

8th International Conference on Sustainable Solid Waste Management

VOLATILE FATTY ACIDS PRODUCTION FROM AGROINDUSTRIAL WASTE: IMPACT OF PROCESS pH

SILVIA GRESES HUERTA

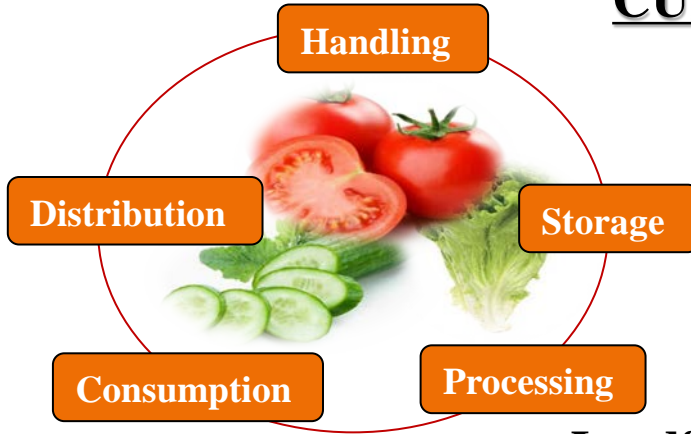
**Postdoctoral researcher
Biotechnological Processes Unit
silvia.greses@imdea.org**

June, 2021

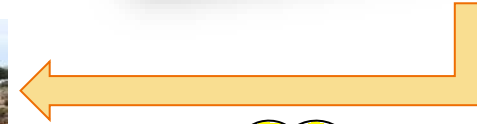
THESSALONIKI, GREECE

CURRENT SITUATION

Agroindustrial waste



1.3 billion tonnes/year



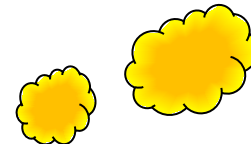
Landfill



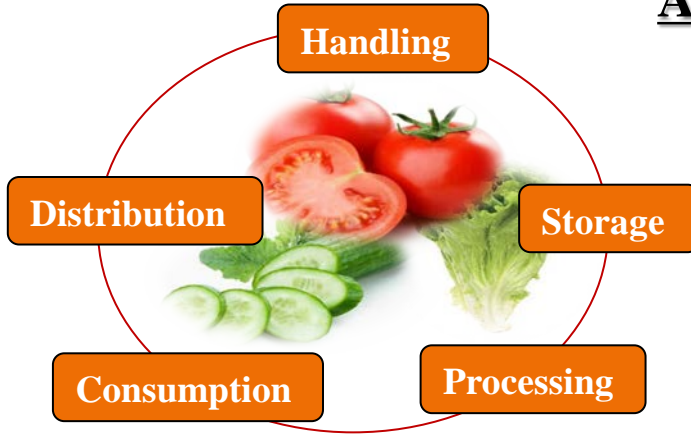
Incineration



Compost



ALTERNATIVE

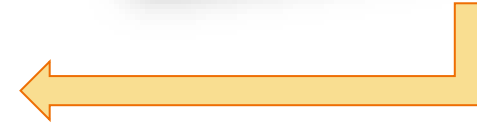
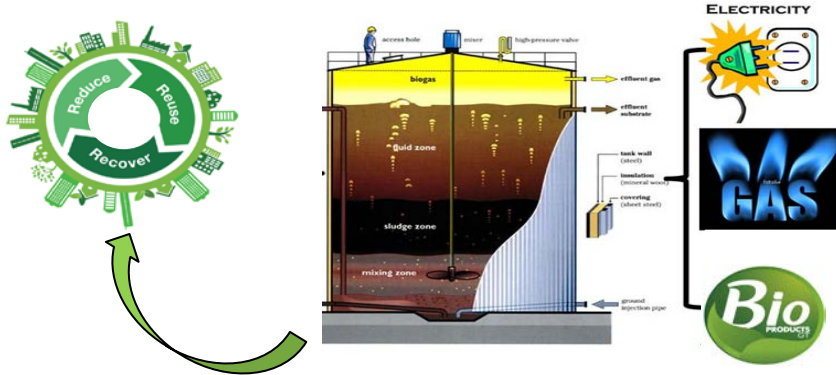


Agroindustrial waste



1.3 billion tonnes

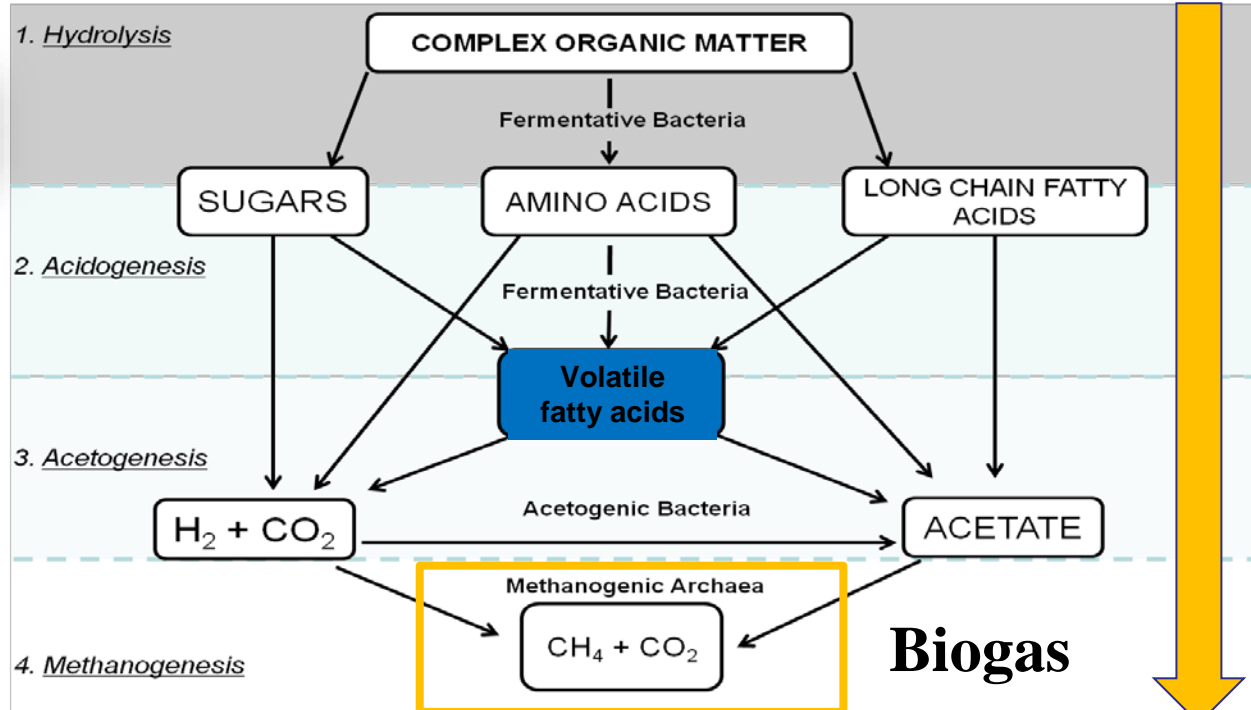
Biological process



ALTERNATIVE

Anaerobic digestion

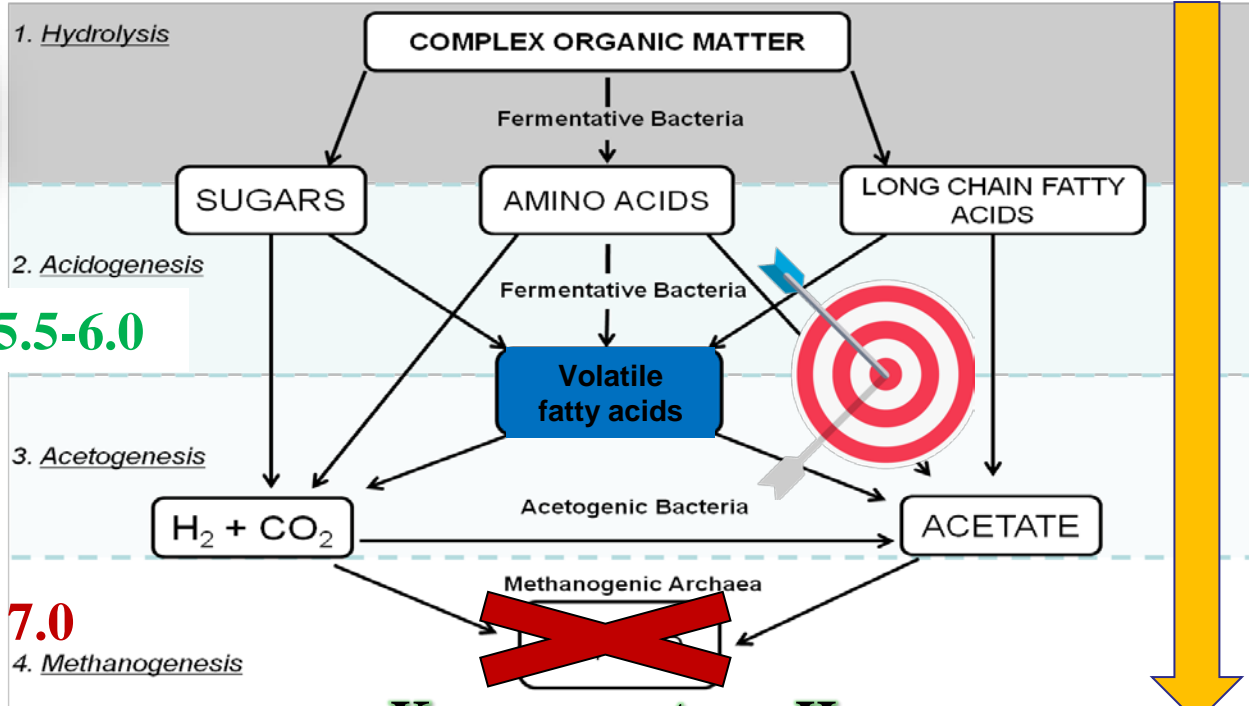
Agroindustrial waste



ALTERNATIVE

Anaerobic fermentation

Agroindustrial waste





Anaerobic reactor



Acetic acid (C2)
Propionic acid (C3)
Isobutyric acid (iC4)
Butyric acid (C4)
Isovaleric acid (iC5)
Valeric acid (C5)
Caproic acid (C6)

**Volatile
Fatty Acids
(VFAs)**

Operational conditions:

CSTR

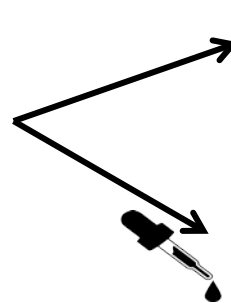
T = 25 °C

OLR = 3 gVS/d·L

HRT = 8 days

NO pH adjustment

**pH adjustment (NaOH)
5.5-6.0**

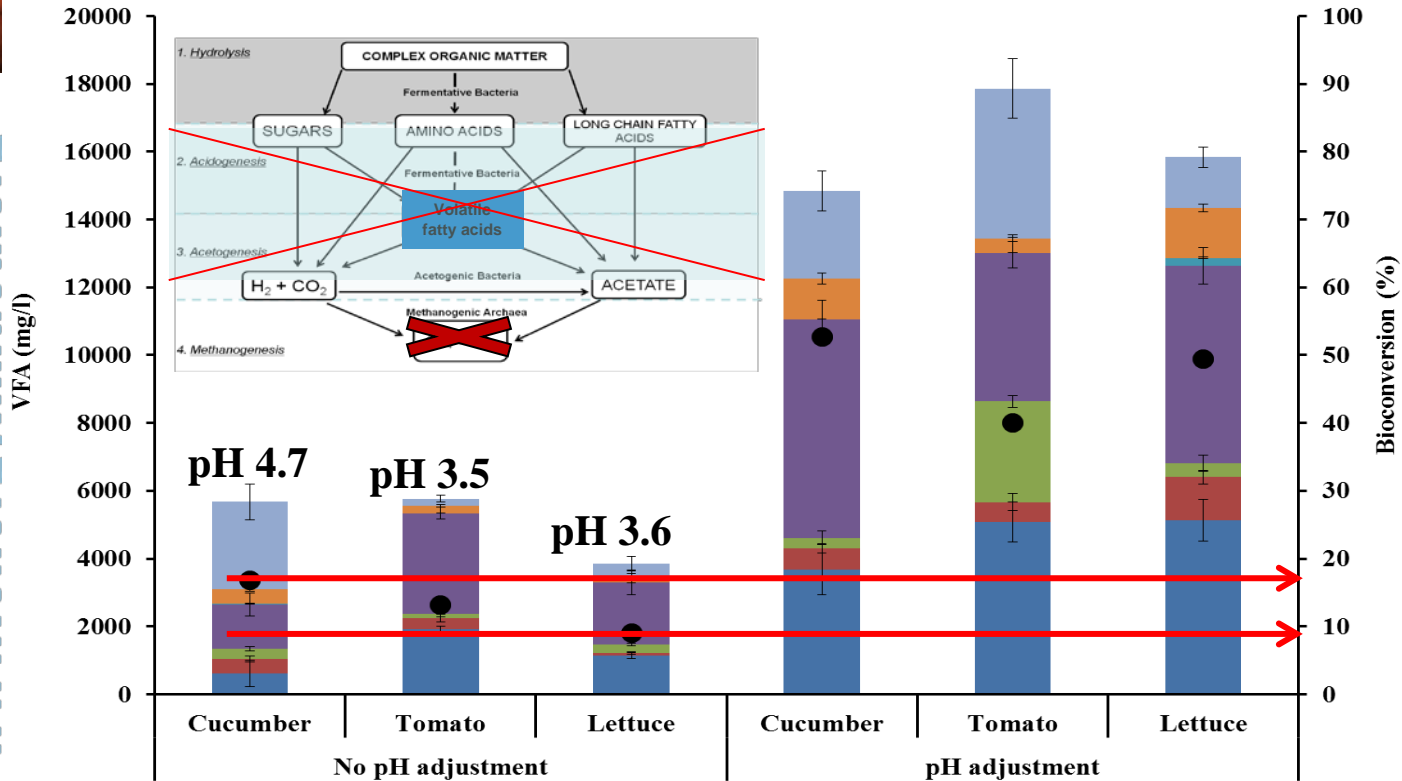


Characterization of agroindustrial waste

	Cucumber	Tomato	Lettuce
TCOD (g/L)	55.2 ± 7.2	68.6 ± 6.8	55.2 ± 10.2
SCOD (g/L)	30.7 ± 1.1	45.0 ± 4.5	35.7 ± 5.8
TS (g/L)	30.4 ± 3.0	41.5 ± 2.7	39.6 ± 0.5
VS (g/L)	27.2 ± 3.0	34.3 ± 0.9	34.8 ± 0.2
TN (g/L)	1.04 ± 0.11	1.08 ± 0.95	1.50 ± 0.97
SN (g/L)	0.21 ± 0.02	0.13 ± 0.02	0.24 ± 0.03
NH ₄ ⁺ -N (g/L)	0.03 ± 0.01	0.03 ± 0.01	0.03 ± 0.02
pH	5.2 ± 0.2	3.9 ± 0.1	5.5 ± 0.2
%CH (w/w)	65.5 ± 9.1	52.7 ± 12.5	63.4 ± 4.8
%Proteins (w/w)	22.7 ± 4.2	18.6 ± 8.5	23.7 ± 0.3
%Lipids (w/w)	1.4 ± 0.2	11.3 ± 2.0	1.4 ± 0.9
%Ash (w/w)	10.4 ± 2.3	17.4 ± 9.2	12.9 ± 0.4

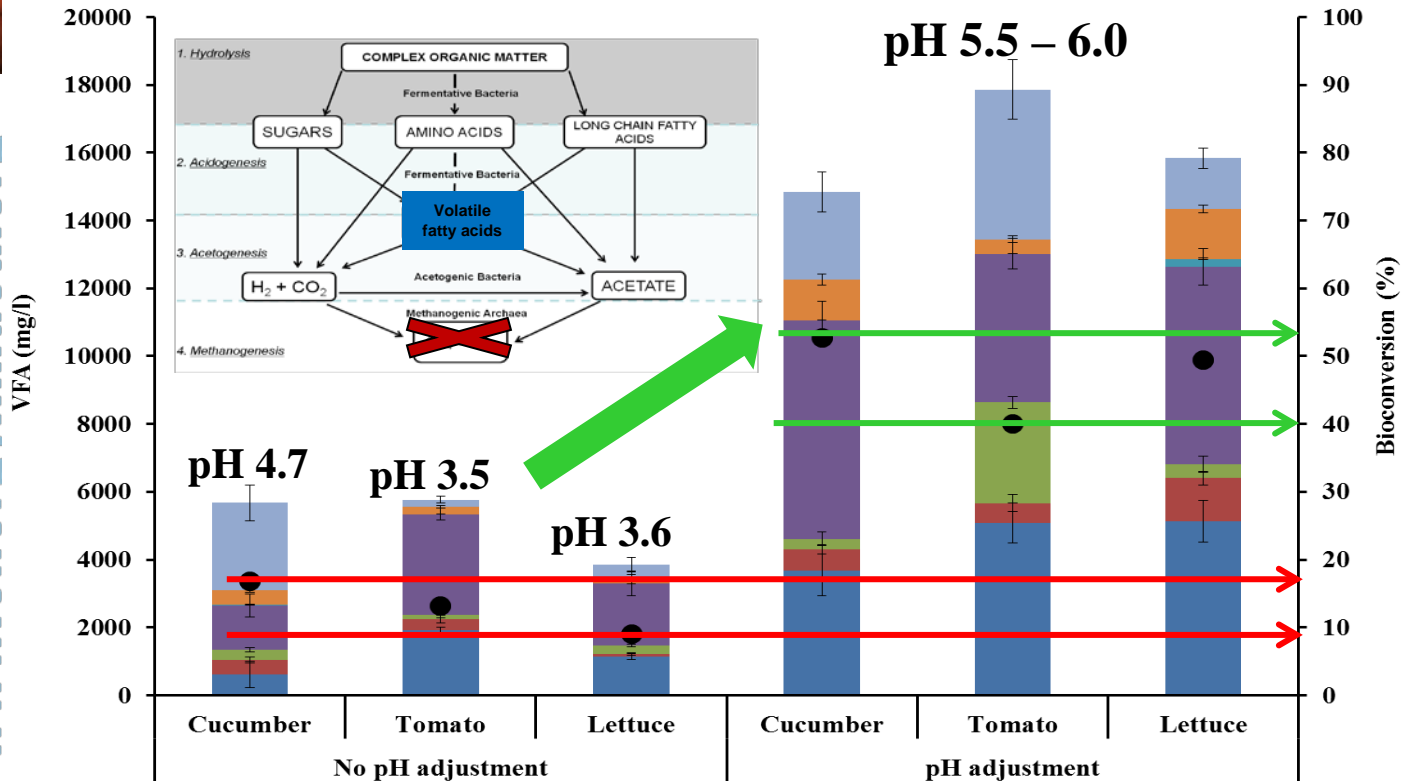
Volatile fatty acids production

■ C2 ■ C3 ■ i-C4 ■ C4 ■ i-C5 ■ C5 ■ C6 ● Bioconversion



Volatile fatty acids production

■ C2 ■ C3 ■ i-C4 ■ C4 ■ i-C5 ■ C5 ■ C6 ● Bioconversion



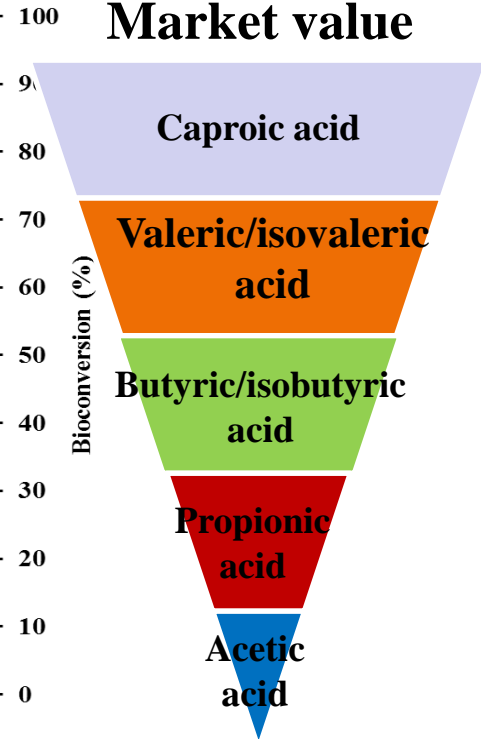
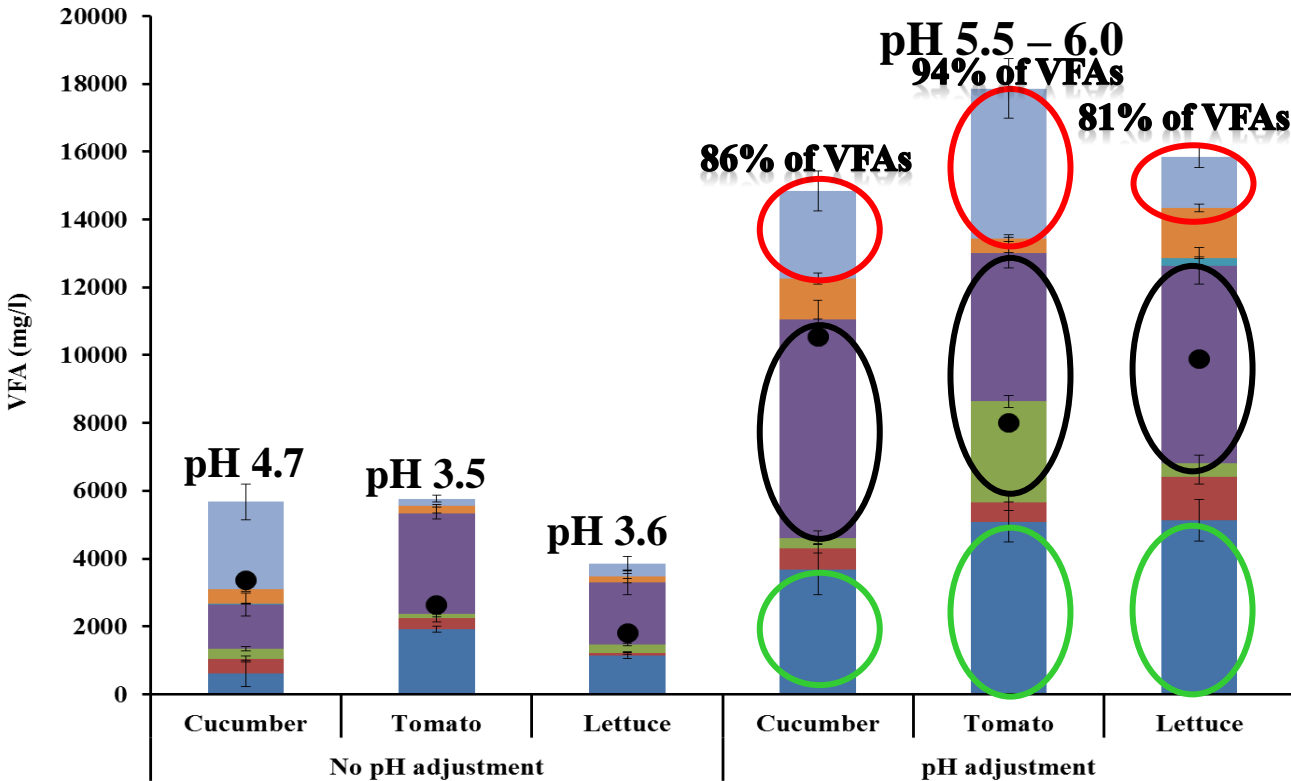
HIGH values



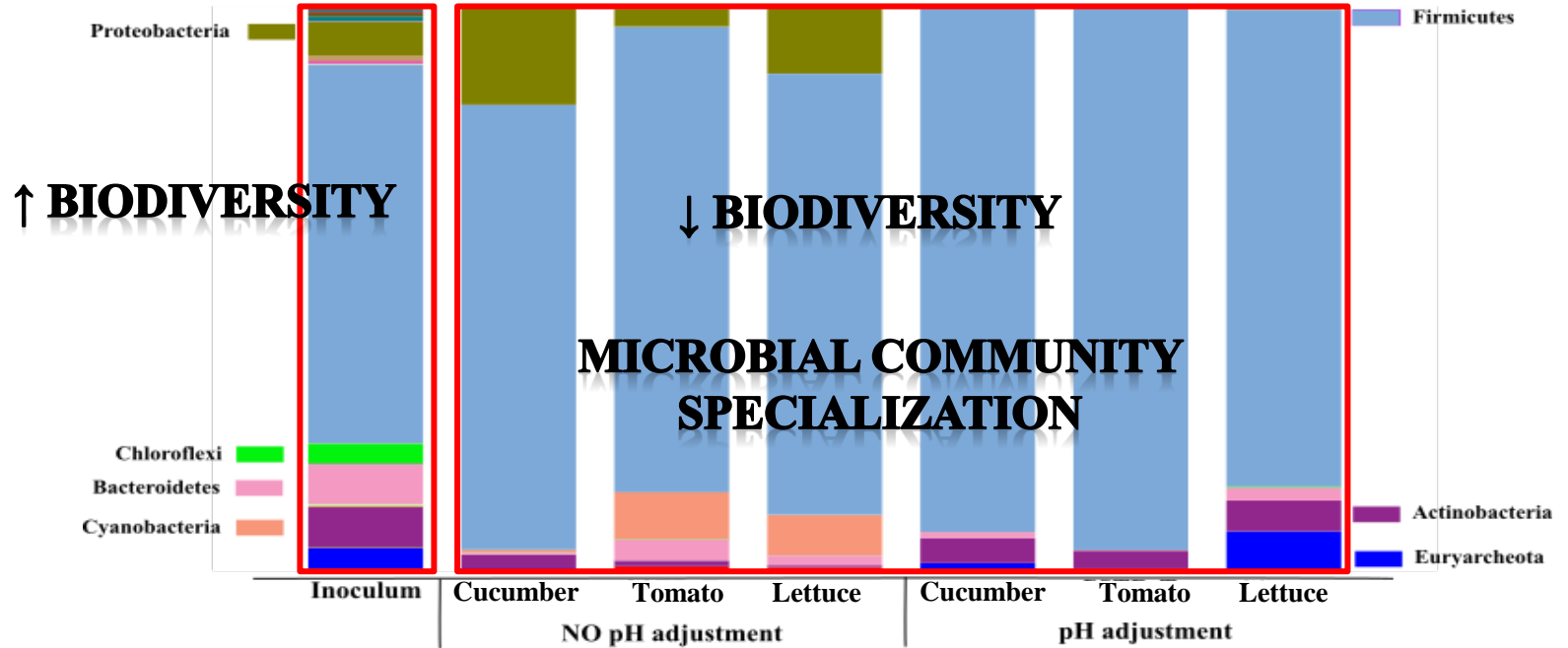
**Common values
in literature
18 – 33 %**

Volatile fatty acids production

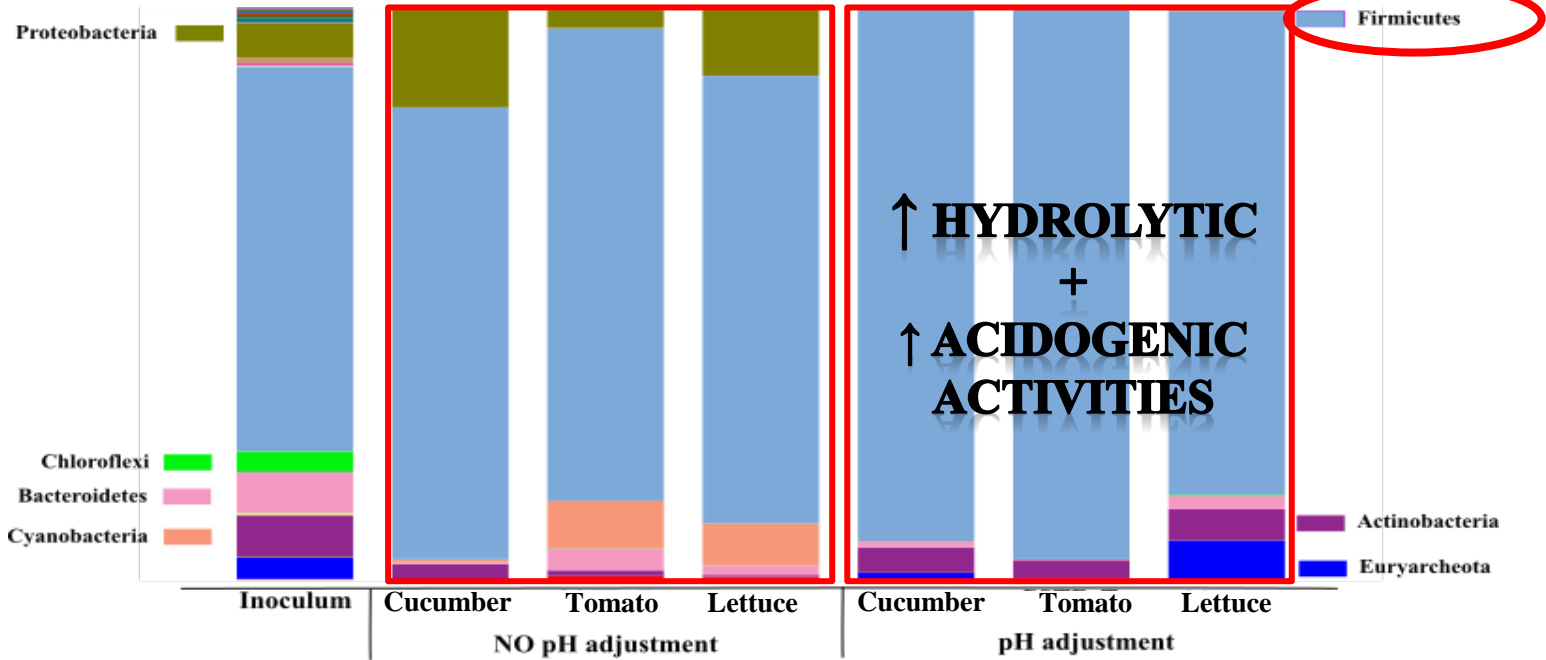
■ C2 ■ C3 ■ i-C4 ■ C4 ■ i-C5 ■ C5 ■ C6 ● Bioconversion



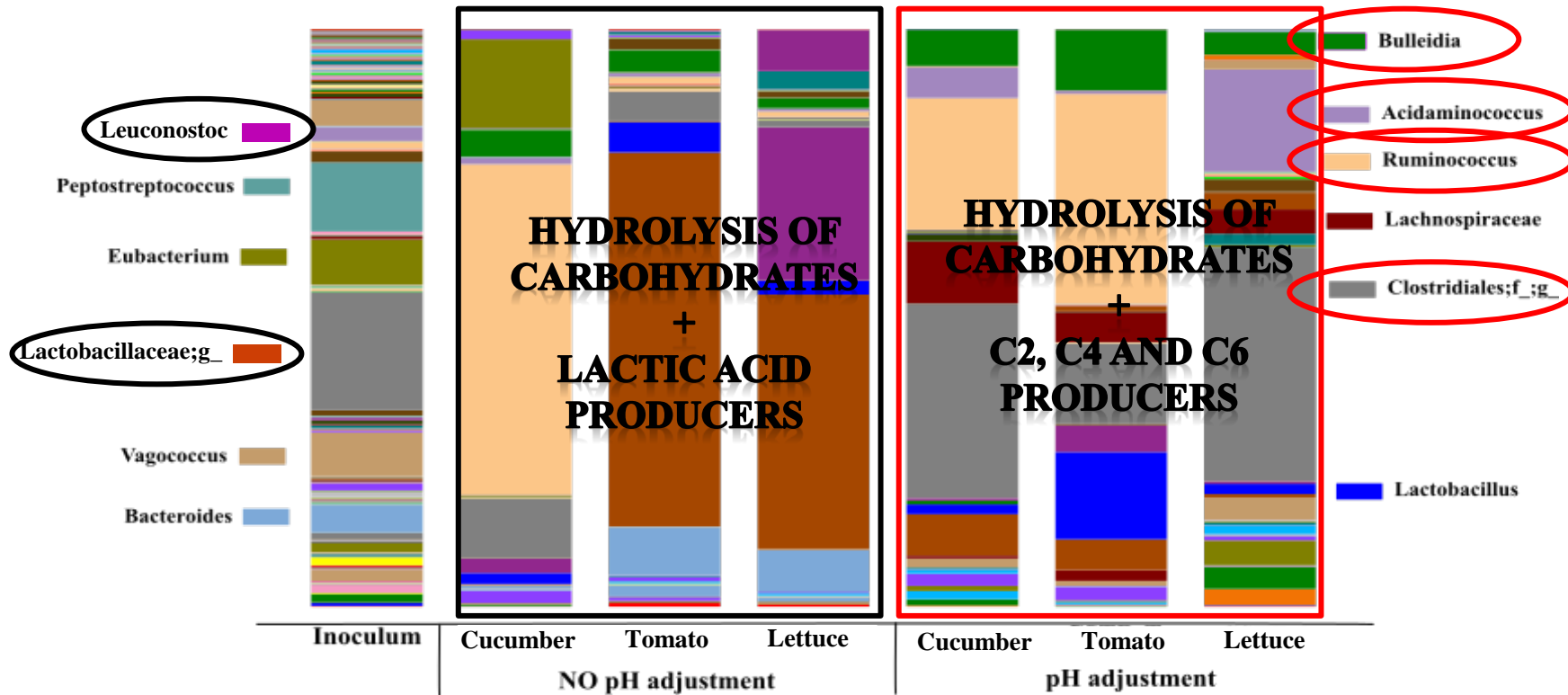
Microbial community analysis: PHYLUM



Microbial community analysis: PHYLUM



Microbial community analysis: GENUS



TAKE HOME MESSAGES

- Agroindustrial wastes are valuable resources for VFAs production
- Process efficiency is highly related to pH
- Bacterial community specialized in carbohydrates degradation can be promoted
- Firmicutes is a key bacterial phylum for maximizing VFAs production

8th International Conference on Sustainable Solid Waste Management

Thanks for your attention

SILVIA GRESES HUERTA

Postdoctoral researcher
Biotechnological Processes Unit
silvia.greses@imdea.org

June, 2021

THESSALONIKI, GREECE