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Plasticulture changing face of Indian Agriculture

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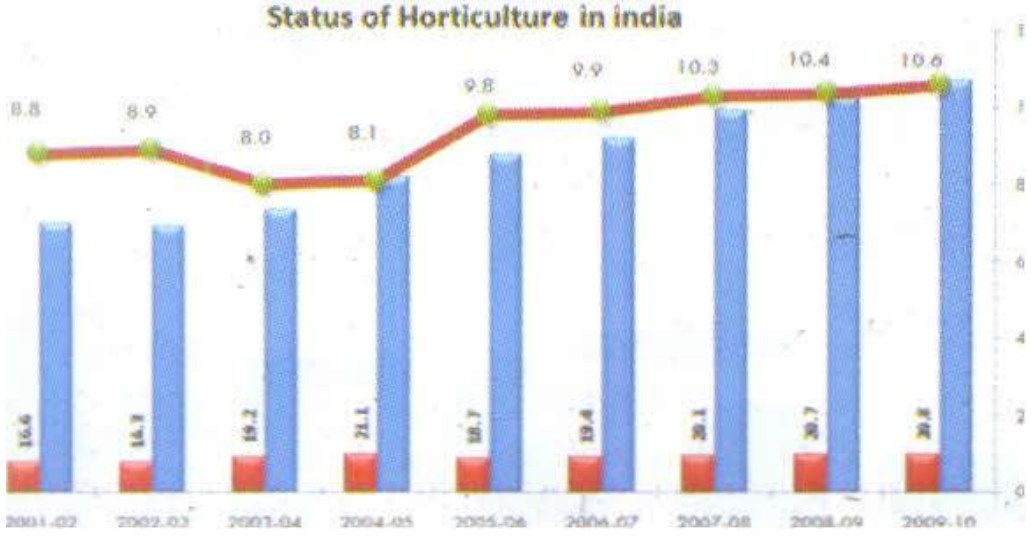
Agriculture is the ministry of the developing countries world over which provides food fiber and raw material to the industry and avenues inputs for employment. Water and sunlight are essential inputs for sustaining agriculture on land resource. Agriculture in India has passed through critical phases in the past few decades and has achieved self sufficiency in food production. Despite the fact that the country supports more than 16% world population with 2.4% land resources and 4% water resources, the achievement in the agriculture sector is laudable. Nearly 65% people directly or indirectly depend on agriculture and provide 58.2% employment in the country. It contributes nearly 16% of India's GDP and consumes 80% available water resource, which is likely to decrease 7.8 during 2011-12, which agri & allied sector showed significant contribution.



As a result there has been immense scope of Plasticulture application & development in the country. Plastics as an agriculture input world break the technological barrier to increasing agriculture productivity and provide impetus post-green revolution for a new phase of rapid development. In order to promote & develop the use of plastics materials in agriculture &

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associated field, the Government of India decided to constitute a National Committee to promote Plasticulture development in the country. The introduction of plastics in agriculture, water management & related areas would depend on several crucial factors such as;

- Government policy on irrigation water tariff and fiscal concessions on new irrigation method.
- Government policy on new agriculture method using modern materials.
- Availability of plastics products & grass root level distribution network
- Know-how & technical information at grass root level through extension measures
- Price of plastics product

Testing & standardization facilities for plastics uses in agriculture & irrigation application Many parts of the world including India is facing severe stress on natural resources, particularly land and water. Meeting the food and raw material demands in the face of increasing population and shrinking resources base is going to be a challenge in the immediate future. Achieving food security is a high priority in many countries including India, and agriculture must not only provide food for rising population but also save critical inputs for agriculture and their better management.

Major issues today concerning Indian agriculture today are;

- Low crop productivity -40 to 60% of world average.
- Only 40% of land area is irrigation with conventional irrigation.
- Heavy pre and post harvest losses food grains (10-20%) / fruits and vegetables (30-65%)
- Farmers share merely 30- 35% of total realization.
- Progressively lac of hectares of agriculture land getting uncultivable because of water logging and soil salinity.
- Un-organized network for marketing of agriculture produce.

Sustainability of food production increasingly depends on sound and efficient crop management and conservation practices consisting primarily of irrigation development and management with respect to agriculture and other allied areas.

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Type of Plasticulture Application in Agriculture

Plasticulture Application	Polymers Used
Drip irrigation system	LLDPE, PVC, PP
Sprinkler irrigation system	HDPE, PVC
Sub-surface Drainage	PVC
Canal Lining	LDPE, PVC
Pond Lining	LDP, LLDPE, EVA
Greenhouse	LLDPE, LDP, EVA
Plastic Tunnel	LLDPE, HDPE
Shad net House	HDPE
Plant Protection Nets	HDPE
Mulching	LLDPE, PP Non Woven
Soil Solarisation	LLDPE
Cap Covers	LDPE

Plasticulture application most widely used in agriculture, water management & related application are made of PE (LLDPE, LDPE and HDPE), PP and PVC.

The range of plastics raw materials are being constantly upgraded to offer cost economy and technical advantages – unheard of in earlier days – which constantly upgrades the Plasticulture product scenario to work in favors of the farming community. Plasticulture application such as micro irrigation and controlled environment agriculture helps in better utilization of land, water, sunlight and raising crops in extreme climatic conditions. The use of advanced irrigation techniques such as drip and sprinkler irrigation technologies have enabled raising of crops on undulating terrains, saline soils, areas with brackish water besides attaining saving of water and other inputs as fertilizer, increase in productivity, improvement in quality of produce thereby the environment.

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Scope of Plasticulture:

The Green Revolution with its emphasis on irrigation, high yielding varieties, fertilizers, pesticides and scientific farming methods, swept across the country, which resulted in turning India from that of a food deficient nation to food surplus nation. The increased agriculture productivity, better quality of produce as well as crop diversification are going to be the keys to the country's success in both, meeting the increasing domestic demand as well as being competitive in the international market. The post W.T.O. regime calls for a closer look at the agriculture and horticulture sector in quality and quantity of produce so that the Indian farming sector dose not lose to the international competition. Innovative agro practices need be adopted towards transformation of Indian agriculture precision farming practices, which will result in optimizing our agro input resources manifold to enhance agriculture productivity in items of quality and quantity. Plasticulture applications are one of the most useful indirect agriculture inputs, which hold the promise to transform agriculture towards ***"SecondGreen Revolution"*** in India.Major Plasticulture Application

Water Management:

- Lining of canal, ponds & reservoirs with plastics film
- Drip & sprinkler irrigation system
- Water conveyance using PVC & HDPE pipes
- Sub-surface Drainage

Nursery management:

- Nursery bags, pots, pro-trays, root trainers, coco peats, hanging baskets, plastic trays etc.

Surface cover cultivation:

- Soil solarisation
- Plastics mulching

Controlled environment agriculture:

- Greenhouses
- Shadnet houses
- Plastic tunnels

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- Plant protection nets

Innovation packing solution

- Plastic crates, bines, boxes, leno bag, unit packaging nets etc
- CAP covers controlled atmospheric packaging (CAP) & modified atmospheric packaging (MAP)

Organic farming

- HDPE

Plasticulture application can provide answer to the low periodicity areas by way of adopting various Plasticulture applications in the area of water management in situ moisture conservation, protected technologies, nursery management, in nov. active packaging for pre-&post harvest losses. That would help the country to meet both food and nutrition demands at a time when population growth is @ + 1% per annum with depleting natural resources such as land & water.

Benefits of Plasticulture Applications

S.No.	Plasticulture Applications	Water Saving (%)	Water Use Efficiency (%)	Fertilizer Use Efficiency (%)
1.	Drip irrigation system	40-70	30-70	20-40
2.	Sprinkler irrigation system	30-50	35-60	30-40
3.	Plastic mulching	40-60	15-20	20-25
4.	Greenhouse	60-85	20-25	30-35
5.	Shade nets	30-40	30-50	Not Available
6.	Plastic Tunnel	40-50	20-30	Not Available
7.	Farm pond lined with plastic film	100	40-60	Not Available

Indian Agriculture-Current Status:

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The total geographical area of India is 329 million hectares of which 141 million hectares is net sown area, while 193.7million hectares is the gross cropped area. More than 62.25mha is under different form of irrigation sources out of which more than 5mha is under the Micro Irrigation.India is the largest producer of coconut mango, banana, cashew, nuts, pulses, ginger, turmeric and black pepper. It is also the second largest producer of rice, wheat, cotton, sugar, fruits and vegetables.

Nearly 20 million ha is under the horticulture sector out of net sown area 141 m.ha. The CAGR of area is 3% & total production 5% respectively between 2001-02 to 2008-09. More than 10 lakh ha have been added under horticulture sector between 2007-08to 2009-10

Plastics are still underutilization in agriculture sector in India @ 1% vis 7% in developed countries. Today majority of Plasticulture business opportunities is subsidy driven in India. The growth of agriculture and allied sectors is still a critical factor in the overall performance of India economy. As per the 2010-11 advance estimates released by the Central Statistics Office (CSO), the agriculture and allied sector accounted for 14.2 per cent of the gross demos tic product (GDP), at constant 2004-05 prices.

Enhancing agricultural productivity to meet growing demand for food security for the entire population is one of the key objectives through optimizing agricultural land, water, agri-inputs by adopting improved cultivation practices and Plasticulture application. Plastics are vital inputs in all these areas and only through increased adoption of various Plasticulture application in water management protected agricultural & post harvest measures can achieve these targets there by significantly towards food security in India

National committee on Plasticulture application in horticulture (NCPAH) in the ministry of agriculture GOI as the national agency to promote precision farming & use of various Plasticulture application under the central sector mission for Plasticulture development in the country. Major flagship schemes are given below in which Plasticulture is a component if or which subsidies are provided.

Plasticulture components under different govt. programmers

Scheme Name	Plasticulture components

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National Mission on Micro irrigation (NMMI)	Drip & Sprinkler irrigation system
National Horticultural Mission (NHM)	Greenhouse, shade net house, plastic mulching plastic tunnel, community pond, HDPE vermin bed, protection nets etc.
Horticultural Mission for North East & Himalayan states (HMNH)	Greenhouse, shade net house, plastic mulching plastic tunnel, community pond, Hail protection nets
Rashtriya Krishi Vikas Yojana (RKVY)	Drip & Sprinkler Irrigation, Greenhouse, Shad net house, Hail Protection nets
Integrated Scheme on oilseeds, Pulses, oilpalm & Maize (ISOPOM)	Drip & Sprinkler Irrigation system
National Food Security Mission (NFSM)	Drip & Sprinkler Irrigation system
Vegetables Initiative for urban clusters	Drip & Sprinkler Irrigation Greenhouse, shade net house, plastic mulching plastic tunnel
Rain fed Area Development Programme	Greenhouse, Plastic Tunnel, Pond lining, Micro irrigation, HDPE vermin Bed, Mulching

Plasticulture Prospects:-

As per the second advance estimates released by ministry of agriculture, production of food grains during 2010-11 is estimated at 232.07 million tones compared to 218.11 million tones last year, the agriculture sector needs to grow at 8.5 per cent during 2011-12.

- India has immense scope of use of plastic in agriculture current consumption is 0.05 kg against 5 kg in development countries.
- As per CRISIL projected polymer consumption by 2012 12.75 MT, the additional demand 3.3 MMT is Driven by Plasticulture (59%) packaging (22%) and plastic in infrastructure (19%)

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- To achieve project 4% AGR of Agriculture sector under xi five year plan, greater utilization of Plasticulture application can help to enhance productivity & at same time reduces post harvest losses in agri/ horti produces.
- India as a country with +1% population growth, shrinkage land, reduced water availability for agriculture, market access for fresh, processed farming method and various Plasticulture application for enhancing productivity quality & reducing cost of cultivation along with post harvest losses in agri/horti sector.

Conclusion:-

Pioneering work by agriculture scientists and the efforts of farmers had helped achieve a breakthrough in the agriculture sector in the 1960s, popularly know as the "Green Revolution". High agriculture production and productivity achieved in subsequent years has been the main reason for attaining food security to a large extent. The food safety net for each a and every of the over a billion citizens a number that is growing required special attention for achieving higher production and productivity levels in pulses oilseeds fruits and vegetables which had remained untouched in the first green revolution but are essential for nutritional security. Due to sustained efforts India now ranks high in many commodities such as milk, rice, wheat, fruits & vegetables. Today in Agriculture the emerging issues concerning available land sunlight water due to urbanization and population growth effect of climate change water logging & salinity causes environmental problems calls for use of various Plasticulture application to meet food & nutrition demand in the country. The adoption of these applications would increase demand for polymers in the area of water management & protected agriculture, per and post harvest measures, processing etc in India. This would help supply chain to link between farms & fork and incentives millions of farmer with higher remunerative returns and at the same time lower the prices for end-consumers in India.