It's Poor Agricultural Research That Ails India's Agricultural Growth

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"Although the ideal can not be realized, one or two changes or rather a single change might revolutionize a country."
- From Plato's Republic

Recently, I chanced upon the website of Economic Advisory Council to Prime Minister (www.eac.gov.in) and read its latest report (released on 12th July 07) on "Economic Outlook for 2007-08". Dr. C. Ranga Rajan and his team of economists have done a wonderful job of analysing Indian agricultural sector. What appeals most is that you do not find in this report any trace of traditional excuses for non growth in our farm sector. The report in fact subtly disregards, disputes and throws into dust bin many oft repeated, stale and self serving claims of our armchair agricultural scientists. My scientist friends will excuse my strong language. I know many of you are talented and committed. But the likes of you remain in minority – outmanoeuvred and suppressed by your armchair counterparts in agricultural universities. Blissfully for them, our institutional system demands no accountability for flaws and failures. Hence they get away fatal ignorance and blunders. Latest edition of "Handbook of Horticulture" released in July 2006 by Indian Council of Agricultural Research (ICAR) recommends Endrin for crop pest control in banana. Endrin
Consortium of Indian Farmers Associations

was banned in India and world wide nearly 20 years ago. India is the largest producer of banana in the world. But our agricultural scientists do not know what to recommend and what not to recommend for pest control in banana. The book also recommends a variety of insecticides and fungicides for pest and disease management in opium crop. ICAR scientists are probably the first and only ones in the entire world to recommend an impressive range of pesticides for protecting opium crop! Do they know that not a single pesticide is registered in India for use on opium crop? You will now understand why I call our agricultural scientists as armchair scientists. The famous lines in Bible “Oh Lord! Forgive them. They know not what do they do” is perfectly applicable to a majority of them. When I said this the other day, a farmer leader retorted “No… they need to know… it is their duty to know. Therefore, even the Lord must not forgive them” Any way, let me reserve discussions on this to another day and turn to the report of Dr.C.Ranga Rajan and his team. The excerpts- my remarks are shown in italics.

- Indian economy is expected to grow by 9% during 2007-08. The economic growth is primarily driven by acceleration in industry and service sectors.

- Agricultural sector is expected to grow by only 2.5% during current financial year [a further slide from last year’s 2.7%].

- India’s agriculture is favorably placed both in terms of arable land and irrigated land [yet its performance continues to be bad].

With 161 million hectares of arable land, India stands second and is very close to USA, the world’s largest (176 million hectares). China ranks third with 130 million hectares. However, when it comes to irrigated area India has the largest in the world. India has 55.8 million hectares under irrigation, followed by China and USA with 54.5 and 22.4 million ha.
respectively. (Yet our agricultural productivity is far less than in China and USA and many other countries)

**Average Yield 2003-2005**

<table>
<thead>
<tr>
<th>Crop</th>
<th>India</th>
<th>China</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rice</td>
<td>3034</td>
<td>6233</td>
</tr>
<tr>
<td>Wheat</td>
<td>2688</td>
<td>4155</td>
</tr>
<tr>
<td>Groundnut</td>
<td>1109</td>
<td>2886</td>
</tr>
</tbody>
</table>

Unit: kgs/ha  
Source: FAOSTAT

- Gains in crop productivity is very poor over time in India compared to other countries. [This clearly points to poor agricultural research in recent decades]

- While farm sizes are small in India, they are larger than in China. Average farm size in India is 1.4 ha whereas it is only 0.4 ha in China. [Therefore the size of farm in India is no excuse for poor yields. This is the most favourite excuse from of our agricultural scientists].

- Farm mechanization in India (as represented by intensity of tractor usage) is greater than in China. India has 15.7 tractors per 1000 ha while China has only 7 per 1000 ha). [Oh, yet another common excuse gets buried].

- China is the largest user of fertilizers in the world with 28% share followed by USA(13.6) and India(11%). Ratio of NPK consumption in India is exactly similar to China. [India stands almost at par with USA in fertilizer consumption].

- Percentage of agriculture & horticulture accounts for 68% of total output in farm sector in India and animal husbandry & fisheries account for 28.5%. In China, the ratio is 50% and 44%: [In other words, in China, farmers attention to both agriculture and animal husbandry is almost equal. This probably contributes to a higher net farm income in China].
The report, "Economic Outlook for 2007-08," however, does not carry any analysis of what ails our agriculture. In this article, I attempt to analyse that part of the subject left out in the report— in a bold language supported by lots of data.

So, size of the farms is not the constraint in India for poor agricultural growth, as rightly pointed out by Dr. C. Ranga Rajan.

Farm mechanisation is not the constraint.

Lack of irrigation is not the constraint either, as India has the largest area under irrigation in the world.

India enjoys more "sunlight days" than China, USA, EU etc. (Have you ever heard anyone referring to this? What is freely available is always ignored!)

Why, then, India’s agricultural growth trails far behind China?

Quality of agricultural research and agricultural policy decisions make a huge difference between India and China.

I repeat, quality of agricultural research and agricultural policy decisions make a huge difference between India and China.

First, agricultural research:

An USDA bulletin (no 775) says "since 1980's China’s government has heavily supported research.....that could potentially allow farmers to produce more food from China’s limited land area."

China has not only emerged as a major food producing country, it is now the world’s third largest food donor — after USA and EU.

The less we say about India’s agricultural research post 1985, the better. My scientist friends tell me that there is more politics than science inside the corridors of Indian agricultural
universities. This politics kill professionalism and pride. While work is questioned in our agricultural universities, non-work is not. Therefore, many talented scientists choose inaction to action. Labs rarely remain open beyond 5 pm. A leading newspaper, Tribune (7th May 2001) had this to say about agricultural research in Punjab Agricultural University (PAU).

“90% of PAU’s budget is consumed by staff salaries; another 7% on peripherals leaving only 3% for research”

Only 3 percent! This means that for every one crore rupees allocated, only 3 lakhs go into research. What kind of research output one can expect from our agricultural universities?

India’s current agricultural productivity (kgs/ha yield) is equivalent to what China achieved way back in 1985 in many food crops. Why can’t we hold our agricultural scientists accountable for this shoddy show? India has the largest number of government paid agricultural scientists in entire world. India has over 30,000 scientists and technicians working in 39 state agricultural universities and over 500 Krishi Vigyan Kendras (KVKs) besides plethora of crop specific research centres. What are they doing? In the last 20 years, they have not developed elite germplasm for our principal food crops. There is perceptible fatigue in plant breeding. Visit the web sites of our national agricultural research centres; you will develop nausea.

The website of Indian Council of Agricultural Research (ICAR) states that development and adoption of new varieties doubled oil seed production from 12.6 million tons in 1987 to 23.4 in 1997. But, why to stop with 1997? Pray, what happened to oilseed production after 1997? Well, here lies the reason for ICAR blacking out production data post 1997 from public view. Our oil seed production have come under a long period of stagnation after 1997 and is at 25.29 million tons in 2004-05, the latest year for which data is
available. (Source: Agricultural Research Data book 2006). Understandably, this data is inconvenient to ICAR scientists and hence they love to hide. After all, who questions ICAR?

ICAR’s website further states (sans data of course) that wheat productivity increased 7 times in India thanks to its work in development of improved crop varietal technology. This is totally false and farce. Our wheat productivity in (kgs/ha) was 2281 in 1990-91 and 15 years later i.e. in 2004-05, it crawled to 2718. Even if we push the base year by 35 years to 1970, the productivity has just registered 2 fold increase between 1970 and 2005. Where is 7 fold increase that ICAR talks about in its website? ICAR must either give data or withdraw this fancy/false claim. If our wheat productivity has indeed registered 7 fold increase in the last 35 years, we will not be importing wheat now.

(Note: Between 1970 and 2004, percentage of area under irrigated wheat in India had increased from 54 to 88 (Source: www.iastp.res.in) This must be factored in too before attributing agricultural research to productivity increase during this period.)

In case of pulses, our production nosedived from 14.26 million tons in 1990-91 to 13.38 in 2004-05 even as our consumption (and consequently imports) has shot up. Our country is paying a heavy price for inefficiency in agricultural research in pulses and oilseeds. During the year 2003-04, India imported 1.7 million tons of pulses. Similar trend can be seen in oil seeds production too. India’s production of primary oilseeds slipped to 15.8 million tons in 2002-03 from 22.1 million tons in 1995-96. Our import of edible oil went up during this period from 1.16 million tons to 4.3 million tons.

Here is hard data that shows that ICAR has slipped into sleeping sickness – with no body to wake them up so far.
Between 1997 and 2001, there has been a 50% reduction in number of research varieties released by ICAR. No data has been made available after 2001. Similarly in case of horticultural crops, ICAR released 61 varieties during five year period 1990-1995. It dropped by 30% to 42 during the next five years. (Data source: Agricultural Research Data book 2006). Of the varieties released, no body knows how many have had successful and widespread adoption by farmers and how many remained merely in papers and records. I am yet to see a report by ICAR that regularly reviews field adoption and performance of crop varieties developed and released by them. I understand that many new varieties released by ICAR do not grow beyond glossy annual reports of ICAR institutes and universities. This explains why there exists a gap between agricultural research and agricultural development in India. Government of India must constitute a monitoring committee to assess the utility value and field worthiness and field adoption of plant varieties and technologies released by ICAR scientists. The claims of agricultural scientists must be assessed in farmer’s fields and not in micro plots within university campus.

As per China Agricultural Year Book-2005, between the years 1999 and 2004, Chinese authorities received and assessed as many as 2046 applications for registration of new plant varieties. China uses DNA molecular technologies for
testing seed quality. Chinese scientists use advanced techniques in plant cell & tissue culture, haploid breeding, anther culture, binear hybrid rice, etc to continuously improve farm productivity and farm income.

Where does ICAR stand in this arena?

One may wonder whether budget was or is a constraint. Data, in this case, however shows a hefty growth.

**Investments Agricultural Research & Education**

(ICAR & DARE) Rs in crores

<table>
<thead>
<tr>
<th>Year</th>
<th>Budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997-98</td>
<td>3301.70</td>
</tr>
<tr>
<td>1998-99</td>
<td>4245.20</td>
</tr>
<tr>
<td>1999-00</td>
<td>4558.45</td>
</tr>
<tr>
<td>2000-01</td>
<td>5165.40</td>
</tr>
<tr>
<td>2001-02</td>
<td>6846.00</td>
</tr>
</tbody>
</table>

**ICAR**: Indian Council of Agricultural Research

**DARE**: Division of Agricultural Research and Education

**Data source**: Agricultural Research Data book 2006

Between 1997 and 2001, there has been 100% growth in spend. Sadly, however, there is a disturbing disconnect between expenditure and research output. ICAR appears to operate in an island of zero accountability to deliverables. As mentioned earlier, there exists a big gap between ICAR’s academic research and their actual utility value and adoption by farmers. One scientist privately remarked “the aim of our agricultural research is to present papers in seminars and to produce annual reports! Naturally, this severely retards our growth in farm sector.

Latest data shows that rate of growth of India’s rice production is the lowest in Asia.
Growth in Rice Production in Asia (1961-2005)

<table>
<thead>
<tr>
<th>Country</th>
<th>Growth in Production (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pakistan</td>
<td>334</td>
</tr>
<tr>
<td>Myanmar</td>
<td>260</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>245</td>
</tr>
<tr>
<td>China</td>
<td>226</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>178</td>
</tr>
<tr>
<td>Thailand</td>
<td>166</td>
</tr>
<tr>
<td>India</td>
<td>144</td>
</tr>
</tbody>
</table>

Source: World Rice Statistics from IRRI

India’s growth rate is lower than that of small countries like Pakistan, Myanmar, Sri Lanka etc. The entire blame should go to poor research. Our farmers still predominantly use rice varieties released nearly 20 years ago.

Paddy area and production in China and India (2004)

<table>
<thead>
<tr>
<th>Country</th>
<th>Area</th>
<th>Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>28</td>
<td>186</td>
</tr>
<tr>
<td>India</td>
<td>42</td>
<td>124</td>
</tr>
</tbody>
</table>

Area: Million hectares  
Production: Million tons

India has 50% more area than China but produces 50% less than China! In other words, paddy productivity in China is 100% higher than India.

Though India’s performance in horticulture is better than in agriculture, its growth rate is far below China. While, India’s growth is sluggish, China leaps forward.

Production of Fruits & Vegetables (Million tons)

<table>
<thead>
<tr>
<th>Year</th>
<th>India</th>
<th>China</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>55</td>
<td>60</td>
</tr>
<tr>
<td>1990</td>
<td>75</td>
<td>150</td>
</tr>
<tr>
<td>2003</td>
<td>135</td>
<td>450</td>
</tr>
</tbody>
</table>

Source: FAO
In 1980, the production was almost equal between India and China. But there is a huge gap between the two by 2003! Though Apple is originally a crop of Europe, China now grows nearly 50% of apples produced in the world. It is also the largest exporter of apples.

Between 1994 and 2004, total export value of China’s fruits and vegetables more than doubled from $2.3 billion to $5.1 billion according to USDA. India’s export of fruits and vegetables is less than $1 billion.

By end of our eleventh plan (i.e. by 2001-12), India’s food grain production is expected to reach 337 million tons from the present level of 208.

Oilseed production is to reach 58 million tons from present level of 16.

Production of pulses is to reach 30 million tons from current level of 14.

To achieve 11th plan targets, we need to produce 50% to 400% more than what we produce today in these principal crops with no increase in India’s net cultivable area which will continue to be at the present level of 142 million hectares. Targeted increase in agricultural production during 11th plan period is, therefore, possible only with increase in crop productivity (yield/acre). Crop productivity increase is possible only with high quality, field extendable research. Therefore, the million dollar questions are: (1) Does ICAR have any blue print as to how to increase crop productivity in order to achieve 11th plan agricultural production targets? (2) Does ICAR still have inherent skills to produce high quality agricultural research whose results can be replicated in millions of farms? ICAR has miserably failed us in the last 20 years—from mid 80s onwards. As said earlier, ICAR is in deep slumber. Though ICAR remains structurally strong, it is functionally weak. Who will whip up ICAR and make its
scientists work and be accountable for results? In China, if an agricultural scientist does not perform, he or she gets replaced. Will our central and state governments do the same here?

A recent survey conducted by M/s Pulse Australia shows that India would need to import as much as 3-5 million tons of pulses in the coming 5 years. Australian farmers and exporters are gearing up to meet India’s requirements. India has the largest cultivated area under pulses in the world. Yet, we are unable to produce adequately to meet our domestic demands.

In just three years (from 2003 to 2005), China’s rice production went up from 160 million tons to 180 million tons and wheat from 86 million tons to 97 million tons, and its agricultural GDP from $209 billion to $282 billion according to latest data released by National Bureau of Statistics of China. Whereas in India, production of rice and wheat have shown a near stagnation. Our crop productivity and production will go up only if we do what China did – reforming agricultural research. Unless our authorities show the proverbial stick before our agricultural scientists now, India’s eleventh plan agricultural production targets will merely be a pipe dream.

Now, something about our agricultural policies.

As a policy, China imports low yielding crops (low yielding under China’s agro climatic conditions) so as to free up domestic lands for higher yielding crops. This makes excellent sense- agriculturally, environmentally and economically. Prof. Huang Jikun, Director of the Centre for Chinese Agricultural Policies has this to say “The demand for Soya bean is growing, but rather than meet it domestically, we have realized that it is better to import it. We should instead focus on what we are most suited to be producing.”

Do we have such well thought about policies? India’s average productivity of Soya is just around **one ton per hectare**.
as against three tons in Argentina. Yet we have nearly 8 million hectares under Soya. Why can’t we follow China and stop producing crops that are alien to our agro clime and instead focus on our traditional core crops (for example pulses) where we are chronically short of requirement. Why should we import red gram (tur dal) from Myanmar every year? Why should our edible oil import steadily go up? Do we have a think tank to decide on what to grow and what to import? If not, why not?

"With China’s entry into WTO in 2001, agricultural research and development has been restructured to improve international competitiveness of China’s agricultural products", claims a statement from China. India became WTO member six years earlier than China. Our ICAR has failed to deliver R&D that helps enhancing international competitiveness of Indian agriculture.

For our agriculture to remains alive, active and vibrant, our agricultural scientists must lead from front.

"Everything else may wait but not agriculture"
- Jawaharlal Nehru

But, our agriculture has got into an eternal wait. It has been waiting for a miracle from ICAR.

Needed, a strong action from government to make ICAR relevant and useful to over 100 million farm holdings in India.

ICAR has the world’s largest team of agricultural scientists and technicians. They should deliver world class service to Indian farmers. Our government must immediately intervene and make necessary reforms and corrective actions to make ICAR truly professional, productive and accountable.

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