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Management of Plastics, Polymer Wastes and Bio-polymers and Impact of Plastics on the Eco-system

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Release of
National Policy on Petrochemicals
and the Plastindia Foundation Publication titled
"Plastics Enhancing Lives"

A grand function was held at Hotel Ashoka, New Delhi on 28th September, 2007 to mark the release of National Policy on Petrochemicals and the publication on "Plastics Enhancing Lives".

The function was chaired by Hon'ble Minister for Chemicals, Fertilizers and Steel, Shri Ramvilas Paswan and Minister of State for Chemicals and Fertilizers and Parliamentary Affairs, Shri B. K. Handique.

ICPE had organized a walk-in exhibition, displaying panels on plastics recycling and samples of plastic recycled products, which were appreciated by the Minister and all others. Both Hon'ble Ministers, Shri Ramvilas Paswan and Shri B. K. Handique took keen interest and observed the display minutely. Recycling Technologies of plastics including use of waste plastics in tar road, production of fuel from waste plastics, recovery of energy from waste plastics (cement kilns) and manufacture of luggage from waste car batteries were explained through the panels. The Hon'ble Minister was happy and made specific suggestion in his address later to make arrangement for similar exhibitions for mass awareness, who are not aware

The ICPE and Plastindia Team explaining the display panels to Hon'ble Minister Shri Ramvilas Paswan. Seen in photograph (L to R): Mr. Arvind Mehta, President, Plastindia Foundation; Mr. Amar Seth, Vice President, Plastindia Foundation; Hon'ble Minister; Mr. Mihir Banerji, Reliance Industries Ltd.; Mr. Anil Anand, Plastindia Foundation and Mr. T. K. Bandopadhyay, Technical Manager, ICPE.

Hon'ble Minister seeking clarification on certain points from ICPE and Plastindia Team.

of such possibilities of manufacture of useful products from recycled plastics. The Hon'ble Minister also stressed that the industry should ensure that consumers get the cost benefit of recycled plastic products. This, he had said giving examples of the briefcase manufactured from battery waste. The Hon'ble Minister also answered questions from the press on various critical points on anti-plastics propaganda.

A short film was screened on Waste Management with clippings from earlier ICPE films with addition of some interviews with BMC officials and with some NGOs. Participating delegates appreciated the efforts of Plastindia Foundation and ICPE.

Studies on the Selection of **Plastic Woven Sacks** for Storage of Food Commodities

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Abstract of a detailed Study on Plastics in Food Packaging conducted by Central Food Technological Research Institute (CFTRI) Mysore for Indian Centre for Plastics in the Environment (ICPE):

Mycological and insect penetration studies were evaluated on paddy, rice and wheat stored for six months (at RT and accelerated condition) in Jute, Poly Propylene (PP) and High Density Poly Ethylene (HDPE) woven sacks. Thirty different species of fungi belonging to the genus *Aspergillus, Mucor, Rhizopus, Alternaria, Penicillium, Cladosporium* and some mycelia sterile were isolated by decimal serial dilution technique, *Aspergillus* Sp. was predominant in almost all the samples analysed. Total fungal counts varied considerably among the commodity and the paddy harboured higher number of fungal population than rice and wheat. The samples stored at accelerated condition exhibited total deterioration of the commodity within 15 days due to rapid fungal growth and at the end of 30 days of storage, visible fungal colonies were observed on the surface of the grain. Based on the mycological analysis and insect penetration studies it is evident that the HDPE woven sacks are more suitable for storage of food grains than the traditional Jute sacks.

Key Words: *Woven sacks, Grain-storage, Fungal load, Periodical sampling, Insect penetration and Accelerated condition.*

Introduction

From the early stages of Kernel formation on the standing crop until their use and consumption, cereal grains are subjected to damage by several biological agents, mainly fungi (Christensen 1991). The fungi colonizing grain have been classified into two groups, known as 'field' and 'storage' fungi (Christensen and Kaufmann, 1969). Field fungi characteristically colonize the ripening grain and include *Alternaria, Cladosporium, Helminthosporium* and *Fusarium* Sp., but they seldom develop further in storage conditions. In contrast, storage fungi are present in low numbers before harvest but develop rapidly in storage when conditions are favourable, mainly *Aspergillus* and *Penicillium* Sp. Although low levels of storage fungi present during harvest, much is added during threshing, winnowing, drying and when grain is stored in contaminated stores (Lacey 1971; Flannigan 1978). The third and intermediate group of fungi such as *Fusarium* Sp., which can sometimes develop in most grain during storage (Pelhate 1968). Field fungi require readily available water and therefore seldom develop in storage situation; while storage fungi, especially *Aspergillus* Sp. are able to grow at low water activities (aw, 0.70-0.75) enabling them to initiate

grain spoilage. Fungi that infest grains in storage is responsible for decrease in germination, discoloration, heating, mustiness and total spoilage (Lacey et al. 1991, Lacey and Magan, 1991). Both storage and field fungi can produce mycotoxins which may cause health hazards to humans and animals after their ingestion (Christensen 1991, Frisvad and Samson 1991 and Miller 1995). Further, these spores are also responsible for respiratory diseases in people handling and transporting them. Although fungal invasion depends on growth and harvest conditions, any such internal mycota may be responsible for fungal spoilage of the product or more significantly, formation of mycotoxins in the product (King et al. 1986 and Mills, 1989). For all these parameters, the type and number of genera and species present soon after harvest and drying can provide information useful for the control of moulding in store by different processes (eg. Drying, chemical treatment and modification of atmosphere). On the other hand, the Sp. present can give information on the conditions under which grains have been stored. Therefore, it is essential to characterize and identify the spoilage fungi, in order to control and prevent fungal growth and potential mycotoxin formation (Gourama and Bullerman, 1995).

In India, majority of the food grains are stored in jute sacks since ages. This is because the jute sacks are cheap and they are porous in nature. Due to several advantages of polymers, selection of alternatives to jute sacks or most suitable packaging material can ultimately result in improved shelf-life and better quality while reducing costs, particularly by avoiding undue food losses and waste (Elias 1979). A good packaging material should not support the growth of contamination fungi and insect development. It is important to evaluate the packaging material with respect to microbiological quality during storage of food grains. Therefore, the present study was undertaken to assess the suitability of commodity storage, insect penetration and variation in fungal profile in paddy, rice and wheat stored in three packages such as PP, HDPE and Jute sacks at ambient (RT) and accelerated conditions.

Materials and Methods

Packaging Materials

Fresh woven sacks made of HDPE, PP and Jute sacks were used for short duration (6 months) storage of wheat *(Triticum aestivum),* rice *(Oryzae sativa)* and paddy. The above three types of sacks were supplied by Indian Center for Plastics in the Environment, Mumbai.

Storage Condition

Paddy, rice (variety Sona-Mahsuri) and wheat (variety Duram) harvested during December 2003 were procured from one of the local mills of Mysore. Paddy was packed in HDPE, PP and Jute sacks, each containing 35 kg; while rice and wheat were packed in 50 kg sacks (based on their bulk density) and they were machine stitched. Sacks were placed one above the other vertically, wherein each column six sacks were arranged and stored for six months at ambient conditions (RT). The above commodities were also stored in 1 kg pack (25 x 20 cm, size) of respective HDPE, PP and Jute sacks and were stitched as above.

These small unit pack bags were stored at accelerated conditions (38 ± 1°C and 90 ± 2% RH). Sufficient gap was maintained for each set of experiment to avoid cross contamination of insects and rodent interactions, if any during storage.

Withdrawal of Sample and Mycological Analysis

In each withdrawal, the sack was opened and the sample was poured on to an aluminium tray (3 x 6 x 1) and 1 kg sample was taken out after thorough mixing. Samples stored at RT was withdrawn on monthly basis while other set of samples stored at accelerated condition was drawn after 8 and 15 days intervals. Mycological analysis was carried out in triplicate plates on the same day using Potato Dextrose Agar (PDA), which was purchased from HI-Media Ltd., Mumbai. The samples were analysed by decimal serial dilution technique (Harrigan and McCance, 1990). 10 gm of appropriate sample was taken into 100 ml of 0.1% peptone solution in 250 ml Erlenmeyer flasks which were subsequently shaken in a Lab-line incubator-shaker for 30 min at 140 rev/min. Serial dilutions were made from the stock suspension up to 1:106 ml. 1 ml aliquot of appropriate dilution was taken onto sterile petridish and 15 ml of molten PDA was poured over it. The plates were allowed to solidify and incubated at 25 ± 1°C, and the colonies were counted after 5 days. Triplicate plates were maintained for each set. Fungal identification was done based on colony characterization and morphological structures under the microscope (Olympus, Japan) according to Raper and Fennell (1965).

Insect Penetration Studies

An experiment was conducted at room temperature (25 ± 1°C and 60 ± 5% RH) with a clean and dry desiccators (0.85L cap.) which served as test chambers. The desiccators were filled with 500 gm of wheat that was earlier kept in freezer for 24 hours to kill live insects if any. The packaging materials such as PP and HDPE were cut into 15 cm^2 size and were sandwiched between bottom and lid of the desiccators. Five replicates were maintained for each packaging material with equal number of replications for gunny sacks which served as control. From the established cultures of *R. dominica* (lesser grain borer). *S. oryzae* (rice weevil) and *T. castaeneum* (rust-red flour beetle) adults (2-3 days old), 100 per replicate were released on the packaging material through the aperture of

Table-1. Fungal population in rice, paddy and wheat stored for six months at ambient temperature (RT)

Duration of storage	Fungal population (x 10^3 /cfu/gm)								
	RICE			PADDY			WHEAT		
	JUTE	PP	HDPE	JUTE	PP	HDPE	JUTE	PP	HDPE
Initial load	17.1±3.0	NT	NT	33.0±3.8	NT	NT	124±11.2	NT	NT
1st month	1.4±0.2	0	0	60.4±5.1	46.7±4.4	39.3±3.8	77.0±2.9	41.0±3.4	28.9±2.8
2nd month	1.0±0.2	0	0	68.2±7.2	58.0±5.2	55.3±4.0	10.0±1.4	3.0±0.2	2.0±0.2
3rd month	0	0	0	98.4±13.7	101.4±13.8	86.0±12.1	0	0	0
4th month	0	0	0	60.0±6.6	45.0±9.3	35.0±9.6	0	0	0
5th month	0	0	0	36.3±4.6	20.2±1.8	22.6±1.1	0	0	0
6th month	0	0	0	32.6±3.1	55.1±3.2	71.8±8.3	0	0	0

Values represent the mean ± standard deviation of triplicate plates.

NT = Not Tested.

Table-2. Fungal population in rice, paddy and wheat stored for 30 days at accelerated condition (90 ± 2% RH and 38 ± 1°C)

Commodity	Duration of storage	Fungal population (x 10^3/cfu/gm) in different packaging material initial load		
		JUTE	PP	HDPE
RICE	Initial load	0	0	0
	8 days	4.1±0.4	3.8±0.5	3.2±0.3
	15 days	214.7±9.9	13.7±0.2	4.1±0.8
	30 days	> 300	>300	>300
PADDY	Initial load	24.2+5.1	NT	NT
	8 days	77.2±6.2	74.8±5.9	76.4±5.6
	15 days	196±8.1	140.5±12.4	131.0±12.4
	30 days	>300	>300	>300
WHEAT	Initial load	82.7±4.25	NT	NT
	8 days	184.7±19.2	137.6±6.5	101.3±5.8
	15 days	266.3±18.3	179.8±7.4	124.2±5.8
	30 days	>300	>300	>300

Values represent the mean ± standard deviation of triplicate plates.

NT = Not Tested.

desiccator lid and aperture was closed with rubber septum. The rubber septum was opened for 2 min daily for sufficient aeration to the insects. This was continued for 2 weeks. At the end of experiment, wheat kept in the desiccator was sieved to count the insects penetrated if any, through the packaging materials and % insect penetration in each packaging material was calculated.

Results and discussion

The results of rice, paddy and wheat stored for six months at RT in different types of sacks such as Jute, PP and HDPE are shown in Table-1. Total fungal counts vary considerably among the commodity tested and paddy harboured higher number of fungal population than rice and wheat throughout the study. The fungal profile in commodity stored at RT has decreased within 3 months, irrespective of type of sacks in which they have stored, although there was a fluctuation in fungal population in paddy samples (Table -1). Data on mycological analysis carried out from initial rice samples yielded 17.1 x 10^3 cfu/gm. Subsequent analysis indicated a drastic reduction in population in samples analysed from 1st and 2nd month and no fungal colonies were isolated from 3rd to 6th month. Contrary to this, the rice samples stored in PP and HDPE sacks, did not support fungal growth throughout the study. The fungal profile in paddy storage was different from rice and wheat. In case of paddy, the population of fungi was observed throughout the study in all three packaging materials. Also, in Jute sacks there was a gradual increase in fungal population up to 3 months and declined further in subsequent analysis. However, in PP and HDPE sacks although there was an increasing trend initially, further analysis indicated a fluctuation in population. Data on wheat storage

Table-3. Insect penetration through different packaging material

Packaging materials	% insect penetration		
	T. castaeneum	*R.dominica*	*S. oryzae*
JUTE	98.7±6.3	83.8±7.5	67.0±4.1
PP	0	2.9±0.1	0
HDPE	0	0	0

Values represent the mean ± standard deviation of five replicate samples.

revealed a gradual decrease in population within 2 months and no fungal colonies were recorded in the subsequent analysis. However, in PP and HDPE sacks although there was an increasing trend initially, further analysis indicated a fluctuation in population. Data on wheat storage revealed a gradual decrease in population within 2 months and no fungal colonies were recorded in the subsequent analysis.

In the present findings, woven PP and HDPE sacks did not show any fungal colonies in rice, and lesser number of colonies in wheat samples. The results obtained here corroborate with Odamtten et al. (1985a), who reported woven PP sacks did not support the growth of fungi in maize stored for 4 months in Jute sacks. Odamtten et al. (1985b) also stated grain contents stored in PP sacks were of better microbiological quality than those kept in Jute sacks and there was a positive correlation between the final mycoflora on Jute sacks and loss in tensile strength due to the presence of saprophytic fungi such as Sp. of *Aspergillus, Fusarium, Penicillium, Rhizopus* and *Ttichoderma.* Jute sacks contain sufficient nutrients to support fungal growth. This implies that fungi can attack this packaging material and cause mechanical and chemical damage and soiling (Hueck, 1965). Fungi therefore play a major role in the reduction of tensile strength of the Jute sacks. Presence of fungal spores on the fabric of Jute sacks, in addition to soiling the sacks it also alters the appearance of the sacks by their colored metabolites.

The fungal species isolated and identified includes Sp. of *Aspergillus: A condidus, A. speluneus, A. niger, A. fumigatus, A. ochraceous, A. flavipes, A. versicolor, A. ornatus, A. sparces, A. sulphuricus, A. asperescens, A. sydowii, A. terricola, A. biplanus, A. wenti, A. thomii, A. flavus, A. alliaceus, A. chevalieri, A. restrictus, A. cremius, A. sclerotiarum, A. thomii, A. tamari, A. canoyii and Sp. of Mucor, Rhizopus, Alternaria, Penicillium, Cladosporium* and Mycelia sterile.

With regard to insect development in paddy and rice stored in Jute sacks exhibited a large number of adult *Carcyra cephalonica* (rice moth) and other insect species from second month and continued till the end of storage. Almost same trend was observed in woven PP sacks, except that the moth development was delayed up to 6th month. Contrary to this, the rice and paddy stored in HDPE sacks and wheat stored in all three types of sacks, neither moths nor insects were developed throughout the study. This indicates that HDPE sacks are more suitable in preventing the fungal development during commodity storage and thereby protecting the grain quality.

Results of data on rice, paddy and wheat stored at accelerated condition (at 90% RH and 38°C) are shown in Table-2. Initially, the fungal population in rice was not observed at 10 dilution. Subsequent analysis after 8 and 15 days of storage, there was a significant increase in fungal population. At the end of 30 days of storage the population has reached to > 300 cfu/gm. Paddy and wheat on the other hand, had initially yielded 24.2 x 10^3 and 82.7 x 10^3 cfu/g, respectively and has reached to > 300 cfu/gm at the end of 30 days of storage. As expected, the samples exhibited total deterioration within 15 days due to rapid fungal proliferation (black and green spots) and by the end of 30 days visible fungal colonies were also detected.

During storage of commodities, packaging provides a physical barrier that prevents or impedes the infestation by insects. With reference to packaging materials there are three factors that determine the infestation of a commodity. They are insect species, type of packaging materials and type of commodity packaged. Insects may vary in their capacity to penetrate packaging materials. In addition, holes larger than 2 mm will allow most of the stored-product adult insects to enter packages, whereas holes smaller than 0.3 mm^3 will prevent entry of most stored-product insects (Cline & Highland, 1981). Most research to determine penetration abilities of various species of stored-product insects were against the packaging films (Cline 1978, Highland 1988), but not with woven plastic packages. There has been no previous report available on insect penetration of plastics woven packages. The present study carried out on this aspect revealed that, among the three packaging materials

tested, maximum penetration was observed in Jute sacks. The level of penetration in Jute sacks were 98.7, 83.8 and 67% of the tested *T. castaeneum, R. dominica* and *S. oryzae,* respectively (Table–3). With the plastic woven sacks, only 2.9% of the tested *R. dominica* were penetrated through polypropylene (PP) woven sacks, while none of the *T. castaeneum* and *S. oryzae* could penetrate through PP. Conversly, there was no penetration in HDPE woven sacks by all the three insect species tested. From these results it is evident that the polyethylene woven sacks were more resistant to insect penetration in comparison with Jute sacks. Therefore, the plastic woven sacks are more safe and advantageous in preventing insects penetration during commodity storage than traditional Jute sacks.

Conclusion

In summary, the present findings revealed that there was a significant different between the higher number of fungal colonies associated with Jute sacks, than woven PP and HDPE sacks. Among the three commodities stored at RT, paddy harboured higher number of fungal colonies than rice and wheat throughout the storage period. Based on the results of both mycological analysis and insect penetration studies it can be concluded that woven HDPE / PP sacks have many microbiological and physiological advantages over the traditional Jute sacks to merit their use for commodity storage. This would probably save defects and losses due to insects and fungi which were estimated to be over 30% of the annual harvest.

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4th CMS Vatavaran

ICPE participation in the Environment and Film Festival

ICPE participated in the 4th CMS Vatavaran – Environment and Film Festival held at India Habitat Centre, New Delhi from 13th-16th September, 2007. The festival was an activity forum for promoting environment issues in the public media serving the dual purpose of generating awareness on environmental issues and to recognize and applaud the environment and wildlife filmmakers. ICPE had booked a stall-cum-exhibition space of 4 x 3 metres in the lobby area just outside the Stein Auditorium which was an ideal place to exhibit our awareness films and distribute ICPE literature. The educative panels of ICPE and the banners were displayed and awareness booklets were distributed. Copies of recent editions of newsletter – Eco Echoes were displayed and were handed over to visitors who evinced keen interest on issues of plastics and environment and waste management. The film – 'Living in the Age of Plastics', Cartoon film for children and the ICPE film on 'Plastics Recycling' were being shown in a continuous loop. All the publications of ICPE and folders made of recycled plastics were also displayed. More than 5000 visitors attended the film festival over a period of 5 days and a majority of them visited the stalls. Visitors included noted dignitaries, Government officials, NGOs, film makers, journalists, media personnel, research institutes, delegates from foreign embassies, lecturers, teachers, school and college students and the general public. The visitors were very appreciative of ICPE's efforts in plastics waste management and anti-littering and the good display of educative material.

ENVIS Centre **Evaluation Workshop** – Western Region

– A Brief Report

The Regional Evaluation Workshop of all the 11 ENVIS Centres of Western Region was organized by the ENVIS Headquarter of MoEF during 9th and 10th October, 2007 at International Institute of Population Sciences (IIPS), Deonar, Mumbai.

Shri Siddharth Behura, Special Secretary, MoEF, Government of India, inaugurated the 2-day Workshop. Dr. S. P. Sharma, Advisor-MoEF and In-charge of ENVIS Headquarter, Delhi, Shri Shyamlal Goel, Principle Secretary-MoEF, Government of Maharashtra, and Prof. S. Lahiri, Director-IIPS were present.

The Presentation made by ICPE highlighted, as per the MoEF guidelines, the activities performed, achievements and the action plan for 2007-08 among other relevant matters regarding Website management on the subject. The ICPE Website was also projected, highlighting the modifications executed in the Website as per the suggestion of the Expert Committee made during the Shimla Workshop held in Oct. 2006.

Comments/Suggestions on ICPE Presentation during the Workshop by the Expert Committee:

1. Comment by Prof. P. B. Mangla, Ex-Head, Department of Library and Information Science, University of Delhi & Member-Expert Committee:

- Plastics have become an integral part of our daily life. However, there is a need for a proper information system on plastics for the benefits of the common mass, so that the various misconceptions regarding plastics can be dealt with and proper guidance can be provided for the use of right material for right application without jeopardizing the health safety and environmental aspects.

  Looking into the Centre's expertise and knowledge on the assigned subjects, Prof. Mangla strongly suggested that ICPE should make use of the Ministry's ENVIS platform to make more awareness programmes.

- Prof. Mangla appreciated the quality of ICPE Newsletters and other publications and opened one subject for further discussion and consent by the Ministry whether such quality publications could be priced and not distributed free of cost. (There was a reference of ICPE-IIP publication and CRISIL Report in the ICPE Website.) This suggestion was made to invite the attention of the reader on the subject matter. On this suggestion, Dr. Sharma informed that TERRI already sells some of their publications.

2. Shri Sanjay Gehlot, Director, NIC and Member-Expert Committee, made following suggestions for improvement of ICPE Website:

   i) To install a downloading mechanism only after registering in the site.
   (This is to ensure the identity of the web visitor downloading a particular article.)
   ii) Install an appropriate induction and provide direct linkage on the particular subject matter.
   iii) Incorporate some amount of dynamic aspects in the Website.
   iv) Take the help of NIC to install Media Player for uploading audio-visuals.
   v) Website Hits Figures should be taken from NIC. A direct hit counter system also should be incorporated.

3. Suggestion by Dr. S.P. Sharma, Statistical Advisor and Head – ENVIS Headquarter:

- Creation of database on time-scale. Though various articles contain data on different subjects, however, a proper system should be installed to accumulate the data bank separately.
- Sector-wise consumption of different plastics should be incorporated.
- The databank should contain the following:

  i) Energy required for production of plastics
  ii) Plastics waste generated by industries
  iii) Cost of production of plastics
  iv) Average life of various plastics

General:

During the ICPE Presentation, it was brought to the notice of the ENVIS Headquarter that some Government ENVIS Centres had come out with article on Plastics Recycling and Waste Management – a subject allotted to ICPE. It was brought to the notice of ENVIS Headquarters that the particular Government ENVIS Centre had published some wrong information on the production of plastics and the additives content and its alleged toxicity. The ENVIS Headquarters was requested to restrain such Centres from publishing wrong information in their official newsletter. Dr. Sharma assured to look into the matter.

A detailed Action Plan will be made and submitted for the circulation to the Ministry.

Awareness Programmes

Lady Sri Ram College, Delhi

ICPE conducted an awareness programme at Lady Sri Ram College, New Delhi and made a presentation on Recycling and Plastics Waste Management on 26th September, 2007. This was subsequent to the programme organized last year after which the President of their eco-club 'Prakriti' had invited ICPE again to conduct a similar programme this year as well. The programme was conducted in the seminar hall of the "Prakriti" Eco-society. A presentation was made on Recycling & Plastics Waste Management with special emphasis on the message of segregation of waste at source and anti-littering. The students were briefed on the various applications of plastics, its benefits and latest technologies of waste management & recycling of plastics. This was followed by screening of the film 'Living in the Age of Plastics' and an interactive question and answer session. The students showed keen interest in the programme and were eager to initiate a waste management project in their college premises.

Annual Green Fair 2007 organized by Modern School, New Delhi

On November 6, 2007, Modern School, Vasant Vihar, New Delhi had organized the Annual Green Fair 2007 in its campus. ICPE participated in the fair and conducted an awareness programme on ICPE's efforts in Solid Waste Management. Attempt was made to bring about an awareness about the correct way of waste disposal among the youth. Various myths about plastics and the realities were also brought forward before the youth by way of distribution of newsletters, booklets and display panels. ICPE film on 'Living in the Age of Plastics', 'Plastics Recycling' and the cartoon film for children – 'World of Plastics' were screened.

Visitors appreciated ICPE's efforts in bringing about awareness on waste management and anti-littering and the good display of educative materials. The Management of the School invited ICPE for further programmes in the school in future.

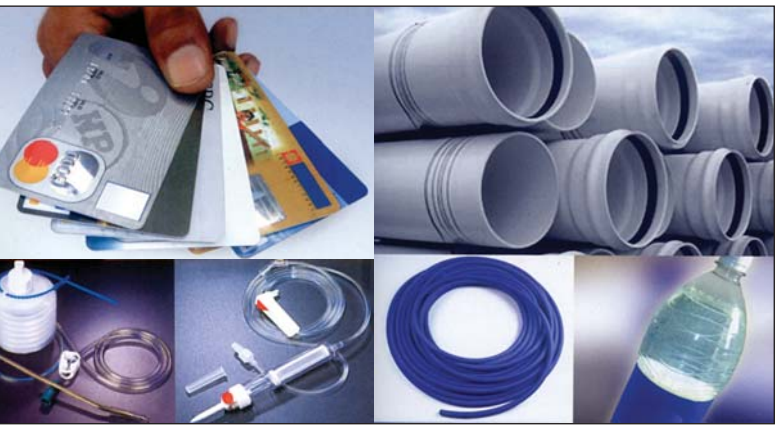
Corporate House

On request of Max India Ltd. – BOPP Unit based at Ropar, Punjab and its head office at Delhi, ICPE had organized an awareness programme on 11-12 December, 2007 on "Role of Plastics in Environment" clarifying the myths and misconceptions on Plastics in the minds of people. Ms. Savita Pradeep of ICPE Delhi had conducted the two-day programme, which was attended by 92 employees.

ICPE brochures and newsletters providing information on Plastics Waste Management and Plastics and Environmental issues were distributed and the film on "Living in the Age of Plastics" was screened.

The Management of the Corporate House appreciated ICPE's effort and assured that it would carry the message to the other sections of the society in and around Ropar.

Development of Plastics Applications in Thrust Areas



Plastics is light in weight and saves energy in the manufacturing and transportation. It also provides cost-effective substitutes for the conventional and natural materials. Plastics can replace high value metals and wood in various applications. It can be used in carrying potable water, plasticulture, construction, etc. Engineering plastics have the potential for substituting metals in high performance applications and are used in electronics, telecommunications, automobiles, consumer durables, and infrastructure and transportation sector for specific industrial applications.

In the construction industry also, there is a wide scope for using plastic products like door/window frames and insulation panels. In the transportation sector, the use of geotextiles, geosynthetics and polymer-modified bitumen is highly recommended. In respect of plasticulture there is a need to establish a linkage between the National Committee on Plasticulture Applications in Horticulture (NCPAH) and the proposed Plastic Development Council (PDC) which may be responsible for overall coordination, monitoring, technology support and quality control in the field of plasticulture. Some countries like China have made it mandatory to use a certain percentage of plastic products in various sectors. The feasibility of increasing usage of plastics in agriculture and other sectors will be examined. The policy would aim at encouraging, promoting and expanding the usage of synthetic fibres rather than replacing usage of natural fibre with synthetic fibres. It was proposed to set up an Inter-Ministerial Expert Committee under the Department of Chemicals and Pharmaceuticals, which will look into the requirement of making the use of plastics in thrust areas and make recommendations to the concerned Ministries. This Expert Committee will be serviced by the Plastic Development Council.

Source: National Policy on Petrochemicals

Top 10 Myths about **Plastic Grocery Bags**

Myth #1:

Plastic bag bans are spreading like wildfire across the country.

Fact:

No. In fact, plastic bags have not been banned anywhere, not even in San Francisco. San Francisco is requiring that larger grocery stores and larger chain pharmacies use paper bags or compostable plastic bags instead of 100% recyclable bags. Contrary to popular belief, there is a growing movement to increase access to recycle plastic bags – not eliminate them. New Jersey, Connecticut, and cities in California have all taken recent action to table legislation that would ban certain types of plastic bags and instead are now looking to implement plastic bag recycling programs.

Myth #2:

Paper grocery bags are a better environmental choice than plastic bags.

Fact:

Plastic bags are 100% recyclable and for all environmental impacts related to air emissions, water emissions and solid waste – those of paper bags are significantly greater than that of plastic grocery bags:

Plastic bags use 40% less energy to produce and generate 80% less solid waste than paper.

Paper bags generate 70% more emissions, and 50 times more water pollutants than plastic bags.

Even paper bags made from 100% recycled fiber use more fossil fuels than plastic bags.

Myth #3:

Plastic bags are the largest component of landfills and the primary component of litter.

Fact:

The item most frequently encountered in landfills is paper. On average, it accounts for more than 40% of a landfill's contents.

Newspapers alone take up as much as 13% of landfill space. Cigarette butts, chewing gum, and candy wrappers account for about 95% of all litter in the English-speaking world. Education, as well as responsible use and disposal of all materials and products, is the key to reducing litter.

Myth #4:

Plastic grocery bags take 1,000 years to decompose in landfills.

Fact:

Virtually nothing – not paper, food, plastic or even compostable or biodegradable products – decompose in today's landfills, because they are actually designed to be as stable and dry as possible. Research by William Rathje, who runs the Garbage Project, has shown that when excavated from a landfill, newspapers from the 1960s have been intact and readable.

Myth #5:

Plastic bags feed America's addiction to oil.

Fact:

Plastic bags are extraordinarily energy-efficient to manufacture. Eighty per cent of the plastic used to make plastic bags in the U.S. comes from North American Natural Gas, not oil. Less than 0.05% of a barrel of oil goes into making all the plastic bags used in the US while 93% - 95% of every barrel of crude oil is burned for fuel and heating purposes. Although they are made from natural gas or oil, plastic bags actually consume less fossil fuels during their lifetime than do compostable plastic and paper bags.

Myth #6:

Compostable bags can degrade in backyard composts.

Fact:

In order to breakdown, compostable bags must be sent to an industrial composting facility, not backyard piles or municipal composting centres. There are very few of these facilities in the U.S. and where these facilities are not available, compostable bags will sit in landfills because they can't be recycled.

Myth #7:

For people who live near water, paper bags are the environmentally friendly choice to protect marine wildlife.

Fact:

Since paper bag production has more negative environmental impacts related to air emissions, water emissions and solid waste than plastic grocery bags, they're not a solution. Recycling and proper disposal of all products would make sure that any threat to the environment, including wildlife, would be reduced.

Myth #8:

Low recycling rates for plastic bags prove recycling them doesn't work.

Fact:

Recycling does work. The problem is not everyone knows that plastic grocery bags are 100% recyclable and not everyone has access to plastic bag recycling in their community. A national at-store plastic bag recycling program would bring the recycling solution to everyone and increase rates. One Southern supermarket chain has such a program, and recycles more than 20% of the volume of plastic bags that it provides to customers.

Myth #9:

Recycling of plastic bags is too expensive.

Fact:

The price of not recycling them is high. Recycling can help save resources and minimize the amount of waste going to landfills. Also, recycling helps reduce litter, as bags are contained and stored. Its worth noting that it takes 91% less energy to recycle a pound of plastic than it takes to recycle a pound of paper.

Myth #10:

There's no demand for recycled plastic.

Fact:

Today there is a growing market for recycled plastic that didn't exist 15 years ago. It's also cheaper now to use recycled plastic than to obtain new materials, increasing potential for more recycling of used plastic bags. Recycled plastic grocery and shopping bags are currently being made into new consumer products such as clean new plastic shopping bags, outdoor decking and railing products.

Source: www.progressivebagalliance.com

PVC Toys and Phthalate Plasticizers

In recent times, there have been some queries relating to the safety of PVC Toys. Reality on the issue is briefly explained below:

(I) Query:

Views on the toxicity level in the PVC toys along with the use of specified plasticizers/stabilizers by Indian manufacturers.

ICPE Response:

PVC (Poly Vinyl Chloride) is one of the largest consuming plastic materials in the world and is probably the most researched plastics over the past more than 50 years. PVC is approved by the regulatory bodies over the world including that in India for manufacturing items that are used for packaging of food products, storing and transportation of potable water and pharmaceutical products and for storing blood (blood bags) apart from various other industrial and domestic uses.

PVC is one of the few polymers which needs a intermediate stage of processing, called compounding, before fabricating it into the end product by different processing techniques like extrusion, injection moulding, calendaring, etc. During the compounding process, different additives are to be added to avoid any degradation in the polymer and also to facilitate the processing. Regulatory bodies over the world have specific Standards controlling / regulating the type and level of these additives into the polymer. Bureau of Indian Standards also has such specifications for use of various additives in the compounding process of PVC.

While making flexible PVC products, a softening agent called plasticizer is required to be added. The regulatory bodies have specific standards / specifications regulating the use of such plasticizers in PVC compound. Flexible PVC products are also used for manufacturing toys. When the specified type of constituents as per the limit specified in the regulatory standards are used for manufacturing any PVC product including PVC toys, there is no probability of causing any toxicity by those products either to the environment or to the user of those products.

Commonly used plasticizers, namely, phthalate plasticizers are completely safe for use in PVC formulation for manufacturing products intended for use in contact with food and medical products. Although there was a suspicion earlier that DEHP (Di-Ethyl Hexyl Phthalate) was carcinogenic to humans, however, in February 2000 after extensive studies, International Agency for Research on Cancer (IARC), classified DEHP in Group 3 (not classifiable as to carcinogenicity to humans). DEHP is used extensively to soften PVC products including many life saving medical devices (blood bags).

(II) Query:

Whether there are Standards for manufacture of PVC Toys or similar PVC products.

ICPE Response:

Bureau of Indian Standard (BIS) has adopted the specifications laid down by International Organization for Standardization (ISO) relating to toys.

IS 9873 (Part 1): 2001 / ISO 8124-1: 2000 titled Indian Standard – Safety Requirement for Toys (First Revision) deals with the Safety aspects related to mechanical and physical properties.

IS 9873 (Part 3): 1999 / ISO 8124-3: 1997, reaffirmed 2005 titled Indian Standard Safety Requirement for Toys (First Revision) deals with migration of certain elements. Maximum acceptable element migration from toy materials has been clearly specified in this standard. These elements include Tin, Arsenic, Barium, Chromium, Lead, Mercury and Selenium.

The Indian Standard IS:10148-1982, reaffirmed 02-2003 titled Positive List of Constituents of Poly Vinyl Chloride (PVC) and its co-polymers in contact with foodstuffs, pharmaceuticals and drinking water deals with all types of constituents used in both rigid and flexible PVC products which may come in contact with food, etc., products. It also deals with the type and level of plasticizers to be used in such products.

It is understood that implementation of any standard specification is a matter of agreement between the seller and the buyer, in absence of any other binding condition.

(III) Query:

Other details relevant to the issue.

ICPE Response:

Influenced by insufficient knowledge and information, some international organizations had been alleging that phthalate plasticizers present in the PVC toys, pose health problems to children who could put those toys into their mouth. However, enough scientific evidence was not available to prove the above allegation. The European Parliament had imposed a ban in July 2005 on the use of six phthalates – DEHP, DBP, BBP, DINP, DNOP and DIDP in toys and childcare articles, where their concentration exceeds 0.1% by mass of the plasticized material. This action of European Parliament taken on the basis of majority vote, caused dissatisfaction in the scientific fraternity as the scientific data did not call for such an action.

However, in a recent development, the same European Union (EU) confirmed on 13th April, 2006 that the most widely used plasticizers are not classified as hazardous and pose no risks to either human health or the environment from their current use. The publication in the European Union Official Journal of the outcomes of the EU Risk Assessments for DINP and DIDP marks the end of a 10-year process of extensive scientific evaluation by regulators and provides confirmation of safety for users across Europe (and elsewhere).

ICPE views on some other points:

- Recycled Plastics should not be used for making toys which the children could put into their mouth.
- All pigments / colorants used for manufacturing the toys should be as per IS 9833 : 1981.

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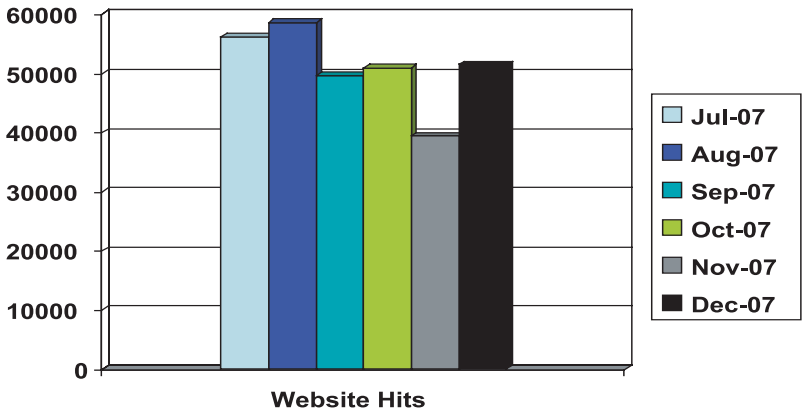
www.envis-icpe.com

Website hits for July-December 2007

Months		Hits
July	:	56,236
August	:	58,627
September	:	49,624
October	:	50,984
November	:	39,384
December	:	51,527



Do Not Litter.
Keep Your Environment Clean.

- **Segregate and Throw Waste Only in Waste Bins.**
- **Use Two Bins – One for Wet Waste, One for Dry Waste.**

Plastics, Metals, Paper …
Can be recycled into useful products.

Waste Food and other Biodegradable Waste …
Can be composted into manure.

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