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Meeting on technical co-operation among developing  
countries on plastics for agriculture in arid and  
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Introduction to the Algerian Plastics Processing Industries

Application of plastics in agriculture,  
hydraulics, and agro-industry.

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## INTRODUCTION

The Algerian Plastics Processing Industries hold an important position in the country's economy. The materials and plastic products established, concern practically the main sector activity relating to the social and economic life in Algeria.

The industry developed potential allows, nowadays, the country to avoid the recourse to import finished or semi finished plastic products (to the exception of synthetic fibres).

The development of the plastic industries has planned the third of capacities to the products aimed to agriculture, hydraulics and agro-industrial uses.

These sectors being related and inter dependant has the priority in the orientation of the plastics processing capacities.

The real take off of plastic industries in Algeria has coincided with the putting into exploration of the industrial plastic potential in early 1980.

Since than, appreciable progress has been realised, in particular the greenhouse, as it is shown by the following figures :

### Evolution of greenhouse surfaces (hectares)

| <u>1970</u> | <u>1980</u> | <u>1990</u> |
|-------------|-------------|-------------|
| 20          | 200         | 5000        |

## **1 - The Algerian Plastics Processing Industries.**

### **1.1 - Historical references and evolution**

The Algerian Plastics Processing Industries crossed two periods :

- The first period, distinguished by the public sector investments during the 1970 s, and corresponded to the first and second four-year plans (1970-1973 and 1974-1977)
- The second period, directed by private national sector investment within 1980 years thanks to the 82-11 law of 21 august 1982 and to the regulation system which fostered the promotion of the private national investments.

The industrial investment effort made during the last two decades, allowed to set up a modern plastics processing industry in Algeria. The development of this industry was constantly recorded in the prospects of the agriculture modernization in particular. The historical evolution of this plastic processing industry can be shown by some data and significant elements as shown hereunder :

#### **a - Birth of the plastic processing industry in Algeria.**

The first plastic processing facility constructed by the public national company Sonatrach (hydrocarbons-petrochemistry) started to produce agriculture films and fertilizers bags in 1972.

In 1973, Sonatrach carried out a short term plan to develop the plastics processing industries: twenty (20) processing plants, with an annual capacity of about 100000 tons, were became gradually, operational.

Following the setting up of the potential of the plastics processing industries, in 1980, the national company for plastics and rubbers, originated from Sonatrach's restructuring.

On the other side, and within the same period, two (02) petrochemical production complexes for plastics industries, came on stream :

- Complex of plastics raw materials production at Skikda - Low density polyethylene (LDPE) and poly-vinyle chloride (PVC).
- Complex for methanol and synthetic resins at Arzew.

**b - Evolution of the industrial potential for plastics processing**

|   | <b>1970</b> | <b>1980</b> | <b>1990</b> |
|---|-------------|-------------|-------------|
| . Number of plastics processing plants    | 60          | 300         | 800         |
| . Evolution of processing capacity (tons) | 20000       | 150000      | 500000      |

**c - Evolution of use of products in agriculture within this industrial potential**

|  | <b>1970</b> | <b>1980</b> | <b>1990</b> |
|--|-------------|-------------|-------------|
| . Use of products in agriculture in respect of the total processing capacity | 6%          | 12%         | 10,6%       |
| . Use of products in agriculture and hydraulics use products                 | 6%          | 18%         | 21,3%       |
| . Use of products in agriculture, hydraulics and agro-industry               | 15%         | 34%         | 34,5%       |

**d - Evolution of the consumption of agriculture film.**

|                     | <b>1970</b> | <b>1980</b> | <b>1990</b> |
|---------------------|-------------|-------------|-------------|
| . Quantities (tons) | 80          | 1000        | 28000       |

## 1.2 - Industrial and technological developed potential

a - The existing industrial potential has set thanks to various national operators.

. The national Company for Plastics and Rubbers (derived from Sonatrach), the main enterprise for plastics processing in Algeria. It has a production capacity of more than 100000 tons/year of which one third (1/3) concerns agriculture, hydraulic (irrigation) and agro industrial use products.

. The enterprises of the national private sector, with more than seven hundred (700) plastics processing plants, have a production capacity of about 300000 tons/year and more than two thirds (2/3) have been recently completed. Products intended for agriculture, hydraulics and agro-industry, within this private sector potential, account for more than one third (1/3).

. The national public enterprises having plastics processing plants integrated to their activities and producing for their own needs; the activities are the following ones : consuming goods (packing), chemistry (packing for products, maintenance), leather industry, shoemaking (maroquinerie), fancy leather work (synthetic leather, shoes, plastic soles, ...), telephones industry (phone supports), electronic industry (technical articles), textile industry (ropes, canvas ..). These units have an estimated process capacity of more than 50000 tons/year.

b - The development of this industrial potential allowed the institution of various technology process, thanks mainly to the national enterprise (Sonatrach/ENPC) which had practically set all the present technical processing.

The technology process which has been registered are extrusion, injection, contact process, injection-blowing, compounding, thermoforming, calendaring.

The first two processes, namely extrusion and injection, represent about two thirds (2/3) of the total available capacities, where extrusion has a dominant position (40% of capacities).

### 1.3 - Plastic raw materials

a - The raw materials necessary to the existing industrial potential are the following :

. By order of importance :

|                                    |      |
|------------------------------------|------|
| - Low density polyethylene (LDPE)  | 29%  |
| - PVC                              | 19%  |
| - High density polyethylene (HDPE) | 17%  |
| - Polystyrene                      | 7%   |
| - Polypropylene                    | 2%   |
| <hr/>                              |      |
| Sub/Total                          | 74%  |
| - Special products*                | 26%  |
| <hr/>                              |      |
| Total                              | 100% |

\* Polyol, polyester, etc ...

. Following are the main applications

|   |  |
|---|--|
| LDPE  | agriculture film, milk packs film, fertilizers bags, tubes, cables, bags, cosmetic bottles   |
| HDPE  | boxes, crates, extrudate mesh (net), bottles, packing, jerry-can   |
| PVC   | tubes, pipes, cables, shoes, bottles, flooring, leather imitation  |
| Polystyrene                                 | goods conditioning, technical parts, isolation school articles   |
| Polypropylene                               | ropes, strings, school articles, house hold articles, technical parts, weaved bags.  |
| Special products (polyester, polyol, etc..) | polyurethane sponge.  <br>rippled plates, furniture, boats, pipe irrigation, car component parts, plates technical parts (electronic, electric domestic parts) |

b - Most of raw materials treated by plastic processing industries are essentially imported. The national producing capacities of raw materials represent only 15 to 20% at most, of plastic processing industries.



#### 1.4 - Plastic products consuming sectors

a - The configuration of the algerian plastic processing industries, according to different consuming sectors, is as follows :

|                         |       |         |
|-------------------------|-------|---------|
| 1 - Furniture           | 16,0% |         |
| 2 - Different packaging | 14,6% |         |
| 3 - Agriculture         | 10,6% |         |
| 4 - Agro-industry       | 13,2% | } 34,5% |
| 5 - Hydraulics          | 10,7% |         |
| 6 - Shoes making        | 9,3%  |         |
| 7 - Construction        | 8,7%  |         |
| 8 - House-hold articles | 7,1%  |         |
| 9 - Electro-industries  | 4,7%  |         |
| 10 - Education          | 2,0%  |         |
| 11 - Car accessories    | 0,7%  |         |
| 12 - Textile industry   | 0,2%  |         |
| 13 - Leisure            | 0,2%  |         |
| 14 - Others             | 2,0%  |         |
|                         | <hr/> |         |
|                         | 100%  |         |

b - Almost all the finished or semi finished plastic products used or consumed in Algeria are locally produced. With the exception of fibres and synthetic filaments intended for textile industry (spinning, weaving, knitted goods, ..). The plastic products imports are occasional and at most exceptional, for agriculture film sometimes, plates, polyester and milk pocket film.

## 2 - Applications of plastic products in agriculture, hydraulics and agro-industry in Algeria

The series of products developed by algerian plastic processing industries are mainly the following :

### a - Agriculture

- . agriculture films
- . fertilizers bags
- . seeding bags
- . packing boxes
- . extrudate mesh (Net)

### b - Hydraulics

- . irrigation pipes
- . drainage tubes
- . watering tubes
- . reservoir, cistern

### c - Agro-industry

- . jerry-cans, bottles for oil
- . mineral water bottles
- . bottles crates, milk small pockets
- . sugar, salt packets
- . yoghourt pots
- . other consuming packing.

The available producing capacities concerning these products are estimated to 170000 tons/year at most, divided as follows :

| Percentage | Agriculture | Hydraulics | Agro-industry |
|------------|-------------|------------|---------------|
|            | 31          | 31         | 38            |

## 2.1 - Plastic products for agriculture use

The structure of available capacities to processing for these products shows clearly the predominance of agriculture films and packings.

|                     |     |
|---------------------|-----|
| . agriculture films | 56% |
| . crates            | 27% |
| . fertilizers       | 10% |
| . seeding bags      | 4%  |
| . extrudate mesh    | 3%  |

### 2.1.1 - Agriculture films

a - Agriculture films set by plastic processing industries and required by the agriculture sector are of two types :

- LDPE Film            2 meters \* 100 microns and 4,4 meters \* 200 microns  
                         clearness 70% to 80% - Supple ordinary (neuter)  
                         stabilised or thermal stabilised. Used mainly for  
                         greenhouse and tunnels.  
                         Also used to retain water and for irrigation
  
- Opaque and            5 meters \* 200 microns, 1,05 \* 50 microns,  
  black film            1,16 meter \* 80 microns. Used for  
                         covers-mills, strawing, market garden  
                         products and vine.  
                         Also used to retain water.

b - Producing capacity more than 28.000 tons/y can normally satisfy agriculture needs with a range of 25.000 tons presented as follow :

|                          |            |
|--------------------------|------------|
| . greenhouse film        | 21000 tons |
| . black film             | 3500 tons  |
| . tunnel film            | 450 tons   |
| . strawing film :        |            |
| - market garden products | 300 tons   |
| - vine                   | 200 tons   |

As far as the greenhouse film is concerned, "thermal stabilised" demand represents, at present, the three thirds (3/4) of annual needs concerning agriculture films.

Agriculture film production is assured equally by ENPC and the other national private enterprises relating to the sector.

### 2.1.2 - Crates

a - Crates used for fruit and vegetable picking and also for their making, and which are produced by algerian plastic processing industry are of two types :

- Crates with three planks or 40 litres used for heavy products (potatoes, onions, citrus fruit; ...).

- Crates with two planks or 20 litres used for light or fragile products (tomatoes, grapes, ...).

b - The producing capacities of these products are estimated between 10000 and 15000 tons/year, ranging more or less equally between ENPC and the other enterprises belonging to the private sector.

c - In view of such a high demand for these products and because of the progressive generalisation of this type of packaging (instead of crates made of wood), the available producing capacities cannot satisfy totally the agriculture sector.

### 2.1.3 - Fertilizers bags

a - These products have been classified in the agriculture sector since its final destination remains agriculture they are really aimed for packaging fertilizers produced in the different industrial complexes within the country : packaging of the agriculture input.

b - The producing capacity of fertilizers bags amounts to about 5000 tons/year. These bags are furnished by ENPC.

#### 2.1.4 - Extrudate mesh (nets)

This product had been introduced by ENPC for the needs, essentially, of agriculture sector and in the following using :

- Wind-screen, umbrage to protect crops, trees, seed-beds, ...
- Enclosure, .. for breeding
- Soil stabilisation (erosion), draining
- Packaging

In view of the difficulties to ensure the promotion of this product within the agriculture sector, ENPC has managed to replace some of the capacities of "extrudate mesh" - a maximum of 1500 tons will be conserved for eventual agriculture needs, however 4000 tons/year were initially projected.

#### 2.2 - Plastic products for hydraulic use

They are essentially tubes made of LDPE, PVC and polyester for the following sectors :

- Agriculture : - LDPE irrigation pipes
- Hydraulics : - PVC and LDPE tubes for  
water transportation
- Housing : - PVC tubes (water running, plumbing)  
- Polyester tubes (water evacuation)

A total capacity of almost 50000 tons/year is available. The rank of the irrigation tubes and covers among the total tubes consumption is not defined. However, these products are still not sufficiently used by the agriculture sector.

At ENPC level, a producing capacity of 20000 tons of LDPE tubes is designed essentially to meet the agriculture needs.

### 2.3 - Plastic products for agro-industrial use

The concerned products are mainly foods packaging. The available processing capacities are estimated at more than 60000 tons/year, as follows :

|  |       |
|--|-------|
| - Oil packaging                                  | 36,8% |
| - Mineral water bottle racks<br>milk pocket bags | 15,8% |
| - Other foods packaging                          | 13,7% |
| - Yoghourt jugs                                  | 9,5%  |
| - Mineral water bottles                          | 9,0%  |
| - Salt and sugar jugs                            | 9,0%  |
| - Milk small jugs                                | 6,8%  |
|  | <hr/> |
|  | 100%  |

In spite of their relative importance, the available processing capacities meet only partially the needs concerning some packaging, namely the mineral water bottles, the milk jugs (film), the racks, ...

### 3 - Prospects

#### 3.1 - At the plastic processing industry level

The algerian plastic processing industry, in spite of its relatively important expansion shall be developed,

- on the one hand, to reinforce the capacities relating to some strategic products which are "non sufficient",
- on the other hand, to integrate or introduce new technology production as recycling of plastics wastes, and manufacturing the synthetic fibres, ...

a - As to the reinforcement of the existing capacities, ENPC shall increase its capacities to about 40000 tons/year more than 50% of its new capacities are for agriculture and agro-industry sectors.

b - The recovery and the recycling of the used agriculture films are envisaged by ENPC in one of its operational unit which will process about 70000 tons/year.

The recycling of plastics wastes is considered as a good technology, considering the important volumes of plastics rejection, particularly the industrial and commercial packaging, which are easily recoverable.

c - The synthetic fibres and filaments making also considered, but it is still at a study level for the planning of a polyester fibres unit.

#### 3.2 - At the plastic products for agriculture level

a - With its new capacities, ENPC will be able to double its production of agriculture films, a supplement capacity of nearly 15000 tons.

New lines of film production relating to milk jugs would enable to reduce the resort to imports : a supplement capacity of about 5000 tons.

The seeding bags will benefit of a new producing capacity of about 300 tons.

b - In order to improve the quality of these products, ENPC will be assisted by laboratories of CERHYD (Hydrocarbons Research Center) and IAP (Algerian Petroleum Institute) specialised in petrochemistry.

## CONCLUSION

Progress achieved by the algerian plastic processing industry allow the existing industrial and technology potential to be better adapted to the quantitative and qualitative demands of the domestic plastics market.

The consumption of plastic products in Algeria penetrated all the sectors in significant proportions. However, the plastics market is still rigid and this does not encourage the innovation and the diversification of sets of products.

The plastics market, particularly in agriculture use, is mainly characterized by the following tendency: the use of plastic products remains limited mainly to the greenhouse and packaging, but important possibilities are not yet be exploited in spite of a close concertation between plastic producers and users.

The reinforcement and the diversification of the plastics use in agriculture demand to be sensitised and a farmer training and also an effort relating for the commercial promotion by plastics producers.