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*EUROPEPLAND– Implementing a trans-EUROpean
PEPper LANDrace collection for resilient agriculture*

30 October 2024, Almeria, Spain



INRAE – GAFL – BRC-Veg



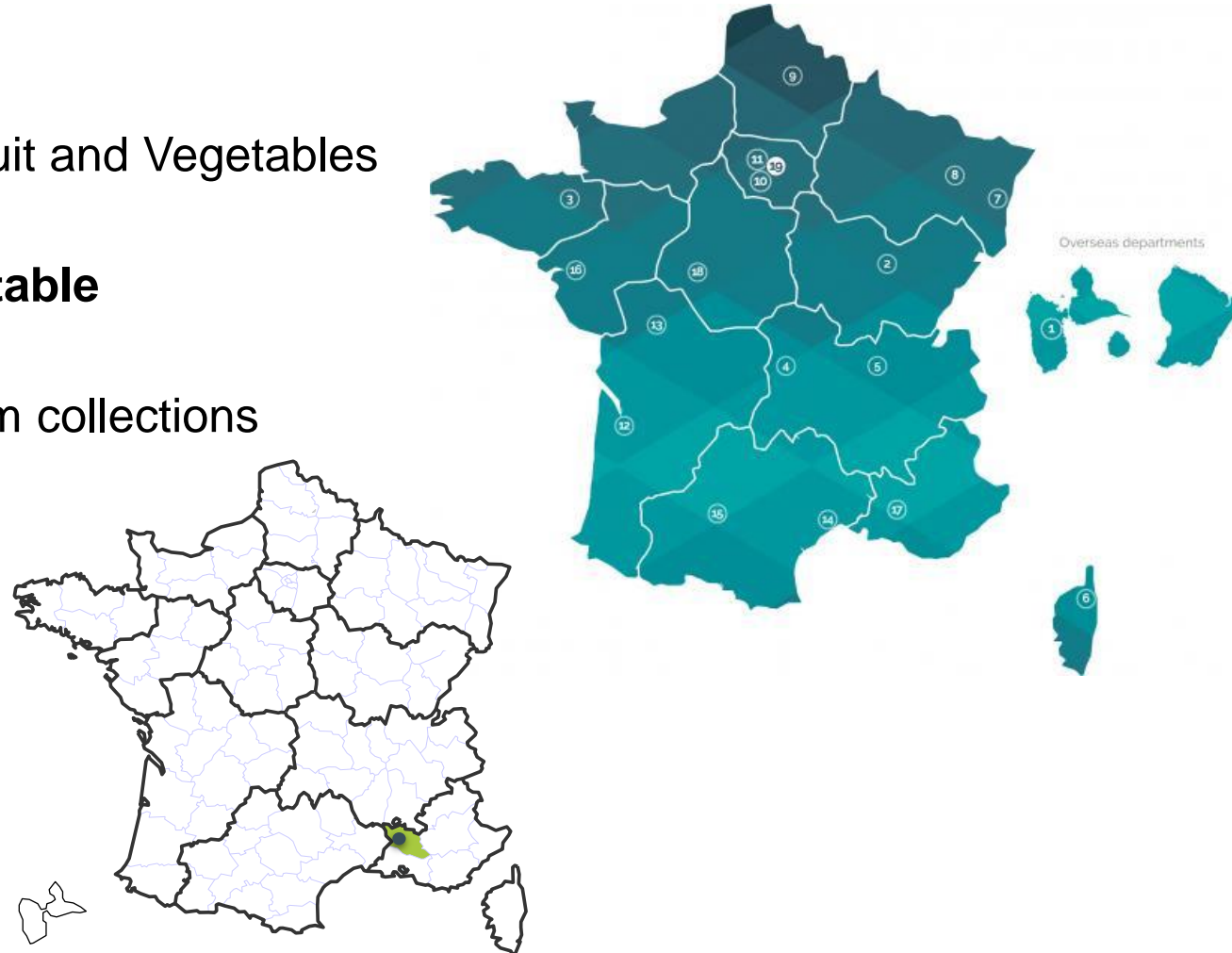
= National Research Institute for Agriculture, Food and Environment



= Genetic Improvement of Fruit and Vegetables

BRC-Veg = Biologic Resources Centre of Vegetable

- Conserve, characterise and distribute germplasm collections
 - ✓ **Pepper**, Tomato, Eggplant, Melon and Lettuce
- Capsicum resequencing and pangenome
- Genetic and phenotypic diversity
 - Domestication
 - Sustainable resistance to pests and diseases
 - Floral and quality traits
 - Adaptation to abiotic stress
 - Robustness
 - Plant and fruit development
- Genome editing
- Pre-breeding and genotype-phenotype modelling



Located in Avignon, France

Project activities on pepper



- *Capsicum* resequencing and pangenome : PRO-GRACE WP3 + AGRODIV
- Genomic and phenotypic diversity : PRO-GRACE WP3
- Domestication : G2P-SOL

Tripodi *et al.*, 2021 PNAS - Cao *et al.*, 2022 Mol Pl

- Sustainable resistance to pests and diseases : ARCHIV + COMBINE

Tamisier *et al.*, 2020 Mol Plant Pathol - Moury *et al.*, 2021 PCI - Maillot *et al.*, 2022 Front Pl Sc

- Plant host genetic on plant pathogen diversity : COMBINE
- Plant/Fruit development and quality traits : G2P-SOL

McLeod *et al.*, 2023 PlantJ

- Adaptation to abiotic stress : G2P-SOL; ROBUSPIM

Fumia N *et al.*, 2023 Plant Phenome Journal

- Immunity robustness to changing environments: ROBUSPIM

Billaud *et al.*, 2024, Hort Res



Archiv



COMBINE

G2P-SOL



Your institute's pepper landraces collection

At the end of the 18th century, creation of the first seed company in France « Andrieux et Vilmorin »

At the end of the 19th century, first pepper to be added on the catalogue

- 1877: Piment doux d'Espagne
- 1887: Piment carré doux d'Amérique



Piment doux d'Espagne.
Fruits réd. au tiers.

1877



Piment gros carré doux.
Fruits réd. au tiers.

1887



Piment cerise.
Rameau réd. au dixième ; fruit, de moitié.



Your institute's pepper landraces collection

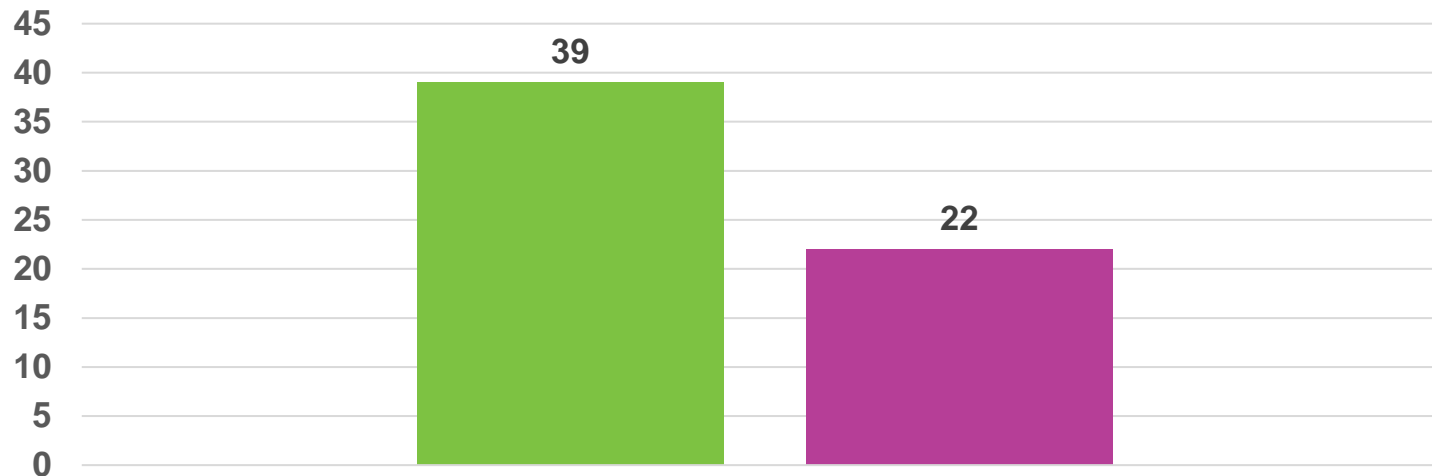
BRC-Veg Pepper collection

- 2217 accessions of 90 different countries
- 143 French accessions
- 61 French Landraces accessions

23 traditional French Varieties

- Carré Doux D'Amérique
- Cerise
- Doux Aurore
- Doux De Valence
- Doux Hatif De Saint Rémy
- Doux Long Des Landes
- Gros Carré D'Amérique
- Gros Carré De Robion
- Gros Carré Doux
- Jaune Sucette Hyerois
- Lagnes
- Marseillais
- Museau De Bœuf
- Petit Marseillais
- Piment De Cayenne
- Piment D'Espelette
- Piment Doux D'Anglet
- Piment Du Chili
- Piment Sucette = Sucette de Provence
- Poivre Rouge De Bresse
- Poivron D'Ampuis
- Rouge Long Ordinaire
- Tendre De Chateaurenard

61 French Landraces Accessions



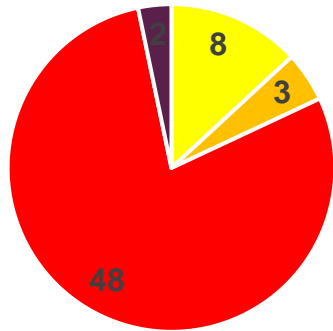
French Landraces Accessions

- French Landraces with a name and history
- French Accessions prospected among producers and gardeners from 1960

Your institute's pepper landraces collection

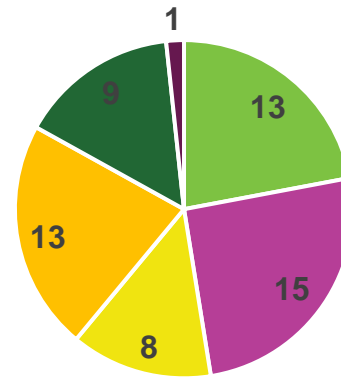
Morphological characterisation of the 61 accessions

Fruit color at maturity



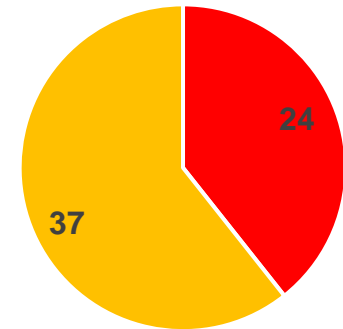
■ Yellow ■ Orange ■ Red ■ Brown

Fruit shape



■ Square
 ■ Rectangular
 ■ Triangular
 ■ Pointed >5cm
 ■ Pointed <5cm
 ■ Pointed at the base, thick flesh

Taste



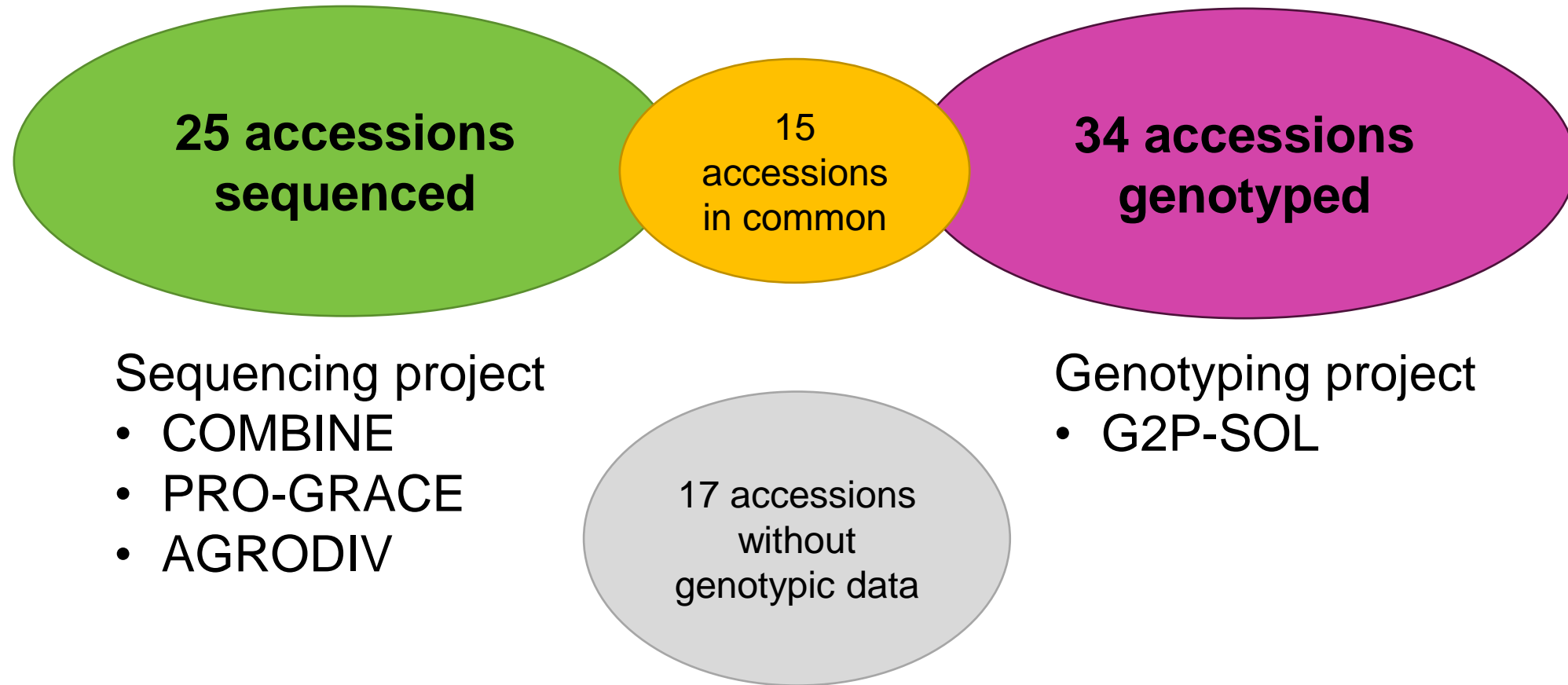
■ Hot ■ Sweet

Other descriptors such as :

- Flower phenology
- Leaf phenology
- Plant organs size
- Plant shape
- Resistance (CMV, TMV, PVY, Powdery mildew, *Phytophthora i.*, etc.)
- Fruit size and weight
- Thickness of fruit flesh
- Agricultural use
- Aspects of the fruit (smooth, shiny, etc.)

Your institute's pepper landraces collection

Genotypic characterisation of the 61 accessions



Sequencing project

- COMBINE
- PRO-GRACE
- AGRODIV

Genotyping project

- G2P-SOL

Your institute's pepper landraces collection



Piment gros carré doux.
Fruits réd. au tiers.

1887



Gros carré doux
= Big sweet blocky



Piment cerise.
Rameau réd. au dixième; fruit, de moitié.



Piment cerise = Cherry pepper

Your institute's pepper landraces collection

Piment du Chili



Piment de Cayenne



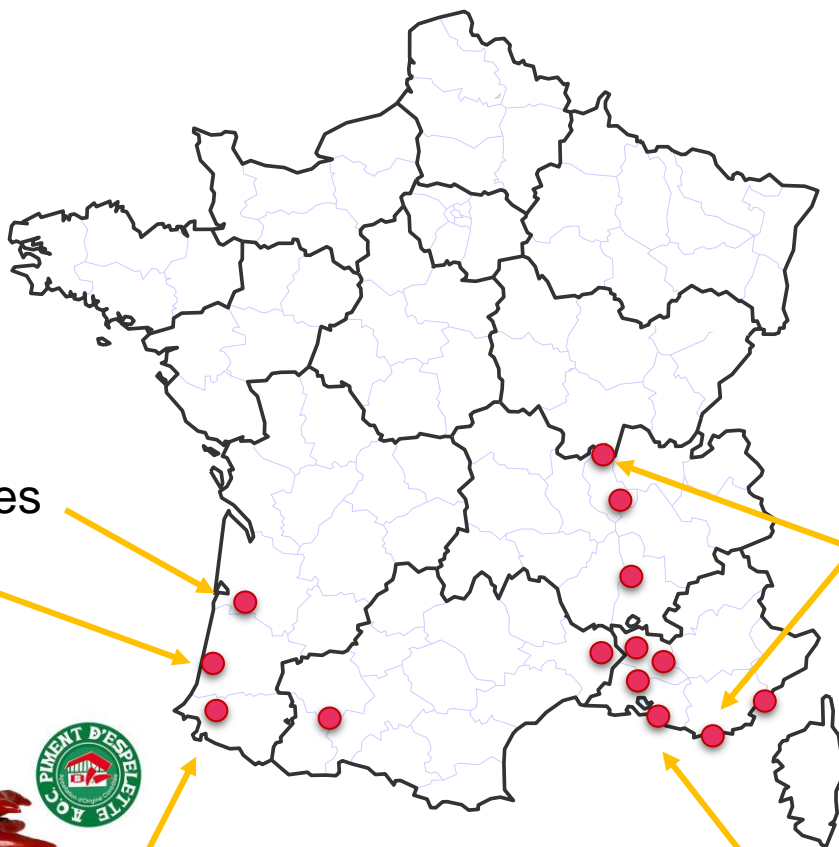
Rouge long ordinaire
= Ordinary long red



Your institute's pepper landraces collection



Doux long des Landes
Piment d'Anglet



Jaune sucette Hyérois



Poivre rouge de Bresse



Piment d'Espelette



Petit Marseillais

Thank you for your attention!

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- Jacques Lagnel
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