COMPOSTED SOIL AMENDMENT (COMPOST) MIXED, AND WITH SEWAGE SLUDGE, AND SLUDGE PLASTERS: CHEMICAL CHARACTERISTICS AND SOIL AMENDMENTS' PROPERTIES

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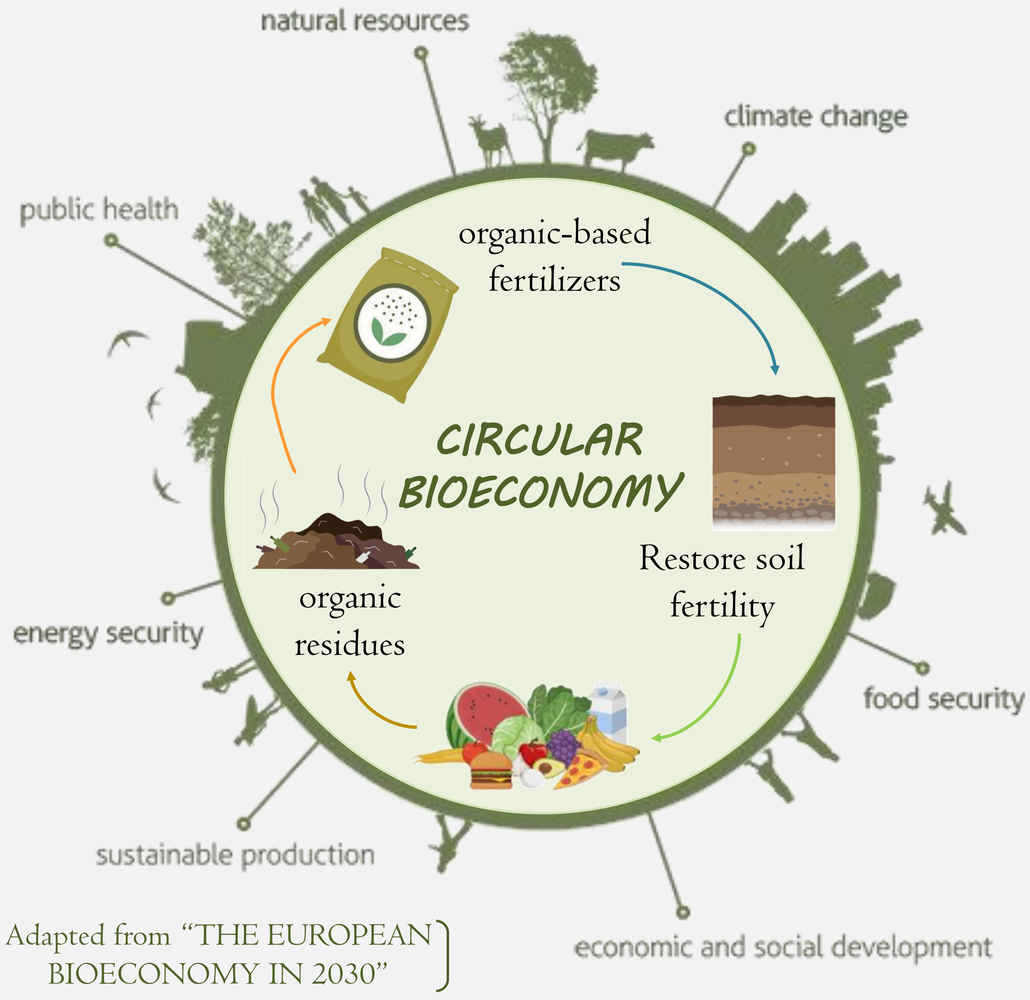


Adapted from "THE EUROPEAN BIOECONOMY IN 2030"

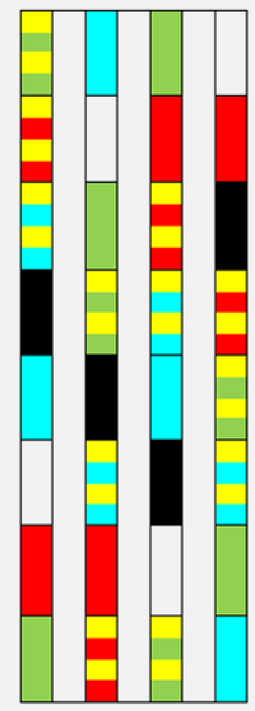
Aim of the work

Assess the effect of three organic-based fertilizers (OBFs) - municipal organic waste compost (MOW), sludge plasters (SP), and sewage sludge compost (SSC) – on soil biochemical parameters of a vineyard to determine if OBFs are environmentally safe and valuable for soil fertility and soil organic matter content restoration.

The experimental site

The vineyard (cv. Sangiovese, grafted on 110 Richter - *V. berlandieri* x *V. rupestris*) was planted in 2019 on clayey-loam soil at the experimental center of the University of Bologna (Cadriano, Italy) according to a randomized block design with four field replicates.

TREATMENT	N DOSE ($kg_N\ ha^{-1}$)
Control (CK)	-------
Mineral (MIN)	120
MOW 10	120
MOW 20	240
SP 10	120
SP 20	240
SSC 10	120
SSC 20	240



OBFs properties

OBFs' chemical differences are attributable to matrices' different origins and constitution; no critical issues emerged in relation to contaminants and pollutants (Italian D.Lgs. 75/2010).

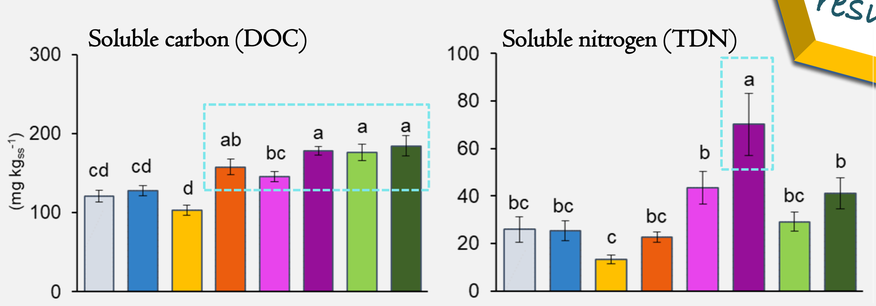
	MOW	SP	SSC	D.Lgs 75/2010
Humidity (%)	25	50	48	Max 50%
pH	8.3	8.5	7.4	6 – 8.5
Organic C (C %ss)	28.1	18.4	24.6	Min. 20%
Total N (N %ss)	2.2	2.2	2.3	
C/N ratio	13.2	8.7	10.7	Max 25
Total P (P_2O_5 %)	0.93	1.86	0.99	
Total K (K_2O %)	1.61	0.28	0.77	
Total S (SO_3 %)	0.45	8.41	2.20	
Total Ca (CaO %)	7.84	14.4	6.49	
Total Mg (MgO %)	0.70	0.70	0.64	
Total Na (Na_2O %)	0.84	0.29	0.24	

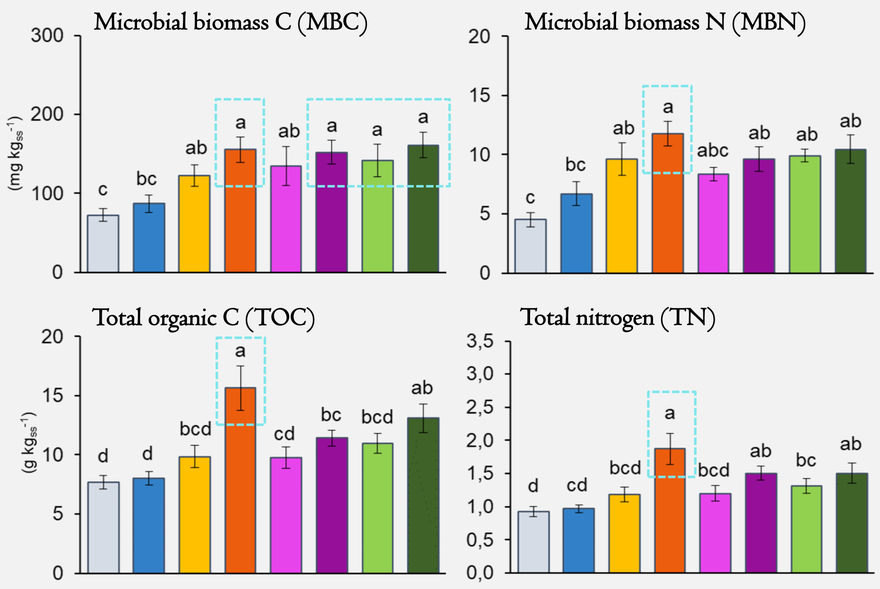
($mg\ kg^{-1}$)	NUTRITIONAL ELEMENTS Fe	Mn	Cu	Zn	Cd	Cr(VI)	Hg	Ni	Pb
MOW	5863	290	73.1	128	0.33	nd	nd	16.1	22.2
SSC	7087	384	85.0	123	0.24	nd	nd	23.9	26.8
SP	7686	187	119	206	0.32	nd	nd	13.9	12.6
D.Lgs. 75/2010	--	--	*230*	*500*	*1.5*	*0.5*	*1.5*	*100*	*140*

Soil biochemical results

Legend: CK, MIN, MOW 10, MOW 20, SP 10, SP 20, SSC 10, SSC 20

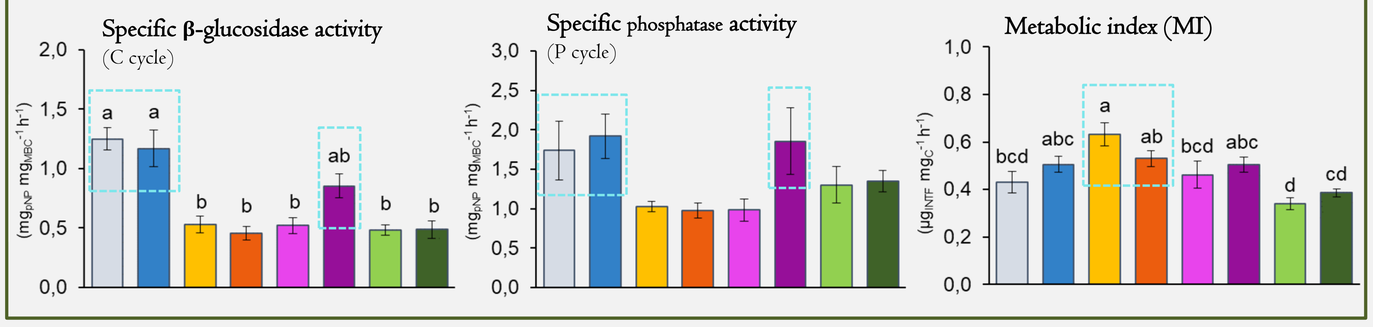
SP microbial transformation with accumulation of carbon and nitrogen soluble forms (DOC and TDN).





MOW and SSC favor microbial biomass C and N (MBC and MBN), total organic C and N accumulation (TOC and TN).

CK, MIN, SP: microbial populations increased the release of enzymes involved in C and P cycle, highlighting their ability to adapt to nutritional needs arising in differently treated soils. MOW increased the C metabolic efficiency use.

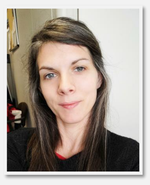


Take home message

- OBFs used resulted to be environmentally safe (no contaminants and pollutants detected) and efficient in maintain soil fertility.
- It will be necessary to monitor the OBFs' effects on C sequestration and productivity
- There is the environmental, social, and economic need to define the value of OBFs utilization for the valorization of the agricultural production chain and soil health maintenance.

C added in 5 years

	(t ha^{-1})
MOW 10	26.1
MOW 20	52.2
SSC 10	16.6
SSC 20	33.1
SP 10	8.6
SP 20	18.7



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