

# MULTI-ACTOR CULINARY BREEDING METHODOLOGIES: FROM THEORY TO PRACTICAL EXAMPLES IN EUROPE



**SMARTIES.BIO**  
G R O W   D I F F E R E N T



26-27-28 Oct 2023 - DUBLIN - IRELAND



# GUSTO ITALIANO project



SAVE  
Biodiversity  
Vegetable  
Seeds



A COLLABORATION WITH  Uprising seeds



## GUSTO ITALIANO PROJECT

Safeguarding and promoting the Italian horticultural heritage through the recovery of local germplasm and traditional knowledge, applying our scientific protocols





## GUSTO ITALIANO PROJECT

Offering to the market high genetic level seed with excellent quality in terms of germination and tested free from the main disease transmissible by seed.





## GUSTO ITALIANO PROJECT

With a direct strong connection with the culinary aspect.

Intrinsic culinary value:

- taste
- flavour
- original recepies





# GUSTO ITALIANO PROJECT

## THE PROBLEM: GENETIC EROSION

due to a market that requires agricultural products of very high standards (yields, resistance to diseases, shelf life, etc.)

Many minor products of great cultural, historical, environmental, **culinary** and social value risk extinction as they do not comply with the rules of the modern market in favor of new hybrid varieties produced by multinational companies



# GUSTO ITALIANO PROJECT

## GOAL AND RESULTS:

- Recovery of ancient varieties, often abandoned;
- Application of our breeding protocols to develop performing varieties with respect to the needs of the current market;
- Production of quality seeds with high germination and compliant with current legal standards;
- Seeds certified free from diseases (LMV, Phoma, Alternaria, Xanthomonas, Pseudomonas, Fusarium);
- Breeding a range with several cycles of earliness ideal for satisfying market demands;
- Recovery of traditional tastes;**
- Promotion of recipes from the past;**
- Promotion of historical and cultural heritage;





# GUSTO ITALIANO PROJECT

## A PILOT PROJECT

- Microfarms / farmer markets
- Access to niche markets
- Promotion of the Italian tradition
- Opportunity for farms to offer quality products with an added value
- Opportunities for professional growers and home gardener.
- Culinary value**
- Creation of supply chain networks







# GUSTO ITALIANO PROJECT



- Cavolo Laciniato Nero di Toscana
- Broccolo Fiolaro di Creazzo
- Broccolo di Bassano
- Broccolo Padovano
- Verza Moretta
- Verza Marinanta
- Cavolfiore Verde di Macerata





# GUSTO ITALIANO PROJECT

-Pomodoro de Jerno (da serbo)  
ANNARITA

-Pomodoro Nasone del Cavallino  
NOSE

-Pomodoro Cuore di Bue VELVET

-Melanzana Cima di Viola, Lunga di Napoli

-Zucca Marina di Chioggia

-Zucca Violina Liscia

-Zucca Violina Rugosa

-Zucca Trombetta d'Albenga

-Rucola Laguna di Venezia





# GUSTO ITALIANO PROJECT

- Cicoria Rossa di Chioggia
- Cicoria Rossa di Treviso Precoce
- Cicoria Rossa di Treviso 2 Tardivo da forzare
- Cicoria Rossa di Verona
- Cicoria Variegata di Castelfranco
- Cicoria Variegata di Lusia
- Cicoria Bianca di Chioggia
- Cicoria Pan di Zucchero
- Radicchio Variegato di Chioggia
- Cicoria Rosa
- Cicoria Goriziana
- Cicoria Catalogna Gigante di Chioggia
- Cicoria Catalogna Puntarelle di Galatina





# GUSTO ITALIANO PROJECT

-Lattuga Batavia Bionda del Cavallino  
ALBACHIARA

-Sedano Verde Chioggiotto

-Basilico Classico Italiano (Genovese)  
GUSTOSO

-Cipolla bianca musona di Chioggia

-Cipolla rossa musona di Chioggia

-Cipolla bianca piatta di Bassano

-Cipolla rosa di Bassano

-Cipolla Ischitana

-Cipolla ramata di Montoro





# GUSTO ITALIANO PROJECT

## A CASE STUDY: AZIENDA AGRICOLA MAISTRELLO STEFANO

- ✓ -Microfarms / farmer markets
- Access to niche markets
- Promotion of the Italian tradition
- ✓ -Opportunity for farms to offer quality products with an added value
- ✓ -Opportunities for professional growers and home gardener.
- ✓ -Culinary value
- ✓ -Creation of supply chain
- ✓ networks





# GUSTO ITALIANO PROJECT



## A CASE STUDY: AZIENDA AGRICOLA MAISTRELLO STEFANO





# GUSTO ITALIANO PROJECT



## A CASE STUDY: AZIENDA AGRICOLA MAISTRELLO STEFANO





# SMARTIES.BIO

- The project is conducted on an organic farming scheme.
- The goal is to provide an entirely and exclusively dedicated supply chain, from genetic and agronomic research to production.
- Breeding of varieties suitable to be grown in organic farming
- Smarties.bio operates in its own structures and land certified for organic farming
- Production chain of certified seed from organic farming



Organismo di controllo autorizzato dal MiPAAFT:  
IT BIO 009  
Agricoltura Italia - Operatore controllato n° F253





# Classification of cultivated leaf/root chicories

*Cichorium intybus* L.



Root chicory



Forage chicory



Witloof chicory



Leaf chicory

Four groups according to the purpose and use they are grown for



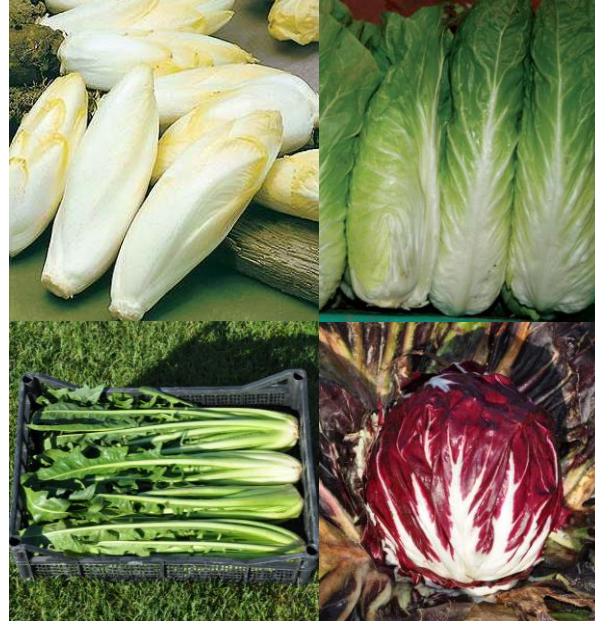
# Classification of cultivated leaf/root chicories

*Cichorium intybus* subsp. *intybus* L.

## var. *foliosum*

traditionally includes all the cultivar groups whose commercial products are the leaves

e.g. Witloof (var. *foliosum*), Sugar Loaf (var. *porphyreum*), Catalogne (var. *sylvestre*) and Radicchio (var. *latifolium*)



## var. *sativum*

includes all the types whose commercial product, either destined to industrial transformation or direct human consumption, is the root

i.e. Root chicory



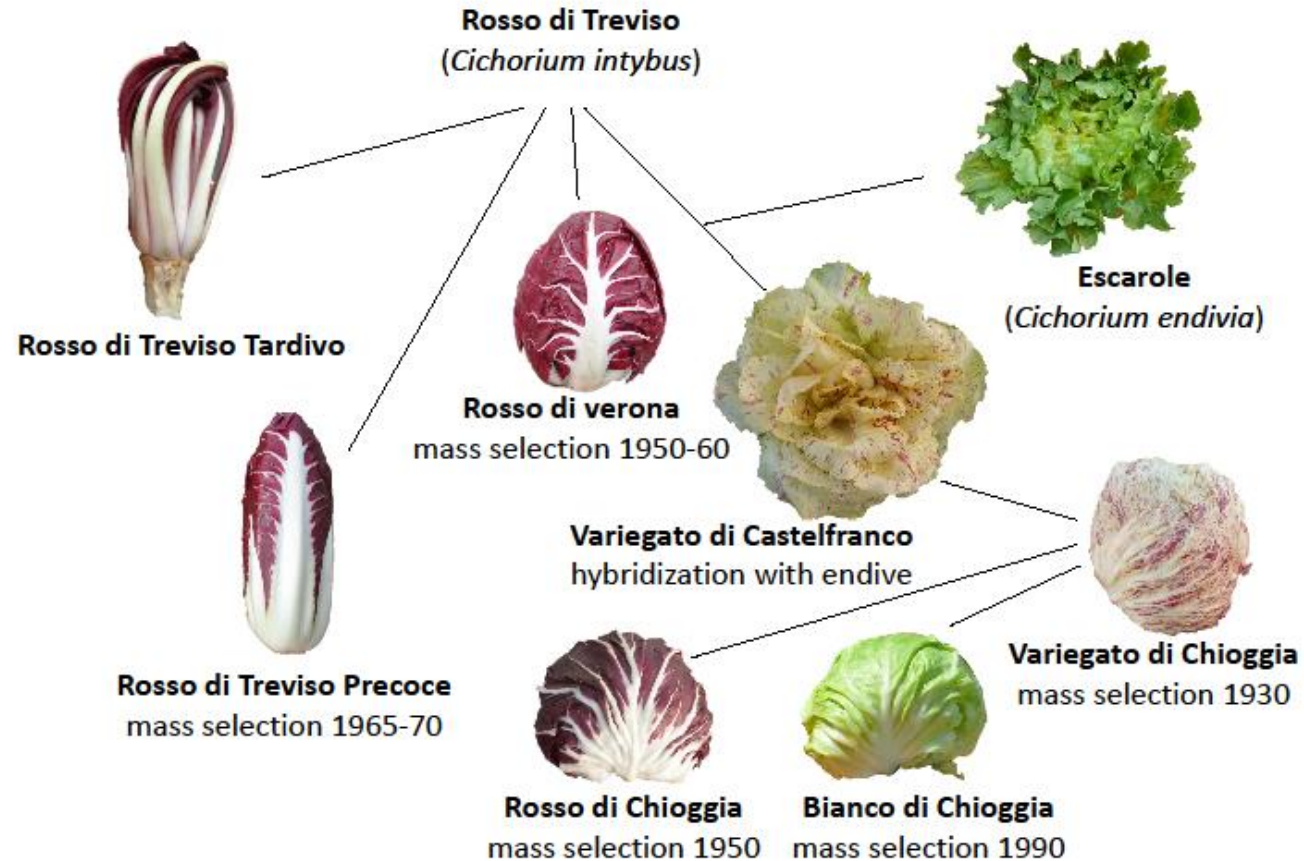


# Classification of cultivated leaf/root chicories

## Italian Radicchio: phylogenesis

The cultivation of red chicory dates to the first half of the 16<sup>th</sup> century in the Venetian territories.

After spreading the nearby territories the original type differentiated into well-characterized biotypes

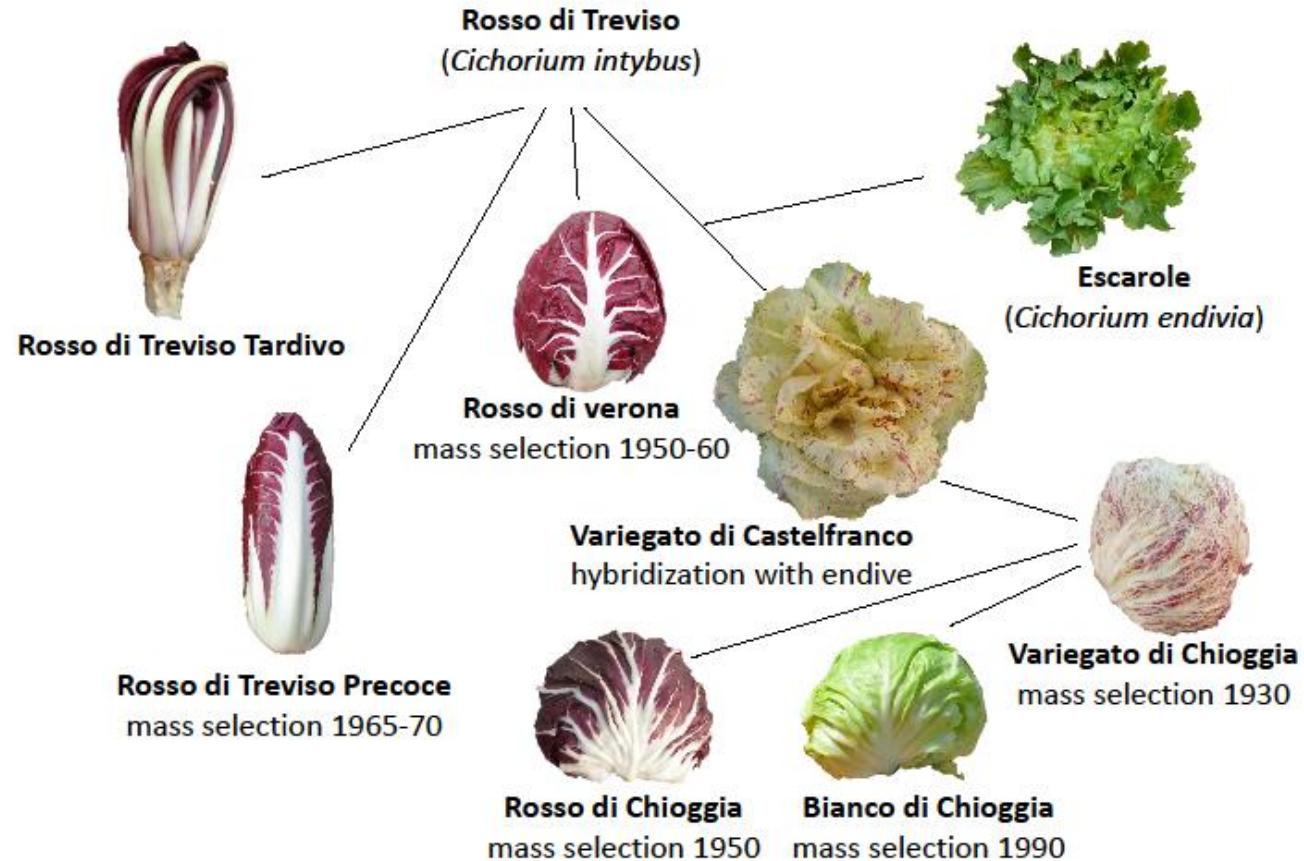




# Classification of cultivated leaf/root chicories

## Italian Radicchio: phylogenesis

All types of Radicchio derive from red-leafed individuals of *C. intybus* var. *foliosum*, whereas the types with variegated leaves originated from spontaneous or artificial crosses with individuals of *C. endivia* var. *latifolium*





# Classification of cultivated leaf/root chicories

## Italian Radicchio: biotypes and landraces

Red of Chioggia is the most widespread and very extensively grown in north-eastern Italy, while the others represent locally valuable high-quality crops  
The Italian common name “Radicchio” indicates a very differentiated group of chicories with red or variegated leaves that are traditionally cultivated in North-Eastern Italy.

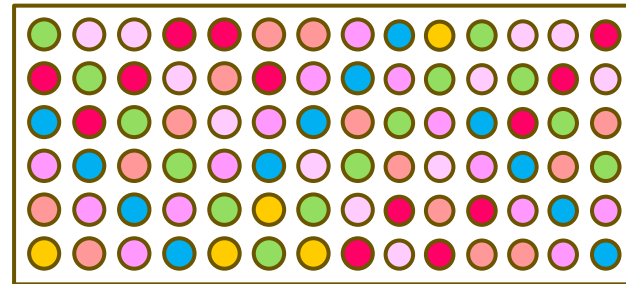




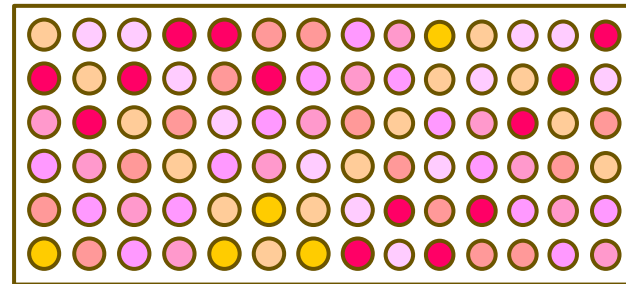
# BASIC GENETIC SCHEMES TO BREED A RADICCHIO VARIETY

OP: open pollinated variety

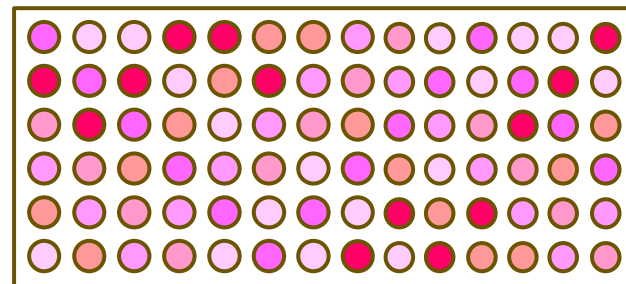
CHARACTER: Color



Breeding Population



1° st year selection

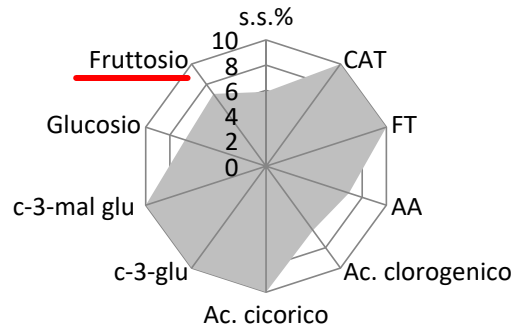


2° nd year selection



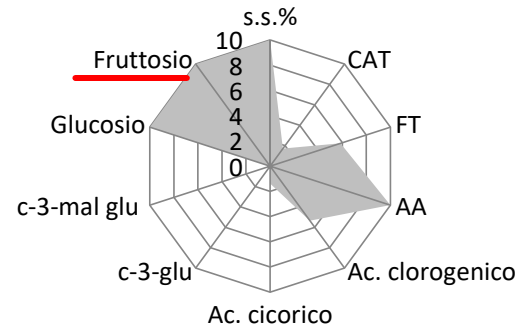
# QUALITY LAB DATA RELATED TO TASTE

Among the same type - *Cicoria Variegata di Lusia*



Var: SORGENTE

55 days to maturity  
Extra early cycle  
Sept harvesting



Var: FONTE

110-130 days to maturity  
Late cycle  
Dec-Jan harvesting

Key table:

s.s.% = Dry matter percentage  
CAT = Antioxidant activity  
FT = Total phenols  
AA = Ascorbic acid  
Ac. Clorogenico = Chlorogenic acid  
Ac. Cicorico = Cichoric acid  
c-3-glu = Cyanidin-3-glucoside  
c-3-mal-glu = Cyaniding-3-malonil-glucoside  
Glucosio = Glucose  
Fruttosio = Fructose





# MORPHO TRAITS THAT DRIVE THE SELECTION:

-qualitatives: YES or NOT

-quantitatives: most of the charactes we care about are qualitatives

CPVO-TP/154/2-Rev  
Date: 31/03/2023

Table 1: Classification of types according to characteristics

Plant: type	Plant: diameter (char. 2)	Leaf: length (char. 4)	Leaf: width (char. 5)	Leaf: colour (char. 8)	Leaf: anthocyanin distribution (char. 9)	Plant: head formation (char. 20)	Time of head formation (char. 21)	Head: shape in longitudinal section (char. 25)	Head: colour of cover leaves (char. 29)	Plant: formation of stem (char. 31)
<b>Chioggia</b>	medium to large (notes 5-7)	very short to medium (notes 1- 5)	medium to broad (notes 5-7)	dark green (note 4)	<b>diffused only</b>	<b>closed</b>	very early to very late (notes 1-9)	circular to oblate (notes 3-4)	medium to dark red (notes 7-8)	absent
<b>Verona</b>	small to medium (notes 3-5)	medium (note 5)	medium to broad (notes 5-7)	medium green (note 3)			very early to very late (notes 1-9)	ovate (note 2)	medium red (note 7)	absent
<b>Rossa di Treviso precoce</b>	medium (note 7)	long (note 7)	narrow (note 5)	medium red (note 6)			very early to late (notes 1-7)	elliptic (note 1)	medium red (note 7)	absent
<b>Pan di Zucchero/ Pain de Sucre</b>	large (note 7)	medium to long (notes 5-7)	very broad (note 9)	light green to medium green (notes 2-3)	<b>absent</b>		medium (note 5)	elliptic (note 1)	light green (note 3)	absent
<b>Bianca di Milano</b>	medium (note 5)	medium (note 5)	broad (note 7)	yellowish green to light green (notes 1-2)			early (note 3)	ovate (note 2)	light green (note 3)	absent
<b>Bianca invernale</b>	large (note 7)	medium to long (notes 5-7)	medium to broad (notes 5-7)	yellowish green to light green (notes 1-2)			late (note 7)	ovate (note 2)	light green to medium green (notes 3-4)	absent
<b>Variegata di Castelfranco</b>	medium to large (notes 5-7)	medium (note 5)	broad (note 7)	light green (note 2)	<b>in patches only</b>		medium to late (notes 5-7)	ovate (note 2)	yellowish green (note 2)	absent
<b>Variegata di Lusia</b>	large (note 7)	medium to large (notes 5-7)	broad (note 7)	light green (note 2)			early to late (notes 3-7)	oblate (note 4)	yellowish green (note 2)	absent





# RAW BAR - SAGRA DEL RADICCHIO (Radicchio Festival) 2022 Portland OR - USA

Consumer test  
Opportunity to taste the differences:

- texture
- bitterness





**GRAZIE**