



# Agricultural Machinery Sector In India

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## Introduction

Over the last few years, there has been considerable progress in agriculture mechanization. It is generally believed that the benefits of modern technology have been restricted to farmers with large land-holdings. Yet the fact remains that even small farmers are adopting and utilising selected farm equipments for efficient farm management through custom hiring. Mechanical equipments for various farm operations like tillage, sowing, irrigation, plant protection and threshing etc are generally being used by the farming community.

Moreover, reliance on animate power for day to day management of farm operations is showing a continuous decline owing to higher gains in form of improved land and labour productivity resulting from use of mechanical power. Improved implements such as M B plough, puddler, disc harrow, peg tooth harrow, spring line harrow being more efficient have been adopted. Further, use of sowing or planting devices is also registering a higher growth due to their impact on seed and fertiliser use. The number of draught animals has also shown a decline as a consequence of farm mechanization.

Trend of Machinery Population in Indian Agriculture (Number in million) <sup>1</sup>						
Machinery	1950-51	1960-61	1970-71	1980-81	1990-91	2000-01*
Tractor	0.008	0.03	0.09	0.428	1.233	2.641
Power tiller			0.017	0.08	0.095	0.118
Combine harvesters					0.003	0.006
Electric Pump	0.02	0.1	1.029	4.33	8.91	12.514
Diesel Pump	0.083	0.23	1.546	3.101	4.659	5.94
Power sprayer/duster			0.045	0.124	0.2	0.311

Growth of Mechanical Power Operated Agricultural Machinery (no in thousands)						
Implement	1971-72	1976-77	1981-82	1986-87*	1995-96*	2000-01*
Combine (tractor)	3.5	5.6	12	37	61.5	109
Harvester (self propelled)	4.5	3	3	18	35	55.7
M.B & disc. Plough	573	925	1429	2392	4004	5427
Disc.Harrow	556	1292	1892	3574	6751	9826
Cultivator	815	1766	3150	5956	11558	18444
Seed Drill/Seed fert.drill	246	640	1606	2777	7301	12609
Planter	85	244	305	443	643	798
Leveller	494	1201	4140	7008	11861	15912
Potato digger			569	878	1355	21813
Total threshers	2058	5041	10250	13638	19089	22104
a) Wheat thresher	1825	4278	8319	11599	16172	18763
b) Paddy thresher	136	575	1318	1148	1622	1767
c) Other threshers	97	188	613	89	1295	1574
Sugarcane crusher	872	1045	1208	1512	1892	2133

<sup>1</sup> Source: Singh, Joginder; "Scope, Progress and Constraints of Farm Mechanization in India"; published in Status of Farm Mechanization in India; IARI, March 2006

## India in the Global Farm Equipment Market

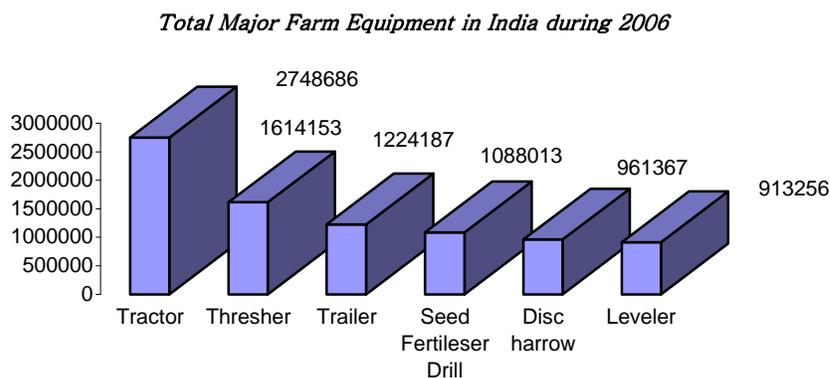
Indian market is expected to contribute nearly 10 % in 2006 to the worldwide farm equipment market estimated at \$ 66 Billion.

- Over the last few years Indian agricultural equipment market has been widely exposed to international trade.
- Global majors like John Deere, New Holland, Carraro and Same Deutz have already made an entry in Indian market, whereas Indian players are looking for alliances with foreign partners overseas.
- Many factors affecting agricultural equipment sales in India include the monsoon, government declared support prices for crops, commodity prices, crop production expenses (including fuel, fertilizer, pesticides and other costs) and the credit policy announced by banks.

## Status of Farm Mechanization in India

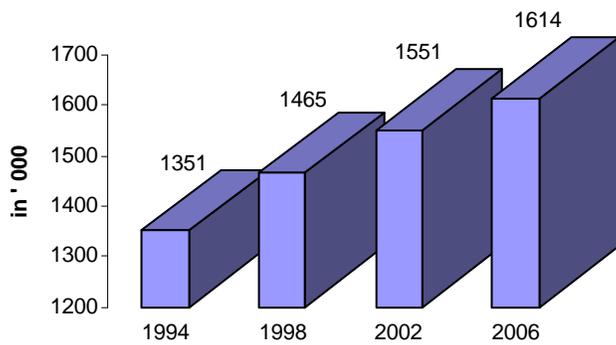
Even though farm mechanisation shows an increasing trend, there are wide ranging disparities in the levels of mechanisation across states.

- Northern States such as Punjab, Haryana, Uttar Pradesh (particularly Western and Tarai belt) have achieved a faster growth in mechanization over various Plans
- The sale of other implements and machines like combine harvesters, threshers and other power-operated equipment have been increasing almost throughout the country
- The pace of mechanization in North-Eastern States has not been satisfactory due to constraints such as hilly topography, socio-economic conditions, high cost of transport, lack of institutional financing and lack of farm machinery manufacturing industries
- Mechanization in Western and Southern states of the country viz., Gujarat, Maharashtra, Rajasthan and certain areas of Tamil Nadu, Andhra Pradesh etc., has increased with the increase in area under irrigation and also with the growing awareness among farmer



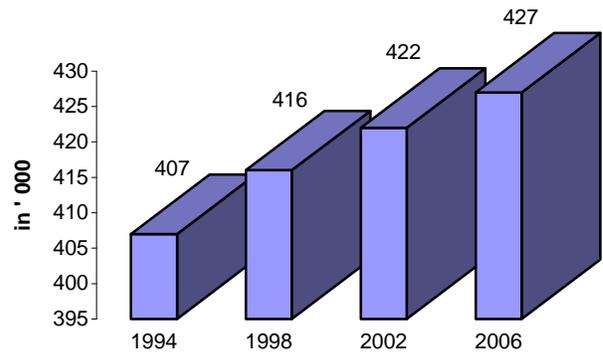
## Use of Major Farm Equipments over the years in India<sup>2</sup>

Number of Threshor



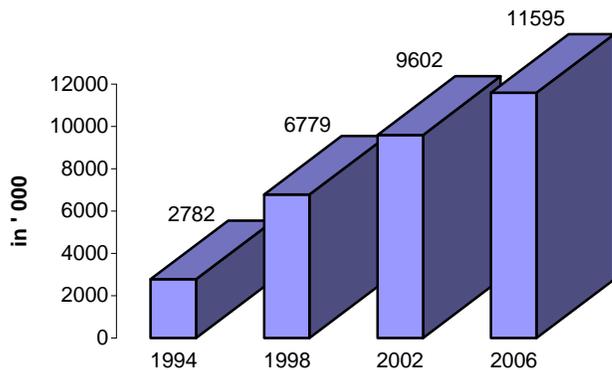
Use of threshers has increase by nearly 20% since 1994

Number of Harvester



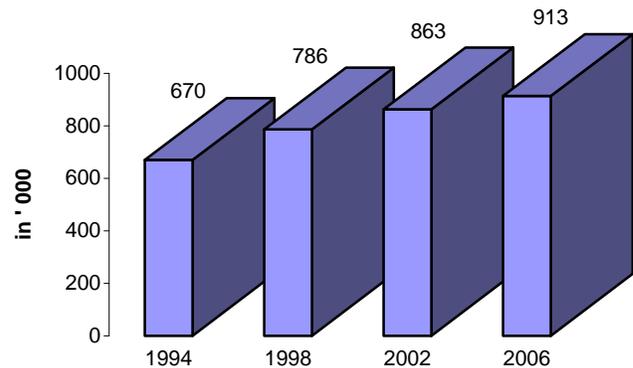
Use of Harvesters has increased by nearly 5 % since 1994

Number of Reapers



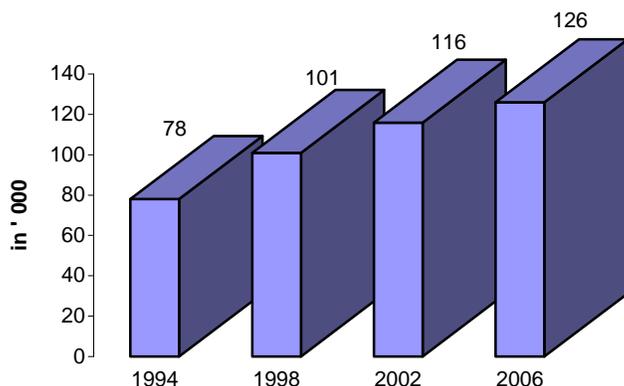
Use of Reapers has increased by nearly 315% since 1994

Number of Leveler



Use of levelers has increased by more than 35% since 1994

Number of Maize Shellers

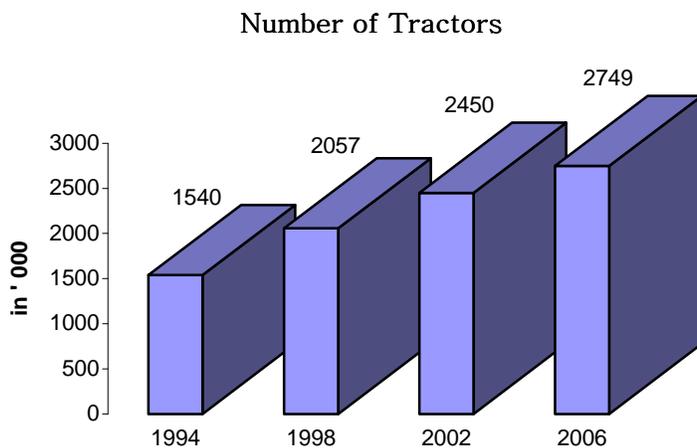


Use of Maize Shellers has increased by nearly 61% since 1994

<sup>2</sup> Source: Agriculture Equipment Market in India, Zinnov Consulting, 2006

## Tractors

India is the second largest manufacturer of tractors in the world. The Indian tractor industry closed FY'05 on a very positive note with 250,000 units registering a growth of over 30% over previous year. The government's focus on the agricultural economy with increased rural lending ensuring availability of cheap finance led to the growth. Exports stood at 27,700 units in FY'05. Tractor industry is categorized on the basis of power delivered by the engine Horse Power (hp). 30-40 hp tractors primarily used in southern and western regions due to hard soil conditions dominate Indian market. It is followed by range of 21-30 hp, which finds its market in soft soil conditions and well irrigated northern states. The tractor industry comprises 14 players, including three MNCs and is led by Mahindra & Mahindra Ltd, Tractors & Farm Equipment Ltd and Punjab tractors Ltd. Riding on the back of normal monsoons and strong rural credit growth, during April-November'05, overall tractor sales has grown by about 13% over the corresponding period last year, to 186,000 units. Backed by Government's initiative on rural roads and better connectivity with major towns and cities, increase in area under irrigation, improved agricultural performance and factors like increment in minimum support price coupled with more emphasis on agricultural financing (total outlay for agricultural financing, which was Rs 108,500 crore in FY'05, has been increased by 30% in FY'06) will keep up the momentum and industry is likely to achieve 10% growth in the current financial year. Exports have also registered growth of around 60% during the first eight months of FY'06 to 19,300 units as compared to 12,200 units in the same period last year.



- Use of tractors has witnessed an increase of more than 78% since 1994
- There are more 13500 tractors per millions hectares at present in India

## Factors affecting demand for tractors

Demand for tractors is likely to be driven by thrust on

- Irrigation,
- Rural infrastructure and
- Enhanced farm credit

Company	Products	Tractor sales as a % of total	Market Share in Tractors
Mahindra & Mahindra Ltd	Utility vehicle, LCV, Three wheelers, Tractors	25	44 %
TAFE Ltd.	Tractors & farm machines	80	23 %
International Tractors ltd	Tractors	100	11 %
Escorts	Tractors	NA	14 %
New Holland	Tractors	100	5 %
John Deere	Tractors	100	4 %
Others	Tractors & farm machines	NA	7 %

## Export Potential

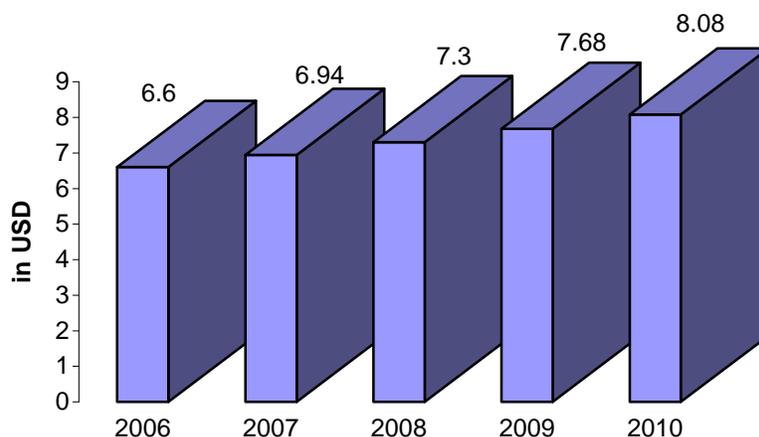
Exports are expected to be driven by

- Multinational tractor manufacturers who have made India an export hub for sourcing of aggregates and tractors. Hence, the growth in exports will depend on the level of outsourcing by companies like L&T John Deere and New Holland Tractors and
- Aggressive strategy for overseas markets by domestic manufacturers like Escorts and Mahindra & Mahindra

## The Overall Indian Farm Equipment Market

The market for farm equipments in India is on a growth phase post a decline period that lasted during period 1999 to 2002. The reasons behind the revival include easy availability of finance schemes and reduction in interest rates. The Government focus on building and improving infrastructure also had a positive effect on the overall performance of the farm equipment sector. Contract farming, which is being encouraged by the Government since 2005, will also have a favourable impact on the farm equipment demand. Farmers will now be hedge their crop risks through technical advice provided to them by the corporate organisations, besides assurance of upfront prices and market outlets would increase the farmer affinity for mechanized Agri technologies.

Indian Agriculture Equipment Market



The Indian Farm Equipment Market is expected to grow at a CAGR of ~5%

## Policies pertaining to Agriculture Machinery Sector

### CENTRAL SECTOR EXTENSION PROGRAMMES<sup>3</sup>

#### **Promotion of agricultural mechanization**

In this scheme, subsidy for the purchase of tractors below 18 hp to hp along with 3 matching implements is being provided to farmers, individually or in a group, having irrigated land between 2.4 to 3.2 ha. Subsidy rate is 30% of the cost to a maximum limit of Rs. 30000.

#### **Special food production programmes (for wheat, maize and millet)**

Under these programmes subsidy is provided up to 50% of the cost limited to Rs. 1500/- per implement/farm on bullock drawn implements. Under maize and millet programmes, subsidy is also provided on plant protection equipment limited to 50% of cost or up to Rs.600/

#### **Oil seed production programme**

Under this programme subsidy is being provided on bullock drawn implements to the tune of 50% limited to a maximum of Rs.700/- to small and marginal farmers. Subsidy is also being provided on plant protection equipment up to 50% of cost limited to Rs.500/

#### **National pulse development programme**

Under this programme subsidy is being provided on bullock drawn implements up to 50% of cost limited to Rs.500/-per farmer. Subsidy is also provided on plant protection equipment up to 50% of cost limited to Rs. 500 and Dal processing equipment up to 50% of cost limited to Rs. 4000 for machines of less than 1.5 hp capacity.

#### **Intensive cotton development programme**

Under this programme subsidy is being provided on plant protection equipment up to 50% of cost limited to Rs.600 for manually operated equipment and 25% of cost limited to Rs. 4000 for tractor mounted equipment.

#### **Integrated programme for rice development**

Under this programme subsidy is being provided on animal drawn implements, rice transplanter and water pumps up to 50% of cost limited to Rs.1500. Subsidy is also being provided on power tillers up to 25% of cost limited to Rs.12000.

#### **Development of industrial designs of prototypes of implements**

This scheme was approved for the 8th plan with an outlay of Rs.13.5 million. The scheme envisages identification of improved, nearly developed equipment and grant of financial assistance to the R&D institutions for developing industrial designs together with jigs and fixtures needed for their commercialization.

### STATE SECTOR EXTENSION PROGRAMMES

Under the state sector programmes generally two promotional programmes are being used by the state governments;

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<sup>3</sup> Source: Singh Gyanendra; "Agricultural Machinery Industry in India (manufacturing, marketing & mechanization promotion), published in Status of Farm Mechanization in India; IARI, March 2006

### **Custom hiring of implements**

Under this programmes tractors with matching implements for deep ploughing, rotavation, reapers, threshers, combines, drilling and boring machines, dozers, ditchers etc are being given to farmers on subsidized hire charges.

### **Manufacture of implements**

State governments having agricultural implement workshops are manufacturing a good number of improved agricultural implements and providing to farmers at nominal profits. Most of the implement popularization Schemes sponsored by the Central Government are under review to have an integrated approach to the input requirements of the farmers. Under Macro Subsidy Schemes, the State Governments are required to prepare a consolidated requirement based on the inputs to be promoted for increasing the productivity of agriculture.

## **TESTING AND EVALUATION**

The adoption of agricultural machinery is greatly influenced by the quality and after sales available to the farmers. Since manufacture of agricultural machinery is reserved for small-scale industries, the quality is affected by the manufacturing technology adopted by them. Testing and evaluation helps in up-gradation and quality production of machinery. R&D institutions and quality certification agencies conduct the T&E. Testing and evaluation is conducted on newly developed equipment and during its serial production, to facilitate and ensure quality, reliability, durability, functional ease, comfort in operation and cost of operation. Testing is conducted with well defined standard parameters, defined in BIS, ISO, or OECD standards, and where as evaluation is done to measure the performance under simulated or field conditions or the parameters for which the equipment has been designed.

### **Institutions involved in testing and evaluation**

#### **Bureau of Indian Standards**

The Bureau of Indian Standards has the statutory authority to inspect the quality of products manufactured and marketed in India. The agricultural machines manufactured by the organized sector like tractors, earth moving machinery, irrigation equipment , plant protection, dairy equipment, processing machinery etc. are certified for their quality by BIS. The BIS has established their Regional Testing Laboratories to facilitate testing and evaluation, including that of agricultural machinery. The BIS has also authorized other Government and Semi-Government testing laboratories to conduct testing on their behalf as per BIS Test Codes or ISO Test Codes.

#### **Farm Machinery Training and Testing Institute**

The Ministry of Agriculture, Government of India has established 6 Regional Testing Centres located at Budni, Madhya Pradesh (Central Region), Hissar, Haryana (Northern Region), Ganganagar, Rajasthan (Northern), Assam (Eastern Region), Anantpur, Andhra Pradesh (Southern Region), Tamil Nadu (Southern Region). CFMT&TI, Budni is equipped to undertake testing of tractors, combines and other agricultural machinery. Other Centres, test agricultural machinery and irrigation equipment. These Centres conduct testing and evaluation as per BIS Test Codes.

#### **Regional Research Laboratories under CSIR**

The Regional Research Laboratories (RRL) under CSIR have established microprocessor based modern testing facilities especially for metallographic and material testing. These laboratories have memorandum of understanding (MOU) for sharing research and testing facilities for quality assessment of products, including agricultural machinery.

### **Independent testing and evaluation laboratories**

Few NGOs, institutions/association have established independent institutions for undertaking testing and evaluation and these have been authorized by Govt. Deptts . /BIS /other consumer organizations (Bank Consumers Protection Forum, etc.) to undertake quality performance testing on their behalf. Few Universities, including Agricultural Universities and Institutes under Indian Council of Agricultural Research conduct quality certification evaluation for consumers on request.

### **Agricultural Machinery Marketing and after sale-services**

The large and medium scale manufacturers have well organized distributors and dealers through out the country to undertake advertising and product promotion in their respective territories, conduct product awareness training programmes for the prospective customers, provide after-sales-service to the customers including free services, repair and maintenance, supply of parts, etc. Therefore, this organized sector has the whole of the country as their market due to which their production volumes are large, and their information feed back about their product performance, improvements required in design, production processing or quality, and the new requirements of the farmers to undertake product developments. Very few small-scale industries have established their marketing network and therefore provide service support in their premises. In the absence of standardization of parts and components farmers are compelled to carry their machines to the manufactures for repair and replacement of parts and components. Due to this, their market size is limited to their proximity, and they are not able to develop their businesses. The village artisans on the other hand are located in the villages and therefore provide immediate attention to the needs of the farmers in their immediate neighbourhoods. Therefore, the tools and implements, etc. made by them are against specific requirements of individual customers

### **Popularization of agricultural machinery**

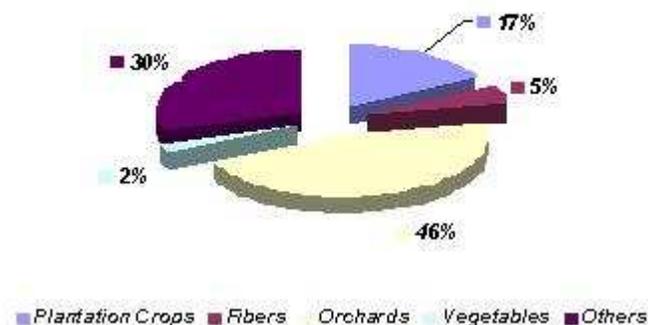
The assimilation of R & D requires an effective technological infrastructure of institutions and services to develop and test prototypes, to set up pilot plants for intensive evaluation and extensive demonstrations besides, training and credit support. New technology also requires network for transfer of technology to the manufactures. Popularization of agricultural machinery in the country is undertaken by the Provincial Governments through Department of Agriculture or Department of Agricultural Engineering. The activities are coordinated by the Department of Agriculture in Cooperation with the Ministry of Agriculture, Government of India. The Ministry of Food Processing promotes technology related to agro-processing. The extension system deals with the first-line extension projects with a view to: i) demonstrating the latest technologies to the farmers as well as the extension agencies; (ii) testing and verifying the technologies on the farmers field (iii) providing opportunities to get firsthand scientific feed-back; (iv) developing extension or technological models for the state extension systems; (v) providing training and communication support; and (vi) promoting research in transfer of technologies.

## Irrigation in India

India has invested heavily in the development of infrastructure for irrigation since independence. As opposed to an irrigation potential of 22.6 Mha in 1950 -51 the country today has an irrigation potential of 102.8 Mha. Even though the utilization of our ultimate irrigation potential stands at 63.35%, the country of late is making big strides in both creation and utilization of the irrigation potential. All this and more has been the result of change in emphasis on not only creation of physical facilities but also on efficient utilization of the created irrigation potential.

Crops	Area (Mha)		
	Drip	Sprinkler	Total
Cereals	-	27.6	27.6
Pulses	-	7.6	7.6
Oil Seeds	3.8	1.1	4.9
Cotton	7	1.8	8.8
Vegetables	3.6	2.4	6
Spices & Condiments	1.4	1	2.4
Flowers, Medicinal & Aromatic Plants	-	1	1
Sugarcane	4.3	-	4.3
Fruits	3.9	-	3.9
Coconut & plantation crops, oil palm	3	-	3
<b>Total</b>	<b>27</b>	<b>42.5</b>	<b>69.5</b>

Crop Coverage under Micro Irrigation in India

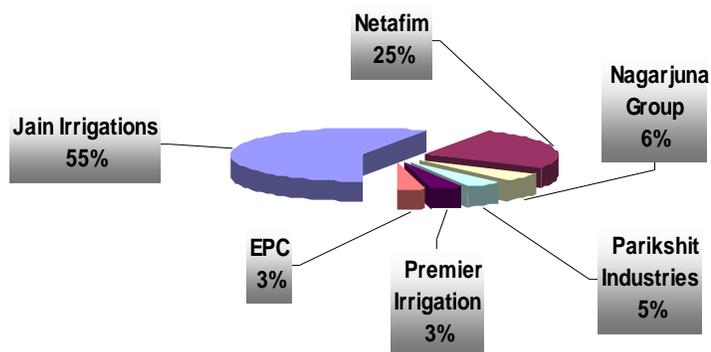


Source: Rajput TBS & Neelam Patel, *Micro Irrigation Manual*, Water Technology Centre, IARI; 2007

### Area covered under micro irrigation in different states (lakh Ha)

State	Drip	Sprinkler	Total
Maharashtra	341848	153507	495355
Andhra Pradesh	155441	124510	279951
Tamil Nadu	116665	26332	142996
Karnataka	14433	157028	271461
Gujarat	53707	96374	150061
Kerala	10562	1548	12110
Rajasthan	10025	554708	564733
Madhya Pradesh	6483	100000	106483
Punjab	5101	10000	15101
Uttar Pradesh	4609	10000	14609
Haryana	4258	503877	508135
Orissa	2036	20220	22256
Chattisgarh	1979	3765	5744
Himachal Pradesh	116	581	696
West Bengal	110	150020	150130
Sikkim	80	10030	10110
<b>Grand Total</b>	<b>829067</b>	<b>1927009</b>	<b>2756076</b>

### Market Shares of Major Irrigation Companies in India



Irrigation Potential in India (Mha)	
Drip Irrigation Potential	27
Sprinkler Irrigation	42.5
<b>Total</b>	<b>69.5</b>

## Government Initiative for Popularization of Micro Irrigation System

### Micro Irrigation (MI) Scheme<sup>4</sup>

A Centrally Sponsored Scheme under which out of the total cost of the MI System, 40% will be borne by the Central Government, 10% by the State Government and the remaining 50% will be borne by the beneficiary either through his/her own resources or soft loan from financial institutions.

- i) Assistant to farmers will be for covering a maximum area of five ha per beneficiary family
- ii) Assistance for drip and sprinkler demonstration will be 75 % for the cost for a maximum area of 0.5 ha per beneficiary, which will be met entirely by the Central Government
- iii) All categories of farmers are covered under the Scheme. However, it needs to be ensured that at least 25 % of the beneficiaries are Small & Marginal farmers
- iv) The focus will be on horticultural crops being covered under the National Horticulture Mission
- v) The Scheme includes both drip and sprinkler irrigation. However, sprinkler irrigation will be applicable only for those crops where drip irrigation is uneconomical.
- vi) There will be a strong HRD input for the farmers, field functionaries and other stakeholders at different levels. Besides there will be publicity campaigns, seminars/workshops at extensive locations to develop skills and improve awareness among farmers about importance of water conservation and management
- vii) Supply of good quality system both for drip and sprinkler irrigation having BIS marking, proper after sales services to the satisfaction of the farmer is paramount

### Nature of Scheme

This will be a Centrally Sponsored Scheme under which out of the total cost of the MI System, 40 % will be borne by the Central Government, 10 % by the State Government and the remaining 50 % will be borne by the beneficiary, either through his/her own resources or soft loan from financial institutions. In other words, out of the Government assistance, 80 % share (40 % of unit cost) will be met by the Government of

<sup>4</sup> Source: Rajput TBS & Neelam Patel, *Micro Irrigation Manual*, Water Technology Centre, IARI; 2007

India (GOI) and the balance 20 % (10 % of unit cost) will be met by the participating State Government. The concerned States shall make available their share of 20 % to the Implementing Agencies (IA) during the financial year.

### **Scheme Components**

**Area Coverage under Micro Irrigation:** The scheme will facilitate increase in coverage of area under drip as well as sprinkler irrigation systems for enhancing crop productivity. Initially the focus will be on covering the areas under horticultural crops being promoted under National Horticulture Mission (NHM), which are conducive to drip irrigation or sprinkler irrigation and fertigation. For other crops, it will be restricted to potential belts/regions in the water deficit, arid and semi-arid areas. A cluster approach will be adopted in implementing the Scheme.

## Trade Scenario of Farm Equipments<sup>5</sup>

TABLE 1: EXPORTS

	Exports (US\$ Million)						
	2007-08 (Apr-June)	2006-07	2005-06	2004-05	2003-04	2002-03	2001-02
Agricultural or horticultural Sprayers or Irrigation Equipments	0.62	4.41	2.43	0.91	0.6	0.43	0.35
Agricultural, horticultural or forestry machinery for soil preparation or cultivation; lawn or sports ground rollers; parts thereof	5.84	28.85	23.01	15.65	16.86	14.79	11.76
Harvesting or threshing machinery, including straw or fodder balers; grass or hay mowers; machines for cleaning, sorting or grading eggs, fruit or other agricultural produce, other than machinery of under HS Code 8437; parts thereof	2.13	6.89	5.52	3.91	1.63	1.59	1.22
Milking machines and dairy machinery, and parts thereof	0.42	2.26	1.35	1.83	2.3	0.92	0.58
Presses, crushers and similar machinery, used in the manufacture of wine, cider, fruit juices or similar beverages; parts thereof	1.55	5.8	4.92	4.1	1.68	1.69	2.31
Other agricultural, horticultural, forestry, poultry-keeping or bee-keeping machinery, including germination plant fitted with mechanical or thermal equipment; poultry incubators and brooders; parts thereof	2.21	9.24	3.28	4.25	2.92	2.5	1.39
Machines for cleaning, sorting or grading seed, grain or dried leguminous vegetables, and parts thereof; machinery used in the milling industry or for the working of cereals or dried leguminous vegetables, other than farm type machinery; parts thereof (HS Code 8437)	5.84	15.71	14.67	10.7	6.43	8.23	10.53
Machinery, not specified or included elsewhere, for the industrial preparation or manufacture of food or drink, other than machinery for the extraction or preparation of animal or fixed vegetable fats or oils; parts thereof	9.25	36.95	37.66	24.31	16.71	10.25	8.35

<sup>5</sup> Source: Ministry of Commerce, Government of India

TABLE 2: IMPORTS

	Imports (US\$ Million)						
	2007-08 (Apr-June)	2006-07	2005-06	2004-05	2003-04	2002-03	2001-02
Agricultural or horticultural Sprayers or Irrigation Equipments	0.91	6.54	5.93	2.75	2.38	0.89	0.89
Agricultural, horticultural or forestry machinery for soil preparation or cultivation; lawn or sports ground rollers; parts thereof	2.52	18.76	15.97	8.89	4.57	5.9	3.47
Harvesting or threshing machinery, including straw or fodder balers; grass or hay mowers; machines for cleaning, sorting or grading eggs, fruit or other agricultural produce, other than machinery of under HS Code 8437; parts thereof	2.63	14.88	8.52	7.05	2.51	4.29	3.42
Milking machines and dairy machinery, and parts thereof	7.6	15.23	11.83	4.95	3.96	1.51	1.13
Presses, crushers and similar machinery, used in the manufacture of wine, cider, fruit juices or similar beverages; parts thereof	1.2	9.9	2.94	4	0.55	0.47	0.4
Other agricultural, horticultural, forestry, poultry-keeping or bee-keeping machinery, including germination plant fitted with mechanical or thermal equipment; poultry incubators and brooders; parts thereof	1.54	4.17	5.96	3.53	1.65	2.01	36.62
Machines for cleaning, sorting or grading seed, grain or dried leguminous vegetables, and parts thereof; machinery used in the milling industry or for the working of cereals or dried leguminous vegetables, other than farm type machinery; parts thereof (HS Code 8437)	14.14	63.7	30.98	29.21	15.08	11.74	8
Machinery, not specified or included elsewhere, for the industrial preparation or manufacture of food or drink, other than machinery for the extraction or preparation of animal or fixed vegetable fats or oils; parts thereof	20.41	60.71	28.26	25.86	20.74	11.49	15.26