

# VII Forum Internacional de Plasticultura

Proteção de Filmes plásticos para a Agricultura

Daniella La Torre – June 19th 2018

# Facts and Figures

**BASF**  
We Create Chemistry

We combine  
economic  
success, social  
responsibility and  
environmental  
protection

Ludwigshafen,  
Germany

Our chemistry is used in almost  
**all industries**

EBIT 2015 before special items  
**€6.7 million**

Sales 2015  
**€70.4 billion**

Employees (as of December 31, 2015):  
**112 thousand**

In 2014, around  
**1 200** new patents were  
registered

**338** production sites

**6** Verbund sites

# BASF Segments



## Chemicals

Petrochemicals  
Monomers  
Intermediates



## Performance Products

Dispersions & Pigments  
Care Chemicals  
Nutrition & Health  
**Performance Chemicals**



## Functional Materials & Solutions

Catalysts  
Construction Chemicals  
Coatings  
Performance Materials



## Agricultural Solutions

Crop Protection



## Oil & Gas

Oil & Gas

# Plastic Additives

*A growing market for plastics*

The main applications, greenhouse and mulch film, account for almost

**50%**

of the total market, with around one million tons being produced for each.



Currently, about

**3,500,000**

metric tons of film are produced every year for the plasticulture market.



The plasticulture market enjoys an average annual growth of about

**5%**

depending on application and region.



## Improving production efficiency

The rising price of energy and growing scarcity of raw materials, including seeds and fertilizers, are making it necessary for growers to adapt agricultural practices to make them more efficient. Agricultural plastics with extended durability contribute to improving efficiency.



## Increasing yield with fewer resources

The growing world population and continuous depletion of raw materials require more productivity with the same or fewer resources on the same amount of land. Agricultural plastics play an important role in helping to enhance crop productivity and quality.



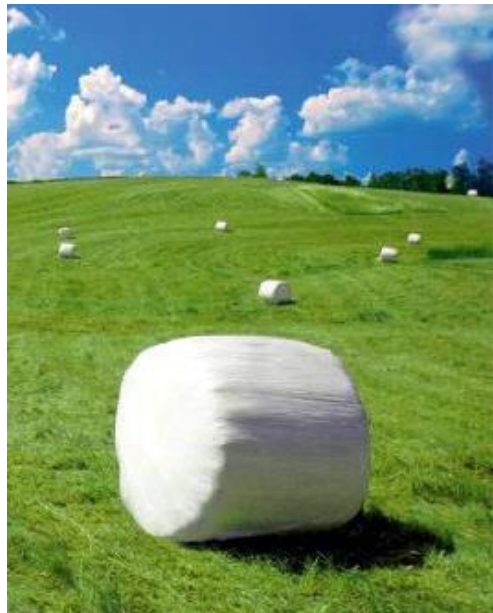
## Adopting responsible agricultural practices

Increasingly stringent regulations require the adoption of more responsible agricultural practices. New approaches, such as integrated or biological pest management (IPM), result in different uses of agro-chemicals treatments, making it necessary to stabilize agricultural plastics with light stabilizers which are resistant against these agro-chemicals.

**Agricultural plastics are strongly influenced by three main trends that are shaping the market and driving innovation**

# Plastic Additives

## Film protection with additives



# Plastic Additives

*Plastics need stabilization*

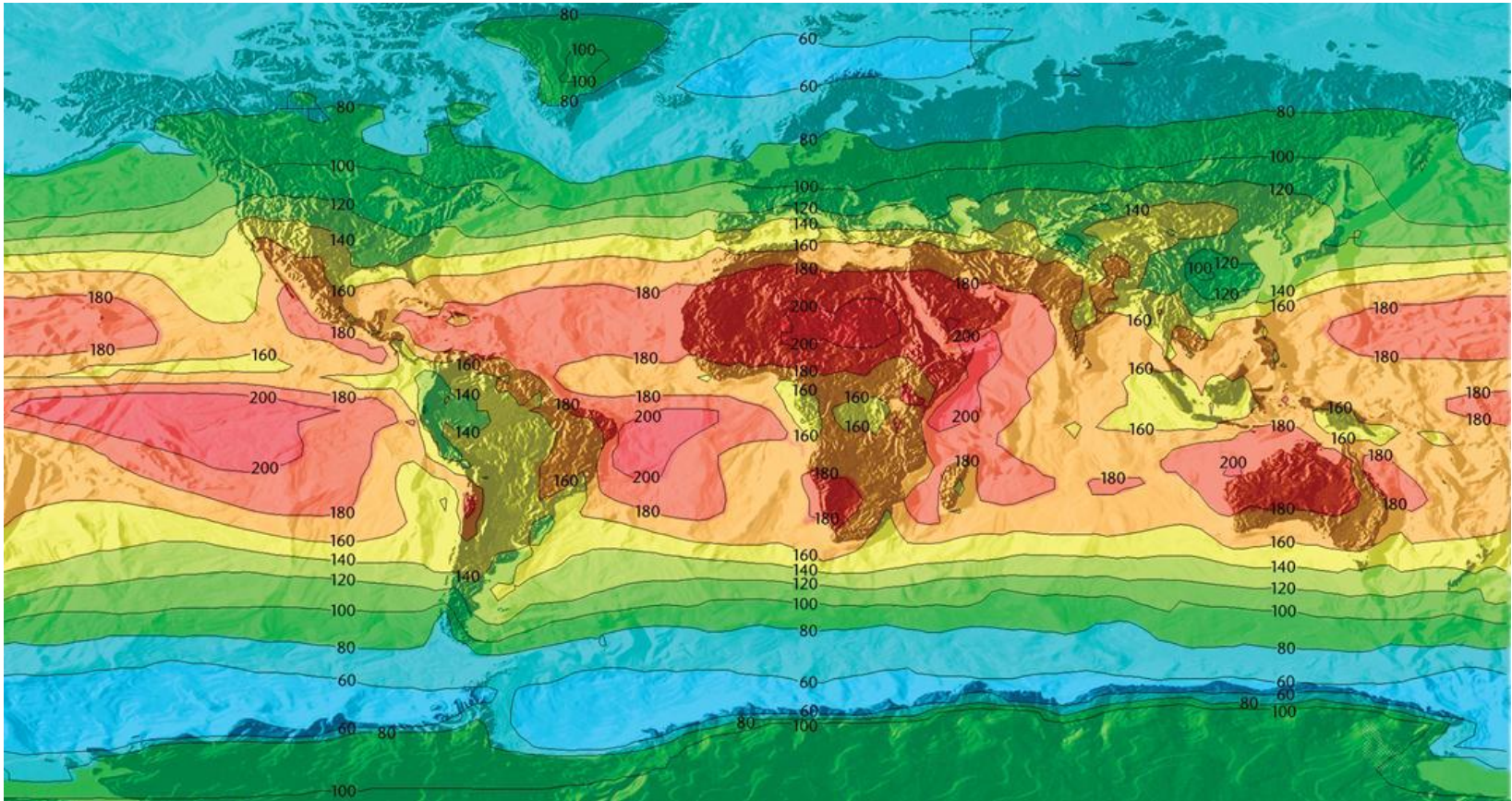
## Why Do I Need to Use Stabilizers ?

**Plastics can suffer degradation with light, heat, moisture...**

- Stabilizers Used to Maintain the Polymer's Original Strength, Flexibility, Toughness; etc.
- Properties Need to be Maintained to Meet End Use Applications that have Performance Targets
- Stabilizers should be used as tools or accessories to obtain the “best” products with the “most” value

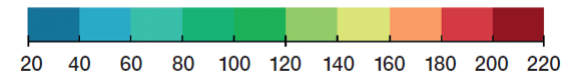
# Plastic Additives

## Total solar radiation



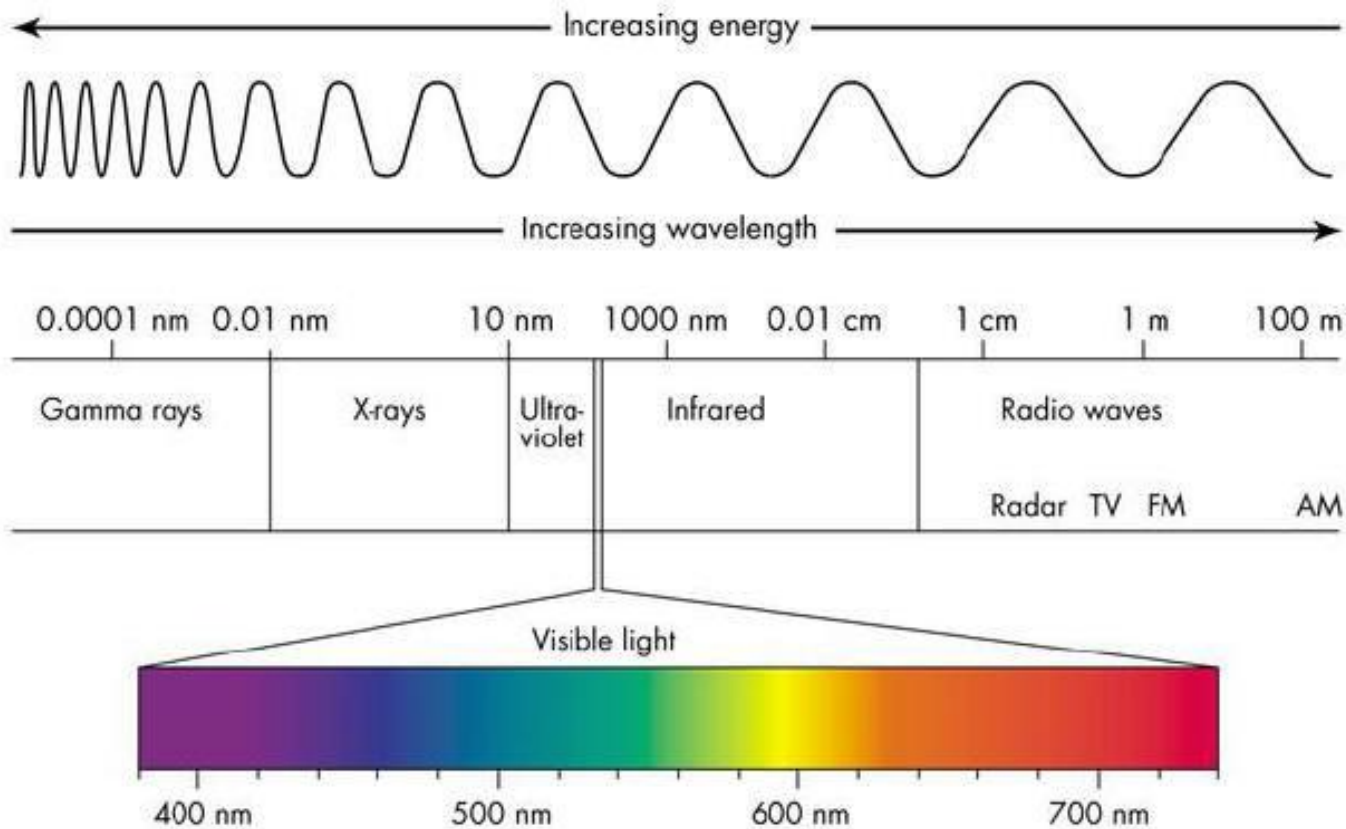
1 KLangley = 1Kcal/cm<sup>2</sup>

Yearly average solar irradiance [kLy]



# Plastic Additives

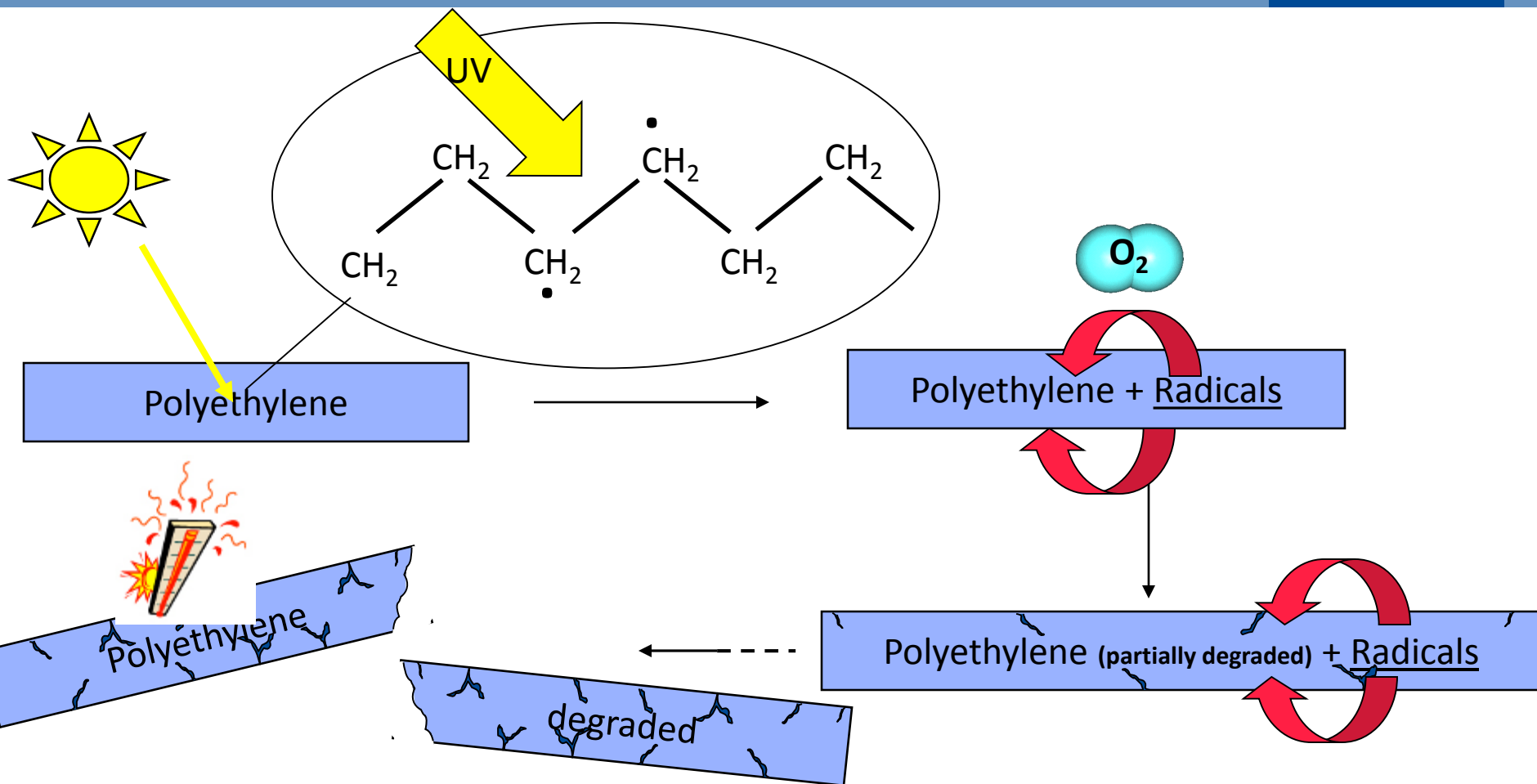
## The Spectrum of Electromagnetic Radiation





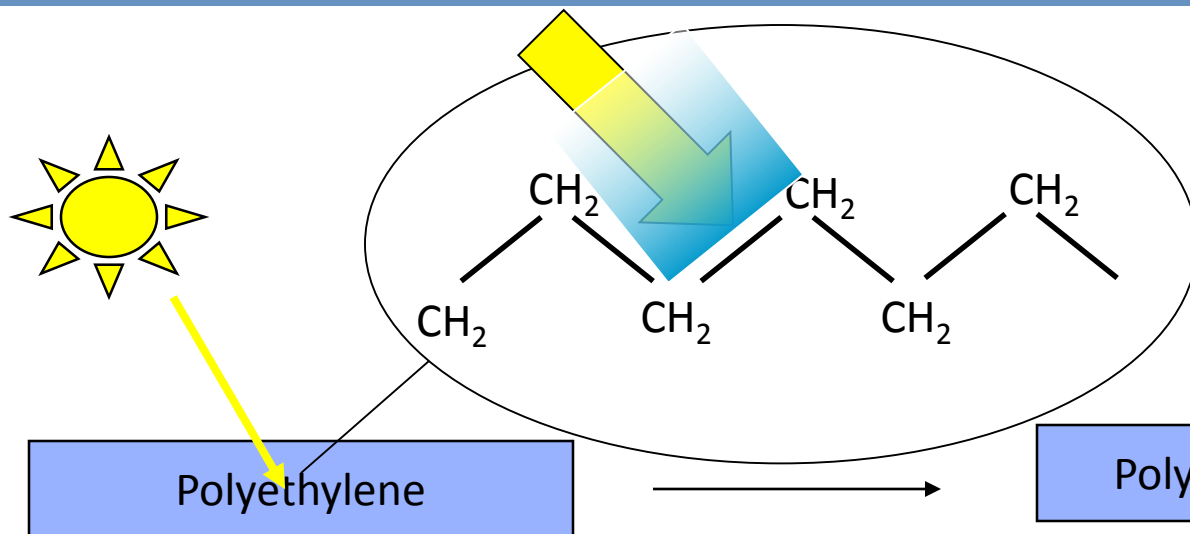
# Plastic Additives

## Polyolefins and the Photo-Oxidative Degradation



# Plastic Additives

## How to slow down Photo-Oxidative Degradation



1. UV Absorbers mechanism

2. HALS mechanism

(HALS)  
Radicals  
Scavengers



# Plastic Additives

## Light Stability

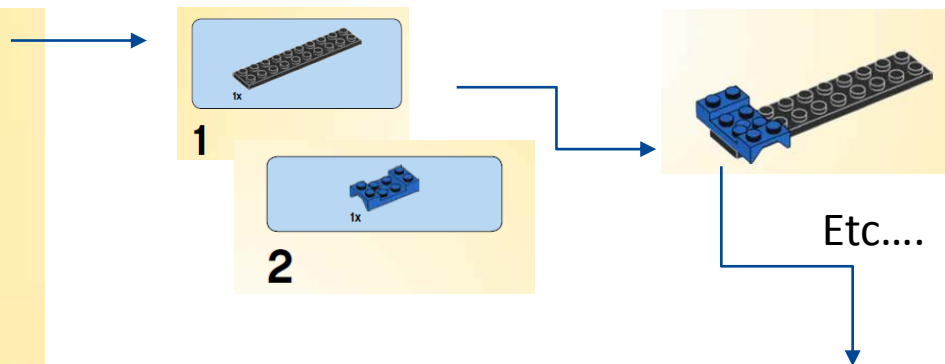
- Chimassorb<sup>®</sup>, Tinuvin<sup>®</sup> and Uvinul<sup>®</sup> light stabilizers stop the harmful effects of sunlight on plastic.
- Consumers see highest durability and aesthetics of plastics in outdoor furniture, toys, and building materials.
- Use of Light stabilizers is key to ensure the predicted lifetime of the material. The less added additive, the less the plastic material will last.



# Plastic Additives

## Which stabilizers are the best? – Lego approach

- Use the right 'LS' blocks to fulfil application end requirements



# Agricultural films

## *Main parameters that influence lifetime*

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### *1. Film inherent parameters*

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Polymer type	PE-LD, PE-LLD, EVA copolymer
Film type	Monolayer, coextruded multilayer
Film thickness	
Stabilization	Stabilizer system and concentration
Fillers	Kaolin, chalk
Pigments	
Other additives	Antiblocking, antifogging agents, etc.
Film manufacturing	

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### *2. General environmental parameters*

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Greenhouse related:	
Support/frame material	Wood, aluminum, galvanized iron, etc.
Protection of contact surface	Paint, PE film layers
Design	High, low, ventilated or not
Film fixation	
Climate related:	
Solar irradiation	UV intensity, global energy
Temperature	Mean, maximum
Wind, rain, snow	

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### *3. Special environmental parameters*

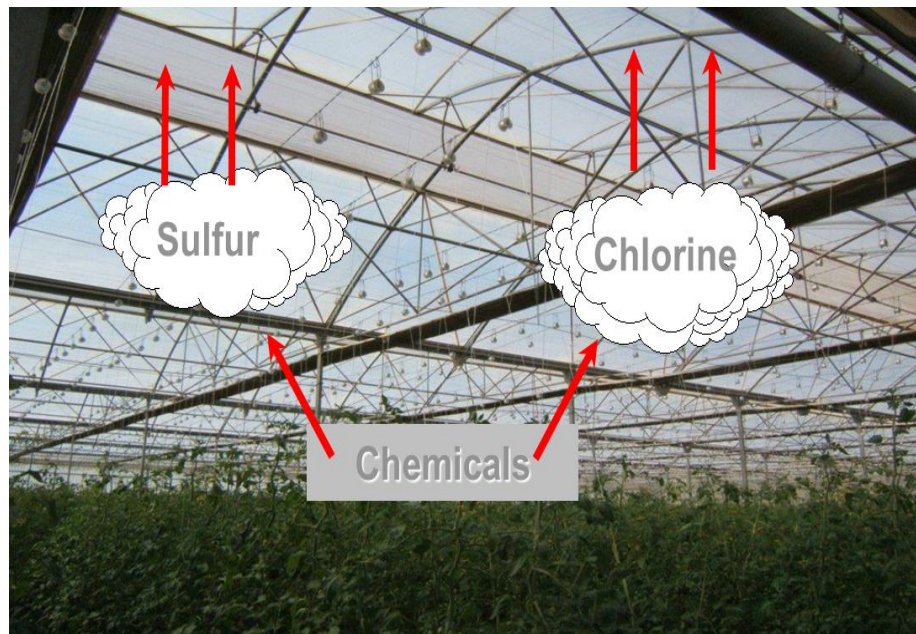
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Crop type	Tall, short
Agrochemicals	Type, frequency and mode of application

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# Agriculture Industry

## *The use of Pesticides*



- Moderate = low or no use of pesticides
- Severe = frequent use of pesticides
- Critical = burned sulfur or extreme use of pesticides

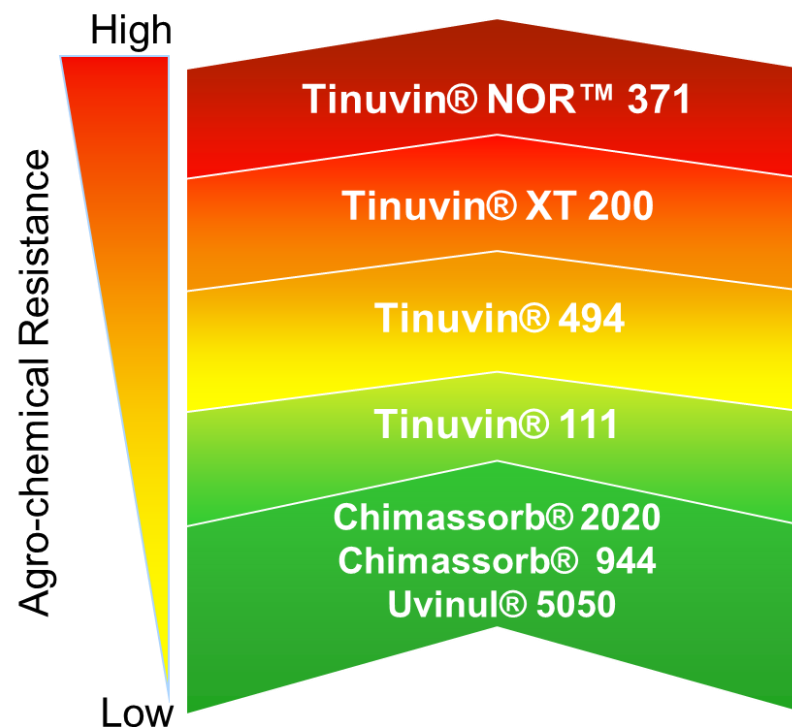
- Increasing greenhouse density in an area can contribute to the spread of diseases and virus, and result in a significant increase of pest control chemicals
- Additionally, environmental pressure from government, supermarket chains and consumers on the use of pesticides and their residues results in the use of more volatile and more aggressive agrochemicals

Agricultural applications require an appropriate stabilization package in order to serve their purpose

# Plastic Additives

## *Agriculture Portfolio*

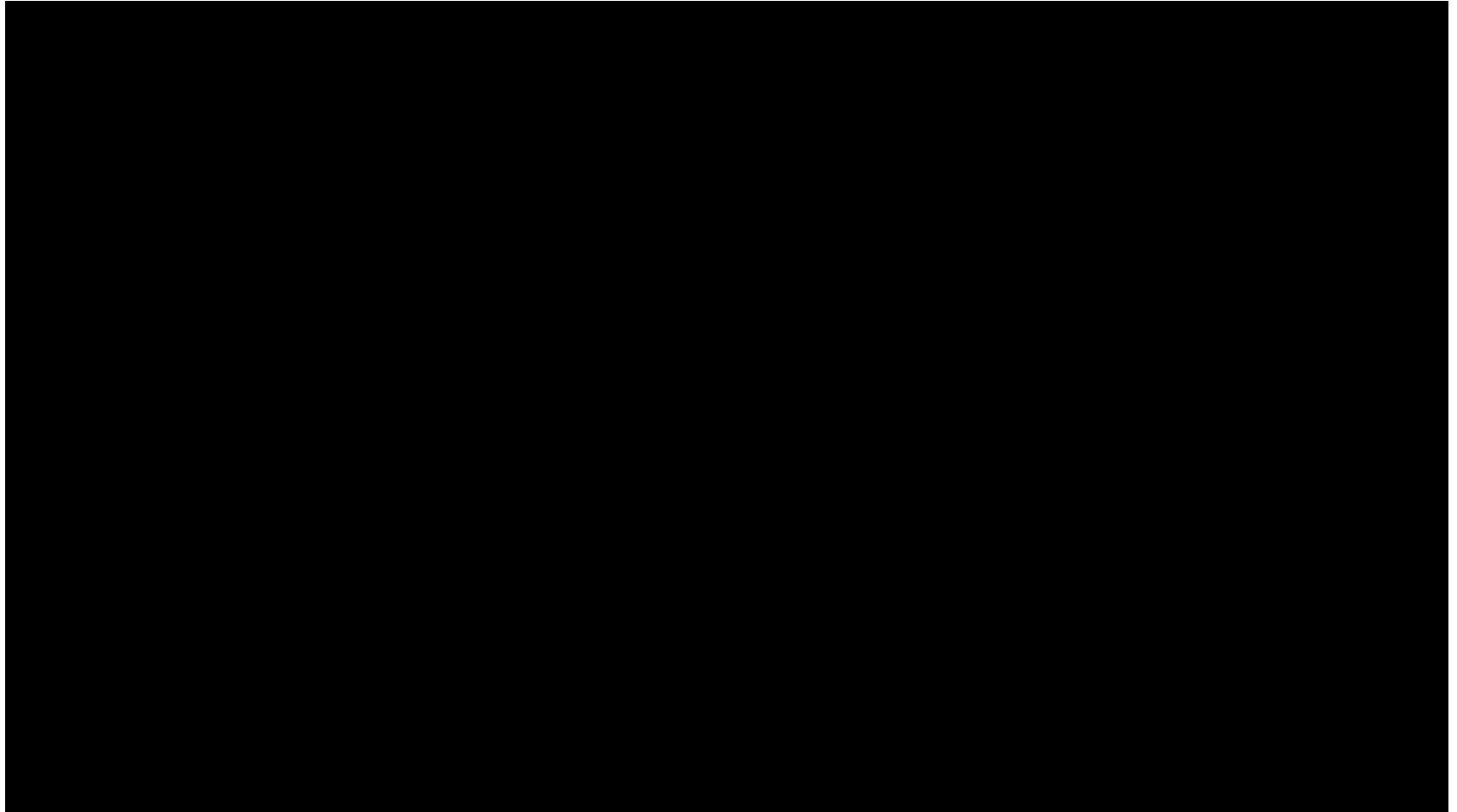
**New agricultural practices demand highest performing solutions and innovation for agricultural plastics**



**Innovative light stabilizers for improved yields and better environmental performance**

# Plastic Additives

## Film protection with additives





# Tinuvin<sup>®</sup> NOR<sup>™</sup> 371

*Toughest Chemical and Weathering Conditions*



**High-performance UV stabilizer designed to provide long lasting Agro Films**

*Particularly resistant to strong solar radiation and very high concentrations of pesticides*

*Main applications:*

- Greenhouse – up to 36 months
- High performance mulch film – Coffee, orange
- PP raffia – ground cover



**Outstanding durability and resistance to agrochemicals**

# Tinuvin<sup>®</sup> XT 200

*Maintaining optimum light and mechanical properties*



## **Agro-Films with moderate resistance to agrochemicals**

*Enables cost-effective agro films while providing resistance to strong solar radiation and high concentrations of agro-chemicals*

- Moderate resistance to sulfur & chlorine
- Excellent optical properties to increase agronomic results

### *Main applications*

- Greenhouse – up to 24 months
- Shading nets
- Small tunnels

**Ideal balance between cost and chemical resistance**

# Tinuvin<sup>®</sup> 494 AR

*Maintaining optimum light and mechanical properties*



## Agro-Films with moderate resistance to agrochemicals

*For more than 20 years enabling farmers to extend the lifetime of their greenhouse covers*

- Moderate resistance to sulfur & chlorine

### *Main applications*

- Greenhouse (diffuse and anti-virus)
- Mulch

Protecting the greenhouse film while improving quality of light

# Tinuvin® 111

*Maintaining optimum light and mechanical properties*



## **We make your plastics stronger to protect your crops longer**

*Providing resistance to strong solar radiation and moderate concentrations of pesticides*

- Longer protection against UV, even in conditions of high solar radiation
- It is an excellent UV stabilizer with moderate resistance to sulfur & chlorine

### *Main applications*

- PP raffia – ground cover
- Mulch
- Bale wrap

**Durable while cost-effective mulch solution**



The Chemical Company

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Reginal Technical Expert

Plastic Additives

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