India's agricultural economy

Agriculture in India accounts for over 16% of the country's GDP and employs about 50% of the country's entire workforce. After the United States, India has the largest amount of arable land – land that is suitable for cultivation of crops. Hence agriculture sector is an important part of Indian economy. While India has claimed its place in the world as the largest producer of many fruits and vegetables, the country lags behind a big way in terms of yield and earnings. Indian farmer on an average receives anywhere between 10-23% of the price that the end consumer pays while in countries like the United States, farmers receive anywhere between 64-81% of the price.

Targeting farm productivity

In order to make farming a more rewarding profession, multiple issues along the entire chain, starting from the farm and ending at the consumer, need to be addressed. One such issue that needs attention is farm productivity. India's productivity for many crops lags behind the world's standards. The table below provides a snapshot of the situation for a few fruits and vegetables:

Crop	Average yield, India* (tonnes/hectare)	Highest yield achieved in the world* (tonnes/hectare)
Mangoes	6.3	40.6
Bananas	37.8	59.3
Potatoes	19.9	44.3
Tomatoes	19.3	524.9
Onions	16.6	67.3
Fresh Vegetables	13.4	76.8

*Source: FAOSTAT – Production Crops: 2010 data

As it can be seen, the gaps in yield for all the crops shown above are staggering. While it may be debated that it is unfair to compare India's productivity with the

best in the World, it is undeniable that the country is nowhere in the vicinity of the sort of potential that can be achieved. To achieve that there are practices which are cost effective, and yet, our farmers are totally incognisant of such practices. One such measure is the usage of Agrotextiles – Non-woven fabric made of polypropylene.

Agrotextiles – Offering Farm Productivity Solutions:

Fruits and vegetable crops need a certain degree of environmental consistency to grow. However, in a country like India, weather patterns are not very predictable. Many fruits and vegetables grown across the country are sensitive to environmental parameters and often fall prey to unexpected fluctuations.

This is where Agrotextiles stand to play an important role. There have been numerous cases in India where crops have been destroyed by frost (Tinda in Jaipur). In many other areas in India, there have been cases of crops getting destroyed because of insect attacks – mango, bananas and pomegranates face this situation. Agrotextiles that are used to offer protection from such attacks, make agriculture more productive. In some cases, the textile can be used to limit sunlight and retain moisture, especially in arid regions.

In India, Polypropylene nonwoven is used to cover the agricultural field but it is used very sparingly. It can be used as fruit cover or crop cover to save fruits from insect attacks while allowing air and sunlight to pass through, thereby improving the yield as well as the quality of the fruit. It is lightweight, cost effective and can last for 2-3 seasons if handled properly.

To study its suitability in India, Reliance Industries Limited has sponsored many trials in different regions where fruits like mango, banana and grapes etc. have been covered by Polypropylene nonwoven cover. These trials have been done in coordination with reputed agricultural centres and the results have been hugely encouraging.

Polypropylene nonwoven has the potential to increase the agricultural productivity in India. The main impediment to this is a lack of awareness. Reliance Industries Limited is putting major efforts to create awareness by conducting different kinds of awareness programs. Once stakeholders realize the immense benefits it provides, Polypropylene nonwoven would become an integral part of Indian agriculture.

Fruit Cover and its applications

One of the most simple and convenient ways of improving the fruit yield and fruit quality is using polypropylene nonwoven as fruit cover. It can be used either as bunch sleeve (where it covers the whole bunch of the fruit) or as an individual fruit cover where it can save the fruits from various deterrents (while allowing air and sunlight to pass through) such as-

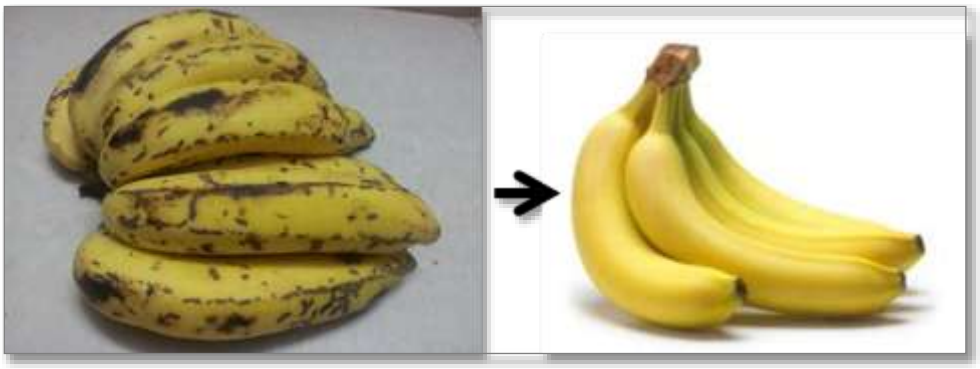
1) Insect attacks
2) Extreme hot and cold weather
3) Cross pollination

It also advances the fruit maturity, increases the bunch weight, improves the physico-chemical parameters and increases the shelf life of the fruit. It can be used to benefit many fruits such as:

Banana

Research Project was carried out by **National Research Centre for Banana** in the villages of Trichy.

Results- The yield and quality improved drastically. Fruit maturity was advanced (early harvest), bunch weight increased, physico-chemical parameters improved and blemish free, injury-free bananas were obtained.



Cost benefit analysis assuming 1200 banana plants per acre

Details	Control Plot	Plot with PP Nonwoven
Average Production Cost	Rs. 1.68 Lacs	Rs. 1.78 Lacs
Average Yield	25 kg/bunch	31 kg/bunch
Then Market Value	Rs. 8/kg	Rs. 9/kg
Net Profit		**Rs.84,800/acre**

After the success of the above trial, States like **Tamil Nadu, Maharashtra, Gujarat and Uttar Pradesh have started using PP Non Woven Banana covers to realize these benefits.**

Mango

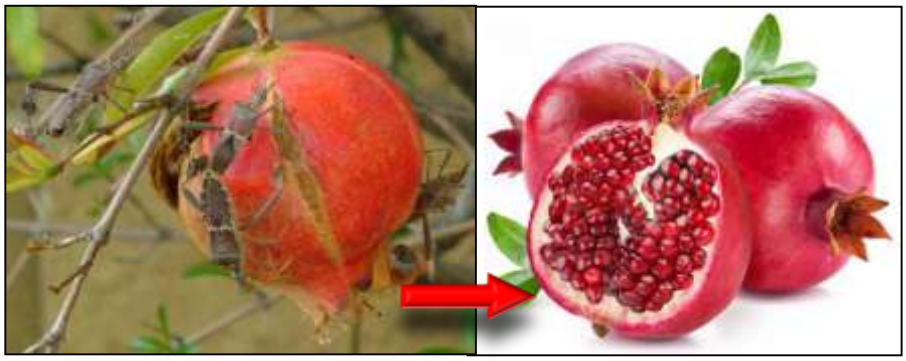
PP Non-Woven has been used as a fruit cover for Alphonso Mango in Maharashtra.

Results of trial done with Dapoli University-

- Protects mango from insect attacks and reduces incidence of stem end rot
- Improves fruit retention (fruits/bunches)
- Increases fruit weight significantly
- Delay in ripening
- Reduced occurrence of spongy tissue
- Provides good shine & skin gloss with lesser spots
- Helps in uniform produce

Pomegranate

Trial conducted at **National Research Centre for Pomegranate, Solapur.**



Results of the trial-

- Prevents sun burn
- Avoids damage to fruit due to abrasion/friction amongst fruits
- Prevention from dangerous disease from sucking pest called “Telya”
- Enhanced /uniform coloration to the fruit
- Juicy pomegranate arils / red colour leading to better price

Grapes

Result of trial conducted at National Research Centre for Grapes-

1) Stark **reduction in incidences of pink berry** formation.
2) Improvement in shelf life
3) Advancement in fruit ripening

Crop Covers – An Introduction

Worldwide, the application of using crop covers has been gaining significant mileage. A significant amount of research on the positive effects of crop cover, also popularly known as row cover, has been done. Research has proved that crop cover measures increase the yield of the crop apart from improving the quality of the produce. The higher volume of produce ensures greater return on investment and better quality paves the way for higher profit margins per unit weight of produce.

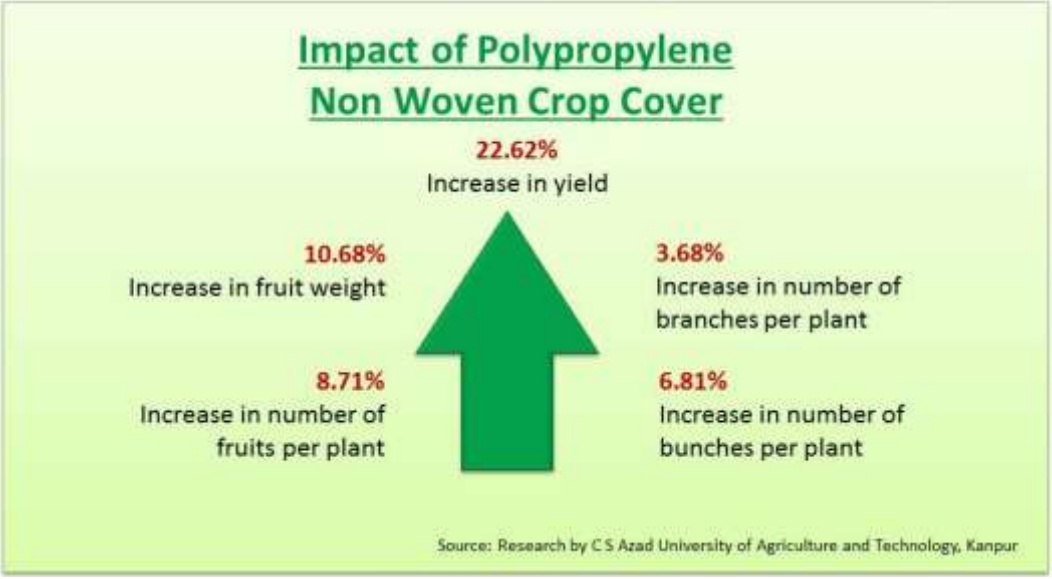
Apart from this, these covers have also helped reduce the usage of pesticides and protected growing crops from insects and birds, thereby protecting it from potential damage. The method has proven to be economical with a vastly improved volume and quality of produce. With some research and trials in India for similar crops, there is scope to create a tremendous impact on our farmers by making this a standard practice.

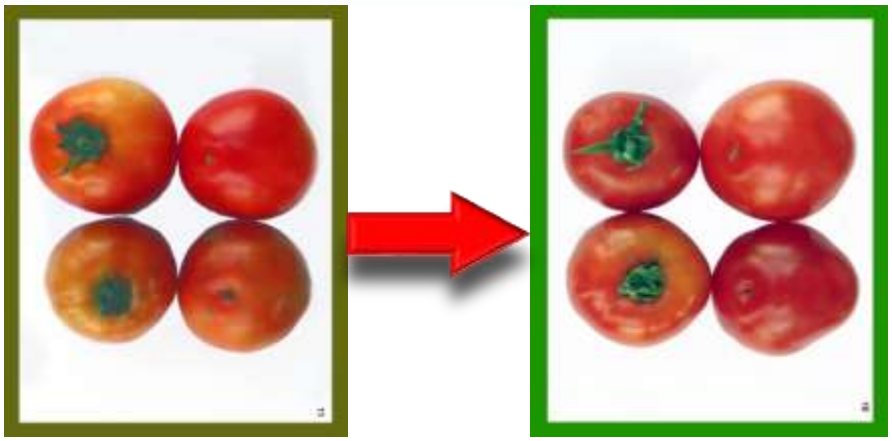
Multi-row floating row cover for frost protection of

Crop Cover Examples:

Tomato:

Tomato crops can be protected from frost by the usage of crop covers. A research study was done at CSA Agricultural University, Kanpur. The following positive effects on the crop were seen-





Light red colour of fruit (no Crop Cover) Darker and Richer fruit (using Crop cover)

Tinda:

Tinda is another crop that is adversely affected by frost in North India. As can be seen, the crop cover virtually transforms the field entirely by protecting the crop against harsh frost conditions. The trial was successfully carried out in Jaipur.

Profitability Analysis- (Value in Rs.)

Per Acre of land	Without PP Nonwoven Fabric	With PP Nonwoven Fabric
Cost of Wind Breaking Grass	30000	0
Cost of PPNW Fabric	0	5000
Cost of Pesticide	40000	20000
Yield	130000	168000
Earning	60000	143000

Green Chilly:

Crop affected by frost | Healthy crop upon row cover usage

Green chilly is yet another crop that can be protected against the negative effects of frost by using row covers. A tunnel-like structure with nonwoven covers can have a positive effect as seen in the picture. Trials have been conducted successfully at Pratapgarh, near Allahabad in Uttar Pradesh.

Musk Melon/ Water Melon

There are numerous advantages of Fruit Cover on Musk Melon & Water Melon which have been observed in adjoining areas of Jaipur-

- Early Harvesting
- Higher Yield
- Reduction of Pesticide
- No requirement of Wind Breaking Grass

Profitability Analysis-(Value in Rs.)

Per Acre of land	Without PP Nonwoven Fabric	With PP Nonwoven Fabric
Cost of wind breaking grass	10000	0
Cost of PPNW Fabric	0	5000
Cost of Pesticide	35,000	12000
Monetary Value of Yield	60,000	87,000

Earning	15,000	70,000

Way Forward:

Fruit covers and Crop covers have been in existence for over a few decades outside India. The materials that have been used for the same have continuously evolved over the years and have impacted the agricultural yield globally. Considering the kind of impact that they have had, similar tests have been conducted in India for various fruits and crops over the last few years, and the results have been very positive indeed. In a sector that badly needs innovative solutions that don't go hard on the pocket, non-woven applications present that kind of opportunity to increase our field outputs in a simple, yet cost-effective manner. Studies have been conducted continuously in Universities to establish the relevance of these materials in improving the yield of farm produce. Campaigns are being conducted by various stakeholders to increase the awareness across the entire farming community. By maintaining similar resolve and focus, the partnership between companies, Agricultural Universities and the Government has the potential to tackle an important impediment that has been bothering our farmers for far too long, and deservedly, help them earn more.