

Friggere.... di curiosità!
Frying... of curiosity!

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Perché siamo qui?

Why we are here?

- Perché siamo curiosi!

Because we are students in Food Design!

- Perché ci piacciono le cose fritte e vogliamo capire se è vero che non si devono mangiare
- To understand if fried stuffs are bad and should be avoided

Lo scopo degli esperimenti

The aim of our experiments

- Valutare l'assorbimento di olio nel processo di frittura di alcune matrici alimentari in condizioni diverse.
- To assess the oil absorption of different foods in different conditions

Programma

- Introduzione alla problematica
- Introductory remarks
- Fritture di Melanzane, Montanara e Patate
- Frying test Eggplant, dough, potatoes
- Risultati analisi
- Results of the oil absorption
- Spiegazione tecnico/scientifica
- Explanation of the results

Vero o falso?

True or false

- Durante la frittura, maggiore è la perdita d'acqua maggiore sarà l'assorbimento dell'olio
- During frying the more water loss the higher oil absorption
- Infarinare le melanzane riduce l'assorbimento di olio
- Coating with flour reduce the eggplant oil absorption
- Le patatine fritte fanno male. Contengono molto olio
- French fries contain a lot of frying oil so are junk food.

Vero o falso?

True or false

- Le frittture in olio d'oliva sono più untuose
- Frying in olive oil results in a higher amount of the oil in the final product
- La prefrittura è un metodo consigliato per la croccantezza del fritto
- Prefrying increase the crispness of the final product
- Le pastelle aumentano l'assorbimento dell'olio.
- Battered fried foods contained more oil

Cosa succede durante la frittura

What happen during frying?



- Oil temperature 160-180 °C
- Il modo più efficiente per trasferire calore al cibo
- The more efficient way to transfer heat to food

Cosa succede durante la frittura

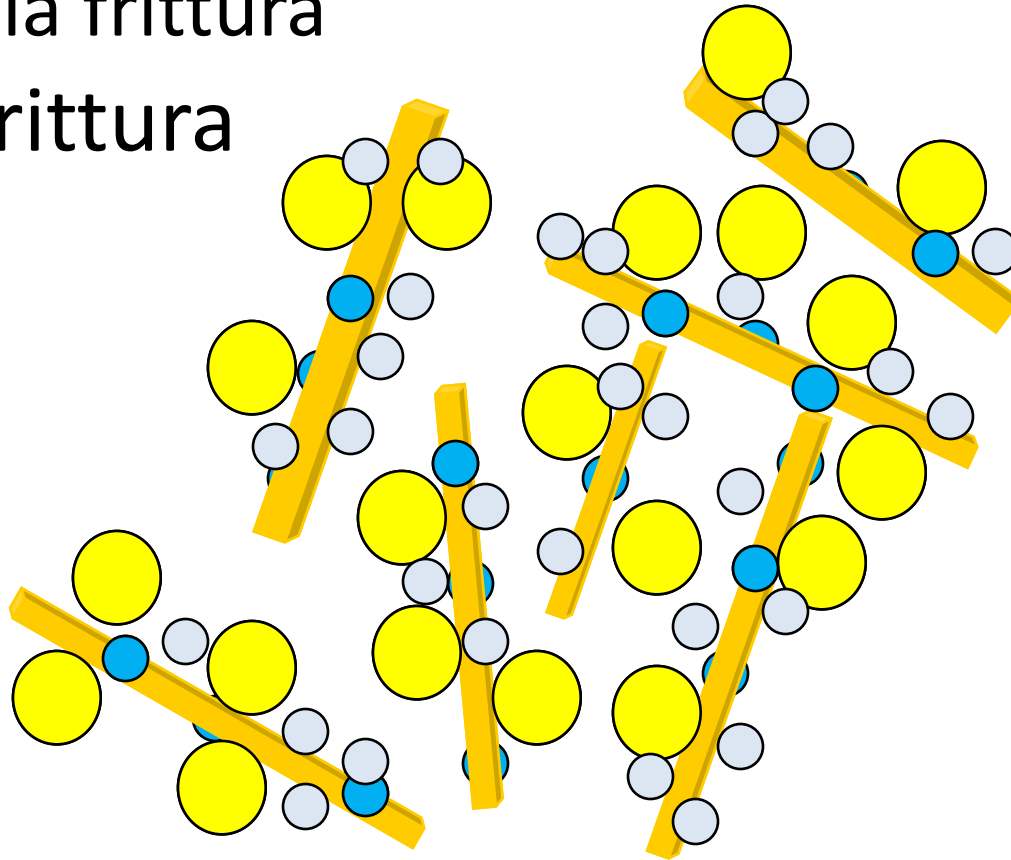
What happen during frying?

- Siamo in un ambiente non ossidante!
- It is a not-oxidant environment!
- L'acqua evapora la temperatura resta sotto i 100 °C
- Water evaporates. Temperature remained below 100°C.
- Quando l'acqua comincia a diminuire la temperatura sulla superficie si avvicina a quella dell'olio
- Reducing the water amount on the food surface the temperature is close to that of the oil

Cosa succede durante la frittura

What happen during frying?

Durante la frittura
Inizio frittura



Cosa succede durante la frittura

What happen during frying?

- L'acqua che evapora crea una pressione che impedisce all'olio di entrare!
- Evaporating water pressure do not allow oil entrance!
- Anche per frittture prolungate resta sempre acqua all'interno
- Also for prolonged frying there is always water evaporating inside
- Sulla superficie invece si avvia la reazione di Maillard
- Maillard reaction on the surface of the product

Dati melanzane

MELANZANE	% PASTELLA IN PESO	% PESO RESIDUO	% PERDITA PESO
Melanzane tal quali	0	57,8	42,2
Melanzane solo farina	9,5	76,1	23,9
Melanzane farina + pastella tradizionale	54,6	63,6	36,4
Melanzane farina + pastella Fiorentina	59,6	62,7	37,3
Melanzane farina + tempura	69,3	51,7	48,3

Dati Montanara

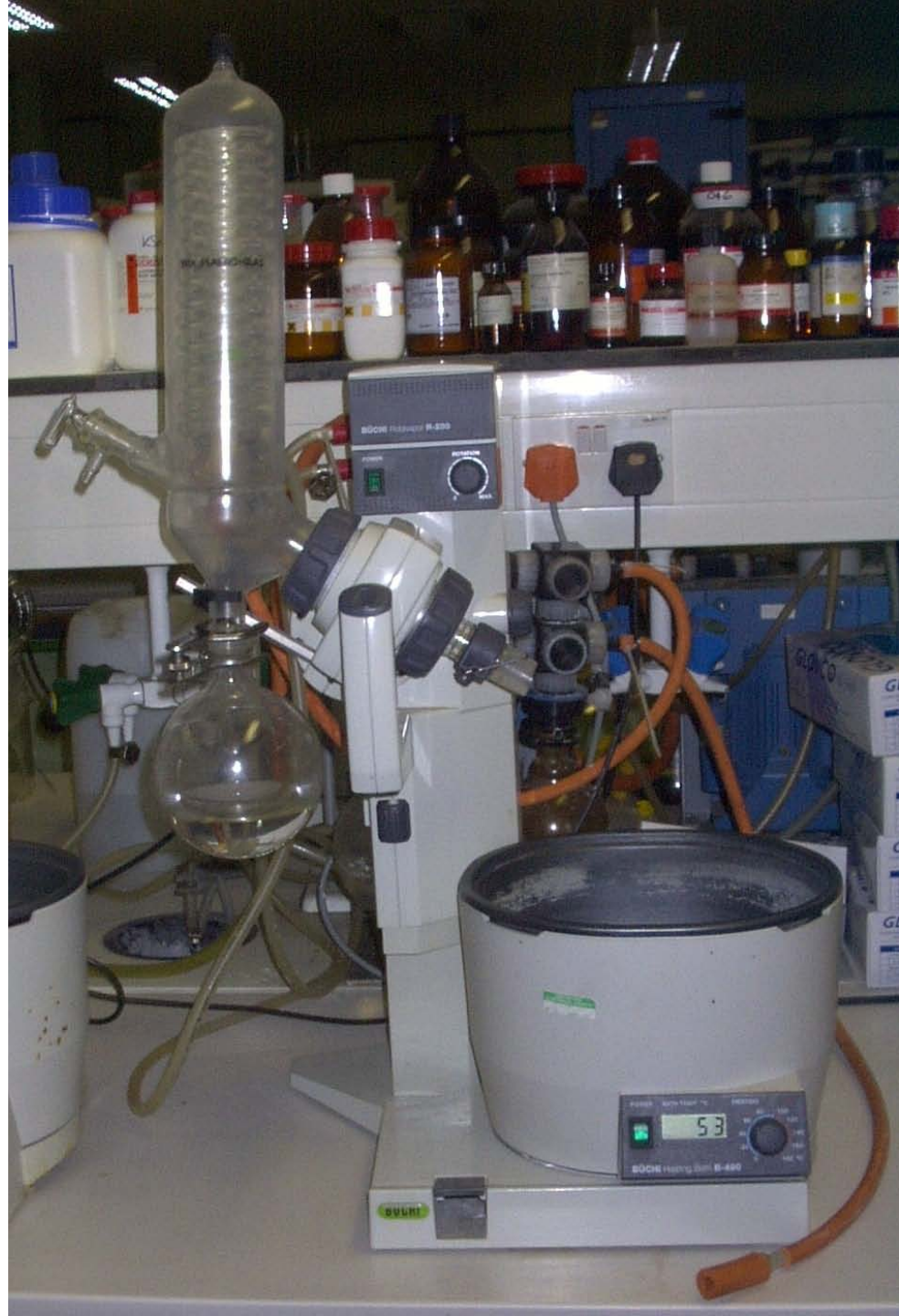
" MONTANARA"	% PESO RESIDUO	% PERDITA PESO
Fresche in Evoo a 180°C	85	15
Prefritte 2' rifinite dopo 30'	92	8
Prefritte 2' surgelate	91	9

Dati Patata

PATATE	% PESO REDISUO	% PERDITA DI PESO
Fresche in Evoo a 180°C	53	47
Disidratate a 50 °C per 40 minuti fritte in Evoo	51	49
Prefritte 2' e fritte dopo 30 ' fritte in Evoo	46	54
Fritte in olio d'arachidi a 180°C	54	46
Surgelate (prefritte) in Evoo a 180°C	48	52

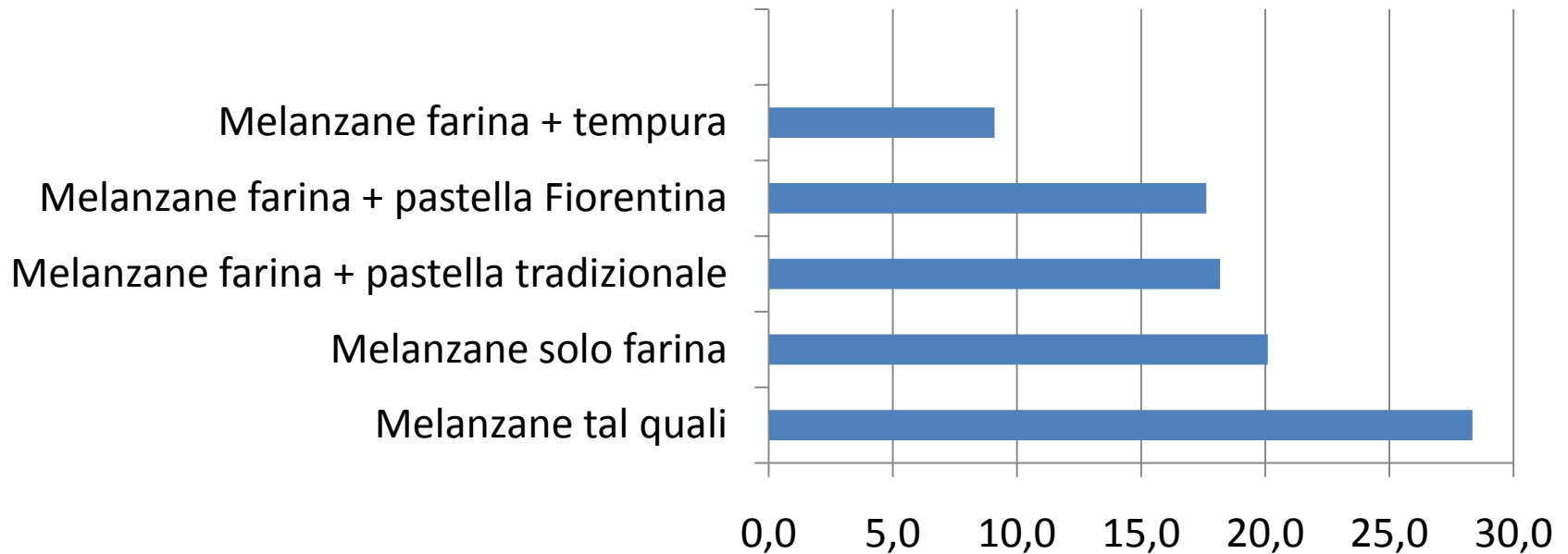
Misurazione olio assorbito

L'olio viene estratto
con solventi ed il
campione pesato
dopo
allontanamento
dello stesso in
evaporatore rotante



Risultati Melanzane

% OLIO ASSORBITO



Fried eggplant have almost 30% fat!

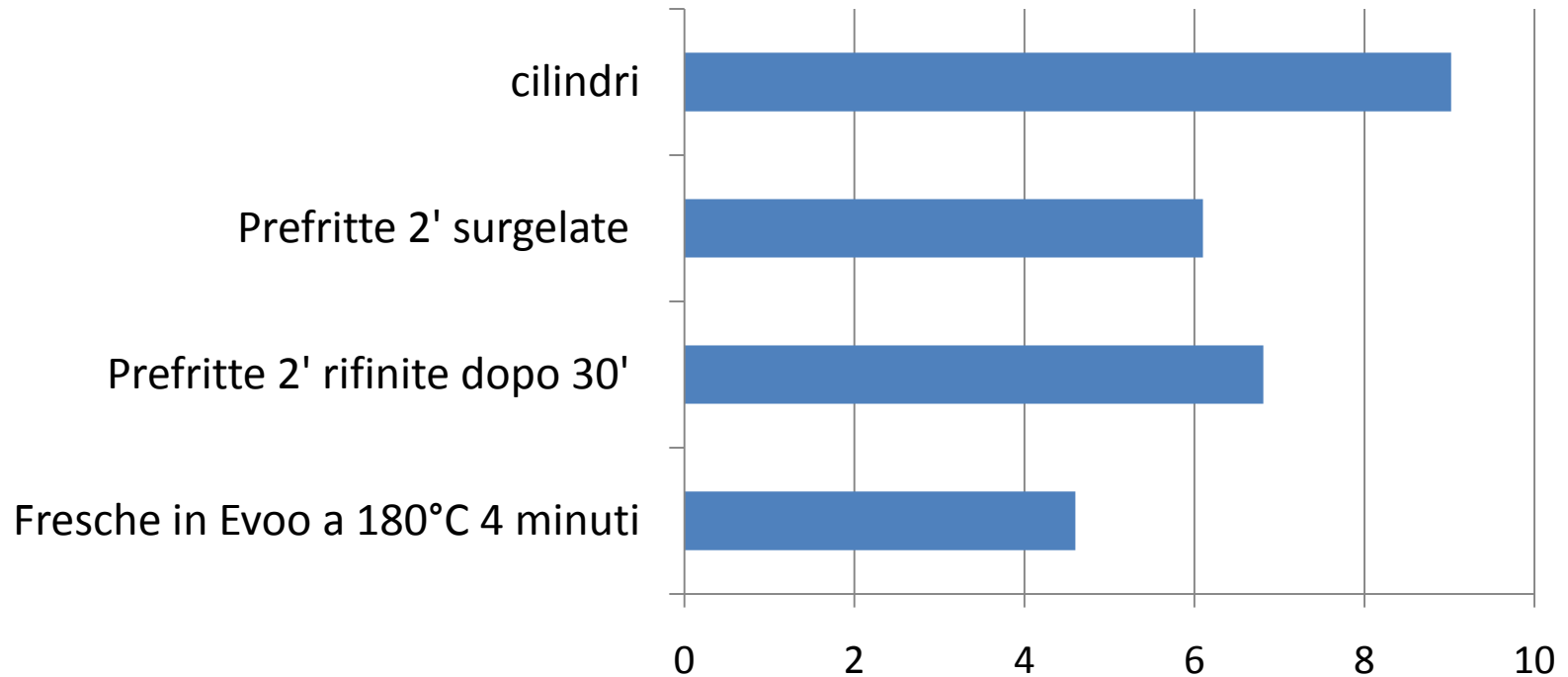
It is reduced to 20% simply by the flour coating

Egg-containing batter do not reduce the oil absorption

Tempura batter is very effective!

Risultati Montanara

% OLIO ASSORBITO MONTANARA

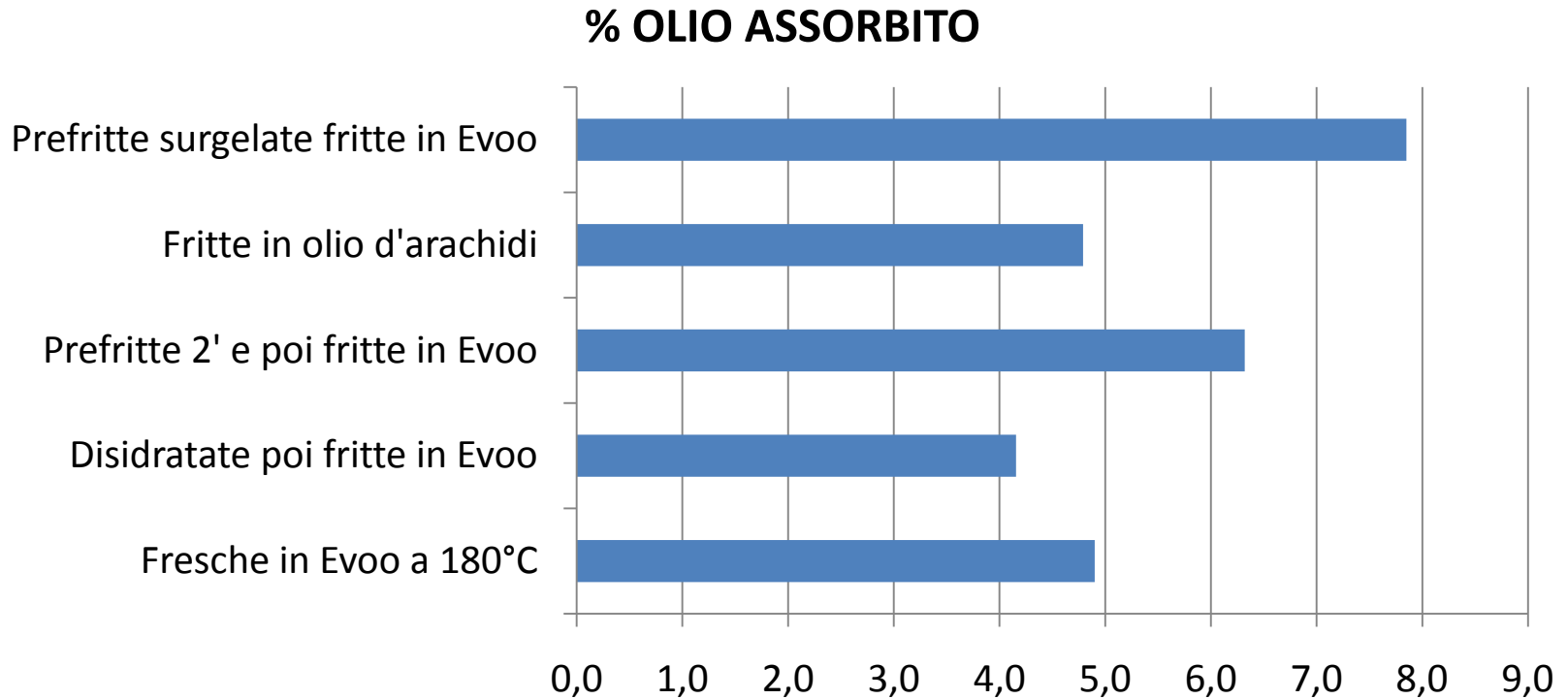


The amount of oil absorbed is low

Oil absorption depends on the shape

Freeze and resting slightly increase the absorption

Risultati Patate



The oil absorption is quite low

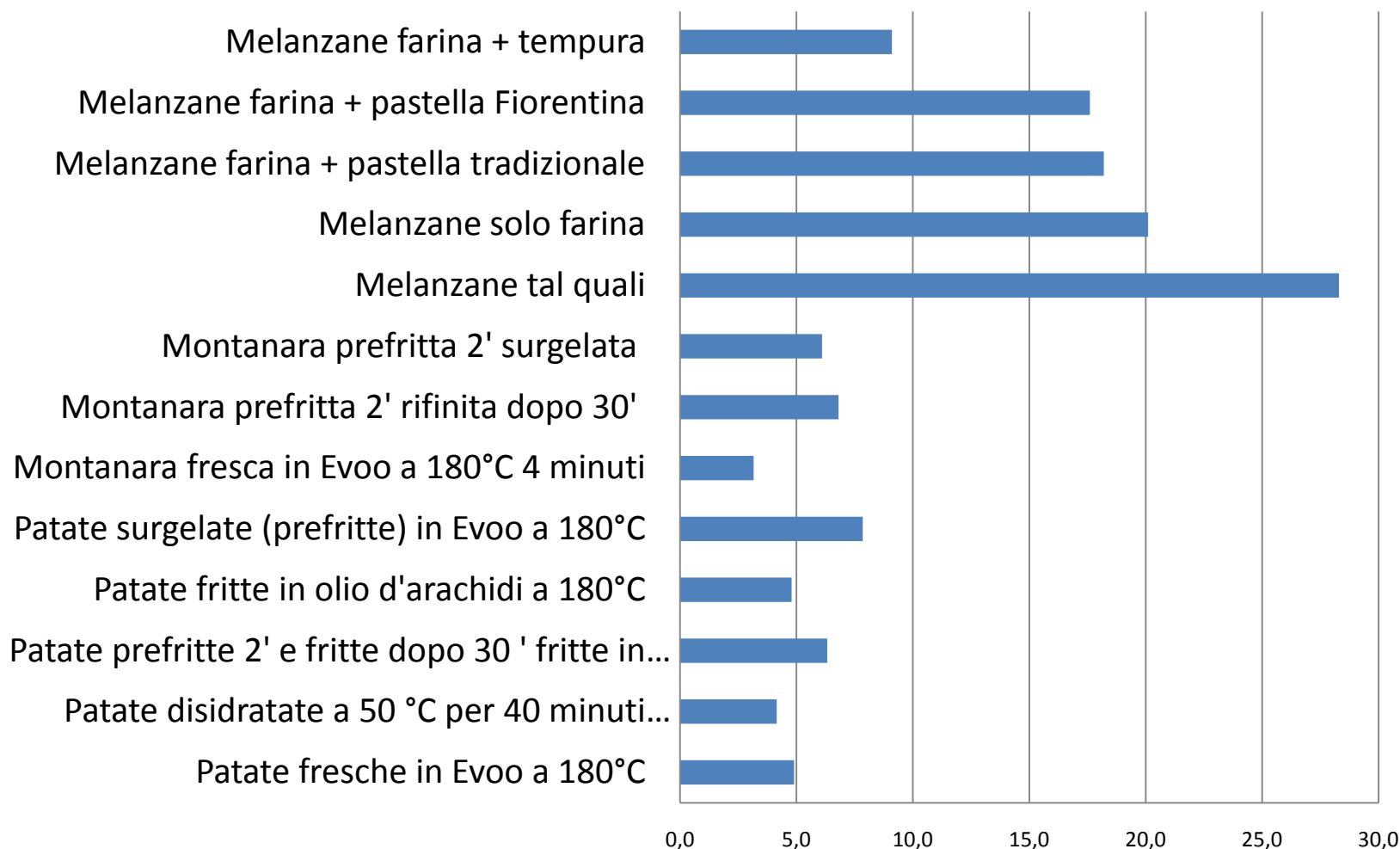
Freeze and resting markedly increase it (more than Montanara)

Type of oil is not relevant

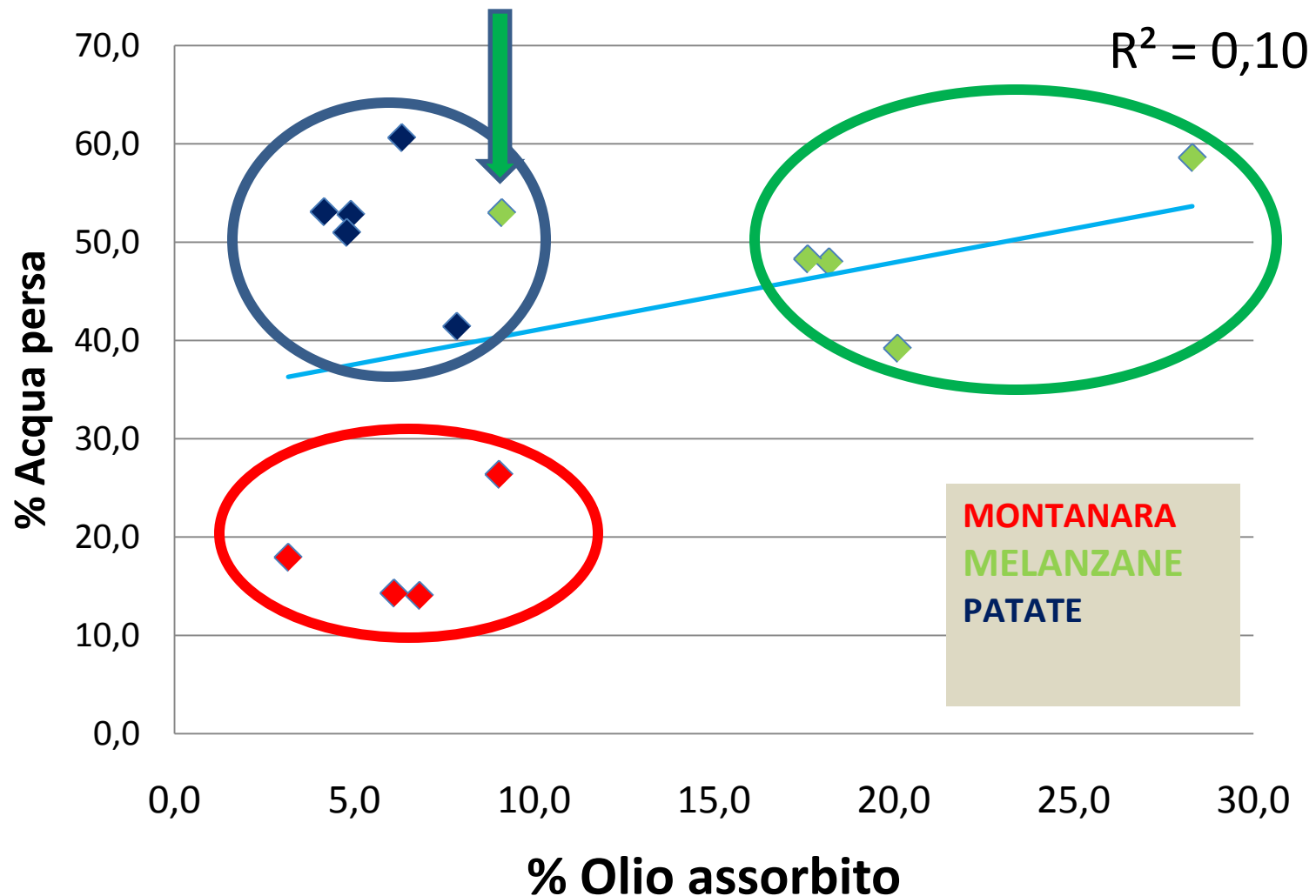
Pre-drying reduce the frying time do not affect oil absorption(*)

Results all together

% Olio assorbito



Oil entrance-water loss correlation

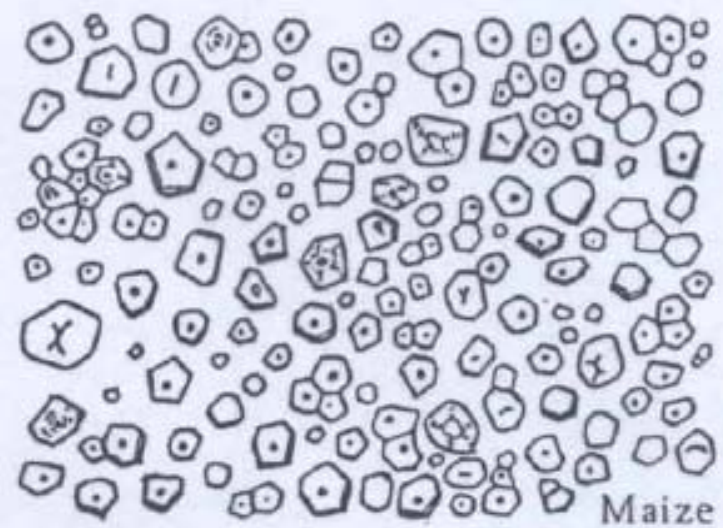
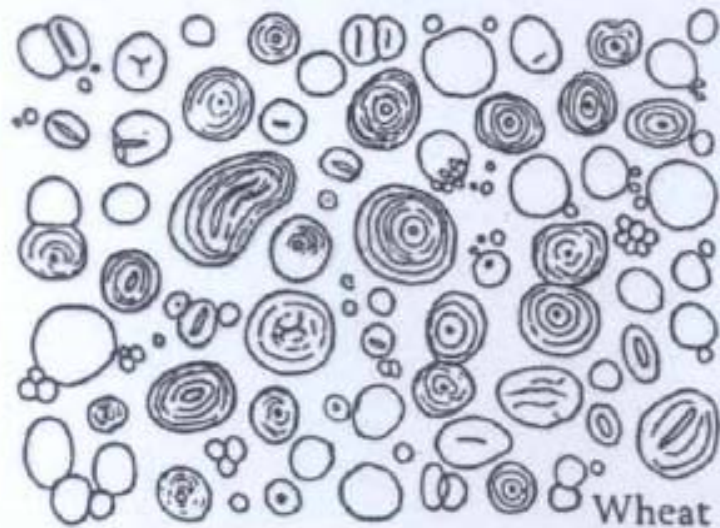
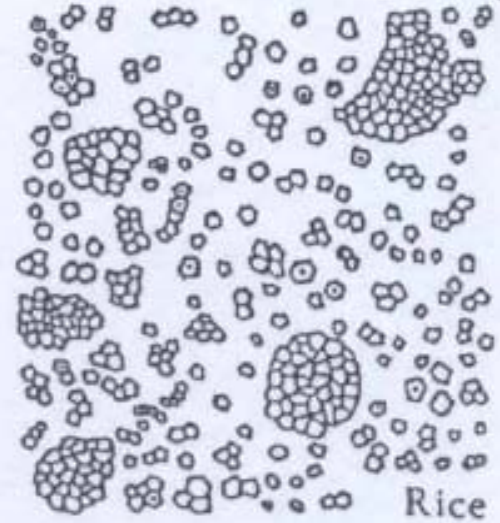
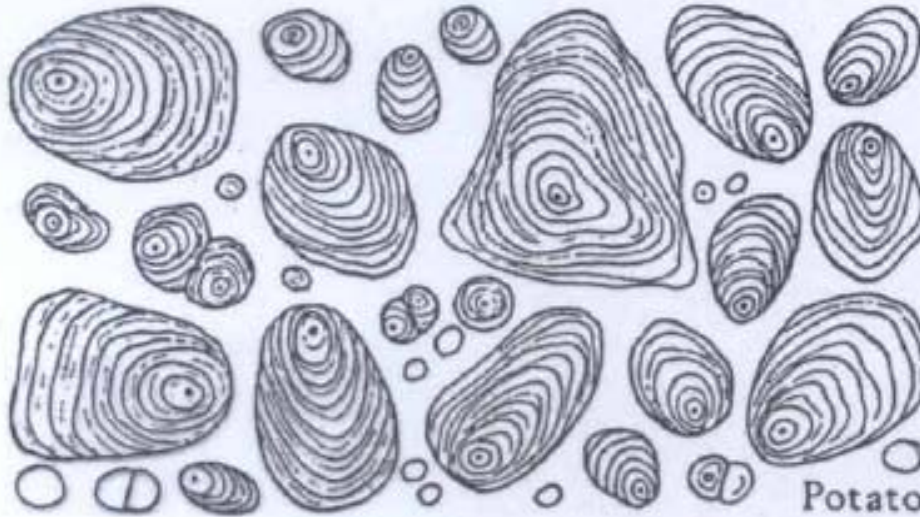


Your Conclusions

Our Conclusions

- No correlation water/oil (as expected)
- Batter coating can be very effective for vegetable products absorption
- Starch plays a major role. Its gelatinization fills the gaps and create a hydrophilic barrier blocking the oil entrance
- Formation of protein structure do not impair oil absorption

Starch types



Future experiments

- Coating with different starch types with and without proteins
- Evaluate the effectiveness of pre-drying in reducing oil absorption