

Contribution of Indian Farm Industry for Ensuring Food Security in the Country

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INTRODUCTION

The contribution of Indian Farm Industry in augmenting the agricultural production has been discussed focusing on the present scenario of demand and productivity and progress of various industries in increasing the productivity of Indian Agriculture. The focus has been put on farm machinery, tractor, fertilizer, irrigation, planticulture, processing and sugar cane processing industry, their present capacities and future growth requirements. "Food security, at the individual, household, national, regional and global levels is achieved when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life". Agriculture has been the life line of Indian economy since ancient times and will continue to be so in future too. It is considered to be the livelihood of about 65 percent of the total population. It is the single largest private sector providing employment to 58.4 percent of country's workforce. India has largest arable land of 160 million hectare sharing 11.2 percent arable land of the world and ranks second next to USA. The net area sown has risen from 118.75 million hectare (41.8%) in 1950-51 to 141.89 (46.5%) in 2005-06 showing an increase of about 19.49 percent since 1950-51 with an average annual growth of 0.35 percent. The net irrigated area has increased from 17.56 percent to 42.43 percent during the same period that has helped in increasing the cropping intensity by 22.32 percent. Tropical countries such as India are at greater risk of facing the adverse consequences of global warming and climate change. Food insecurity and under-nourishment is major problems in rainfed and under privileged rural areas. Despite rising output, per capita availability of food grains has actually declined in the last ten years i.e. from 500 g in 1997 to about 400 g/day by 2006-07. Similarly,

the edible oil per capita consumption per year is less than 12 kg, against the recommend consumption of about 16 kg. Farm Industry in India in post independent era has successfully played key roll in meeting the food requirement of country's ever increasing population. The credit goes to the farmers, scientists, input suppliers and responsive state governments. This paper presents some of the aspects tracing the path of the long journey.

Production and productivity

The total food grain production in the country has increased from 50.82 million tonnes in 1950-51 to 230 million tonnes in 2008-2009. Productivity increase has been from 522 kg/ha to 1756 kg/ha during the same period. Table 1 gives the detailed account of production and productivity of major crops grown in the country during the last 56 years. The major contributions in increase of food grain production have been by paddy and wheat crops. The factors responsible for increase in production and productivity of the crops were introduction of high yielding varieties of wheat and paddy in late 1960s and their subsequent adoption by the farmers from early 1970s onwards. The food grain demand for the year 2011-12 has been projected at 254.9 million tonnes from the present level of about 230.6 million tonnes assuming a population growth of 1.95 percent. Fragmented landholding, rainfed cultivation, low level of input usage, antiquated agronomy, poor technology adoption and lack of rural infrastructure inadequate financial system and need based planning all combine to result in stagnating output, low yields and volatile prices. Acreage under major field crops continues to stagnate. On the other hand, food imports have been large and mounting. India is forced to import major food items such as pulses, edible oil, sugar and wheat.

Agricultural Engineering Today

Table 1. Production and productivity of major crops

Crop	1950-51		1980-81		2001-02		2006-07	
	Production, mt	Yield kg/ha	Production, mt	Yield kg/ha	Production, mt	Yield kg/ha	Production, mt	Yield kg/ha
Rice	20.58	668	53.63	1336	90.75	2006	93.35	2131
Wheat	6.46	663	36.31	1630	73.53	2863	75.80	2708
Oilseeds	5.16	481	9.37	532	21.16	907	24.29	916
Sugarcane	57.02	33422	154.25	57844	289.41	63190	355.52	69022
Pulses	8.40	441	10.63	473	13.79	596	14.20	612
Coarse cereals	15.38	408	29.02	695	33.10	1110	33.92	1182
Total food grains	50.82	522	129.59	1023	212.85	1734	217.28	1756

Agricultural statistics at a glance, 2007

Although the adoption of improved seed varieties, fertilizers, plant protection chemicals, irrigation water and farm mechanization inputs have helped India in increasing the food grain production, the biggest challenge before the agricultural sector of the country is to meet the ever growing demand of food grains to feed the increasing population.

Operational Holding

One of the major constraints attributed to low food grain production has been small land

holdings of the Indian cultivators. The size of holding, in India, is shrinking continuously due to faster urbanization and rapid division of inherited land. The continuous division and fragmentation of inherited land holdings have resulted in increased number of holdings in the country, obviously, of smaller size. Rise in number of holdings without corresponding increase in cultivable area clearly showed pressure of population on land. The average size of holding has declined from 1.68 ha in 1985-86 to 1.41 ha in 2004. Table 2 gives details of operational land holding with various

Table 2 : All India distribution of operational land holding

Category of holding	Number of operational holdings, Million		Area operated, Mha		Average size of operational holding, ha	
	1985-86	2004	1985-86	2004	1985-86	2004
Marginal (Less than 01 ha)	56,748 (58.1%)	71,179 (61.6%)	21,606 (13.2%)	28,121 (17.2%)	0.38	0.40
Small(01-02 ha)	17,881 (18.3%)	21,643 (18.7%)	25,533 (15.65)	30,722 (18.8%)	1.43	1.42
Semi-medium (02-04 ha)	13,253 (13.50%)	14,261 (12.3%)	36,579 (22.3%)	38,953 (23.8%)	2.76	2.72
Medium(04-10 ha)	7,920 (8.1%)	8,092 (6.1%)	47,008 (28.7%)	41,398 (25.3%)	5.94	5.84
Large (10 ha and above)	1,929 (1.97%)	1,404 (1.2%)	33,187 (20.2%)	24,163 (14.8%)	17.20	17.21
All holdings	97,731 (100%)	115,580 (100%)	163,913 (100%)	163,357 (100%)	1.68	1.41

Source: Agricultural statistics at a glance, 2007

groups in the country. Since the size of operational holding is decreasing, therefore, to produce more efforts have to be made to cultivate every bit of land to promote food security in the country.

Farm Power Availability

Farm power is one of the vital agricultural inputs which have helped in achieving self-sufficiency in food grain. The total power availability was 0.30 kW/ha in the year 1971-72. The contribution of draft animal power was 45.26 percent with small share of power tillers and tractors. The power availability has increased to 1.50 kW/ha during the year 2005-06. During these 35 years, the power availability on Indian farms increased by more than 400 percent. The share of animal power and tractor in total power availability shows a reverse trend when

compared with the data of 1971-72 (Bector et al., 2008). In later years, the contribution of tractor power was more compared to share of animal power in total power availability. This may be due to faster acceptability of tractors by the Indian farmers for various types of agricultural operations. Table 3 and 4 show the share of different power sources and their stock. The data indicates that presently the maximum availability of power is through power tillers and tractors compared to other power sources.

Though the power availability on the Indian farms has increased manifold since 1971-72, yet there is shortage of power availability for various agricultural operations when compared with other developed countries of the world. For instance the power

Table 3. Contribution of different power sources to total power availability in India

Year	Total Power, kW/ha	Share of total power (%)					
		Tractor	Agricultural Labor	Draught Animals	Power Tiller	Diesel Engine	Electric Motor
1971-72	0.295	7.49	15.11	45.26	0.26	18.11	13.77
1981-82	0.471	19.95	10.92	27.23	0.33	23.79	17.78
1991-92	0.759	30.21	8.62	16.55	0.40	23.32	20.90
2001-02	1.231	41.96	6.49	9.89	0.54	19.86	21.26
2005-06	1.502	46.70	5.77	8.02	0.60	18.17	20.73

Table 4. Population of power sources and power availability in India

Year	Agriculture workers		Draught animals		Tractors		Power tillers		Diesel engines		Electric motors	
	Million	Power (kW/ha)	Million	Power (kW/ha)	Million	Power (kW/ha)	Million	Power (kW/ha)	Million	Power (kW/ha)	Million	Power (kW/ha)
71-72	125.67	0.045	78.42	0.133	0.119	0.02	0.016	0.759	1.443	0.053	1.535	0.041
75-76	133.75	0.048	77.52	0.135	0.207	0.04	0.023	1.110	2.075	0.078	2.064	0.056
81-82	146.77	0.051	76.21	0.128	0.513	0.09	0.032	1.562	3.061	0.112	3.203	0.084
85-86	161.09	0.057	75.36	0.129	0.746	0.14	0.040	1.971	3.742	0.139	4.192	0.111
91-92	185.24	0.065	74.11	0.126	0.244	0.23	0.060	3.020	4.800	0.177	6.019	0.159
95-96	200.98	0.071	73.30	0.124	1.734	0.32	0.082	4.098	5.528	0.203	7.464	0.196
00-01	222.55	0.079	72.31	0.122	2.599	0.48	0.122	6.112	6.466	0.238	9.525	0.250
05-06	246.44	0.087	71.34	0.120	3.819	0.70	0.181	9.035	7.432	0.273	11.866	0.311

Source i. Power Availability in Indian Agriculture, 2000, CIAE, Bhopal, India
2. Agricultural Research Data Book 2003, IASRI, New Delhi

Agricultural Engineering Today

availability on the farm is highest with 8.75 kW/ha in Japan, 6 kW/ha in Korea, 3.0i kW/ha in Italy, 2.65 kW/ha in France, 2.35 kW in Germany and 2.50 kW in United Kingdom (Thakur and Bisht, 2009). Therefore, there is a need to further increase the power availability on Indian farms to boost up the production for achieving food grain production target for future generation.

Contribution of Farm Industries

The contribution of manufacturing and service sector related to agricultural sector has been very significant mainly after post independence era, in increasing food production and bringing the country to a level of self-sufficiency in food grain production. Some of the farm industries such as tractor and farm machinery industries, fertilizer industries, food processing sector etc. have contributed a lot in terms of increasing crop production and product availability by timely completion of farm operations, reducing post harvest losses and value addition to agricultural produce and thereby, bringing food security. A brief discussion on their role in achieving food security is being presented here.

Tractor Industry

Technological innovations have had profound effect on agricultural sector and tractorization has been proved as backbone of mechanization which have played pivotal role in bringing green revolution in the country and providing food to every mouth. The farm productivity is directly linked with the level of mechanization. The farm power availability has increased from about 0.3 kW/ha (1971-72) to 1.50 kW/ha (2005-06) and this has been mainly possible due to contribution of tractor industries. The tractor industry in India is one of the major components of agriculture machinery industry. The domestic tractor industry made a beginning in 1961 with a total production of 880 units and since then there has been substantial growth in the production of tractors. Tractor use in agriculture has been mainly for power requiring operations like tillage, sowing, interculture, threshing and transport. The use of tractors in field operations being only 35-40 percent and rest is in transportation. The tractors can do the jobs of ploughing, tilling, and sowing in an efficient manner in very less time. This helps

farmers to increase the output and in turn helps the economy to grow further.

A wide choice of competitive models, ranging from 12 to 75 hp are now available to the Indian farmer at an affordable price. The most favourable tractor power segment among the farmers in present scenario is 31-40 hp which is contributing almost 50 percent of the total tractor industry. In the last few years, a substantial shift has been observed in 41-60 hp segment due to better technologies made available by the multinational tractor manufacturers at comparatively lower prices. The increasing trend in production of 41-60 hp and above segment of tractors has resulted in a down fall in 21-30 hp segment tractors. However, due to small and scattered land holding, smaller tractors would be more suitable than the high horse power tractors. Therefore, the tractor industry should focus on production of smaller tractors, though less remunerative, for increasing the power availability on Indian farms to achieve food security.

Farm Machinery Industry

Agriculture is season specific and time bound. The farm machinery makes significant contribution in increasing agricultural production and productivity through timeliness in operations, application of inputs, conserving soil and water resources, and reducing losses, pollution and drudgery apart from increasing cropping intensity. National and global findings have shown that the crop production machineries have increased the crop productivity by 10-15 percent. Besides the productivity, it has helped in reducing the cost of production by 20-25 percent and also has reduced the field, transport, processing and storage losses to the tune of 10 percent. Table 5 provides an account of growth in population of some selected crop production machineries during the period 1971-2001. The data clearly shows that there has been drastic increase in the number of farm machines during the last 30 years in the country.

Today, there is an increasing awareness and concern for appropriate, affordable and energy efficient equipment and technologies focused at increased yield, reduced cost of cultivation with conservation approach and prevention of losses. A

number of machineries like no-till drills, precision drills, lesser levelers, rotavators, reaper-binders etc. have been developed internationally and are being imported by Indian manufactures. These machineries are very precise in their work and save enormous amount of resources used for crop production. However, the cost of these machineries is beyond the reach of a common farmer in India. Besides this the spare parts are not easily available as well as

there is no well developed network for after sale support. The agriculture machinery industry in India has helped immensely in increasing the productivity of land and labor. As the role of farm machineries in crop production cannot be undermined, it is, therefore, need of the hour that farm machinery industries should produce field worthy machineries in India and make available the same to the farmers at an affordable price to promote use of machineries for increasing the production. It should also make liaison with the farmers to provide after sale service by establishing service centres at farmers door step.

Fertilizer Industry

India is primarily an agriculture oriented country and its economy is still highly dependent on the agrarian produce. Fertilizer is one of the critical inputs for

agriculture and its low input use often results in low yields. The first fertilizer manufacturing unit in India was set up in the year 1906 at Ranipat in Chennai. At present, there are more than 57 large as well as 64 medium and small fertilizer production units. The main products manufactured by fertilizer industry are phosphate based fertilizers, nitrogenous fertilizers, and complex fertilizers. India is the third largest producer of nitrogenous fertilizers in the world. The present use of fertilizer in the country is about 50 million tonnes (urea and phosphatic fertilizers), which comes to about 113 kg/ha of nutrients, to produce about 231 million tonnes of food which is much lower in comparison to developed countries. As regards to state wise fertilizer consumption is concerned, the fertilizer application per ha is quite high in Punjab, Haryana, Andhra Pradesh and Tamil Nadu but it is quite low in Rajasthan, Orissa and Madhya Pradesh, apart from in the States in the North-Eastern region during 2004-05 and 2005-06.

Fertility status of soil is on decline with occurrence of multiple nutrient deficiencies in Indian soils. This is where the role of balanced fertilizer use comes into play. According to agriculture

scientists, different type of fertilizes (i.e. Nitrogen, Phosphate and Potash- NPK) should be used in a

Table 5: Growth in population of selected crop production machineries during 1971-2001

S. No.	Name of machineries	1971	1981	1991	2001
Tractor/power operated equipment Figures in '000					
1.	Mould board/disc ploughs	45	124	470	700
2.	Seed drills/planters	0.2	0.3	8	10
3.	Power sprayers	205.8	1025	1379.3	2400
4.	Combine harvesters	33.1	152	485.8	1000
5.	Power threshers	57.3	142.7	498.9	1000
6.	Tractor trailers	81.5	315	1155.8	2500
Animal operated equipment					
7.	Iron/ steel plough	5359	6688.1	9607.1	1100.1
8.	Cultivator	Na*	4262.6	5325.4	6400
9.	Seed drills/planters	Na*	5616.2	7349.4	9500
10.	Puddlers	1694	2823.6	2374	11000

*Na: Data not available

balanced proportion to maintain the productivity of soil. The standard ratio, for Indian soils, has been recommended as 4:2:1 but during 2005-06, the ratio was 5.6:2.2:1 indicating higher consumption of nitrogenous fertilizer (Table 6). Use of organic resources of nutrients like compost, farm yard manure, green manure etc. has proved quite beneficial for crop productivity since time immemorial. There should be proper integration of nutrients between organic sources and chemical fertilizer to ensure sustainable agriculture and lessen the burden on fertilizer import.

It is estimated that the food demand would touch over 300 million tonnes by the year 2025 resulting in more demand of fertilizers. Table 7 shows the production of fertilizer by the indigenous fertilizer industries which indicates that the industry is not able to fulfill the demand of the farmers in respect of fertilizer requirements. India featured predominantly in the international markets, in 2009, as the world's largest importer of urea, potash and DAP. Urea imports are making a dent on the country's economy. Hence to achieve food security in the country fertilizer security is of paramount significance and the fertilizer industries will have to play a pivotal role by stepping up the fertilizer production to meet the domestic demand of fertilizer. Also when considering their social and environmental obligations, this sector should come forward and educate the farmers for judicious, not excessive, use of fertilizers.

Table 6: Consumption ratio of chemical fertilizer

Chemical Fertilizer consumption ratio : NPK			
Year	N	P	K
1990-91	6.0	2.4	1
1996-97	10.0	2.9	1
2000-01	6.4	2.7	1
2003-04	6.9	2.6	1
2004-05	5.7	2.3	1
2005-06	5.6	2.2	1

Source : Indian Economy, 2007-08

Table 7. Consumption, Production and Import of fertilizers

Year	Consumption million tonnes	Production million tonnes	Imports, million tonnes
1998-99	19.798	13.624	3.145
1999-2000	18.070	14.289	4.075
2000-01	16.702	14.705	2.091
2001-02	17.360	14.628	2.399
2002-03	16.096	14.466	1.674
2003-04	16.798	14.265	2.018
2004-05	18.399	15.405	2.750
2005-06	Na	15.573	4.314

Na: Data not available

Source: Indian Economy, 2007-08

Irrigation and Plastic Industries

Irrigation is one of the agricultural operations performed in crop production system. India supports 17.5% of world population with 4% of world water resources and 2.3% of world's land area. Conventionally farmers irrigate their crop by flooding the field i.e. surface irrigation is practiced especially for the major crops like rice and wheat. The irrigation efficiencies of surface irrigation method through canal irrigated areas are reported to be 22% in Rabi season and 35% in Kharif season (Singh, 2009). Studies have indicated that significant amount (20-25%) of irrigation water is lost during flooding due to poor farm designs and unevenness of the fields. With the shrinking available water resources, judicious application of irrigation water is of utmost importance. This can be addressed by adopting improved irrigation technologies like sprinkler and micro-irrigation system. Reported studies have also shown that drip irrigation can save 30% to 40% water as compared to traditional method of surface irrigation. This system of irrigation also ensures 20-25% more productivity per hectare.

To address the critical challenges of water shortage and to increase productivity and profitability of the farmers from available land and water resources, high tech interventions like precision farming and plasticulture are available today. Advanced technologies such as micro

irrigation, green house cultivation, mulching, low tunnels, shade nets, in-vitro propagation along with development of modern information and communication technologies (ICTs) form the part of precision farming. In India the area under various plasticulture applications, as compared to world over, is meager. Government of India has been announcing incentives to popularize plasticulture applications from time to time, and therefore, the usages are catching up in recent years. The area under micro and sprinkler irrigation has gone up to the level of 3.5 million ha. Similarly, the area under poly house cultivation, mulching and other applications of plasticulture are also increasing significantly.

Advances in techniques of production and international competition has led some of the advanced farmers for achieving early crops, higher yield and better quality of produce at lowest possible cost of production. The plastics in different from such as film, fiber, sheet tube/pipes, woven materials, netting, foams and moulding have large potential in different segment of the pre and post crop production. The major R & D issues in plasticulture are development of appropriately automated crop and climate specific and energy efficient green house designs and management system using biodegradable and environment friendly materials. The changing scenario in India in context to globalization will enhance the plastic consumption in agriculture and allied areas to improve the production, productivity and quality produce.

The irrigation industries, green house manufactures and other plasticulture industries are playing important role for the manufacturing, design, supply and installation of sprinklers, micro-irrigation systems, different kind of green/shade net houses, plastic mulching, low tunnels, pro-trays/root trainers etc which has growing demand by the agriculture sector. Plasticulture industries also supply different kind of packaging and transportation materials in the market. Therefore, these industries are playing major role for increasing the production, productivity and post harvest handling of agricultural produce proving higher return to the farmers.

Processing Industries

Agro-processing sector is being termed as sunrise industry in India in view of its potential. Indian food processing sector is highly fragmented comprising of grain processing, fruits and vegetables, milk and milk products, beer and alcoholic beverages, meat and poultry, marine products, and packaged food and drinks. A large number of entrepreneurs in this industry are small, in terms of production, and are largely concentrated in the unorganized segment accounting for more than 70% of the output in terms of volume and 50% in terms of value. Table 8 shows food processing units in organized sector.

Table 8. Number of processing units in organized sector

S. No.	Types of processing units	Number of units
1.	Flour mills	516
2.	Fish processing units	568 (+ 482 cold storage units)
3.	Fruits and vegetable processing units	5293
4.	Meat processing units	171
5.	Sweetened and aerated water units	656
6.	Milk products units	266
7.	Sugar mills	429
8.	Solvent extraction units	725
9.	Rice mills	139208
10.	Modernized mills	35088

Source: Website of Ministry of Food Processing Industries (annual report 2003-04)

The food processing industry is presently growing at a rate of 14% against 6-7% growth in 2003-04. However, India's share in exports of processed food in global trade is only 150%. For further growth of this industry, the government has formulated Vision-2015 which includes tripling the size of food processing industries from around US\$ 70 billion to about US\$ 210 billion, raising the level of processing of perishables from 7 per cent to 20 per cent, increasing value addition from 20 per cent to

35 per cent, and enhancing India's share in global

Agricultural Engineering Today

food trade from 1.5 per cent to 3 per cent. Table 9 shows the export of agricultural commodities and products from India.

Grain processing includes milling of wheat, rice and pulses. Primary milling of grains is the considered to be the important activity in the grain-processing segment of the industry. However, primary milling adds little to shelf life, wastage control and value addition. Around 65% of rice production is milled in modern rice mills including sheller-cum-huller mills. In 1999-00, there were more than 91,000 rice hullers and 2,60,000 small flourmills which were engaged in primary milling. There are now 43,000 modernized rice mills and huller-cum-shellers. Wheat is processed for flour, refined wheat flour, semolina and grits. Apart from the 820 large flourmills, there are over 3 lakh small units operating in this segment in semi-urban rural areas. Around 820 large flourmills in the country convert about 10.5 million tonnes of wheat into wheat products. Dal milling is the third largest processing operation in the grain processing industry, and has about 11,000 mechanized mills in the organized segment milling accounting about 75% of pulse production in the country. Oilseed processing is another major segment largely concentrated as the cottage industry. According to an estimate, there are approximately 2.5 lakh Ghanis and Kolhus; 50,000 mechanical oil expellers; 15,500 oil mills; 725 solvent extraction

plants; 300 oil refineries and over 175 hydrogenated vegetable oil plants.

Bread and biscuits constitute the largest segment of consumer snack foods with an annual production of around 4 million tonnes. There are over 60,000 bakeries and 20,000 traditional food units in India. Bread manufacturing is mainly in small-scale sector. Out of the total production of bread, 40% is produced in the organized sector and remaining 60% in unorganized sector. In the production of biscuits the share of unorganized sector is about 80%.

India is the second largest producer of fruits and vegetables in the world accounting about 150 million tonnes. The installed capacity of fruits and vegetables processing industry has increased from 1.10 million tonnes from year 1993 to 2.10 million tonnes in 2006. The major processed items in this segment are fruit pulps and juices, fruit based ready-to-serve beverages, canned fruits and vegetables, jams, squashes, pickles, chutneys and dehydrated vegetables. Some recent products introduced in this segment include vegetable curries in retortable pouches, canned mushroom and mushroom products, dried fruits and vegetables and fruit juice concentrates.

Post harvest value addition to raw produce in India is only 7% which is very low compared to China (23%), Thailand (30%), Brazil (70%), Philippines

Table 9: Export of consumer food items

Name of commodities	2001-02		2004-05		CAGR	
	Quantity, MT	Value, Rs.Mn	Quantity, MT	Value, Rs. Mn	Quantity, MT	Value, Rs. Mn
Groundnuts	112813	2509	177115	5030	16.2	26.1
Guar gum	117883	4031	129648	6643	3.2	18.1
Jaggery & Confectionery	365893	4365	35549	770	-54.0	-43.9
Cocoa Products	1293	129	2274	273	20.7	28.5
Cereal Preparations	38087	2247	49487	2778	9.1	7.3
Alcoholic & Non -alcoholic Beverages	49672	1183	30045	1138	-15.4	-1.3
Miscellaneous Preparations	23189	1373	52514	2244	31.3	17.8
Milled Products	322347	1964	140123	1449	-24.2	-9.6

Source: Ministry of Food Processing Industries website (annual report 2005-06)

(78%) and Malaysia (80%) but the trends indicate that the value addition process is gradually gaining momentum though selectively. It is estimated that the post harvest losses in durable commodities are around 10% whereas in perishables it is reported to be around 40% which results in economic losses to the tune of Rs. 50,000 crores a year. There is mainly because of inadequate processing technologies, infrastructure facilities and qualified technical personnel. Adding value to the farm produce can be a great stride to enhance profitability of the farmers. The food processing industry segments showing consistency in growth include edible oil, biscuits, alcoholic beverages, bear, and to some extent processed foods. At the same time, the consumer expectations from marketplace with regard to variety and quality in food have multiplied in recent years. The process is gaining further momentum with opening of Indian markets to imported value added food products resulting in diversification of food consumption at household level.

The food habits in Indian household are changing. The consumers are diversifying their food basket to include more meat and poultry, dairy products, fruits and vegetables and other non-cereal foods instead of cereals. The demand of cereals in food consumption has declined by 10 % whereas demand for high-value and processed commodities have increased. Of course, it is restricted to the emerging middle-class, employed essentially in the industrial and services sectors, and living largely in urban and semi-urban areas, and representing just over 30% of the population. This gives an ample opportunity to the farmers to diversify their agriculture to profit oriented production from conventional agriculture. The corporates can establish backward linkages with the cultivators, thereby buying produce directly and do away with avoidable intermediaries thereby benefiting the farmers. To support agro-industries and value chains, options include linking small farmers with commercial farmers, exporters or agro-processing firms in a long-term relationships, initiatives that improve the capacity of small farmers and small agro-enterprises to participate in chains for high value products, and innovative mechanisms to link public funding with private sector resources.

One of the major task before process engineers and technologists is to design low cost efficient equipments and systems for processing various food and horticultural crops thereby reducing the drudgery, minimizing the post harvest losses and thereby increasing the profitability of farmers in rural areas.

Sugar Industry

Sugar industry occupies an important place among agriculture based industries. It is the second largest agro-based industry after textile. There are over 453 sugar mills in India. There are about 252 mills in co-operative sector, 134 mills in private sectors and around 67 mills in public sector. Its importance can be adjudged from the fact that about 45 million sugarcane growers and a large number of rural labourers depend on sugarcane and sugarcane industry for their livelihood. Sugarcane cultivation accounts for about 3% of total cultivated area and contributes 7.5% of gross value of agricultural production. However, as far as production is concerned, India has notched up to 2nd position with a share of over 15% of world sugar production after Brazil, the largest sugar producer in the world. The Indian sugar industry uses sugarcane in the production of sugar, hence, maximum numbers of the companies are in major sugarcane growing states like Uttar Pradesh, Maharashtra, Gujarat, Tamil Nadu, Karnataka, and Andhra Pradesh. Uttar Pradesh alone accounts for 24% of the overall sugar production whereas Maharashtra contributes about 20%.

According to a report of USDA Foreign Agricultural Service, the sugar consumption rate is highest in India. In spite of a number of sugar mills, there is a miss-match between the production and consumption. There is scarcity of sugar in the country which has resulted in import of this commodity. In 2008-09 alone 5 million tonnes of sugar was imported and the government is likely to buy a similar

amount in the current year. The main cause of sugar scarcity is due to less area sown, low production of sugarcane compared with other cane producing countries and low support price offered by the

Agricultural Engineering Today

governments. Thousands of farmers protested against the low state-set sugarcane price this year. Because of lower cane pricing farmers are not willing to grow the sugarcane. Therefore, for self-sufficiency in this area the farmers should be encouraged to grow sugarcane by offering better support price. The sugar industry should promote the farmers to grow more sugarcane by purchasing the produce and making timely payment. The scenario of glut and scarcity may be avoided by proper consideration and implementation of policies.

CONCLUSIONS

The majority of the populace of India lives in rural areas and the foremost occupation in the villages is agriculture. The agro-based industries such as tractor industry, farm machinery industry, fertilizer industry, irrigation and plastic industries, sugarcane industry, processing industry etc. have played vital role in increasing crop production and achieving self dependency in food grains since the era of green revolution in the country. As the availability of land for agriculture is shrinking and population is increasing day by day, therefore, the farmers and farm industries will have to contribute significantly in achieving national food security

and share their social responsibility to make food available to every mouth.

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Agriculture in India, India is an agriculturally developed country. Important agricultural produces of the country are wheat, rice, cotton, oilseed, tea, jute, potatoes, sugarcane, water buffalo, livestock, goats, sheep, fish, and poultry. The crops yield in this practice are mainly consumed by the farmer and his family with very little surplus left for sale in the market. This type of agriculture has been the most common practice in the country for over 700 years and still prevails in many parts of India. Pressure of Population on Agriculture: The population in India is increasing at a high rate and this puts pressure on the agriculture sector. Agriculture has to provide food and employment to large sections of the society. Ensuring food security goes beyond securing a sufficient supply. It also requires social and economic access to safe and nutritious food. Food consumption has an impact on human health and the environment. The challenge is how to meet consumers' needs and preferences while minimising the related impact on health and the environment. It will also enable Europe to take leadership in the concerned markets and will play a role in supporting the goals of the Common Agricultural Policy, the European Bioeconomy Strategy, and more broadly of the Europe 2020 strategy and its flagship initiatives 'Innovation Union' and 'Resource-efficient Europe'. In India, the food industry is estimated to be USD 448 Bn in FY 16. This industry is growing at ~10% and contributes to 9-10% of manufacturing GDP in FY17. The diversity in Indian culture and changing needs of customers create further complexity in the food production and distribution system in the country. A number of changes are shaping the Indian food landscape with disruptions in business models of companies, in terms of their interaction with consumers and responsiveness to their needs. While packaged food is the fastest growing segment posting a double digit growth yoy, currently only India's production of food grains has been increasing every year, and India is among the top producers of several crops such as wheat, rice, pulses, sugarcane and cotton. It is the highest producer of milk and second highest producer of fruits and vegetables. In 2013, India contributed 25% to the world's pulses production, the highest for any one country, 22% to the rice production and 13% to the wheat production. It also accounted for about 25% of the total quantity of cotton produced, besides being the second highest exporter of cotton for the past several years. Figure 1: Yield in different Food availability in rural parts of India during the lockdown became a problem for administrators, researchers, and civil society as poor people's resilience reached a breaking point in the face of prolonged unemployment. The central and state governments have acted quickly to help agriculture navigate this unprecedented crisis. However, more measures are needed to reboot the sector and ensure it exits the crisis more resilient than before. Procurement and prices are key to preventing surpluses. Used to witnessing healthy demand for their produce, vegetable and fruit producers were in for a ru

In fact, failure to ensure food security has unavoidably resulted in many social problems including civil unrest and riots in many major cities of the world. Behnassi et al. However, due to the discovery of oil in most of the south-south region of the country, agricultural activities have been grossly limited resulting from the consequential industrialization and frequent oil spillage. Also, agricultural activities in the north are sometimes plagued by extreme weather conditions such as draught and flooding during the raining season. Food security sits on the top of the list of targets of Millennium Development Goals (MDGs). The scheme aimed at ensuring food and nutritional security to around 80 crores ration card holders who were affected due to the COVID-19 induced national lockdown. This scheme will enable migrant workers and their family members to access PDS benefits from any fair price shop in the country. 232. Economic Survey 2020-21 Volume 2. Overview of agriculture. Gross Value Added in Agriculture. 7.2 As per the provisional estimates of national income released by CSO on 29th May, 2020, the share of agriculture and allied sectors in Gross Value Added (GVA) of the country at current prices is 17.8 per ce Problems of indian farmers. Let us praise the poor Indian farmer. The relevance of sustainable farming practices and innovations ensuring a steady income for the farmer is also being acutely felt. How do we ensure appropriate support systems for the farmer to boost production in agriculture, such as affordable credit availability in time, essential inputs and insurance, marketability besides storage, transportation etc? III. Innovations and initiatives. Food security framework for the poor in India. The road to agricultural development is one which invites critics, self-styled activists and so-called experts as fellow travelers. The poor production and productivity levels of farmers, reveals the state of continuing neglect of the farm sector and farmers. During this period, India transitioned from achieving just food security to surplus production. The key highlights of this period include: Expanding cereal production. This scheme ensures the promotion of organic farming. Adoption of farming will promote the balanced use of chemical fertilizers and enhance the quality of farm produce. Other policies Rs 15,000 crore will be used to support dairy infrastructure in the country which will help the private segment of this industry, creating plants and exporting niche products. Rs 4,000 crore will be used to promote herbal plants focused agriculture which is expected to generate Rs 5,000 crore of income for the farmers.