Obtaining of added-value organic materials by composting of agri-food waste

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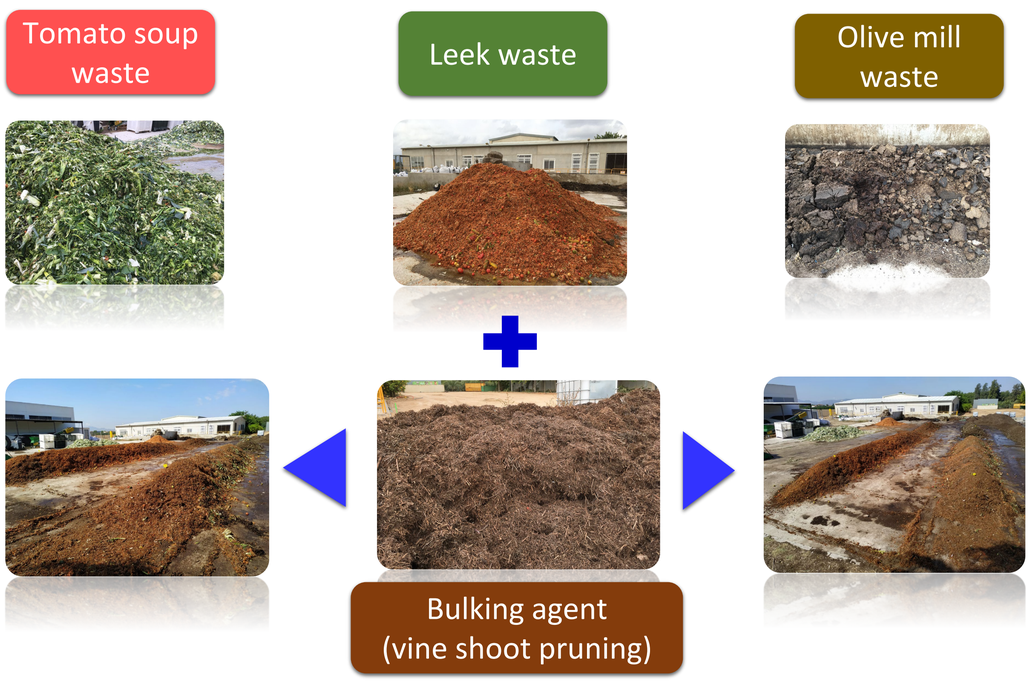
OBJECTIVE: *to study the feasibility of the management and valorisation of* ***agri-food wastes by its co-composting*** *with vine shoot pruning and to evaluate the* ***potential suppressive capacity*** *against the phytopathogen Phytium irregulare.*

Experimental design

- Elaboration of 6 composts (dry matter basis) by the turning composting system.

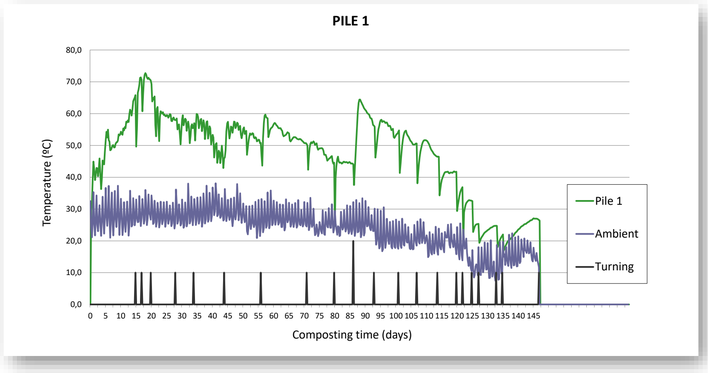
	Tomato soup waste	Leek waste	Olive mill waste	Bulking agent (vine shoot pruning)
Pile 1:	*34.3 %*	*18.5 %*		*47.2 %*
Pile 2:	*45.9 %*			*54.1 %*
Pile 3:		*28.0 %*		*72.0 %*
Pile 4:		*20.8 %*	*33.6 %*	*45.6 %*
Pile 5:	*24.7 %*		*33.5 %*	*41.8 %*
Pile 6:	*20.8 %*	*8.00 %*	*30.2 %*	*41.0 %*

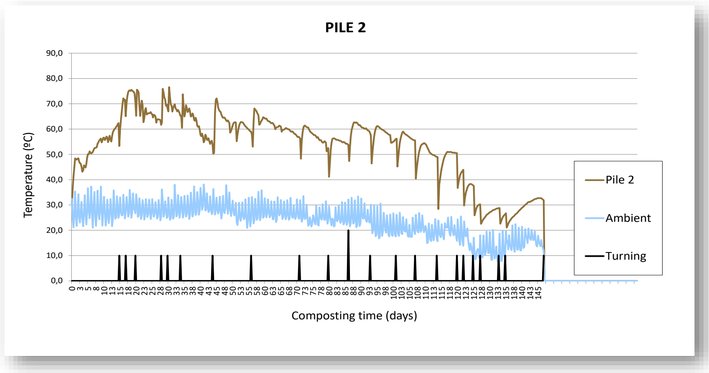


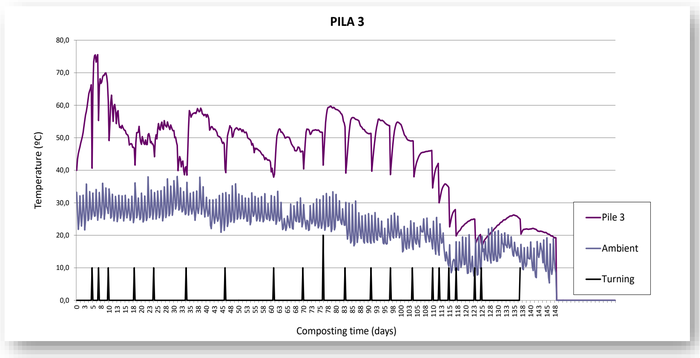
- Monitoring of temperature evolution and determination of physico-chemical and chemical parameters during composting.
- The bio-oxidative phase, which lasted between 157 and 166 days, with a maturation period over two months.

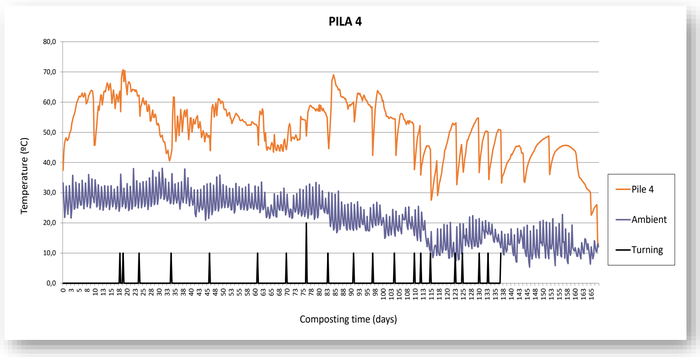
Results and Discussion

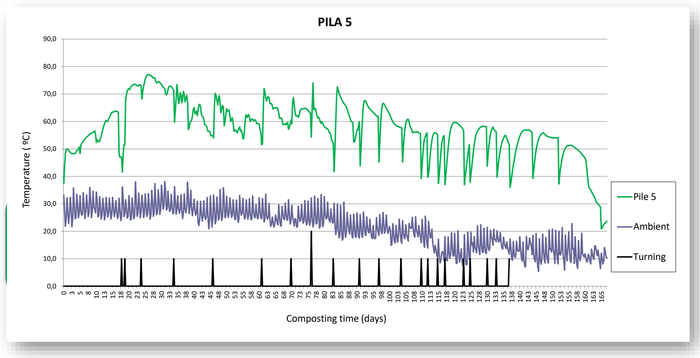
- Thermophilic temperatures (> 40ºC) in the first week. All the piles showed **thermophilic values at least a month.**
- At the beginning of composting, Pile 3 showed the most rapid temperature rise, probably due to the highest proportion of leek waste.
- The **highest temperature** values were reached in the **piles with olive mill waste**.











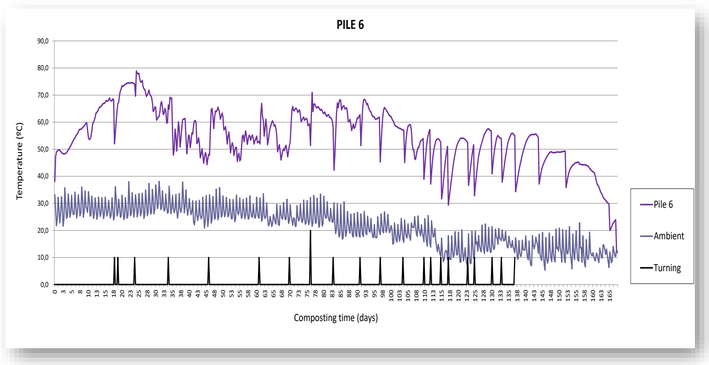


Table 1. Evolution of physico-chemical and chemical characteristics during composting

Composting stage	pH	EC (dS/m)	OM (%)	TOC (%)	TN
		Pile 1			
Beginning	6.7	4.08	87.4	45.9	1.9
Thermophilic	8.4	4.79	73.4	40.6	3.2
End of bio-oxidative	8.8	7.08	65.1	35.9	3.2
Maturity	8.9	5.98	63.6	37.4	3.3
		Pile 2			
Beginning	6.4	2.51	90.6	48.1	1.6
Thermophilic	8.0	4.05	79.9	44.1	3.1
End of bio-oxidative	8.2	5.76	73.0	40.1	3.4
Maturity	8.4	5.44	66.8	37.7	3.4
		Pile 3			
Beginning	5.9	4.64	80.9	40.8	1.3
Thermophilic	8.3	4.14	71.7	38.8	1.9
End of bio-oxidative	8.9	4.86	58.0	32.4	2.6
Maturity	8.9	4.86	54.6	31.8	2.5
		Pile 4			
Beginning	5.9	4.65	85.6	44.5	1.2
Thermophilic	8.2	4.34	74.5	39.9	2.5
End of bio-oxidative	8.7	5.06	65.3	35.0	2.9
Maturity	8.9	4.94	62.2	36.8	2.6
		Pile 5			
Beginning	5.5	3.31	91.9	49.0	1.4
Thermophilic	7.6	2.96	87.8	46.5	2.4
End of bio-oxidative	8.2	3.83	79.4	42.4	3.4
Maturity	8.6	3.65	75.9	43.3	3.2
		Pile 6			
Beginning	6.1	4.04	87.2	45.7	1.5
Thermophilic	8.1	3.88	81.7	43.6	2.8
End of bio-oxidative	8.7	4.72	74.4	39.8	2.9
Maturity	8.8	4.75	68.6	40.4	3.3

- Increase of pH and EC in all the piles; decrease of OM, the **lowest** values at the end of bio-oxidative phase found in pile 3.
- **Increase of total N:** concentration effect. **The highest N values at the end of the bio-oxidative phase in mixtures with tomato soup waste.**
- **Clear inhibitory effect on the growth of *P. irregulare*** in *in vitro* conditions (data not shown).

CONCLUSIONS

The composting of agri-food wastes is an efficient method to manage these wastes and also allows to obtain end-products with an adequate maturity degree, suitable physico-chemical and chemical characteristics, absence of phytotoxicity and the potential biocontrol capacity against P. irregulare, which provide environmental benefits in the circular economy framework.

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