

La genética al servicio de la sostenibilidad

1-2-2024



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Comer no siempre ha sido fácil

en twitter: @jmmulet

1ª Revolución verde: Domesticación de plantas y animales silvestres.

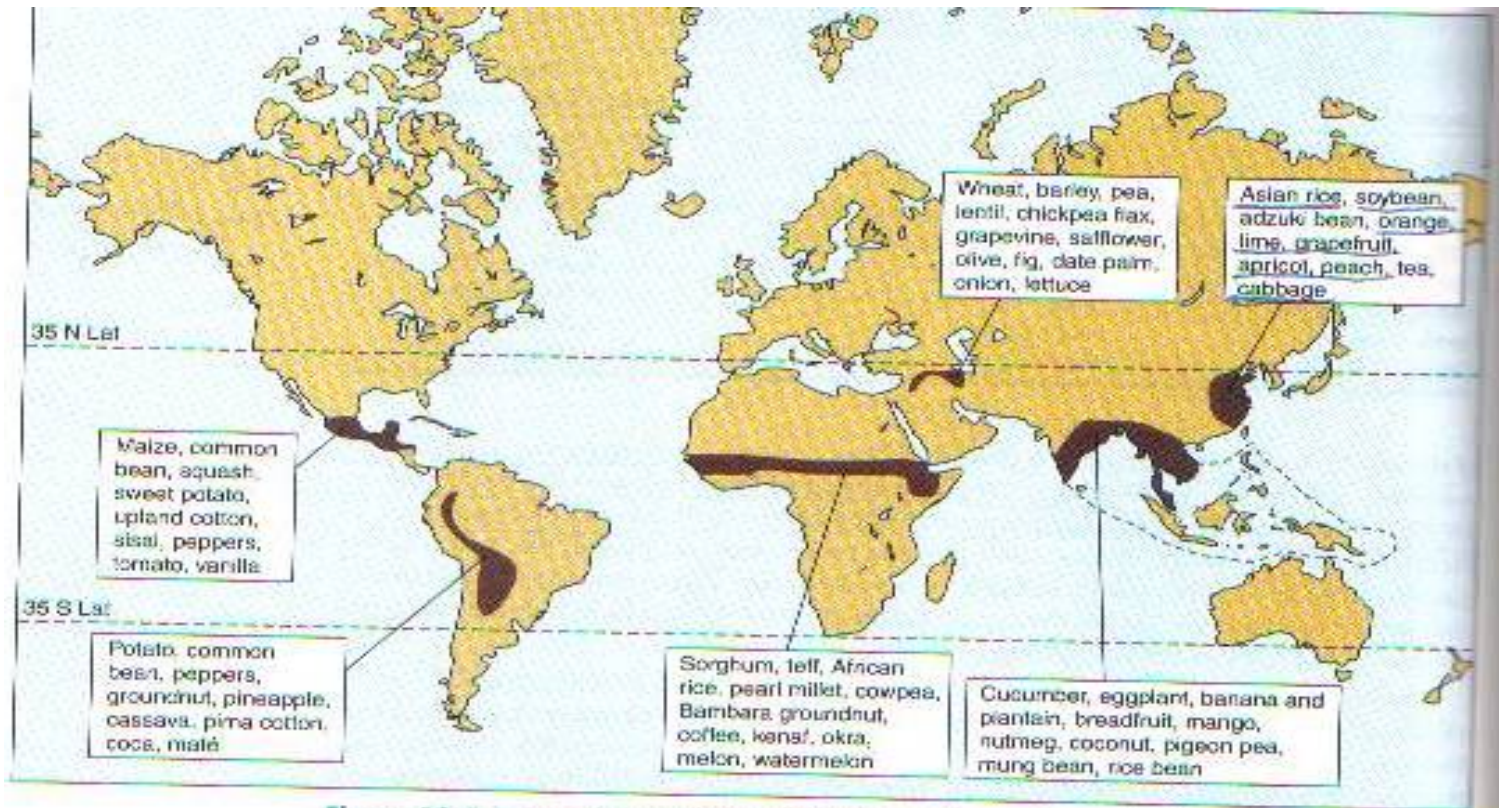


Figure 13.4 Map of the world showing the major centers of origin of crops, which are distributed mainly in tropical regions. *Source:* P. Gepts (2001), *Origins of plant agriculture and major crop plants*. In M. K. Tolba, ed., *Our Fragile World: Challenges and Opportunities for Sustainable Development* (Oxford, U.K.: EOLSS Publishers), pp. 629–637.



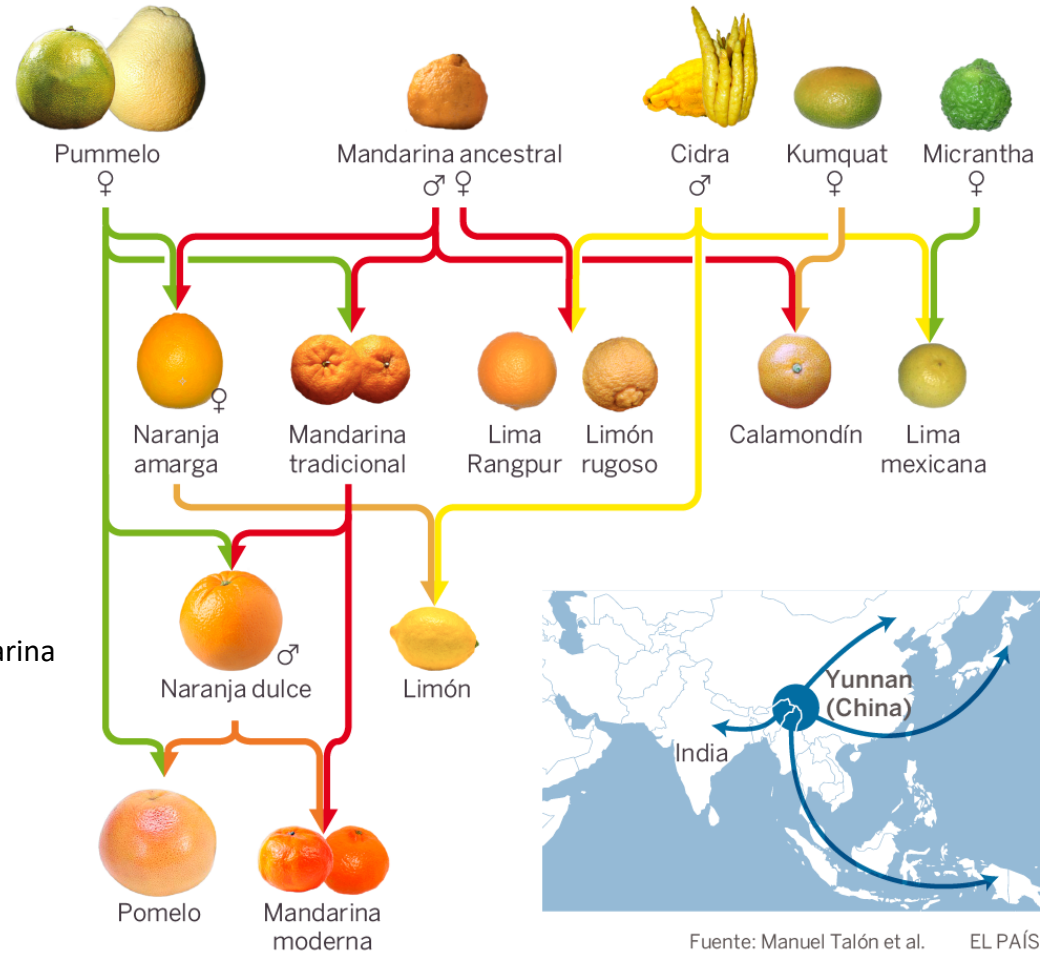
UNA GRAN FAMILIA de solo... tres especies

Limón (*Citrus x limon*) híbrido entre limón francés y naranjo amargo)

Clementina (*Citrus x clementina*) híbrido entre mandarina y naranjo amargo

Lima, naranjas, pomelos, etc.

EL ÁRBOL GENEALÓGICO DE LOS CÍTRICOS



Híbridos famosos



Fuente: Manuel Talón et al. EL PAÍS



Selección en masa y evaluación de la descendencia



**10% al 18% de azúcar
x15 azúcar/Ha en un siglo**

2ª Revolución Verde: Norman Borlaug.



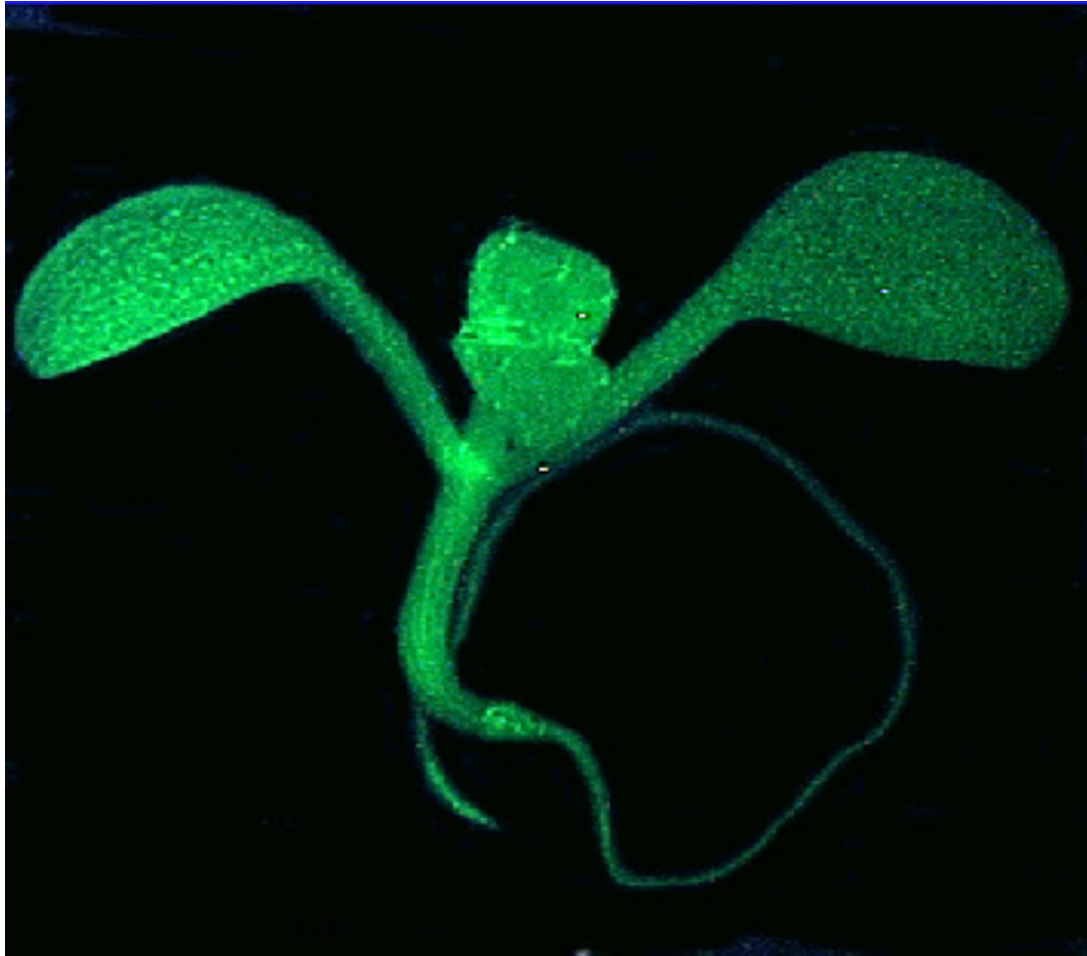
El desarrollo de nuevas variedades de trigo que permitieron duplicar la producción mundial.



Producing Better

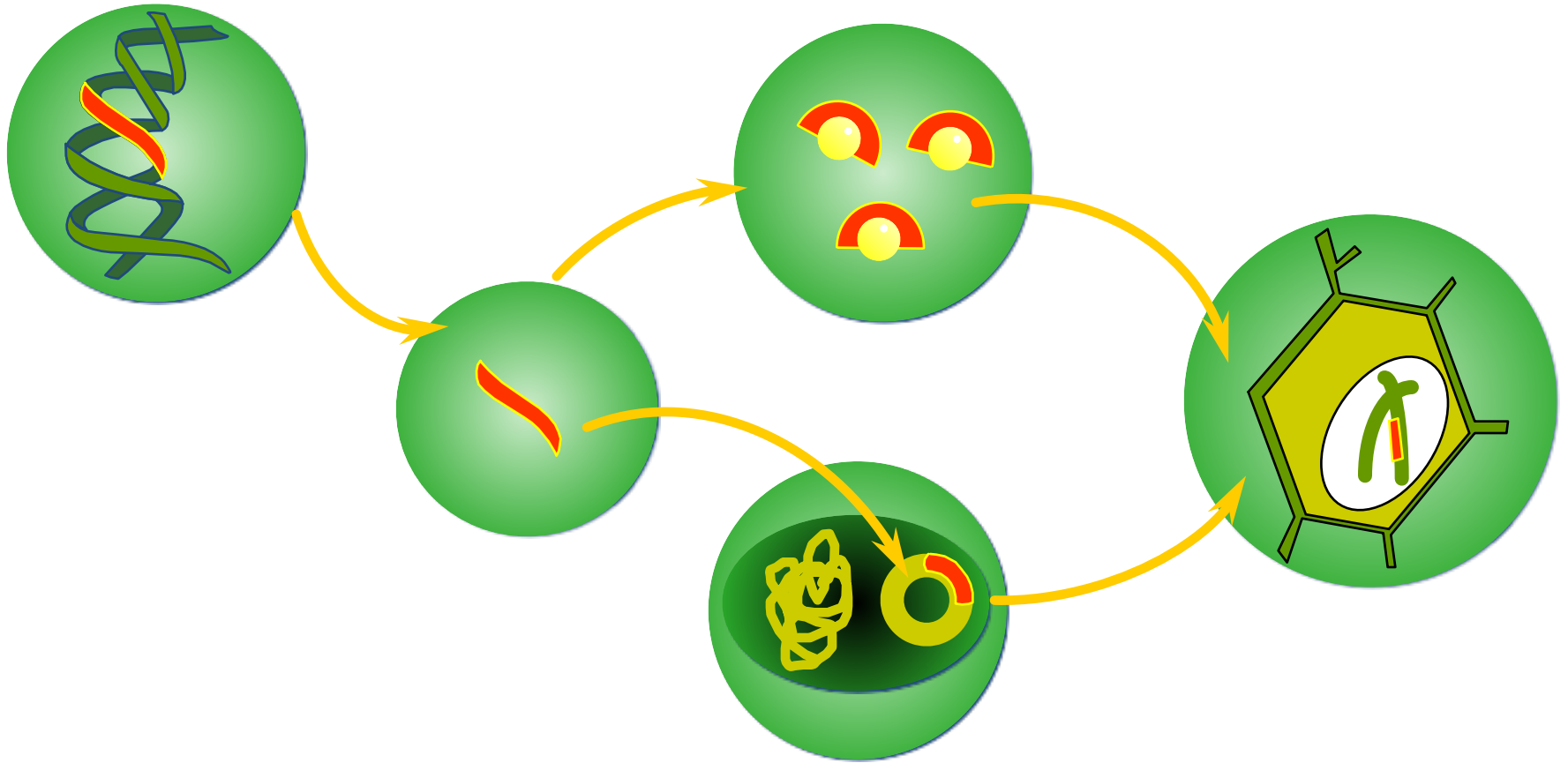
The history of corn production plot demonstrates the great strides we have made in producing more with less, and the opportunity we have to continue to “produce better” through tailored solutions that drive us toward our reduced environmental impact commitment while meeting the needs of a growing population on an increasingly hotter planet.

3ª Revolución verde: Los transgénicos

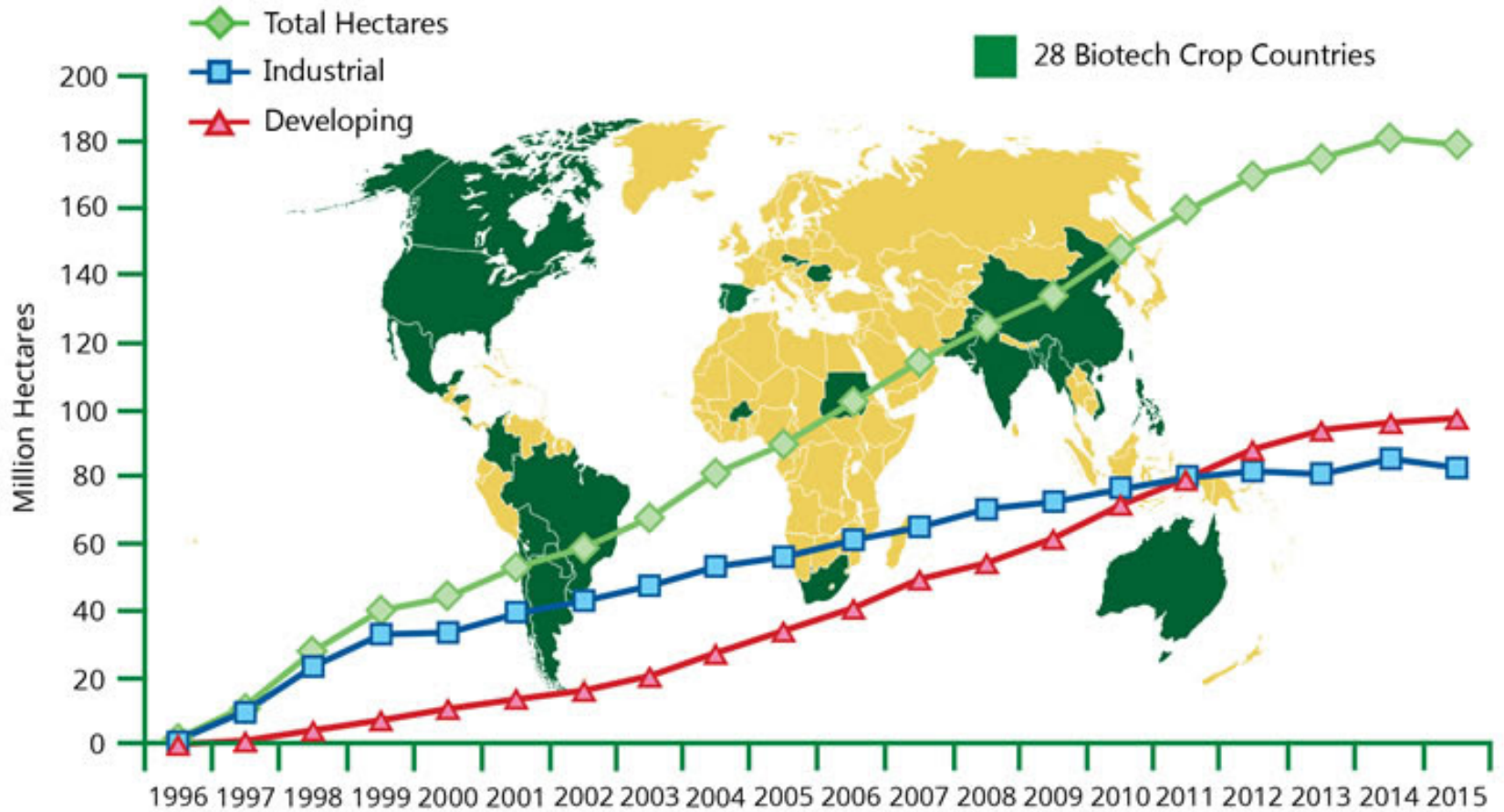


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Transferir genes: Un simple copia y pega.



GLOBAL AREA OF BIOTECH CROPS Million Hectares (1996-2015)



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.

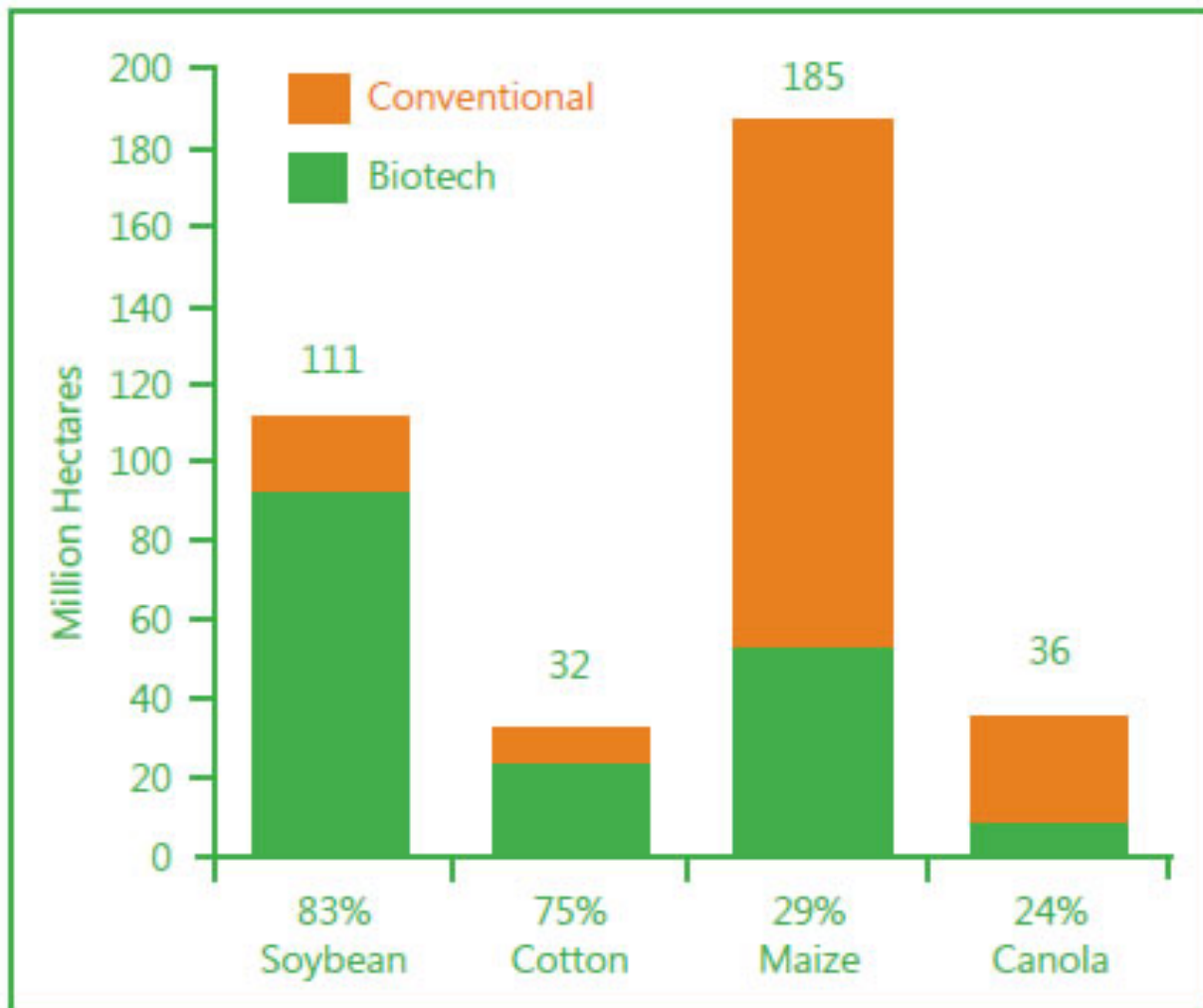


Figure 3. Biotech Crop Area as % of Global Area of Principal Crops, 2015 (Million Hectares)

Global Hectarages Data for 2015 (FAO, 2013)

Source: Compiled by Clive James, 2015.

¿qué impacto ha tenido esto en la viticultura?



En el mundo de la cerveza el panorama es un poco diferente

World's first GM lager: Could beer made from genetically modified wheat usher in a new era of GMO crop acceptance?

Carolina Millan, James Attwood, Jonathan Gilbert | Bloomberg | June 7, 2022



Craft beer is taking off in Argentina. It's a great place to grow wheat and hops Credit: Lesley Murphy

Argentina's Bioceres Crop Solutions Corp., the farm technology company that's trying to convince the world to eat genetically-modified wheat, is in talks with Buenos Aires craft beer maker Rabieta to brew the first-ever GM lager.

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The deals would come on the heels of a similar contract with confectioner Havanna as Bioceres seeks to go where no company has before by winning worldwide acceptance for gene-edited wheat.

While the vast majority of the world's soybean and corn crops are already GMOs, these are largely fed to

Una levadura modificada genéticamente produce aromas más intensos de lúpulo en la cerveza



Imagen: Genetic Literacy Project

La levadura genéticamente modificada produce intensos aromas a lúpulo en la cerveza y sin ningún efecto negativo en el proceso, según una investigación de la Universidad

Un detalle incómodo



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¿existe alguna forma de certificar que un cultivo o producción es sostenible?

Ahora mismo más que sostenibilidad tenemos etiquetas muy bonitas

- Muchos logos

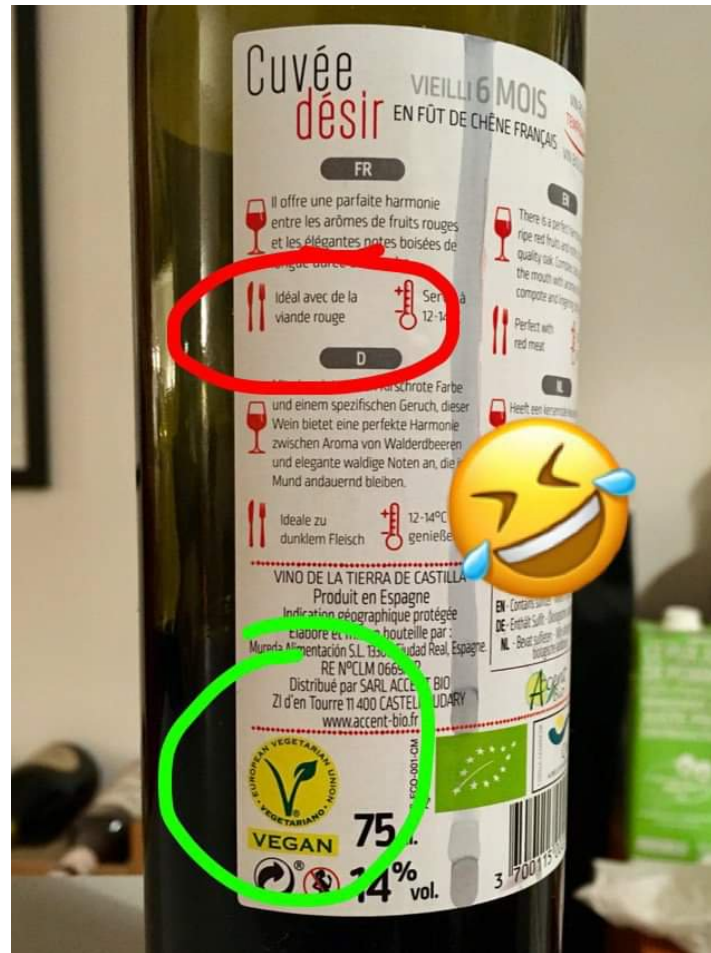


Logotipo retirado

Logotipo de la cadena ALDI

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Cuidado con el exceso de etiquetas





Una curiosidad

¿Hay alguna nota de cata que pueda distinguir si un vino es ecológico, biodinámico o convencional?

Único
Logotipo
oficial



Una simple operación matemática



+



=



Hasta el 2012 el vino ecológico no existía

- Solo se podía etiquetar como “vino procedente de uvas ecológicas”
- Otros productos como miel, cerveza o yogurt no se han incorporado al reglamento hasta el año 2020.

A efectos de
sostenibilidad:
La producción
ecológica tiene un
gran problema



Un día se acaba, pero ¿hay alternativa ecológica?

elDiario.es

Hazte socio/a

Inicia sesión



Investidura en Catalunya

Israel

Restricciones tras el estado de alarma

Así va la vacunación

+ Temas

La UE amplía el permiso para un pesticida de agricultura ecológica pese a su riesgo tóxico para la fauna

Los compuestos de cobre estarán permitidos por un año más, pese a que están en una lista de productos considerados "de especial preocupación para la salud pública o el medio ambiente"

La Autoridad Europea de Seguridad Alimentaria ha calificado su uso como de elevado riesgo para aves, mamíferos y organismos del suelo

"Hay zonas donde hemos abusado del uso del cobre y los niveles acumulados son demasiado altos", explica la investigadora Assumpció Anton



Foco

CRISIS CLIMÁTICA

El cobre a la larga es malo

Review > [Chemosphere](#). 2016 Nov;162:293-307. doi: 10.1016/j.chemosphere.2016.07.104. Epub 2016 Aug 16.

Copper accumulation in vineyard soils: Rhizosphere processes and agronomic practices to limit its toxicity

Gustavo Brunetto ¹, George Wellington Bastos de Melo ², Roberto Terzano ³, Daniele Del Buono ⁴, Stefania Astolfi ⁵, Nicola Tomasi ⁶, Youry Pii ⁷, Tanja Mimmo ⁸, Stefano Cesco ⁷

Affiliations + expand

PMID: 27513550 DOI: [10.1016/j.chemosphere.2016.07.104](#)

Abstract

Viticulture represents an important agricultural practice in many countries worldwide. Yet, the continuous use of fungicides has caused copper (Cu) accumulation in soils, which represent a major environmental and toxicological concern. Despite being an important micronutrient, Cu can be a potential toxicant at high concentrations since it may cause morphological, anatomical and physiological changes in plants, decreasing both food productivity and quality. Rhizosphere processes can, however, actively control the uptake and translocation of Cu in plants. In particular, root exudates affecting the chemical, physical and biological characteristics of the rhizosphere, might reduce the availability of Cu in the soil and hence its absorption. In addition, this review will aim at discussing the advantages and disadvantages of agronomic practices, such as liming, the use of pesticides, the application of organic matter, biochar and coal fly ashes, the inoculation with bacteria and/or mycorrhizal fungi and the intercropping, in alleviating Cu toxicity symptoms.

Keywords: Copper; Cu toxicity; Rhizosphere processes; Vineyard soils.

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> [Sci Total Environ](#). 2018 Mar;616-617:796-804. doi: 10.1016/j.scitotenv.2017.10.243. Epub 2017 Oct 28.

Modeling ecotoxicity impacts in vineyard production: Addressing spatial differentiation for copper fungicides

Nancy Peña ¹, Assumpció Antón ², Andreas Kamilaris ², Peter Fantke ³

Affiliations + expand

PMID: 29089133 DOI: [10.1016/j.scitotenv.2017.10.243](#)

Abstract

Application of plant protection products (PPP) is a fundamental practice for viticulture. Life Cycle Assessment (LCA) has proved to be a useful tool to assess the environmental performance of agricultural production, where including toxicity-related impacts for PPP use is still associated with methodological limitations, especially for inorganic (i.e. metal-based) pesticides. Downy mildew is one of the most severe diseases for vineyard production. For disease control, copper-based fungicides are the most effective and used PPP in both conventional and organic viticulture. This study aims to improve the toxicity-related characterization of copper-based fungicides (Cu) for LCA studies. Potential freshwater ecotoxicity impacts of 12 active ingredients used to control downy mildew in European vineyards were quantified and compared. Soil ecotoxicity impacts were calculated for specific soil chemistries and textures. To introduce spatial differentiation for Cu in freshwater and soil ecotoxicity characterization, we used 7 European water archetypes and a set of 15,034 non-calcareous vineyard soils for 4 agricultural scenarios. Cu ranked as the most impacting substance for potential freshwater ecotoxicity among the 12 studied active ingredients. With the inclusion of spatial differentiation, Cu toxicity potentials vary 3 orders of magnitude, making variation according to water archetypes potentially relevant. In the case of non-calcareous soils ecotoxicity characterization, the variability of Cu impacts in different receiving environments is about 2 orders of magnitude. Our results show that Cu potential toxicity depends mainly on its capacity to interact with the emission site, and the dynamics of this interaction (speciation). These results represent a better approximation to understand Cu potential toxicity impact profiles, assisting decision makers to better understand copper behavior concerning the receiving environment and therefore how restrictions on the use of copper-based fungicides should be considered in relation to the emission site.

¿Entendéis el interés de la viticultura francesa por promocionar el nuevo logo y cargar sobre los sulfitos?

Le vin : jus de raisin fermenté

Conventionnel



Produits et pratiques autorisés

SO₂ total admis (mg/l)
Rouge - Blanc **150 - 200**

Bio



SO₂ total admis (mg/l)
Rouge - Blanc **100 - 150**

Biodynamie



SO₂ total admis (mg/l)
Rouge - Blanc **70 - 90**

Source : <http://www.vignevin.com/pratiques-oenol/>

Naturel



Vin Méthode Nature

Vin Méthode Nature <30mg/L
SO₂ < 30

Vin Méthode Nature
Traces*

Labellisation par cuvée (contrôles systématiques)

Association des Vins Naturels

Traces*

Sur au moins 80% du volume de production

Vins S.A.I.N.S**

Traces*

Sur toute l'exploitation, Toutes les années

Lien vers les différents cahier des charges des Vins Nature
<https://www.vinsnaturels.fr/vin-nature.php>

*** Seuls sont présents les sulfites naturels ** Sans Aucun Inurant Ni Sulfite ajouté**

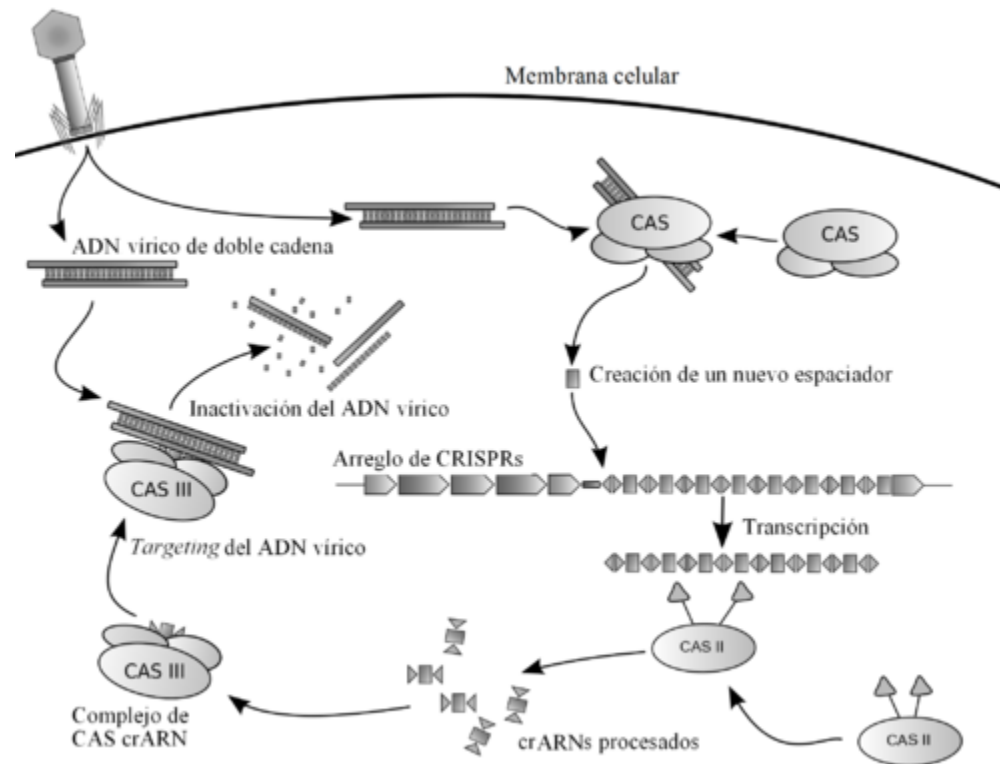
Problemas que afrontamos:

- Clima cambiante.
- Aumento de plagas.
- Estrategia from farm to the fork.
- No se puede solucionar todo tirando cobre.

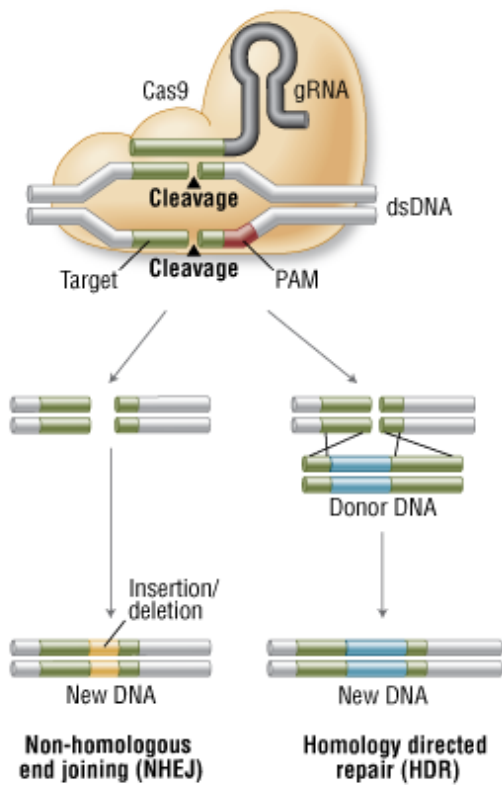
Y ahora tenemos el CRISPR



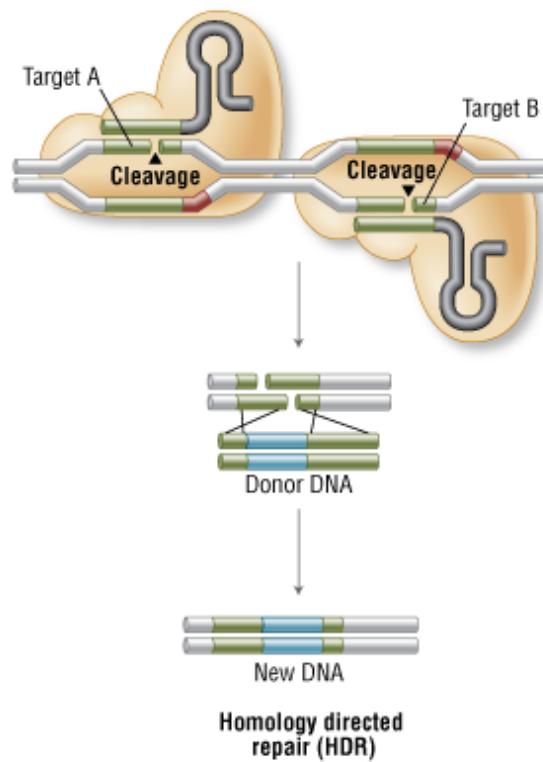
clustered regularly interspaced short palindromic repeats



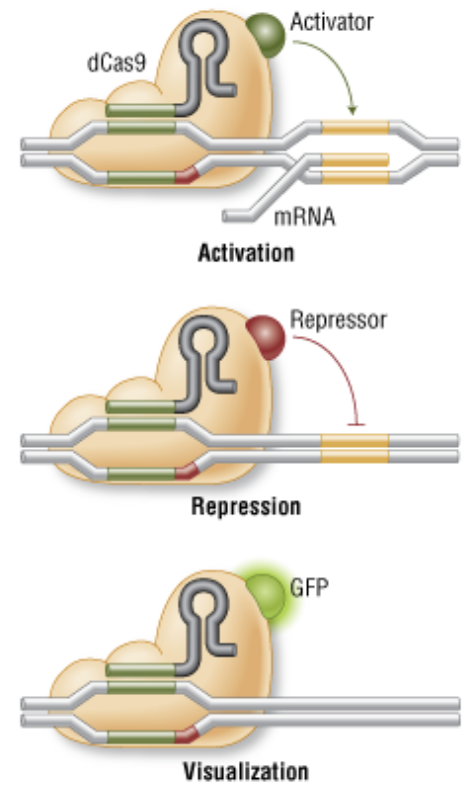
A. Genome Engineering With Cas9 Nuclease



B. Genome Engineering By Double Nicking With Paired Cas9 Nickases



C. Localization With Defective Cas9 Nuclease



En USA no se consideran transgénicos

The screenshot shows the Nature Biotechnology website interface. The top navigation bar includes links for Home, News & Comment, Research, Careers & Jobs, Current Issue, and Archive. The main content area features two news articles. The left article is titled "Gene-edited CRISPR mushroom escapes US regulation" and discusses a fungus modified with CRISPR-Cas9. The right article is titled "CRISPR-edited crops free to enter market, skip regulation" and mentions DuPont Pioneer's high amylopectin corn. Both articles include author names, publication details, and interactive buttons for PDF, Citation, Reprints, Rights & permissions, and Article metrics. Images of mushrooms and corn are included below the respective articles.

nature International weekly journal of science
nature biotechnology

Home | News & Comment | Research | Careers & Jobs | Current Issue | Arch | Home | Current Issue | News & comment | Research | Archive | Authors & ref
Archive > Volume 532 > Issue 7599 > News > Article | home - archive - issue - news - full text


NATURE | NEWS | NATURE BIOTECHNOLOGY | NEWS

Gene-edited CRISPR mushroom escapes US regulation

A fungus engineered with the CRISPR-Cas9 technique can be cultivated and sold without further oversight.

Emily Waltz
14 April 2016

PDF | Rights & Permissions




Jose A. Bernal Baceta/Getty Images

The common white button mushroom (*Agaricus bisporus*) has been modified to resist browning.

CRISPR-edited crops free to enter market, skip regulation

Emily Waltz
Nature Biotechnology 34, 582 (2016) | doi:10.1038/nbt0616-582
Published online 09 June 2016

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Article metrics

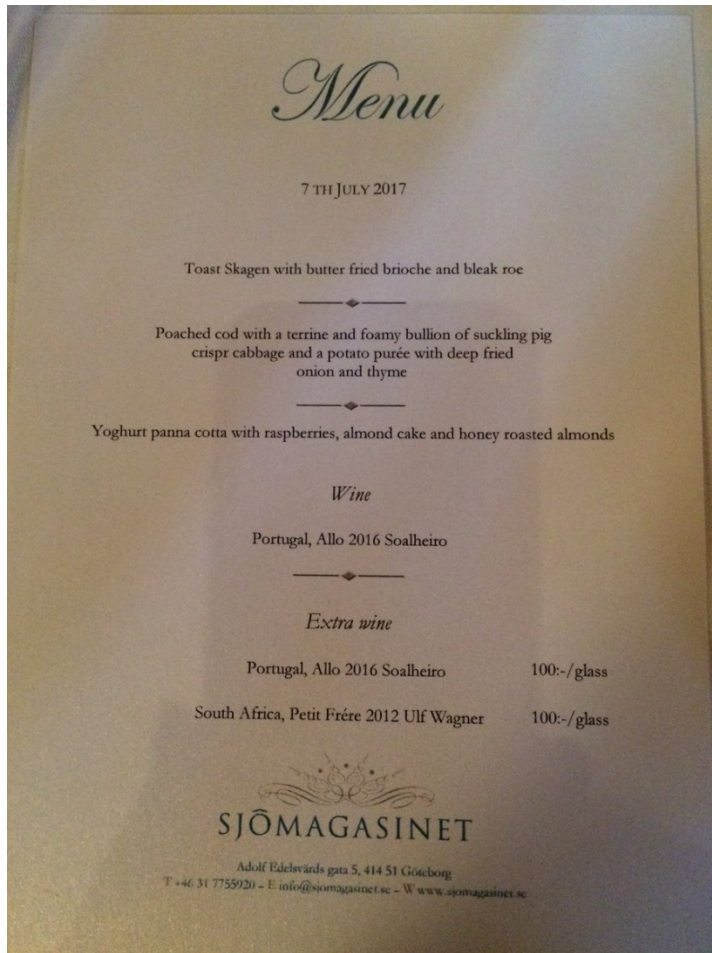


© Dinodia Photos / Alamy Stock Photo

DuPont Pioneer's high amylopectin corn is the first CRISPR-edited plant likely to bypass USDA oversight.

twitter: @jmmulet

Esto ya está aquí...



twitter: @jmmulet

Ya existen tomates comercializados

Ensaladas que reducen la presión arterial: salen a la venta los primeros tomates editados genéticamente con CRISPR

Andrea Núñez-Torrón Stock 28 sep. 2021 13:30h.



twitter: @jmmulet

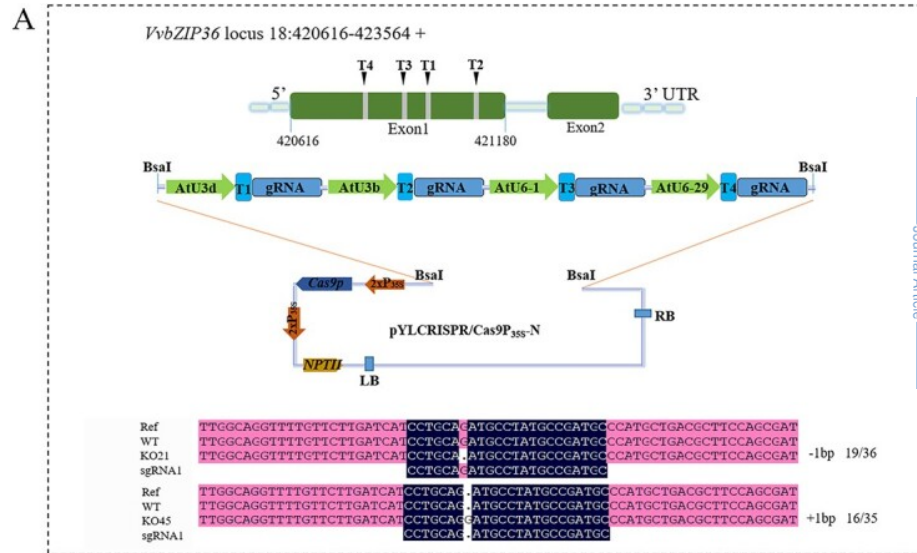
Advertisement for Nescafé Dolce Gusto coffee with milk. The ad features the Nescafé Dolce Gusto logo at the top, followed by the text "TU COFFEE SHOP EN CASA" and "CAFÉ CON LECHE X6". The price is listed as "22.98€". Below the text, there is an image of a box of Nescafé Dolce Gusto coffee with milk.

NBT

- New breeding techniques
- Zinc finger nuclease; TALENs, and CRISPR/Cas Tools)
- 'oligonucleotide-directed mutagenesis' (ODM)).
- cisgenesis
- Intragenesis o gene shuffling.
- Epigenetic modification.
- Grafting of unaltered plant onto a genetically modified rootstock.

¿Qué se ha hecho en viña?

- Una búsqueda de “crispr-cas9 grapevine” en una base de datos científica da 23 resultados desde el 2016 (esto va rápido).
- Modificaciones en el desarrollo (ramas laterales forma del racimo).
- Resistencia (Xylella, Mildiu y Botritys).
- Resistencia a sequía y frío y acumulación de antocianos.



Hortic Res. 2022; 9: uhac022.

Published online 2022 Feb 20. doi: [10.1093/hr/uhac022](https://doi.org/10.1093/hr/uhac022)

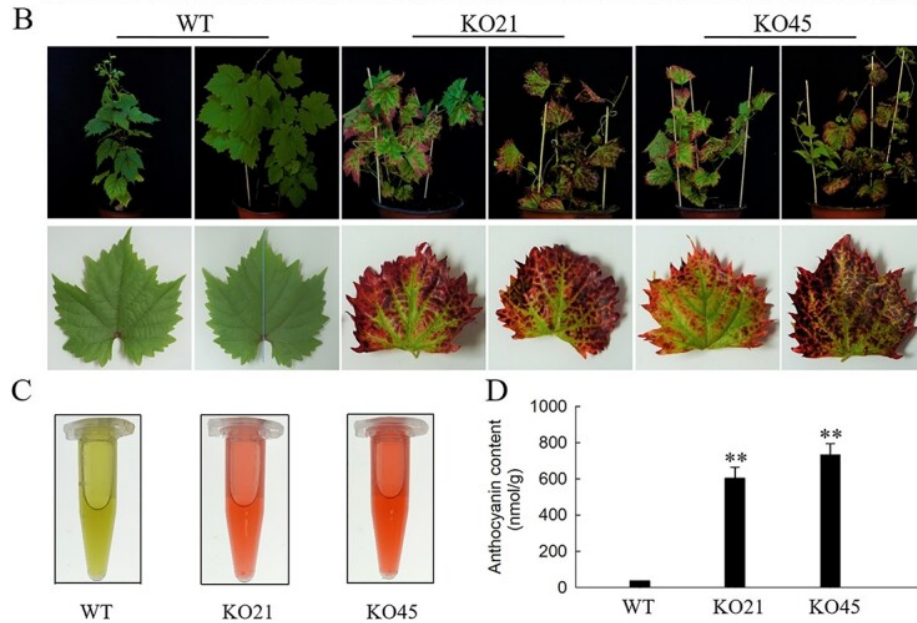
PMCID: PMC9174745

PMID: 35184164

CRISPR/Cas9-mediated mutagenesis of *VvbZIP36* promotes anthocyanin accumulation in grapevine (*Vitis vinifera*)

Mingxing Tu, Jinghao Fang, Ruikang Zhao, Xingyu Liu, Wuchen Yin, Ya Wang, Xianhang Wang,[✉] Xiping Wang,[✉] and Yulin Fang[✉]

► Author information ► Article notes ► Copyright and License information ► [PMC Disclaimer](#)



Crimson S.



Line	wt	D39	M50	O79
Genotype		<i>dmr6-1</i>	<i>dmr6-2</i>	<i>dmr6-1_2</i>

Front Plant Sci. 2023; 14: 1242240.

Published online 2023 Aug 21. doi: [10.3389/fpls.2023.1242240](https://doi.org/10.3389/fpls.2023.1242240)

PMCID: PMC10486898

PMID: [37692430](https://pubmed.ncbi.nlm.nih.gov/37692430/)

Simultaneous editing of two *DMR6* genes in grapevine results in reduced susceptibility to downy mildew

Lisa Giacomelli,¹ Tieme Zeilmaker,² Oscar Giovannini,¹ Umberto Salvagnin,¹ † Domenico Masuero,¹ Pietro Franceschi,¹ Urska Vrhovsek,¹ Simone Scintilla,¹ † Jeroen Rouppé van der Voort,² and Claudio Moser¹

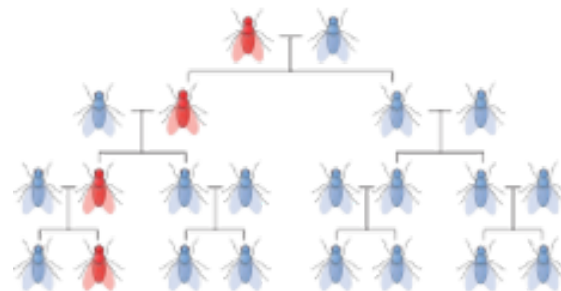
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Journal Article

Aplicaciones de ciencia ficción

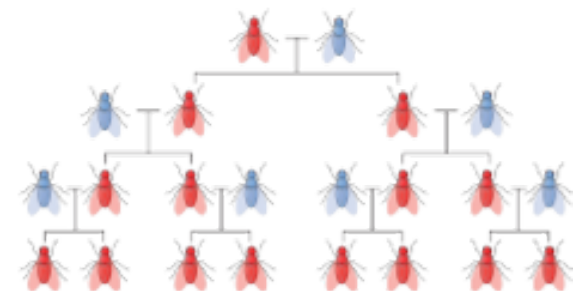


Normal inheritance



Altered gene does not spread

Gene drive inheritance



Altered gene is always inherited

J. M. MULET

COMEMOS LO QUE SOMOS



Cómo la cultura
y la sociedad
han modificado
la comida

DESTINO

¡¡¡Gracias!!!

- Si tenéis ganas de más:
- <http://jmmulet.naukas.com>
- @jmmulet