Chapter 1

Importance of Groundnut in Indian Economy

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1.1 Introduction

India is among the largest vegetable oil economies in the world next only to USA, China, Brazil and Argentina. In the agricultural economy of India, oil seeds one important next only to food grains in terms of heritage, production and value. Currently, India accounts for about 13-15% of world's oilseeds area, and 8-9% of world's oilseeds output and 10-11% of world's vegetable oils consumption. The diverse agro ecological conditions in the country are favorable for growing all the nine annual oilseeds, apart from a wide range of other minor oilseeds of horticultural and forest origin, including in particular coconut and oil palm. Oilseeds occupy about 13-14% of gross cropped and account for nearly 1.4% of gross national product and 8% of the value of all agricultural combustions. About 14 million formers and engaged in the production of oilseeds and action million in their processing.

Edible oil constitutes an important port of our daily diet, being source of energy, essential fatty acids like oleic and linoeic acids which are vital for our growth. Domestic consumption of vegetable also has increased substantially over the last two decades and has touched the level of (19.82 million tonnes in 2012-13) and is likely to increase further with enhancement in income and population. The growth in growth in production of domestic vegetable oils (4.22 million tonnes in 2012-13) has not been able to keep pace with the growth in consumption and the gap between production and consumption is being met through imports. The cost of import of 10.385 million tonnes of vegetable oils was Rs. 61106.43 crores during 2012-13 next only to crude oil and gold.

1.2 Groundnut as an Oilseed

Groundnut is the second most important annual oilseed crop after soybean. It is believed to be native of Brazil (South America) since many closely related species are found there. The crop spread from Brazil to Peru, Argentina and Ghana, from where it was introduced into Jamica, Cuba and other West Indies islands. The plant was introduced by the

Portuguese into Africa from where it was introduced into North America. It was then transported along the American west coast to Mexico and then across the Pacific to the Philippines, from where it spread to China, India, Malaysia and Indonesia.

The groundnut seed oil content varies from 44 to 50% depending upon the varieties and agronomic practices/ conditions. Its oil finds extensive use as a cooking medium both as refined refined oil and vanaspati ghee. It is also used in soap making, and in manufacture of cosmetics, lubricants olein, stearin and their salts. Kernels are also eaten raw, roasted or sweetened. They are rich in protein and vitamins A, B and some members of the B_2 group. Their calorific value is 349 per kg. The handpicked and selected (HPS) types of groundnut kernels are exported to other countries. The residual oilcake contains 7-8% N, 1.5% P_2O_5 and 1.2% K_2O and can be used as organic manure. It is an important supplement in cattle and poultry rations. It is also consumed as a confectionery product. The cake can be used for manufacturing artificial fiber. The haulms are fed (green, dried or silage) to livestock. Groundnut shell is used as fuel, for manufacturing coarse boards, coal substitutes, etc.,. Groundnut is also of value as a rotation crop. Being a legume with root nodules, it can fix atmospheric N and their by improves soil futility.

1.3 World Groundnut

The total world production of groundnut was 45.31 million tonnes from 25.46 million hectares with an average productivity of 1780 kg/ha during 2013-14 (Table 1.1) China, India, Nigeria, USA, Sudan, Myanmar, Indonesia and Senegal, are the major countries producing groundnut. Asia accounts for 55% of the global groundnut area and 67% of the global production while Africa constitutes 40% of global area and 26% of the production. The average yield of groundnut among the groundnut growing countries in the world varies between 300 kg and 5400 kg/ha

Table 1.1 *Area production and productivity of groundnut in major countries (2013-14)*

Country	Area (lakh.ha)	Production (lakh t)	Yield (kg/ha)
Cameroon	4.63	6.36	1373
China	46.82	169.19	3614
India	52.50	94.72	1804
Indonesia	5.14	11.50	2216
Myanmar	8.90	13.75	1545
Niger	7.20	2.80	389
Nigeria	23.60	30.00	1271
Senegal	7.70	7.10	922
Sudan	21.62	17.67	817
USA	4.21	18.93	4496
World	254.60	453.08	1780

During 1980-2006 periods, the global groundnut area grew by 1.0% yield by 2.4% and production by 3.4% annually during the same period, the growth rates for Asia were 0.6%, 3.2% and 3.8% respectively. For Africa these figures were 2.2%, 1.5%, and 3.7% respectively. In Asia, it was the yield which contributed to increased production but in Africa, the increased production came largely through area expansion.

Productivity and production of groundnut in Asia picked up substantially 1991 onwards with very little increase in area in Asia, China and Vietnam led the way. The advancement in groundnut production and productivity came along in a step by step manner with scientific achievements, government's encouragement and the hard work of the farming communities in these countries.

1.4 Groundnut in India

During 2013-14, India produced 9.67 million tonnes of groundnut from 5.53 million hectares with a productivity level of 1750 kg/ha. For the first time groundnut productivity in India nearly equaled the world average groundnut productivity (1780 kg/ha). Six states namely Andhra Pradesh, Gujarat, Karnataka, Maharashtra, Rajasthan and Tamil Nadu account for about 90% of the total groundnut area of the country (Table 1.2). Tamil Nadu has the highest productivity followed by Gujarat and Rajasthan. About 74% of the total produce is harvested from rainy season crop, while only 26% from the irrigated post-rainy season crop. The average productivity during the post-rainy season is as at two times more than rainy season.

Table 1.2 *State-wise area, production and yield of groundnut (2013-14)*

State	Area (lakh.ha)	Production (lakh t)	Yield (kg/ha)
Andhra Pradesh*	13.86	12.34	890
Gujarat	18.42	49.18	2670
Karnataka	7.25	6.58	908
Madhya Pradesh	2.00	1.98	990
Maharashtra	2.67	3.25	1217
Odessa	0.58	0.80	1379
Rajasthan	4.66	9.06	1944
Tamil Nadu	3.42	9.62	2813
Uttar Pradesh	0.96	0.86	896
West Bengal	0.79	2.02	2557
Others	0.66	1.04	1576
All India	55.27	96.73	1750

* Includes Telangana

The growth rates in area, production and productivity during pre-TMOP (1951-1986) and post-TMOP (1986-2012) period were 1.13, 1.59, 0.45% and 1.39, 0.20, 1.20% respectively. Groundnut acreage has declined in recent years largely because farmers switch over to more profitable or less risky crops such as Bt cotton and soybean. Groundnut contributes 0.4 to 0.6% of gross national product and 2 to3% of all agricultural commodities. In states like Gujarat and Andhra Pradesh groundnut contributes upto 4-6% of value of all agricultural commodities. India also earns sizeable foreign exchange through export of many groundnut products.

1.5 Record Yields in Groundnut

Groundnut is photo synthetically a highly efficient crop. Since of the examples of record pod yields are as follows:

- 10.5 t ha^{-1} over a small area under intensive cultivation in Shandong province, china (Yanhao et.al., 1996).
- 9.6 t ha^{-1} in large plots in Zimbabure (Hidebrand, 1996).
- 9.4 t ha^{-1} in a 0.2 ha plot in a summer groundnut crop in Maharashtra and 9.5 t ha^{-1} in a 3 cent plot in Andhra Pradesh, India (Nigam, 2000).

These figures represent the yield potential of groundnut for the respective agrological zones. Theoretical potential pod yield that can be researched in the crop in Shandong Province in China is 17.3 t ha^{-1} (Yanhao et.al., 1996).

1.6 What AILS Groundnut in India

Most of the groundnut in India is grown under four major agro ecologies:

1. Rainfed (kharif season, June – September)
2. Irrigated (rabi season, October – March)
3. Residual moisture (rabi season, October – March)
4. Irrigated (Summer / spring season, February – May)

In all the four major agro ecologies, various constraints gentle that limit groundnut productivity. Some of the constraints are common across all the four agro ecologies.

Groundnut is extensively grown in the semiarid tropics by resource – poor farmers where many Abiotic and biotic factors limit its productively and seed viability. The major Abiotic factors affecting groundnut production include drought, low availability of phosphorus especially under acidic soil condition, salinity and temperature stress (Both low and high). In calcareous soils, groundnut is also affected by iron-induced chlorosis. Rust, late leaf spot (LLS), and early leaf spot (ELS) are widely distributed foliar diseases. Groundnut rosette disease (GRD) is the most distructive disease of groundnut in Sub-Saharan Africa. Bacterial wilt of groundnut is prevalent in East Asian region, while peanut bud necrosis disease in South Asia. Unlike disease, insects are of localized importance. The only groundnut insect pests of significance are leaf miner in South Asia: Spodoptra in southeast Asia, termite in Africa, and cornear worm, lesser corn stock borer, and Sothern corn rootworm in USA. Nematodes are of importance in USA. Sucking pests such as aphids, Jassids, and thrips are not themselves considerable economically important but are carrier of virus diseases such as aphids for GRD (Dwivedi et.al., 2003).

Most of these stresses often occur in combinations and their severity and extent of distribution vary with cropping systems, growing seasons, and regions. Global yield loss caused by these stresses is enormous for example, yield loss done to rust and LLS together has been projected at US $ 1066 million of which nearly 50% can be realized through genetic enhancement.

1.7 Yield Gaps in Groundnut

The yield gap is difference between potential yield and actual yield. It can be decomposed into two parts, viz., yield gap-I and yield gap-II. Yield gap-I is the difference between experimental stations average attainable maximum yield and on farm experiments average maximum yield. This yield gap arises firm difference in environment that cannot be managed in the farmer's fields. Yield gap-II, which is of primarily concern is the difference between yield attained in on farm experiments and the average actual farm yield. This gap reflects the effects of biological, soil and water, physiological, genetic and socio-economic constraints. This gap exists because farmers use sub optimal doses of inputs and cultural practices. It is manageable and narrowed by increasing efforts in research and extension services, as well as by appropriate government intervention, particularly in institutional issues. There gaps can also be classified as agronomic constraints, socio-economic constraints, institutional constraints management constraints etc.

Yield gaps calculated on the basis of the yields recorded under Front Line Demonstrations (FLD) of ICAR and average / highest yield recorded in the states is given in Table.1.3. It indicates that an average yield gap of 65% for kharif and 32% for rabi/summer groundnut over state average yield. However, yield gaps are higher in the states of Karnataka (72-101%) and Rajasthan (94%).

Table 1.3 *State-wise yield gap (kg/ha) groundnut*

State	Rabi 2011-12			Kharif-2012		
	SAY	FLD	Yield average (%)	SAY	FLD	Yield average (%)
Andhra Pradesh	1848	2947	70	533	1648	74
Gujarat	1914	2216	19	790	1446	42
Karnataka	917	2498	101	564	1694	72
Maharashtra	1446	2176	46	1037	2379	85
Odessa	-	-	-	1041	2424	88
Rajasthan	-	-	-	1549	3033	94
Tamil Nadu	3571	2027	-110	1928	1870	-4
West Bengal	1969	2962	63	-	-	-
Mean	1974	2471	32	1063	2078	65

SAY: State average yield, FLD : Frontline demonstration yield

Rajasthan and Tamil Nadu were identified as high potential-low gap states, while Gujarat was recorded under the high potential-high gap state. (Table 1.4). Potential districts for groundnut in important states are given in Table.1.5

Table 1.4 *Classification of states according to potential yield and yield gap in groundnut*

Gap	High potential			Low potential		
	State	Potential yield (kg/ha)	Yield Gap (%)	State	Potential yield (kg/ha)	Yield Gap (%)
High gap	Gujarat	2151	30	Karnataka	1677	28
Low gap	Rajasthan	2377	15	Maharashtra	1712	17
	Tamil Nadu	2209	10	Andhra Pradesh	1341	19

Table1.5 *Potential Districts for groundnut in important states*

State	Districts
Andhra Pradesh	Anantapuram, Chittoor, Kurnool, YSR Kadapa, Vizayagnagaram and Srikakulam.
Telangana	Mahabubnagar, Warangal and Nalgonda.
Gujarat	Junagadh, Jamnagar, Rajkot, Amreli, Bhavnagar, Porbandar, Kutch, Subarkantha, Banaskantha and Vadodara.
Karnataka	Chitradurga, Tumkur, Gadag, Bijapur, Belgaum, Bellary, Dharwad, Koppal, Raichur, Chickballapur, Bhagalkot, Kasargad and Haveri.
Maharashtra	Kolhapur, Satara, Pune, Sangli, Nasik and Dhale.
Rajasthan	Bikaner, Jaipur, Jodhpur, Sikar and Chitture.
Tamil Nadu	Thiruvannamalai, Villupuram, Vellore, Kancheepuram, Numakkal, Erode and Salem.
Odessa	Jajpur, Baragarh and Ganjam.

1.8 Prioritization of the Constraints

In spite of the moderate grains in productivity of groundnut made in India there remains on large gap in potential yield and yield realized at the farm level, particularly in rainfed agriculture. For to well defined and focused research agenda that will ensure sustainable yield grains in a consistent manner, the following is required. Identify production constraints including socio-economic factors operating in various agro ecologies. Rank them in order of their adverse impact on productivity. Identify best management (genetic or non-genetic) options for major constraints based in benefit cost ratio for return in research investment for each identical constraint. Identify research lags.

Indicate probability of success and research investment costs.

Research institutions should focus on the priority constraints of groundnut of their region. In many cases non-genetic option may be an easier and profitable solution of constraint alleviation. Socio-economic, policy and infrastructure related issues affecting groundnut productivity and production will have to be dealt with at government level removing impediments in reaping the benefits of research outputs by farmers.

1.9 Issues/Concerns in Groundnut

Some of the major issues/Concerns which affect the groundnut production, productivity and utilization are as listed below (Hedge, 2009)

- Continued dependence of groundnut on rainfed production system nearly 72% of groundnut area is under rainfed condition.
- Non availability of quality seeds of improved varieties due to weak seed chain. The seed replacement rate over in state like Gujarat is just about 3%.
- General tendency to promote only state varieties at the cost of nationally released varieties.
- Inadequate plant stand which is by for the most important constraint hindering higher productivity.
- New biotic threats like stem and bud necrosis has became major constraint in many regions.
- Inefficient processing as the crop is reserved for small scale sector lending to poor oil recovery and reduce earnings to farmers and higher cost to consumers.
- Inadequate marketing support and non remunerative prices often acting as a disincentive for greater investment on inputs in crop production.
- Unfavorable and unstable import policy lending to depress a domestic prices which adversely affects the farmers although consumers many benefit in the short term.

The country has already achieved an average productivity of 1.7 t/ha during 2013-14. If all the constraints ore addressed adequately there is every possibility of achieving a productivity level of 2-2.5 t/ha under rainfed conditions and 4-5 t/ha under irrigation lending to total national productivity of 2.5 to 3 t/ha under intensive cultivation, a productivity level of 6-7 t/ha is easily achievable.

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