Special Feature

POLYPROPYLENE NONWOVEN COVER FOR FRUITS & VEGETABLES
Enables Growth

- Sector-Specific
- Process Focused Developmental, Approach from ‘Molecule to Marketplace’
- Product, Application and Market Development
- Structured Sector Management Programmes
- Trends Transplantation
- Market Extension in conjunction with Nodal Agencies, Machinery Manufacturers and Leading Processors

Supports Development

- Technical Support
- Quality Assurance
- Post-trial Vendor Development
- Advisory Services
- An Exclusive Entrepreneur Development Program
- Collaborative Research with Scientific Institutions
- Partnerships with government bodies and institutions for developing new standards and specifications
- Capability and development

Enriches Relationships

- Knowledge Transfer.
- Sharing of Intellectual capital and technical resources.
- Customer meets.
- Manpower Training.

Ensures Sustainability

- Development of Sustainable, cost-effective and environment-friendly solutions.
- Easing the pressure on natural resources.
- Focus on renewable resources.
- Balancing economic growth with improved quality life.
Greetings to all Repol Konnect readers!

The markets have rallied and the inflationary pressure has eased since the formation of the new government. This has resulted in increase in demand of general goods but the polymer industry has not been able to benefit from the same because of drastic changes in the upstream industry. The industry has had to grapple with falling crude prices, extremely volatile exchange rate and uncertain demand. However, there are signs that the prices might have bottomed out and we can look forward to a more stabilized market in the coming weeks.

Meanwhile, we have continued our efforts to create new business opportunities in Polypropylene and that has reflected in the numerous events/exhibition done by us. We are also pleased to highlight our efforts to help the Indian farming sector through nonwoven fruit and crop cover. The benefits of the same have been covered in this issue along with some of the new developments occurring in the downstream industry.

Enjoy reading the newsletter.

Meet our leaders
Mr. Vipul S Shah

In an endeavor to create a world class Petrochemicals business and strengthening our leadership in the Petrochemical organization, Mr. Vipul S Shah has joined us as Chief Operating Officer (COO)-Petrochemicals business. He began his career with Reliance Industries Limited in India and has joined us back with over 26 years of diversified technical and managerial experience in the Marketing and Commercial portfolios across geographies in Dow Chemical Company.

Repol Konnect team wishes Mr. Vipul S Shah a long and successful journey in Reliance family.

Please visit us at Hall 10R / A4

Feb. 5-10, 2015, Gandhinagar, Gujarat, India.
SKAPS Industries are a USA based multinational dealing in Geo Synthetic products and solutions to the world market. They are one of the leaders in Geo Synthetic manufacturing with state of the art plants around the world, 3 being in India. SKAPS Industries (India) Private Limited (SIIP), incorporated in 2005, is promoted by Non-Resident Indians headed by Mr Paresh Vyas. SKAPS Moriya plant (100% EOU) commenced during 2005 and another facility at Mundra SEZ which commenced during 2009-10. SKAPS Industries India had Production capacity of 10,000 MTPA to make woven technical textile, 23,000 MTPA to make staple fiber and 6,500 MTPA to make non-woven technical textile products.

The philosophy of SKAPS is to provide their customers the correct solutions and products with speed and quality. Their plants are equipped with the latest state of the art machinery and testing equipment as per AASHTO& ASTM norms. Their plants are also successfully certified by NTPEP, USA for Quality Control and Process.

SKAPS ability to diversify its clientele as well as cater to a wider geography and develop market and products having newer applications (apart from geo-textile) would govern its growth prospects. Furthermore, increasing awareness about application of technical textile in India along with a favorable regulatory environment would be crucial for its prospects in the domestic market. SKAPS is working very closely with Reliance Industries for promoting the use of Geosynthetics in India and appreciates its efforts and diligence for the same.

What is the effect of using Polypropylene nonwoven (PPNW) fruit cover for apple?

A Research Study conducted by the Scientists of ICAR on PPNW fruit cover for apple fruit has revealed that bagging of apples has significantly influenced the colour development in apples. Bagged apples resulted in development of attractive red colour over non-bagged apples. Bagged apples reported higher level of Soluble Acids, Ascorbic acids at the harvest. Incidence of bitter pit in the bagged fruits was lower than non-bagged ones.

Percentage of decrease in pesticide usage with PPNW fruit cover?

There will be considerable reduction in usage of fungicides and other harmful chemicals used by farmers for getting attractive colour.

Any suggestion for using PPNW as fruit cover or crop cover which will be more effective?

Usage of Light yellow colour bags found to be effective in getting bright colour and enhanced fruit quality.

Any Comments on improving PPNW fruit cover performance?

PP Nonwoven covers must be UV stabilized.
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

<table>
<thead>
<tr>
<th>Details</th>
<th>Control Plot</th>
<th>Plot with PP Nonwoven</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Production Cost</td>
<td>Rs. 1.68 Lacs</td>
<td>Rs. 1.78 Lacs</td>
</tr>
<tr>
<td>Average Yield</td>
<td>25 kg/bunch</td>
<td>31 kg/bunch</td>
</tr>
<tr>
<td>Then Market Value</td>
<td>Rs. 8/kg</td>
<td>Rs. 9/kg</td>
</tr>
<tr>
<td>Net Profit</td>
<td></td>
<td>Rs. 84,800/acre</td>
</tr>
</tbody>
</table>

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.

* Based on the results obtained by Reliance Retail Contract Farmers.
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
- Reduced occurrence of spongy tissue
- Provides good shine & skin gloss with lesser spots
- Helps in uniform produce
- Higher TSS, which is an eating-quality attribute

Pomegranate

Trial conducted at National Research Centre for Pomegranate, Solapur.

- Prevents sun burn
- Avoids damage to fruit due to abrasion/friction amongst fruits
- Prevention from dangerous disease from sucking pest and from fruit borer infestation
- 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) Increased berry diameter

Others (Vanilla, Jackfruits & Dates)

Non-woven fruit cover trial was also successful for dates, Jackfruit at Tanjore (TN) and for Vanilla at Tiptur where particularly for vanilla following positive results were obtained.

- No yellowish vanilla beans
- No fruit fall
- Increase in the length & breadth of the beans
- Moisture retention is high which is must for vanilla pods
- 100 % success on pollination without any failure
Litchi

The infestation of fruit borer, browning/blackening of skin and fruit cracking are serious problems in Litchi fruit. To eliminate these problems, PP Non-woven fabric was used as bagging for Litchi Bunches at ICAR- National centre research on Litchi, Mushari, Muzaffarpur, Bihar and numerous positive results were obtained-

1) Increase in fruit weight
2) Spotless bright red colour
3) 25-30% less damage to fruit
4) Higher value of acidity, extending harvesting period
5) Higher TSS
6) Higher profit for farmers
7) Significant control of fruit borer infestation
8) Reduced incidence of pests

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.

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

1) Dark red color
2) No incidences of diseases & pests

Impact of Polypropylene NonWoven Crop Cover

- 38.9% Increase in yield
- 13.25% Increase in fruit weight
- 12.94% Number of fruits per plant
- 3.85% Number of branches per plant
- 8.89% Number of bunches per plant

Source: Research by C.S. Azad University of Agriculture and Technology, Kanpur
**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.

<table>
<thead>
<tr>
<th>Per Acre of land</th>
<th>Without PP Non woven Fabric</th>
<th>With PP Non woven Fabric</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost of Wind Breaking Grass</td>
<td>30,000</td>
<td>0</td>
</tr>
<tr>
<td>Cost of PPNW Fabric</td>
<td>0</td>
<td>5,000</td>
</tr>
<tr>
<td>Cost of Pesticide</td>
<td>80,000</td>
<td>20,000</td>
</tr>
<tr>
<td>Monetary Value of Yield</td>
<td>1,50,000</td>
<td>3,20,000</td>
</tr>
<tr>
<td>Earning</td>
<td>40,000</td>
<td>2,95,000</td>
</tr>
</tbody>
</table>

* Based on the results observed by Progressive Farmers

**Green Chilly**

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.

![Effect of frost on the cover](image)

**Brinjal**

Non-woven crop cover trial was done on Brinjal in coordination with Indian Institute of vegetable research and following positive results were obtained:

1) Reduction in shoot damage: Extent of shoot damage with NW was 0.72% (as compared to 23.91% without NW)
2) Reduction in Fruit Damage: Fruit Damage of 14.57% with NW (as compared to 54.73% without NW)
3) Increase in Yield: 281 q/ha with NW (as compared to 158 q/ha)

**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.)*

<table>
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<tr>
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<th>Without PP Non woven Fabric</th>
<th>With PP Non woven Fabric</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost of Wind Breaking Grass</td>
<td>10,000</td>
<td>0</td>
</tr>
<tr>
<td>Cost of PPNW Fabric</td>
<td>0</td>
<td>5000</td>
</tr>
<tr>
<td>Cost of Pesticide</td>
<td>35,000</td>
<td>12,000</td>
</tr>
<tr>
<td>Monetary Value of Yield</td>
<td>60,000</td>
<td>87,000</td>
</tr>
<tr>
<td>Earning</td>
<td>15,000</td>
<td>70,000</td>
</tr>
</tbody>
</table>

* Based on the results observed by Progressive Farmers

**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.
What do you have to say about the Agriculture Industry in India?

Agriculture industry in India is marching towards precision farming, high input use efficiency, commercial farming, safe and green Agriculture. The complete chain from production to consumption of agricultural produce needs modern technologies to reduce post-harvest losses and more value added products. The Indian Agriculture has lions share in our GDP and provides opportunity to associate other allied sectors. Hence, the agricultural Industry is backbone of Indian economy.

What is the role Research organization like ICAR and Centre for excellence in growth of Agriculture?

The ICAR is the apex organization for Agricultural research, education and technology transfer in the Country. Through its vast network of 99 Institutes, 49 Agricultural /Veterinary/ Horticulture Universities and more than 637 KVK’s it provides quality education and technology back stopping in each field of agriculture. ICAR conducts the problem solving researches, the basic and strategic researches and acts as frontiers for technology dissemination. The new Schemes of ICAR like Farmer’s First, Student READY, ARYA, etc. provide sample opportunities to excel in area of sustainable agriculture. Development theme specific “Centre of Excellence” established in niche areas further boost the quality output in modern agriculture and allied sector.

What is role of plastic-culture played in promoting advanced farming technology?

The plastic-culture particularly through protected structure and climate control system has enabled the off-season production of various horticultural commodities. The mulching with different coloured and varied thickness of plastic have revolution sized the horticultural production. The improved nursery raising and management, irrigation, technologies, packaging and retailing of different agricultural produce, has witnessed remarkable changes with the use of plastic in recent years.

How do you see the growth of packing technologies helping to reduce the wastage in farm produces? What role has polymer played in it?

The polymer has played pivotal role in produce handling and packing. Different kind of handling trays and crates with high density polyethylene and bags and pouches with low density polyethylene have been quite effective in minimization of post-harvest losses and ease in produce transport. Plastic punnets, boxes, bags, etc. have been very effective in minimization of post-harvest losses in different commodities.

How do you think PPNW fruit cover bag is going to help in the development of quality Litchi produce?

The PPNW bags improves the microclimate inside the bagged bunches by way of reducing the temperature and increasing the humidity. It also protects the fruits from hot desiccating winds, sunburn and fruit bores and slowdowns the ripening process hence, improves the colour and quality and harvesting period of litchi fruits.

Use of PP Nonwoven fruit cover for Litchi
Agritex 2014, Tamil Nadu

Reliance Industries Ltd. participated in agricultural trade fair, AGRI INTEX 2014 at Coimbatore. The fair turned out to be a great platform for convertors to explore new business opportunities. Reliance Polymers with the help of its customers created awareness about PP Silage and Nonwoven covers amongst the local farming & dairying community.

Krishimela2014, Karnataka

Over 15 lakhs farmers from different districts of the Karnataka visited the event where the focus was to showcase the developments & opportunities in pre and post-harvest areas using Polypropylene PP FIBC bags, PP Nonwoven, Pipes and other Plasticulture products.

Krishimela2014, Karnataka

The event mostly targeted northern parts of the Karnataka which is an agriculture belt and provided a platform to customers to translate developments into business opportunities. Over 25,000 farmers visited the Reliance Polymers stall and got impressed with the idea of PP Non-woven covers for various fruits and crops. Similarly, dairy farmers showed a lot of interest in portable silage bagsexpressed their desire to buy 500 Kg / 1000 Kg bags.

Agritech Asia 2014, Gujarat

One of Asia’s prime exhibitions on agriculture, the event served farmers and agricultural companies of the entire nation through showcasing of new technologies related to farming sector. The exhibition was spread over 15,000 square meters and witnessed participation from countries like USA, Israel, Belgium, Cyprus, Italy, Spain, Japan, Germany, Canada, Holland etc. and over 200 national and international companies working in agricultural field.
CUSTOMER MEET / INDUSTRY EVENT

The exhibitors came from the fields of irrigation technology, seeds and biotechnology, agricultural equipment and dairy technology industry and were well equipped with latest technologies and innovations to help the Indian agricultural sector. Reliance Polymers also participated in the event and along with its customers displayed the Silage Bag Samples and Nonwoven fruit covers and crop covers.

New Trends in Packaging

Reliance Polymers organized a customer meet in Bangalore on “Trends and Developments in Packaging” where a presentation was given on rigid Packaging and advantages of PP clarified bottles over glass bottles were explained. The meet was attended by a good cross section of end users like HUL, ITC, MTR and turned out to be quite a success.

Global Geosynthetics Summit 2014, Gujarat

The summit with the theme “Enhancing the Application of Geosynthetics in Infrastructure Sector” was held on 5th - 6th September, 2014 at Gujarat with the mission being deliberation on strategies for leveraging the economic, environmental and technical benefits by the usage of Geosynthetics. This summit got all stakeholders from Transport (Road, Rail and Bridges), Water resources, Landfill and Mining together in a single platform to chalk out a long term concerted effort in terms of standardization, policy recommendations, contract enforcement etc. for enhancing the application of Geosynthetics in Infrastructure sector. Renowned speakers in this niche field addressed the participants and spoke on the above applications of Geosynthetics.

Relevant case studies on using of right material at place and time were discussed. Also present on the occasion, director of The Geosynthetics Institute in USA Dr. George Koerner advised that for an acceleration adoption of Geosynthetics, it is important to have generic specifications for both, Centre and State, packaged technology (design, build and supply), target distributors and partnership with large institutions. The summit was organized by the CII jointly with the Indian Technical Textile Association and supported by the office of the Textile Commissioner, Ministry of Textiles, Government of India & INDEXTb, Government of Gujarat.
Repol Polypropylene Silage bags

Silage bag preparation
- Selection of green fodder having proper maturity and desired moisture level (58%-68%)
- Chopping of Fodder into desired sizes
- Addition of diluted molasses to the chopped fodder for proper fermentation
- Selection of desired size of FIBC bag with 'liner'
- Filming of chopped fodder with intermittent ramming from top to evacuate air
- Closing the liner and storing for a specific time
- Silage is ready for feeding to the livestock

Advantages of Repol Polypropylene 'Silage Bags'

Silage bags made from Repol Polypropylene are revolutionizing 'Fodder Management' vis-a-vis traditional methods of 'Mud Silos,' 'Underground Silos' and 'Concrete Structures'

- Repol 'Silage Bags' are variants of large sacks (known as Flexible Intermediate Bulk Container) with a Polyethylene liner
- Silage made in Repol Silage bags can easily be stored up to 3 years without affecting its nutritional value
- Being a lighter material, transportation is possible unlike traditional 'Silos'
- The bags are readily available in different sizes - 100kg to 1000kg
- These bags are tough with high tear and puncture resistant properties

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