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**India's Tryst with Destiny in Agriculture**

Presidential Address

by

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**Introduction**

Jawaharlal Nehru referred to India's tryst with destiny on the midnight of August 14-15, 1947 and urged that with the dawn of freedom we should work for a nation where every child, woman and man has opportunities for good health, nutrition, education and employment. Thanks to public policies and investments over the last 60 years as well as the enormous progress made by the country in agricultural research, education and extension, impressive achievements have been made in improving agricultural productivity and production on the one hand, and human longevity, on the other. The contributions of public good research in India will be clear from the following data:

- Foodgrain production increased from about 45 million tonnes in 1951-52 to over 200 million tonnes at the beginning of this century
- Productivity of major cereals increased from 700 kg per hectare in 1961-62 to over 1700 kgs per hectare now

- The net area under irrigation increased from about 21 million hectares in 1951-52 to over 60 million hectares now; gross irrigated area has also increased by over 300 percent. Groundwater irrigation has played the lead role in bringing more area under irrigation, thanks to technological advances
- Annual Milk production has gone up from about 20 million tonnes in 1950-51 to nearly 100 million tonnes this year (2007), thereby taking India to the first position in the world in milk production. This was achieved through management innovations spearheaded by the National Dairy Development Board, leading to mutually reinforcing linkages among milk production, processing and marketing.
- Both marine and inland fisheries have registered impressive progress : a major contribution to this progress has been made by scientific advances in the production of seed, feed, and induced breeding as well as crafts and gear
- Science and technology coupled with social engineering have helped to promote conservation, restoration and commercial forestry, and the regeneration of coastal mangrove wetlands
- Significant progress has been made in the development of affordable drugs for the control of malaria, tuberculosis, leprosy, cholera and the other diseases; small pox has been eradicated and leprosy is likely to be eradicated soon
- Many nutritional disorders like those arising from micronutrient deficiencies have now affordable remedies through a food-cum-fortification approach
- Rural drinking water supply has been made nearly universal through the design of simple water pumps and the application of remote sensing and hard rock drilling techniques

- Rural energy systems have gained enormously from scientific work related to the harnessing of biogas, biomass, solar and wind and other forms of renewable energy. Nuclear power generation based on indigenously developed technologies is making an important contribution to energy security. Bio-fuels are also receiving increasing attention.
- Great progress has been made both in space technologies and in the peaceful applications of atomic energy.
- Global leadership has been achieved in the field of Information and Communication Technologies (ICT) and it is now possible to bridge the urban-rural digital divide through **Gyan Chaupals or Village Knowledge Centres** under the Every Village a Knowledge Centre movement.

In spite of all this progress, an atmosphere of gloom and doom on the farm front is prevailing during this 60<sup>th</sup> anniversary year of our independence. The contribution of agriculture to GDP has gone down below 20 percent although nearly two thirds of our population still depend upon agriculture for their livelihood. Nearly 80 percent of the farm population operate small holdings, the average size of holding being 1.41 ha. Out of a total geographical area of 329 m ha, over 142 m ha constitute the net sown area. Nearly 63 percent of this area is rainfed. A recent study by the National Sample Survey Organization (NSSO) has revealed that nearly 40 percent of the farmers interviewed will like to quit farming if they have another option. How do we reverse this situation and bring back the pride in farmers and farming which was prevalent during the green revolution days of nineteen sixties and seventies?

### **Major Challenges**

In this lecture I would like to deal with the following six major challenges agricultural scientists and policy makers have to grapple with in order to revive the “we shall overcome spirit” of the nineteen sixties.

- ❖ **Defending the Gains** : The fertile crescent area covering Punjab, Haryana and Western UP is currently the mainstay of our food security system. Unfortunately this region is facing serious ecological and economic problems. Ground water depletion is taking place at the rate of two to three feet every year and there is also salinization of soils. Economically, the cost – risk – return structure of farming is becoming unfavourable with the result that a majority of farmers are indebted.

In such areas it is important to promote conservation farming, minimum tillage and green agriculture. Conservation Farming involves efficient soil health and water management and adoption of the principles of precision farming. Green agriculture promotes the application of ecologically sound techniques like integrated pest management, integrated nutrient supply, crop - livestock integration, and the use of the most appropriate crop and variety. Green agriculture, unlike organic agriculture permits, the use of the minimum essential mineral fertilizers and chemical pesticides. It also permits the planting of genetically modified crops. The National Commission on Farmers (NCF) has suggested that there should be separate certification procedures for the products of organic and green agriculture.

The other important requirement is the conservation of prime farm land for agriculture. There has to be a land use strategy in every State based on the principles of ecology, economics, equity and employment generation. The available land should be classified by a professionally competent Land Use Advisory Service into the following categories:

- **Conservation areas** like forests, national parks, biosphere reserves, etc.,
- **Restoration areas** which require attention from the point of view of land care and soil health improvement

- **Sustainable intensification areas** which are ideal for crop and animal husbandry and fisheries and agro-forestry and for promoting an ever-green revolution leading to advances in productivity in perpetuity, without associated ecological harm.
- **Industrial and non-farm use areas** with low biological potential for agriculture and which are ideal for industries, housing, roads and special economic zones.

Once such a classification of the available land made in every State, it will be easy to promote the harmonious development of agriculture and industry. It should be borne in mind that sustainable agriculture is not only the backbone of the livelihood security system of the rural population, but also the main prerequisite for national sovereignty. In addition to water conflicts, we are now witnessing land wars. **This is just the tip of the iceberg since the worse is yet to follow keeping in mind the vast pressure of population on land and the jobless growth nature of modern industry. At present, only agriculture comprising crop and animal husbandry, marine and inland fisheries, agro-forestry and agro-processing, can promote job-led economic growth.** The sooner, a scientifically and politically acceptable system of land use is developed with the best available remote sensing data and professional expertise, the better will it be for avoiding conflicts and confrontation with farming communities. **The potential of land wars halting the economic progress of the country should not be ignored any longer.**

Land diversion for non-farm purposes is being done in some cases by invoking the provisions of the Land Acquisition Act of 1894. This Act is totally outdated and the following clause is particularly anti-farmer and pro-rich. “In determining the compensation, the court shall not take into consideration any increase to the value of the land acquired likely to accrue from the use to which it will be put when acquired.” There are some who would like to see large numbers of farmers with small holdings quitting farming by selling their land to business and industry. Land Markets which will provide a fair deal to small farmers are being suggested for this purpose. Those who propose such

an **exit** strategy for farmers should also suggest an **entry** strategy. Where will the farmers who sell their land go for their life long livelihood? **Exit and Entry strategies must be proposed together. The most urgent need in our country is the mandatory introduction of a livelihood impact statement in all development and commercial projects in the area of industry and retail trade.** The introduction of a few large transnational super markets will affect the livelihoods of millions of women and men engaged in small scale retailing. **Infact micro-retail enterprises provide the largest number of livelihood opportunities both in urban and rural areas. Job destruction and job creation must be concurrent events, if we are to avoid social chaos and unrest.**

- ❖ **Extending the Gains** - As mentioned earlier, we have a large reservoir of untapped production opportunities in the country. (Table - 1). Such an untapped yield reservoir is a major strength of our rural economy.

**Table 1**

<b>Comparative Crop Productivity (kg/hectare)</b>			
<b>Crop</b>	<b>USA</b>	<b>China</b>	<b>India</b>
Maize	8900	4900	2100
Paddy	7500	6000	3000
Soybeans	2250	1740	1050
Seed Cotton	2060	3500	750
Tomato	6250	2400	1430

We should immediately plan to introduce mutually reinforcing packages of technology, techno-infrastructure, training and trade in order to create the following two additional Fertile Crescents in the country:

- ❖ **Bihar – Eastern UP - West Bengal and Assam region** : This region has abundant water availability and good soils. What is important is to pay attention to the conservation – cultivation – consumption – commerce chain in its totality. All the links in the chain should be attended to. As in the first fertile crescent area

of Punjab, Haryana and Western UP, assured and remunerative marketing opportunities hold the key for stimulating farmers' interest in producing more.

- ❖ **Tamil Nadu – Karnataka – Andhra Pradesh and Orissa region** : Now that the Cauvery Water Tribunal has given its judgement on water allocation in the Cauvery basin, the time has come to concentrate on the efficient use of the available water. The Government of India is initiating this year, **“A More Income and Crop per Drop of Water”** movement all over the country. This region should take a very active part in this movement so that the maximum income can be generated through synergy among water, crop and variety, macro and micro nutrients, implements and market.

The above two additional fertile crescent areas will help the country not only ensure the stability of food supply for the Public Distribution System but also income and work security for millions of rural families.

- ❖ **Making New Gains** – The opportunity for making new gains is maximum in the 63 percent of agricultural area which is purely rainfed. Rainwater harvesting and aquifer recharge together with the cultivation of high value and low water requiring crops will help to improve the productivity of the major crops of dry farming areas such as pulses and oilseeds. These areas are waiting for the so-called “second green revolution”. **Attention to this area will also help to prevent inflationary pressures arising from the high cost of pulses, oilseeds, vegetables and fruits.** Attention to dry farming areas is the best insurance against inflation as well as hunger and poverty. These areas are also ideal for animal husbandry and horticulture. Yield and income enhancing technologies for dryland areas such as the cultivation of **hybrid arhar** (pigeon pea) are available. Pulses Villages can be established along with smallholder horticulture and dairy estates.

Thus, defending the gains involves safeguarding the heartland of the green revolution. Extending the gains to other States where irrigation water is not the major constrain will

involve the immediate creation of two more fertile crescents in eastern and southern India. Making new gains will help to uplift the productivity and economy of rainfed areas. Unless we increase consumption, production will not go up. Hence, a universal PDS will confer the double benefit of stimulating farm production and erasing the unenviable reputation of being the home to the largest number of malnourished children, women and men in the world.

### **Meeting the Challenge of Climate Change**

The Intergovernmental Panel on Climate Change in its fourth assessment report released during February 2007 has drawn attention to the following facts and possibilities

- ❖ Eleven of the last twelve years (1995-2006) rank among the 12 warmest years in the instrumental record of global surface temperature. The total temperature increase from 1850 – 1899 to 2001 – 2005 is 0.76°C
- ❖ Global average sea level rose at an average rate of 1.8 mm / year over 1961-2003. The rate was faster over 1993-2003 about 3.1 mm / year. The total twentieth century rise is estimated to be 0.17 meters.
- ❖ Temperature for the next two decades : a warming of about 0.2°C per decade is projected. Even if the concentrations of all greenhouse gases and aerosols had been kept constant at year 2000 levels, a further warming of about 0.1°C per decade would be expected.
- ❖ Surface air warming in the 21<sup>st</sup> Century : Best estimate for a low scenario is 1.8°C and best estimate for a high scenario is 4°C
- ❖ It is more than 90% certain that there will be frequent warm spells, heat waves and heavy rainfall. It is more than 66% certain that there will be increase in droughts, intensity tropical cyclones and extreme high tides.
- ❖ Increasing atmospheric carbondioxide concentrations would lead to increasing acidification of the ocean.

We should not lose any further time in setting up **Interdisciplinary Research Centres on “The Management of Climate Change”**. Also, in every Panchayat, one woman and one male member should be trained as **Climate Managers**. The aim will be to minimize the adverse impact of aberrant weather and maximize the benefits of normal monsoons. There is also need for anticipatory research to meet the challenges of drought, floods and sea level rise. For example, at MSSRF, Dr Ajay Parida and his colleagues have been working on the transfer of salt tolerance from the mangrove species *Avecennia marina* to rice, pulses and other crops of importance to coastal agriculturists. Similarly work is in progress to transfer genes for drought tolerance from *Prosopis juliflora*. The uncommon opportunities opened up by the possibility for transferring genes across sexual barriers should be fully tapped.

### **Giving the Power and Economy of Scale to Small Farm Families : Need for a Small Farm Management Revolution**

The phenomenal success achieved in the dairy sector owes much to the organization of producer’s cooperatives. This enables the provision of key centralized services, particularly in post-harvest processing and marketing, to support decentralized small scale production. In addition to cooperatives, there are several methods of providing the power and economy of scale to small producers through SHGs, producer companies and contract farming. There is a great opportunity for promoting mutually beneficial contract farming systems based on a win-win situation for both the producer and the purchaser. **In order to ensure that contract farming is pro-small farmer, it will be useful if a multi-stakeholder Sustainable Contract Farming Council is set up in every State.** The most important requisite for success is assured and remunerative price for the produce at the time of harvest. A code of conduct has to be developed to promote successful and socially sustainable and equitable contract farming systems.

If symbiotic systems of contract farming with both public and private sector organizations can be fostered, it may be possible to introduce **Universal Crop Insurance** at the village level. Also, the provision of credit and other essential inputs can be

arranged at the right time and place. There is need to improve the efficiency and economics of small farm agriculture. The smaller the farm the greater is the need for marketable surplus, so that the farm family can have a reasonable cash income. A Small Farm Management Revolution is the pathway to achieving the UN Millennium Development Goal relating to the elimination of hunger and poverty.

Agriculture is the largest private sector enterprise of India. Land is individually owned and land use decisions are individually made. Different modes of mutually beneficial contract farming have always existed, as for example, in sugarcane and tobacco. We should derive lessons from successful models and extend their extrapolation domain to other crops like cotton, pulses, oilseeds, vegetables, fruits, flowers and medicinal plants. The contract between the rural producers and urban purchasers (particularly large corporate entities) should not become an unequal social bargain. The proposed State Contract Farming Council should promote symbiotic **Private (urban purchaser) – Private (rural producer)** partnerships. Only then will contract farming become a blessing and not a curse.

### **Eliminating the Knowledge Deficit in Rural Areas**

In addition to the Small Farm Management Revolution, we need to improve our methodologies for bridging the growing gap between potential and actual yields, even with the technologies on the shelf. The following steps will help to eliminate the expanding know-how/ do how gap:

- Establish Farm Schools in the fields of outstanding Farmer-achievers, in order to promote farmer to farmer learning (Land to Land)
- Train one woman and one male member in every Panchayat as Farm Science Managers and familiarize them with issues like genetically modified crops and farmers' rights
- Restructure **Krishi Vigyan Kendras** as **Krishi aur Udyog Vigyan Kendras**, in order to end the prevailing mismatch between production and post-harvest

technologies, on the one hand, and to promote concurrent attention to on-farm and non-farm livelihood opportunities, on the other

- Establish **Gyan Chaupals** or **Village Knowledge Centres** to promote quality trade and legal (with reference to Farmers' Rights) literacy and to provide dynamic information on meteorological and marketing factors
- Organise 60,000 Lab to Land demonstrations in the areas of post-harvest technology, agro-processing and marketing
- Establish a State Farmers' Commission for continuous and structured interaction with farm families in technology and policy related issues.

The above are some of the 21<sup>st</sup> Century challenges facing us. For every problem, there may be several solutions. We should not take to easy solutions like importing food, pulses, and other commodities from outside, which may sound attractive in the short term but will prove to be disastrous in the long term. We should remember that in our country the majority of consumers are also farmers, since they constitute two thirds of the population. Therefore, the consumer – producer differentiation made in industrialized countries where hardly 3 percent of the population is engaged in farming, is not valid under our conditions. Improved agricultural productivity is the only pathway available to us for achieving Jawaharlal Nehru's agenda for our Tryst with Destiny namely, "ending of hunger, poverty, ignorance, disease and inequality of opportunity". We can achieve inclusive economic growth only through accelerated agricultural progress.