UNIVERSITY OF MINNESOTA
Driven to Discover℠

Driving Where? Discovering What?

Prof. Diersen explains what he has been up to in his

Master's graduate studies in Applied Plant Sciences at the U of M; the intersection of science & faith; and the future of food

Science Majors & Minors (In the field or soon)

Anatomy II / Botany / Ecology / Geology Students since 2012

- What Grace is This That very God Would stoop to lift a cross of wood
- And walk a road of rock and blood, A sinner’s road, for me.

U of Minnesota Courses

- Fall 2013 (9 credits here – Bio Lab did not count MWF)
  - Ecology Theory and Practice 4 cr – Dr. David Tilman
  - Integrative Plant Biology 3 cr – Dr Cindy Tong

U of Minnesota Courses

- Spring 2014 (12 credits here MWF)
  - Applied Crop Physiology & Development 4 cr – Dr Mary Brakke
  - Biology/Ecology/Management of Invasive Plants 3 cr – Dr Don Wyse

- Summer 2014
  - Field Study of Soils 2 cr – Dr Jay Bell
  - Research Methods in Crop Improvement and Production 1 cr (all)
  - Agroecosystems Analysis 3 cr – Dr Paul Porter

U of Minnesota Courses

- Fall 2014 (12 credits here M-F)
    - Colloquium in Sustainable Agriculture 2 cr – Dr Craig Schaeffer, Dr Helene Murray

U of Minnesota Courses

- Spring 2015 (15 credits here M-F)
    - Ethics Training .5 cr
- Fall 2015 (12 credits here M-F)
    - Grad Seminar 1 cr – Dr Don Wyse

U of Minnesota Courses

- Spring 2016 (12 credits here M-F)
    - Applied Experimental Design 4 cr – Dr Roger Moon
- Fall 2016 (9 credits here MWF)
    - Plant Breeding Principles 3 cr – Dr James Anderson
    - Topics in Plant Biochemistry 3 cr – Dr Clay Carter

Novel Mechanisms of Biological Weed Inhibition Effected by Common Mycorrhizal Networks

Gregory Diersen

- Weed management issues
  - Reduced yield or reduced profit
  - Herbicide resistance & mechanical control problems

- Arbuscular Mycorrhizal Fungi (AMF) as possible weed inhibitor
  - Jordan et al. 2000

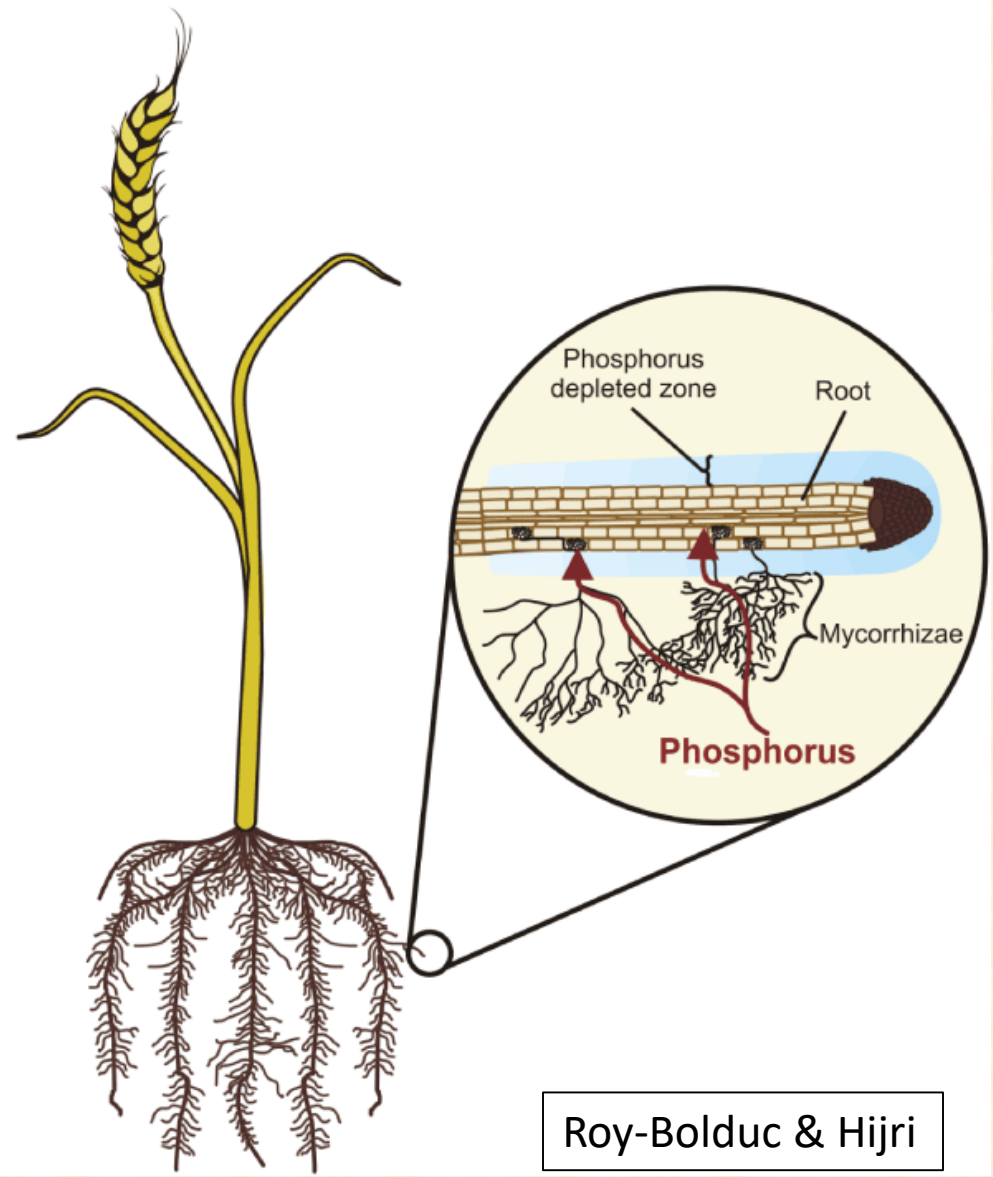
- Hypothesis:

Arbuscular mycorrhizal fungi (AMF) can be managed to function as a biological weed inhibitor in summer-annual production systems

Understanding the Underground

- Plants & Arbuscular Mycorrhizal Fungi
- Host-dominance Hypothesis
- Non-host Interference Hypothesis
- Experimental Designs
- Application

Plants & Arbuscular Mycorrhizal Fungi

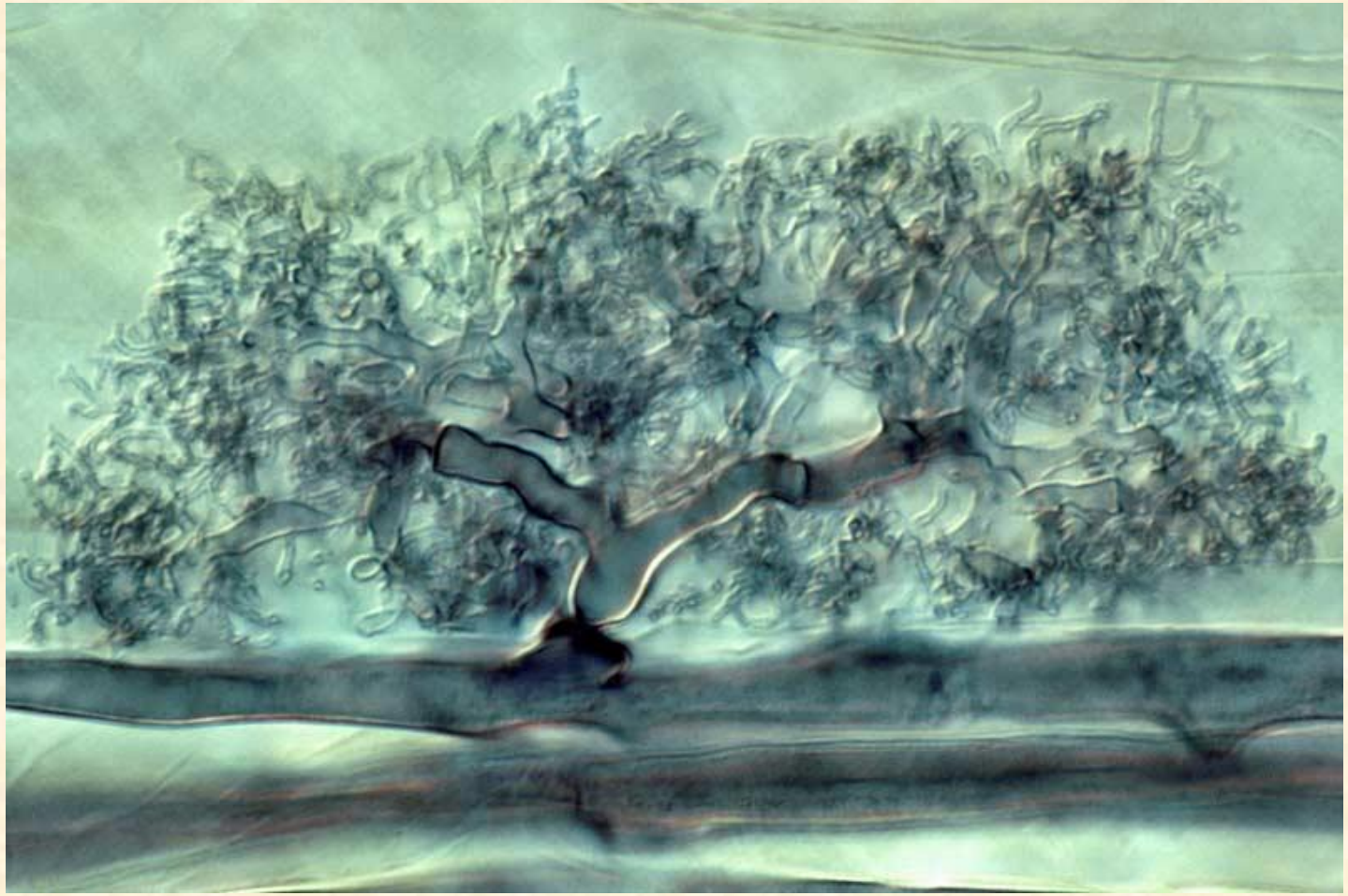


Roy-Bolduc & Hijri

Improved plant nutrition
Phosphorus

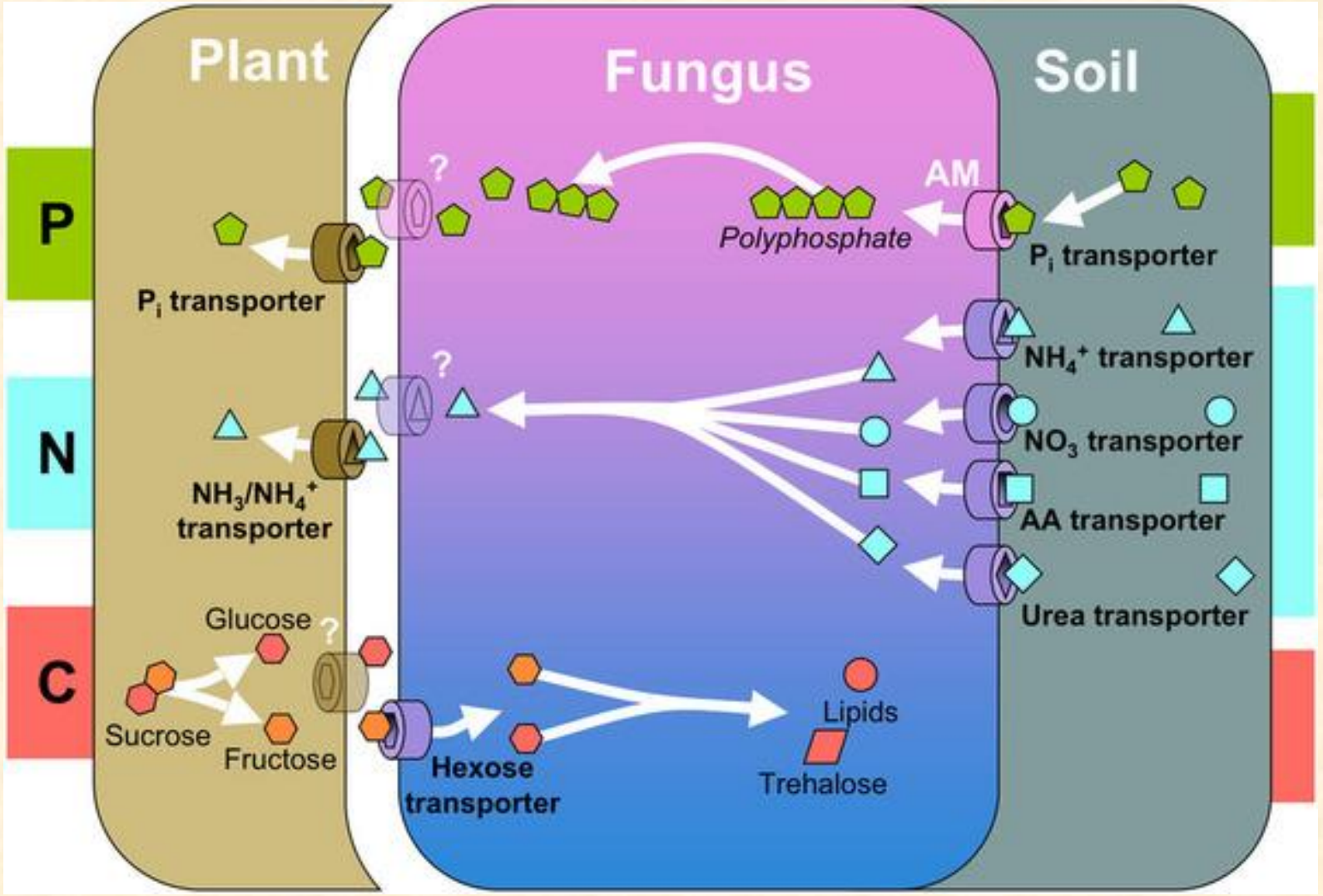
Increased water use efficiency (WUE) – potential drought tolerance

Plants & Arbuscular Mycorrhizal Fungi



Arbuscule (arum)

Plants & Arbuscular Mycorrhizal Fungi



Paola Bonfante & Andrea Genre

My tissue issues

- Race against Klockziem's retirement
  - Race against new Biology Prof. (Fenske) starting his own program
- Time management challenge & Teaching outside the realm I am learning
- Develop and teach EDU 3241 as a semester course – include Creation perspective, all of earth & space for ECE →8th and lesson plans
- PED courses – mine? To whom shall they go?

Called to?

- MLC to teach future teachers
  - I’m just happy to be here, taking it one day at a time, trying

- ~~Be a Ph.D. plant science researcher – be the world’s expert in the field of AMF and weed management~~

–

- ~~Farmer/rancher~~

–

- ~~Geologist~~

Science or the Bible?

- In which do you believe?
- “Can you be a science teacher if you don’t believe in science?” R.L.
- They are not separated in my mind; they are ordered. First things first.

- Destruction by Volcanic fire?

- Eternal burning?

Bible

- Foolishness of God
  - Reason by Siegbert Becker

Luther's quote -

"Reason is a whore, the greatest enemy that faith has; it never comes to the aid of spiritual things, but more frequently than not struggles against the divine Word, treating with contempt all that emanates from God."

- Can we save the earth?
  - Volcanic fire
- We are charged with spreading the Gospel, caring for souls.
  - Rainbow

- One segment of our population would have no living thing harmed/killed/eaten. (vertebrate cousins)

- One segment of our population seeks alteration of genetics in any possible form. (in order to form a more perfect…….)

- Technology has freed us from the bonds of marital union, from manual labor, from pain, from all kinds of the effects of sin. **
    - ** as long as you have the finances
    - ** at least while alive on earth

- Frankenfoods – the potentially scary future of food

- God’s promises remain – feed your family the best you can

In the terminology of the United States Environmental Protection Agency (EPA), a concentrated animal feeding operation (**CAFO**) is an animal feeding operation (AFO) that (a) confines animals for more than 45 days during a growing season, (b) in an area that does not produce vegetation, and (c) meets certain size ...

Concentrated animal feeding operation - Wikipedia
https://en.wikipedia.org/wiki/Concentrated_animal_feeding_operation

A **genetically modified** organism, or **GMO**, is an organism that has had its DNA altered or modified in some way through genetic engineering. In most cases, **GMOs** have been altered with DNA from another organism, be it a bacterium, plant, virus or animal; these organisms are sometimes referred to as "transgenic" organisms. Jan 11, 2016

GMOs: Facts About Genetically Modified Food - Live Science
www.livescience.com/40895-gmo-facts.html

About this result • Feedback

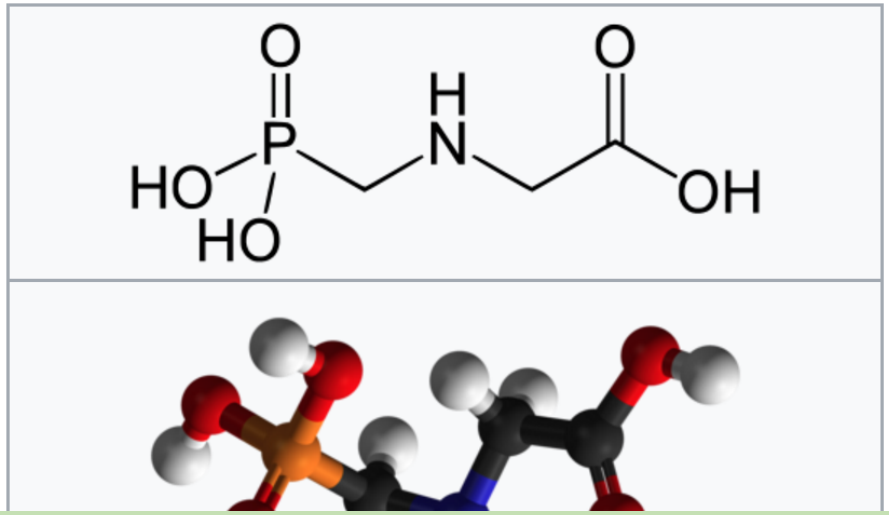
Glyphosate

From Wikipedia, the free encyclopedia

Not to be confused with Glufosinate.

Glyphosate (*N*-(phosphonomethyl)glycine) is a broad-spectrum systemic herbicide and crop desiccant. It is an organophosphorus compound, specifically a phosphonate. It is used to kill weeds, especially annual broadleaf weeds and grasses that compete with crops. It was discovered to be an herbicide by Monsanto chemist John E. Franz in 1970.[3] Monsanto brought it to market in 1974 under the trade name **Roundup**, and Monsanto's last commercially relevant United States patent expired in 2000.

Glyphosate



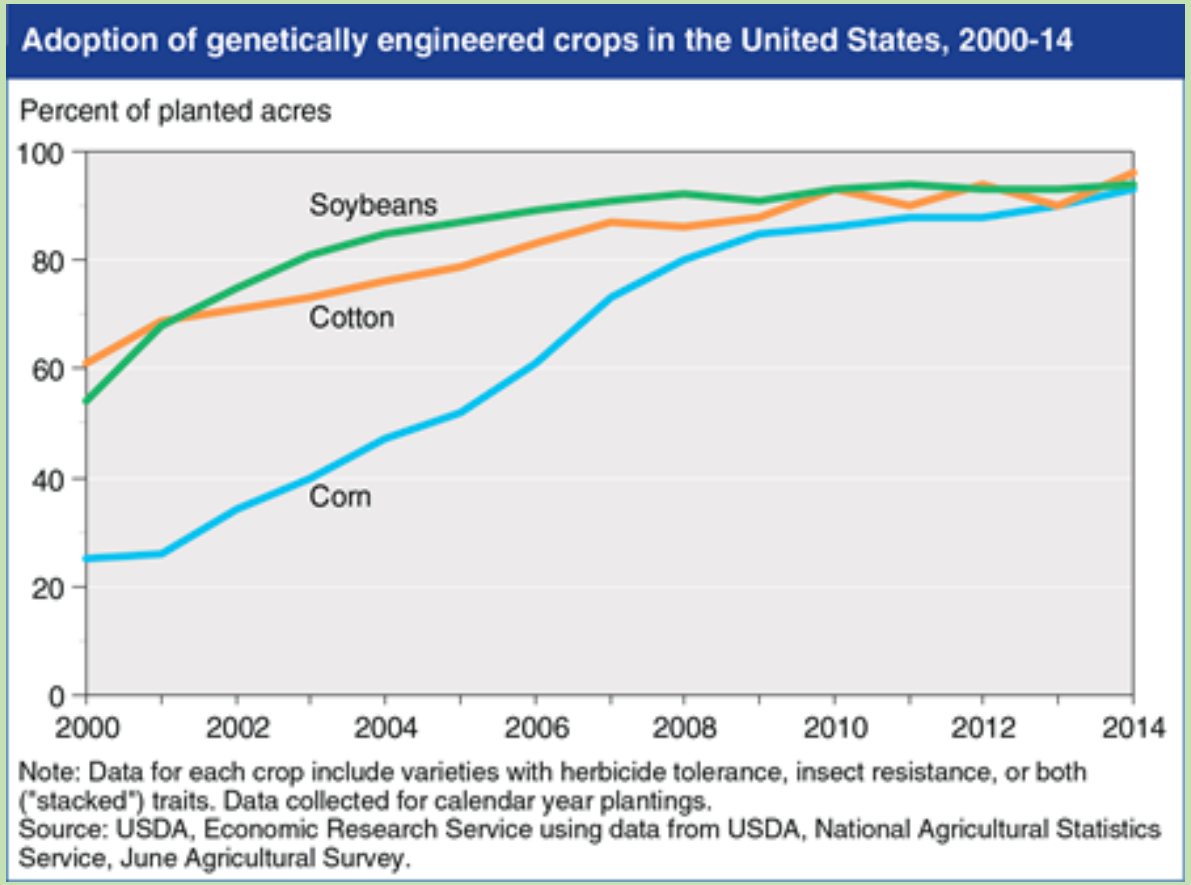
- Farmers quickly adopted glyphosate, especially after Monsanto introduced glyphosate-resistant Roundup Ready crops, enabling farmers to kill weeds without killing their crops.

- By 2016 there was a 100-fold increase from the late 1970s in the frequency of applications and volumes of glyphosate-based herbicides (GBHs) applied, partly in response to the unprecedented global emergence and spread of glyphosate-resistant weeds.[5]:1

- Glyphosate is absorbed through foliage, and minimally through roots,[6][7][8] and transported to growing points. It inhibits a plant enzyme involved in the synthesis of three aromatic amino acids: tyrosine, tryptophan, and phenylalanine.

- Therefore, it is effective only on actively growing plants and is not effective as a pre-emergence herbicide.

- An increasing number of crops have been genetically engineered to be tolerant of glyphosate (e.g. Roundup Ready soybean, the first Roundup Ready crop, also created by Monsanto) which allows farmers to use glyphosate as a postemergence herbicide against weeds.



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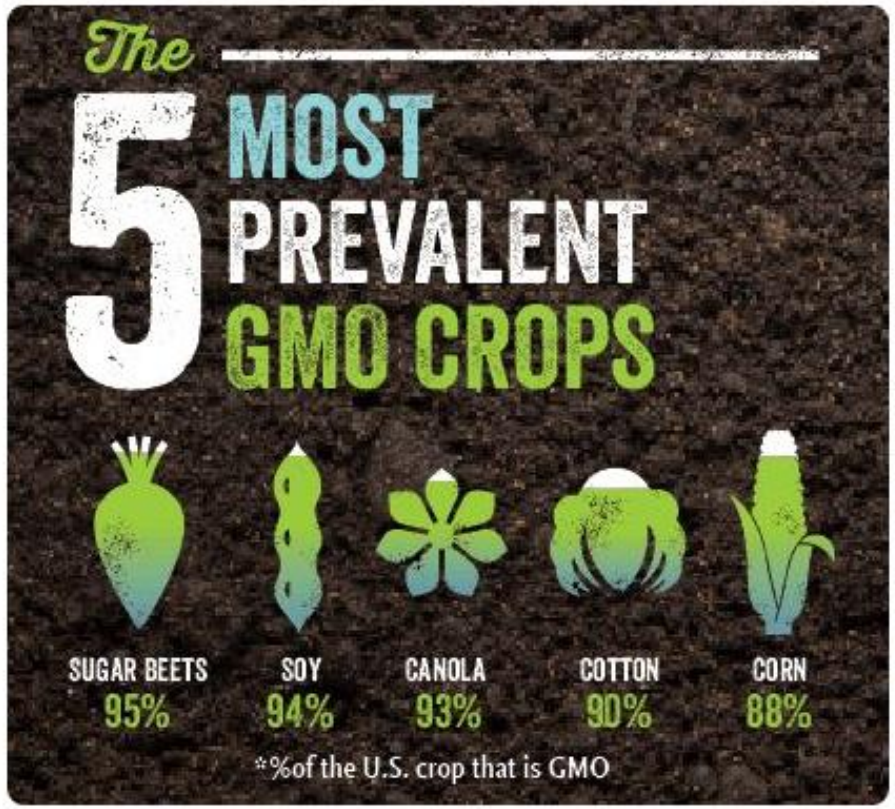

Saved from
Whole Foods Market

Visit

- The development of glyphosate resistance in weed species is emerging as a costly problem. While glyphosate and formulations such as Roundup have been approved by regulatory bodies worldwide, concerns about their effects on humans and the environment persist.[5][9]

Send Tried it! ••• Save

Saved from
Food Republic

Visit

CRISPR

From Wikipedia, the free encyclopedia

Clustered regularly interspaced short palindromic repeats (**CRISPR**, pronounced *crisper*[2]) are segments of prokaryotic DNA containing short, repetitive base sequences. In a palindromic repeat, the sequence of nucleotides is the same in both directions. Each repetition is followed by short segments of spacer DNA from previous exposures to foreign DNA (e.g., a virus or plasmid).[3] Small clusters of *cas* (CRISPR-associated system) genes are located next to CRISPR sequences.

The CRISPR/Cas system is a prokaryotic immune system that confers resistance to foreign genetic elements such as those present within plasmids and phages[4][5][6] that provides a form of acquired immunity. RNA harboring the spacer sequence helps Cas proteins recognize and cut exogenous DNA. Other RNA-guided Cas proteins cut foreign RNA.[7] CRISPRs are found in approximately 40% of sequenced bacterial genomes and 90% of sequenced archaea.[8][note 1]

A simple version of the CRISPR/Cas system, CRISPR/Cas9, has been modified to edit genomes. By delivering the Cas9 nuclease complexed with a synthetic guide RNA (gRNA) into a cell, the cell's genome can be cut at a desired location, allowing existing genes to be removed and/or new ones added.[9][10][11] The Cas9-gRNA complex corresponds with the CAS III crRNA complex in the above diagram.

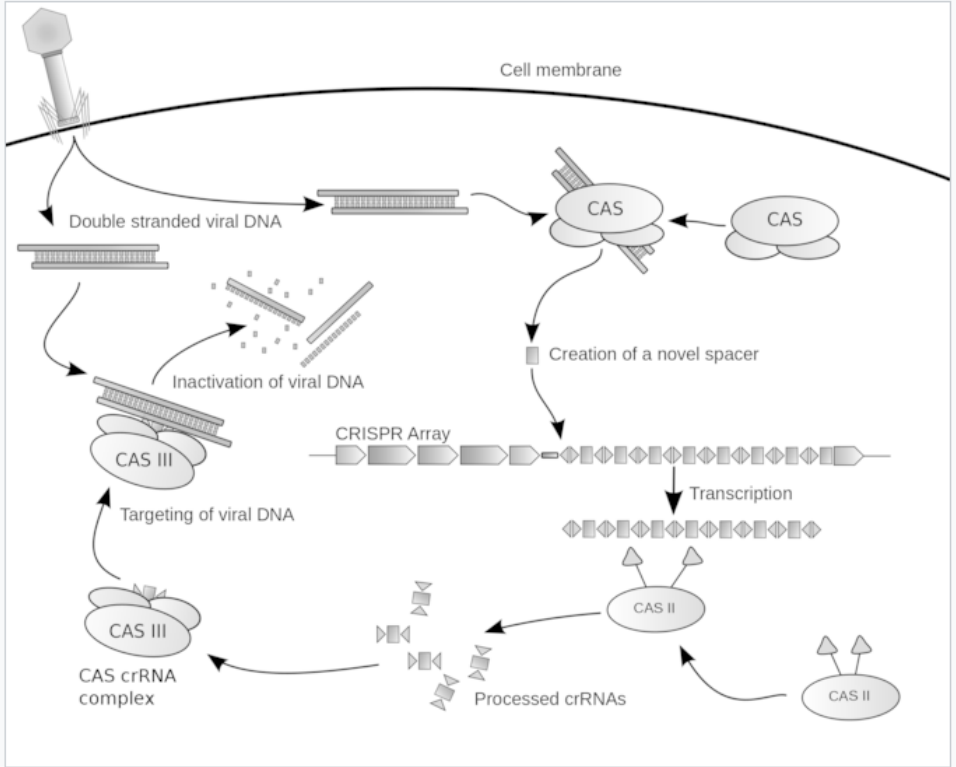

Diagram of the CRISPR prokaryotic antiviral defense mechanism.[1]

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- CRISPR/Cas genome editing techniques have many potential applications, including medicine and crop seed enhancement. The use of CRISPR/Cas9-gRNA complex for genome editing[12][13] was the AAAS's choice for breakthrough of the year in 2015.[14] Bioethical concerns have been raised about the prospect of using CRISPR for germline editing.[15]

Voytas Lab at the U of M

- RESEARCH OVERVIEW
- Methods for precisely altering DNA sequences in living cells enable detailed functional analysis of genes and genetic pathways. In plants, targeted genome modification has applications ranging from understanding plant gene function to developing crop plants with new traits of value. Our group has enabled efficient methods for targeted genome modification of plants using sequence-specific nucleases. With zinc finger nucleases (ZFNs), TAL effector nucleases (TALENs), and the CRISPR/Cas9 system, we have achieved targeted gene knockouts, replacements and insertions in a variety of plant species. Current work is focused on optimizing delivery of nucleases and donor DNA molecules to plant cells to more efficiently achieve targeted genetic alterations.

CRISPR/Cas9 for Glycine Max

Note: We are currently in the process of submitting our plasmids to addgene.org, if you want to be notified when they are available, email mich0391@umn.edu and I will notify you when they are ready. (Plasmids are expected to be available for order within the next month)

Protocol for CRISPR design and construction (.PDF)

CRISPR design website

Site for ordering plasmids

Animal Production and Human Technologies

In Vitro Fertilization (IVF): Side Effects and Risks

americanpregnancy.org/infertility/in-vitro-fertilization/ ▼

Mar 12, 2017 - **IVF** is the process of fertilization by extracting eggs, retrieving a sperm sample, and then manually combining an egg and sperm in a laboratory dish. The embryo(s) is then transferred to the uterus. Other forms of ART include gamete intrafallopian transfer (GIFT) and zygote intrafallopian transfer (ZIFT).

Gamete Intrafallopian Transfer · Male Infertility · Infertility Medications

ar·ti·fi·cial in·sem·i·na·tion

/ˌärdəˈfiSHəl inˌseməˈnāSHən/

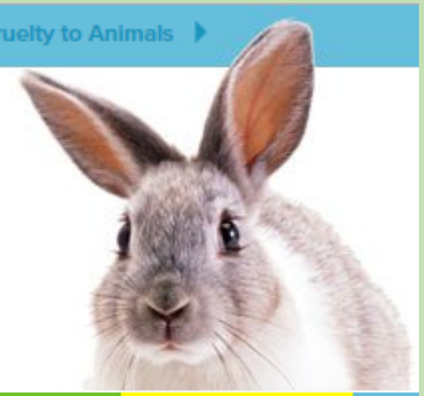
noun

the injection of semen into the vagina or uterus other than by sexual intercourse.

PETA

ANIMALS ARE **NOT** OURS

TO EAT, WEAR, EXPERIMENT ON, USE FOR ENTERTAINMENT, OR ABUSE IN ANY OTHER WAY.



Our Mission Statement

People for the Ethical Treatment of Animals (PETA) is the largest animal rights organization in the world, with more than 5 million members and supporters.

PETA focuses its attention on the four areas in which the largest numbers of animals suffer the most intensely for the longest periods of time: in the food industry, in the clothing trade, in laboratories, and in the entertainment industry. We also work on a variety of other issues, including the cruel killing of rodents, birds, and other animals who are often considered "pests" as well as cruelty to domesticated animals.

PETA works through public education, cruelty investigations, research, animal rescue, legislation, special events, celebrity involvement, and protest campaigns.

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Like 5.1M | Follow | 908K followers

SIGN UP FOR PETA UPDATES

E-Mail Address SUBMIT

In This Section

CCD – Colony Collapse Disorder

- Proverbs 3:5-6 New International Version (NIV)
- **5** Trust in the LORD with all your heart
  and lean not on your own understanding;
  6 in all your ways submit to him,
  and he will make your paths straight