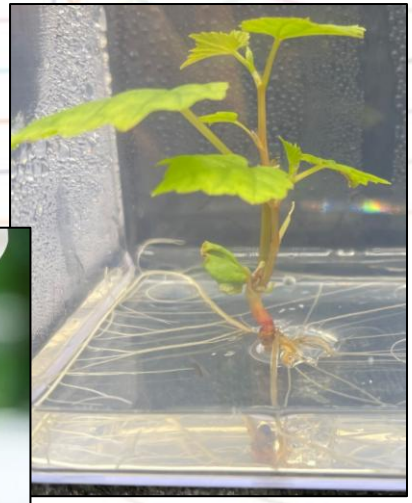
crea
Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria

Centro di ricerca
Viticoltura ed Enologia

Strategie possibili nella difesa della vite in un mondo che cambia

Riccardo Velasco,
Direttore del CREA VE



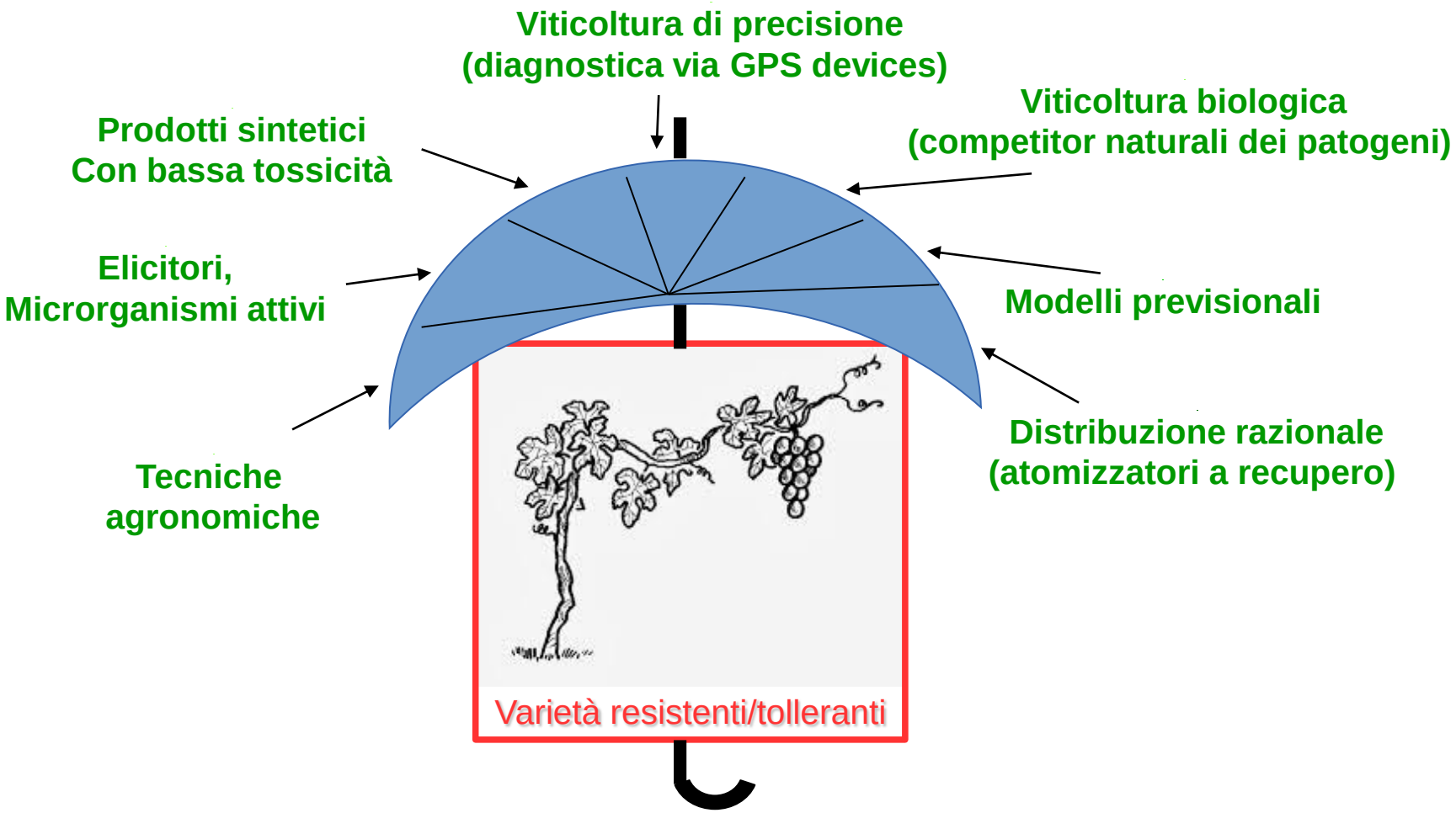
Eventi climatici estremi e malattie aggressive

Spostano l'asticella sempre più in alto

Meno input
Miglior output:

1. Miglioramento genetico (due vie)
2. Viticoltura digitale (SSD, IA)
3. Prodotti x difesa meno (non) impattanti

Riduzione dei pesticidi
Richiesta convinta della società civile

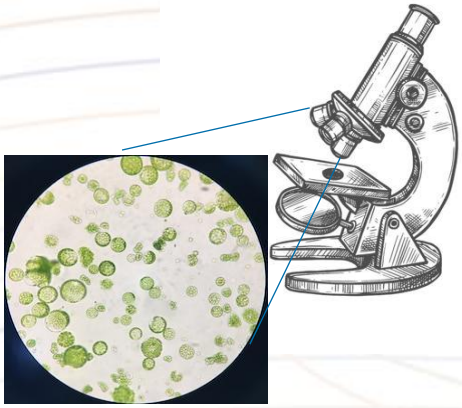


Miglioramento genetico classico

Dal miglioramento genetico all'avvento delle biotecnologie vegetali

Incroci classici = **nuove varietà**
(polline su fiore femminile)

Biotecnologie = **stesse varietà**
(moderne non-OGM)



Glera x 30 donatori di resistenza

44.000 piantine ottenute dal breeding — 2012-2020

Markers assisted selection

8.000 piante in campo — 2017-2023

Selections in the field

2000 in valutazione — 2020-2023

Quality testing

Varietà promettenti

Running experiments

Sperimentazione in corso: piante figlie di Glera in campo

Popolazioni	Anno d'impianto	Selezioni di Glera
2012 2015 ↓	2017	700
2016	2018	900
2017	2019	600
2018	2020	1800
2019	2021	1000
2020	2022	2100
2020	2023	750

Piante messe a dimora fino al 2023

DATI 7_3_8 (2023) - Glaurum

Glera x Solaris

Numero piante: 20

Anno impianto: 2022

Portinnesto: Kober 5BB

Forma d'allevamento:

Sylvoz

Resistenze peronospora:

Rpv3-3, *Rpv10*

Resistenze oidio:

Ren3, *Ren9*

Biotecnologie moderne:

Tecniche di Evoluzione Assistita

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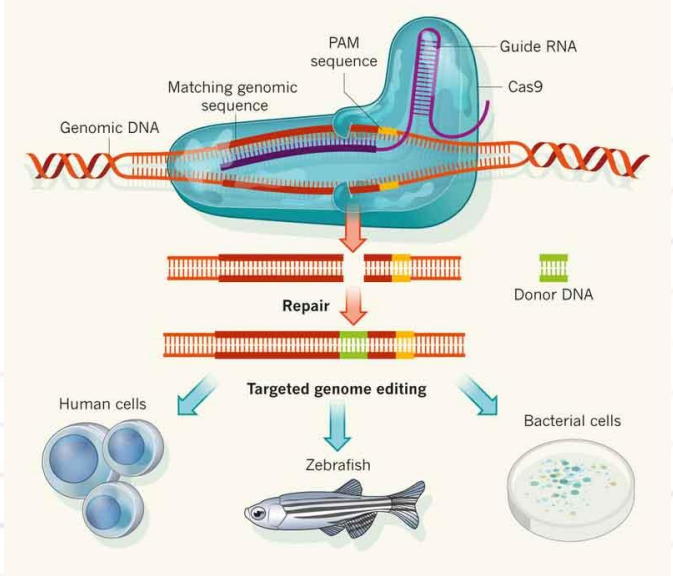
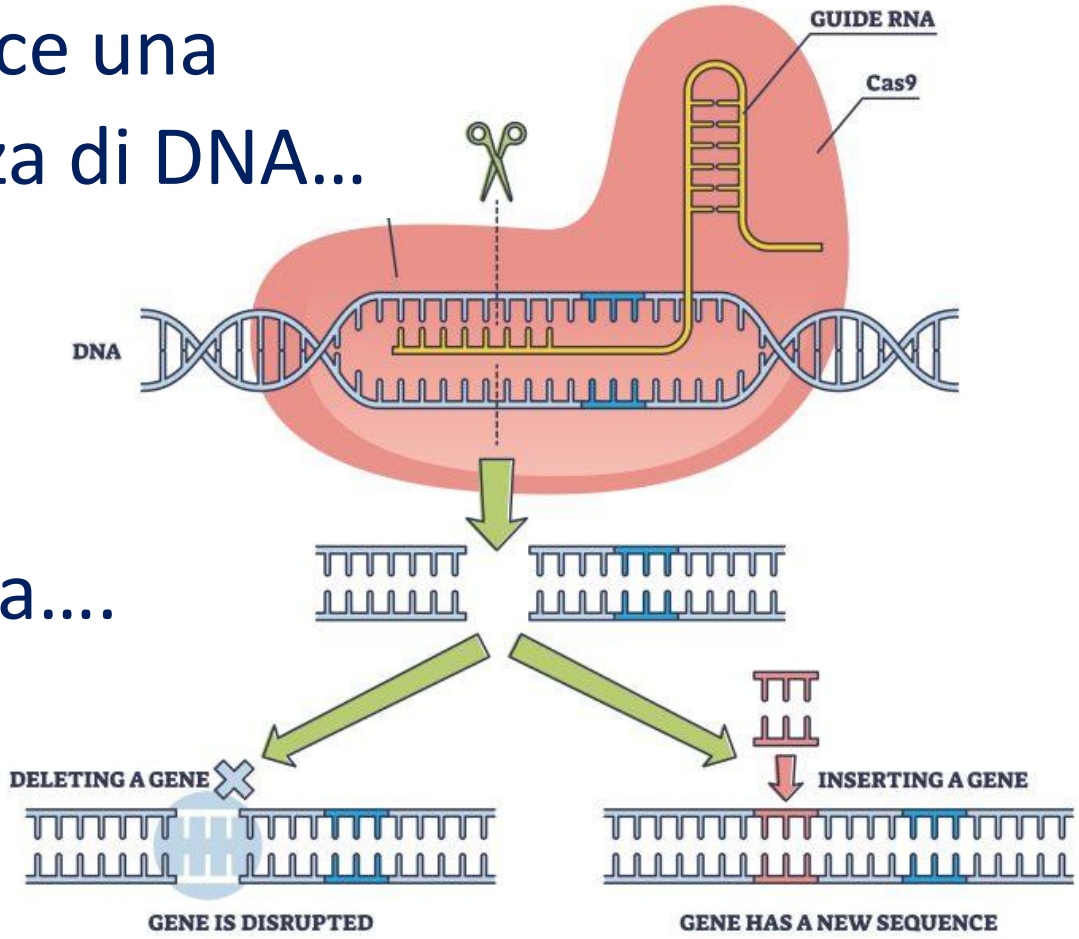
CRISPR/Cas9: biotechonology revolution (genome editing = mutagenesi biologica?)



Premi Nobel per la chimica 2020
J. Doudna e M. Charpentier

CRISPR/Cas

Riconosce una sequenza di DNA…



…e la taglia….

….la cellula poi lo ripara

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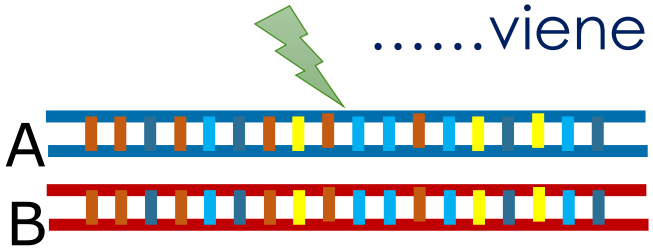
DNA danneggiato ….

……viene riparato dalla cellula

Esterno

Solar radiation
CRISPR/Cas9



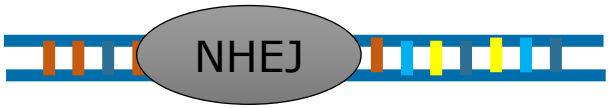
Interno

Chromosomal stress,
Duplication of the DNA,
DNA crossing over,
O2 free radicals

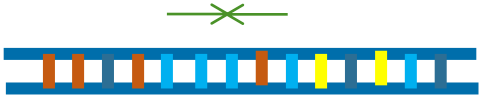
Doppia rottura (DSB)

DNA repair (possible errori)

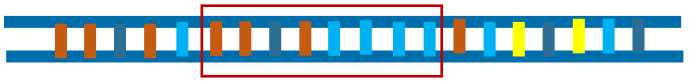
Non Homologous End Joining



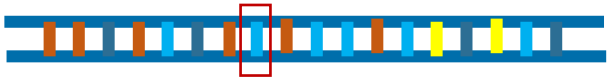
Delezione



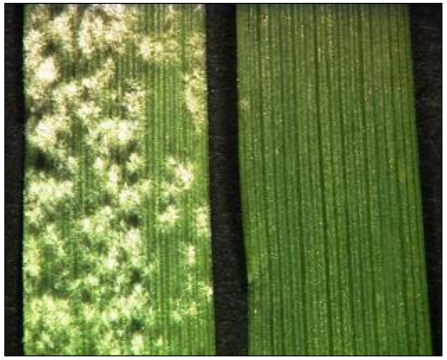
Inserzione



Mutazione



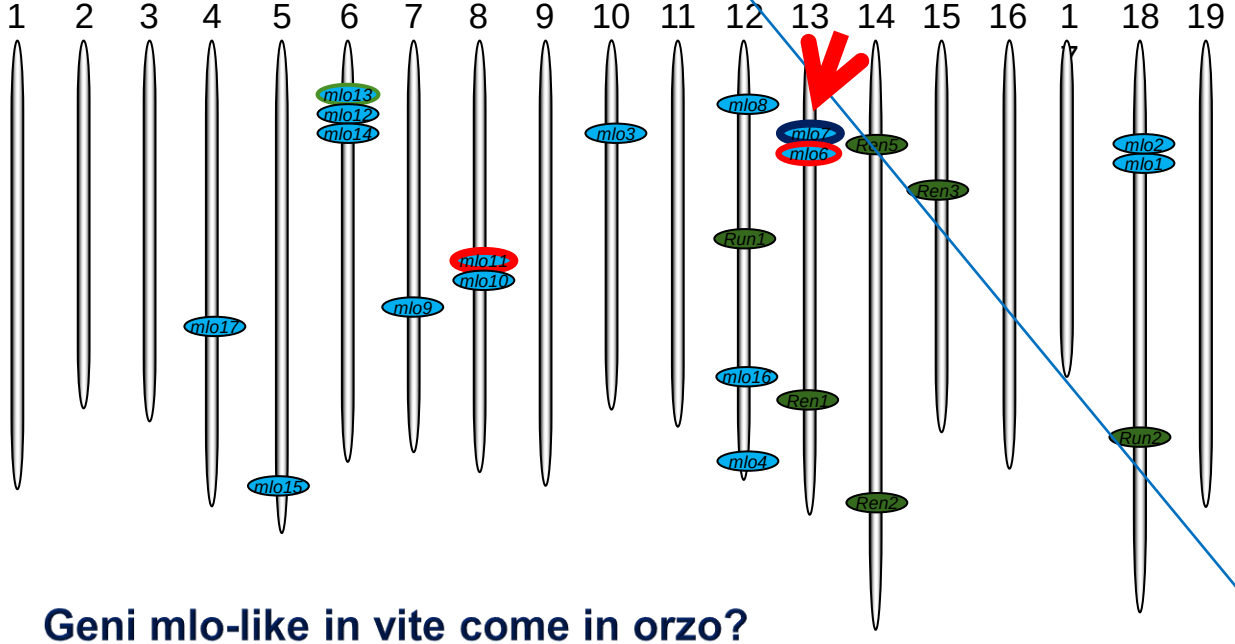
Büschges, R. et al., (1997)
The barley *Mlo* gene: a novel control element of plant pathogen resistance. *Cell 88: 695-705*



Orzo *Mlo* vs. *mlo*

Pessina, S. et al., (2016)
Knock out of *Mlo* genes reduce susceptibility to powdery mildew in grapevine. *Hort Research 3: 16016*

Mlo gene family in grapevine – distribution along the 19 chromosomes



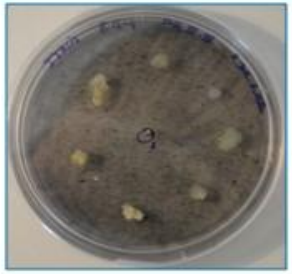
Brachetto vite suscettibile

Brachetto-mlo07 mutata

Geni mlo-like in vite come in orzo?

Inflorescence

Embryogenic callus



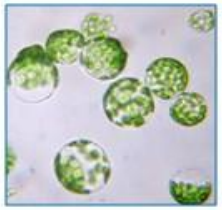
Transient expression

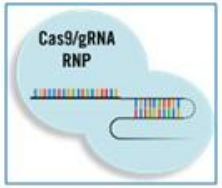
Agrobacterium tumefaciens & CRISPR/CAS binary vector

DNA-free

OR

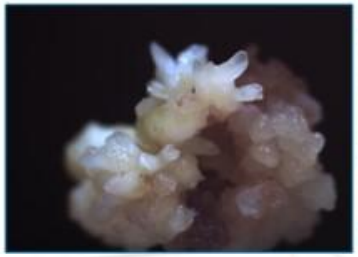
Protoplasts & RNPs





Stable transformation

Selection and regeneration



In attesa del Parlamento Europeo….

Grazie
dell'attenzione