

# Plastic solutions for **AGRIBUSINESS**





# PLASTICS AT THE SERVICE *of Agribusiness*

With a global future sight, the 8,000 Members of Braskem strive every day to improve people's lives by creating the chemistry and plastics sustainable solutions. Braskem is the largest resin producer in the Americas, including basic chemicals and petrochemicals, with revenues of R\$ 58 billion in 2020. It exports to Customers in approximately 100 Countries and operates 40 industrial units, located in Brazil, in the United States, Germany, and in Mexico.

Having a production focused on polyethylene (PE), polypropylene (PP) and polyvinyl chloride resins (PVC), besides basic inputs such as ethylene, propene, butadiene, benzene, toluene, chlorine, soda, and solvents, Braskem presents one of the most complete portfolios in the market, including green polyethylene, produced from 100% renewable sugarcane ethanol.

## *Plasticulture and Sustainability*

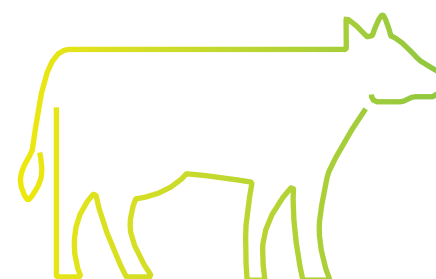
By developing innovative solutions for agribusiness, Braskem and plastics contribute to higher production and reduced food losses in the field, foster more efficient use of water resources, and allow optimization in the use of inputs, in addition to improve the living and working conditions in the field. Braskem's Global Sustainable Development Strategy aims to guide all efforts towards a more sustainable future and the development of plasticulture is part of that journey.





# ► Introduction

Our agriculture is a field of opportunities for investment and development, being recognized worldwide for its productive capacity.



## Trade balance

In 2020, agribusiness represented 48% of Brazil's foreign sales. The trade balance of Brazilian agribusiness exports totaled US\$ 100.81 billion in 2020, an increase of 4.1% compared to 2019. However, imports of agribusiness products, on the other hand, fell by 5.2%, reaching US\$ 13 .05 billion. The increase in exports and the drop in imports resulted in a surplus of US\$ 87.76 billion for the sector.

Source: Department of Commerce and International Relations of the Ministry of Agriculture, Livestock and Supply (Mapa).

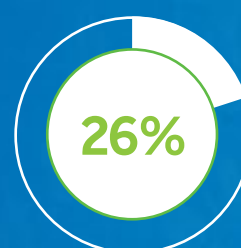
## Main characteristics

Brazilian vocation for agribusiness is directly related to the natural characteristics and diversity of land in the country, which also has a favorable climate for planting, adequate soil, good light, among other characteristics.

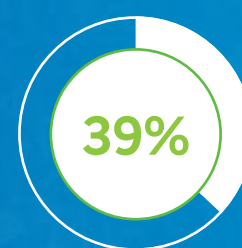
Furthermore, due to Brazil's vast territorial extension, the country is capable of expanding its agricultural capacity without harming the environment.

## An overview of agribusiness in Brazil

Agribusiness is a fundamental sector for Brazilian economy, representing around 26% of the national Gross National Product (GNP). It is also responsible for 39% of the jobs created in the country.



GNP



Jobs created

## Favorable conditions



Large fertile areas



Plenty of water



Cutting edge technology



Regular rains



## The importance for economy

Here is other data that evidence the importance of that sector for the national economy:



About 30% of the Brazilian lands are used for agriculture and cattle raising.



It is the main sector for our exports.



Brazil employs only 7.6% of its territory for crops.



Brazil protects and preserves the native vegetation in more than 66% of its territory.



Over the last 20 years, the grain-planted area grew by 37% and the production increased more than 176%.



90% of the production growth in recent years is due to the productivity in the field.



Between 25 million and 30 million people work directly or indirectly with agribusiness, which represents approximately 30% of the Country's workforce.

## Production ranking



Worldwide coffee, sugar and orange producer.



Sugarcane producer and leader in the sugar and ethanol exports.



Worldwide beef and poultry exporter.



Worldwide soybean producer.



## ► Applications for Agribusiness





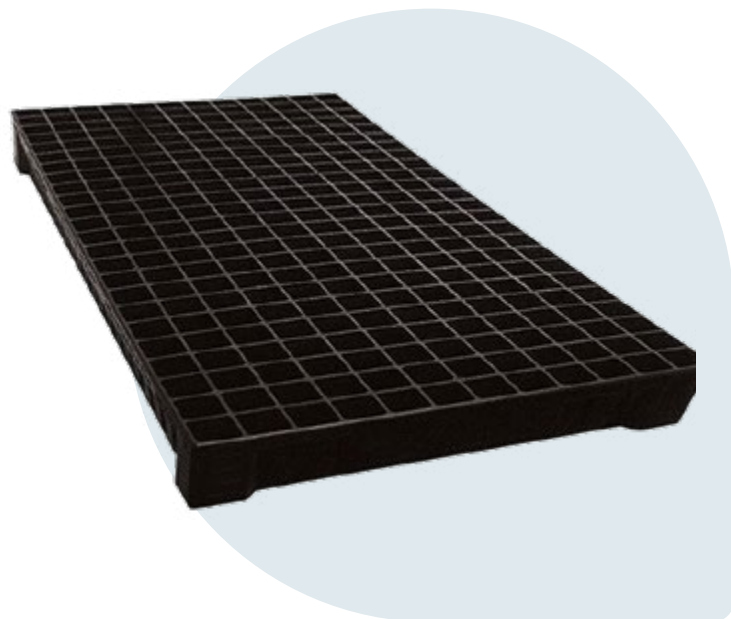
## ► Protected Cultivation

Excessive rain, frost, hail, and drought compromise agricultural production. The protected cultivation technique involves several plastic solutions, capable of ensuring the producer profitability throughout the year, even when the weather conditions are adverse.



Tray for seedlings	12
Nonwoven crop coverage	12
Fruit bagging	13
Cover film	13
Mulching – Short-cycle cropping	14
Mulching – Long cycle cropping	14
Slabs	14
Raffia fabric for ground covering	15
Reflective fabric	15
Protection for bananas: insect protection	16
Protection for bananas against chilling	16
Raffia fabric for crop covers	17
Greenhouse screen	17
Hail protection screen	17





## Tray for seedlings

**Description**  
Tray in PP for the seedling production of Vegetables, Aromatic Plants, Phytotherapeutic Plants, Fruits, Grasses, Native Plants, Ornamental Plants, Tobacco and works such as Grafting, Cuttings and Micropropagated seedlings.

**Function**  
To enable the production of seedlings on a larger scale.

**Benefits**

- Facilitates sowing and handling of the seedlings.
- Allows better sanitary and nutritional control.
- Facilitates transport to the final location.
- Reduces the need for replanting.

## Nonwoven crop coverage

**Description**  
Polypropylene nonwoven blanket used in hardwood crops.

**Function**  
Protection of seedlings against pests and weeds in open-air planting.

**Benefits**

- Protection against damage caused by heavy rains on hardwood crops (e.g. lettuce, arugula, chicory).
- Protection of seedlings in horticulture and floriculture from intense cold and mild frost.
- Protection of seedlings from excessive heat (e.g., leaf burning).
- Reduction the crop losses level.
- Improvement in the plants quality.



## Fruit bagging

**Description**  
Non-woven polypropylene bags for bagging fruits.

**Function**  
To protect fruits from the attack by insects and other pests.

**Benefits**

- Protection against extreme weather conditions (e.g., frost).
- Protection against UV radiation.
- Reduction in the crop loss level.
- Increased fruit quality.
- Easy handling and application.
- Reduction in management costs.

## Cover film

**Description**  
Film with special additives for covering and closure of greenhouses and low tunnels.

**Function**  
Developed to allow greater control of the greenhouse and low tunnel internal conditions (light intensity, temperature, humidity, etc.), according to the crop needs.




**Benefits**

- Protection from frost, hail, and UV rays.
- Reduces the spreading of pests and diseases.
- Uniformity and precocity in the development of plants.
- Increased productivity.






## ► PROTECTED CULTIVATION

### Mulching Short-cycle cropping

-  **Description**  
Agricultural film for soil coverage with special additives for short cycle crops.
-  **Function**  
Prevents weed growth and retains the soil moisture for short cycle plants (e.g. lettuce, strawberry, bell pepper, tomato).
-  **Benefits**
- Water and energy consumption are reduced in irrigation.
  - Labor costs are decreased (weed control).
  - Greater and better plant development is fostered.
  - Higher productivity is created.






### Slabs




-  **Description**  
Polyethylene bags where substrates are inserted in various cultures.
-  **Function**  
To ensure good productivity in the protected cultivation in areas affected by phytosanitary problems.
-  **Benefits**
- There is no need to relocate the greenhouse if the area has phytosanitary problems.
  - Low cost.
  - Ease of handling.
  - There is no contact between the fruits and the soil, because the plants are overhung.



### Mulching Long cycle cropping




-  **Description**  
Agricultural film for soil coverage with special additives that ensure product integrity for crops more than 18 months old.
-  **Function**  
It prevents weed growth and retains the soil moisture for long cycle plants (e.g. coffee, cocoa, citrus, pineapple).
-  **Benefits**
- It reduces water and energy consumption in irrigation.
  - It decreases labor costs (weed control).
  - It promotes greater and better plant development.
  - It creates higher productivity.

### Raffia fabric for ground covering

-  **Description**  
Polypropylene fabric for use in crop soil coverings.
-  **Function**  
Being pervious, it prevents the growth of weeds.
-  **Benefits**
- It prevents the growth of weeds.
  - It preserves moisture.
  - It decreases labor and water costs.
  - It prevents the passing of roots through the tissue.
  - It resists to chemical agents.
  - It improves efficiency in the production of vegetables.
  - It increases light reflection to the plant.
  - It decreases the soil temperature.



### Reflective fabric




-  **Description**  
Polypropylene raffia fabric with reflective pigments and anti-UV additivation.
-  **Function**  
To reflect and evenly diffuse the light in fruit crops.
-  **Benefits**
- Fruits with uniform coloration.
  - Better distribution and uniformity of light and heat.
  - High resistance.








## ► PROTECTED CULTIVATION

### Protection for bananas: insect protection

-  **Description**  
25 µ PE film with anti-UV additive for thrips insect control in banana production.
-  **Function**  
Protect the banana bunch against attacks by the rash thrips insect. Repellence occurs with the use of the anti-UV additive which, besides protecting from the sun rays, reduces the vision of the insects inside the bag, with no need to use pesticides.
-  **Benefits**
- Fruits with more quality.
  - Easy installation.
  - Reduction of the use of inputs for controlling insects in the field.
  - Protection of the banana bunch from the sun rays.
  - High mechanical resistance against bad weather.
  - You can use the film twice and get the same efficiency in the field.
  - There are no restrictions on recycling the film.





### Protection for bananas against chilling

-  **Description**  
25 µ PE film with thermal additive and 5 mm PE expanded blanket, used in the banana production to reduce the effects of chilling.
-  **Function**  
Used in production of bananas where the temperature gets as low as less than 13 °C to protect the bunches from the chilling effects (banana peel darkening and staining).
-  **Benefits**
- Protection against chilling
  - Improvement of the fruit visual quality
  - Easy material installation
  - High mechanical resistance material.
  - Unrestricted material for recycling.






### Greenhouse screen

-  **Description**  
Screens with special additives for greenhouse covers.
-  **Function**  
To control the light passage according to the needs of each crop and protect from hail.
-  **Benefits**
- Protection against hail and rain.
  - Homogeneity in the growth of plants.
  - Higher productivity.






### Raffia woven fabric for crop covers

-  **Description**  
Anti-UV additivated polyethylene raffia fabric.
-  **Function**  
To control and reduce brightness in crops that need such protection.
-  **Benefits**
- Protection of sunlight sensitive fruits.
  - Improvement in fruit quality.
  - Reduction of losses.
  - Temperature control.



### Hail protection screen

-  **Description**  
Screens with special additives for covering crops.
-  **Function**  
To protect the crop and prevent hail from damaging it. Optimum for covering fruit trees (grapes, apples, persimmons, guavas, peaches, etc.), vegetables (lettuce, tomato, etc.) and reservoirs.
-  **Benefits**
- It has a reinforced mesh throughout its length.
  - It has an edge for fastening.
  - It has excellent tensile strength.
  - It provides protection against excessive wind.
  - It provides protection against sunburn.



## ► Packaging




The plastic is an excellent solution for the packaging of grains, vegetables, and goods such as agrochemicals, fertilizers, seeds, etc. It is also able to meet the most diverse types of packaging systems, from the manual to the automated ones.

Flexible container – PVC Big Bag packaging	20
Flexible container – Raffia Big Bag packaging	20
Raffia packaging	21
Bottles and drums	21
Raschel	22
Potato bag	22
Coffee bag	23








### Flexible container Raffia Big Bag packaging




-  **Description**  
High storage capacity packaging in polypropylene raffia.
-  **Function**  
Packaging, storage and transportation of sugar, wheat flour, grains and seeds in general, fertilizers, animal feed, herbicides, among others.
-  **Benefits**
- High storage capacity.
  - Ease of supply.
  - High resistance to UV radiation.
  - Reduction of ergonomic risks in handling.



### Raffia packaging




-  **Description**  
Polypropylene raffia packaging that uses hot welding technology instead of conventional sewing. They store products weighing up to 50 kg.
-  **Function**  
To provide protection for handling and carrying products weighing up to 50 kg.
-  **Benefits**
- High drop resistance.
  - Waterproof and rodent and moth•proof.
  - Printability.
  - Low weight.
  - Ease of handling.
  - Better accommodation of packages.

### Flexible container PVC Big Bag packaging

-  **Description**  
Reinforced PVC laminate or PVC canvas coated on both sides with PVC film with additives.
-  **Function**  
These are large volumetric capacity containers that are used for transportation and storage, facilitating movement and handling, transforming small and scattered loads into large standardized volumes. Indicated for the carrying and storage of bulk products of varied densities. The number of trips for each Big Bag can reach up to 400 times, reinforcing the circularity proposal and reduction in carbon consumption.
-  **Benefits**
- Ease of storage in indoor or outdoor locations.
  - Provides protection against bad weather in outdoors storage.
  - It does not require complex handling facilities.



### Bottles and drums

-  **Description**  
Rigid high-density packaging, high-molecular-weight polyethylene, fitted with a screw cap volume that ranges from 1 to 50 liters. It can be of the monolayer or multilayer type, depending on the product to be bottled.
-  **Function**  
Transportation of products intended for cropping, such as fertilizers, herbicides, fungicides, among others.
-  **Benefits**
- They maintain the product quality and package integrity, even under adverse conditions of transportation and handling.
  - They allow the fractioning of the product in adequate amounts for handling and application.
  - It allows the production of packaging complying with resolution 420 of ANTT for transportation of hazardous products.







## Raschel



### Description

Sacks, in different colors, for packaging horticultural products.



### Function

To comply with the different regional cultures and customs. It has standard sizes and also special ones, upon request.



### Benefício

- It offers good resistance for carrying products in a 2 to 30 kg range.

## Potato bag



### Description

Made of multifilament polypropylene with reinforced seams, it guarantees the growers better quality, resistance, and brightness, enhancing the potatoes' beauty and quality.



### Function

To package potatoes assuring quality.



### Benefits

- Resistance.
- Breathable fabric.
- Visual appeal.



## Coffee bag



### Description

Made of polypropylene, it is a lighter bag if compared to conventional jute, it is more resistant, and odorless.



### Function

To store green coffee beans.



### Benefits

- It is 100% recyclable.
- It is odorless.
- It is lightweight and sturdy.
- Conservation.
- It is adherent, being able to stack one bag on the other without the risk of slipping








## ► *Protection and storage*

O plástico, por aliar alta barreira à umidade, excelente resistência mecânica e durabilidade, é muito utilizado em armazenagens de longo período, sem alterar as características do produto. Por reunirem vantagens significativas, as soluções em plástico reduzem as perdas, contribuem para a garantia de oferta de alimentos durante todo o ano e maximizam a rentabilidade do produtor.

Bins	26
Canvas	26
Bag silo	27
Coffee harvesting fabric	27
Wrap	27





Bins

-  **Description**  
Plastic container for carriage and storage of products.
-  **Function**  
To store products such as post-harvest fruits and vegetables, as well as meats, both at room temperature and in cold storage.
-  **Benefits**
  - To provide a smooth inner surface, which preserves the quality of the fruit's visual aspect.
  - Ease of cleaning.
  - Excellent durability thanks to the impact resistance over a wide temperature range.
  - Higher stacking than the solutions with other materials.
  - Low maintenance requirements.
  - It is lighter than the solution with other materials.






Canvas

-  **Description**  
Films with special additives for the protection of agricultural product inputs, among others.
-  **Function**  
To protect the most diverse products, being widely used as silage cover, of inputs (fertilizers, insecticides, etc.) and agricultural products (grain) and agricultural machinery and equipment.
-  **Benefits**
  - It provides protection from rain, frost, and sun.
  - It provides physical protection from animals.






Bag silo




-  **Description**  
A flexible tunnel for grain and animal feed storage.
-  **Function**  
The bag silo creates a controlled atmosphere that allows the storage of grain and animal feed products for long periods without nutritional loss of the stored material.
-  **Benefits**
  - It maintains the quality of the stored product for up to 12 months.
  - The storage can be done in the property.
  - Ease of installation.
  - Low investment.
  - Enables the batch segregation.



Coffee harvesting fabric

-  **Description**  
PP raffia fabric with reinforced selvages for handling in the field.
-  **Function**  
It is used to collect the coffee beans.
-  **Benefits**
  - High resistance.
  - Ease of handling.
  - Reduction in grain losses.

Wrap

-  **Description**  
High-adherence polyethylene film used to store and protect pre-dried silage that will be used for dairy and beef cattle feed.
-  **Function**  
To protect the pre-dried good so that it can be used to feed the herd in times of grazing shortage (draught season) or in confinements.
-  **Benefits**
  - No storage cost, since it can remain in the field.
  - The nutritional value of the food is maintained.
  - The storage for up to 12 months is possible.
  - Easy handling and transport of the bales.





## ► Irrigation




Irrigation is an essential technique to increase the productivity of crops and to assure food availability, even during draught periods. The PVC and polyethylene pipes have excellent water tightness, lightness, high durability, and ease of installation and maintenance of irrigation lines.

Irrigation hose	30
Polyethylene irrigation pipe	31
Dripper tube	31
PVC pipe - Fixed irrigation	32
PVC pipe - Mobile/portable irrigation	32
PVC pipe with weldable joints - Fixed irrigation	33








## Polyethylene pipe for irrigation

-  **Description**  
Polyethylene pipe, with diameters ranging from 8 to 900mm, and with UV protection for irrigation lines.
-  **Function**  
Polyethylene pipes are used to convey water in the various irrigation systems, from the catchment to the emitters (dripping, sprinkling) or to the equipment (pivot). The polyethylene pipes can be buried in or remain on the ground surface.
-  **Benefits**
- Fast, mechanized installation with no need for trench leveling (buried) or no trenching required (superficial)
  - High resistance to animal trampling and agricultural machinery
  - Service life longer than 10 years.






## Irrigation hose

-  **Description**  
Pipes used for irrigation system.
-  **Function**  
To create uniform water distribution in agricultural crops and in pastures.
-  **Benefits**
- Low cost.
  - Increased potential in the action of the inputs.
  - Uniformity in irrigation practice.
  - Reduction in water and energy costs.





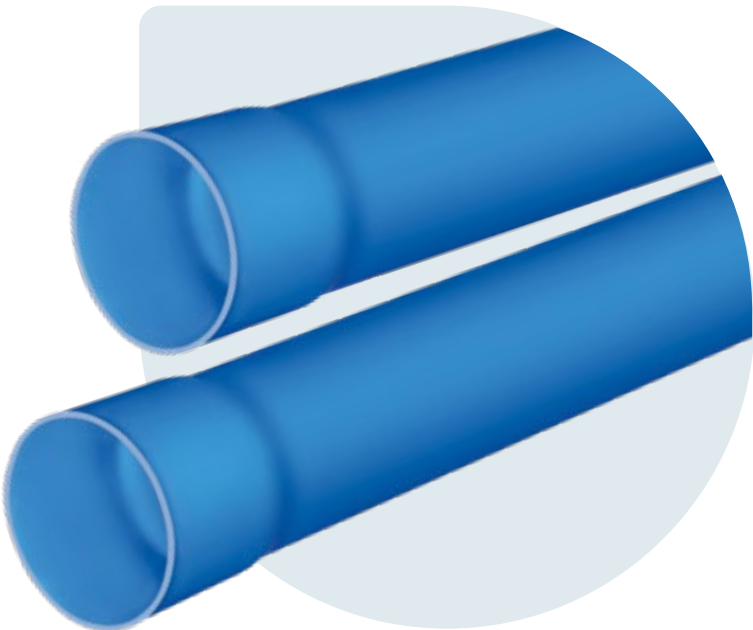
## Dripper pipe

-  **Description**  
UV protected polyethylene tubing for dripping irrigation (buried or not buried).
-  **Function**  
To distribute water evenly and at the right time throughout the field.
-  **Benefits**
- Better control of irrigation as a function of the crop and the soil.
  - Possibility for fertigation.
  - Rational use of water.
  - Increased productivity.





PVC pipe  
Fixed Irrigation



-  **Description**
- PVC pipe recommended for large irrigation networks and central pivot pipelines with the elastic joint connecting system. Available in 0.4/0.6/0.8/1.25 and 1.6 MPa grades.
-  **Benefits**
- Resistance to impact, abrasion, and wear.
  - High chemical resistance, immune to corrosion.
  - They have the same external diameter as cast iron pipes.
  - Low roughness and highly watertight.
  - They are not attacked by fouling.
  - They provide work productivity increase due to their lightweight and easy installation.
  - It is non-toxic and 100% recyclable.



PVC pipe  
Mobile/portable irrigation

-  **Description**
- PVC pipe recommended for mobile irrigation systems at room temperature. Available in 0.5/0.75 and 0.8 MPa grades.
-  **Benefits**
- No tools are required for fastening and joining.
  - Resistance to impact, abrasion, and wear.
  - High chemical resistance, immune to corrosion.
  - They show low roughness and are watertight.
  - Non-destructive maintenance thanks to the ends (male and female) and simple sleeve.
  - It is non-toxic and 100% recyclable.

PVC pipes with weldable joints  
Fixed Irrigation

-  **Description**
- PVC pipe recommended for large irrigation networks and central pivot pipelines with welded joints union system. Available in 0.4/0.6/0.8 and 1.25 MPa grades.
-  **Benefits**
- Resistance to impact, abrasion, and wear.
  - High chemical resistance, immune to corrosion.
  - Low roughness and highly watertight.
  - They are not attacked by fouling.
  - There is no loss of pipes in maintenance, which is made with the help of running sleeves.
  - They provide work productivity increase due to their lightweight and easy installation.
  - It is non-toxic and 100% recyclable.



## ► *Parts and Equipment*




Chemical and impact resistance, lightness, and shape flexibility are attributes that make plastic the ideal material to replace metals that were traditionally used in parts for agricultural implements.



Seed box	36
Sprayer	36
Fertilizer reservoir	37
Fuel tank	37






Seed box

-  **Description**  
Plastic reservoir installed in the equipment destined to automatically sow the soil.
-  **Function**  
Temporary storage of seeds in an agricultural sowing machine.
-  **Benefits**
  - Ease of installation.
  - Low investment.
  - Lighter as compared to its equivalent (metal).
  - Possibility of using different colors, customized according to the assembler.






Fertilizer reservoir

-  **Description:**  
PE box used to facilitate the fertilizer descent in agricultural machines.
-  **Function**  
To store and carry the fertilizer in the agricultural machine that will perform the fertilizing operation.
-  **Benefits**
  - Thermal stability, reducing waste and keeping the proper conditions of the fertilizers.
  - Due to its high durability, it can last for several years.






Sprayer

-  **Description**  
Rigid polyethylene packaging with a screw cap and manual or automatic application device (pump). Usually worn on the back or on the side of the body through straps.
-  **Function**  
They temporarily store agrochemicals such as fertilizers, herbicides, and fungicides for manual application by spraying on various types of crops.
-  **Benefits**
  - High resistance to pressure, oxidation, and perforations.
  - They maintain product quality and package integrity, even under adverse transportation and handling conditions.
  - They allow fractioning and several mixtures for the application.



Fuel tank

-  **Description**  
Tank designed to keep combustible liquids in a suitable atmosphere. The part has a complex design to “fit” into irregular surfaces of the machine.
-  **Function**  
To safely store combustible liquids in agricultural machinery, without losing their properties.
-  **Benefits**
  - It maintains the stored product quality.
  - Ease in developing parts with complex geometry.
  - High productivity regarding its equivalent.
  - Low investment in molds.
  - Customized design for each automaker.





## ► Infrastructure


Plastic is increasingly replacing traditional materials such as metals, ceramics, and wood in infrastructure applications. Due to characteristics such as lightness, durability, ease, low installation and maintenance costs, water tightness, corrosion resistance, and flexibility in design, plastic solutions present countless advantages, from the cover to the piping.


Rural tent	40
Biodigester	40
PE cistern	41
PVC cistern	41
Septic tank	41
Industrial storage shed	42
Storage shed	42
Geomembrane	43
Floating photovoltaic module	43
Water reservoirs	44
Water storage tank	44
Diesel and biodiesel tank	45
Tent and shed	45
Drainage pipe	46
HDPE sewage pipe	46
PVC pipe – Agriculture and cattle raising	47
PVC pipe – Artesian wells	47



### Rural tent

 **Description**  
Tent made of PVC canvas.


 **Function**  
It is developed especially for emergency actions, support points, operational bases and commands, mess rooms, dormitory or lodging in field/farm or construction sites.


 **Benefits**

- Easy to assemble and disassemble.
- Can be reinstalled in other locations, has good ventilation and is weather resistant.



### PE cistern


 **Description**  
Polyethylene tank for drinking water, rainwater, or graywater.


 **Benefits**


- Water tightness.
- Easy and fast installation.
- Easy cleaning.
- High durability.



### PVC cistern

 **Description**  
Comprised by a PVC geomembrane pocket that fully covers the excavation in the soil. The roof has a galvanized iron structure covered by a reinforced PVC laminate.


 **Function**  
It prevents light from passing through and insects and dirt from entering.


 **Benefits**


- A practical, easy-to-assemble, low-cost solution.
- Suitable for water storage, either through rainwater capture, water supply by tanker trucks, or other means.



### Biodigester

 **Description**  
Made of PVC geomembrane, with special formulation for weather resistance.


 **Function**  
It can be installed in excavations in suitable soil, with the walls and bottom coated with flexible PVC geocomposite. The cover is made by another blanket, which inflates and provides the necessary anaerobic conditions, as well as storing the biogas.


 **Benefits**

- Improved sanitation aspect, which reduces the presence of flies and odors.
- Production of quality bio-fertilizer, because the biodigester stabilizes the organic matter and improves the use of minerals.
- Fuel availability (biogas) generating savings for the property as a whole.
- Disposal of animal waste in an environmentally friendly manner and without harmful impact on the environment.



### Septic tank

 **Description**  
Rotomolded PE tanks for use in residential systems, creating up to 85% removal of organic matter in the effluent. The optimum solution for isolated regions, coastlines, or near waterways.

 **Benefits**




- High chemical and mechanical resistance.
- Ease of cleaning – annual cycles.
- It follows ABNT NBR 7229:1993 and ABNT NBR 13969:1997 standards.










## Industrial storage shed

-  **Description**  
With a steel structure and covered with reinforced PVC canvas, it has no intermediary columns – access provided by sliding doors according to the client's needs.
-  **Function**  
It allows the storage of a variety of products and can be adapted to mess rooms, workshops, warehouses, or any other environment that may be required. It is also provided with natural lighting and ventilation.
-  **Beneficio**
- The shed can be assembled with air conditioning system, exhaustion, and gutters for rainwater collection and storage in a cistern.

## Storage shed




-  **Description**  
Steel structure with reinforced PVC canvas, it has no intermediary columns and the access is provided by sliding doors according to the requirement. It can also be provided with an air conditioning system, exhaustion, and gutters for water catchment.
-  **Function**  
It allows the storage of a variety of items, but is especially suitable for flower and vegetable growers who use greenhouses in their planting, and also for fish farmers.
-  **Benefits**
- It can be designed with natural lighting, with translucent strips on the roof, minimizing or eliminating the use of electricity during the day.
  - For feeding training of carnivorous fish species, the structure is covered with reinforced PVC laminate with total blackout for control over the photo-period.



## Geomembrane

-  **Description**  
Polyethylene or PVC membranes.
-  **Function**  
Impermeability and water tightness in large areas of soil and reservoirs, and insulation of metal tanks.
-  **Benefits**
- Flexible and easy to transport.
  - Practical and fast installation: reduces labor costs.
  - Low friction.
  - Mechanical and chemical resistance.
  - Dimensional stability: less thermal deformation, as compared to direct competitors.
  - Easily repairable and weldable.
  - UV rays resistance.

## Floating photovoltaic module


-  **Description**  
A system for generating electricity from sunlight, in which photovoltaic modules are installed on floating surfaces placed in lakes or ponds, instead of the traditional metal structures on land.
-  **Function**  
To generate electric power from photovoltaic modules installed on HDPE floats.
-  **Benefits**
- Generation of clean electric power from a renewable source, with the possibility of benefiting from the advantages of distributed mini-generation (up to 5 MW) eliminating or reducing the need for diesel generation.
  - Utilization of an area not intended for pasture or planting, for the system installation.
  - Reduction of evaporation in the area under the floating system, besides not creating environmental impact.
  - Lower system installation and maintenance costs as compared to the traditional on-ground model.
  - It withstands 200 km/h of wind and 1.5 m of waves.
  - Higher productivity as compared to systems installed on land, because of the lower operating temperature of the modules.
  - High system durability (over 20 years).







## Water reservoirs

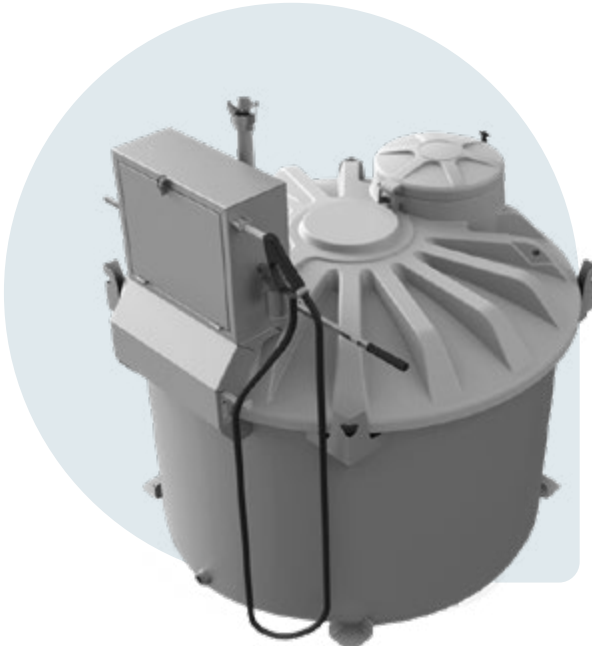


 **Description**  
Polyethylene water tanks. They replace fiberglass tanks.


 **Function**  
To store large volumes without cracking or spilling.


 **Benefits**

- Lighter, more resistant, and non-toxic: they replace fiber-cement and fiberglass tanks.
- Ease of installation: lightweight for transport and handling.
- UV rays and impact resistance: they do not crack easily.
- They have a Sectorial Quality Program – PBQP-H.




## Diesel and biodiesel tank


 **Description**  
Polyethylene tank and ASTM A36 steel containment basin.


 **Benefits**

- Excellent money value.
- Low maintenance.
- Weather resistant.
- Ease of transportation.
- Double protection with interstitial monitoring.
- It has lifting points in the containment.
- Volumetric ruler.
- It complies with Standard NBR 16443:2017 requirements.

## Water storage tank

 **Description**  
Water tank made of reinforced PVC laminate.

 **Function**  
It can be stationary, suitable for water storing and supplying – especially drinking water in regions lacking that resource at certain times of the year or in emergency situations – and also used for its transportation.

 **Benefits**


- Fast and simple installation, with no need for specialized technicians.
- It is filled and emptied through valves, avoiding waste.
- Totally watertight, it avoids contamination.
- The material is foldable and can be stored in individual packages.



## Tent and shed

 **Description**  
Made of reinforced PVC canvas.

 **Function**  
To protect workers and equipment.



 **Benefits**

- They are lightweight, easy to assemble and disassemble.
- They have a galvanized metallic structure, do not require foundations and foundation drills, and offer high resistance to bad weather conditions.







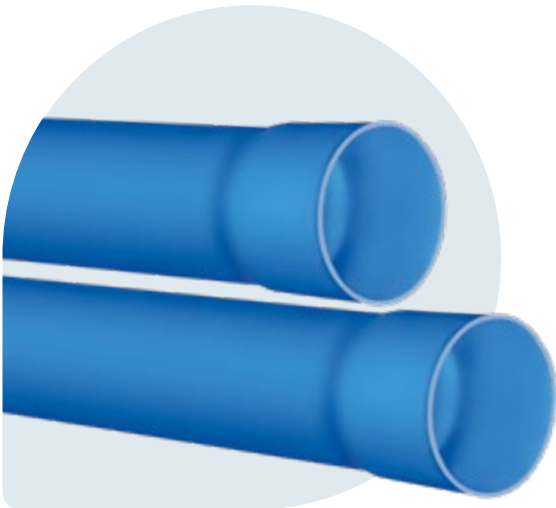
Drainage pipe

-  **Description**  
PVC and PE pipe of circular section with several perforations to collect and drain the excess liquid infiltrated into the soil.
-  **Benefits**
  - Lightness: increase in productivity due to the ease of installation and transportation.
  - High durability: greater resistance to impact, abrasion, corrosion, and wear as compared to competing materials.
  - They do not suffer corrosion and have excellent chemical resistance.
  - They do not require leveling and sand cribbing for their installation.
  - High inflow per linear meter of pipe.






PVC pipe  
Agriculture and cattle raising

-  **Description**  
PVC pipes is recommended for conducting cold water in animal breeding, they are provided with the weldable joint union system. Available in 0.6 and 0.8 MPa grades.
-  **Benefits**
  - Impact, abrasion, and wear resistance.
  - High chemical resistance, immune to corrosion.
  - Low roughness and water tightness.
  - They are not attacked by fouling.
  - It is non-toxic and 100% recyclable.





HDPE sewage pipe

-  **Description**  
Corrugated high-density polyethylene pipe with a smooth interior.
-  **Function**  
Sewage, sanitation, and rainwater systems for homes, breeding centers, and agribusiness.
-  **Benefits**
  - Ease of installation: lightness and flexibility.
  - It does not require leveling and sand cradling for installation.
  - High durability: mechanical, abrasion, and corrosion resistance.
  - High inflow per linear meter of pipe.



PVC pipe  
Artesian wells

-  **Description**  
PVC pipes recommended for groundwater exploration in deep tubular wells. Available in the following application classes: Light (up to 50 m deep) Standard (up to 150 m deep) and Reinforced (up to 300 m deep).
-  **Benefits**
  - Better hydraulic performance due to the longitudinal ribs.
  - Impact, abrasion, and wear resistance.
  - High chemical resistance, immune to corrosion.
  - Low roughness and watertight.
  - They are not attacked by fouling.
  - It is non-toxic and 100% recyclable.



## ► Transportation

A large part of the agricultural products cost is related to transportation between the producing regions and the final consumer. The plastic solutions, besides saving fuel for being lighter, assure waste decrease both during loading and unloading and during the course. The risks of contamination and contact with moisture are also reduced, assuring maximum product use.



Bulk box	50
Container lining	50
Water storage and transportation tank	51
Fabric with handles for package handling	51



## Bulk box



### Description

Inner protection for truck bodies in PP raffia fabric.



### Function

To avoid grain loss in transportation.



### Benefits

- Cargo protection with reduced transportation losses.
- Reduces the possibility of cargo contamination.
- It prevents the load from contacting the body, avoiding corrosion and reducing maintenance costs.
- It can be installed in any type of body.
- Washable.
- Low weight.

## Water storage and transportation tank



### Description

4,500 or 6 thousand liters capacity reservoir, made of reinforced PVC laminate.



### Function

Drinking water conveyance and storage.



### Benefits

- Emergency supplies, construction sites, fighting forest fires and landscaping, transporting water quickly and without waste.
- The product can be installed on any open body truck.

## Container lining



### Description

Inner lining for steel container in PP raffia.



### Function

Powder or bulk grains solid materials conveyance.



### Benefits

- Time and cost reduction in loading and unloading processes.
- Ease of removal of any type of dry cargo.
- Savings in labor hiring.
- Reduction in the use of forklifts.
- Lower risk of product contamination by not requiring manual contact during loading and unloading.
- Product integrity preservation.



## Fabric with handles for package handling



### Description

PP raffia fabric with handles.



### Function

Storage, transportation and movement of packages, dispensing with the use of pallets.



### Benefits

- Reduced weight and volume as compared to pallets.
- More resistant to humidity and fungus.
- It has no corners, splinters, or nails that could damage the packaging.
- Flexibility of storage of different types and sizes of packages.





## ► Cattle raising




Ease of cleaning, rust-proof material, forming flexibility, and high mechanical and weather resistance are all points that make plastics used in various applications involved in animal breeding. In other words, by providing well-being to the animals, consequently, plastic contributes to higher productivity.

Drinking fountain for poultry raising	54
Feeder	54
Feeder for poultry and pig raising	55
Fence spacer	55
Aviary curtains	56
Aviary screen	56
Bird cage	57
Expanded blanket for farmhouse thermal insulation	57
Floors for poultry and swine raising	58
Vinyl tank for fish farming	58
Fish screen	59






### Drinking fountain for poultry raising






-  **Description**  
Polypropylene drinking fountains produced in different sizes and shapes, suitable for each stage of development of the birds or type of bird.
-  **Function**  
To allow suitable hydration to minimize mortality and maximize weight gain for broiler poultry or hens nutrition.
-  **Benefits**
- Corrosion resistant.
  - Lightness and mechanical resistance.
  - Easy assembly and disassembly.
  - Ease of cleaning.
  - Soft contact edges, avoiding bird harm.

### Feeder for poultry and pig raising






-  **Description**  
Polypropylene feeders produced in different sizes and shapes, suitable for each poultry and pigs stage of development.
-  **Function**  
To allow an optimal relationship between amount of feed used and weight gain for broilers or swine or adequate nutrition for laying birds or swine breeders, thus reducing feed waste.
-  **Benefits**
- Corrosion resistant.
  - Lightness and mechanical resistance.
  - Easy assembly and disassembly.
  - Ease of cleaning.
  - Soft contact edges prevent harm to the animals.
  - Low labor requirements for adjusting the feeding system.

### Feeder

-  **Description:**  
PE parts, used for animal feed.
-  **Function**  
Used to provide feed and water to confined or grazing animals.
-  **Benefits:**
- Lighter and resistant.
  - Ease of movement.
  - It maintains the quality of the food and water.
  - Ease of installation.






### Fence spacer

-  **Description**  
Injected polypropylene, weather resistant part with an exclusive fitting system, used in the construction of rural fences.
-  **Function**  
Used to keep the fence wires at the correct spacing, avoiding the passage of animals and delimiting areas.
-  **Benefits**
- Easier and faster installation and also maintenance.
  - Resistant to animal impact.
  - Lightweight and easy to carry.
  - Compatible with electric fences.
  - Highly durable.








### Aviary curtains

-  **Description**  
Curtains for poultry houses and farms.
-  **Function**  
Control of shed lighting and temperature.
-  **Benefits**
- Reduced energy consumption for temperature maintenance.
  - Better brightness control.
  - Flexibility of installation and handling.
  - Fully washable.



### Bird cage

-  **Description**  
Polyethylene cage made for carrying birds. Depending on the type and size of the birds, there are versions that best fit each situation.
-  **Function**  
One of the main purposes of the plastic cage is to carry birds from the farms to the slaughterhouses (refrigerators) in a safe and operationally effective manner. For this, its structure and design facilitate handling and cleaning after use, the bird's comfort and well-being, as well as its resistance and durability.
-  **Benefits**
- It is highly resistant to bad weather, impacting conveyance and handling conditions, and washing processes.
  - It provides comfort and adequate ventilation for live birds.
  - It avoids shocks and bruises during transportation.






### Aviary screen

-  **Description**  
Screen made of polyester yarn impregnated with PVC, specially developed for the poultry industry. Resistant to temperature and weather exposure, it is offered in the following widths: 2.10 / 2.80 and 3.20 m.
-  **Function**  
Excellent for protecting birds and plants, complying with the Ministry of Agriculture, Livestock and Supply standards, (Map), with an opening of up to 2 cm, and is bird and animal entrance proof.
-  **Benefits**
- Lightweight, practical, easy-to-install, and highly durable.
  - Resistant to tearing and fraying.
  - Compatible with the main cleaning detergents on the market.



### Expanded blanket for farmhouse thermal insulation

-  **Description**  
Polyethylene blanket coated with aluminum film.
-  **Function**  
Control the relative humidity to maintain a pleasant environment and prevent the generation of fungus and bacteria.
-  **Benefits**
- Greater thermal comfort in the shed.
  - Lower power consumption.
  - It decreases mortality through animal welfare.
  - Helps control water and feed consumption.
  - It prevents condensation in the shed.
  - It assists in controlling the relative air humidity.
  - It provides comfort and adequate ventilation for birds.
  - It avoids shocks and bruises during carriage.



Floor for poultry and swine raising

- **Description**


Polyethylene and polypropylene floors produced in different shapes, suitable for each stage of breeding development or for each purpose of breeding (reproduction or broiler). Elevated by PVC beams.
- **Function**


To provide comfort and aid in the sanity of poultry and swine breeding.
- 

**Benefits**
  - Thermal and contact comfort for breeding.
  - Corrosion resistant.
  - Lightness and mechanical resistance.
  - Pieces that fit together perfectly, forming surfaces of various sizes and shapes.
  - Easy assembly and disassembly.
  - Ease of cleaning, thus assisting in animal health.
  - Adapted to any type of beam.




Fish screen

- **Description**

Extruded and monofilament HDPE screen.
- 


**Function**


It was developed for raising fish, in all phases, and seafood.
- 

**Benefits**
  - Great resistance to moisture and corrosive sea air.
  - Better cost-benefit in relation to metallic screens.
  - It doesn't hurt the creation.
  - Easy handling because it is lighter and malleable.
  - Ease of application.
  - There is no need for skilled labor in application.
  - Reduces the risk of contamination and injury.
  - Good durability and appearance.
  - There is no need for maintenance.
  - Good mechanical resistance




Vinyl tank for fish farming

- **Description**

5 thousand to 100 thousand liters capacity circular tank.
- 

**Function**

System for raising aquatic organisms. Indicated in broodstock maintenance, spawning, fingerling and juvenile production, fattening, feeding training of carnivorous fish, fish purification, mussels, oysters from slaughter and quarantine.
- 

**Benefits**
  - Covered with flexible, weather-resistant PVC.
  - It assures the required flexibility in production management.





