

**A GMO és a növényvédelem helyzete  
2016-ban az USA-ban  
(Egy amerikai tanulmányút tapasztalatai)**

*MNT Növényvédelmi Klub  
2016. november 7.*

**Nagy Sándor**

# Tartalom

- ❑ Az USA mezőgazdasága napjainkban
- ❑ A GMO termesztésének helyzete az USA-ban, fejlesztési irányok
- ❑ Farm Progress Show – növényvédelmi technológiák

# A tanulmányút háttere

- ❑ Magyar Kukorica Klub
- ❑ Szervező: Dr. Szieberth Dénes elnök
- ❑ Korábbi tanulmányutak



2014: USA: Washington, Virginia állam, Boone (Farm Progress Show)

2015: Csehország és Németország

2016: USA: Washington, Boone (Farm Progress Show), farm látogatás

# Az USA mezőgazdasága

## Az USA

- Terület: 9,83 M km<sup>2</sup>
- Lakosság: 318 M fő
- 3. legnagyobb és 3. legnépesebb állama
- 3 időzóna
- K-Ny: ~ 5000 km
- É-D: ~ 2500 km
- GDP 18 560 Mrd USD



# Az USA mezőgazdasága

## Az USA

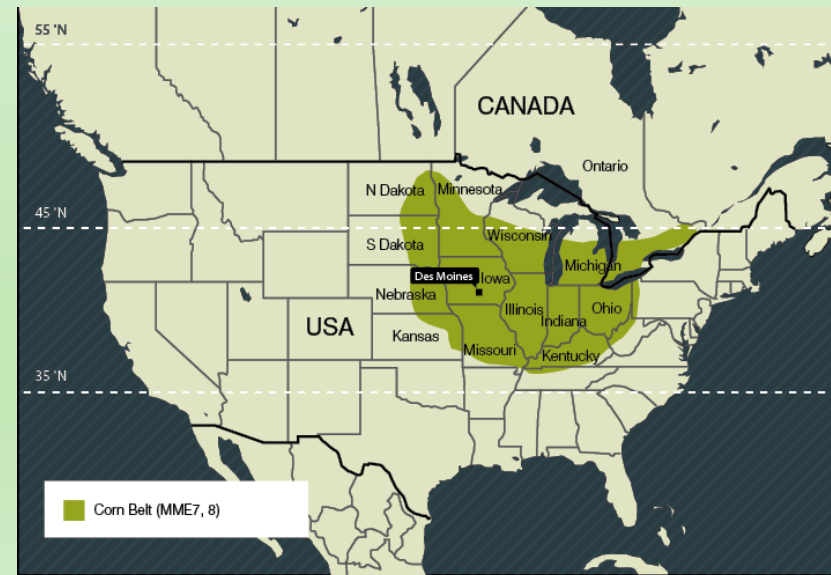


# Az USA mezőgazdasága

## Az USA

- ❑ Terület: 9,83 M km<sup>2</sup>
- ❑ 2,2 M gazdaság (169 ha/farm)
- ❑ Mezőgazd. művelt terület: 370 M ha
  - ❑ Búza: 20,3 M ha (-7%)
  - ❑ Kukorica: 37,6 M ha (+7%)  
export: 50 M t, 50% etanol
  - ❑ Szója 33,5 M ha (+1%)
  - ❑ Szőlő (370 000 ha, Kalifornia)
  - ❑ Alma (150-200 000 ha)

## Kukorica övezet





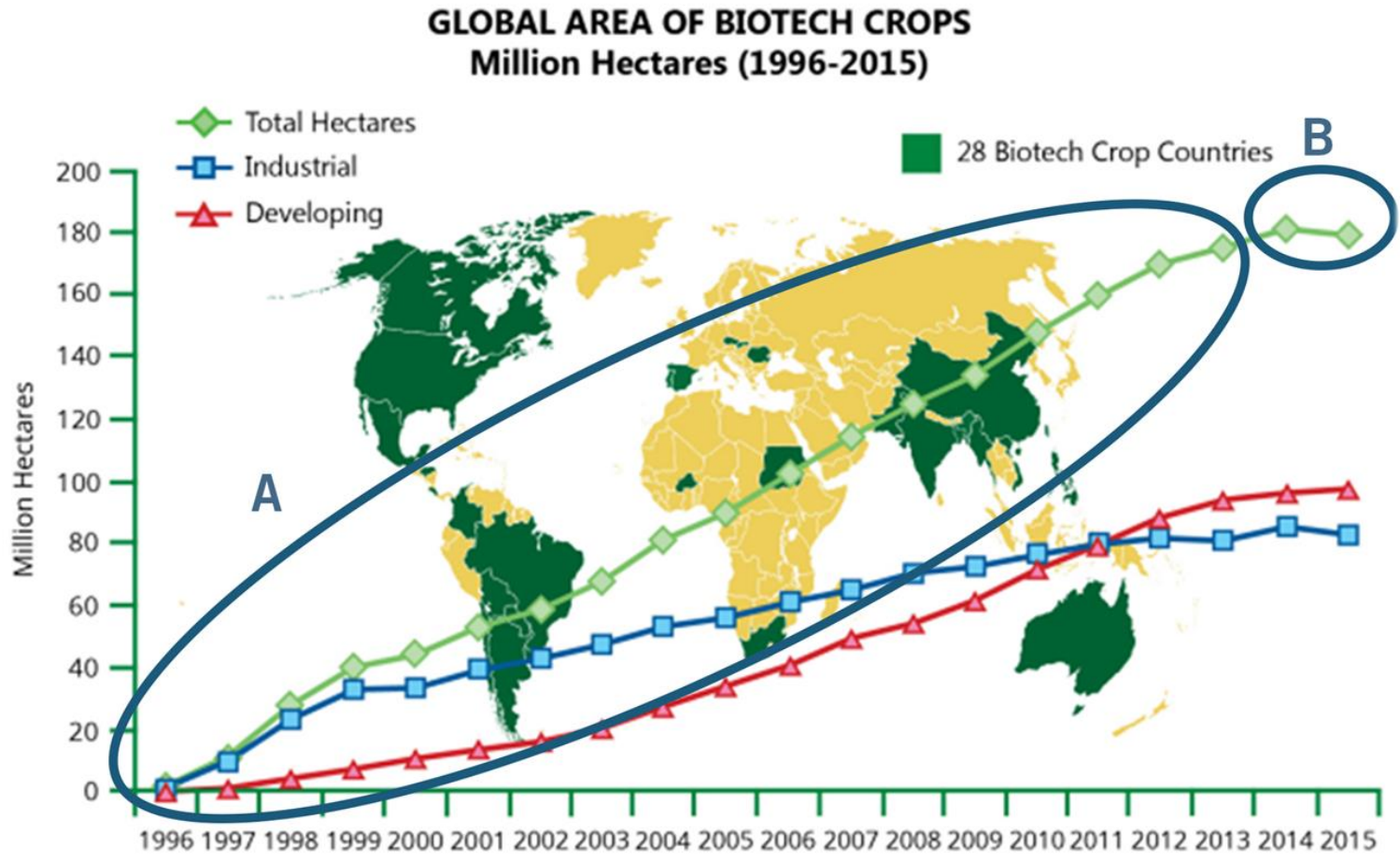
# Az USA mezőgazdasága



**Farm  
Progress  
Show  
Boone, IA**



# GMO-k az USA-ban



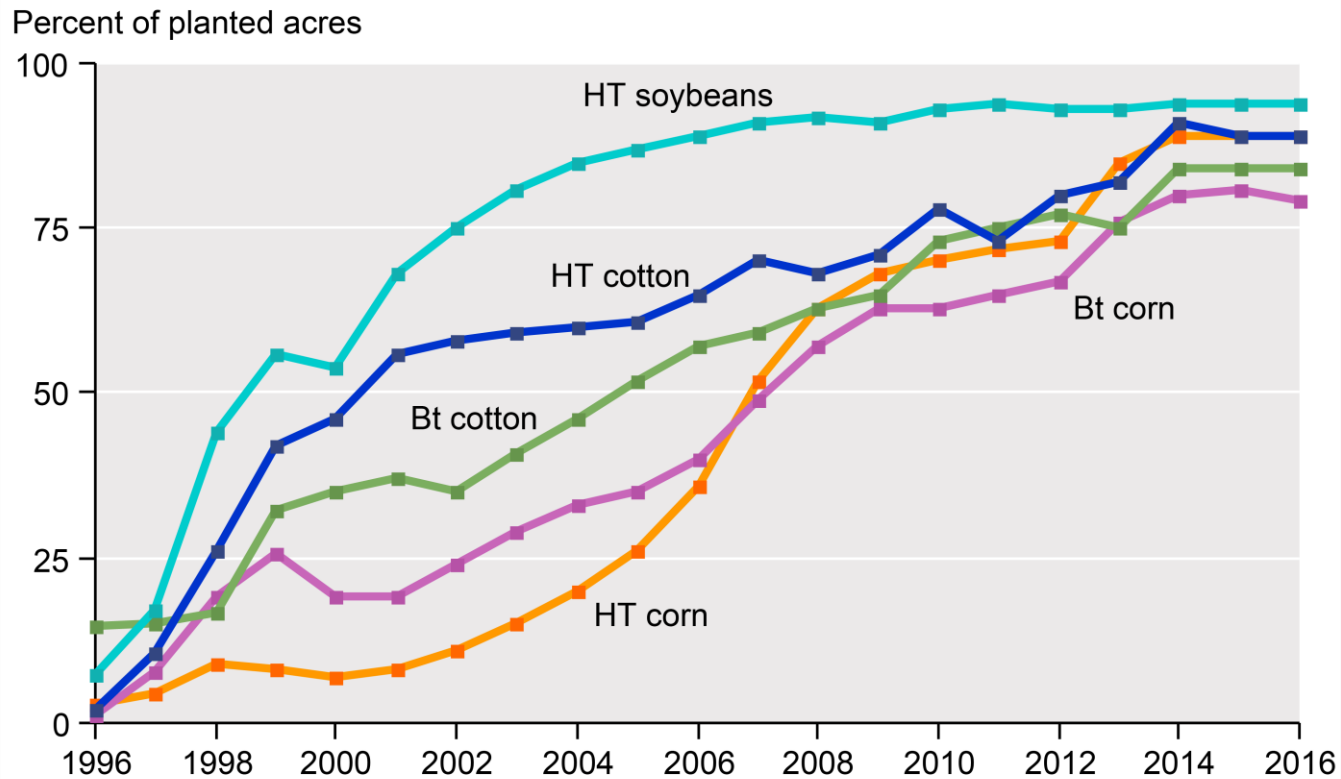
*Up to ~18 million farmers, in 28 countries planted 179.7 million hectares (444 million acres) in 2015, a marginal decrease of 1% or 1.8 million hectares (4.4 million acres) from 2014.*

Source: Clive James, 2015.



# GMO-k az USA-ban

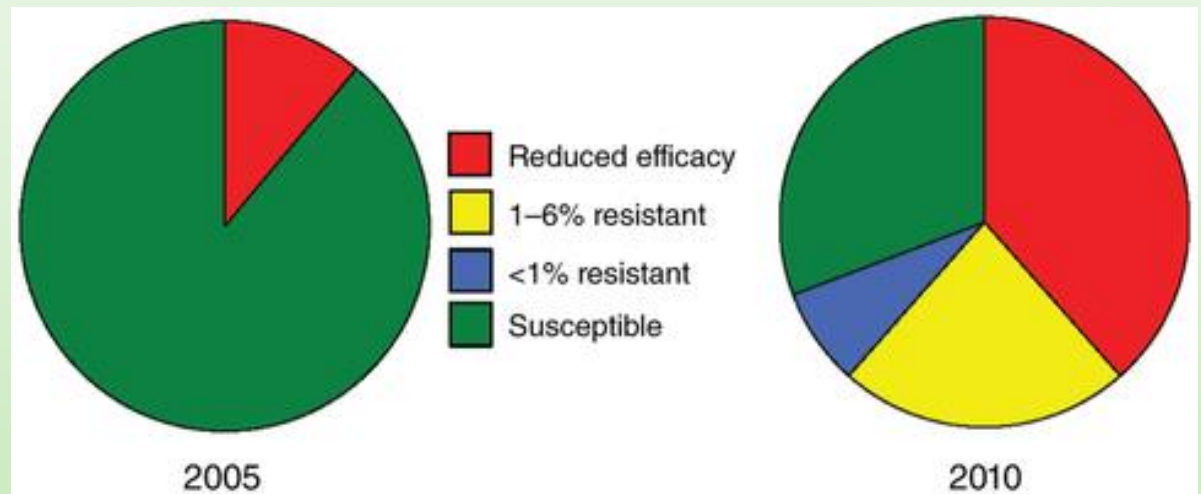
Adoption of genetically engineered crops in the United States, 1996-2016



Data for each crop category include varieties with both HT and Bt (stacked) traits.  
Sources: USDA, Economic Research Service using data from Fernandez-Cornejo and McBride (2002) for the years 1996-99 and USDA, National Agricultural Statistics Service, *June Agricultural Survey* for the years 2000-16.

# GMO-k az USA-ban

## Bt rezisztencia



- ❑ Új event-ek kombinációja (új toxinok, új hatásmódok)
- ❑ Vetőmag keverék (garantált a konvencionális egyedek vetése)

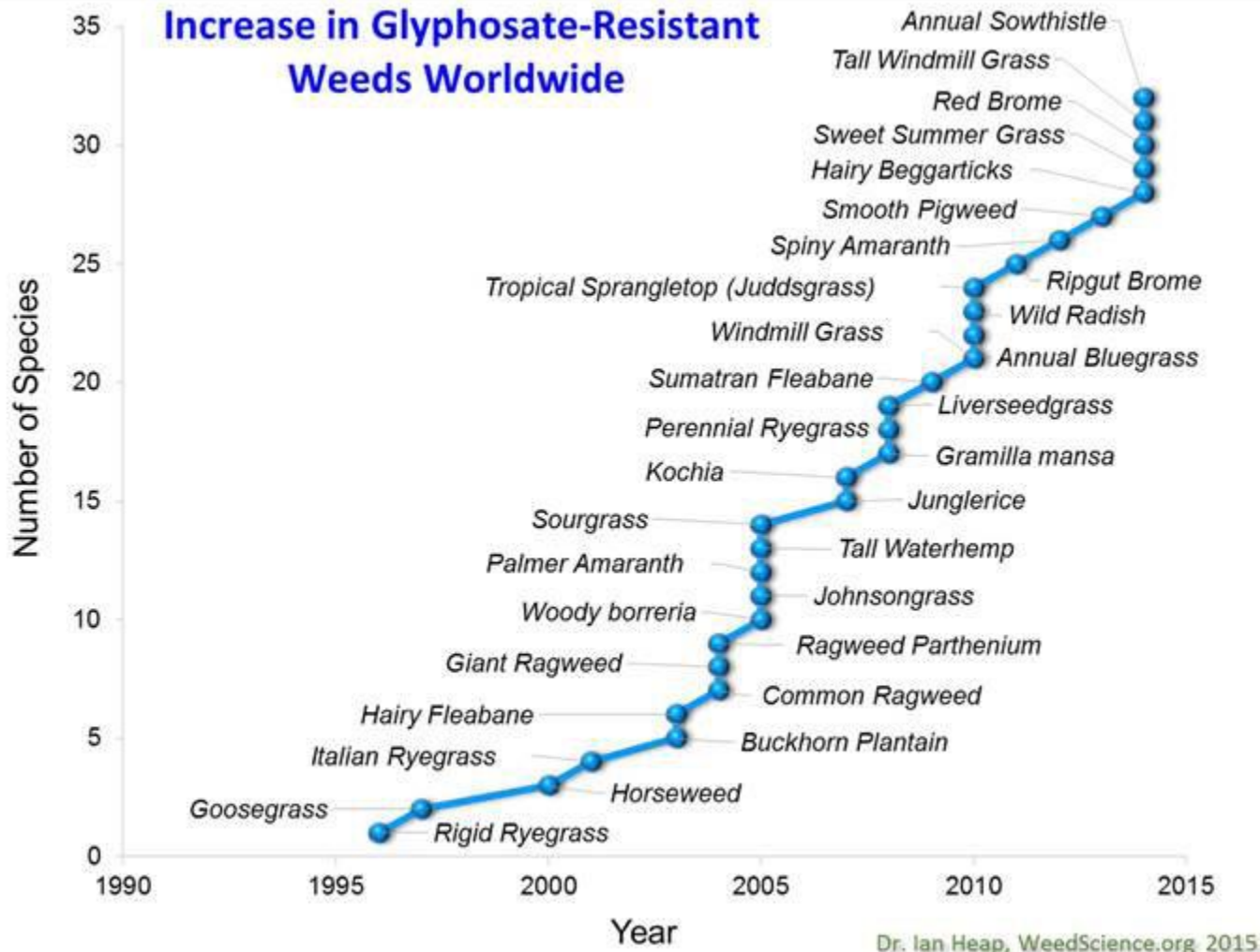
PIO, 2010, 10% non-GM

# GMO-k az USA-ban

Weed	HRAC-Group involved	Number of records	Crop involved	Countries of report
<i>Amaranthus hybridus</i>	B/2 and G/9	1	Corn, Soybean	Argentina
<i>Amaranthus plameri</i>	B/2 and G/9	8	Cotton, Soybean, Corn	United States
	B/2; G9 and C1/5	1	Corn	
<i>Amaranthus rudi</i>	B/2 and G/9	1	Soybean	Canada
	B/2; G/9 and E/14	1	Corn, Soybean	United States
	B/2 and G/9	3	Corn, Cotton, Soybean	
	B/2; G/9 and E/14; C1/5	1	Corn, Soybean	
	B/2; G/9 and F2/27; C1/5	1	Corn, Soybean	
<i>Ambrosia artemisiifolia</i>	B/2 and G/9	1	Soybean	Canada
	B/2 and G/9	2	Soybean	United States
	B/2; G/9 and E/14	1	Corn, Soybean	
<i>Ambrosia trifida</i>	B/2 and G/9	1	Soybean	Canada
	B/2 and G/9	3	Corn, Soybean	United States
<i>Conyza canadensis</i>	B/2 and G/9	1	Soybean	Canada
	B/2 and G/9	2	Soybean, Wheat	United States
<i>Conyza sumatrensis</i>	B/2 and G/9	1	Corn, Soybean	Brazil
<i>Kochia scoparia</i>	B/2 and G/9	3	Spring Barley, Wheat, Canola, Corn, Soybean	Canada
	B/2 and G/9	1	Cropland, Wheat	United States
	B/2; G/9 and O/4; C1/5	1	Corn	
<i>Lolium perenne ssp. Multiflorum</i>	B/2 and G/9	1	Wheat	Argentina
	B/2 and G/9	1	Wheat	Chile
	B/2; G/9 and A/1	1	Spring Barley	
	<b>B/2 and G/9</b>	<b>1</b>	<b>Wheat</b>	<b>Italy</b>
<i>Lolium rigidum</i>	B/2; G/9 and A/1; K1/3	1	Wheat	Australia
	B/2; G/9 and A/1; C1/5; D/22	1	Pasture seed	
	B/2; G/9 and A/1	1	Wheat	Israel

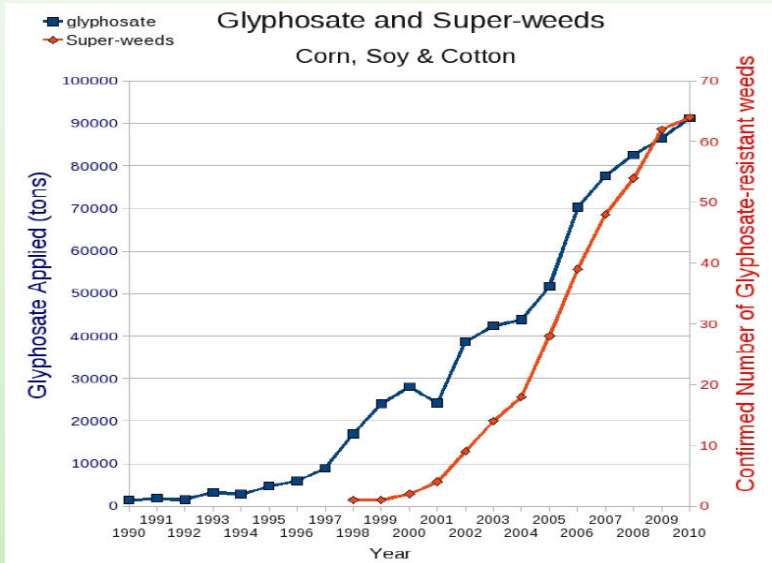
**Glifozát  
rezisztencia  
(globális)**

# GMO-k az USA-ban

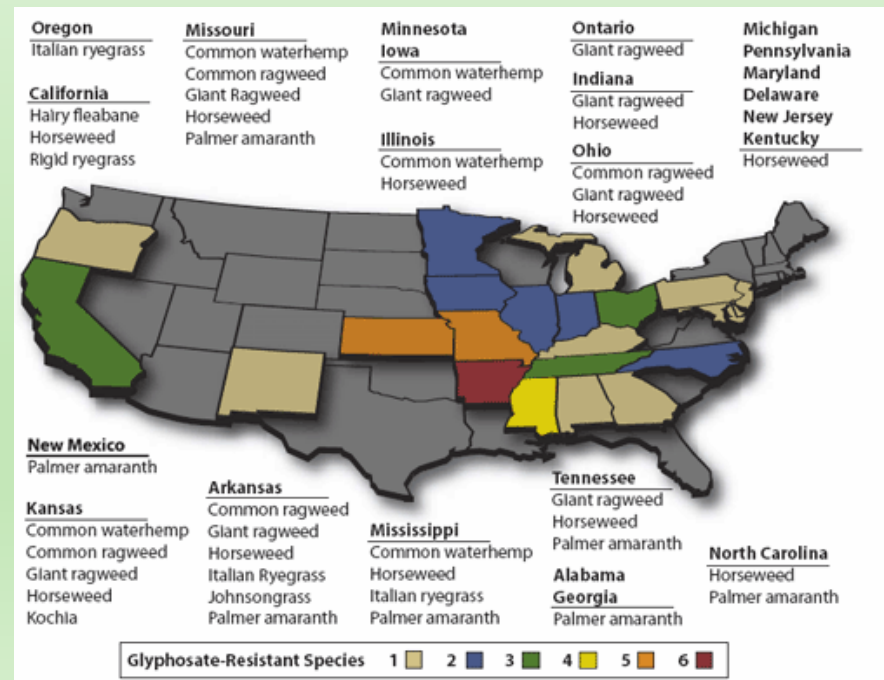
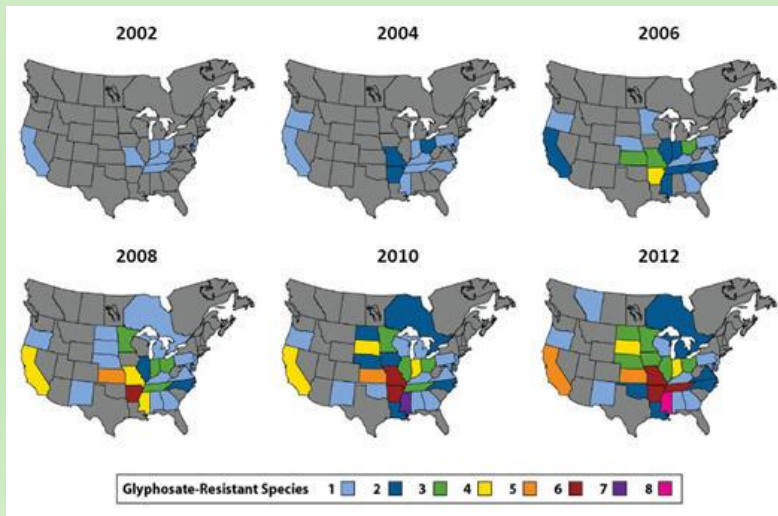


**Glifozát  
rezisztencia  
(globális)**

# GMO-k az USA-ban



## Glifozát rezisztencia (USA)





# GMO-k az USA-ban

## Trendek

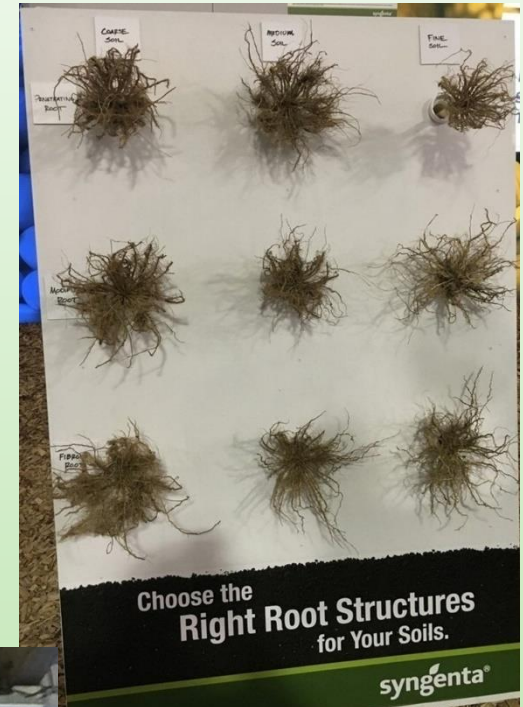
- ❑ Búza (MON-RR): nem engedélyezett
- ❑ Event-ek összekapcsolása: RR+Bt+glufozinát+dikamba
- ❑ „Konvencionális” herbicidek: s-metolaklór, mezotrion, tembotrion, atrazin, biciklopiron
- ❑ Genom szerkesztés (PIO, 2016: CRISPR kukorica) – nem GMO?
- ❑ „Gén csendesítés”, interferencia (RNAi – MON):

mRNS használata a célszervezet gén expresszió gátlására (*Diabrotica*)



# Növényvédelmi trendek az USA-ban (kukorica övezet)

- ❑ Kukorica fungicid használat (levél betegségek)
- ❑ Inszekticid csávázás: neonikotinioidok
  - ciantraniliprol
  - Lumivia
- ❑ Hagyományos levél/talaj herbicidek használata



# Növényvédelmi trendek az USA-ban (kukorica övezet)



# Növényvédelmi trendek az USA-ban (kukorica övezet)

**The new standard  
in seed treatment.**

Pioneer Premium Seed Treatment 250 plus  
DuPont™ Lumivia™ insecticide seed treatment  
offering has a **new mode of action** that goes to work  
quickly to protect critical areas of the corn plant including:

**SEED  
ROOTS  
SHOOT**

**Protect your success.**

 | DuPont™  
Lumivia™  
insecticide seed treatment



# Növényvédelmi trendek az USA-ban (kukorica övezet)

48,4% fluopiram

**ILEVO**<sup>®</sup>

ILEVO<sup>®</sup> is the first soybean seed treatment product that offers protection against Sudden Death Syndrome (SDS), Soybean Cyst Nematode (SCN) and other nematodes in the seed zone.

**SDS and SCN: Top Soybean Yield Robbers**

Yield Loss (Millions of Bushels)
Soybean Cyst Nematode: 122.7
SDS and SCN: 153.0
Seedling Rot: 48.34
Charcoal Rot: 39.14
Sudden Death Syndrome: 44.82
Phytophthora Rot: 30.53
Sclerotinia Stem Rot: 24.2
Brown Stem Rot: 13.51

SDS and SCN accounted for over 153 million bushels of yield loss in 2015\*

**ILEVO for SDS**

Controls Fusarium Root Rot, the causal agent of SDS, from the moment of planting

**ILEVO for SCN**

Helps manage shifts in SCN populations to maximize yield potential

**ILEVO Yield Benefit<sup>™</sup> +3.7 bu/A OVERALL AVERAGE**

Partners with SDS- and SCN-tolerant varieties for greater protection

Protects plants from SDS all season, reducing foliar symptoms

Broad-spectrum protection against nematodes, including SCN, in the seed zone

SDS AND SCN DISTRIBUTION IN THE U.S. IS GROWING



# Növényvédelmi trendek az USA-ban (kukorica övezet)

**40,3 % klotianidin**  
**8,1 % Bacillus firmus I-1582**

By combining Poncho®/VOTIVO® and ILeVO® seed treatments, growers get protection against top yield-robbers like Sudden Death Syndrome (SDS), Soybean Cyst Nematodes (SCN) and early-season insects.

**PONCHO**  
moves systemically within the plant to protect against above- and below-ground insects.

**VOTIVO**  
creates a living barrier that grows with the roots to extend protection through multiple generations of nematodes.

**REGISTER FOR A CHANCE TO WIN A NEMATODE SAMPLING OF YOUR FIELD!**

**ENTER HERE**

**PONCHO/VOTIVO + ILeVO DELIVERS TRIPLE-ACTION PROTECTION**

**BAYER**

**PONCHO**

**VOTIVO**

**ILeVO**

**ZONE**

# Növényvédelmi trendek az USA-ban (kukorica övezet)



# Növényvédelmi trendek az USA-ban (kukorica övezet)

**SMARTSTAX<sup>®</sup> PRO TECHNOLOGY**  
PENDING REGULATORY APPROVALS

- Next-generation insect control
- Three modes of action for corn rootworm
- *Bt* technology in combination with a novel mode of action
- Improved season-long root protection
- Reduced beetle emergence
- Additional ways to combat insect resistance

Roundup Ready Corn 2

SmartStax RIB Complete Corn Blend

SmartStax PRO RIB Complete Corn Blend

**4 event – 8 gén  
(Bt+Bt+RR+LL)**

**Bt: 2 hatásmód**

**95 % Bt +5 % RIB**



# Növényvédelmi trendek az USA-ban (kukorica övezet)

The image shows a trade show booth for Bayer's corn herbicides. The main backdrop is green with the text "BAYER IS BRINGIN' THE W.O.W. FACTOR!". Below this, a list of seven herbicides is provided, each with a brief description. A television screen in the center displays a cornfield under a blue sky with the "Balance flexx" logo. At the bottom of the booth, logos for Corvus, Balance flexx, DiFlexx, Capreno, Liberty, and DiFlexx are visible.

**BAYER IS BRINGIN' THE W.O.W. FACTOR!**

Seven powerful herbicides from Bayer all with one goal: **Wipe. Out. Weeds.**

- Corvus**  
The #1 pre-emergent with 3 levels of defense
- Balance Flexx**  
Cost-effective flexible foundation
- DiFlexx**  
Dicamba safe enough for early corn
- Capreno**  
The longest-lasting residual of any post
- Liberty**  
The only non-selective alternative to glyphosate
- DiFlexx DUO**  
The only premix dicamba + HPPD on the market
- Laudis**  
Powerful residual control, combined with crop safety

Balance flexx

Corvus

Balance flexx

DiFlexx

Capreno

Liberty

DiFlexx

**tienkarbazon+izoxaflutol**

**izoxaflutol**

**dikamba+safaner**

**glufozinát**

**dikamba+tembotrion**

**tembotrion+safaner**

# Növényvédelmi trendek az USA-ban (kukorica övezet)



**CORN  
ROOTWORM  
MANAGEMENT**

**Proven Corn Rootworm Protection:  
Now and in the Future**

Corn rootworm is often considered the "billion-dollar bug" and can lead to an average yield loss of up to 20 Bu/A when left unmanaged. Protect against this invasive pest with the corn trait technologies designed to help maximize your yield potential.

**SmartStax® Technology**

- Broadest spectrum of insect control on the market, offering multiple modes of action for control of both above- and below-ground insect pests
- Two modes of action against corn rootworm and corn ear worm

**SmartStax® PRO Technology** (PENDING REGULATORY APPROVALS)

- Contains a novel mode of action that controls corn rootworm differently than all other commercially available products on the market
- The first ever three-mode product designed to fight against corn rootworm and to help decrease beetle emergence, improving overall levels of control and product durability

**SmartStax® TECHNOLOGY**      **SmartStax® PRO**  
PENDING REGULATORY APPROVALS

**PLOT DEMONSTRATION**  
Right 3 Rows: Corn with above-ground protection ONLY  
Left 3 Rows: Corn with SmartStax® Technology

This information is for informational purposes only and is not an offer to sell products with SmartStax® PRO Technology. These products are not yet registered or approved for sale or use elsewhere in the United States. Commercialization is dependent on multiple factors, including successful completion of the regulatory process. The information presented herein is provided for informational purposes only, and is not intended to be construed as an offer to sell, or a recommendation to use, any agricultural product for the purpose indicated. It is a violation of federal law to produce or offer to sell an unapproved pesticide.

MONSANTO 



# Növényvédelmi trendek az USA-ban (kukorica övezet)

**acetoklór+fomesafen**

## WEED MANAGEMENT IN SOYBEANS

**Start Clean. Stay Clean.**

Using an overlapping residual strategy can better maximize your ability to control weeds through canopy. Consider using Warrant® Ultra Herbicide POST to help Stay Clean.

- The go-to residual benefits of Warrant® Herbicide with the added postemergence and residual activity of fomesafen for a broadened range of control against tough-to-control weeds in soybeans and cotton
- Superior crop safety in soybeans compared to competitive products like Prefix® Herbicide due to Monsanto's unique micro encapsulated acetochlor
- Eligible for incentives from Roundup Ready PLUS® Crop Management Solutions in soybeans and cotton of up to \$5.00/A

*While the proper tank mix can go a long way to increasing effectiveness, application timing can play equally as large a role. The longer soybeans compete with weeds, the more yield is affected, especially as canopy approaches. Be sure you target emerged weeds prior to their reaching four inches in height for maximum control.*

**WarrantUltra**  
HERBICIDE

**PLOT DEMONSTRATION**

PRE: Roundup PowerMAX® Herbicide + Rowel® FX Herbicide  
POST: Roundup PowerMAX® Herbicide + Warrant® Ultra Herbicide (applied after weeds exceeded four inches)

MONSANTO

# Növényvédelmi trendek az USA-ban (kukorica övezet)

**dikamba+glifozát**





# Növényvédelmi trendek az USA-ban (kukorica övezet)

**WEED MANAGEMENT IN SOYBEANS**

### Safe and Effective Dicamba Applications

Proprietary VaporGrip™ Technology to be available in Monsanto-branded dicamba herbicides, pending regulatory approvals, reduces the potential for off-target movement from volatility, maximizing safe and effective on-target applications.

#### Relative Volatility of Herbicides Containing VaporGrip™ Technology

(Relative volatility as measured in hurricane testing)

Herbicide	Relative Volatility (%)
DMA dicamba	100
Clarity®	~1
XtendiMax™ with VaporGrip™ Technology	~0.2

DMA or acid formulations of dicamba will NOT be permitted.

PENDING REGULATORY APPROVALS

**XTENDIMAX™**  
VaporGrip

# Felhasználható tapasztalatok a hazai növényvédelem számára

- ❑ Innovatív technológia fejlesztési környezet
- ❑ Piacközpontú, intenzív gazdálkodás
- ❑ Integrált, rendszer szemlélet
- ❑ Jól felépített szaktanácsadási rendszer
- ❑ Biotechnológiai eljárások kutatása, felhasználása  
genome editing, RNAi (EU – GMO???)

**Köszönöm a figyelmet!**