IPKey

AMÉRICA LATINA

Desafíos para lograr una efectiva observancia de los derechos de obtentores vegetales

Perspectiva desde el Sector Académico

QUITO, ECUADOR – 6 Y 7 DE FEBRERO 2020

Dr. Miguel Rapela
Director Académico CPI Universidad Austral
Director Vinculación Plataforma Genómica UBATEC

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Desafíos no resueltos de los últimos 20 años

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Coexistencia de Derechos

VARIEDAD

GERMOPLASMA

DOV

Expresión del Germoplasma

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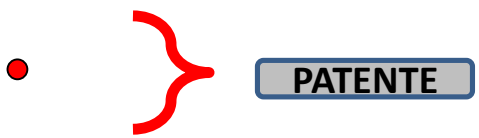
Coexistencia de Derechos

CG



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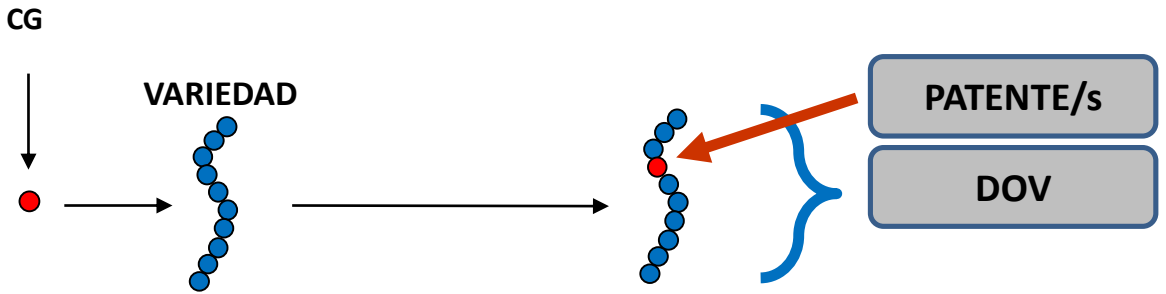
Coexistencia de Derechos



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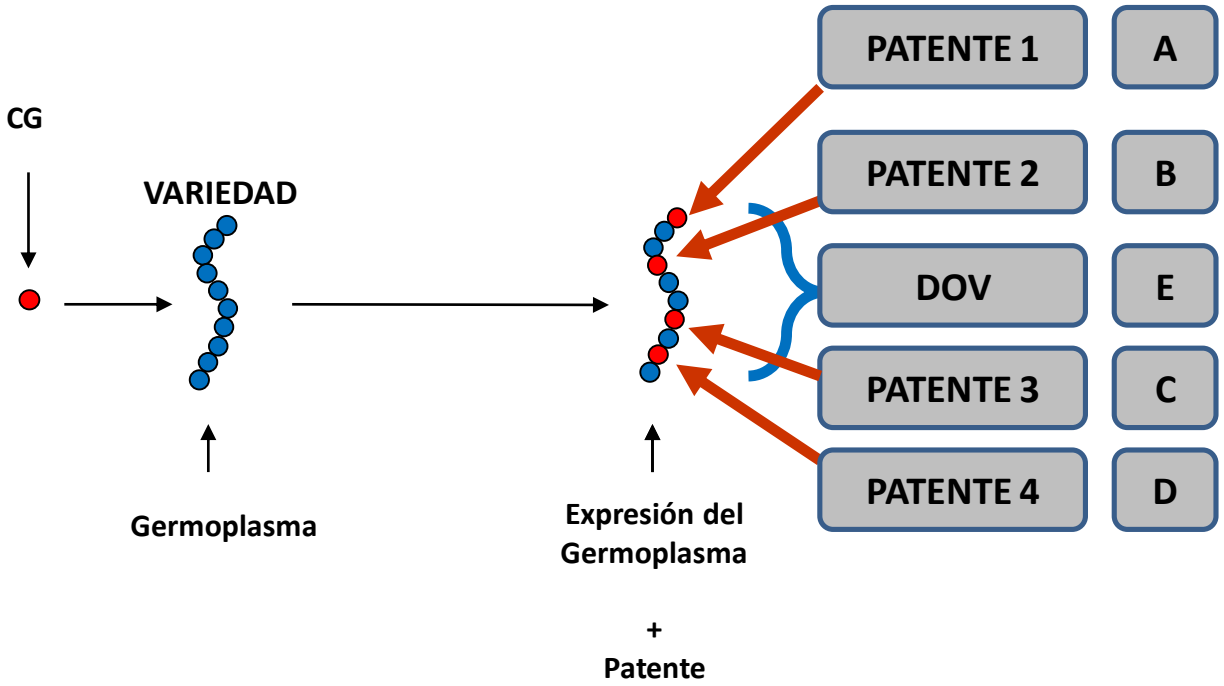
Coexistencia de Derechos



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Desafíos presentes … tampoco resueltos

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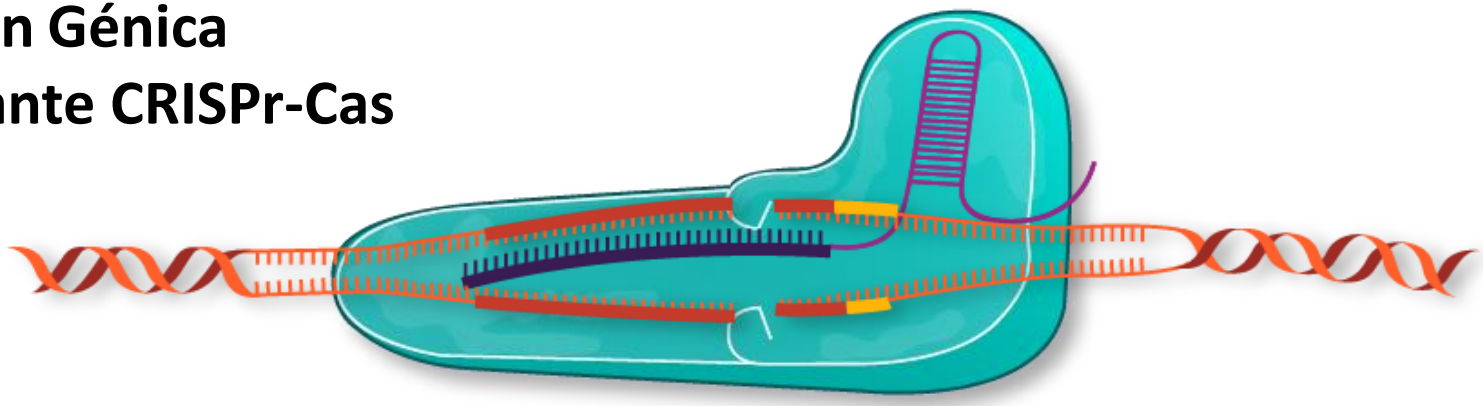
Coexistencia de Derechos

Edición Génica mediante CRISPr-Cas



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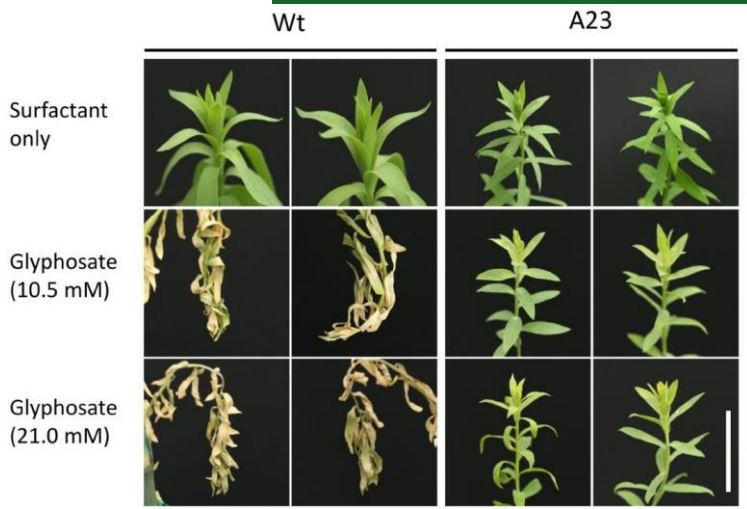
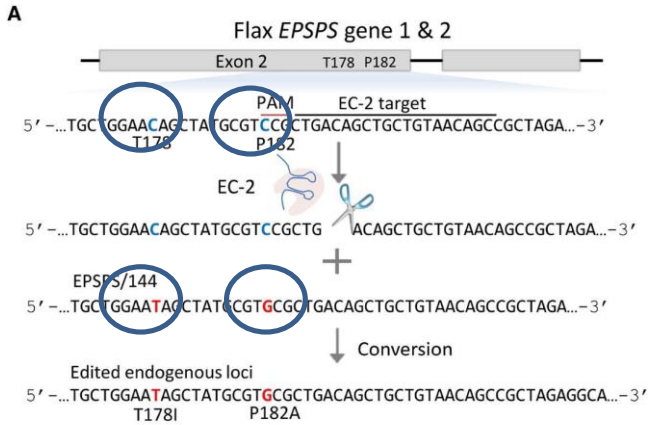
Caso #1





Oligonucleotide-mediated genome editing provides precision and function to engineered nucleases and antibiotics in plants

Noel J Sauer (nsauer@cibus.com), Javier Narváez-Vásquez (jnarvaez@cibus.com), Jerry Mozoruk (jmozoruk@cibus.com), Ryan B Miller (rmiller@cibus.com), Zachary J Warburg (zwarburg@cibus.com), Melody J Woodward (mwoodward@cibus.com), Yohannes A Mihiret (ymihiret@cibus.com), Tracey A Lincoln (tlincoln@cibus.com), Rosa E Segami (rsegami@cibus.com), Steven L Sanders (ssanders@cibus.com), Keith A Walker (kwalker@cibus.com), Peter R Beetham (pbeetham@cibus.com), Christian R Schöpke (cschopke@cibus.com) and Greg FW Gocal (ggocal@cibus.com)

Plant Physiology. February 10, 2016

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Caso #1

Compañía A

Compañía C

Variedad 3
No Transgénica
CRISPR-Cas9
Tol. glfosato

Variedad 1
Convencional

¿Definición de Variedad?

Compañía B

Variedad 2
Transgénica
Tol. glfosato

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Caso #2

Zachary Lippman en el Cold Spring Harbor Laboratory de los Estados Unidos analizó una colección de 4.193 variedades silvestres de tomate, buscando aquellos con patrones de ramificación inusuales, identificando genes de elevada aptitud comercial (Lippman y col, 2008).

Con estos genes descubiertos, usaron CRISPR-Cas9 para editar una variedad de tomate comercial, generando una gama de arquitecturas en la planta, desde largas y delgadas ramas con racimos de flores, hasta tupidos ramitos de flores con una arquitectura similar a la coliflor; incluyendo algunos con rendimientos mejorados (Soyk y col, 2017). En otros términos, para este desarrollo, no se hizo uso ni se tomó acceso físico al material que conforma el recurso genético, sino solo información del mismo. **DEMATERIALIZACIÓN**

GENETICS

CRISPR editing seeks the perfect tomato

Geneticists correct harmful interaction of two desirable plant mutations.

BY HEIDI LEDFORD

From giant fruit to compact plants, today's tomatoes have been sculpted by thousands of years of breeding. But mutations linked to prized traits — including one that made the fruit easier to harvest — yield an undesirable plant when combined, geneticists have found.

It is a rare example of a gene harnessed during domestication that later hampered crop-improvement efforts, says geneticist Zachary Lippman of Cold Spring Harbor Laboratory in New York. After identifying the mutations, he and his colleagues used CRISPR gene editing to engineer more-productive plants — a strategy that plant breeders are eager to adopt.

"It's pretty exciting," says Rod Wing, a plant geneticist at the University of Arizona in Tucson. "The approach can be applied to crop improvement, not just in tomato, but in all crops."

Tomatoes have been bred for thousands of years.

PHILIPPE HUGUEN/AFP/GETTY

Lippman knows his way around a tomato farm. As a teenager, he spent his summers picking the fruit by hand — a chore he hated. "Rotten tomatoes. The smell lasts all day long," he says. "I would always pray for rain on tomato-harvest day."

But years later, his interest in the genetics that control a plant's shape led him back to tomato fields, to untangle the genetic changes that breeders had unknowingly made.

In the 1950s, researchers found a new trait in a wild relative of tomatoes growing in the Galapagos Islands: it lacked the swollen part of the stem called the joint.

Joints are weak regions of the stem that allow fruit to drop off the plant. Wild plants benefit from dropping fruit because it helps seed dispersal. But with the advent of mechanical tomato pickers, farmers wanted their fruit

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Lippman ZB, Cohen O, Alvarez JP, Abu-Abied M, Pekker I, Paran I, et al. (2008) The Making of a Compound Inflorescence in Tomato and Related Nightshades. PLoS Biol 6(11): e288. https://doi.org/10.1371/journal.pbio.0060288

Soyk S, Lemmon ZH, Oved M, Fisher J, Liberatore KL, Park SJ, Goren A, Jiang K, Ramos A, van der Knaap E, van Eck J, Zamir D, Eshed Y, Lippman ZB (2017). Bypassing Negative Epistasis on Yield in Tomato Imposed by a Domestication Gene. Cell DOI: http://dx.doi.org/10.1016/j.cell.2017.04.032

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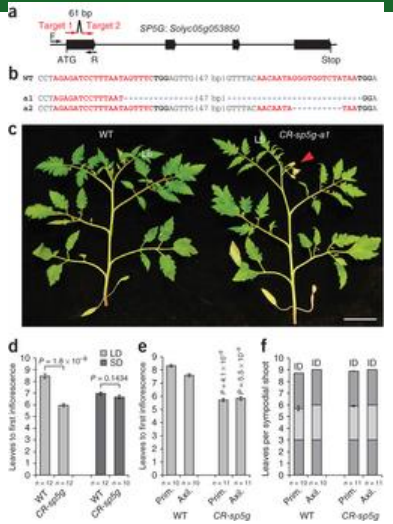
Caso #2

Variedad 1

Edición génica a partir de información sobre un RRGG



Información genética

Silvestre

¿Se hizo utilización del recurso genético?

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Caso #3

TOMATE

Domesticación

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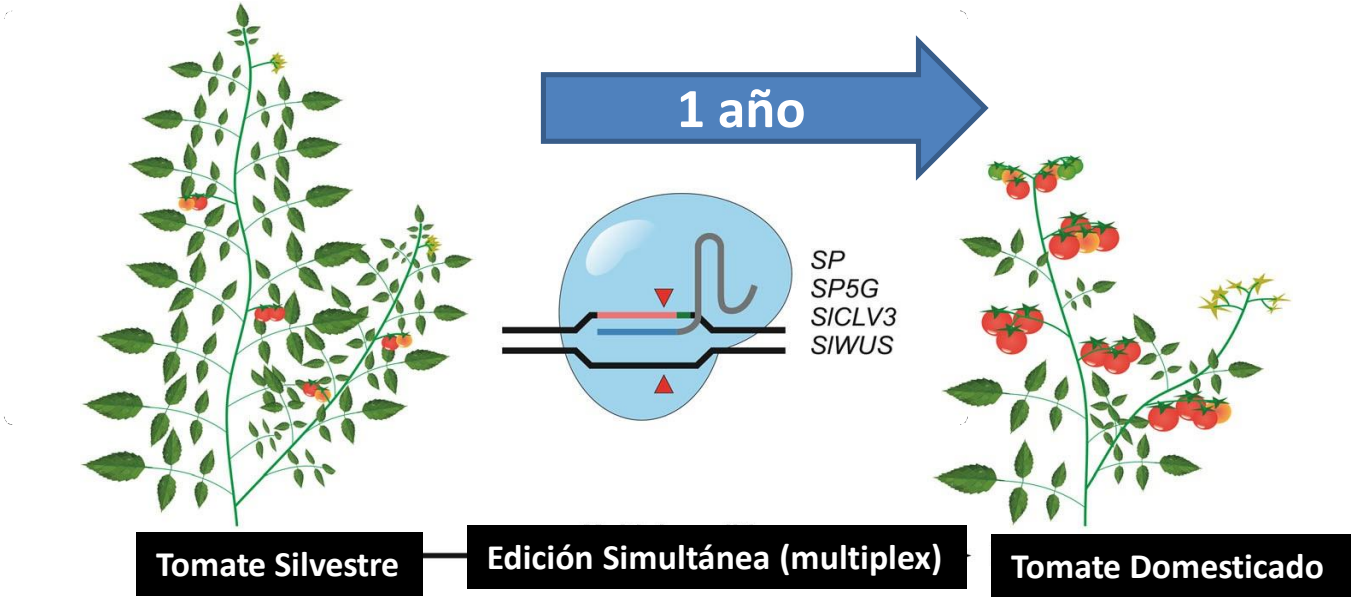
Caso #3

2018

Domesticación acelerada



Edición Génica simultánea de 4 genes involucrados en: 1) arquitectura de planta (SP); 2) días a floración (SP5G); 3) tamaño del fruto (SCLV3); 4) tamaño del fruto (SIWUS).

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Li T, Yang X, Yu Y, Si X, Zhai X, Zhang H, et al. Domestication of wild tomato is accelerated by genome editing. Nat Biotechnol. 2018. https://doi. org/10.1038/nbt.4273

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Futuros Desafíos

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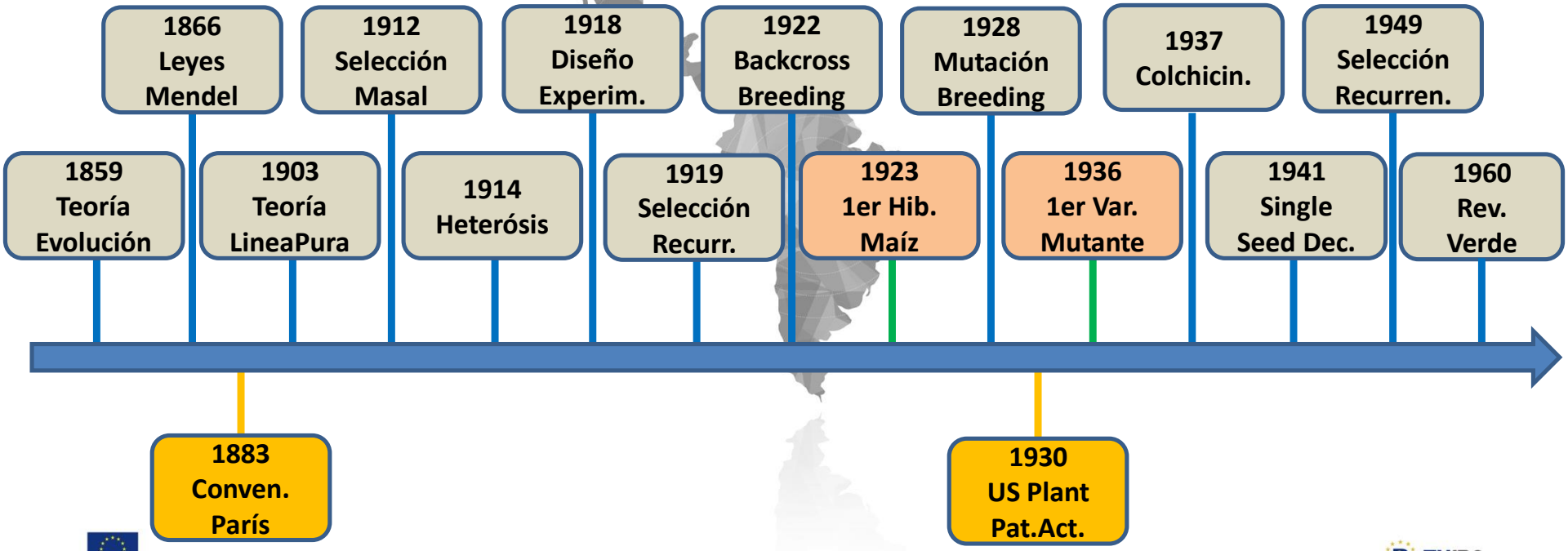
Línea de tiempo



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Línea de tiempo

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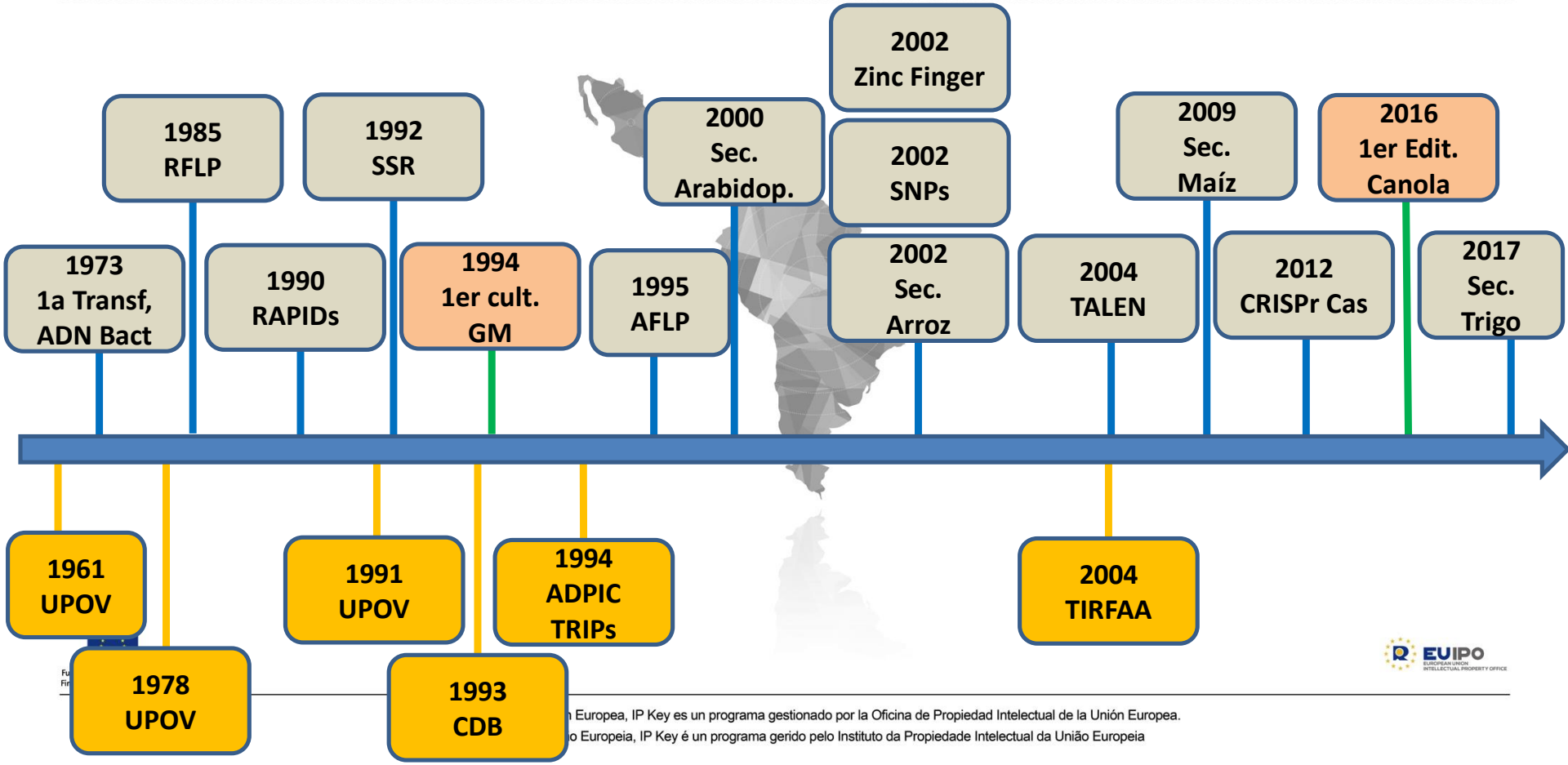

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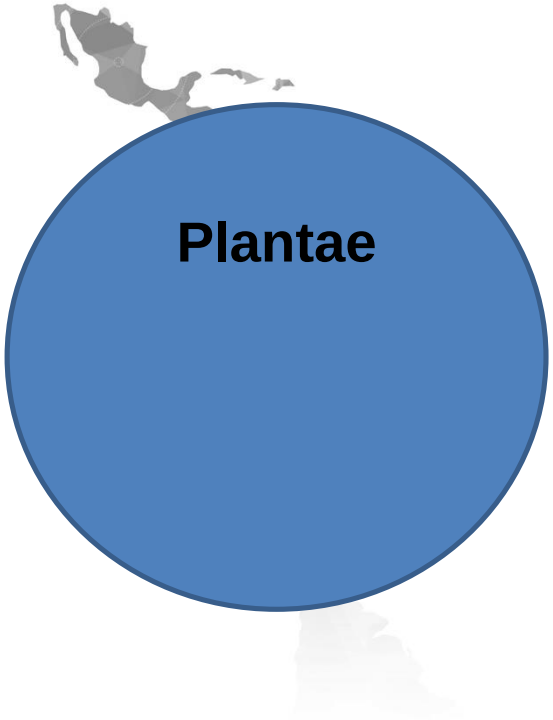

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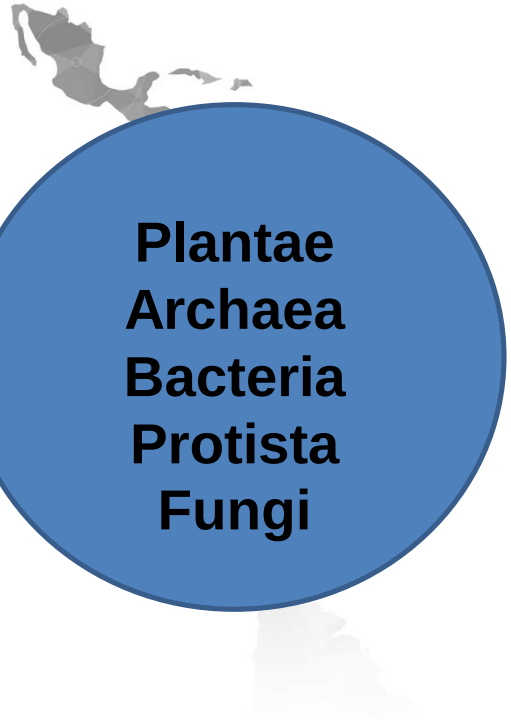

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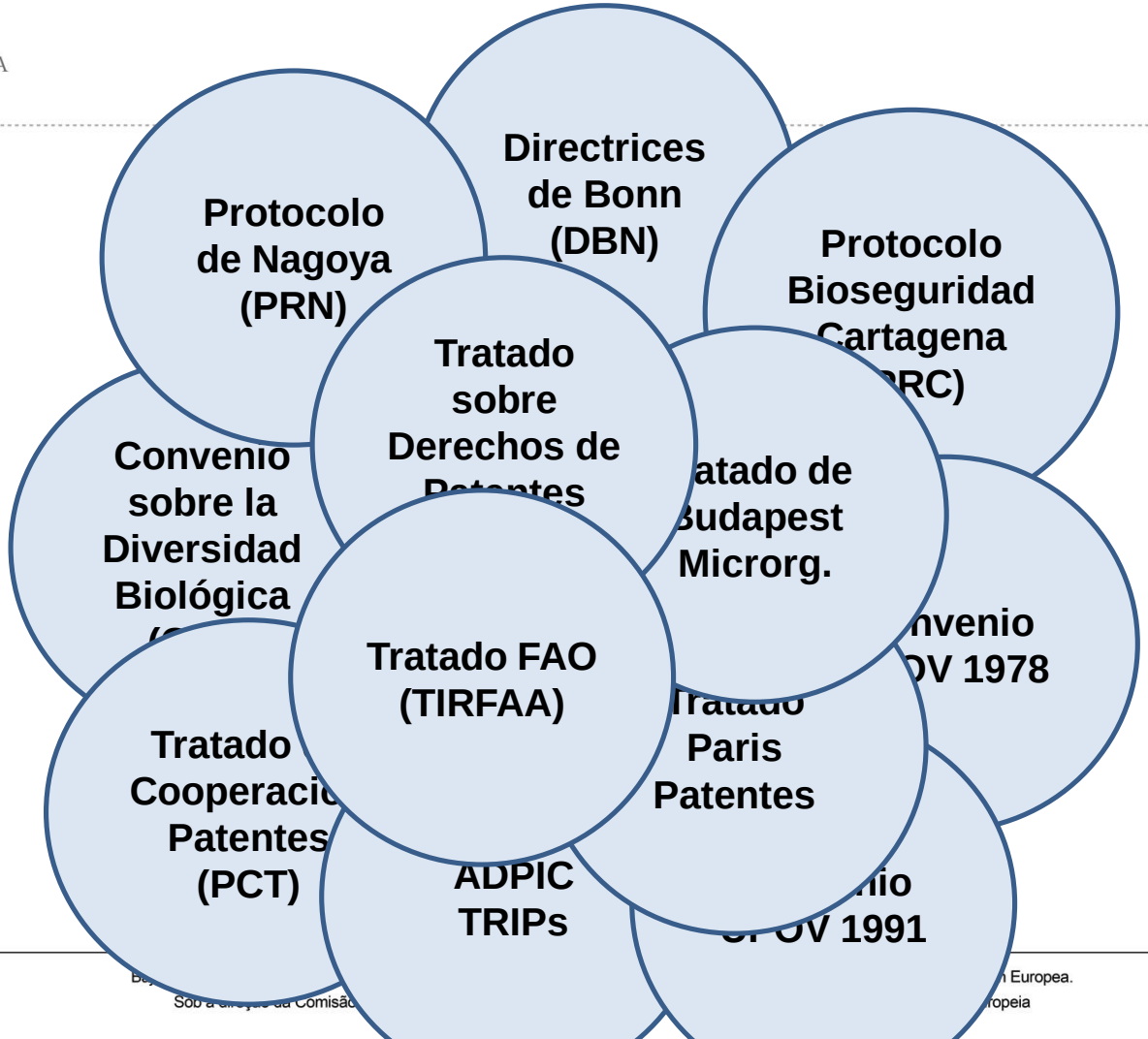

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Directrices de Bonn (DBN)

Protocolo de Nagoya (PRN)

Tratado de Budapest Microrg.

Tratado sobre Derechos de Patentes (TDP)

Convenio sobre la Diversidad Biológica (CDB)

Tratado de Cooperación Patentes (PCT)

Plantae
Archaea
Bacteria
Protista
Fungi

ADPIC TRIPs

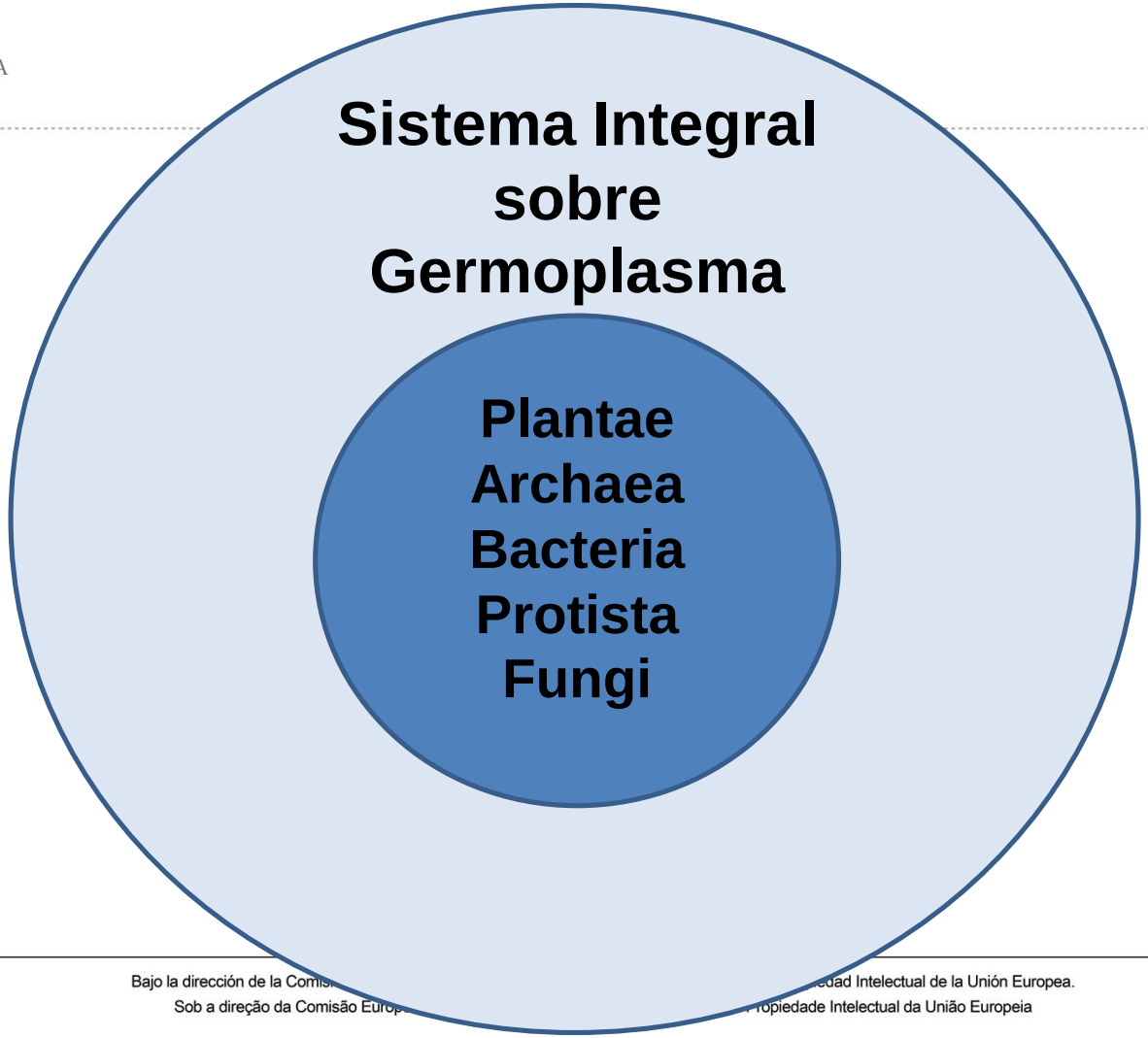
Convenio UPOV 1978

Tratado FAO (TIRFAA)

Tratado Paris Patentes

Protocolo Bioseguridad Cartagena (PRC)

Convenio UPOV 1991



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Gracias

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