is distributed amongst then each cultivator gets ₹90,000 as subsidy. The number of cultivators is not the same as the number of farm holdings and that must be understood. The average farmer income is the country is ₹77,000 and farmers in Punjab are getting ₹90,000 as subsidy.

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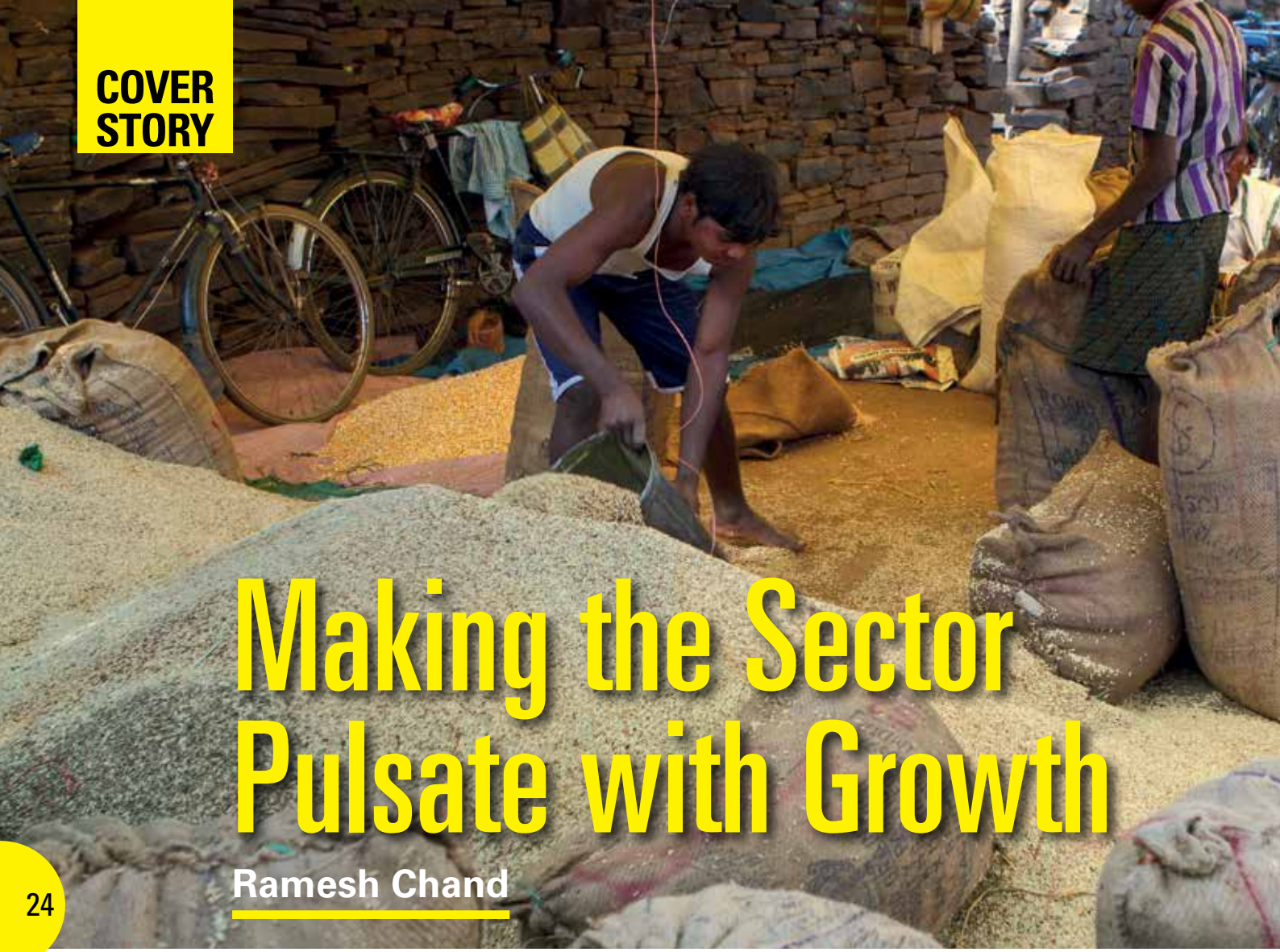
Bharat Krishak Samaj has a proposition for the government to consider: withdraw fertilizer and electricity subsidy in its form and give every cultivator ₹90,000. Irrespective of the size of the farm holding — an acre or five acres, five, 10 or 20 hectares — the beneficiary gets ₹90,000. This can inject equity into the distributing resources generated in this country. The current production enhancing subsidy actually gives more benefits to large farm owners who consume more input and get

Withdraw fertilizer and electricity subsidy in its form and give every cultivator its equivalent; irrespective of the size of the farm holding. The beneficiary gets ₹90,000 per head

more subsidy. This is a radical thought and there will be lots of holes that can be punched into it.

People in policy making will argue that the farmer will consume alcohol with the money but that is the farmer's choice and, in any case, only a small percentage of farmers will do so. The government can even consider putting the subsidy in the account of the lady of the household. Electorally too that would be a winning strategy because if the women get ₹90,000, it translates into 50 per cent of the votes. Government policy must also make sense at the hustings. Once the farmer has the money, every rupee that he saves is a rupee earned, so he will automatically shift to growing crops that require reduced inputs like pulses.

The farmer will use less fertilizer, draw less water from the ground, consume less fuel and the government will need to import less fuel and save on foreign exchange. Additionally, this will save the soil, save biodiversity, improve human health and all this at zero extra cost to the government. There is need for out-of-the-box thinking and what is being suggested is a formula that will benefit 80 per cent of the farmers, who will be net gainers in Punjab itself. The state will achieve crop diversification, improve its soil health and reap a lot of other benefits. ●



Making the Sector Pulsate with Growth

Ramesh Chand

Why are things not happening as planned for pulses? The first question is around imports.

As far as pulses are concerned, why are things not moving despite all that has been prescribed? The difficulty with importing this year has been caused by the international situation with pulse prices and the shortage. Had pulses been freely available like edible oil this situation would not have arisen.

RAMESH CHAND
Member, Niti Aayog

The second issue is that there has been no technology breakthrough in pulses in India or the world, though China's yield is higher than India's for various reasons There has not been any improvement in productivity of pulses. Pulses thus present a special situation in that India cannot raise production at home to keep pace with growth in population nor can it import from elsewhere. Thus the per capita production, availability and consumption have all declined with consumption having declined significantly.

In economics, the law of diminishing marginal rate of substitution operates and a consumer is willing to substitute a commodity up to a point. As he keeps on substituting, he is asked to make a bigger and bigger sacrifice. Initially the farmer accepted and agreed to have potato, onion and vegetable in the place of pulses but the limit has been reached and no consumer is willing to substitute pulses anymore. "I want my sambar, my vada at any cost because it cannot be made out of potato or other kind of vegetables". That is the level that the country has touched.

Another factor complicating imports is the global trend in favour of pulses. Even developed countries are facing a trend towards vegetarianism and the preference for pulses is rising globally. Consider the global attention to pulses that led to the designation of an international year of pulses. Such global attention can have two kinds of effects. One, it can make it more difficult for India to raise supplies from elsewhere because of competing interests from countries that are also raising their per capita consumption. Two, there is the hope that the global concern will lead to

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focused R&D in pulses and to some technological breakthrough.

It must be remembered that India did not achieve the technological breakthrough in agriculture; it adopted proven technology from elsewhere in rice, wheat and maize and those hybrids were the results of breakthroughs achieved in other countries, giving India options that it used. It is doing so for cotton where developments have been driven by the private sector. Neither the public nor the private research systems in India have achieved any breakthrough and for pulses too India might have to depend on some global breakthrough.

A question has been raised about the objective function around pulses and the answer is clear that India wants more pulses but not at ₹200 a kg but at affordable prices. Of the country's workforce more than 60 per cent is engaged in manual work with an income at the wage rate of around ₹300 on an average. Pulses selling at ₹200 a kg is simply unaffordable for a family of five. India cannot afford to pay the farmer any price that he may ask for but can reasonably incentivize farmers to produce more pulses so that they do not go beyond

India wants more of every pulse category. It is not like consuming rice and wheat in place of maize and ragi. The demand is for specific pulses

the purchasing power of the consumer. That is the objective function; improving incentives for the farmer; to ensure that prices do not fall below MSP; and to see that prices do not exceed the MSP by two or three times. That is the goal that is being pursued.

Is the government sleeping or is it taking active interest in addressing the pulses issue? After the global interest and the sky-rocketing pulse prices, the government is seriously concerned and the pulses situation is being monitored by the principal secretary to Prime Minster on a daily basis. There is a move to have a package for pulses as was done for cereals that will comprise MSP — announcement and ensuring that the MSP accrues to the farmers — procurement and buffer stock as the three pillars of the package. The fourth pillar will be the disposal of pulses, partially through the public distribution system.

There is still the missing element of technology. This package is thus trying to get more pulses by providing better prices, better markets upon the understanding that these incentives work best if there is technology for which there is a potential. Currently, it is all about bringing in more area under pulses; some from coarse grains, some from soya bean and some even from oilseeds.

This response is not yield driven, which is a major challenge. There is some technology in the pipeline, such as the ICRISAT's pigeon hybrid. The Indian Agricultural Research Institute (IARI) has also developed a short duration variety of pigeon pea and it is now multiplying seeds that mature just in 120 days. These are areas of hope. India's problem is that it wants more of every pulse category. It is not like consuming rice and wheat in place of maize and ragi; the demand is for specific pulses. What can be satisfied by moong cannot be satisfied by arhar and there are these specificities to consider.

If there is some technology in the pipeline for arhar, more is needed for the six or seven other pulses, which are not even in the pipeline. If the

Icrisat and IRI technology is available, it will ease the pressure on arhar but not for the other pulses unless other technological breakthroughs take place. Three years ago there was some discussion under the National Agricultural Innovation Project (NAIP) that the Tamil Nadu Agricultural University has developed some growth hormone for pulses. That may have been accepted in Tamil Nadu but has not become popular at an all-India level. The country needs developments that will make both substantial change and incremental change like seed replacement rate. The ministry of agriculture has now sanctioned ₹138 crore for seed development; to produce quality seeds because seed replacement rate in pulses is very small and something has to be done about it.

Things change slowly for the agriculture sector. From mid-nineties, when the economic reforms were launched, the character of the service sector changed. There are different kinds of health sector services and even different types of manufacturing services that followed reforms in those sectors and the technological changes that ensued. There is a different type of commerce in the country from what obtained 20 years back following reforms that prompted new investments, competition and innovation.

Agriculture reforms have followed a strange path; the Essential Commodities Act (ECA) was scrapped and there are notifications on the food ministry website of the changes in 2002 and 2003 that created, for instance, openings for 10 big companies to join India's grain markets in 2004-05. In 2006, farmers in the largest wheat producing state of Uttar Pradesh got a farm harvest price that was higher than the MSP and the farmer in the highest paddy growing state, West Bengal, got a price for paddy that was higher than the MSP.

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India's marketable surplus is more than 11 million tonnes of pulses. The government should not buy the entire quantity; which would amount to nationalization of the pulses trade

For 20 years before that and all the years after that farmers did not get MSPs. When India withdrew the Essential Commodities Act, 10 companies, the Australian Wheat Board, Cargill, Glencore, amongst others came to India and Indian companies like ITC, Hindustan Lever and Britannia entered the business creating competition and improving the prices that the farmer received. The global food crisis spoilt everything and India too got caught up in the developments and these companies were asked about their inventory on a monthly basis and such other questions that meant bringing back the ECA in stages by 2006. The reforms came back to zero.

Again, in 2002 the country started talking about agricultural produce market committee (APMC) reforms and the model APMC Act was given to states. In 2013, the group of agriculture ministers of states gave their recommendations for changes in the ECA urging that agriculture should not be under its purview but that has not happened. These reforms are being debated and the secretary agriculture and I made a presentation to the cabinet on the need for reform in agriculture and the kind of reforms needed in the short, medium and long terms.

The ministry of agriculture explained the kind of reforms have been attempted by states and the picture is very interesting. Two-thirds of the states (21) introduced change to have the model APMC Act and have provided for direct purchase by processor, direct sale by farmer, contract farming and changes like that. Of them 10 states did not notify the rules while 11 notified them but had diluted the changes so much that the entire sector was not covered. They specified that contract farming was allowed but not for all of agriculture but for selected commodities; like organic cotton in Karnataka.

As a result, the reforms do not cover more than six per cent to seven per cent of agriculture. Farmer groups should debate what kind of reforms are needed because the central government is in a mood to implement these reforms. The states must also be brought on board because agriculture is a state subject and attempts to persuade the states have failed. In the last 14 years, states could not be persuaded to accept reforms.

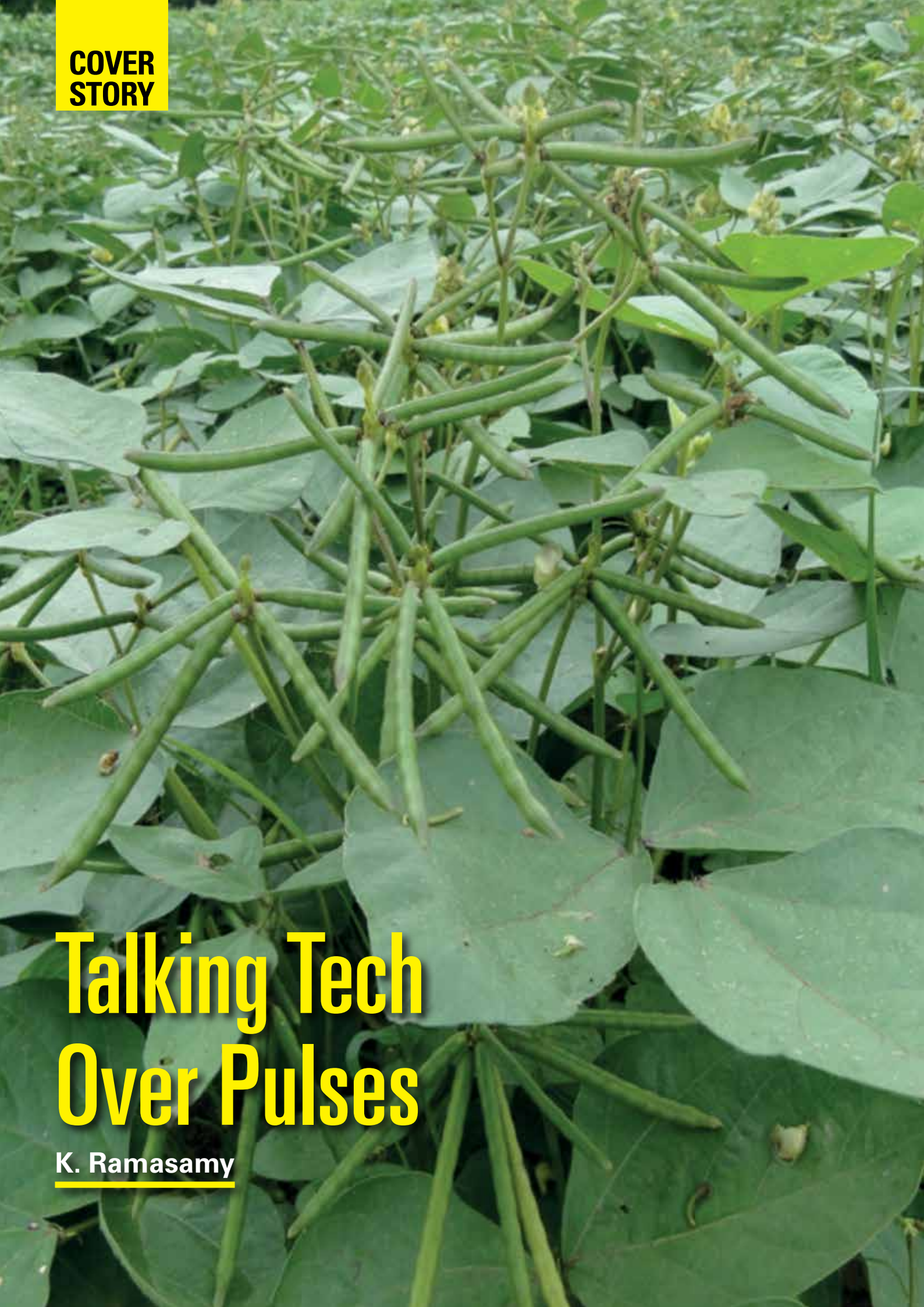
The government has come up with the e-NAM (National Agriculture Market) initiative and the pilot is being attempted in some states but most states are reluctant. Uttar Pradesh wants e-NAM only for wheat, though there is greater need for such reforms in other commodities. A farmer's organization like the Bharat Krishak Samaj should try and build some consensus from Jammu and Kashmir to Kanyakumari, even if full agreement is not possible. The Centre should be informed that these are 8-10 areas where states need to make change and then the states must be persuaded to make them.

Three days ago at a leadership award programme, where there was an award for farmer leadership too, I said that the farmer leadership award for next year should go to the farmer leader who can convince his state to bring about these reforms. If he does not succeed, agriculture will continue to be the same old story of long-term growth at 2.75 per cent, periodically increasing to three per cent with the blessings of nature and dropping back to two per cent in a continuing cycle.

As far as pulses are concerned, there is a proposed procurement of only two million tonnes. India's marketable surplus of pulses (out of a production of 17 million tonnes) is more than 11 million tonnes and the government will not be able to buy the entire 11 million tonnes; nor should it buy because that would amount to nationalization of the pulses trade. Markets are important, competitive markets are very important, the purpose of procurement and MSP is to ensure that that a particular kind of competition holds in the market. It is important to understand the role of the market and do something that will enable the markets to play their due role. For this, both the Centre and states have to move ahead or else there will be constant need to engage in fire-fighting.

What about a crop neutral incentive structure? This has to be debated because, generally, incentives are given to promote a particular thing and not in a neutral way. Sometimes the need is for more cereals, or pulses, or oilseeds and the need may not be constant, which means that the incentives have to be specific and not crop neutral. The policy of crop neutral incentives needs to be debated. As far as pulses are concerned, serious action needs to be taken to make the market competitive and if some breakthrough is achieved by way of technology, with the blessings of nature, India may produce more than 20 million tonnes. However, that may not happen next year. ●

COVER STORY



Talking Tech Over Pulses

K. Ramasamy

Indian agriculture has been supplying food to the entire country and scientists have had a major role to play in making this possible. The outcome of agriculture-led industrialization has also been very positive. However, there are certain pockets of shortages that need to be addressed. For the past three years, Tamil Nadu has invested in minor millets and production has gone up from nine lakh tonnes to 29 lakh tonnes. That has been made possible by scientists working with farmers, identifying their difficulties and helping them overcome them.

K. RAMASAMY
Vice Chancellor,
Tamil Nadu
Agricultural
University

Admittedly, this is a difficult period for pulses and prices in Tamil Nadu went up to ₹140 a kg for moong and urad. The farmer is happy at ₹140 a kg and is willing to invest in pulses but the prices are too high for the ordinary consumer. The Tamil Nadu Agricultural University (TNAU), therefore, invested around ₹1 crore, purchased the produce to stabilize the prices and after processing, distributed it as seed. This paved for additional seasons for pulses (*Thai pattam*: January to March, *Chithirai pattam*: April to June, *Kuruvai*: July to September).

Pulses are often treated as a stray crop and are deprived of the right, production-oriented inputs. This is why yields are low, between 560 kg to 700 kg per hectare

The problem with pulses is that they are often treated as a stray crop and are deprived of the right, production-oriented inputs, which is why one gets low yields of between 560 kg to 700 kg per hectare. Given its due importance the output can go up to 1,200 kg to 2,000 kg per acre. Three years ago the Viluppuram district achieved 3,000 kg per acre and got the Krishi Karman award from the Government of India.

Some interventions have been made such as seed priming and introduction of a crop booster for uniform flower setting for pulses. The crop booster can be hormones but is mainly diammonium phosphate. Even if no hormone is available, farmers can go for diammonium phosphate and spray water to get a 10 per cent yield increase in the pulses. There are considerable problems around climate resilience and pollen sterility is very common in pulses. If pollen viability is increased, the seed setting and the locule filling is also positive. The crop booster helped in managing these two problems.

Currently, Andhra Pradesh and Karnataka are availing of this facility but there is a problem because the administrators want the universities to come up with a knowhow and generate wealth immediately but also distribute the technology free of cost. They do not realize that once the technology has been developed, one has to secure patents. Also, if universities are expected to generate wealth, the technology cannot be given free of cost to anybody. The Tamil Nadu Agricultural University has agreed to produce the crop booster and supply it without sharing the details but both the central government and other the universities want composition and manufacturing details.

As a technology developed by a public institution, the TNAU is happy to give it free of cost but it cannot be expected to generate wealth in that case. This is the dilemma facing the university. Some maize (Co 6) and rice (Co 51) varieties and some pulses have been given free of cost to the National Seeds Corporation, the Gujarat State Seeds Corporation and Karnataka State Seeds Corporation. These are state governments owned organization but even private agencies are demanding free technology.

The TNAU went to the ICRISAT with a proposal to get hybrid and transgenic seeds and take the available knowhow to the entire country. The transplantation of red gram or pigeon pea is one of the very positive things and has been taken around some five lakh hectares under the transplantation. This year a 60-day crop, based on the water availability for black gram and green gram (moong and urad), has been planted. Water is a problem and wherever there is bore well, three crops each of urad and moong have been planted to yield at least ₹1 lakh profit per acre for the farmer.

Other improvements are for rice and sugarcane that are now amenable to mechanization from seed to harvest and the crop comes to maturity in the normal period. Introducing mechanization in pulses needs crop orientation/designing. That is being attempted. Pulse disease is also being addressed. For the first time the moong bean is totally free from yellow mosaic. This disease is one of the reasons


Greengram – Short plant type


Greengram – Branching type


Blackgram - Multi pod in the stem


Blackgram – Branching type

for the low crop productivity in moong. This is also a 50-day duration crop, currrently under the mass multiplication programme.

The second important development is synchronized maturity. In synchronized maturity, one can harvest more than one pulse at a time and save on cost of harvesting. Normally there is multiple picking for pulses and with ₹250-₹300 per person per day, which makes the harvesting operation unprofitable. Synchronized maturity helps. Mechanical harvesting needs a straight crop, otherwise there is a 20 per cent loss of produce during harvesting itself.

There are attempts to make bunches with increased number of pods as well. On an average, there are 25-30 pods in a normal yielding pulse that has been improved to 52 to 55 number of pods per plant. Each locure in the pod has to be filled as well and this is being done with additional impact. It is possible to induce multiple branching so that the number of pods can be increased and work is being done in this area.

This is also possible by selecting the right plant type and there are demonstrations to show that with raised bed with proper drainage, farmers can go for three crops, from January to July. For two-month crops, three crops can very easily be harvested. These are the various interventions and the results in terms of pulse production in Tamil Nadu are very positive with lessons learnt from sister districts and sister concerns.

Where there is a will, there is a way and from a village shanty these operations have moved on to centralized procurement, storage and such others. Farmers do not have storage facilities leading to post harvest problems. For grains, farmers use dry straw and everything is purchased from the fields but not so for pulse that is not purchased from the field and has to be stored. Therefore, the need to procure or, at least, supply storage bins. If this problem is taken care of, the farmers will be happy to produce. The issue is not big but has been blown out of proportions.

Farmers can definitely go up to fill the gap of five million metric tonnes by switching over to normal single crop or to two industrial crops like sugarcane and cotton as an intercrop. They can be harvested in a couple of months and then in the fifth month and in the 10th month. The technology is there, and the farmers can shoulder the responsibility. The planners and the government have started interacting with the farmers and this should benefit everyone. ●

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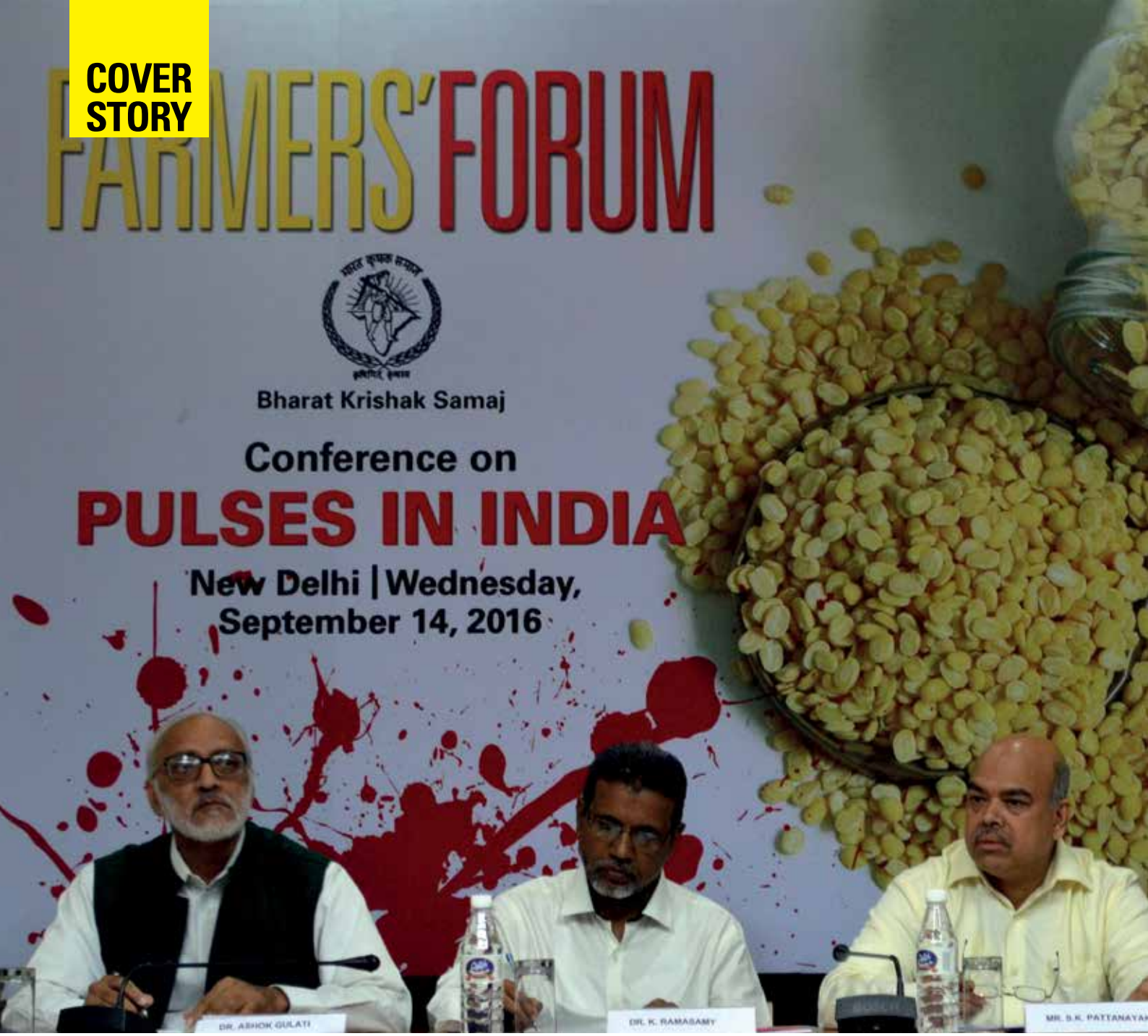


Point Counterpoint

Seminar talk and ground realities

Malavika Dadlani: I am a former joint director research at ICAR/IARI; basically a seed scientist and have two small queries. Everybody talked about increasing the seed replacement rate but in pulses, however, the major problem, as has been debated every year at the Annual Breeder Seed Meeting, is how to get a reasonable price for seeds. No farmer is interested in producing seed because the breeder seed price is lower than the market price of pulses. So do we really want to increase the seed replacement rate? Also, since there is an increase in consumption of pulses globally should we not think about allowing exports of certain pulses; just to get a fair market?

Unidentified: I have two questions, one for Mr Gulati and one for Mr Chand. Mr Gulati why is there this gap between wholesale and retail prices of pulses? Is it because the stocking limits had to be lowered? Mr Chand spoke about the bringing

pulses into the PDS. Is that a good idea considering the horrific state of PDS?

Unidentified: There was a passing mention of transplanted red gram. It is a technology for crop intensification but no one talked of what is happening on the ground around increased production. This is not new variety or new technology but just a management system. Something is happening to increase production without increased inputs, new seeds or any new technology. Farmers are developing seeds; there is a variety called ('Richa') pigeon pea that can double the harvest. Yet one is looking at Icrisat for all the technology. This is not the way to go.

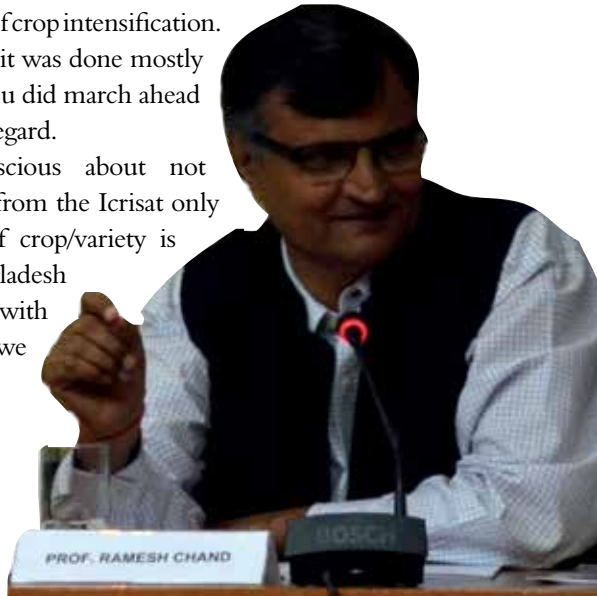
S. K. Pattanayak: As far as the question on the seed

Sarat Mulukutla, Chief – Commercial Segment, National Commodity & Derivatives Exchange Limited

replacement rate is concerned, I do not know the reasons for the drop in breeder seed production. It may partially be on account of the price but mostly because the indents were not forthcoming from the various states. There is also a general reluctance to try to coordinate the breeder seed production because of which production has dropped to 12,000 quintals. We want to incrementally add around 1,000 quintals per year and step it up to 15,000 quintals breeder seeds. We have a network of all our institutions and a robust ICAR system to see that this is stepped up. The subsidy on breeder seeds has increased over the years and I am certain that the difference will be corrected to ensure that breeder seeds get a little higher price than the normal crop.

Dr Ramasamy did mention transplanting as a form of management by which there has been increased production not only in Tamil Nadu but also Karnataka and parts of Telangana and Andhra Pradesh and farmers are very clear about it. Many model demonstrations have also targeted this in particular. I am not sure whether that itself constitutes the system of crop intensification. In the context of SCI, it was done mostly for rice and Tamil Nadu did march ahead of other states in this regard.

We are also conscious about not popularizing varieties from the Icrisat only and a whole range of crop/variety is available to us. Bangladesh has adopted a variety with very high yields that we

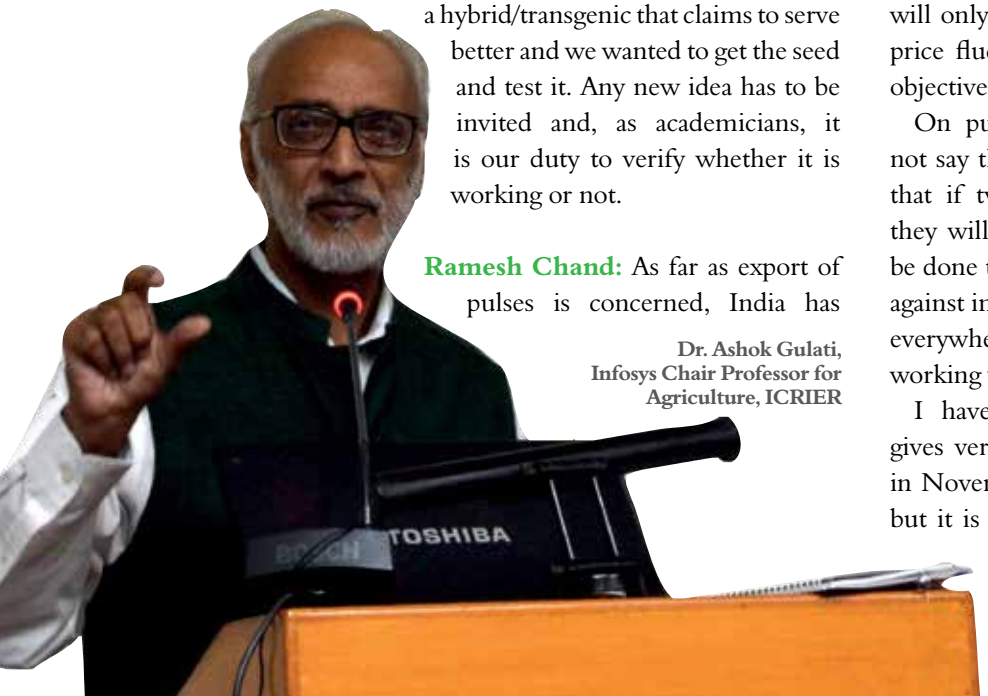


Prof. Ramesh Chand, Member, NITI Aayog

1. K. C. Tyagi, Member of Parliament, Secretary General and Spokesperson Janata Dal (United)
2. Malavika Dadlani, Former Joint Director (Research) Indian Agricultural Research Institute
3. Amit Bansal, Zonal Head (North), Star Agriwarehousing & Collateral Management Ltd
4. C. D. Mayee, Former Chairman, Agricultural Scientists Recruitment Board
5. Sreedhar Nandam, Vice-President, National Collateral Management Services Ltd
6. Mani Shankar Aiyar, Member of Parliament, Rajya Sabha, Indian National Congress

are trying to get into our system. Pollination support through honeybees also increases cross pollination and we have made it compulsory for bee boxes to be put up where pulses are grown. These are only some of the additional things in a whole range of activities that are being undertaken.

K. Ramasamy: None of the traditional technologies are avoided; they are being taken into account and there is constant comparison. The water issue is more important now and micro irrigation is paving the way for transplantation. There can be no blanket recommendation for transplantation of all crops through the year, everywhere. The reason for going to the Icrisat is because it came up with a hybrid/transgenic that claims to serve better and we wanted to get the seed and test it. Any new idea has to be invited and, as academicians, it is our duty to verify whether it is working or not.



Dr. Ashok Gulati, Infosys Chair Professor for Agriculture, ICRIER

Ramesh Chand: As far as export of pulses is concerned, India has been exporting about 7-8 lakh tonnes of pulses every year. Only when crisis got deep recently was there was this temporary restriction. There have been arbitrary decisions around exports and imports and we have been told to develop a trigger mechanism so that farmers know that things are being done in a transparent manner. Such changes will only be resorted to on in case of exceptional price fluctuations and we are developing certain objective criteria for doing so.

On pulse distribution under the PDS, I did not say that pulses will be placed under PDS but that if two million tonnes are being procured, they will have to be disposed of and this cannot be done through retail outlets. However, I am not against including pulses in PDS that is not horrific everywhere. It may be horrific in some states but is working very well in others.

I have been told that pulse transplantation gives very high yield. I plan to visit in Dharwad in November when the crop is standing two feet but it is for first rate agriculture universities and

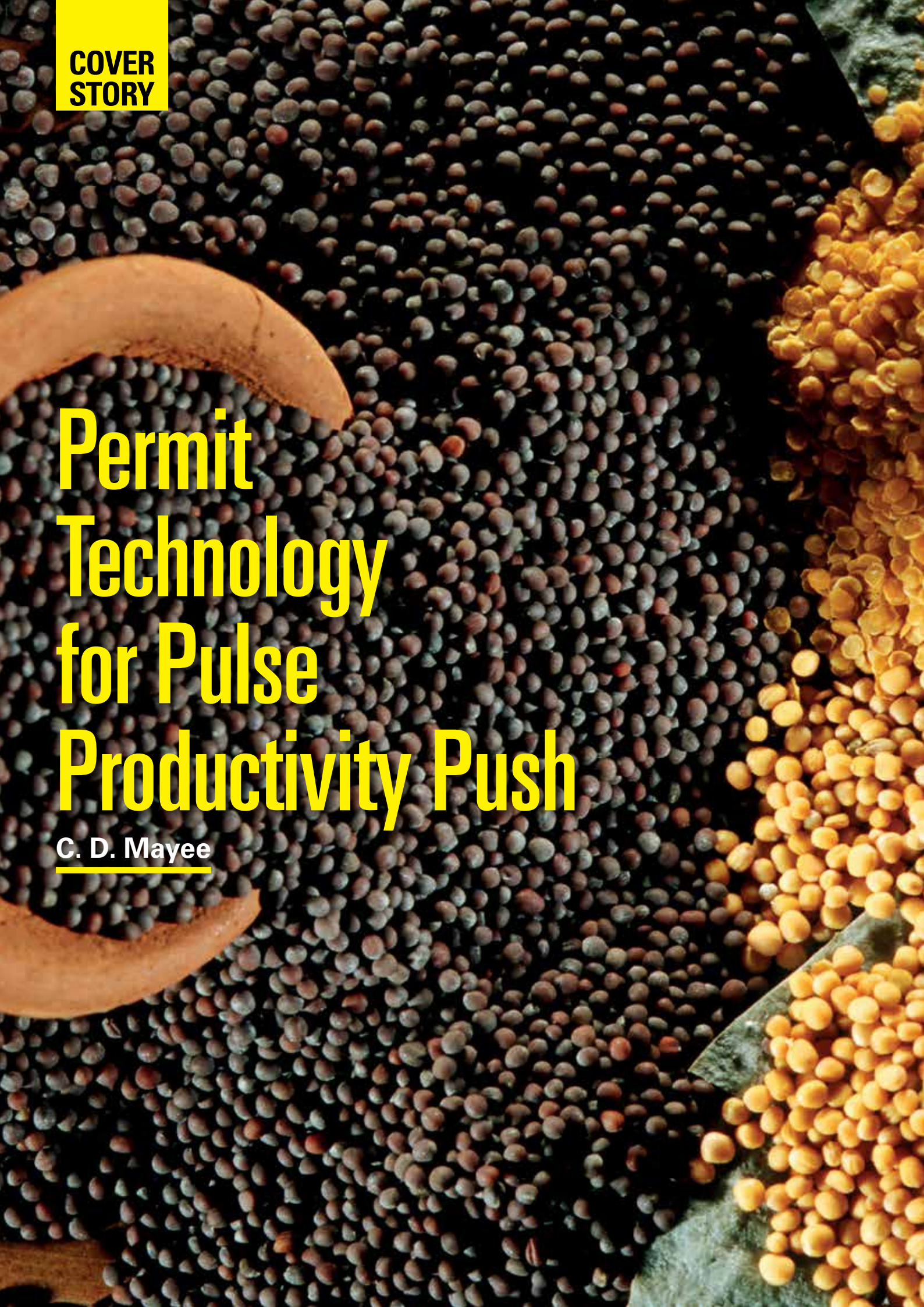
There have been arbitrary decisions around exports and imports and a trigger mechanism is being developed so that farmers know that things are being done in a transparent manner

the ICR institutes to evaluate it properly and say examine its potential. I agree that India has not harnessed the potential of its agronomy but has relied excessively on genetics and plant breeding. Agronomy can help us achieve a lot of things and that is what is needed today, particularly for pulses.

Ashok Gulati: The gap between retail and wholesale prices has been narrowed very rapidly. There is always resistance from the retailers when they have bought a produce at a higher price. They want to recover that. Most of us think the margins are very high but pulses have to go through the dal mills and when they get processed the average recovery is around two-thirds of the original quantity. There is good reason for the price to go up from the wholesale price that the farmer is selling at to the price the consumer is buying but there is need to be careful there.

S. K. Pattanayak: Most people are fixated on pulses moving through the PDS but there is new thinking around that. Brazil buys foodgrains from the farmers and it supplies to all institutions. In this country, apart from PDS, there is the military, the police forces, the hospitals, the old age homes, the hostels run for backward classes, schedule castes, schedule tribes and a whole range of government institutions that consume pulses. If the government wants, the state governments and others can use this mechanism to buy at MSP and take it to where the market is. It is not necessary that pulses go through the PDS. If Brazil can do it, so can we. There is a ready option. ●

COVER STORY



Permit Technology for Pulse Productivity Push

C. D. Mayee

India has changed the name of the agriculture ministry to the Ministry of Agriculture and Farmers Welfare but one has not yet seen much welfare coming the farmer's way. In Maharashtra, for instance, the onion that he has grown fetches ₹1 a kilo at the Lasalgaon market but there is no hue and cry over that. Yet if the price of pulse goes to ₹200, every newspaper reports it because the consumer calls the shots. When prices come crashing down, as it has for the moong bean, there is total silence. This is the tragedy of the Indian farmer, whose voice is never heard.

C. D. MAYEE
Former Chairman, Agricultural Scientists Recruitment Board

There is around 80 million hectares under pulse production globally of which 33 per cent is in India but the country contributes only 26 per cent of the production because of stagnating productivity. India produced nearly 45 per cent of the world's chickpea and 70 per cent of the pigeon pea. The tragedy is that in India chickpea grows on about 10 million hectares and pigeon pea over 4.5-5 million hectares but the country has not achieved a yield of even 1,000 kg grain per hectare.

Pigeon pea is seedless, its production ranges between 600 kg-700 kg per hectare and few states like Madhya Pradesh, Maharashtra, Karnataka and Andhra Pradesh, which along with Uttar Pradesh and Gujarat, account for more than 50 per cent of the production. These are dry land states with very heavy soils that basically need technology upgradation. Some 92 per cent of pulses is grown as rain-fed crops and productivity fluctuations are basically on account of rains.

While most people believe that output will increase with greater irrigation, this will not work for pulses because if irrigation improves, farmers will promptly shift to sugarcane, as has happened in the driest region of Marathwada in Vidharbha, which now has sugar factories. There are more than 26 sugar factories in Marathwada, a traditionally dry land area with only 13 per cent irrigation. The moment Jayakwadi water was available people turned to sugarcane. In Punjab too, as soon as irrigation improved, chickpea went out of favour. This is established and one has to be very careful. What is needed is protective irrigation — flood protective irrigation or drip or sprinkler irrigation — because complete irrigation will not help the pulses cause.

Crop loss is also caused by wilt, pests and diseases, sterility mosaic, pod-fly and pod-borer that are all too frequent. Fortunately, considerable research has taken place throughout the country and wilt resistant and sterility mosaic resistant varieties are available from traditional means. For pod-fly, however, there is need for solutions as have been found for BT cotton; for BT pigeon pea or BT chickpea. Everybody becomes conscious around this because these are GM but they are relevant for the nation.

The fact is that around 75 per cent of the pigeon pea and 25 per cent of the chickpea are grown as intercrop. It is interesting that Indian research has never been concentrated on areas where sole pigeon pea can be grown. Everybody was talking about Icrisat but these hybrids are not new. They were developed nearly 15 years ago. Why are they not popular? ICPL87 was the first hybrid to be tried. The heterocyst in this pigeon pea, not more than eight per cent to nine per cent, is lost when it goes to field, increasing the cost of seed with no productivity gains. Who will grow this?

There are other serious problems, particularly on hybrids with the pod-fly. The average consumption of fertilizer must be taken in account. Everybody is talking about bio-fertilizer only but there is need for zinc sulphate, sulphur and more nitrogen, phosphorus and potash. These have to be done for pulses that have been a neglected crop in dry lands. Unless farmers are sure of the yield, they will not add this fertiliser.

Technology applications are important too and there is need for short duration pigeon pea cultivars, stress resistance and such other qualities. Icrisat supposedly developed two varieties; one of red pigeon pea and another of white pigeon pea and there were nearly 200 demonstrations in Maharashtra but they were of 120-day duration and the grain was so small that nobody wanted to purchase them. When the duration is reduced for pigeon pea, the grain size also gets reduced and there is no technology to address that.

Everybody talks about bio-fertilizer only but pulses need zinc sulphate, sulphur and more nitrogen, phosphorus and potash too. Farmers have to be sure of their yields

Pigeon pea, by nature, must be a minimum 140-160 day crop and must fit in the entire cropping system. It cannot be bred for a one-crop regime as has been done and research has not gone to field though a large number of varieties have come up in the last 20 years in both Kanpur and under an all India co-ordinated programme. They have not seen the light of the day.

The talk is about improving the seed replacement rate but who are the suppliers of seeds today? There are some seed corporations only because no private company has come into the seed supply business. There is not enough profit in pigeon pea and chickpea, a high volume crop. Unless there are very high yielding types that would yield a

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profit, one must go through the entire processing of seed to obviate problems with the seedlings. It is important to complete the chickpea BT trials for commercialization of GM chickpea. There is excellent on-going research for pod-fly and pod-borer and the desi BT GM chickpea is also available.

There is a great deal of talk about mustard but very little about BT chickpea, for which field trials have taken place at two locations for two years in Andhra Pradesh. Permission has been given to Maharashtra but the state has withdrawn the permission because of pressures not to go ahead. Punjab and Haryana too say that they are under pressure. What is this pressure on science not to do research? Will India continue to import cheap pulses but not let its farmers benefit from improved productivity? India needs to improve the area under irrigation, fertigation and use of salt tolerant cultivars.

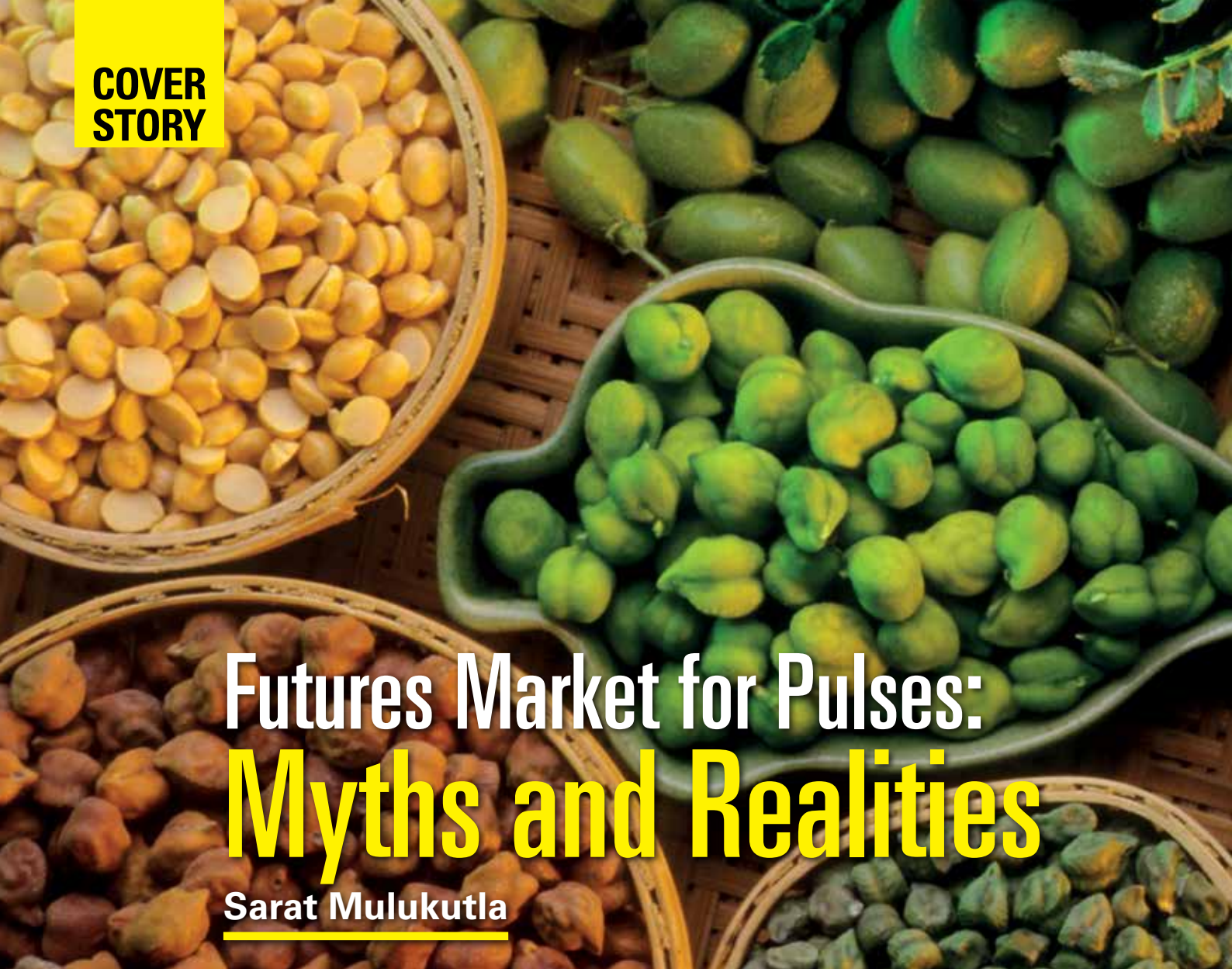
Chickpea is affected by 57 insects but insect-resistant chickpea has been developed. It effectively controls helicoverpa, which causes both pod-fly and pod-borer. This has been developed at the Assam Agricultural University — Indian BT, Swadeshi BT — under a PPP model. Even the PPP model is suspected of having private interest, however. How should the country go forward? People in the private sector are also doing good work and this has to be accepted. They are leading the BT chickpea project, the DBT has approved it and it is under field trials. The current pulse production is around 20 million tonnes and India will have to import 4-5 million tonnes. It is the biggest importer. Sunagro Seeds and the Assam Agricultural University have made available BT chickpea that increases the yield by 20 per cent to 25 per cent with field trials being conducted under an all-India coordinated programme.

No research is complete unless all trials are completed but even field trials are not being allowed in many states though the introduction of BT chickpea would benefit lakhs of farmers and increase output by about two million tonnes. The buffer stock being talked about can be achieved if research and commercialization of a technology, which has helped cotton on a large scale continuously for 14 years, is permitted.

Water is another looming crisis and 68 per cent of the chickpea sown area is drought prone with erratic rainfall and declining per capita water availability. Technologies under development can afford 60 per cent crop protection and there are drought resistant GM technologies too, apart from being insect resistant. Such drought and insect tolerant technologies should prompt more research.

There should be more research into salt tolerant technologies too because 27 million hectares under crops are affected by salt of which 25 per cent to 30 per cent is under pulses; seven million hectares are irrigated and 14 million hectares are rain fed. Yield losses are as high as 25 per cent in salt affected areas. The advantage of deploying salt tolerant technologies like reduced reliance on fresh water, increased use of lower quality water cannot be over-emphasized and experimental evidence shows that it can increase yield. This can be done through GM as well because traditional breeding has not helped much. All that is needed is permission for new technologies in pulses in India and the researchers can make dramatic changes possible. ●

COVER STORY



Futures Market for Pulses: Myths and Realities

Sarat Mulukutla

Trading in the futures market is not a subject that is understood very well with many misgivings and doubts around futures. What are some of the myths that surround futures trading in India? Myth No. 1 is that futures trade has no linkages to the physical markets. That is far from the truth. Futures are very strongly anchored in trading in the physical commodities markets and trades in the futures markets take place in much the same way as they do in the commodity markets.

SARAT MULUKUTLA
Chief – Commercial Segment, National Commodity & Derivatives Exchange Limited

A trade in a specific commodity, say maize, coriander, cumin, turmeric or such other, will involve clearly specifying what grade is being traded and how much foreign matter should be allowed. If it is soya or coriander, what is the permitted percentage of damaged seeds or discoloured seeds. There are very clear specifications, just as in the physical markets. That part is identical. There is a slight difference between futures price and a spot price.

Futures price for a month will usually be slightly higher than the spot price because the holder of the commodity wants to sell a month later instead of selling right away. This means holding the stock in a safe storage/warehousing. There is need to borrow to finance the storage cost because storage should be such that there is no deterioration in quality. The price will then be the spot price, plus the interest on money borrowed for a month and the storage cost. This is called the cost of carry and the futures price will usually be higher to that extent. However, as the futures contract moves towards expiry, the spot and futures prices actually converge to the spot price because the interest and storage cost comes down to zero. On the day of the expiry of the futures contract, the spot and the futures price should be identical.

Consider the barometer of the underlying market (*Graph 1*) showing exchange prices for desi chana traded in India. There are 27 expiries and trade for 11 months in a year for which there are 11 contracts; in 2014 and 2015 there were 22 contracts and five contracts in 2016 or 27 contracts overall before the government suspended it on July 27, 2016. The deviation between the futures and the spot on expiry date is less than three per cent, which is acceptable and trading is not something different, nor is the behaviour of prices on exchanges very different. It is converging, as it should ideally, thereby establishing that there is very strong linkage. It is not that futures trade is something very different from what is traded in the physical market.

Myth No. 2 is that futures trade does not include transfer of physical goods, which is a very wrong notion. Most contracts that trade on NCDEX (National Commodity & Derivatives Exchange) are compulsorily deliverable or compulsory delivery contracts. Chana has seen healthy deliveries. The global standard for a deliverable contract is in the region of one per cent to two per cent of the production of that commodity in that country, which is deemed enough from the price discovery point of view. In 2015, nearly three lakh tonnes were delivered on the exchange platform and the chana production in India was about 70 lakh tonnes in that year. Desi chana that is traded would possibly be around 40 lakh to 50 lakh tonnes or more than five per cent, which is excellent for a futures contract. There is a lot of delivery and farmers who produce or processes take deliveries from the exchange platform.

Myth No. 3 is that futures trading leads to volatility and creates more volatility in the spot markets. What needs to be understood is that futures are a barometer of the underlying dynamics of that commodity in terms of supply and demand. One is looking at a possible glut of pulses in the coming month and that is because once prices rose, the futures contract was suspended. A lot of farmers thought it was good to start sowing more

Had futures trading not been suspended, the farmer and other participants in that commodity chain would have had a signal about the supply and demand dynamics in, say, January

chana and other pulses this year but a lot of import contracts were booked and there will be a huge supply. However, there are many farmers who have not started sowing pulses. With the suspension of futures, an important function performed by the futures market has been taken away; that of giving price signals.

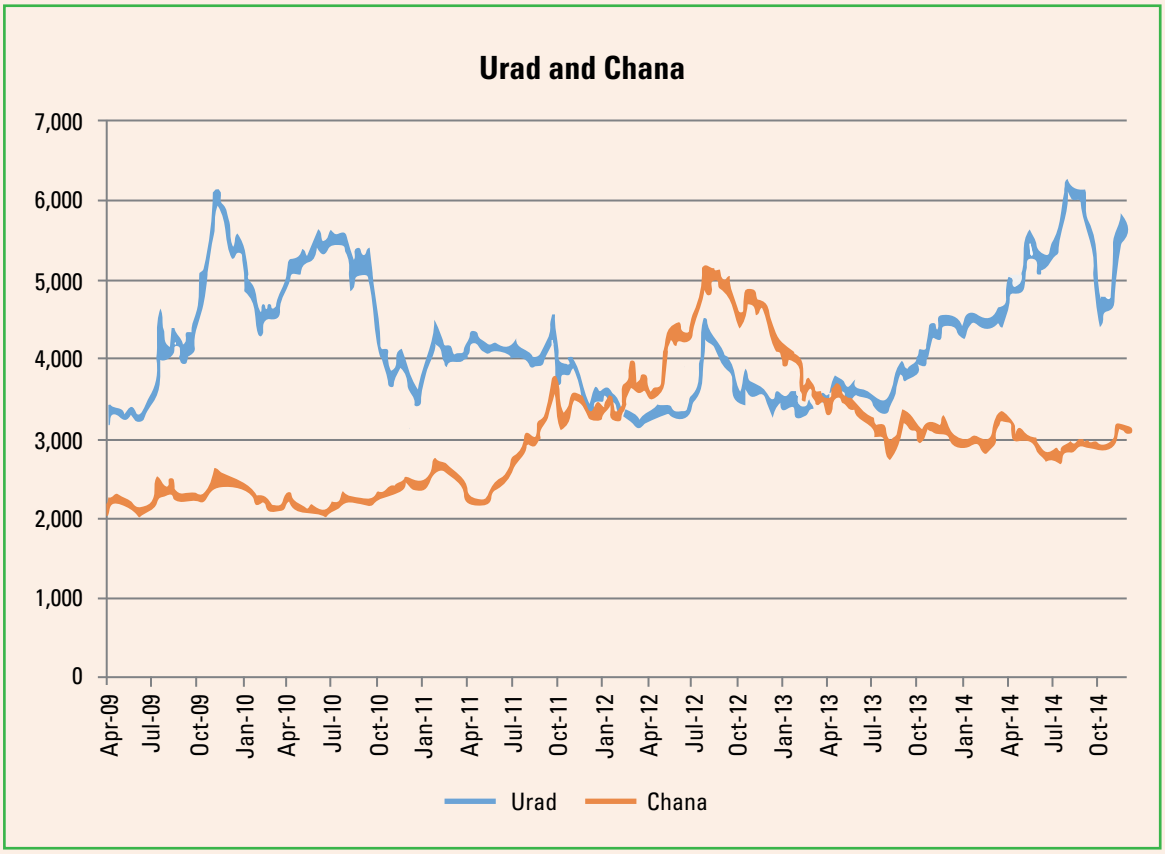
All that the farmer is aware of right now is that the price is very high and that he should sow pulses instead of mustard seeds, for instance. Had futures trading not been suspended, the farmer and every other participant in that commodity chain would have had a signal about what might be the supply and demand dynamics in, say, January. Nobody has that signal now and one can only look at the spot price that being high may prompt one to sow pulses. A futures contract would have shown that the supply is very high because of imports and a lot of acreage has come under pulse cultivation and that farmers might desist from sowing because they would have seen that the January price is much lower than the current price.

Thus futures trading is essentially a barometer of only supply and demand dynamics at a different point of time in the future and does not give rise to volatility. In fact after the futures contract in chana was suspended on the NCDEX on July 27, the volatility has increased. It went to 23.5 per cent, as against 25.8 per cent for the same period before the suspension. The volatility has increased in the spot market because there is complete uncertainty, without any view of the future demand-supply scenario. Suspending futures contract has actually done a great disservice as is clear from *Graph 1* on chana and toor dal.

Chana (orange line) was traded on the exchange until two months ago and toor dal (blue line) was not traded on the exchange. The graph shows absolute prices and the volatility was much higher for toor than for chana that was traded on the exchange. It is the same for urad dal that was not traded on the exchange while chana was, allowing people to take views on demand and supply and plan action on whether to buy or to sow or not to sow.

Myth No. 4 is that future markets are susceptible to manipulation. There is a well-regulated, transparent price discovery platform and the new regulations have further strengthened the

Graph 1: Barometer of the underlying market dynamics



Chana futures suspended on July 27, 2016. Volatility for 28 days post-suspension in Delhi market was 23.5%; Volatility for same period pre-suspension was 15.8%

processes. There are a lot of tools that the exchange has at its disposal to maintain market integrity. There are position limits that can be applied if the NCDEX feels that the market integrity might be threatened by the buy or the sale side. Position limits can be raised and people have to put in more collateral to ensure that if anyone is unable to discharge obligations, on the buy or the sell side, the exchange has adequate collateral to take care of any contingencies. There are various sorts of margins — ad hoc margins, special and additional margins — that the exchange can impose at any point of time to ensure that trading is not affected.

Deliveries can be a very potent threat. A seller cannot continue to sell just to express his views but must also deliver that commodity when he is engaging in a certain contract. It is the same for the buyer. People cannot keep buying unlimited quantities and driving prices up because they have to take delivery of that commodity at the end of the day.

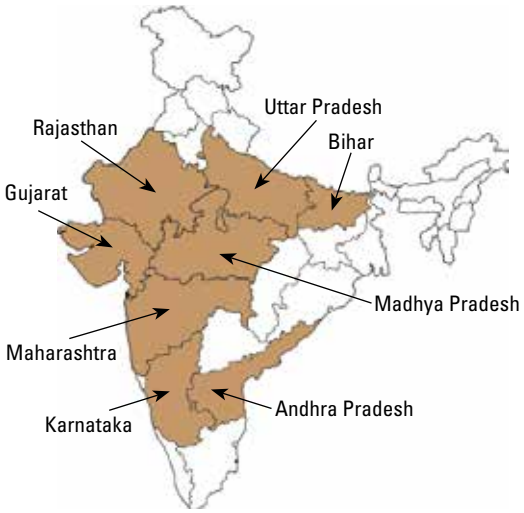
Myth No. 5 is that the future markets are dens of speculators. Consider a farmer taking a decision in September on what crop he should sow and at what price he will sell the harvest, say, in November. The choice is possibly between two crops and he decides to sow chana and wants to ensure that he can lock in the price of the produce that he will harvest in November. Can he do that in the spot market? No. In a sense, he has to take a price risk, which is that the prices may fall by the time the harvest is ready.

If, however, there is a futures contract, it would allow him to sell four months forward and enable him to lock in the price of his harvest, ensuring a certain profit or at least ensuring that there is no loss. Without the futures contract, the farmer must produce and hope that there will be a buyer who is willing to take on that risk. Who is that risk taker? That risk taker is essentially a speculator who is extremely important in the future market scenario. He is the one taking a punt that prices will not go down but will possibly go up and is, therefore, willing to buy from this farmer. That is one of the other important functions that a futures market performs. It provides a risk management set up and ensures that people who do not want to take risk can pass it on to someone else.

Those risk takers are the speculators who are present but are not the only ones in the futures business. The futures business manages other issues like delivery; ensuring that commodities actually get delivered on a contract and so on. Speculators do take on risks but a lot of farmers and processors actually trade on the platform and take deliveries or even give deliveries (*Figure 1*). There

Figure 1: Futures markets have end-user/farmer participation

Location of the various farmer collectives



33 farmer collectives NCDEX is currently engaging with

1,52,000 farmers are members of these collectives

7 farmer collectives have already participated on the Exchange platform

16,000 farmers are members of collectives that have participated on the Exchange platform this financial year

Commodities traded on exchange platform this financial year

MAIZE	MUSTARD SEED	SOYBEAN	WHEAT	CHANA	KAPAS
5,070 MT	20 MT	60 MT	20 MT	20 MT	8 MT

Pragati ka Solid Exchange

There are 33 different types of farmer collectives that the NCDEX is engaging with from this year to secure increased farmer participation on this platform

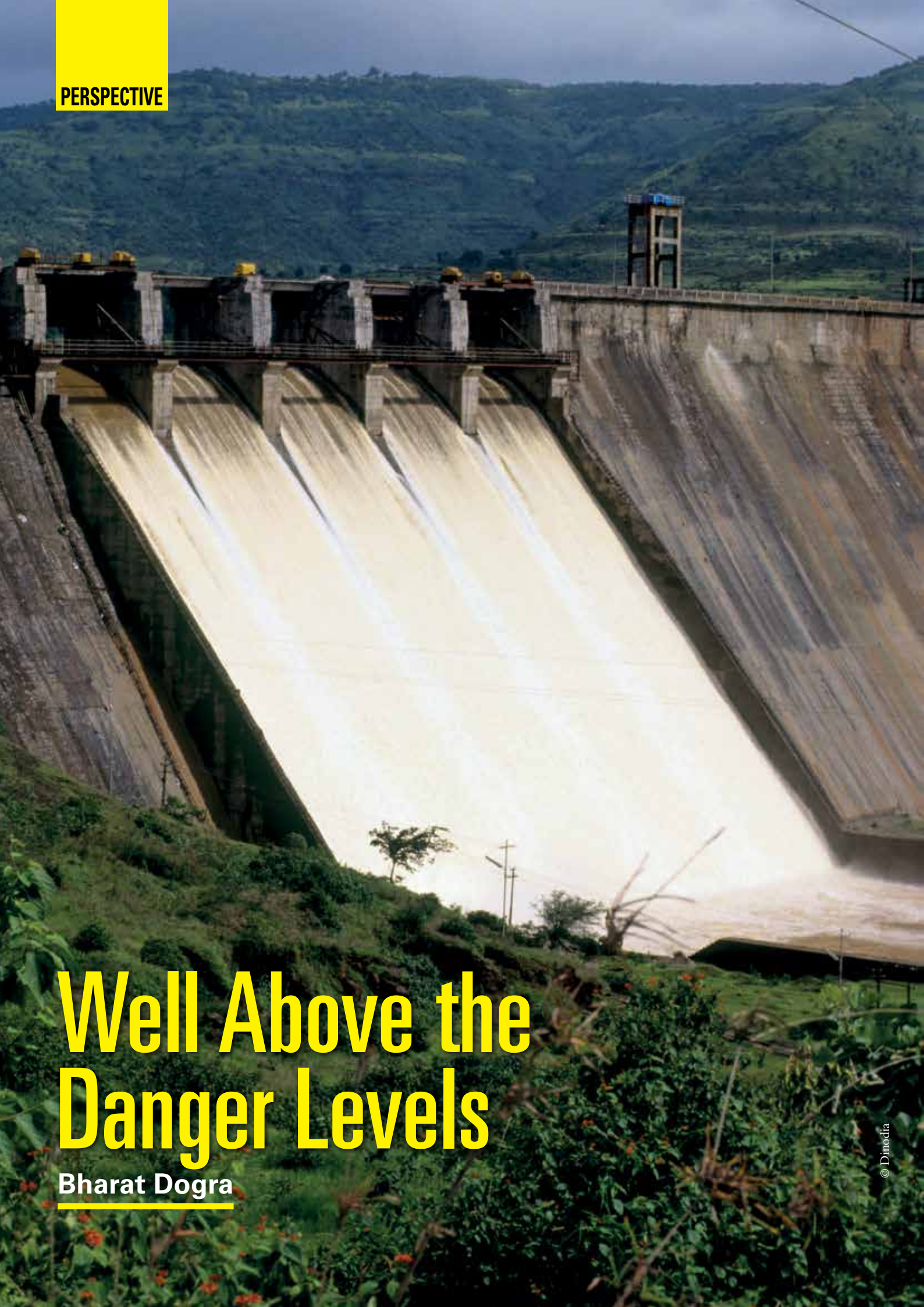
are many efforts on the NCDEX to ensure that farmers come and trade on the exchange through farmer producer organizations.

There are 33 different types of farmer collectives that the NCDEX is engaging from this year with a view to securing increased farmer participation on this platform. Farmer collectives refer to farmer producer companies, farmer producer organizations, primary agriculture credit societies, co-operative unions and such others. About 1,52,000 farmers are a part of these collectives and seven farmer collectives have started trading on the platform, representing some 16,000 farmers. They have all reported about 15 per cent to 20 per cent better realizations from the futures markets than what they got from their local traders.

These farmers are from eight to nine states and they have traded in maize, mustard, soya bean, wheat, chana and kapas. These are real people with real exposures, trading on the exchange platform. In essence, futures are a risk management tool and people who want to transfer risk can do so very effectively using a futures platform. It also ensures that settlement risk is lowered to practically zero. People who want to diversify their investments and not just have financial investments, can also invest in the commodities business and get some returns there.

A futures market also helps in facilitation of physical trade in the sense that the NCDEX has created a whole new infrastructure around warehousing with warehouse service providers. The warehousing infrastructure ensures the infrastructure is available for the spot markets as well and as close to the farmgate as possible. Once the commodity is stored in an exchange warehouse, the bank treats it as secure and lending against that collateral is high. The NCDEX also engages in market development through education on futures and ensures that people can get certifications. There is a problem with the perception about the benefits of futures trading that needs to be addressed. ●

PERSPECTIVE



Well Above the Danger Levels

Bharat Dogra

India had hoped to reduce floods significantly by investing hugely in large and medium dams as well as embankments (flood-walls) and related structures. These hopes have been belied as the flood-prone area has increased in many parts of the country. This is even true of those parts, for example several areas of Bihar, where very long embankments have been built.

BHARAT DOGRA
Senior journalist, specializing in the farm sector

One aspect of the problem is that the number of farmers (and other villagers) exposed to floods has increased. The second and related part is that the nature of floods has changed in some important ways. Earlier floods caused damage and destruction but most farmers had learnt to live with them. The farmers recognized that despite agonies accompanying rivers in spate, relatively modest floods also helped to recharge the groundwater over a wide area while depositing nutrients on their fields in the form of fertile soil and silt.

With the passage of time and several man-made changes, the essential characteristics of flood flows changed in significant ways over wide areas. On the one hand, the beneficial impacts decreased while, on the other, the destruction unleashed by the floods increased. Several factors contributed to these changes. In recent decades reports of destructive floods talk about embankments being breached or huge volumes of water being released from some dam.

Embankments are, of course, built as flood protection measures but when these are breached, the destruction is much greater than in earlier times when there were no such embankments. Large and medium dams are more likely to be planned as multi-purpose projects with flood-control likely to be only one of their many objectives; perhaps a less important objective compared to others like hydel power generation and irrigation.

If conditions requiring huge amount of water to be released develop the destruction is much higher than the moderate floods with which several generations of farmers had learnt to co-exist. Floods caused by embankment breaches and large releases of dam water are certainly more flashy and devastating.

There is the additional problem of duration of floods. Earlier floods tended to drain away faster as the natural drainage paths were generally quite clear. Several kinds of constructions obstructing the drainage path on the one hand and embankments on the other have added to the havoc with flood waters left with no escape route. They tend to remain in a village for several days, even weeks, disrupting the farming schedule; the prolonged water-logging causing water-borne and other diseases, sapping the strength of the farmers and other villagers.

Heavily embanked areas of north Bihar have been reporting many problems due to the increase in water-logging caused by the embankments, obstructing the natural drainage system. This large-scale water-logging has affected the productivity and diversity of farming significantly. The flood level of Ganga river in Bihar rose dangerously high this year following heavy releases from the Bansagar dam that were related to dam management problems.

Embankments are built as flood protection measures but when they are breached, the destruction is much greater than in earlier times, when there were no such embankments

The Bihar chief minister repeatedly drew attention to the chronic problems created by the con-struction of the Farakka barrage, leading to upstream accumulation of silt and consequent pilling over of river waters in villages. Bihar is not the only state to complain. Bengal has lamented that the large scale and highly destructive river erosion in Malda and Murshidabad is also related to the many-sided impact of the Farakka project.

Problems of farmers in flood-prone areas are caused by floods, water-logging and river erosion. River erosion does not get much attention at the national level but in places, like Malda and Murshidabad in Bengal and Bahraich and Sitapur in Uttar Pradesh, it poses a serious threat to the survival of several villages as menacing rivers tear apart or gobble huge stretches of farmland every year.

The real situation in villages differs significantly from the simple textbook statements about the beneficial impact of the various flood control works. The most common flood control method is constructing river bank embankments and it appears to be a sensible approach to take:

creating a wall between a river and a village to protect the settlement and its farms. The reality is often more complex.

In many cases, flood protection is actually provided for a few years but during this period the channelized river cannot deposit its silt over as wide an area as before, leading to the river bed continually rising and eventually threatening to breach the embankment. The embankment can also be raised but the raised structure may be weaker.

What happens when the embankment is finally breached?

- The resulting flood from the river flowing at a much higher level than before is extremely destructive. Of course, the embankment can also get breached much earlier due to poor construction. Complaints of corruption in construction and maintenance are quite common.
- There is also the issue of the farmers trapped between the river and the embankment. In most cases they are not rehabilitated and hence become permanently exposed to much more difficult floods than before.
- The water coming from the catchment areas into the river is now blocked from entering the river by the embankments and contributing to large-scale water-logging at many places. Partial engineering solutions are available for such problems but in reality these are generally not implemented efficiently, perpetuating the water-logging problem.
- While textbook pictures of flood walls appear to be simple, embanking free-flowing rivers lead to even greater complications in places where two or more rivers merge, for instance. In such situations, there are many adverse unintended impacts.

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If the embankment is breached, the flood from the river, owing to its higher level than before, is extremely destructive. Embankments also get breached due to poor construction

Many embankments are not flood control structures but flood transfer structures. This means that while one area is protected, the pressure may increase elsewhere. This leads to many disputes when people of one village may cut embankment at one place to relieve the pressure of flood water on their village leading to increased flood flow in another village. This can lead to violence and tension. Since the priority in official circles is often to protect the more dense and prosperous settlements, this may lead to efforts to save cities from floods even if this is at the cost of nearby villages and their farmers.

Similarly, the actual experience of the operation of several dams has often been very different from the promise of providing protection from floods. Time and again villages, farms and crops have been devastated by water released from dams. Villagers, senior politicians and even state governments have complained that they did not get advance warning. These issues are aired in the media and it becomes clear that the pressure to maximize hydel power generation and irrigation sometimes leads to the neglect of precautions needed for flood control.

There are other aspects of dam mismanagement too. Dam authorities often say that they had to release a lot of water to save the dam or else even the problems would be even more severe. The

overall reality is that crops of a very large number of farmers are devastated by the bigger and more destructive floods unleashed by several dams.

In Bengal, the excessive water released by the dams of the Damodar Valley Corporation has led to several serious flood situations in several villages apart from other problems. Post dam con-structions, the excessive silt and sand accumulating in lower Hooghly could not be flushed into sea by the normal floods of Damodar and Rupnarayan rivers, reducing the water carrying capacity of the river and leading to more destructive floods being unleashed.

The navigability of the river was impacted, endangering the future of Calcutta Port and it was suggested that the Farakka barrage be constructed to divert the extra water to the Bhagirathi and the Hooghly. This turned out to be a case of trying to correct one mistake by making a bigger one. The Farakka project led to the accumulation of silt in upstream areas making the main river and some of its tributaries more prone to unleashing floods and eroding land, including farmland, very ferociously in Bihar and Bengal.

Fisheries and fisherfolk also suffered due to the depletion of fish in the river. In fact, fisherfolk of Bihar organized several protest actions against Farakka project. Another aspect of the tragic situation was that Bangladesh also suffered the adverse impact of this project and the problems faced by villagers across the border led to a deterioration in relations with the friendly neighbour for some time.

Such threats to the lives and livelihood of farmers over vast areas have been driven by the refusal by various construction projects to consider warnings about the far-reaching impact of their projects. Cautionary voices are brushed aside in the enthusiasm to build dams that mean large scale spending. Both in the case of the DVC dams and the Farakka barrage, there were advance warnings by experts holding official positions.

One is reminded of the late Kapil Bhattacharya whose wisdom and engineering knowledge went unheeded thanks to the very powerful construction lobbies that are involved in such projects. Any negative opinion on the desirability of dams or their long-term adverse impact is simply not tolerated. In the case of large scale embankments, local opinion is often ignored as powerful persons,

including those with political connections, benefit from construction contracts or those for repairs and maintenance of embankments year after year.

These issues need to be emphasized at this juncture as India gets set to approve even bigger projects that can play havoc with the natural flows of river and drainage of flood waters. If adequate caution is not exercised, the number of farmers exposed to the watery menace and river erosion will increase even more rapidly in the near future.

The construction of link roads in rural areas has been taken up in a big way in recent years bringing about many benefits but, if they neglect the drainage aspect during construction, they may aggravate both floods and water-logging. Many villages are learning this to their dismay.

While states like Assam have been excessively flood prone for a very long time, in recent times heavy floods have been reported in regions that have never experienced floods. The desert district of Barmer in Rajasthan has experienced heavy floods in a totally unimaginable phenomenon.

This draws attention to the role of climate change in causing floods as well. One of its likely manifestations is that more rain may be concentrated over a few days or even a few hours. This appears to be happening in more and more areas and, if this trend persists, more destructive floods are likely in the near future.

Another likely impact of climate change is a rise in the sea level that can certainly increase the threat of flooding vast areas in India's long coastal belt. The melting and receding of glaciers in times of global warming can also increase the threat of floods. When climate change heightens the threat of floods, there is need for greater caution lest faulty policies and projects add to the agony.

Regrettably caution has been thrown to the winds in recent times and remedial measures are urgently needed. Flood-protection projects and policies need to be carefully evaluated with a spirit of learning from past mistakes. There should be willingness to admit serious mistakes if these are revealed by impartial and careful evaluations. In the case of controversial projects like the Farakka barrage such impartial decisions that are free from the pulls and pressures of vested interests are badly needed.

While efforts to reduce the threat from floods are important, so is the need for a system of compensatory payments. The existing system should be improved significantly so that payments for

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disaster relief are received by farmers promptly and with dignity. While a system for flood relief and compensation is in place and farmers should be entitled to payment for loss of crops. A well-considered policy is yet to be framed for farmers who lose some or all of their land or even their houses to river erosion. This should be taken up in right earnest because the plight of river ero-sion victims is pathetic.

Rain and thunder can lead to not just water problems; there are lightning related disasters too that cause both loss of life and property. Policies for providing relief and help following lightning relating tragedies should be strengthened.

In any event the much-publicized farm insurance policy has several loopholes because farmers do not get any insurance benefits even when their crops suffer from heavy damage from floods or river erosion and other natural or man-made calamities. This long festering complaint from many parts of the country should get priority attention.

The other niche problem vis-à-vis compensatory

A lot needs to be done to make available suitable technology and flood resistant seeds to help farmers take up low-cost and eco-friendly farming

payment is faced by sharecroppers or those who lease the land. They do not get any compensation even when they contribute not only their labour but also other resources for cultivation. This injustice should also be removed.

A lot needs to be done for making available suitable technology and flood resistant seeds that can help farmers to take up low-cost and eco-friendly farming suitable for flood prone areas. This can be best achieved in close co-operation with the farmers of flood prone areas as their varied experiences over a long time have provided them with special skills and methods of coping with difficult flood and water-logging situations.

The technology of clonal propagation of rice propagated by the late R. H. Richaria, former director of the Central Rice Research Institute, can help to rapidly multiply rice so that even after some initial loss by floods the rice crop can be salvaged. ●

When the Rains Look Good; the Battle Cries Look Bad

Asish Ghosh

Food security for more than 1.2 billion people, representing 16 per cent of global population, to be ensured from a landmass of 2.4 per cent of the global space, is a big challenge even for the most talented scientific brain, the hardest working farmer and the most competent administrator. In India, the monsoons queer the pitch by playing truant, being over generous or simply by being uneven.

There never is a perfect monsoon, certainly not with climate change making its voice heard on the fields of Indian agriculture. Climate change has company this year because making the situation bleak along the lush farmlands on India's border is the threat of hostilities breaking out between neighbours. Given these unhappy set of circumstances, how did Indian agriculture fare this year?

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Every year, the Indian Meteorological Department (IMD) is entrusted with the onerous task of forecasting the monsoon rainfall apart from other services that it is asked to provide. The end of monsoon season report from the IMD is expected on October 7, 2016. As per available information, India received 862 mm of rainfall compared with the normal level of 887.5 mm. Normal to excess rainfall occurred in 27 of the 36 sub-divisions. Most parts of India's north-west, east and south India received subnormal rainfall, although farmers in Punjab and Haryana have access to canal irrigation.

The worst hit regions were Kerala, where rainfall was 34 per cent below normal. Assam and Meghalaya had a shortfall was 30 per cent. Weak

With increasing oilseeds production and grave concern expressed by scientists, is it necessary to allow GM food crops when the production shows an upward trend?

rainfall also affected Punjab, Haryana, Himachal Pradesh and parts of Karnataka. However, rainfall was more than in the last two years (when deficit was between 12 per cent and 14 per cent). The current year's rainfall helped to increase water level in 91 major reservoirs of India that remain the main source for supplying irrigation and drinking water for the next season. The September rainfall helped to replenish the soil moisture.

This year, the kharif planting area increased by 3.5 per cent or 106.5 million hectares, pulses occupying the highest areas. (Sally, 2016) It is now estimated that during the current kharif season, production of foodgrain increased by nine per cent or 135 million tonnes, surpassing a six-year record. It is expected that there will be lower food inflation and higher farm income. If one analyses the position, taking the major cereals and grains into account, it will reveal that:

- Rice production increased by three per cent or 93.9 million tonnes.
- Pulses production has risen by 57 per cent, which is net 8.7 million tonnes.
- In terms of cooking oil supply, oilseed harvest has increased by 41 per cent, hopefully saving India considerable foreign exchange.

It may not be out of place to refer to the current controversy regarding the introduction of GM mustard to save on foreign exchange for importing edible oil. With increasing oilseeds production and grave concern expressed by scientists, is it really necessary to allow GM food crops when the production shows an upward trend?

Should India ignore the fact that the majority of the members of European Union did not allow GM food in their market because of public health concerns. (Ghosh, 2015. *http://www.downtoearth.org.in/blog/do-we-really-need-gm-mustard-in-india–52159* last accessed on 01.10.2016).

Although monsoon rainfall is estimated to be three per cent to five per cent below normal, the kharif yield for most crops is expected to be higher. The major water reservoirs provide cheer and should help the winter crops get sufficient irrigation. The total kharif planting, including foodgrain, oil seeds and cotton has reportedly risen by 6.3 per cent area under planting that is equal to more than one lakh hectares. (Economic Times, 2016)

India's sugar production, however, is likely to decline 6.5 per cent, which may well translate into 23.5 million metric tonnes, based on the Long Period Average (LPA) of the south-west monsoon rainfall. This is based on the data from sugar producing states of Maharashtra, north Karnataka, Uttar Pradesh and Tamil Nadu, although Maharashtra received 12 per cent above LPA rainfall (746.4 mm) (Ghosal, 2016).

Not just the rains, geopolitics has been taking a toll of agriculture too. Following the current political tension between India and Pakistan, reportedly Punjab, a leader in agricultural production, faces a critical problem of evacuating 1.5 million people from 1,000 villages from six border districts from September 29, 2016. This process of evacuation has sent a tremor down the farming community that was preparing to harvest its paddy crop.

A Punjab farmer is quoted in the media saying, "The last time when the army laid landmines we had sown wheat. Now, paddy is ready for harvest. How can I leave just like that? I have a loan in lakhs to pay off. It's not just me, almost every farmer has taken a loan and this crop is our only hope." Even in a good kharif season, the farmers of India may face a completely unpredictable future (Dua et al., 2016). ●

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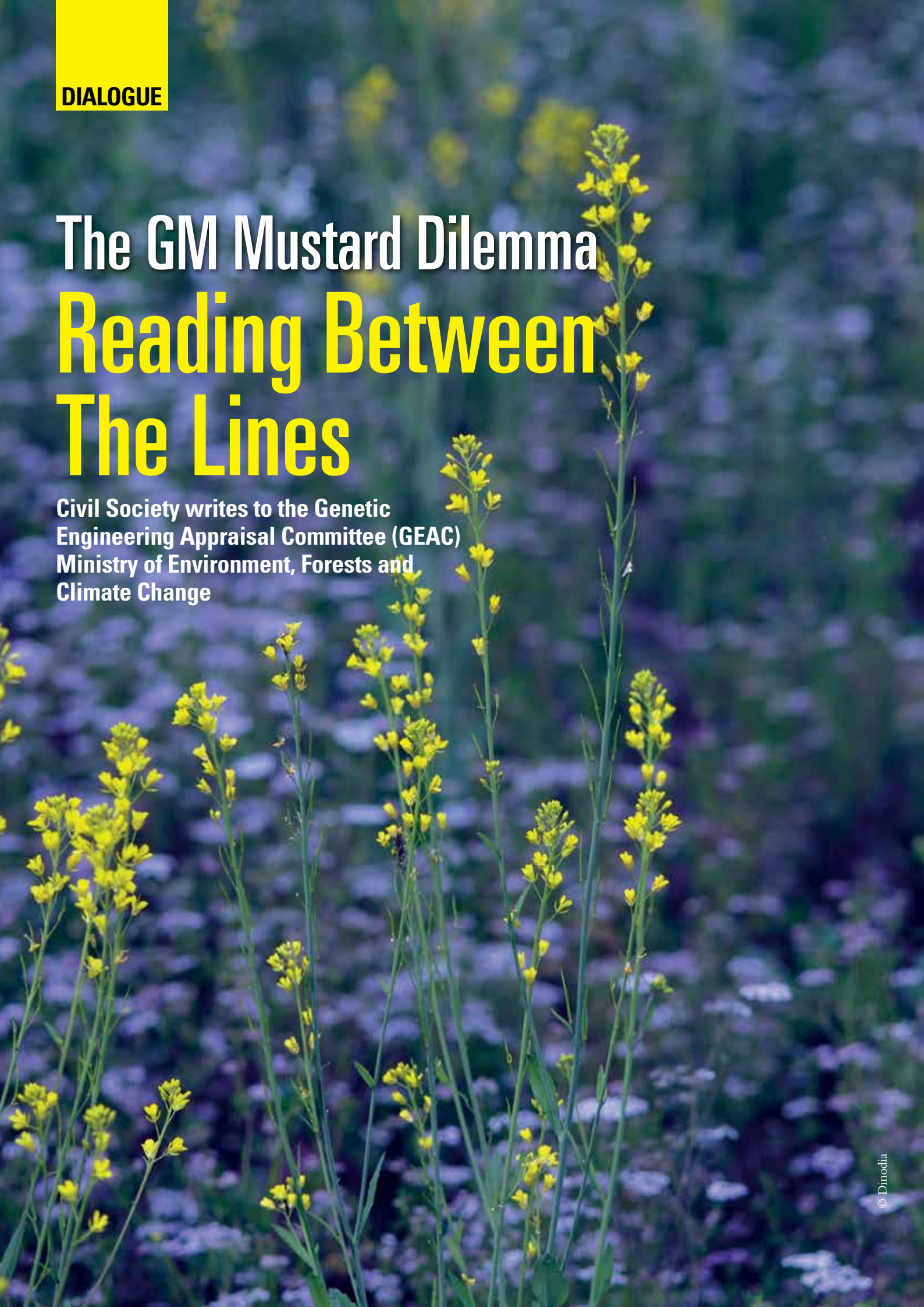
DIALOGUE

The GM Mustard Dilemma

Reading Between The Lines

Civil Society writes to the Genetic Engineering Appraisal Committee (GEAC) Ministry of Environment, Forests and Climate Change



On July 18, 2016, an eight-member delegation comprising Yudhvir Singh, Rampal Jat, Sharad Pawar, Debal Deb, Kapil Shah, Rajesh Krishnan, Ananthoo and Kavitha Kuruganti made detailed presentations of their objections against and concerns with regard to GM mustard of the Delhi University's Centre for Genetic Manipulation of Crop Plants (CGMCP). The GEAC with Amita Prasad, Additional Secretary, MoEFCC in the chair, along with K. Veluthambi, Co-Chair, Pushpa Bhargava, Supreme Court Appointee in the GEAC and such other GEAC members like S. K. Apte, Ramesh Sonti, O. P. Govila, S. S. Banga, Luther Rangrezi, Renee Borges, S. R. Rao, Madhumita Biswas and others were present in the two-hour meeting. All presentations are available in public domain. The letter accompanying the presentation encapsulates the position of civil society on the debate.

The overarching theme was the unscientific and fraudulent testing of and claims around DMH-11 transgenic mustard hybrid; inadequate testing of parental lines; and all three GMOs in question being herbicide tolerant. The consequential demand was that the application be rejected in toto; all regulatory lapses be investigated and all biosafety data be shared in public domain. The letter also referred to the numerous failures on the part of regulators to discharge their mandate of "protecting environment, nature and health in connection with application of gene technology".

DMH-11 was tested against low-performing varieties released decades ago. The extant scientific requires hybrids to be tested against hybrids and latest high-performing comparators

WHO SAID WHAT

- **Rajesh Krishnan**, on DMH-11 and parental lines being Herbicide Tolerant Crops
- **Debal Deb**, on Ecological Risks and Risk Assessment of GM mustard
- **Sharad Pawar**, on Agronomic Evaluation of DMH-11 GM mustard
- **Kapil Shah**, on Vield data tampering and other issues with agronomic evaluation
- **Ananthoo**, on consumer concerns and objections related to GM mustard
- **Kavitha Kuruganti**, summarized objections on GM mustard

The letter emphasized that "this GMO would not have reached this stage of regulatory approvals and processing nor would it have (mis)utilized crores of rupees of taxpayers' monies if only the regulators were rigorous in executing their mandate, transparent in their functioning and independent in action". Given that all the three GMOs in question are herbicide tolerant (HT) GMOs (with the use of GURT technology) and for a crop for which India is a Centre of Diversity, the application should not have been processed by the regulators at all. "Further, the matter of risk assessment regime related to GMOs as well as HT crops specifically is awaiting the Supreme Court's pronouncements on the matter and is sub-judice", the letter said.

Concerned citizens were thus faced with a situation where the GEAC has been withholding information from the public domain, "protecting the interests of crop developers at the expense of public interest" was the fear expressed. The letter said that the evidence was being presented on the basis of the small set of documents and data that were accessible along with expert evidence, analysis and arguments adding that this was enough for the writers to surmise that there are many issues fundamentally alarming, inaccurate, fraudulent, unscientific and unsafe, to demand that the GM mustard application be rejected in toto.

"This pertains to all the three approvals being sought, for environmental release of transgenic mustard lines and hybrid DMH11, as applied by the crop developers: "(a) Growing and multiplication of mustard (*B. juncea*) parental lines containing event bn3.6 (Bar-barnase genes) and event modbs 2.99 (Bar-barstar genes) for hybrid seed production; (b) Producing seed of mustard hybrid DMH-11 using the parental lines Varuna bn 3.6 and EH-2 modbs 2.99 for cultivation by the farmers; (c) Use of the two events – bn 3.6 and modbs 2.99 for introgressing the bar-barnase and bar-barstar genes into new set of parental lines to develop next generation of hybrids with higher yields, disease resistance and quality traits".

When biosafety data (including raw data) is finally drawn out for public and independent scrutiny, there can only be more reason for consternation at the

progress that this GMO has been able to make till now. "We take GEAC seriously as a regulatory body constituted under a statute – we take its mandate of protecting the environment and regulating GMOs seriously; we also seriously expect GEAC to do a thorough job in executing its mandate. If we are reconciled to a regulatory body not doing its job thoroughly, that would be a real disrespect of the body and of the law under which GEAC was formed (EPA 1986's 1989 Rules)", the letter says adding that the findings bring to question citizens' faith in the dependability, integrity and rigour of GM regulators as well as the scientists applying as crop developers.

DMH-11 R&D and testing have been rigged

- "The GMO approved for R&D in 2003 is not the same as being assessed now! DMH-11 was a hybridization product of EH-2 barnase line X Varuna barstar line between 2003 and 2006. However, when DMH-11 reappeared after a break of few years in 2010, for Biosafety Research Level (BRL) I testing, it had become a cross between Varuna barnase X EH-2 barstar line. This is scientifically unacceptable, that the same dossier is being maintained for different GMOs and events. From all materials available in the public domain, it appears that GEAC members have been kept in the dark about such a swapping of parents.
- "In the regulatory pipeline, as far as we are aware, no GMO got into BRL trials straightaway by this kind of maintenance of single biosafety dossier, and condensed all testing into three seasons. No event selection trials have ever been discussed in any GEAC meeting. We object to this unacceptable haste and shortcuts of regulatory processes which compromises scientific rigour.
- "The overall claim and basis on which this GMO is being considered for approval for commercial cultivation is that field trials showed overall average higher yield over 'national check' Varuna by 28.4 per cent and if this GMO is commercialized, India's edible oil import bill will come down".

The letter provided evidence that:

- DMH-11 was tested against low-performing varieties released many decades ago, whereas the extant robust scientific system has scientific guidelines laid down for varietal testing, which require hybrids to be tested against hybrids and latest high performing comparators – hundreds of public sector scientists put themselves through such assessment, whereas a transgenic variety has been allowed unscientific and unreliable standards.
- DMH-11 was tested in ways that are contrary to GEAC decisions and permission letters and the developers and regulators are both responsible for this expediency and lack of rigour. GEAC meetings have clearly asked for the GMO to be tested against non-transgenic hybrids but this was not done, violating the regulatory decision (we are aware that the Applicant is explaining this away as the difficulty in handmade isogenic hybrids being used for testing, whereas we are emphasizing that given that this GMO's main claim and basis is yield increase, it should have followed the AICRPRP protocols rigorously, of comparing itself with recommended Hybrids to prove its claim).
- DMH-11 was tested in just eight locations in all, and only in two locations for two seasons, based on which claims of benefits are being made – in all other locations, trials were one-off, for one season each; in Zone III, trials were done only in one location that too at BRL I stage only. This is obviously inadequate to assess the real performance of a variety that is sought to be released for farmers' use.
- The one year that DMH-11 was tested with another non-transgenic hybrid also included as a comparator, the other hybrid out-yielded DMH-11 (2006-07). Even here, DMH-11's claimed yield advantage against other checks was just 20.3 per cent (in fact, it could be just 17 per cent, as reported in Progress Report of NDDB-Delhi University Biotech Project for the period of March 2010 to February 2012, submitted to the Academic Advisory Committee under Point "2. Biosafety analysis of transgenic hybrid DMH-11").
- Environmental safety testing, bypassing rigorous agronomic evaluation, cannot be considered as a valid basis for yield claims related to DMH-11, which is the main basis for the introduction of this GMO.

Environmental safety testing, bypassing rigorous agronomic evaluation, cannot be a valid basis for yield claims related to DMH-11, which is the main basis for permitting this GMO

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There is also a clear inconsistency between biomass weight and yields. Either the data on these ("vegetative, reproductive and survival biology") parameters has been collected wrongly through unscientific sampling or the yield data being reported has been created to favour DMH-11, or it is a case of both (incidentally, both sets of data were collected the same day, at the time of harvest!). Either way, the entire testing should stand null and void.

- The overall average 28.4 per cent higher yield is also miscalculated by presenting a value derived from average of averages!
- The results of field data as reported by DRMR has been presented with changed values when submitted to GEAC (increased by 15.3 per cent), for BRL I second year data (2011-12) from two two locations where trials took place. These two manipulations (average of averages and changed values) together have notched up the so-called yield benefit of DMH-11 by around 7.5 per cent, in addition to the wrong protocols used.
- There is significant inconsistency in yields as derived from data recorded during the trial for each entry, of plant stand, average number of pods per plant, average number of seeds per pod and average weight of 1,000 seeds and the seed yield in kilos per hectare reported for each entry. Such "derived yields" are not expected to be the same as reported yields of each entry in the trials but the mismatch shows no similarity or trend whatsoever.
- Zone-wise and year-wise evidence of the performance of extensively tested cultivars (more locations and more years of testing, with greater reliability of the average figures of yields of such cultivars which should have been rightly used as the Comparators for DMH-11 testing also) – both hybrids and varieties – and such evidence clearly shows that DMH-11 is not outperforming such cultivars as claimed, and, therefore, yields increasing and India's oil import bill coming down are unfounded claims.

Under the circumstances, any testing of DMH-11 so far for its yield advantage claim has been unreliable in its protocol as well as reporting of data. Further, ICAR's DRMR, in an RTI response, stated that DRMR has not conducted any trial and the data received by DU/NDDB staff was passed to DRMR for onward transmission to DUSC/GEAC. DRMR also provides data to show that DMH-11 GM mustard hybrid is not higher yielding, the letter said.

"The expediency and haste in testing raise serious questions about the scientific competence or integrity of the crop developers. The fact that GEAC has allowed the GMO to proceed this far based on unscientific claims, rigged protocols and violated decisions pointing to incompetence and unscientific bias, is deeply alarming. The developers' claims that national check was used is simple false and we challenge the regulators to show a single trial of GM mustard where a

RTI DATA ON GM MUSTARD CONTINUES TO BE WITHHELD

Given the massive set of issues with the DMH-11 biosafety dossier, it is not surprising that the Ministry of Environment, Forests & Climate Change wants to hide the biosafety data from public scrutiny, saying that it "will do everything that it is legally required to do". The CIC orders of April 1, 2016 have not been complied with so far. This is surprising given that the GEAC had conveniently proffered the minutes of its last meeting in a CIC hearing to show the Central Information Commissioner how keen it was to share information with the public! They are now seeking 90 days time from the CIC until after they finish their review, whereas this argument of wanting to share data after GEAC finishes its review has already been brushed aside by the CIC.

By now, if the regulators were serious, they could have shared all data publicly. By not doing so, they are putting a dent in their own credibility. Should concerned citizens have to resort to their own sleuthing to stumble upon the real story of DMH-11? This is unhealthy. What we present here is based on limited access to information (no health related matters have been analysed so far by us, for instance) and we have reason to believe that other serious discrepancies might be unearthed if data is put out for public scrutiny.

It is time that all documents and correspondence from the beginning pertaining to this GMO are put out into the public domain.

proper check approved for national and zonal level evaluation has been used for BRL testing based on which higher yields are being claimed".

DMH-11 and its parental lines are herbicide tolerant GMOs and the regulators should not have entertained the application

The developer did not apply for DMH-11 and its parental lines as HT crops and used the garb of higher yield claims of DMH-11 through hybridization, which (claims) were also never put to rigorous evaluation. "This GM mustard is Herbicide Tolerant and we believe that it is a Trojan Horse for other HT crops. It is shocking that the GEAC has not done its appraisal as it should have done for a HT crop. In fact, India does not have a risk assessment regime that can assess HT crops' impacts".

Globally, there is a huge debate about herbicide usage and the negative fallouts and the decisions with regard to Glyphosate are well known by now. "This is a rejected hazardous technology being sought to be dumped in India. Given that Bayer Agro Sciences, a Multinational agrochemical and seed corporation has an almost 100 per cent monopoly on the Glufosinate market in India with brands like to which DMH 11 and the parental lines are resistant to, in addition to the fact that patent on bar gene is held by Bayer, one is forced to suspect that this particular GM crop is also being pushed at the behest of multinationals, which will have a huge market out of this, especially in a scenario with increasing glyphosate-related bans".

Significantly, the effect of Glufosinate on honeybees in the context of HT crops has not been studied and mustard is the major food source in northern India for these pollinators during the winter season. The letter explains that the "impact on honey bees will not only impact mustard yields but also that of almost 70 per cent of all crops in north India as bees are the major pollinators for all this. There is a concern about a major potential impact on farm productivity as well as food security apart from the health, environmental and other socioeconomic impacts from the usage of this herbicide tolerant GM Mustard. The disaster

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that is in store for India if it makes an unwise decision about HT crops is very apparent on various fronts. The rejection of the earlier ProAgro/Bayer GM mustard proposal was mainly on this count, as some of the GEAC members might recall". Additional evidence and arguments on this score were also annexed to the letter.

It emphasizes that "this is also a clear case of going against repeated recommendations of various committees against herbicide tolerant crops in India. The majority report of independent experts in the TEC had recommended a ban on HT crops in India, and this matter is still sub-judice while GEAC is entertaining an application of HT crops for commercialization. DMH-11 needs to be rejected outright for being a HT crop".

GEAC deciding on three GMOs on the basis of one incomplete dossier?

The application that GEAC is considering is for "environmental release" (commercial cultivation) of three GMOs – Varuna barnase, EH-2 barstar and DMH-11 hybrid. However, only one dossier has been submitted – it is also seen that biosafety tests, analyses and reports are incomplete for all the three GMOs. For instance, pollen flow studies and crossability studies have not been undertaken for the parental lines. Further, statistical analyses should have been presented specifically for each GMO in different tests. However, this has not been done.

"We believe that it is unscientific and unhealthy that one application for three different events or GMOs is entertained by GEAC and, in this case, we have already shown that one dossier has been maintained for six GMOs in reality! It is clear to us that GEAC cannot take a decision on all three GMOs based on the current data supplied – the testing is incomplete and analysis missing. Each GMO presents its own particular risks and therefore, in this case-by-case approach that the regulators have, they should have prescribed a comprehensive risk assessment regime for each GMO, with its own biosafety dossier built for regulatory decision-making", says the letter.

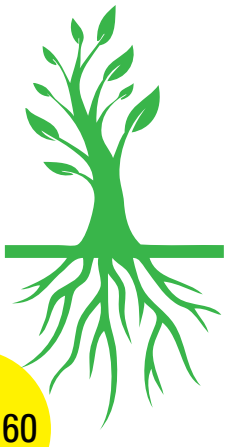
As far as the third sub-application for "approval for use of the two events bn 3.6 and modbs 2.99 for introgressing the bar-barnase and bar-barstar genes into new set of parental lines to develop next generation of hybrids with higher yields, disease resistance and quality traits", is concerned, the letter says: "from what we understand of the regulatory system in India, this should have been applied for with RCGM as fresh research!"

DMH-11 testing absolutely inadequate and incomplete

The letter says that the allegation about the yield results being rigged was being made responsibly. "It is also clear that DMH-11 was never put through some important tests – chronic health safety testing for example. Or its impacts on Indian Systems of Medicine, given that mustard is used in Ayurveda quite extensively in various ways. Similarly, the impacts on honey production and the honey industry by rigorous assessment on impact on honeybees. Experts have been asking for proteomics, transcriptomics and metabolomics related studies which have not been prescribed by GEAC so far and have not been undertaken for DMH-11 either. Only one sub-chronic toxicity study has been taken up, and no animal feeding studies. No risk assessment

Poor standardization of protocols is very apparent in tests for pollination behaviour; one centre studying pollination behaviour in fertile plants, another in sterile plants and a third in both

"As in the case of Bt brinjal, we conclude that with DMH-11 too, the lacunae in biosafety assessment can be summarized as: required tests not done; test protocols not scientific; test data being shoddily recorded or even just doctored; test results being analysed wrongly (in several cases, no statistical analysis exists); conclusions being drawn and asserted contrary to results. In all of this, regulators continue working in an incompetent, apathetic, secretive and conflicted manner. This kind of functioning allows crop developers to claim that they were only following guidelines, after setting convenient and unscientific protocols for themselves. This is not acceptable. The appraisal should have had wise and responsible policy directives applied, followed by needs and alternatives assessment before proceeding on processing the applications being received."



in the context of cold pressed oils, which have found increasing demand and acceptance from consumers, has been taken up. We contend that there are big gaps in the risk and impact assessment taken up on this transgenic mustard".

DMH-11 test protocols are unscientific

The letter annexed several studies to prove that unscientific protocols without any rigour of safety/risk assessment were used in DMH-11 testing and it makes clear that the crop developers prescribed convenient protocols for themselves, rubberstamped by the regulators. This got confirmed through an RTI response given by Delhi University's CGMCP.

The letter presented instances of the methodology used for impact on honeybees, other beneficial insects or for studying aggressiveness and weediness and pointed out that the Shattering Trait is recorded with a Yes or No, ignoring the fact that this is an important trait to have been tested for in detail.

Lack of standardization of protocols for tests is very apparent in tests for pollination behaviour, for instance, with one centre studying pollination behaviour in fertile plants, another in sterile plants and a third in both, with the sample sizes being different in different centres and such others.

There is "analysis to show that conclusions have been drawn wrongly, despite data from the studies showing otherwise. For instance, the crop developers asserting that male sterility breakdown was not seen in any of their extensive observations is an outright lie when data from the trials

Has any assessment been done of how DMH-11 fares in comparison to highly successful, large scale farmer-level experiences of System of Mustard Intensification, for example?

(pollination behaviour) and observations of the CCC visits show otherwise.

The very basis of admitting the GMO application is questionable

Regulators in the field of transgenics are supposed to use standard risk assessment frameworks, which necessarily have to include a realistic assessment of the claimed benefits because decision-making is supposed to involve an assessment of benefits as well as risks, in addition to evaluation of all existing options for an intelligent decision. The letter says: "However, we find that in the case of DMH-11, the regulators have not even begun asking the crop developer basic questions around the claimed benefits".

- Will heterosis in one variety increase yields to an extent that India's oil imports will come down as is being claimed?
- What are the base conditions for the same and do they exist? Is that borne out with the real life experience of DMH-1 which is a non-transgenic hybrid with heterotic vigour that came from the same crop developers?
- Have regulators studied why farmers actively rejected DMH-1 and what impact did DMH-1 have on oil imports after its release in 2009-10?
- What about the existence of several other hybrids in the market and oil import bill not coming down?
- Have other safer and established alternatives to increasing yields of oilseeds in general and mustard in particular been evaluated?
- Has any assessment been done of how DMH-11 fares in comparison to highly successful, large scale farmer-level experiences of System of Mustard Intensification, for example? Have experiences of other countries, which have CMS-based rapeseed mustard hybrids doing quite well, been documented and assessed?

It is thus a matter of serious concern that GEAC allowed this application to move forward this

long without such basic questions being asked, the letter says and adds: "We reiterate our long standing demand once again that need assessment and alternatives assessment should precede the processing of any application for open air release of GMOs. Even this, after applying sensible policy directives to acceptance of an application in the first instance. This is after all fulfilling the mandate of GEAC/EPA 1989 Rules and the fact that the Committee has been renamed as an Appraisal body and an Approval body for a very valid reason". The letter asks that the benefit claim assessment should also be rigorously taken up as should risk assessment.

DMH-11: Concerns with male sterility and herbicide tolerance

The data in the reports of field trials and the Central Compliance Committee's visits to field trials for monitoring establishes that the male sterility trait of Varuna barnase line is not stable, sometimes breaking down. In fact, the CCC reports of 2014-15 record it in all locations (Ludhiana, Nov. 2014; Bathinda, Oct. 2014; New Delhi, Mar. 2015) even though pollination behaviour observations report this only from Ludhiana.

- "This means the very basis for approval of DMH-11 needs to be examined thoroughly, since with such a breakdown, the purported advantage of prevention of self pollination and possibility of heterosis will be affected. In what conditions does the breakdown happen, to what extent, with what implications? There is no data on how much of the yields, pod formation and seed setting in Varuna barnase is due to such male sterility breakdown and how much due to cross pollination. It does not appear that this question was verified by GEAC before allowing BRLII trials, or even before proceeding with second year BRLI trials", the letter says.
- It is also clear that the Male Sterility trait will spread, affecting possibilities for farm-saved seed and subsequent crop performance, the letter emphasizes. "Intra-specific cross pollination is inevitable, given our smallholdings. This will most certainly have implications for the yields of mustard growers and does not augur well for the farm livelihoods of mustard farmers. We also argue that selection pressure does exist in favour of DMH-11, given the yield lure being promised and the use of herbicide tolerance trait/herbicide".
- Herbicide tolerance trait will also spread further and farmers will indeed use herbicide Glufosinate (which is disallowed as per the Insecticides Act in mustard) on their mustard crop in future, even though the crop developers coyly keep saying that "herbicide usage is not recommended". It is ridiculous to think that farmers won't use herbicides because the "crop developer has not recommended". Herbicide usage will have its own huge environmental and health implications for mustard growers and consumers. Such implications have not been assessed at all in the case of DMH-11.
- Cross pollination will be much higher than what is being projected – the protocol adopted for testing pollen flow does not assess the actual cross pollination levels, but only distance. In fact, the good seed setting observations in Varuna barnase is an indication of the cross pollination potential, as per the crop developers themselves.

NO LIABILITY REGIME IN PLACE

We have been demanding for a long time now that a proper liability regime has to be put into place for the risks and damages that are bound to arise from environmental release of GMOs and this is missing even now. Without having such a liability regime in place, how is GEAC even considering a commercial cultivation approval?

There are of course several other issues of concerns, including on the matter of IPRs: while GEAC has ascertained that patents are currently held outside for some genetic materials used, it is clear from the crop developer's statements elsewhere that some patents are held in India too. Further, several patents are also held by MNCs on the genes used. In any case, nothing prevents the crop developer from claiming those patents in future, or even assigning them off to other entities. It is clear from a reading of all existing material that the government has not studied the implications of this from the perspective of farm livelihoods or even criminalization of farmers (the infamous 'Percy Schmeiser' case where 'patent infringement' was 'found' involved GM canola using the same technology as DMH-11). It appears that developing and commercializing a HT crop, thereby controlling the farmers' choices through both seed and chemicals and profiteering on both counts, cannot be ruled out. Moreover, the use of a GURT technology clearly undermines farmers' interests.

Infringement of rights of choice for farmers and consumers

It is clear that any "environmental release" of DMH-11 (as the GEAC terms commercial cultivation) will leave no choices for farmers or consumers. "This will irreversibly contaminate existing non-GM seed stock. Such a contamination will affect all farmers and will immediately affect the organic status of organic mustard growers in particular. It will also impact all those organic farmers who use mustard seedcake as a soil amendment since organic regulation prohibits this too. The impact on honey producers will also be adverse. As far as consumers are concerned, they will also be left with no choices of knowing what they are consuming, given that no labelling regime is enforced in the country", says the letter.

Conflict of interest destroys public faith in regulation

Conflict of interest, which is repeatedly compromising scientific rigour in this field in India, has its ugly role to play in the entire story related to DMH-11. This includes the facts that:

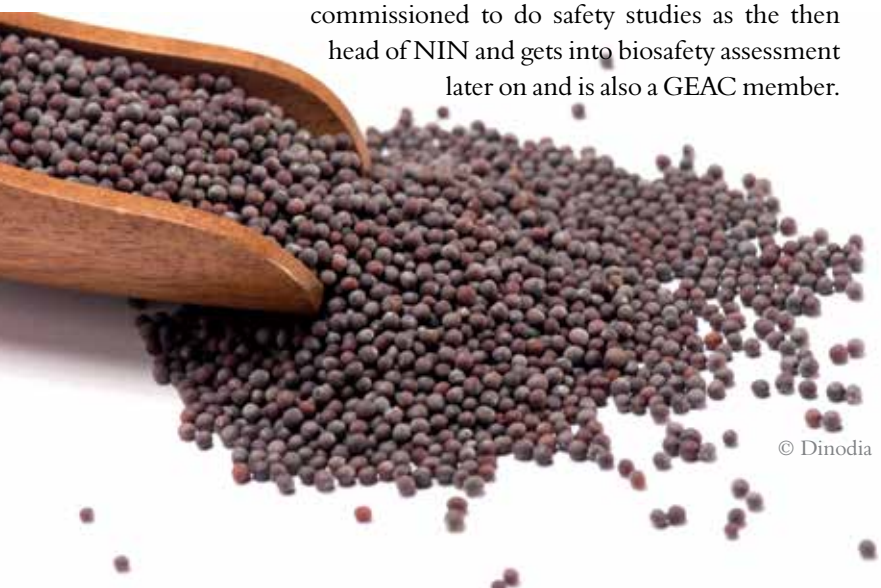
- A scientist in the crop developer team, Akshay Pradhan, who is involved in each stage of DMH-11 R&D and testing, is also a GEAC member (it is only now that he indicated that he will abstain).
- Deepak Pental, one of the main applicants is the head of the Research Advisory Council of DRMR was supposed to oversee the trials and got to set his own test protocols.
- That DBT sits in meetings that decide to formulate a proposal, accepts the proposal, funds the project and also ostensibly assesses biosafety and there are news reports of DBT's GEAC representatives declaring on social media that everything is conclusively safe about this GM mustard.
- The head of RCGM in MoST is on the board of an industry-funded body ILSI and also gets commissioned to do safety studies as the then head of NIN and gets into biosafety assessment later on and is also a GEAC member.
- That a PPP consortium with several private players called Biotech Consortium India Limited (BCIL) gets funded by taxpayers' funds in the DMH-11 project to prepare a roadmap for biosafety assessment and to prepare the dossier.

Why should the nation be asked to trust this set of scientists with clear conflicts of interest as regulatory decision-makers, to do comprehensive and rigorous risk assessment? Are there no other independent scientific experts in the country for such biosafety assessment, given that regulation is mainly about risk assessment and not just about efficacy of traits introduced, the letter asks.

Have the regulators failed the nation?

The GEAC is expected to perform its duty thoroughly, since the safety of food and environment of all citizens is at stake here. All the findings raise serious questions about failure of the regulators. The letter says: Appealing to your integrity and scientific rigour, we ask GEAC members the following questions:

- Were GEAC members aware of all the serious irregularities including swapping of parental lines midway through the testing process, usage of wrong comparators and so on? If so, why were these issues not tackled earlier and how did the application get this far? Why, and on what basis, were permissions given for large scale field trials?
- If these issues were not noticed and debated earlier, is that because of failure to examine the biosafety dossier or reluctance to raise difficult questions or pressure to give clearance?
- Why would a sub-committee feel compelled to finish its job within 15 days, that too when the planting season was already underway?
- Why is it that the regulators do not even ask for raw data and get to study it and see if it is different from what is being reported, and whether further independent analysis is required?
- Why is it that regulators have ignored biosafety violations pointed out not just by civil society groups but by their own CCC teams during field visits? When will the GEAC talk of action taken on complaint filed?
- Many GEAC members do not attend meetings and GEAC takes important decisions without even a decent quorum (with just 11-12 members out of 30+ members). Can a regulatory body like GEAC have (hurried) decision-making with such sparse attendance and participation?



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DISAPPOINTMENT WITH THE REGULATORS

"We daresay that among the public and concerned citizens, there is a great disappointment with the regulators. There are serious questions whether they are being brought under pressure to give clearances. We also have media reports indicating that some regulators are giving statements that everything about DMH-11 has been proven safe. We know that rigorous testing has been avoided by postponing risk assessment to 'post-release monitoring' which show a pre-conceived mindset amongst the regulatory body that the current application has to be approved, irrespective of scientific fraud or risk – this essentially is experimentation on the citizens of India, both farmers and consumers.

We are aware that the GEAC members are not full-time members and are caught in their own research or administrative/bureaucratic work and have reason to believe that they give very little time to this role. This then does not fit well with the responsibility on hand of protecting citizens from the risks of gene technology (EPA 1989 Rules).There are many examples of failure of regulators, whether it be the case of illegal introduction of Bt cotton, continued illegal cultivation of HT cotton, clearance to Bt brinjal without proper appraisal and such others. The GM mustard biosafety dossier, the little that we were able to study, is an excellent illustration of violations and fraudulent procedures and claims, and the regulators have chosen to keep mum about it. GEAC is clearly compromising on its scientific mandate at the cost of environment, health of citizens and livelihood security of our farmers. As current members of GEAC, we believe that you are in a position to take corrective action and chart a different course in view of the findings presented here. We ask you, are you ready to do so?"

- How can a GM regulatory body function without representatives from the Health Ministry, when the health of all citizens is at stake? Similarly, where are the representatives of AYUSH Ministry (other than being invited once)?

DMH-11 GM mustard will take away farmers' sovereignty

The lack of concern and the levels of complacency that the regulators have exhibited so far with this GMO application is worrying. "The implications for farm livelihoods are serious with this male sterile, herbicide tolerant technology deployed herein. Leave alone the yield benefits claimed, farmers in fact are going to incur losses if they use farm saved seed, and lose their sovereignty if they don't. Non-GM neighbouring farmers will also be forced to shift to external seed sources due to male sterility related losses and herbicide damage".

The letter goes on to make specific demands given that scientific and independent evidence provided shows lack of scientific basis, rigour, competence, integrity and responsibility in the case of R&D and testing of DMH-11. Given that extremely successful and safe alternatives exist to improve mustard yields, the letter reiterates its demands:

- Reject the current application in toto and immediately, for all three GMOs.
- Fix liability on crop developers for false/incorrect evidence provided wilfully to regulators in addition to violations of biosafety norms laid down for field trials as shown in the civil society complaint to you and your own CCC reports – blacklist such applicants in the regulatory system.
- Put out all documents pertaining to DMH-11 R&D from its inception into the public domain immediately.
- Record in full detail the discussions in the Special Meeting of the GEAC in its minutes and put out the minutes in the public domain, along with copies of all the presentations and this letter. ●

THE BOTTOMLINE

GM technology is a living technology that is imprecise, irreversible and uncontrollable. GMOs in general and this DMH-11 are unneeded, unwanted and unsafe. There is rejection of this GMO in particular as well as GMOs in our food and farming in general, by state governments, by scientists from various fields of expertise, from farmer unions, from consumer movements, from environmentalists and from ordinary citizens. It is apparent that the only way GM crop developers are able to move forward is through the kind of lax and bad-science-driven regulation that we are witnessing with regard to this GM mustard.

The GEAC must indeed stop its business-as-usual approach and bring in a complete overhaul of the regulatory system or must contend with the serious loss of credibility and trust from the public.

Palia Kalan: From Jungle Raj to Jungle Raj?

Ajay Vir Jakhar

I drive to Palia Kalan, in the vicinity of Dudhwa National Park, to be with friends who farm. The area was a favourite destination for hunting expeditions in days of the Raj with a railway line laid for the crown prince's hunting party. The famous Tiger Camps was a private enterprise organizing these hunts. Its owners have shut shop now and shifted to the more lucrative business of politics.

In the first decade of the last century, while the Wright brothers were experimenting with their first flight, an enterprising entrepreneur in Palia Kalan, Bam Bahadur Shah, purchased land from the siblings of the protégé's of the erstwhile Awadh nawabs. This area formed a part of the Khairgarh state, so named after the khair forest. Khair tree leaves are what yields catechu (*kaththa*) used in *paan*.

When the British were forced to concede Independence, they partitioned the Indian sub-continent. Tormented and displaced, migrant Sikh farmers from Pakistan started to arrive in Palia Kalan. Almost every family coming to Palia bought land from the Shah family. Life was tough, the area full of swamps and wildlife. Movement was restricted in the rainy reason. Probably every farmer family lost a member to malaria in these swampy parts.

Till around 1980 one had to cross the Sharda river by a ferry to reach the farm lands. Earlier, the richer landlords crossed the river and swamps on elephant back in the rainy season. All that changed after 1980, when bridges got built and infrastructure was developed. Productivity increases started thereafter. Electricity was available even before proper roads were built. Samarth Bahadur Shah tells me that electricity supply has improved from the earlier four to six hours to 16 hours per day now. A commendable feat, he says. I also meet Pradeep Singh whose family arrived in 1950. He talks of days of the yesteryears when "Powerline", the all metal wheel tractor, was popular.

The paddy yield is normally 25 quintals per acre and the wheat yield is 20 quintals per acre. It is the paddy harvest season and harvesting is on full

swing. It would be a delightful sight in Punjab and Haryana. While economists constantly harp about stopping Minimum Support Price (MSP) purchases and farmer organizations talk of increasing MSP, to Palia farmers this is a redundant issue, rarely having had the fortune of getting MSP. They have actually sold at the stipulated MSP only once, around 2008. This is the law of another kind of jungle!

This is not east Uttar Pradesh where the crises is recognized. It is western U.P. just seven hours from Delhi. Clearly the system has failed. When I discussed the issue in Delhi, I was told by government officials, on conditions of anonymity, that private traders and companies pay for procurement not to start. I was aghast at the audacity of the private sector commodity firms and the conniving officials.

Since government agencies do not procure paddy or wheat at the promised MSP, private rice-millers and private companies have a big presence exploiting farmers who need to sell their produce, whatever the cost. This is all about crony capitalism. Thus paddy sells for ₹950 per quintal instead of ₹1,520, which is the MSP available to farmers in Punjab and Haryana.

Worse, farmers here are compelled to transport their produce to far-off places like Karnal in Haryana at ₹130 per quintal or to Ludhiana in Punjab at ₹150 per quintal. Even when they manage to reach the mandis in other states, the commission agents do not give them the MSP rates but only about ₹1,350 per quintal. Subsidies for farming are well nigh impossible to get and most farmers prefer not to tap state or central government programmes that supposedly benefit farmers. Corn yields 40 quintals per acre and is the new crop in the area even though farmers do not expect any MSP for maize. In fact, many do not even know that maize has an MSP.

Small farmers tell me that forestry is the ideal crop for the area but being close to the forest means that permissions from the many government departments, including the forest department, police, transport department and state government, are difficult to get. The bribes go up to ₹40,000 per acre! Those who do venture to plant trees prefer to plant poplar instead of eucalyptus because eucalyptus is also a produce of the forest.

Large swathes of land are under sugarcane plantation. It is the best crop; yielding about 250 quintals per acre on an average, that could be improved with better practices. The quality was better earlier and the crop less disease infected;

Sugarcane is the best crop in Palia Kalan, yielding about 250 quintals per acre. The quality was better earlier, the crop less disease infected. It can be improved with better practices

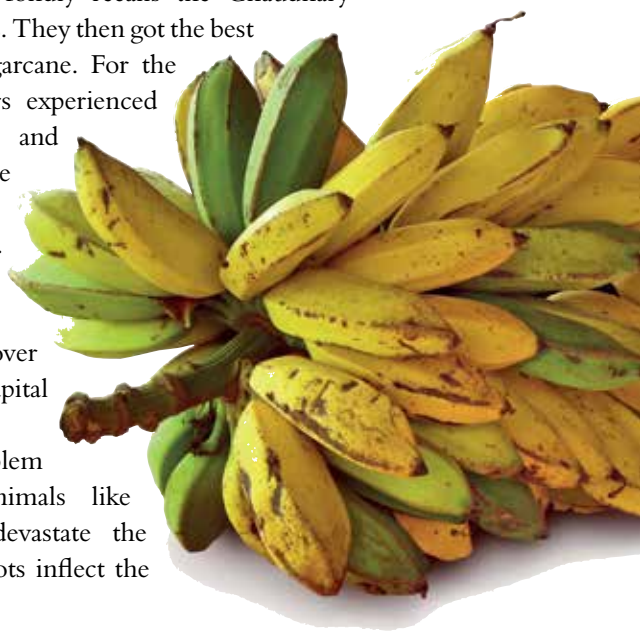
same varieties could be replanted for many years. Today the need for fertilizer has increased and the immunity from pests and disease seems to have decreased. Extension and research have failed to build on the initial momentum of the green. This is precisely why the Green Revolution itself is being questioned now.

There are six sugar mills in the area. Bajaj Hindustan is the oldest and the biggest with a 110 million tonnes. capacity. The Cane Commissioner is an important person; the face of the state, whose writ runs large over all stakeholders. Till two years ago the mill was a good paymaster but the last three years have been bad. Various governments over the last decade have left no stone unturned to destroy the sugar industry and the farmers are suffering the consequences.

The other important crop in the region is bananas. It is also a new crop of the last decade but facing marketing challenges now. Only progressive farmers with capital have been able to take advantage of the crop.

Pradeep Singh is a descendent of a family that settled here. He fondly recalls the Chaudhary Charan Singh days. They then got the best ever rates for sugarcane. For the first time, farmers experienced real prosperity and saved considerable sums. Those days are long gone. Gloom has settled in just as smog settles over the National Capital Region of Delhi.

One major problem is that wild animals like the wild boar devastate the crops. Pretty parrots inflect the




Samarth Bahadur Shah

The Delhi air pollutes the countryside for 365 days; Delhi deals with pollution caused by the burning of crop stubble for three weeks in a year

maximum damage. Avian looks deceive, just as the government does. The wildlife enthusiasts should actually visit the farmers to hear their sorrows. Farmers insist on being compensated for their loss as they are not permitted to kill the wild animals.

The local people, the 'Tharu' come from the forest to work as labour and their plight continues to be sad. The many programmes for their well-being and to mainstream them do not seem to be delivering. The few amongst them or their leaders have manipulated the benefits for themselves. I meet people who nostalgically think the rule of the Raj was better. Of course, those claiming this absurdity were born after India gained Independence.

History has a way of distorting perceptions. It is the same as in China where Mao is fondly remembered even though his policies led to millions of Chinese dying as he destroyed agriculture during the Long March. I regret not having written about their plight but I have to leave it for another time.

Returning to China, history enthusiast Samarth feels that had India focused on the food processing industry in rural areas like China did, it would have fared much better. Bad policy at the centre is to blame, he adds. Even for him, there is the lingering doubt about whether Independence has not been as fruitful for farmers as it has been for other sections of society. He is not alone in his belief.

Walking on the streets, I get to meet ordinary folks who complain that progress has created more problems than it has solved. There is electricity, TV, roads, rudimentary medical facilities and people have the power to elect or remove a government in power but they feel deprived of pleasures of life. The local youth is migrating out and even looking for jobs in distant Andhra Pradesh. Jobs and improved livelihoods have not followed progress.

There is also the question of alcoholism that I raise and the response answer hits me hard. As much as 75 per cent of the youth is alcoholic. I ask what the definition of youth is. Anyone above the age of 14, I am told. There is no restriction on teenage purchase of alcohol; alcoholism is rampant here. One wonders if Nitish Kumar is right in banning liquor sales in Bihar. The local hooch manufacture will negate any such ban, the youth tell me. The local brew is not only more potent and healthy but is cheaper too, I am informed.

My last trip to Palia some time back was in the general compartment of a train with no sitting space. It is necessary to experience such realities to remain grounded. Leaders fail to understand the frustrations and needs of the deprived sections of society. The 'Garibi Hatao' slogan of Indira Gandhi still rings hollow here; acts such as nationalization of banks or land ceilings have not yielded the desired results. Palia can be a case study. The inequality in society is increasing sharply again and resentment is on the rise.

I hire a taxi to take me to the railway station of Shahjahanpur. To my horror, the train is running 14 hours late. I have commitments in Delhi so the driver finds me a bus on the highway. The bus has sleeper berths! I wonder if the transport authority has allowed berths/beds on buses. There seems to be a safety issue without seat belts though I am thrilled to get a ride home. It is a ride to remember. A berth at the last row of the bus is a night long rollercoaster ride. It has shaken every atom in my body by the time I am back in Delhi.

I enter Delhi that is enveloped in a layer of smog and find the state government and the populace blaming farmers for it. Air knows no politics; the polluted Delhi air pollutes the countryside for 365 days a year; Delhi has to deal with pollution caused by the burning of crop stubble in the neighbouring states for about three weeks in a year. With that thought I continue to my farm and, 'No', I am not burning my stubble. ●

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