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DEPARTMENT OF FOOD SCIENCE
Science and Technology

Yield, quality and nutrient content of strawberry grown at different organic fertiliser strategies

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BACKGROUND

- Increased demand for organically produced fruit and vegetables
- Increased import
- Protected cultivation of high value crops
  - longer season
  - increased product quality (and maybe keeping quality)
  - weather protection
  - biological control easier
  - potentially higher nutrient and water input efficiency through fertigation
- Only limited research on liquid organic fertilisers

Material and methods

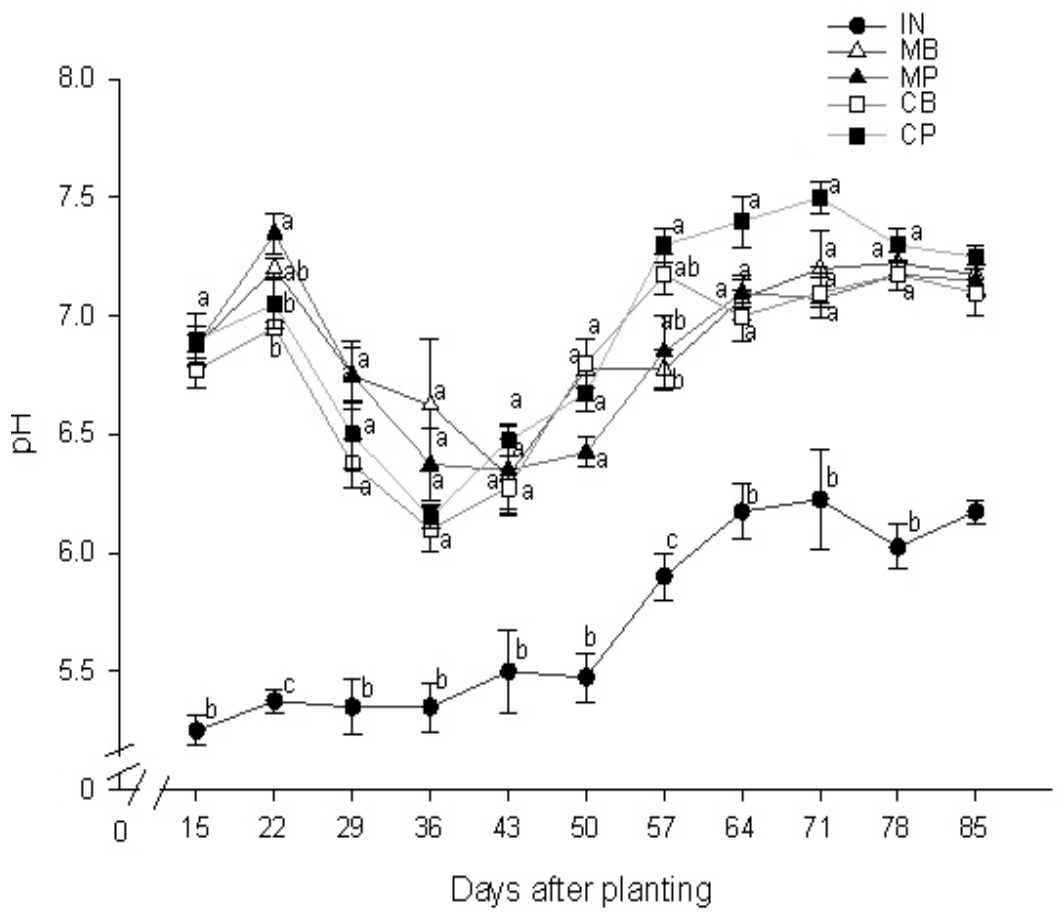
- Cold stored tray plants of 'Sonata' were potted in 1.4 L pots filled with peat 4th July 2011.
- Fetigation supplied by one dripper per plant
- 4 replicates and 4 plants per replicate
- 5 treatments, fertigation solutions with similar total N content

Treatments

Treatments	Peat	Solid fertilizer (Before planting)	Liquid fertilizer given before green fruit stage (N-P-K)	Liquid fertilizer given from green fruit stage (N-P-K)
Inorganic (IN)	Pindstrup 2	Inorganic already included	Inorganic vegetative	Inorganic generative
Montera malt + Broad bean (MB)	Pindstrup 0	33 g Monterra-malt 4-1-5	Broad bean (0.51-0.09-0.41)	Broad bean (0.51-0.09-0.41)
Montera malt + Pioneer (MP)	Pindstrup 0	33 g Monterra-malt 4-1-5	Pioner Hi-Fruit (4-1-5)	Pioner K-max (3-1-7)
Chicken manure + Pioneer (MP)	Pindstrup 0	66 g Chicken manure 2-1-2	Broad bean (0.51-0.09-0.41)	Broad bean (0.51-0.09-0.41)
Chicken manure + Broad bean (CB)	Pindstrup 0	66 g Chicken manure 2-1-2	Pioner Hi-Fruit (4-1-5)	Pioner K-max (3-1-7)

Effect of fertigation strategy on drainage pH

Results

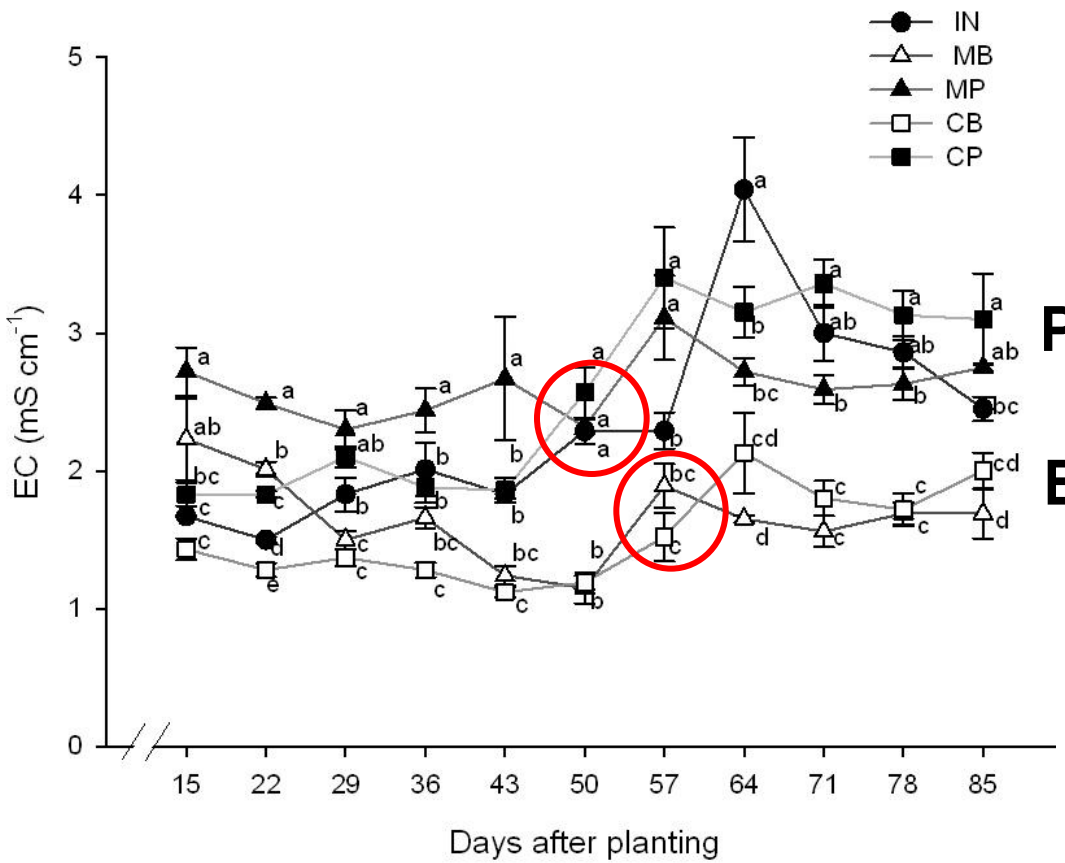


organic

inorganic

Effect of fertigation strategy on drainage EC

Results



Pioner

Broad bean

Nutrient content in drainage water

	24 days after planting					66 days after planting				
Nutrient (mg L^{-1})	IN	MB	MP(Hi-Fruit)	CB	CP(Hi-Fruit)	IN	MB	MP(K-Max)	CB	CP(K-Max)
NO_3^-	99^{a}	2^{b}	2^{b}	2^{b}	4^{b}	130^{a}	2^{c}	61^{b}	3^{c}	30^{b}
NH_4^+	1^{e}	99^{b}	136^{a}	36^{d}	84^{c}	0	2	1	1	1
P	$35b^{c}$	18^{d}	34^{c}	$38b^{c}$	56^{a}	32^{a}	6^{c}	3^{d}	9^{b}	3^{d}
K	143^{e}	259^{c}	321^{a}	218^{d}	283^{b}	257^{b}	192^{c}	472^{a}	176^{c}	492^{a}
Mg	32^{a}	$8b^{c}$	6^{c}	10^{b}	$8b^{c}$	68^{a}	25^{c}	17^{d}	33^{b}	27^{c}
Ca	165^{a}	32^{b}	27^{b}	30^{b}	31^{b}	409^{a}	102^{b}	56^{d}	83^{bc}	77^{cd}
S	59^{b}	95^{a}	95^{a}	32^{c}	47^{bc}	371^{a}	45^{c}	62^{bc}	47^{bc}	80^{b}
Na	31^{d}	58^{b}	68^{a}	50^{c}	57^{b}	103^{b}	57^{c}	167^{a}	65^{c}	187^{a}
Cl	53^{d}	98^{ab}	101^{a}	$91b^{c}$	88^{c}	165^{ab}	141^{b}	165^{ab}	170^{ab}	213^{a}
Fe	0.88^{c}	1.38^{ab}	1.75^{a}	1.32^{bc}	1.14^{bc}	1.48^{a}	0.20^{c}	0.30^{b}	0.15^{c}	0.20^{c}
Zn	0.45^{a}	0.04^{b}	0.05^{b}	0.06^{b}	0.07^{bc}	0.32^{a}	0.12^{b}	0.15^{b}	0.13b	0.16^{b}
Cu	0.19^{a}	0.03^{c}	0.05^{b}	0.04^{b}	0.04^{b}	0.18^{a}	0.04^{b}	0.01^{b}	0.01^{b}	0.01^{b}

Nutrient content in leaves

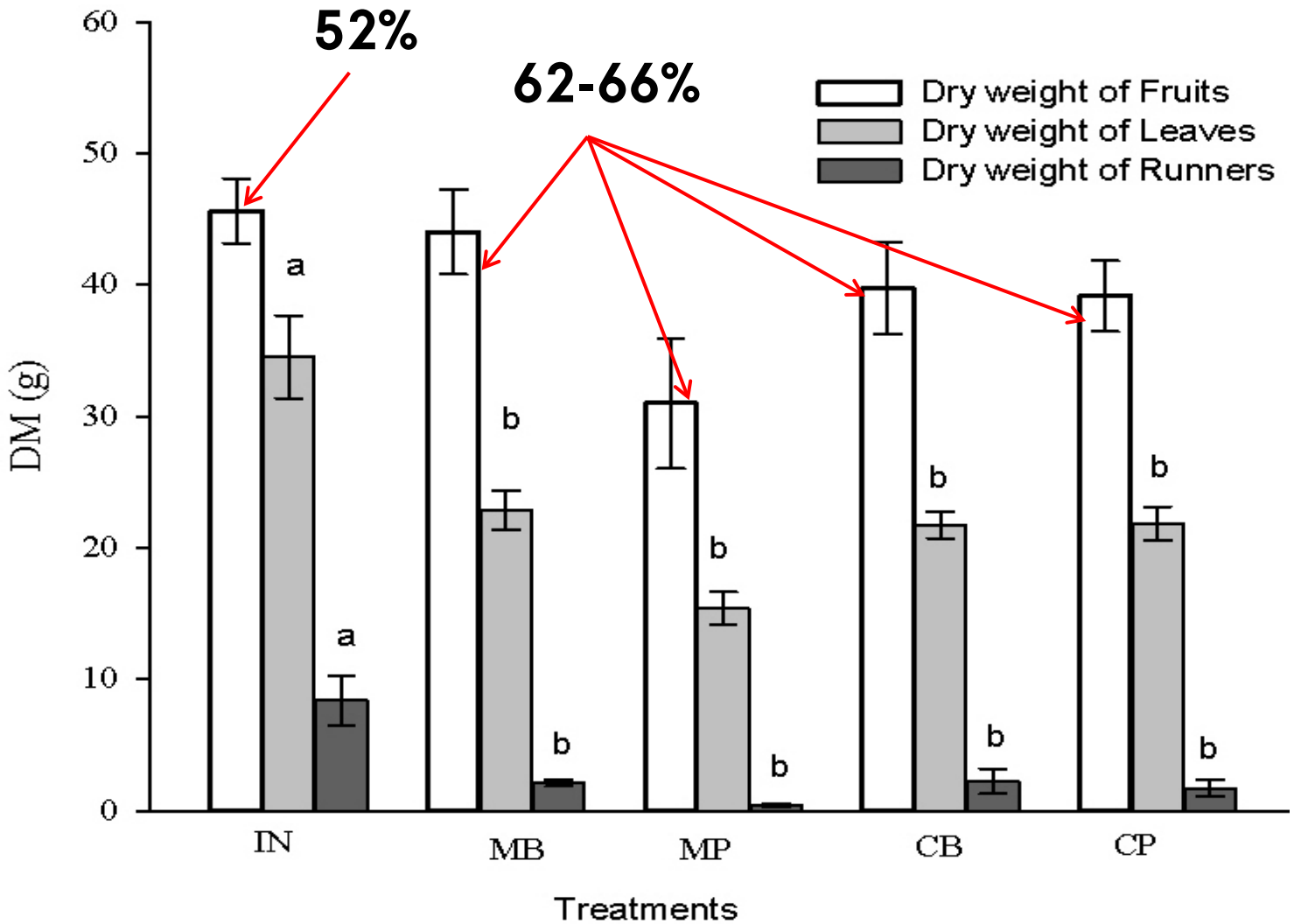
Treatments	Macronutrients (% of DM)						Micronutrients (mg kg^{-1})				
	N	P	K	Ca	Mg	S	B	Cu	Fe	Mn	Zn
24 DAP											
IN	3.6	0.56^{a}	2.7^{a}	1.14^{a}	0.46^{a}	0.24^{b}	55.4^{a}	3.2^{a}	83.2^{a}	268^{a}	25.9^{a}
MB	3.5	0.36^{c}	2.4^{ab}	0.74^{bc}	0.40^{bc}	0.29^{a}	21.7^{c}	2.3^{b}	51.5^{b}	132^{b}	14.1^{c}
MP	3.6	0.38^{c}	2.3^{b}	0.65^{c}	0.38^{c}	0.28^{a}	18.7^{c}	2.8^{b}	46.1^{b}	123^{b}	14.8^{bc}
CB	3.5	0.48^{b}	2.6^{ab}	0.89^{b}	0.46^{a}	0.27^{ab}	36.3^{b}	2.3^{b}	54.4^{b}	145^{b}	21.2^{ab}
CP	3.5	0.50^{b}	2.5^{ab}	0.73^{bc}	0.43^{ab}	0.26^{ab}	29.3^{c}	2.3^{b}	46.9^{b}	151^{b}	18.8^{bc}
66 DAP											
IN	3.2^{a}	0.48^{a}	2.4	1.25^{a}	0.36	0.74	46.6^{a}	4.0^{a}	82.5^{a}	173^{a}	21.0^{a}
MB	2.9^{ab}	0.32^{b}	2.1	0.96^{b}	0.37	0.76	10.6^{c}	1.4^{b}	49.3^{b}	169^{a}	20.3^{ab}
MP	2.8^{b}	0.25^{b}	2.4	0.74^{bc}	0.27	0.78	15.0^{bc}	1.9^{b}	48.0^{bc}	128^{b}	16.7^{bc}
CB	2.7^{b}	0.30^{b}	2.3	0.97^{b}	0.34	0.81	20.5^{b}	1.6^{b}	50.2^{b}	132^{b}	15.3^{c}
CP	2.7^{b}	0.26^{b}	2.4	0.60^{c}	0.31	0.76	16.6^{bc}	1.7^{b}	40.5^{c}	103^{b}	17.4^{abc}

Fruit yield, number, and size

Treatment	Fruit yield (g plant^{-1})*	Fruit size (g)*	Number of fruit plant^{-1}*	Percentage of fruit yield (%)*	Total yield (g plant^{-1})
IN	309 17^{a}	15.0 0.7^{a}	21.6 0.9	86.8 3.3	356 15^{a}
MB	265 24^{ab}	13.8 0.5^{bc}	21.0 2.1	81.6 2.6	324 22^{ab}
MP	191 15^{c}	11.7 0.4^{c}	16.4 1.1	83.0 4.3	231 18^{c}
CB	244 18^{bc}	13.9 0.6^{b}	18.8 1.2	84.1 2.2	290 21^{b}
CP	230 12^{bc}	12.7 0.9^{bc}	18.4 0.8	81.1 1.6	283 13^{bc}

*Marketable

Dry matter distribution



Conclusions

- Incorporation of Monterra malt before planting combined with Broad bean fertigation gave similar yield as inorganic fertilisation
- The lower yield from organic treatments could partly be due to higher peat pH and deficit micronutrient levels and partly due to low levels of available N
- The higher pH may result in $CaCO_3$ and $MgCO_3$ formation and explain the lower leaf Calcium content found
- Quality parameters were only slightly affected by fertiliser strategy
- Further studies are necessary before grower guidelines can be given