The Bertalanffy Lecture @ COS presents

Let plant scientists secure our food supply!

a comic inspired by the talk by Dirk Inzé.

THINGS ARE NOT LOOKING GOOD...

AND I KNOW WHOSE FAULT THAT IS!

FOR THE EARTH.

RISING GLOBAL TEMPERATURES

GLOBAL WARMING STRIPES*

1850 2017

AND THE POPULATION INCREASE...

7 BILLION

OF HUMANS ON EARTH

1 BILLION

1850 2017

...ARE MAKING A MESS!

CLIMATE CRISIS

BIODIVERSITY LOSS

OCEAN ACIDIFICATION

SHRINKING ICE SHEETS

THIS INCLUDES MORE EXTREME EVENTS, LIKE DROUGHTS.

DROUGHT = NO RAIN, BAD FOR GROWING PLANTS.

THIS FORECAST IS ESPECIALLY TRAGIC FOR THE TROPICAL REGIONS, WHERE RIGHT NOW OUR PLANTS GROW THE BEST!

CHANGE IN LIKELIHOOD OF DROUGHTS UNTIL THE END OF THE CENTURY**

Same
Double
Triple
Quadruple

SO THINGS ARE ALSO NOT LOOKING GOOD...

WITHOUT ENOUGH PLANTS...

WHAT WILL WE EAT?

FOR HUMANS.

PLANT SCIENTISTS MIGHT NOT SEEM YOUR USUAL SUPERHEROES, BUT THEY HAVE SOME GOOD IDEAS TO MAINTAIN CROP YIELD AND SECURE OUR FOOD SOURCES IN THESE CHALLENGING TIMES:

MAIZE

CORN PLANTS WITH LONGER CYCLES OF CELL DIVISION HAVE BIGGER LEAVES!

ENHANCED

WILD TYPE

POTATO

WILD TYPE

ENHANCED

STARCH

POTATO PLANTS CAN PRODUCE MORE STARCH IF WE MODIFY THEIR ENERGY-STORING SUGAR METABOLISM!

THERE IS SO MUCH WE CAN DO WITH THE GENETIC NETWORKS CONTROLLING PLANT GROWTH AND RESISTANCE TO STRESS!

RICE

SEEDS

WILD TYPE

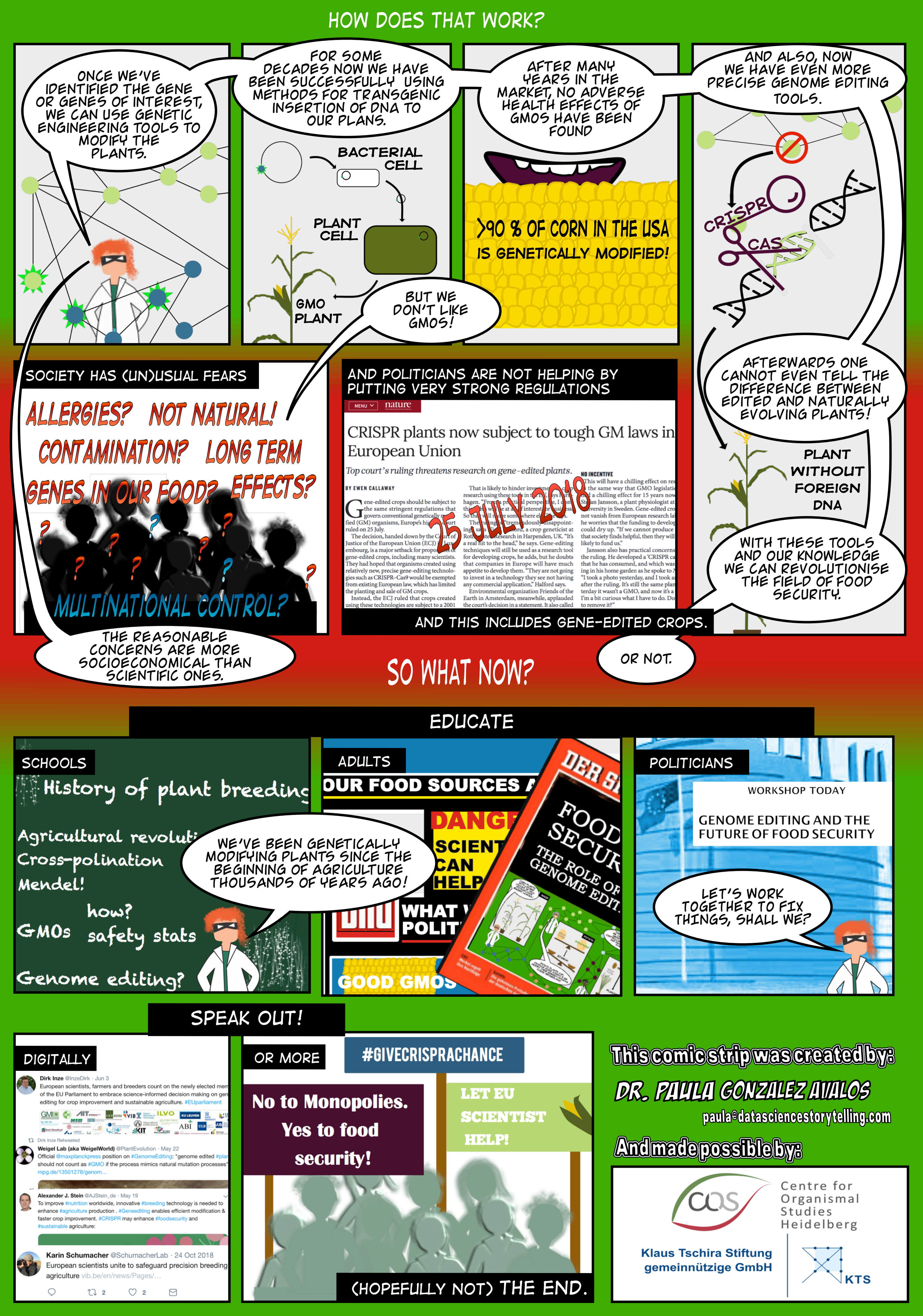
ENHANCED

PLANTS

BY OPTIMISING PHYTOHORMONE EXPRESSION WE CAN HAVE RICE PLANTS WITH LARGER SEEDS AND MORE GRAIN!

*HTTPS://WWW.CLIMATE-LAB-BOOK.AC.UK/2018/WARMING-STRIPES/

**DIRMEYER, P., FLOODS AND DROUGHTS IN A CHANGING CLIMATE - NOW AND THE FUTURE, EARTHZINE (2011)


HOW DOES THAT WORK?
ONCE WE'VE IDENTIFIED THE GENE OR GENES OF INTEREST, WE CAN USE GENETIC ENGINEERING TOOLS TO MODIFY THE PLANTS.
FOR SOME DECADES NOW WE HAVE BEEN SUCCESSFULLY USING METHODS FOR TRANSGENIC INSERTION OF DNA TO OUR PLANS.
BACTERIAL CELL
PLANT CELL
GMO PLANT
BUT WE DON'T LIKE GMOS!
AFTER MANY YEARS IN THE MARKET, NO ADVERSE HEALTH EFFECTS OF GMOS HAVE BEEN FOUND
>90 % OF CORN IN THE USA IS GENETICALLY MODIFIED!
AND ALSO, NOW WE HAVE EVEN MORE PRECISE GENOME EDITING TOOLS.
CRISPR
CAS
AFTERWARDS ONE CANNOT EVEN TELL THE DIFFERENCE BETWEEN EDITED AND NATURALLY EVOLVING PLANTS!
PLANT WITHOUT FOREIGN DNA
WITH THESE TOOLS AND OUR KNOWLEDGE WE CAN REVOLUTIONISE THE FIELD OF FOOD SECURITY.
SOCIETY HAS (UN)USUAL FEARS
ALLERGIES? NOT NATURAL!
CONTAMINATION? LONG TERM
GENES IN OUR FOOD? EFFECTS?
MULTINATIONAL CONTROL?
THE REASONABLE CONCERNS ARE MORE SOCIOECONOMICAL THAN SCIENTIFIC ONES.
AND POLITICIANS ARE NOT HELPING BY PUTTING VERY STRONG REGULATIONS
nature
CRISPR plants now subject to tough GM laws in European Union
Top court's ruling threatens research on gene-edited plants.
25 JULY 2018
AND THIS INCLUDES GENE-EDITED CROPS.
OR NOT.
SO WHAT NOW?
EDUCATE
SCHOOLS
History of plant breeding
Agricultural revolution
Cross-polination
Mendel!
how?
GMOs safety stats
Genome editing?
WE'VE BEEN GENETICALLY MODIFYING PLANTS SINCE THE BEGINNING OF AGRICULTURE THOUSANDS OF YEARS AGO!
ADULTS
OUR FOOD SOURCES
DANGER
SCIENCE CAN HELP
WHAT POLIT
GOOD GMOS
DER SP
FOOD SECUR
THE ROLE OF GENOME EDIT
POLITICIANS
WORKSHOP TODAY
GENOME EDITING AND THE FUTURE OF FOOD SECURITY
LET'S WORK TOGETHER TO FIX THINGS, SHALL WE?
SPEAK OUT!
DIGITALLY
Dirk Inze @InzeDirk · Jun 3
European scientists, farmers and breeders count on the newly elected members of the EU Parliament to embrace science-informed decision making on gen editing for crop improvement and sustainable agriculture. #EUparliament
Weigel Lab (aka WeigelWorld) @PlantEvolution · May 22
Official @maxplanckpress position on #GenomeEditing: "genome edited #plan should not count as #GMO if the process mimics natural mutation processes"
Alexander J. Stein @AJStein_de · May 19
To improve #nutrition worldwide, innovative #breeding technology is needed to enhance #agriculture production. #Geneediting enables efficient modification & faster crop improvement. #CRISPR may enhance #foodsecurity and #sustainable agriculture:
Karin Schumacher @SchumacherLab · 24 Oct 2018
European scientists unite to safeguard precision breeding agriculture
OR MORE
#GIVECRISPRACHANCE
No to Monopolies. Yes to food security!
LET EU SCIENTIST HELP!
(HOPEFULLY NOT) THE END.
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