Compost Amended Media and N Liquid Fertilizer effects On Organic Tomato Seedlings Growth

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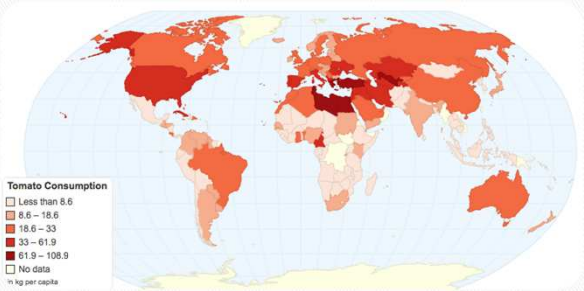
ISHS BioGreenhouse cost EUROPEAN COOPERATION IN SCIENCE AND TECHNOLOGY
3rd INTERNATIONAL SYMPOSIUM ON ORGANIC GREENHOUSE HORTICULTURE
11 - 14 APRIL 2016 / IZMIR, TURKEY

INTRODUCTION



Tomatoes consumption

Peat extraction

- » Organic Farming should rely on on-farm resources & self-sufficiency.
- » Compost is a promising alternative for peat in growing media
- » Data on substitutability vary significantly and mainly are conditions-specific.
- » There is a need to validate relevant data under local conditions

AIM

The objective of the work was to evaluate the response of organic tomato seedlings to growing media amended with locally produced compost and commonly applied N liquid fertilizers in the Apulia region, southern Italy

MATERIALS AND METHODS

Green Waste Compost (GC)
Mixed Waste Compost (MC)
Characterization
Germination Index

Component	Control	GC			MC		
		20	45	70	20	45	70
	% (v/v)						
Peat	90	70	45	20	70	45	20
GC	0	20	45	70	0	0	0
MC	0	0	0	0	20	45	70
Perlite	10	10	10	10	10	10	10

Substrate Formulation

Nursery Trial. Fertilizers:
Blood meal (BM) based
Hydrolyzed Protein (HP) based
Algal Extract (AE) based

1.94 g N L^{-1} substrate 20 and 27 DAS

34 DAS

Evaluation of growth parameters

RESULTS

Peat and composts characteristics

Component	pH	EC (dS m^{-1})	OM (g kg^{-1})	Total N (g kg^{-1})	C/N	Total P (g kg^{-1})	Total K (g kg^{-1})
Peat	4.6	0.4	936	9.3	50.1	0.6	0.3
GC	7.8	1.0	849	18.2	23.3	5.8	7.9
MC	7.5	4.3	618	26.3	11.8	4.7	15.3

Substrates physiochemical properties

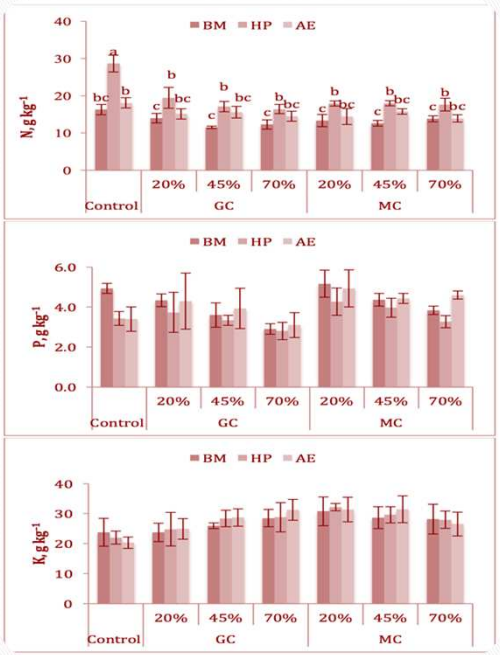
Substrate	pH	EC (dS m^{-1})	OM (g k g^{-1})	Total porosity	Air Capacity	EAW	WBC
				%			
Control	4.10^{c}	0.71^{d}	936^{a}	94.1^{abc}	41.9	17.0^{ab}	5.34^{b}
GC-20	4.80^{b}	0.84^{d}	855^{b}	93.5^{bc}	42.6	14.9^{abc}	4.92^{ab}
GC-45	5.10^{b}	0.93^{cd}	802^{c}	92.9^{c}	43.8	13.6^{bc}	4.80^{ab}
GC-70	5.20^{b}	0.87^{cd}	782^{d}	93.1^{c}	43.2	13.4^{c}	4.35^{ab}
MC-20	5.40^{b}	1.54^{c}	779^{d}	94.1^{abc}	41.4	17.7^{a}	4.04^{ab}
MC-45	6.80^{a}	3.31^{b}	699^{e}	95.0^{ab}	47.8	14.9^{abc}	3.56^{b}
MC-70	6.90^{a}	4.79^{a}	620^{f}	95.8^{a}	49.2	16.5^{abc}	4.40^{ab}

EAW: easily available water (pF1.5 - pF1); WBC: water buffering capacity (pF2 - pF1.5); Within a column, values followed by the same letter(s) are insignificantly different (P≤0.05, Tukey); Air capacity was insignificantly (P=0.118) affected by the compost addition.

Growth parameters of seedlings

Substrate	Fertilizer	SD (mm)	SH (cm)	SI	DW (g)	LN	SLA[1] (cm^2 g^{-1})	SPAD[2]
Control	BM	3.20^{b}	5.96^{a}	18.90^{a}	0.35^{b}	3.50^{b}	0.22^{ab}	39.2
	HP	3.20^{b}	6.38^{ab}	20.20^{a}	0.35^{b}	3.75^{b}	0.29^{b}	39.2
	AE	3.10^{b}	7.01^{ab}	22.50^{b}	0.34^{b}	3.50^{b}	0.24^{ab}	38.5
GC-20	BM	3.35^{b}	6.38^{ab}	19.00^{a}	0.51^{ab}	3.92^{b}	0.20^{a}	40.1
	HP	3.56^{a}	7.01^{ab}	19.80^{a}	0.52^{ab}	4.08^{b}	0.25^{ab}	39.5
	AE	3.28^{b}	7.27^{ab}	22.30^{b}	0.52^{ab}	3.75^{b}	0.21^{a}	37.8
GC-45	BM	3.50^{ab}	7.21^{ab}	20.80^{ab}	0.60^{a}	3.83^{b}	0.21^{ab}	38.7
	HP	3.63^{b}	7.49^{a}	20.70^{ab}	0.60^{a}	4.33^{ab}	0.23^{ab}	38.7
	AE	3.31^{b}	6.86^{ab}	20.80^{ab}	0.54^{ab}	3.92^{b}	0.20^{a}	38.3
GC-70	BM	3.18^{b}	7.55^{a}	24.00^{b}	0.52^{ab}	4.00^{b}	0.20^{a}	38.8
	HP	3.24^{b}	7.35^{ab}	22.90^{b}	0.55^{ab}	4.17^{ab}	0.23^{ab}	39.3
	AE	3.06^{b}	7.81^{a}	25.80^{b}	0.52^{ab}	4.25^{ab}	0.27^{ab}	37.9
MC-20	BM	3.54^{ab}	6.67^{ab}	19.00^{a}	0.45^{b}	4.17^{ab}	0.25^{ab}	37.6
	HP	3.72^{a}	5.99^{b}	16.30^{a}	0.50^{ab}	4.17^{ab}	0.25^{ab}	37.3
	AE	3.49^{ab}	6.97^{ab}	20.40^{a}	0.55^{ab}	4.50^{ab}	0.22^{ab}	36.6
MC-45	BM	3.54^{ab}	6.51^{ab}	18.60^{a}	0.45^{b}	4.25^{ab}	0.24^{ab}	38.8
	HP	3.73^{a}	6.39^{ab}	17.30^{a}	0.59^{a}	4.33^{ab}	0.23^{ab}	38.6
	AE	3.56^{a}	6.16^{ab}	17.50^{a}	0.55^{ab}	4.33^{ab}	0.22^{ab}	37.5
MC-70	BM	3.65^{a}	7.26^{ab}	19.90^{a}	0.62^{a}	4.42^{ab}	0.16^{a}	39.0
	HP	3.54^{ab}	6.73^{ab}	19.20^{a}	0.59^{a}	4.92^{a}	0.24^{ab}	39.2
	AE	3.42^{ab}	7.53^{a}	22.10^{b}	0.54^{ab}	4.33^{ab}	0.21^{a}	38.2
Substrate (S)		**	**	**	**	**	ns	**
Fertilizer (F)		**	ns	**	*	**	*	**
Interaction (S x F)		*	*	**	**	*	*	ns

[2] Insignificant interaction (fertilizer x substrate). Within a column; values followed by the same letter(s) are insignificantly different (P≤0.05, Tukey); SD: seedling diameter; SH: shoot height; DW: shoot dry weight; LN: leaves number; SLA: specific leaf area; SI: sturdiness index; * P ≤ 0.05; ** P ≤ 0.01; ns: not significant.



Content (g kg^{-1}) of N, P and K in tomato seedlings shoot. Fertilizer type and the interaction had not significant effect on P and K content in seedlings.

CONCLUSION

Both composts, at any substitution rate, could be used in growing media but to reduce the salinity effects, the 45% rate of peat substitution seems to produce the best growth parameters for tomato seedlings.

» A complete technological package that should include locally produced substrate together with the commonly available fertilizers should be considered for organic seedling production.

» This is vital for taking a broader picture of the process in order to transfer with efficacy the research outcomes into the nursery industry