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PRESIDENTIAL ADDRESS

Secondary Agriculture: A Driver for Growth of Primary Agriculture in India*

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At the outset, I sincerely thank all the members of the Indian Society of Agricultural Economics for electing me as the President for the 72nd Annual Conference of the Society. I wish to record my thanks to Professor C. Ramasamy, President and office bearers of the Society. I consider it as a great honour and privilege to share my thoughts on secondary agriculture sector for driving the growth of primary agriculture in India with the distinguished members of the Society and invitees.

We are all aware, Pandit Madan Mohan Malaviya, the great visionary created historical milestone by establishing Banaras Hindu University (BHU) in 1916. Since then, BHU has significantly contributed towards producing great freedom fighters, institution builders, teachers and scientists of modern India. It is befitting that the 72nd Annual Conference of the Indian Society of Agricultural Economics is being held in such a sacred temple of learning-the BHU.

THE CONTEXT

It has been a remarkable journey for India to move its agriculture from a state of being a net importer to the one with self-reliance. In this process, India has adopted various institutional interventions, technology and policy regimes as the key drivers to guide the agriculture sector. During the pre-green revolution period (1960-69), the sector grew at a rate of 0.7 per cent, with the policy support of land reforms and the development of irrigation. In the green revolution period (1968-76), adoption of technology particularly high-yielding varieties (HYVs) and chemical inputs with continued thrust on irrigation and extension boosted agriculture growth to 2.26 per cent. But, this revolutionary growth was mainly confined to wheat in irrigated areas of North India. The growth rates were comparatively higher during the periods of wider technology dissemination (1975-83 at 2.34 per cent) and diversification (1988-

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95 at 3.21 per cent). Agricultural growth in this period was mainly supported by institutional credit, subsidised input supply and incentive schemes (minimum support price). However, the same momentum could not be sustained in the post-reform period (1995-2005 at 2.31 per cent because of inefficient input use, degradation of productive resources and drought. The recent initiatives of government, like Rashtriya Krishi Vikas Yojana (RKVY) and National Food Security Mission (NFSM), National Horticulture Mission (NHM) have given a significant turnaround by increasing agricultural growth to 3.13 per cent in the period of recovery (2004-11) (Chand and Parappurathu, 2012).

The last two decades witnessed a different scenario with the liberalised economy by which the primary sector also had to face international competition and prove its worthiness in the ability to produce with better market competitiveness and efficiency. There was a significant shift in terms of agricultural production from traditional field crops to the horticulture and commercial crops and non-land based activities of livestock and fisheries. Many studies indicate that the high growth in the high value commodity sector has given a push to the growth accomplished by the primary sector at large. The high value commodities (HVC) achieved a growth rate of 4.1 per cent, while that of non-HVC was just 2.3 per cent for the period 1981-2009. There is also a wide debate on the decision allowing Foreign Direct Investment (FDI) in organised retailing to link producer to markets and thereby improve farm profitability and growth.

The farm economy is undergoing a gradual transformation with access to education and an opportunity for off-farm employment. With the profitability becoming a question mark, the younger generation with education and expertise prefer to pursue employment in the non-farm sector. In most villages, the farming activity is pursued by older generation. It is an accepted fact that younger folk play a vital role in technology adoption and are getting acquainted to the novel changes and this is another cause of concern. The reducing and variable farm income is found to be the driver of this transformation. In addition, the labour folk are moving out in search of better opportunities. As the saying goes, *flying with the blowing wind*, rural population seems to be willing to go with the booming Indian off-farm economy, which is quite natural. The flagship programmes of Government like MGNREGS and subsidised food grain distribution are either reducing farm labour availability or increasing the latency of not doing work, as labourers earn their living just by working for few days in a month. The reduced availability of labour and exceeding wage rates seem to be influencing, among other demand and supply factors, the gradual shift of agricultural production towards HVCs/horticulture crops with low labour dependency. These developments give rise to a serious threat for food security on one hand and a challenge of handling the excess production of horticultural crops on the other.

India lags behind in terms of Human Development Index, food and nutritional security attainment that the developed world and even the fastest developing BRICS

(Brazil, Russia, India, China and South Africa) countries other than India, have been able to do. Let me first highlight some of the lacunae that we find at a glance, of the progress we have made. The most important aspect pertaining to our agriculture is high human resource relying on the primary sector, which has long been stated to be an inefficient indicator. It is quite obvious that about 55 per cent of the population should depend on 14 per cent of the national income (agriculture sector), while the rest 'high income share' is joyously enjoyed by the rest of the population. On the one hand we have fluctuating agricultural growth and on the other we have distress in farm sector. The issues of concern are that only a few regions and crops are growing, benefiting only a section of farmers, others being left out of the growth process. Again, the reducing farm size, dwindling profitability, resultant indebtedness and farmers' suicides are a matter of concern. The problem is augmented with the absence of suitable technology (fatigue), investment, quality assurance, innovativeness and industry leadership. The farmers most often complain that they are not properly rewarded for their production efforts. The supply chain for most agricultural commodities is highly fragmented with multiple intermediaries contributing to the inefficient handling and high transaction costs. The supply chain is characterised by lack of sufficient and efficient facilities like processing, product-specific transport models, grading, certification and packing.

The food processing sector in India is still in a nascent stage with only 8 per cent of the produce being processed as against 80-98 per cent in case of high income countries (Government of India, 2008). The food processing sector is now receiving the boost with the annual growth of 13.2 per cent in registered food processing units during 2004-10 (Government of India, 2011a). In the above backdrop, there is a strong need to strategically handle the situation in order to facilitate a self-sustainable and long run growth of the sector, which I feel is possible by focusing on secondary agriculture. Though not a panacea for all ailments of the primary sector, it can definitely drive the growth.

I wish to make an attempt to define the term secondary agriculture so that we all know what is covered in my address. Though some previous attempts have been made by the Planning Commission and academic circles, defining the term 'Secondary Agriculture' specifically was found lacking. Many of you may wonder that it encompasses all the post-production activities until it reaches the ultimate consumers, which is nothing but the definition of agricultural marketing. Secondary Agriculture includes "all practices and process which add value to primary agricultural commodities by using efficient technologies, market information and consumer preference". It should be noted that the term value addition in agriculture is a process of increasing the economic value and consumer appeal of an agricultural commodity. It is basically an alternative production and marketing strategy.

Secondary agriculture, driving the growth of primary agriculture is visualised as under:

- (a) Planned withdrawal of working force from primary sector by establishing appropriate linkages with secondary agricultural sector.
- (b) Encash the changing demand towards value added products by promoting diversification of primary agriculture so that farmers improve their production base.
- (c) Building strong demand through value addition and promotion for under-utilised crops such as minor millets, medicinal and aromatic plants and crop by-products so that farmers realise higher returns.
- (d) Encouraging rural industrialisation so that the demand for primary produce is increased as they are used as raw material by the industry and the required quality inputs are made available to improve primary agriculture.
- (e) Improve the supply chain management so that the transaction cost is reduced and market is expanded for primary agricultural commodities.
- (f) Develop human resource to undertake research and extension relating to secondary agriculture so that its expansion and increased efficiency will benefit the primary sector.

POTENTIAL OF SECONDARY AGRICULTURE

The secondary sector is regarded as a sunrise sector for the Indian economy, owing to its immense untapped potential. The impetus for development of secondary agriculture has been firstly due to consumers demand for value added goods like ready-to-eat, ready-to-serve, convenience food, functional food and nutraceuticals in both domestic and international markets. This is again favoured by the growth of organised retail which makes the processed food easily available to the consumers. Secondly, the fast depletion of natural resources used for industries has created a demand for utilisation of non-conventional renewable agro-bioresources. Thus, demand-side factors are key drivers for creating market opportunities for end products of primary agriculture through the growth of secondary sector.

Changing Consumption Pattern: There is an increase in the consumption of HVCs between 1993-2010. The NSSO data reveals that chicken consumption increased by 400 per cent followed by eggs (108 per cent), banana (57 per cent), vegetables (45 per cent), apple (43 per cent), mango (44 per cent), fish (32 per cent) and milk (7 per cent). During the same period consumption of all cereals had reduced by 14 per cent of which coarse cereals consumption had plunged by 63 per cent followed by rice (9 per cent) and wheat (0.7 per cent) (Government of India, 2011b). These facts lends evidence of a clear shift from staple food grains, towards fruits and vegetables, livestock products, and fisheries. The producers have also responded to the changing demand by reallocating production portfolio in favour of HVCs (Sharma and Jain, 2011). Unlike staple foodgrains, these HVCs require comparatively high level of processing, logistic and storage.

Increased Preference for Value Added Products: In India, only around 8 per cent of the country's total agriculture produce undergoes value addition. The highest value addition is seen in milk (35 per cent) followed by marine (26 per cent), buffalo meat (20 per cent), poultry (6 per cent) and fruits and vegetables (2.2 per cent). The level of value addition is higher in developed countries for the same products; milk (60-70 per cent), fruits and vegetables (65 per cent), buffalo meat, marine and poultry (65-70 per cent). The low value addition is attributed to the non-availability of processable varieties of raw materials, seasonal nature of production, lack of adequate post-harvest infrastructure such as processing, cold chain, transportation and proper storage facilities. But, there is a perceptible increase in the consumption of value added products in some HVCs (ranging between 5 to 37.5 per cent during 2002-08). It was high for fruit juices/pulp/concentrates (37.5 per cent) and potato chips (35.5 per cent) followed by *vanaspati* (7.4 per cent) and vegetable oils (5.0 per cent) in vegetable and fruit sector. In the dairy sector, infant milk product (10.4 per cent) had higher increase followed by butter, ghee and other fats from milk (5.4 per cent) and ice creams (5.7 per cent); poultry products increased by 26 per cent and marine products by 8.5 per cent. In contradiction to diminishing overall cereal consumption during the last two decades, consumption of grain based value added products have shown positive trend. Breakfast cereals, confectionery, biscuits, bread and flour milled products have registered a positive growth ranging between 27.5 and 2.8 per cent (NPC, 2010). These facts and the utility deriving factors of increased shelf life, assured quality, nutritive fortification and ease in handling provide ample scope for value addition.

Huge Production Base: India has achieved self-sufficiency in cereals, fruits and vegetables, milk and egg production. It ranks first in world for millets (over 1/3rd) and pulses (1/4th) production (FAO, 2012). India ranks second in world production of both rice (133.7 million tonnes) and wheat (80.7 million tonnes). Among oilseeds, India stands second in groundnut (19 per cent) and rapeseed and mustard (13 per cent) production in the world. In non-edible oil sector, India dominates in castor production (3/4th) and ranks second in lentil (20 per cent) (Government of India, 2011b). Our country is the second largest (247.54 million tonnes) producers of both fruits and vegetables (Government of India, 2012a). India ranks second in global production of sugarcane and cotton with 21 per cent each.

The growth in registered Food Processing Industry (FPI) is high at 13.2 per cent per annum than unregistered FPI (1.5 per cent). This is a very good indicator, as the industry is responding to the market forces and picking up in a big way. However, a close look indicates that 75 per cent of the processing units are under unorganised category which leads to diseconomies before full potential is reached. In the unorganised sector, it is difficult to streamline the supply chain, employ efficient technology, organise backward linkage, product tracing and compliance of institutions. Unscientific storage, transit and networking in supply chain results in

post-harvest wastage. A nationwide quantitative assessment of harvest and post-harvest losses conducted by Central Institute for Post Harvest Engineering and Technology (CIPHET) in 2010 revealed that cumulative wastage is the highest for fruits (6-18 per cent) followed by vegetables (6-12.5 per cent), cereals (4.3-6.1 per cent), pulses (4.3-6.1 per cent), oilseeds (6.0 per cent), poultry (3.7 per cent), fish (2.9 per cent), and meat (2.3 per cent) (Government of India, 2012b). These inefficiencies can be minimised by creating an accountable value chain through enhanced participation of the organised sector. It is apt to concentrate on the high-end processing, as it will be highly beneficial and brings more remuneration to all the stakeholders.

Initiatives and Incentives in Promoting Value Addition: Government has appreciated the need for value addition in the agricultural sector and has identified it as one of the thrust areas. By 2015, government has a vision to increase the level of processing from 8 to 20 per cent, value addition from 20 to 35 per cent and share in global food trade from 1.5 per cent to 3 per cent. To bring this vision into reality there is a need to strengthen the infrastructure for food processing sector with integrated supply chain, storage, preservation and marketing facilities. In this regard, government has taken up few remarkable initiatives like establishment of mega food parks, creation of integrated cold chains, modernisation of abattoirs, quality control laboratories, and R and D, human resource development and capacity building through the establishment of National Institute of Food Technology, Entrepreneurship and Management (NIFTEM) and Indian Institute of Crop Processing Technology (IICPT). Government also enacted an integrated food law through Food Safety and Standards Act and set-up Food Safety and Standards Authority of India (FSSAI) to implement the provisions of the Act. The FDI up to 51 per cent is allowed under automatic approval route in food processing (except milk food, malted foods and flour) and all items of packaging industries, which needs to be utilised effectively.

ROLE OF SECONDARY AGRICULTURE IN UNDER-UTILISED SECTORS

India has a rich biodiversity coupled with diverse agro-climatic conditions that offers opportunity to produce diversified agricultural commodities. However, some commodities are under-utilised. Secondary agriculture should focus on identifying the novel applications, potential markets and develop utility based value products to promote these under-utilised resources. The paper has identified four under-utilised sectors with high potential for value addition, thereby creating opportunities for primary sector growth.

Minor Millets: Cultivation of minor millets in India has a history of more than 3000 years. But, its area has reduced drastically from 7.7 million ha in 1955-56 to 2.13 million ha in 2011. Basically, millets lacked the wider policy support as other

cereals in the form of inputs, technology and incentives. So, its cultivation was confined to marginal and sub-marginal lands resulting in low returns, consequently limiting its cultivation to self-consumption. Recognising its nutritional and ecological significance, government has allocated Rs. 300 crores in 2011-12 under RKVY project for promotion of millets through improved production and value addition techniques and intends to generate consumer demand for millet based food products. Hence, there is a tremendous scope for millet-based value added products by organising efficient supply chain that can propel its production through increased demand.

Medicinal and Aromatic Plants: The plant based pharmaceuticals, herbal medicines, perfumery, cosmetics, fragrances and food flavour industries have been of importance. Out of 9,500 plant species identified by the government, 65 plants have a huge and consistent demand in world trade which needs to be properly tapped. The export earnings could be increased by innovations in the field of post-harvest technology and improving quality. Developing testing procedures/analytical facilities and certification to meet stringent international standards and product/process development for low cost chemicals from both raw materials and other by-products, is the priority.

Biodiesel: The domestic capacity of crude oil being limited; the growing concern on environment protection compels tapping environment friendly source of fuel needed for our economic growth. The trees such as Pongamia, Jatropha, Neem, Mahua and Simarouba can be grown on marginal/cultivable waste land (4.17 per cent of geographical area) which does not compete with food production but can provide additional income to the farming community.

Cotton By-Products: In cotton, seed and stalks are important by-products. Cotton seeds are valued as feed and oilseed. Currently, the stalks are used as fuel but, there is a vast scope for use of cotton stalks to yield value added products such as paper and pulp, soft board, particle boards, hard board, briquetting and microcrystalline cellulose. To harness these benefits, few constraints need to be addressed, viz., absence of an established cotton stalk supply chain, uncertainties in dry land agriculture leading to inconsistent supply of raw material, and industry's hesitation to use any new raw material (CIRCOT, 2011). Using huge amount of stalk as raw material by board industries results in employment generation, increased income to farmer, saves valuable forest resources and protects environment.

RURAL INDUSTRIALISATION – A VITAL LINK BETWEEN PRIMARY AND SECONDARY SECTOR

The most disturbing part of India's growth story is that it has widened regional imbalances, especially between farm and off-farm sector, which could cause serious social and political problems. This imbalance can be reduced through rural industrialisation mainly by making use of primary agricultural commodities as the raw material. Promotion of agro-based industries through rural entrepreneurship is

one of the effective ways to tackle the problem. While, it can improve accessibility to cheaper inputs, agricultural production can be ideally absorbed for necessary primary and secondary processing. Though some may feel that input related industrialisation has to be dealt separately, I wish to discuss it under the banner of secondary agriculture as it plays a crucial linkage to the primary sector. The inputs necessary for production that can be catered by the rural industrialisation consists of nutrients (both organic and inorganic origin), quality seeds and farm mechanisation. Investment intensive inorganic fertiliser production may not be attempted as it is more organised but micro nutrients and bio-fertilisers can be manufactured based on regional needs. Seeds, though are available, its quality especially in the case of field crops is a concern. Seed production and processing can be taken at a decentralised level, making use of technical backup of State Agricultural Universities (SAUs) and private companies. The seed clusters that have emerged in Hyderabad, Bangalore, Nashik and Terai regions can be replicated in other regions. The SAUs through their Krishi Vignyana Kendra (KVKs) seem to be delivering quality service, with public agencies requiring improvement in their quality.

Mechanisation is an essential component that needs some elaboration. The persistent question of how high human resource dependent on primary agriculture is to be systematically moved to other profitable sectors can find an answer here. Some of the recent studies have indicated that in the recent years, the farm labour availability has come down due to its absorption in public sector employment generation programme (MGNREGS), migration and possible wilful unemployment due to availability of subsidised foodgrains. Here, we propose an argument that the excess labour in the 'primary agriculture' can be profitably shifted to 'secondary agriculture' with proper capacity building. The falling labour productivity as highlighted in many studies can be tackled through selective mechanisation. So, bringing mechanisation through Rural Service Centres (RSC) for a cluster of villages will benefit the farming community.

We find that majority of food processing activities are concentrated near the terminal consumption centres. Mere location of these activities near district/taluk production centres can boost the growth of agriculture sector. It can contribute to the absorption of local production and reduce the lengthy supply chain by establishing direct linkage with producers. This can result in greater price realisation for producers on the one hand and cheaper raw material to the processors on the other. The locally available cheap resources add to the cost effectiveness of processors by improving their supply chain by ensuring stable and remunerative price to the farmers.

Food parks that have developed recently in many parts of the country are at different levels, some have achieved success, few have failed and there are some at intermediate levels. The factors relating to performance of food parks relate to their location, lack of infrastructure, poor management and business approach. In addition, there is a need to emphasise on an integrated system of food storage with irradiation and cold chain facilities to minimise post-harvest losses and facilitate value addition

and create employment opportunities in rural region. The Government needs to and provide strategic locations, connectivity through network of roads and rail and uninterrupted power supply to support such industries in rural clusters where Agriculture Export Zones (AEZs) and Food Parks can be located. The secondary agriculture industries are to be part of these clusters. The coordination of activities of a host of entities: commercial, governmental and NGOs may help to synchronise investment decisions to reduce risk. It essentially acts as a catalyst that starts off a virtuous cycle of introducing modern technology to improve productivity that increases incomes and enhancing the ability of users to pay for the services. As the need for such services grow in rural areas, they must be made available within reach to stimulate rural economy beyond any rural planning that has been envisioned so far. The government has to play a key role by its own investment and through initiatives such as Global Investors Meet (GIM) in promoting PPP, that has succeeded in attracting investments in the states of Gujarat and Karnataka.

EMERGING MARKETING FORMATS

Farmers successfully undertake the production activities facing the associated pest, disease, weather and other risks. After overcoming all these hurdles, the produce needs to find a good price in order to reap the benefit of all his efforts. The marginal and small farmers, due to the small surplus often face problems in marketing their produce. So, to say in reality they 'sell' their produce, being unable to successfully 'market' it. Now a days many alternative marketing formats are emerging. Contract farming with processors, exporters and organised retailers; direct sales; producers organising into collective action such as associations and self-help groups have met with certain degree of success. Following the suit of U.S.A., New Zealand and Denmark, India seems to have found the avenue for formulating Producer Companies (PC) which is an emerging option today to overcome the above cited problems. It was as early as in the year 2002, PCs came into existence under the Companies Act, 1956 based on the recommendations of the expert committee headed by none other than our own peer, Dr. Y.K. Alagh (Ashish, 2011). It gives corporate outlook, away from the co-operative boundaries, which could not succeed in a big way to attend to the producers marketing problems. It further gives economic strength and enables strategic alliances with boards, companies or corporations, integrators and exporters as a unit with sufficient bargaining power (Alagh, 2007).

Again, it should be ensured that the provisions of PCs are not mis-utilised by the corporate world in pursuit of tax benefits as in the case of tax exemptions provided for agriculture lands that are commercially used. The existing viable farmer co-operatives, farmers' interest groups and farmers associations can easily be scaled up as PCs. The available statistics indicate that there are about a thousand PCs functioning in India. Kerala state has pioneered the initiation of PCs (mostly

promoted by activists and progressive farmers). Of late, many other states have joined. Madhya Pradesh Government has given boost under its poverty alleviation programme for starting as many as 17 companies with 45 thousand share holders transacting a turnover of about Rs.5 crores per annum. Gujarat, Assam and Jharkhand have also initiated similar programmes. The different formats need to be evaluated for their strengths and replicated depending upon the local needs, earlier to attempts have been made by international institutions, SAUs, NGOs and Governmental organisations, lacked proper exit plans resulting in unsustainable attempts. The Small Farmers Agribusiness Consortium (SFAC) is also working on promoting such collective actions for high value commodities.

The attempts by the private companies such as ITC (*e-choupal*), DCM Shree Ram (*Kissan Hariyali Bazaar*) and others provide farmers with all the technical and physical farm inputs and household articles (may be few formats), apart from providing them market information and procurement avenues. Thus, they serve as “one stop” solution for all farmer needs. The provision of technical and information support are on a nominal payment to make it affordable to the farmers that entangles them with a trade-off with their own profitability. Most of these initiatives, as present are not self-sustainable and efforts to make them profitable models is still going on. It is necessary to study the different models and identify successful ones for its replication. It would be ideal, if it is linked to the Corporate Social Responsibility (CRS) initiatives of private players for the benefit of the farmers.

Contract farming is undertaken by processors, exporters and organised retailers, but to a limited extent and for limited crops. It is presently undertaken for a very few food grains and oilseed crops of premium variety, livestock (mostly milk, chicken and egg), some fruits and vegetables (traditional and exotic) and medicinal and aromatic plants. A few companies have ventured in organic sector as well. The limited penetration of it is evident from the fact that it has covered only about 5 lakh hectares by 2006 (less than 0.22 per cent of gross sown area). Few organised retailers have integrated with the producers and each one of them are presently experimenting with different formats to find the best suited one for them. The major players involved in such integration are Namdhari, Food World, Spencers and Heritage. All these direct procurement linkage cater to the farmers in specific production regions or peri-urban areas, leaving the large mass of farming community waiting to be covered. There are many retail and processing players who either procure from open market or through the public auction platforms such as Reliance Fresh and Safal (Bangalore). The present bottlenecks for penetration of such integration lies in dealing with the large number of small and marginal farmers and the difficulties faced in complying to APMC Acts in many states. Farmers’ collectives discussed earlier can be used as a platform to deal with aggregates which enables transactions in bulk and for a range of commodities.

The regulated market system has to co-exist with the other emerging formats to ensure healthy competition. Farmers need viable and competitive alternate channels

so that they can exercise choice. The market regulation has adopted amendments to allow private markets, PPP, contract farming and electronic initiatives in marketing. Also, there are initiatives under the umbrella of regulated markets such as farmer's market (*apni mandi* in Punjab, *Raitara Sante* in Karnataka, *Uzhavar Santai* in Tamil Nadu and *Raitu Bazaar* in Andhra Pradesh). The success, of short duration, fruits and vegetable market in Gultekdi near Pune catering to the farmers' marketing needs is a good model. The Gultekdi market is efficient and a perfect case for replication near the urban consumption centres wherein farmers can directly sell to push-cart sellers, retailers, hoteliers, hostels and other bulk buyers on wholesale basis. It is ideal to initiate policy action to convert farmers' markets into 'Gultekdi model' at least in major consumption centres, so that farmers are directly benefited by the shortened supply chain. This model can overcome the potential disadvantages of farmers' markets, where they have to spend a whole day in order to sell their produce on retail basis.

Within the regulated markets, there have been innovative practices introduced, which is very necessary in order to create co-existing and competitive markets. The e-tender system introduced in the regulated markets in Karnataka, has partially succeeded in reducing malpractices by traders and providing fair price to the farmers. It has drastically reduced the waiting time for farmers, traders and marketing personnel. The system is capable of augmenting market fee collection to the state exchequer if end-to-end process is connected through the electronic system. Investing in necessary infrastructure, viz., information kiosks, computers, LAN connection and capacity building of market participants will further enhance the efficiency. This evidence highlights that such systems can be effectively implemented in more regulated markets particularly with high arrivals (Chengappa *et al.*, 2012).

CERTIFICATION AND LABELLING OF AGRICULTURAL PRODUCE

Agricultural produce certification and labeling ensures quality and safety of the produce to the consumers and is in vogue in many parts of the world. In India, AGMARK certification is employed on 205 different primary and semi-processed products as per the provisions of Agricultural Produce Grading and Marketing Act, 1937. However, due to voluntary nature of grading for domestic market, it hardly serves any purpose. For example, more than 80 per cent of potato production in England is being graded and certified based on quality standards. Geographical indications, product of designated origin (PDO), Traditional Speciality Guaranteed (TSG), organic, fair-trade, eco-friendly, environmental compliance and eco-labelling are the existing popular certification process in the developed world. European Retailer Protocol Good Agricultural Practices (EUREPGAP) standards are identified to be the toughest one to adopt, upon which the organised global retailers make their procurement. The backyard poultry production with hygienic production practice and certified under '*Label Rouge*' in France is a big hit since last 30 years which stands as

example for certification of production practices such of which can be several in India. Generally, the cost involved in adopting such standards and certification costs are outweighed by the benefit derived as certified produce commands premium price in the market. With such developments in the contemporary world, where do we stand?

I wish to elaborate on the organic agriculture certification in India which has picked up substantially, responding to the changing market scenario. The organic production has increased from 30 lakh ha in 2007-08 to about 80 lakh ha by 2009-10. But, the extent of its certification is a miniscule. According to the available statistics, the extent of certified organic land is to the tune of 8.6 lakh hectares (both certified and in process of certification) which is barely 10 per cent of total organic area and 0.4 per cent of the gross sown area of the country. The inorganic fertiliser usage in many of the states like Nagaland (2.3 kg/ha), Arunachal Pradesh (2.9 kg/ha), Meghalaya (13.9 kg/ha) and Rajasthan (47 kg/ha) is marginal (Sharma and Thaker, 2011); some of the dryland crops are grown with very low fertiliser dosages. Such lands can be easily converted to organic in a very short duration, indicating the wider scope. In addition, India has as many as 44 Geographical Indicators (GI) under agricultural commodities and 4 food products. The successful examples of GI in India are that of Darjeeling tea, Alphonso mango and Basmati rice which already have established worldwide reputation. At the regional level, Pokkali rice in Kerala and Coorg honey in Karnataka are successful GIs. The countries close to India, like China and Thailand are promoting their GI products with culturally associated brands. Thus, the production practices and cultural background of producing area can be easily be encashed for produce from Indian origin. For example, *pomello* (a citrus species) grown in a very close vicinity of Bangalore, the IT capital of India lacks any commercial cultivation, certification and publicity. Even the shade coffee cultivation in the Western Ghats regions of Karnataka and Kerala is not being compensated for the reduced yield due to this practice, despite its higher quality and eco-friendly practice (Chethana *et al.*, 2010), mainly due to lack of proper certification and brand promotion. A systematic effort for certification and labeling will help in expanding the market for agricultural produce and thereby benefit the primary agriculture growth.

USE OF INFORMATION COMMUNICATION TECHNOLOGY (ICT)

The penetration of information technology needs to be well utilised in the agriculture sector. Though it is increasingly becoming popular, its applicability to problem solving in agriculture is limited. The areas that are of crucial importance are market/price information and intelligence, weather forecast, logistics, participatory agricultural extension/consultancy, establishing marketing linkages and modified process in agricultural marketing (e-tender, spot/futures market). Some of the state governments and agricultural universities have enabled production, weather and

marketing information (Voice and text SMS) dissemination through their own call centres and web enabled systems. The private and public agencies like Reuter's Market Light (RML), IFFCO Kisan Sanchar Limited (IKSL) etc. provide multitude of information to the farmers on payment basis. The states with access to other private multiple service providers like *e-chaupal*, *kissan hariyali bazaar* etc. are benefited by such information dissemination systems. But in all the cases, their reach and scale is still limited. The governmental agencies have quality services but are not able to exploit the technology due to many reasons. There are systematic initiatives to apply market intelligence through the centrally sponsored projects such as National Agricultural Innovation Project (NAIP) of ICAR in which efforts are made to make realistic and modeled forecasts which needs to be standardised and put in place for farmers use.

Electronic trade (spot/future) has been found to be useful in price discovery. This system cannot be used by farmers directly as they lack knowledge on technology. The involvement of NCDEX in the regulated markets (in about eleven markets of Karnataka state) is found to be encouraging. The focus on the system to provide market extension to the farmers needs to be thought of. All the regulated markets in the country have been provided web enabled electronic price boards to provide farmers with prevailing market prices, which the farmers are not making use of it presently. The success of electronic system (for example, e-tender) in the marketing process is quite substantial. It can be standardised and adopted in other markets in stages so that the marketing activities can be brought into a greater order. This can also help in integrating the market information dissemination with the price bidding process in the future.

An innovative thinking which needs highlight is the participatory agricultural extension (e-Velanmai) initiated by TNAU, especially to address pest and disease problems of agricultural production. It is an improvement over the existing call centre approach of the agriculture departments. A grassroot level agent would visit the farms to take photograph of the sample and send it to the specialist (team) at the nodal centre (University) and the response of diagnosis and prescription is passed back within the same working day. Such a model is found to be beneficial as it can add to vocal communication, a visual communication mode, enabling quality solutions. This is being attempted on a pilot basis (since July 2007) under a project funding and further extended to 19 more regions in the state in 2011-12. Such novel attempts undertaken elsewhere also need to be identified and adopted, as it can improve the system efficiency and bring greater utility to the farming community. These ICT initiatives provide timely information for the farmers at low costs to improve returns.

AGRICULTURE EDUCATION, HUMAN RESOURCE DEVELOPMENT AND R&D

India's transformation from a food deficit to a nearly food-sufficient country is largely due to the efforts of ICAR and SAUs developing high-yielding variety of seeds and its transfer from the laboratory to the field in conjunction with the agriculture departments. With the changing paradigms, the mission of ICAR and SAUs need to be refocused to address secondary agriculture, which can add value to primary agriculture. India has a vast National Agricultural Research System comprising 97 ICAR institutes, 57 agricultural universities and 5 Deemed to be Universities. The R & D institutes are capable of taking a key role in developing secondary agriculture by providing a clear mandate, direction and the necessary resources.

It is the SAUs that need to show the way to the industry similar to what they did in primary agriculture. Starting from universities, private sector seed industry in India is now fast growing with several successful examples. This model needs to be followed in secondary agriculture to demonstrate to the farmer that further two to three-fold-value can be added to the primary produce. The teaching programmes in SAUs should focus on agribusiness, conversion technologies, commercial applications and market needs with focus on value-addition to agro-products. The need for trained manpower for growth of secondary agriculture is very significant. This need can only be met by modifying the current curricula in SAUs to emphasise value-addition beyond production. If agriculture has to be treated as an industry, then the basic business principles including marketing and sales have to be taught to agriculture graduates. The new curriculum in agro-bio-processing and bio-products need to be developed and incorporated (Shukla and Kumar, 1995). The bio-product based curriculum is unique, as it must be designed to interface with an on-line database offering students knowledge concerning bio-inputs, business trends, policies and other vital functions in understanding the complex and ever-expanding bio-based products industry, in addition to the practical training on bio-processing. The course development in the use of information system to produce and market bio-products and disseminate information/knowledge concerning the scope and potential of agro-based products must be designed to serve all undergraduates and post-graduate students. Availability of trained and knowledgeable human resource is vital for the state and regional agencies and the private sector to undertake any bio-products manufacturing and marketing. The skills and knowledge of agricultural professionals need to change to take full advantage of the bio-based economy (Singh *et al.*, 2003). These changes make it necessary to build capacity for rural entrepreneurs with vocational training and diploma programmes in agriculture like agri-clinics, which further improves technical and management skills to run the business profitably.

Despite the existence of agriculture research and management institutes, a clear understanding of the transition from primary agriculture commodities to secondary agriculture products that the country needs has not yet occurred. In addition, research

institutes needs to understand the complexity of new technologies and machineries, which must eventually be manufactured in the country and made accessible to make these industries internationally competitive. The needs of Indian agro-industries are not being met by the indigenous technologies to develop agro-based products. The same was the case with telecommunication, electronics, pharmaceuticals and automobile industries, and only when new technologies were allowed to come in to the country, a rapid transition occurred. Agriculture needs to follow the same path to build new agro-industries to compete in the open global economy and to empower farmer to get maximum value from their produce. The fact that “Research is Business” or “Today’s Science is Tomorrow’s Commerce” must be fully realised and communicated to each scientist with specific goals to achieve and such accomplishments need to be properly rewarded (Verma, 2008).

As I understood, many international agro-based companies are keen to enter the vast Indian market to develop new products and services. The potential is quite high as value-addition to agro-products can significantly increase agriculture GDP by two to three folds which needs to be strategically utilise to imbibe the best technology and develop the processing industry.

TECHNOLOGY DISSEMINATION AND INTERFACE OF AGRICUTLURE WITH INDUSTRY

Agriculture extension service received a greater attention in the 1960s and 1970s in India but during the last 10 years it is on the decline as agriculture is not a priority to most state governments. In most states, more than 60 per cent of extension jobs lie unfilled. A decade after the end of the Training and Visit (T&V) System, the Department of Agriculture (DoA), the main extension agency, is struggling to find a fresh model, direction and approach. At the same time, the nature of Indian agriculture is becoming more and more complex. New opportunities (and threats) for trade in international markets join older concerns of supporting the rural economy where agricultural production and employment support the livelihoods of many of the poorest in the society.

Despite over 630 KVKs and the state agriculture, horticultural and veterinary departments, the shortcomings of public sector extension are well documented and some reform measures have been implemented. Unfortunately, planning and evaluation of such programmes is based on a very narrow view of merely equating the growth to technology dissemination. Too much of administrative work, lack of back staffing and continuous training to staff and poor conveyance and mobility are the major issues concerned with the existing system of extension (Raghuprasad *et al.*, 2012). There has to be more recruitment of both technical and non-technical staff to reduce the crunch of the field level functionaries. The extension agents and staff should be trained in new extension methods, developing educational materials, using electronic technology including Geographic Information System (GIS) and use of multimedia. The present system is neither effectively using the traditional methods

such as audio-visual aids, nor able to adopt the latest and emerging extension methods such as ICT enabled services. A combination of several approaches can be effective in information dissemination.

Upgrading the extension personnel in new subject areas such as Genetically Modified (GM) technology, climate change, remote sensing, agribusiness and secondary agriculture is necessary due to changing nature of agriculture. In the view of sustaining primary and secondary agriculture sector, extension system needs to act as a bridge between universities, research institutions, industries and farmers. Single window system need to be introduced to address various issues of the farmers and entrepreneurs. In future days, extension centres should be developed as a hub of information/knowledge at the grassroot level by adopting cost effective technologies with greater outreach using ICT applications such as interactive video conferencing, toll free telephone, information kiosks, CD/DVD repository on primary and secondary agriculture. The message for planners is that extension needs a much larger degree of flexibility, a learning environment and a wider range of expertise to fulfill an expanded role. It is necessary to undertake a detailed institutional analysis of the pilot Agricultural Technology Management Agency (ATMA) scheme and other new approaches implemented in the last decade. Special attention needs to be given for understanding the difficulties of implementing new ideas in an old and rigid organisational and institutional hierarchy. An evaluation would provide the scope for institutional change and learning that is required to reinvigorate agricultural extension in India. The extension system should have the potential for generating the necessary institutional innovations that will promote secondary agriculture for the benefit of all stake holders of primary agriculture.

WAY AHEAD

The purpose of this address is to identify the pathways for accelerating the growth of primary agriculture mainly with the approach of secondary agriculture. The potential of secondary agriculture is high with changing consumption towards value added products and diverse production base in the country. The strengthening and expansion of secondary agriculture through rural industrialisation following a cluster approach aims in providing value addition to primary agricultural commodities through processing to suit the demands of the consumers. By developing processing technologies and new products, the demand push for under-utilised crops are created which will help a large number of farmers growing these crops in unfavourable climatic and soil environment. Similarly, the operation of cold chains improves the shelf life of the produce and in reaching them to distant markets. The various examples provided in my address for improving supply chain management helps the primary producers to link to the market and reduce transaction costs. Some of the success stories mentioned here relating to collective action by the producers, contract farming, producer companies, backward integration by the

organised retail chains, introduction of electronic auctioning in regulated markets and direct marketing through farmers' markets provide ample evidences that emerging formats and alternative process of marketing are helping the primary producers to market their produce in a better way. These new alternatives need to be evaluated and appropriate models needed for replication elsewhere. The agricultural produce certification and labeling provides ample opportunities to expand the market and meet the needs of the consumers who are quality and safety conscious. The need for reorienting agricultural education to include secondary agriculture in the curriculum will help in developing the required manpower. Similarly, inclusion of research and extension relating to secondary agriculture in the mandates of ICAR and SAUs is necessary so that appropriate technologies and practices are developed and transferred for the primary producers to reap the benefit of secondary agriculture. The policy recommendations for driving the growth of primary agriculture through secondary agriculture are as under:

- ♦ The strengthening and expansion of secondary agriculture and its linking to primary agriculture is crucial. The nexus involving research institutes – bio resource industries – financial institutions – farmers organisation should be strengthened. The focus of ICAR and SAUs need to be changed to include crop processing and value addition.
- ♦ Encourage Private-Public-Partnership (PPP) so that the technology development, commercialisation and transfer and investment requirement for the growth of secondary agriculture are adequately met. In the process, the Government should be the facilitator, rather than a controller with minimum bureaucratic hurdles.
- ♦ Enabling rural industrialisation is key to link on farm and off-farm activities. This provides ample opportunities for non-farm employment.
- ♦ Capacity building of educated farmers on secondary agriculture through training, vocational programmes, diploma and certificate programmes is essential, so that they acquire the required skills and knowledge for employment in the rural industries.
- ♦ Provide technical and financial support to viable farmers' organisations such as co-operatives, associations and self-help groups to form producer companies so that they can undertake secondary agriculture along with primary agriculture.

- ♦ Secondary agriculture related activities are spread over several ministries in central and state Governments. It is necessary to have a nodal agency to coordinate all the activities.
- ♦ The curricula at SAUs should include secondary agriculture, bioprocessing technologies and agribusiness courses so that we have the right human resources to manage secondary and primary agriculture. In the process SAUs should offer diploma/certificate programmes as for the demand of secondary agricultural sector.

I conclude by stating that secondary agriculture has all the potential to drive the growth of primary agricultural sector in the country so that the targeted growth of 4 per cent per annum as envisaged during 12th Five Year Plan period can be achieved. I urge my colleagues to take more research in secondary agriculture so that the Indian agriculture moves forward with higher growth rates.

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