Think green.
Make it in plants

Jornadas Ecoinnovación en el sector químico de la Comunitat Valenciana
Innotransfer UPV-enero 2024

ibmcp
Instituto de Biología Molecular y Celular de Plantas

CSIC
Consejo Superior de Investigaciones Científicas

Ingeniería genética en plantas para la producción de compuestos de interés

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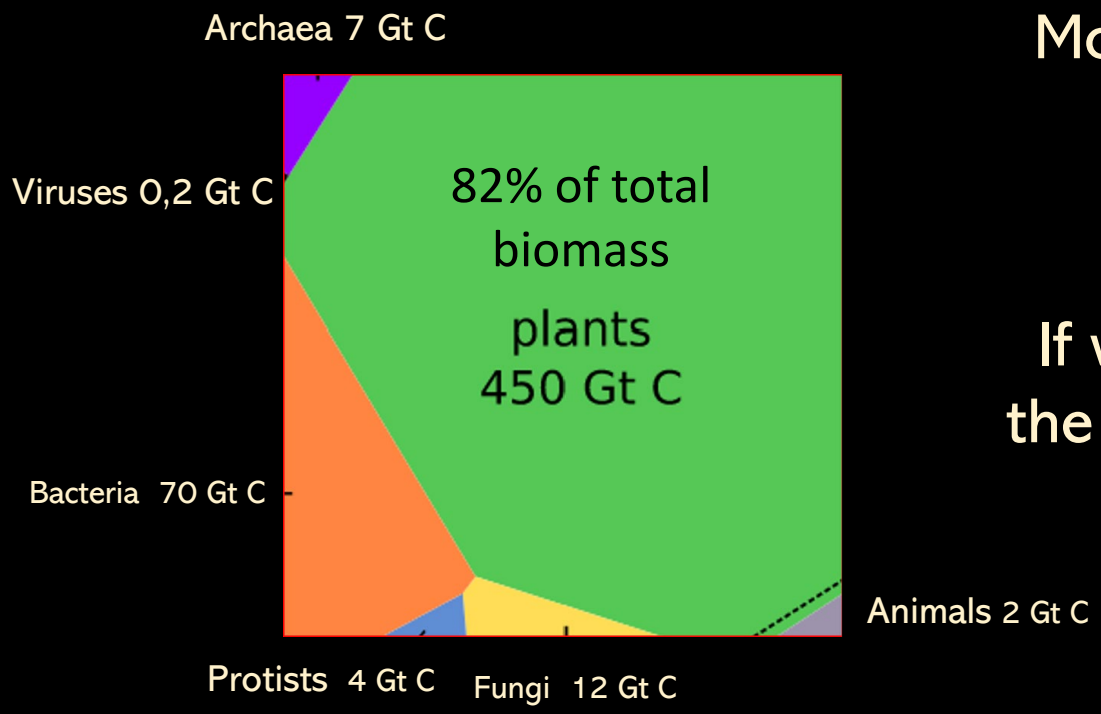
Plant SynBio lab/Plant Genomics and Biotech Group

Plants as bioproduction chassis: the natural decision

Plants are sustainable biofactories by nature



Modern civilizations are conspicuous consumers of bioproducts

If we make **plants** produce the goods the world needs, we will make a better world

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Tobacco plants as safe green biofactories

Field trials

CRISPR tobacco Badajoz 2021

newcotiana

GoldenBraid

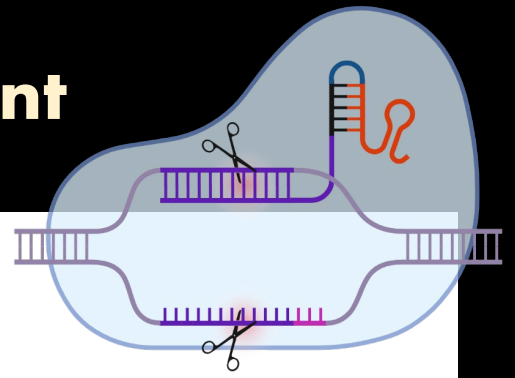
A Lego-like technology to engineering genetically augmented tobacco

GB

>1500K standard genetic elements

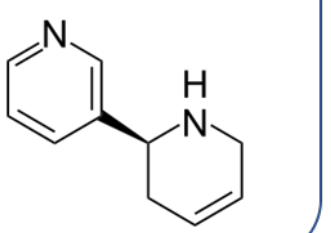
CRISPR-Cas tools

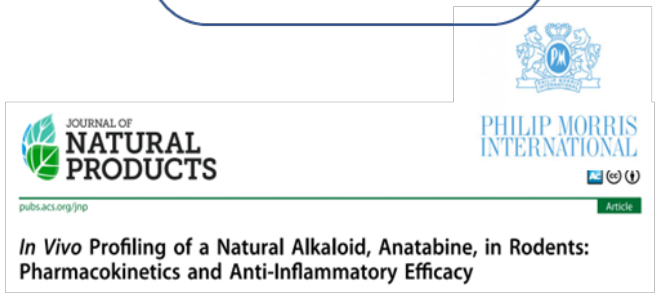
Complex gene editing for biochemical enrichment

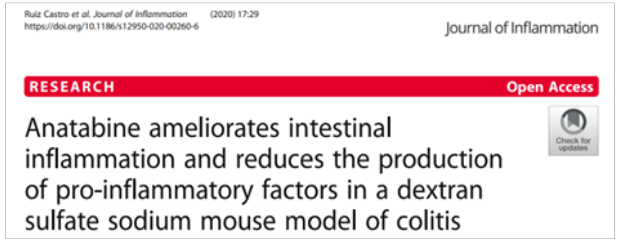


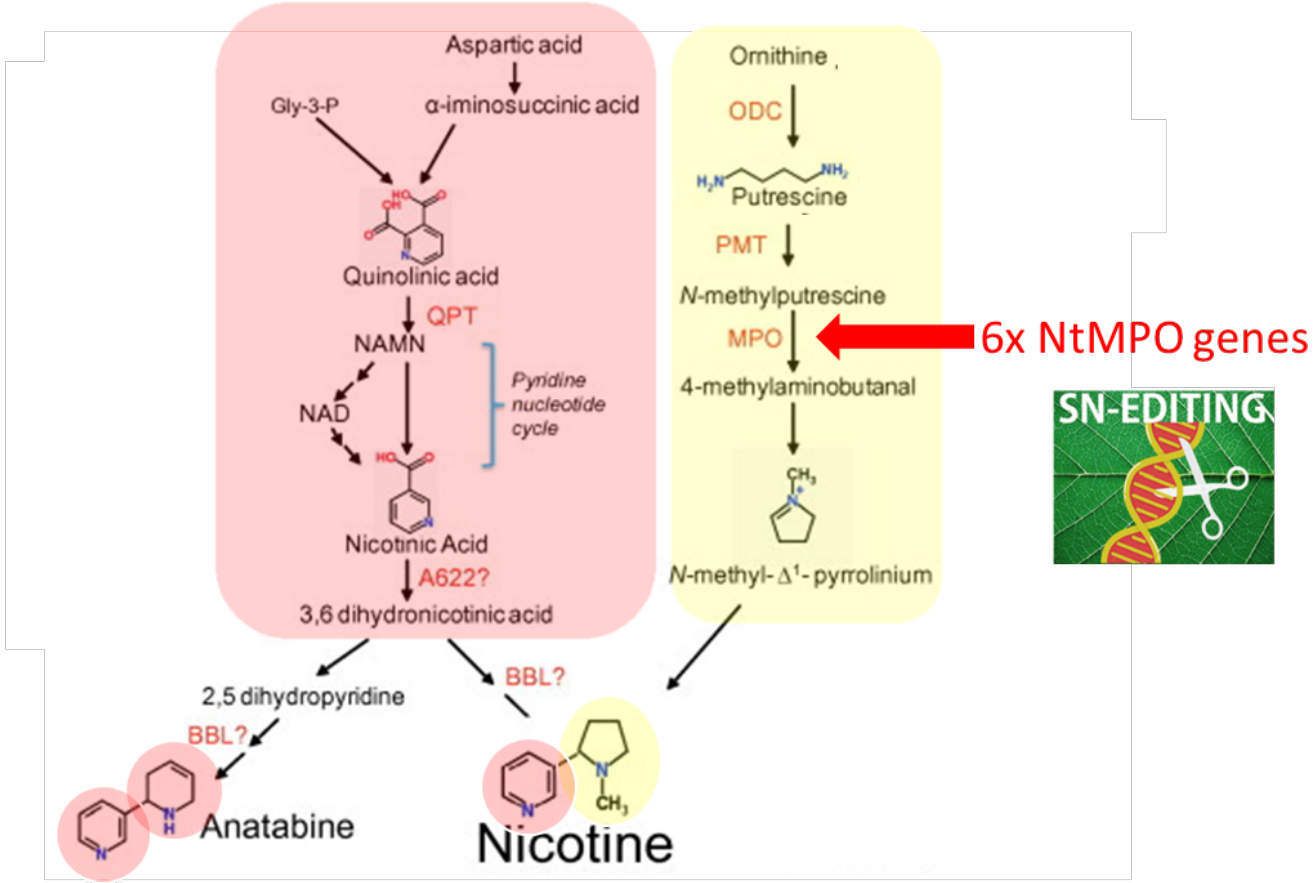
Engineering low nicotine/high anatabine lines

Anatabine



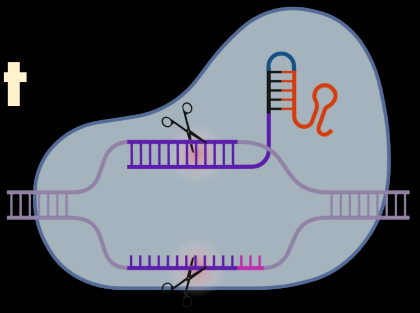


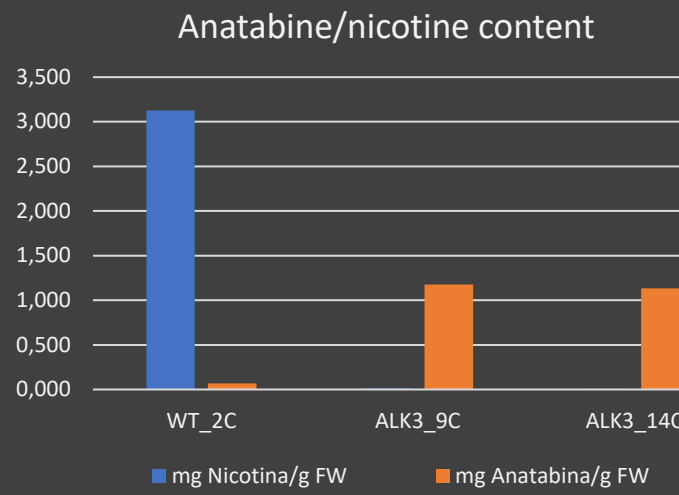




Complex gene editing for biofactory improvement

newcotiana

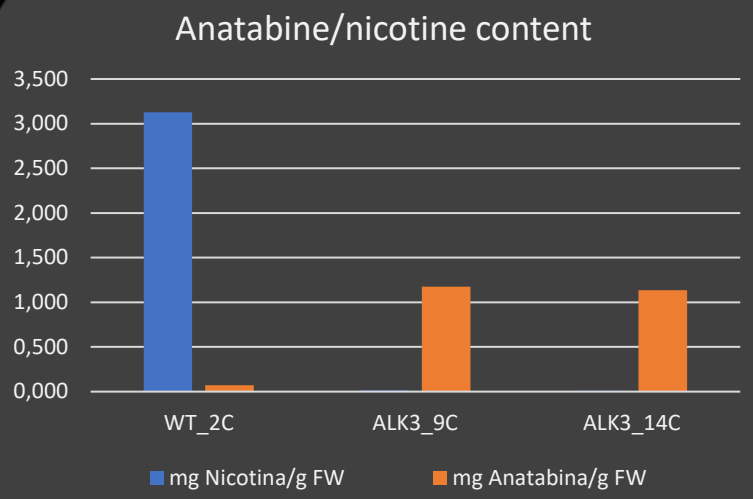




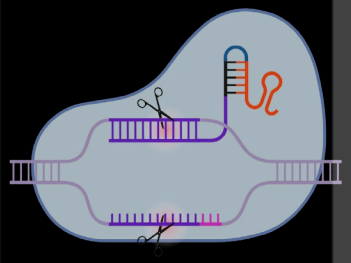
6 KO genes

Complex gene editing for biofactory improvement

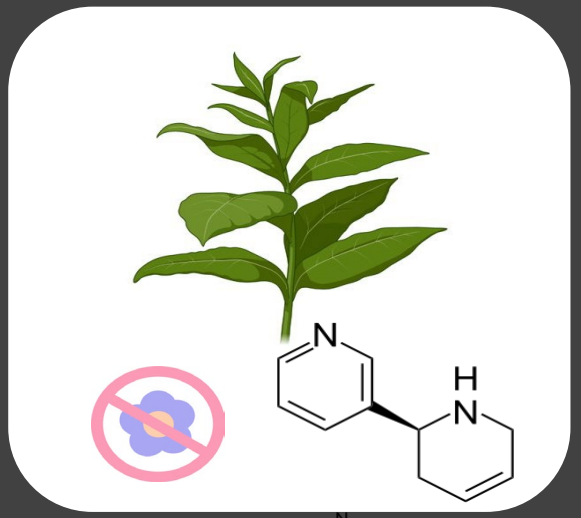
newcotiana



6 KO genes



Trait pyramiding
Transgene-free
CRISPR/Cas gene
editing

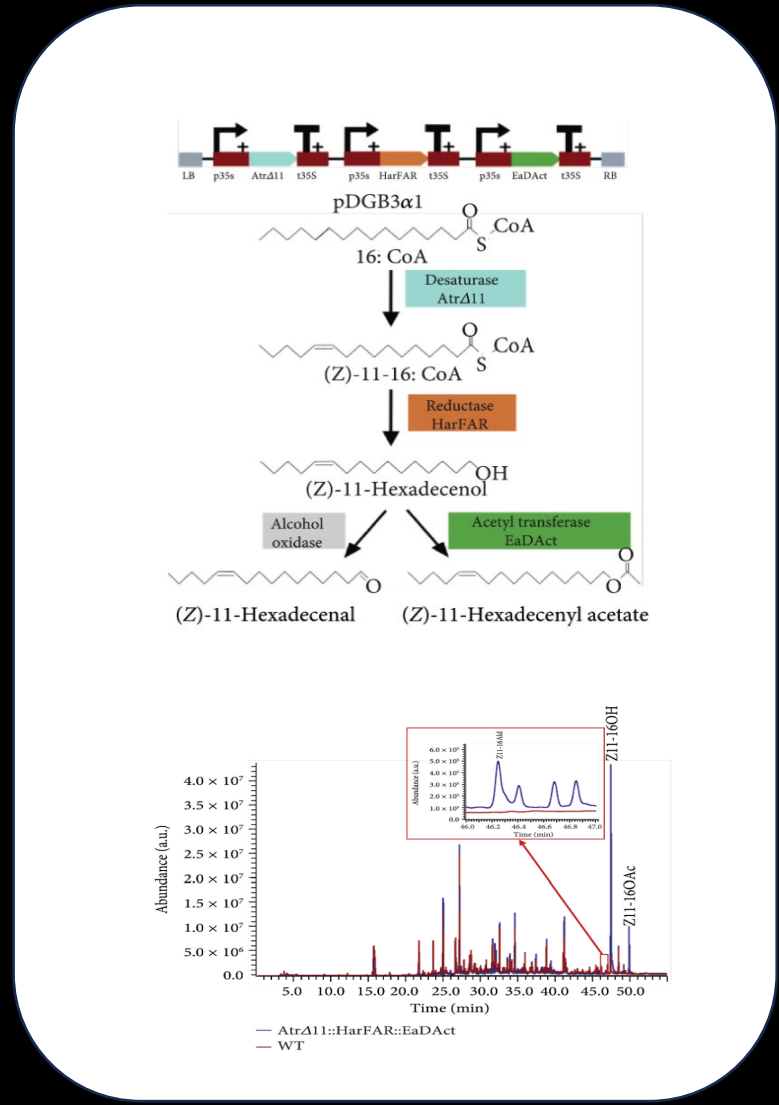


8/ 14 KO genes


Field trials CRISPR tobacco
Extremadura 2021

“Sexy Plants” as living pheromone biodispensers?.

SUSPHIRE

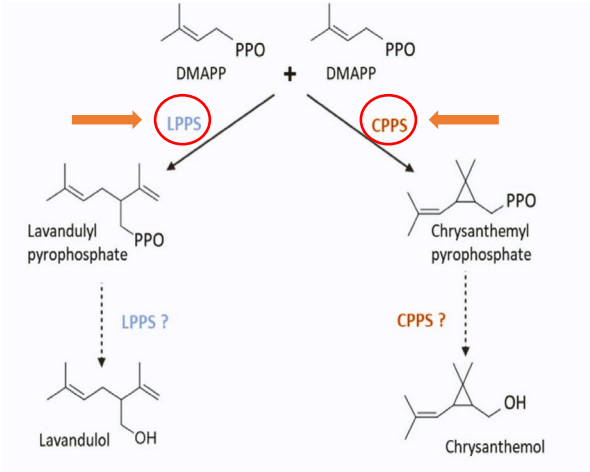


“Sexy Plants” emitting irregular monoterpenoids.

SUSPHIRE/PHEROPLUS

Assessment of tobacco (*Nicotiana tabacum*) and *N. benthamiana* as biofactories of irregular monoterpenes for sustainable crop protection

Rubén Mateos-Fernández [a], Sandra Vacas [b], Ismael Navarro-Fuertes [c], Vicente Navarro-Llopis [b], Diego Orzáez [a,*], Silvia Gianoglio [a]

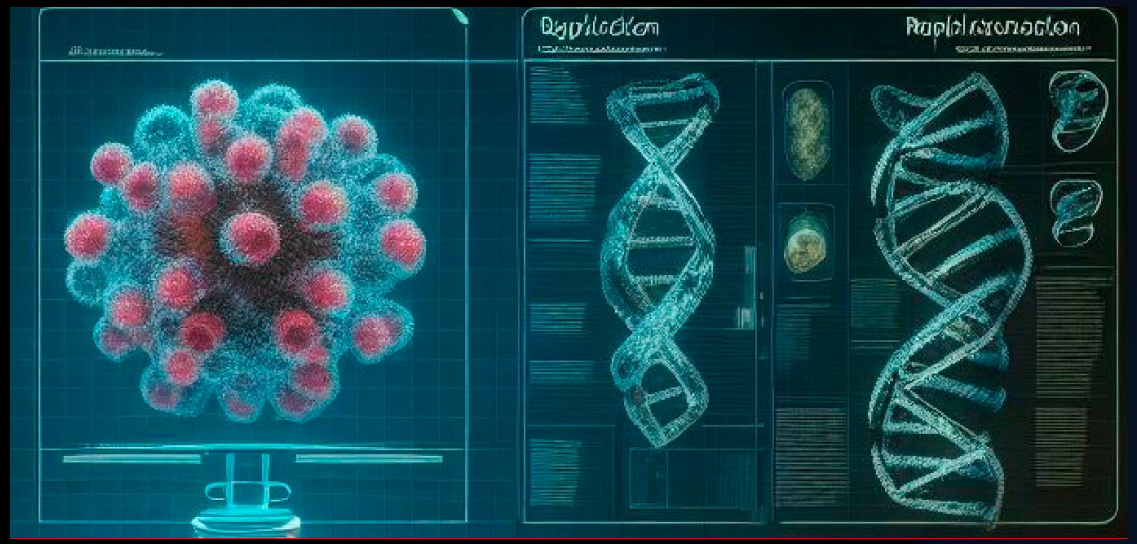


Plant	µg lavandulol g^{-1} FW day^{-1}	µg lavandulyl acetate g^{-1} FW day^{-1}
Nt LPPS-AAT4_4_4	0.06	0.11
Nt LPPS-AAT4_4_5	0.12	0.39
Nt LPPS-AAT4_4_6	0.11	0.34
Mean ± sd	0.1 ± 0.03	0.28 ± 0.15
Nt LPPS-AAT4_8_1	0.09	0.86
Nt LPPS-AAT4_8_4	0.09	0.56
Nt LPPS-AAT4_8_6	0.04	0.47
Mean ± sd	0.07 ± 0.03	0.63 ± 0.20

A few hundred (200– 500) plants per hectare would be sufficient to work effectively (mating disruption)

Self-replicative systems

For high-yield recombinant proteins



Madeinplant
JA Darós

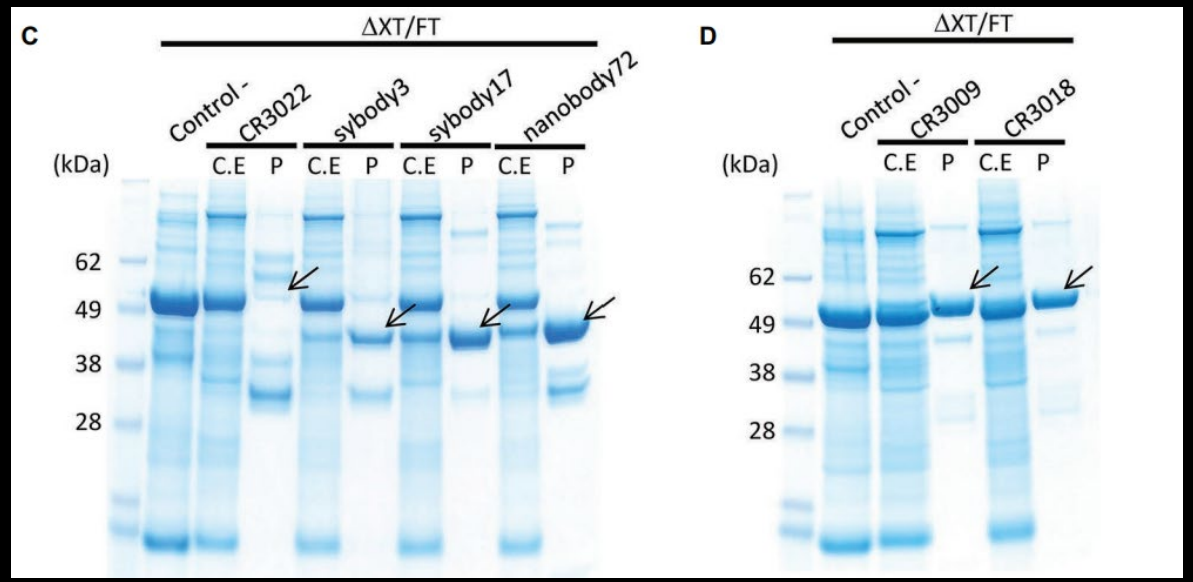
High-yield self-replicative systems

Madeinplant

Pilot Production of SARS-CoV-2 Related Proteins in Plants: A Proof of Concept for Rapid Repurposing of Indoor Farms Into Biomanufacturing Facilities

*Borja Diego-Martin†, Beatriz González†, Marta Vazquez-Vilar, Sara Selma, Rubén Mateos-Fernández, Silvia Gianoglio, Asun Fernández-del-Carmen and Diego Orzáez**

- Antibodies
- Human growth factors
- Viral antigens
- Bacterial antigens
- Lectins
- etc



Reprograming Nicotiana

Newcotiana Fast breeding Plant Biofactory

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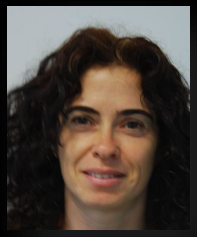

Lourdes Gómez (Group)

María Lobato

SUSPHIRE
NIB (Slovenia)
TUDA (Germany)
EI (UK)
EPA (Spain)

Phytoapps: Next-generation genetic circuits

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Susphire: New products (pheromones) made in plants

Madeinplant

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