

Principal Investigators:

Luisa Torri, Roberta Cevasco e Franco Fassio

Research Collaborators:

Chiara Chirilli | c.chirilli@unisg.it Chiara Nervo | c.nervo@unisg.it (SENSORY TESTS)

Fabiana Rovera | f.rovera@unisg.it (CIRCULAR BUSINESS MODEL)

University of Gastronomic Sciences of Pollenzo (UNISG)

The Project

It is aimed at the study of an innovative hydrolyzed product derived from fishery by-products and its effects on soil and plants

Goal

The introduction and dissemination in the main Ligurian crops of an innovative biostimulating product obtained from by-products of the local fishing chain

PSR Regione Liguria 2014 – 2020 Misura 16 Cooperazione del DGR nr. 668/2019







A hypothesis of circular business model

Focus on the systemic and circular approach of the project

Reference area: **GSA 9** which includes the Ligurian Sea and the Northern Tyrrhenian Sea

The product exerts its effect on crops by improving production performance in a completely **ecological and**

sustainable way

Introduction and **use in the field** of the biostimulant product (dilution and optimized use according to protocol

Project FISH)

PPL

Dissemination

of the product

according to

demand and

market generated

within the territory

The main recipients of the product are Ligurian horticultural and floricultural farms

Packaging (flexible packaging) and appropriate labelling to

guarantee the users

PACKAGING

Storage and marketing of the **biostimulant** produced

PROCUREMENT

Use of "S.O.A."

deriving from a first

phase of fish

processing.

The "S.O.A." are

intercepted when they are

still raw material

By-product of the local catch (S.O.A., ex Reg. EU 1069/2009, category 3 material)

> **Collaboration** with small/medium Ligurian fish processing companies

Freezing of "S.O.A." quickly, to avoid decay. (preference for immediate processing proximity)

> The transport of S.O.A. is accompanied by the **Commercial** Doc. and the Health Certificate (art. 21), specified in the Reg.UE 142/2011 (art.17)

Development of a "derived product" by S.O.A., a biostimulant, through an enzymatic and microbiological process

Low environmental impact logistics, electric vehicles, processing sites nearby

Maintenance of

cold chain

(pre-process):

among the

priorities at the

legislative level

PROCESSING Shelf life of the (minimum 1 year)

Sensory tests and Results

3 different sessions from October 2021 to July 2022. **5 horticultural crops** treated with different formulations of experimental biostimulants.

Subjects were asked to rate how much they disliked/liked the sample in terms of appearance, odour, taste, texture, flavour, and overall liking on a 9-point hedonic scale (1=extremely dislike; 9=extremely like).

Liking mean values (± standard deviation) of two samples of tomatoes_Session 1

Pink beefsteak tomato treated with biostimulant FISH 7 obtained significantly higher scores for flavour and texture.

Attribute	Tomatoes treated with Fish-7	Tomatoes not treated	p- value
Appearance	$6,9 \pm 1,6$	$6,9 \pm 1,4$	1,000
Odour	$6,7 \pm 1,6$	$6,7 \pm 1,7$	0,927
Taste	$6,3 \pm 1,7$	5,8 ± 1,9	0,081
Flavour	6,3 ± 1,7	5,7 ± 1,8	0,028
Texture	6,5 ± 1,9	5,8 ± 1,8	0,020
Overall Liking	$6,6 \pm 1,7$	$6,1 \pm 1,6$	0,083

product

Liking test on **Tomatoes** and Basil 89 subjects 60.7 % female

39.3 % male

Session 2

Liking test on

Garlic and Basil

60 subjects

58.3 % female

41.7 % male

Session 1

Liking mean values of five samples of basil_Session 2

Significant differences were observed for all attributes. Specifically, basil treated with biostimulant Test 2 IDF 10.2 ml obtained lower liking scores for all sensory attributes analyzed.

Attribute	Basil not treated	Basil treated with Test 1 D 6.7 ml	Basil treated with Test 2 IDF 10.2 ml	Basil treated with Test 3 IDB 10.2 ml	Basil treated with Test 4 IDF B 5.6 ml	p-value	
Appearance	6.5 ^a	6.3 ^a	5.4 ^b	6.1 ^a	6.2 ^a	0.0002	
Odour	5.8 ^a	5.5ab	4.4 ^c	4.7 ^{bc}	4.9abc	0.0001	
Taste	5.4 ^a	5.2ab	4.5 ^b	5.1 ^{ab}	4.8ab	0.031	
Flavour	5.4 ^a	5.3ab	4.5 ^b	5.1 ^{ab}	4.8ab	0.018	
Texture	6.3 ^a	6.0 ^a	5.2 ^b	5.9 ^a	6. 0a	0.0004	
Overall Liking	5.7 ^a	5.4ab	4.8 ^b	5.3ab	5.3ab	0.030	

Basil analyzed in session 1 exhibited no significant differences (p > 0.05). For **garlic** (session 2) and **zucchini** (session 3), the only attribute significantly affected by the treatment was appearance (p=0.008; p < 0.0001). Finally, tomatoes (session 3) were notably different in terms of appearance (p=0.0004) and odour (p=0.002).

Liking mean values (± standard deviation) of two samples of onions_Session 3

Significant differences were observed in the perception of taste, flavour and overall liking. Specifically, for these sensory attributes, the onion treated with biostimulant IF 13 had lower liking scores than onion not treated with any biostimulant.

Attribute	Onion treated with IF13	Onion not treated	p-value	Session 3
Appearance	6.5±1.5	6.5±1.6	0.845	Liking test on
Odour	6.1±1.9	6.5±1.9	0.330	Tomatoes, Onions
Taste	5.1±2.1	6.2±1.7	0.006	and Zucchini
Flavour	4.9±2.2	6.2±1.6	0.001	48 subjects 62.5 % female
Texture	5.6±1.9	6.3±1.4	0.067	37.5 % male
Overall Liking	5.3±2.0	6.4±1.6	0.004	